Sludge Treatment Centre Permitting

Environmental Permit Variation Application - Beckton STC Resubmission

TW_STC_EPR_15a_BKN_ASD | Resubmission

December 2023

Thames Water

EPR/PB3238RK/V004

Jacobs

Sludge Treatment Centre Permitting

Project No:	B22849AM
Document Title:	Environmental Permit Variation Application - Beckton STC Resubmission
Document No.:	TW_STC_EPR_15a_BKN_ASD
Revision:	Resubmission
Document Status:	<DocSuitability>
Date:	December 2023
Client Name:	Thames Water
Client No:	EPR/PB3238RK/V004
Project Manager:	Harindra Gunasinghe
Author:	Mark McAree
File Name:	TW_STC_EPR_15a_BKN_ASD.docx

Jacobs U.K. Limited

7th Floor, 2 Colmore Square
38 Colmore Circus, Queensway
Birmingham, B4 6BN
United Kingdom
T +44 (0)121 237 4000

www.jacobs.com

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
Draft	04/10/21	Draft	JK	MKM	MKM	MKM
Draft v2	13/12/21	Updated following further information and feedback	JK	MKM	MKM	MKM
Final	23/12/21	Final for issue	JK	MKM	MKM	MKM
Resubmission	December 2023	Updated application for resubmission	JK	MKM	MKKM	MKM

Contents

1. Introduction

This substantial variation application relates to a biological treatment permit for the Beckton Sludge Treatment Centre (STC), located at the Beckton Sewage Treatment Works (STW), operated by Thames Water Utilities Ltd (Thames Water). It is being made due to sludge treatment operations within sewage treatment works requiring a suitable Environmental Permit under the Environmental Permitting Regulations 2016 (as amended), in order to comply with the requirements of the Industrial Emissions Directive.

Previously, sewage treatment sites operated by sewerage undertakers treating indigenous sewage sludges ('sludges') separated from the main urban waste water treatment stream at the site along with the importation of similar wastes such as cess wastes and interworks sludge, were regulated under the Urban Waste Water Treatment Directive (UWWTD) and Environmental Permitting Regulations as exempt or waste management activities, although some works had parts of the process, specifically biogas utilisation covered by the Environmental Permitting regime.

Now, all aspects of the sludge treatment process at the site, from the thickening of separated sludge from the main aerobic treatment flow, and blending with imported waste of a similar nature to indigenous sludge, sludge pre-treatment, anaerobic digestion, through to the storage of digested sludge cake prior to recovery to land offsite, including biogas storage and utilisation will fall within the scope of this permit variation application.

The current permit in place at the site for the s1.1A1a listed activity operation of a combustion plant will be varied to include an additional listed activity. This application is for the purposes of varying the existing permitted activities to include the anaerobic digestion process as an additional installation activity at the site. An existing separate Environmental Permit (EPR/ZP3833BK) for the incineration of non-hazardous waste in an incineration or co-incineration plant with a capacity exceeding 3 tonnes per hour is also held by Thames Water Utilities Ltd at the Beckton STW site and the scope of the waste incineration permit is not included within this permit variation application. This incineration plant is currently operational but geographically and physically separated to the main AD process.

A number of other sewage treatment related activities are undertaken at the site, outside of the scope of this permit, relating to the treatment of waste waters from the sewer network through aerobic processes. These activities are covered by the UWWTD.

1.1 Non-Technical Summary

This variation application is for a bespoke installation permit for the biological treatment of sludge, by anaerobic digestion, with a capacity above the relevant thresholds. The biological treatment of sludge includes treatment of the indigenous sewage sludges and Surplus Activated Sludge (SAS) from the onsite aerobic treatment process and treatment of imported sewage sludges from other sites, arriving by road to a sludge import point. The indigenous sewage sludges are generated from the aerobic treatment of both waste waters from the sewer network arriving into site at the works inlet, and, from imported waste materials, arriving by road transport into two waste import points near the works inlet. The storage of biogas and operation of biogas fuelled Combined Heat and Power (CHP) engines and boilers for the generation of electricity and heat at the site along with other combustion plant at the facility, which is classified as listed activity combustion plant under s1.1A1 of the Environmental Permitting Regulations, is already permitted, and will be classified as a separate listed activities to the new listed activity.

The Beckton Sludge Treatment Centre (STC) is located within the Beckton Sewage Treatment Works (STW), north of the River Thames and in the London Borough of Newham, in east London.

The STC application includes treatment of both indigenous and imported sludges where indigenous sludge are generated from the incoming flow to the STW which passes through the aerobic treatment process under the UWWTD and imports of sludge from other works are delivered to a sludge offloading point into the THP High Energy Blending Tank. All such imports subject to appropriate waste pre-acceptance and acceptance checks, prior to acceptance. Imported and indigenous sludges combining in the THP High Energy Blending Tank.

The STC comprises an offloading point for permitted imported tankered wastes to two import points near the Works Inlet where it combines with other sewer derived materials and is subject to aerobic treatment under the UWWTD.

All imports will be assessed using the Thames Water standard waste pre-acceptance checks to ensure that they are appropriate for treatment via the UWWTD. Once pre-approved as suitable for treatment via the UWWTD route, the waste carriers are approved. Wastes will be subject to appropriate waste acceptance checks in accordance with Thames Water procedures. Incoming tanker vehicles are directed to the inlet offloading points, which are both impermeable surfaced areas, equipped with sealed drainage.

Indigenous primary sludges derived from the main flow are transferred to the two Primary Sludge Buffer Tanks (which are outside of the scope of this permit) prior to transfer to The Primary Sludge Thickening Plant or Picket Fence Thickeners. Indigenous Surplus Activated Sludge (SAS) is pumped to a SAS Buffer Tanks (which are outside of the scope of this permit) before the sludge is thickened within the SAS Thickening Plant. Liquors are all returned to the Works Inlet via the site drainage system and Liquor Return Pumping Stations.

Thickened sludges are separately pumped to the Thickened Primary Sludge Buffer Tanks or the SAS Blending Tank prior to transfer to the Primary Sludge Blending Tanks where the sludge and SAS is blended prior to treatment. Sludge can also be transferred between the Primary Sludge Blending Tank and six Sludge Buffer Tanks, as required.

There are three routes for sludge treatment. Primarily thickened, blended sludge is subject to pre-treatment within a Thermal Hydrolysis Plant (THP) Process with the application of temperature and pressure, used to enhance the digestion of the sludge, in an enclosed and odour abated system. Sludges from the Thickened Primary Sludge Buffer Tanks and the SAS Blending Tank are pumped via a series of tanks, via Sludge Screens and Pre THP Dewatering Plant to a THP Feed Silo. Sludge is then subject to the THP Process. From the THP Process, sludge is transferred through the THP Cooler to one of the six Primary Digester Tanks at the site. The Primary Digester Tanks are of concrete construction with membrane Biogas Storage holders in the headspace of each digester.

Following treatment over an appropriate number of days within the Primary Digester Tanks, digested sludge is transferred to two Digested Sludge Buffer Tanks. From these Digested Sludge Buffer Tanks, sludge is dewatered by Digested Sludge Dewatering Plant presses, before the dewatered sludge falls to the Cake Barn below. The Cake Barn, which is fully enclosed and subject to air extraction, stores the cake prior to removal from the site under the Sludge Use in Agriculture Regulations 1989 (SUiAR), and in accordance with the Biosolids Assurance Scheme (BAS). Liquor from the Digested Sludge Dewatering Presses gravitates to the Liquor Return Pumping Station 5 and is returned to the Works Inlet.

The second treatment route for thickened, blended sludge is via Beckton Sludge Powered Generator (SPG) at Beckton STW. Sludge is pumped from the Primary Sludge Blending Tank to the SPG. This operation is outside of the scope of the current permit variation application and operations are covered by a separate Environmental Permit, EPR/ZP3833BK. The SPG is geographically and physically separated from the main AD processes on site.

Thickened, blended sludge can also be sent offsite via a rising sludge main. Thickened primary sludge or thickened SAS are removed from the Primary Sludge Blending Tank or SAS Blending Tank and subject to additional screening, prior to transfer to the Undigested Sludge Transfer Blending Tank and Undigested Sludge Transfer Buffer Tanks before being pumped offsite to the Riverside STC for treatment. Operations at Riverside STC aEPR/PB3238RK/V004.

Biogas from the Primary Digester Tanks is captured and stored within roof mounted double membrane Biogas Storage holders in the headspace of each Primary Digester Tank. Biogas is used on site within the CHP engines, boilers or a waste gas burner (emergency flare). The biogas lines are fitted with condensate pots which captures entrained moisture for discharge to the site drainage. The Biogas Storage holders are fitted with Pressure Release Valves (PRVs) as a safety precaution in the event of over pressurising the system.

Biogas is combusted within one of three CHP engines on site, generating electricity for use within the site, and heat is used within the THP boilers. These combustion assets are regulated under Environmental Permit

EPR/PB3238RK/V003 as a s1.1A1 listed combustion plant activity due to their thermal input exceeding 50MWth. In the event that additional heating is required for the THP, this is provided by the two dual fuelled boilers. In the event there is excess biogas there is a ground mounted Emergency Flare, which is used during periods of essential maintenance and emergency use. This is utilised under 10% of the year or less than 876 hours per year.

There are a number of standby generators that operate in an emergency to provide electricity to site process. These are currently permitted activities and remain within this permit although they are not classified as Directly Associated Activities. There are also some small, permitted, boilers at the site. Total rated thermal input of the site is 71.7 MWth.

2. Technical Description

This is a substantial variation for a bespoke installation permit under the Environmental Permitting (England and Wales) Regulations 2016 (as amended), following a change of interpretation of the Urban Waste Water Treatment Directive (UWWTD) by the Environment Agency. It relates to a biological waste treatment permit for the Beckton Sludge Treatment Centre (STC), located at the Beckton Sewage Treatment Works (STW), operated by Thames Water Utilities Ltd (Thames Water).

Scope

The variation application covers the biological treatment of sewage sludge, both indigenous and imported from other waste water treatment sites, by anaerobic digestion, with a capacity above the relevant thresholds. It also permits the acceptance of portable toilet wastes along with cess, septic tank, and similar sewage derived materials to the Works Inlet for processing through the urban waste water treatment directive (UWWTD) process. There are a number of directly associated activities, including the operation of a Thermal Hydrolysis Plant (THP) for pre-treatment. The site's existing listed activity is for combustion plant with an aggregated thermal input of greater than 50MWth.

The biogas CHP engines and associated boilers are covered by an existing s1.1A1a environmental permit EPR/PB3238RK/V003. This permit is subject to a substantial variation to add a new listed activity of anaerobic digestion for recovery.

Location

The STW which is the location of the STC is located to the north of the River Thames, which forms part of the immediate boundary to the south of the site. The area is generally an industrial area within east London, approximately 1.25 km south of Barking. The River Roding can be found to the east of the site, while the north gives way to undeveloped green space, a cinema and the A13 road. To the west is a local authority household waste re-use and recycling centre (HWRC), the A1020 road and a number of commercial, leisure and retail developments.

Almost all of the STW site and STC is within a Flood Zone 3 area that benefits from flood defences. This means that the STC would have a high probability of flooding without the local flood defences. These protect the area against a river flood with a 1% chance of happening each year, or a flood from the sea with a 0.5% chance of happening each year. The site is located within an Air Quality Management Area (AQMA). The London Borough of Newham has declared the Newham AQMA (no. 2) for the whole of the Borough for both nitrogen dioxide NO_2–- Annual Mean and Particulate Matter PM_{10}–- 24-Hour Mean. The site is located outside of a Source Protection Zone (SPZ)

There are two designated ecological receptors within the appropriate distance of the STC, Epping Forest Special Area of Conservation (SAC) which is 7 km from the site, and the Ripple Local Nature Reserve (LNR) which is 1.8 km from the site. There are no Marine Conservation Zones, Ramsar sites and Special Protection Areas (SPA) within 10 km of the site and no Sites of Special Scientific Interest (SSSI) within 2 km of the site. There are 22 non-designated, local wildlife sites within 2 km of the site and no areas of Ancient Woodland within 2 km of the site.

A site plan, showing the Urban Waste Water Treatment Directive (UWWTD) wider Sewage Treatment Works and the permitted area of the Beckton STC can be found in Appendix A.2 while a process flow diagram summarising the sludge treatment process can be found in Appendix A.5.

Waste Activities

The STC comprises of imports of waste for biological treatment and one additional waste activity (imports of non-hazardous waste to the head of the works). Biological treatment processes at the installation are for indigenous sludges separated from the UWWTD areas of the site and for treatment processes for imported sludge that arrives at Beckton STC by road, normally by tanker and consists of sludge from other Thames Water sites.

Imports of non-hazardous waste are considered a secondary waste operation to the main listed activity and consist of portable toilet waste along with cess, septic tank and similar sewage derived materials to the head of the works for processing through the UWWTD process.

Waste imports to the head of works consists of two offloading points for permitted imported wastes which can be found close to the inlet of the STW. These wastes are imported by tanker and consist of liquids and associated sludges from domestic and municipal sources that are similar in composition to those materials derived from the sewer network and managed via the UWWTD route. No wastes are imported packaged in other ways than tankers. Access to the offloading points is controlled by the issue of keys by Thames Water to approved contractors only, who have undergone appropriate waste pre-acceptance checks on the material they wish to import. These keys enable the delivery tankers to discharge waste into the works, through a data logger which records the volume of waste transferred.

The first import point is below the raised inlet and is normally used by larger articulated tanker vehicles which discharge waste through the data logger via the site supplied flexible hose pipes to prevent misconnection issues and directly into the inlet, where the imported waste mixes with incoming flows from the sewer system. The area is of made ground, bunded by a sleeping policeman at the entrance to the offloading area and slopes towards surface drainage that is connected to the site drainage. Webcams cover the area. Waste can be accepted at this import point 24 hours per day.

A second cess waste import point is located downstream of the first and normally accepts smaller sized cess waste vehicles. The area is of made ground, is contained by a bund consisting of kerbing on two sides and sleeping policeman on two sides. Drainage from this area slopes to gully drainage and discharges into the main channel, with the import area covered by CCTV. Waste is discharged through the site supplied flexible hose pipes to prevent misconnection issues into the data logger and is discharged into the main channel where it mixes with the incoming UWWTD flows from the sewer and on through the UWWTD process.

Tank Inventory

Tank Purpose	Number	Operational Volume (m^3)	Total Operational Volume (m^3)	Material
Picket Fence Thickeners	4	4,750	19,000	Concrete
Thickened Primary Sludge Buffer Tanks	2	200	400	Steel
Primary Sludge Blending Tank	1	3,500	3,500	Concrete
SAS Blending Tank	1	3,500	3,500	Concrete
Sludge Buffer Tanks	6	4,750	28,500	Concrete
High Energy Blending Tank	1	30	30	Steel
THP High Energy Blending Tank	1	30	30	Steel
THP Sludge Blending Tanks	2	235	470	Steel
Pre THP Dewatering Feed Tanks	2	183	366	Steel
THP Feed Silo	2	85	170	Steel
THP Process Tanks				
THP Pulper Tank	2	80	160	Steel
THP Reactor Tank	6	40	240	Steel
THP Flash Tank	2	80	160	Steel
Primary Digester Tanks	6	3,965	23,790	Concrete
Digested Sludge Buffer Tanks	2	250	500	Steel
Undigested Sludge Transfer Blending Tank	1	40	40	Steel
Undigested Sludge Transfer Buffer Tanks	2	250	500	Steel

		Overall Total	78,290	
Primary Sludge Thickening Plant Polymer silo (Drum Thickeners)	1	20		Steel
Pre THP Dewatering Plant Polymer silo (Centrifuges)	1	30		Steel
Digested Sludge Dewatering Polymer silo (Filter Press)	1	30		Steel

Sludge Processes

Indigenous primary sludge is thickened via two routes at Beckton STC. Primary sludge can be pumped via underground sludge pipes to one of two Primary Sludge Buffer Tanks which are outside of the scope of this permit. Sludge from the Primary Sludge Buffer Tanks is pumped from the tanks to either Primary Sludge Thickening Plant, or, to the Picket Fence Thickeners (PFTs), which are within the scope of this permit.

There are seven drum thickeners within the Primary Sludge Thickening Plant, which is odour abated via an Odour Control Unit (OCU). Each drum thickener is serviced by a dedicated feed pump from a common sludge line and the sludge is thickened with the addition of a polymer (from a bulk powder silo system) to aid coagulation. The polymer is made up using final effluent or potable water in one of two make up tanks and gravitates to a storage tank, before being pumped to each drum thickener. The polymer silos receive bulk deliveries of raw polymer and are bunded. Thickened sludge is pumped to two Thickened Primary Sludge Buffer Tanks before it is pumped to the Primary Sludge Blending Tank. The Thickened Primary Sludge Buffer Tanks are both aboveground, enclosed, glass lined steel tanks connected to an OCU for odour abatement. The Thickened Primary Sludge Buffer Tanks slope to a drainage point and are fitted with external mixer/chopper pumps operate to prevent settling of the sludge. Thickened Primary Sludge Buffer Tanks are fitted with high level alarms which are monitored by the site SCADA system and would inhibit the Primary Sludge Thickening Plant in the event of a high-level alert. Liquors from the Primary Sludge Thickening are pumped back to the Works Inlet for treatment via Liquor Return Pumping Station 1.

Primary sludge can also be thickened within one of four PFTs. Sludge is pumped from the two Primary Sludge Buffer Tanks via dedicated pumps servicing pairs of PFTs. The PFTs are of concrete construction, covered tanks and connected to an OCU to manage odour emissions. Pumps transfer the thickened sludge to the Primary Sludge Blending Tank. Liquors from the PFTs are pumped back to the Works Inlet for treatment via Liquor Return Pumping Station 1.

Surplus Activated Sludge (SAS) from elsewhere in the aerobic process is pumped via an underground sludge pipeline and fed into the top of the SAS Buffer Tank, which is outside of the scope of this permit, and pumped via an underground sludge line into the SAS Thickening Plant and is thickened via one of the nine belt thickeners. A polymer (from a bulk powder silo system) is made up using final effluent or potable water and dosed to each belt thickener to aid coagulation. Liquors are returned to the Works Inlet for treatment, via the site drainage by one of Liquor Return Pumping Stations 2, 3a or 3b. The thickened sludge is pumped to SAS Blending Tank.

The Primary Sludge Blending Tank and SAS Blending Tank receive thickened sludges. The two tanks are of concrete construction with fixed roofs, have external mixer pumps to prevent settling of the sludge within the tank and the Primary Sludge Blending Tank is connected to an OCU to manage odour emissions. Thickened SAS from the SAS Blending Tank is pumped to an internal High Energy Blending Tank within Primary Sludge Blending Tank and is mixed with thickened primary sludge to achieve the correct blend of SAS and raw sludge for downstream processes. The two Sludge Blending Tanks have conical bottoms and are partially subsurface, with incoming sludge received at a high-level within the tanks and blended sludge pumped out of the two Sludge Blending Tanks at approximately ground level. High level alarms within the tanks would automatically pump excess sludge from the two Sludge Blending Tanks to one of the Sludge Buffer Tanks, which are used to manage excess sludge.

There are six Sludge Buffer Tanks which are of concrete construction, are enclosed with fixed roofs. The Sludge Buffer Tanks receive excess sludge from both of the Sludge Blending Tanks. The Sludge Buffer Tanks are filled sequentially and return sludge to either of the two Sludge Blending Tanks. The Sludge Buffer Tanks have external

mixer pumps to prevent settling of the sludge within each tank. From the two Sludge Blending Tanks, sludge is pumped to the THP plant for pre-treatment.

Sludge can also be pumped to the Sludge Powered Generator (SPG) outside of the installation and the scope of this permit but within the wider STW site alternatively sludge can be pumped offsite via a rising sludge main.

Sludge from the Primary Sludge Blending Tank can be pumped to the SPG via pipelines. Sludge is then processed, by dewatering and combustion within the SPG. This operation is outside of the scope of the current permit variation application and operations are covered by a separate Environmental Permit, EPR/ZP3833BK, which remains in place and outside of the scope of this variation application.

Sludge can be transferred offsite from Beckton STC via a rising sludge main to the Riverside STC, which is regulated under permit EPR/GB3739DY. Primary sludge from the Primary Sludge Blending Tank and SAS from the SAS Blending Tank is pumped to the Undigested Sludge Transfer Blending Tank via a Sludge Screen to remove inorganic contraries and blended in one of two Undigested Sludge Transfer Sludge Buffer Tanks. The Undigested Sludge Transfer Blending Tank and the Undigested Sludge Transfer Buffer Tanks are of steel construction, enclosed with fixed roofs and connected to an OCU for odour abatement. The sludge leaves the scope of this permit when it is pumped offsite from the Undigested Sludge Transfer Buffer Tank.

From the SAS Blending Tank and Primary Sludge Blending Tank blended sludge is first pumped to the THP High Energy Blending Tank (within the THP Process). Blended sludge is then pumped to one of two THP Sludge Blending Tanks where further blending takes place. Re-circulation pumps can return sludge from the THP Sludge Blending Tanks back to the THP High Energy Blending Tank. The tanks contains a high-level switch to prevent overtopping of the tank, that is monitored by SCADA equipment.

Pre-Digestion Process

The THP Sludge Blending Tanks have levels within monitored and controlled via SCADA with tanks filling equally and high-level floats to prevent overfilling. The mixed sludge is then pumped to four Sludge Screens by four pumps, to remove further rag and inorganic material which is discharged into skips for offsite disposal. Blended, screened sludge is then pumped to one of the two Pre-THP Dewatering Feed Tanks which feed four THP centrifuges in the Pre-THP Dewatering Plant. Each Pre-THP Dewatering Feed Tank has an external mixer pump to prevent settling of the sludge, and is fitted with high level floats, monitored via SCADA, to prevent overfilling of the tanks.

Pumps transfer the blended and screened sludge to the Pre-THP Dewatering Plant, where a polymer is added to each centrifuge feed line to aid coagulation. The polymer is made up from a bulk powder system in a make-up tank using potable water or final effluent and stored in a stock tank for use where it is pumped to each centrifuge. Liquor from the Pre-THP Dewatering Plant is returned to the Works Inlet via Liquor Return Pumping Station 4. The dewatered sludge falls in to a THP hopper and is pumped into the top of the THP Feed Silos.

There are two THP Feed Silos within one structure, which are each dedicated to a THP Stream. THP Feed Silos are monitored by high level alarms linked to SCADA and if the levels within the silos reaches the high set point, the Pre-THP Dewatering Plant are inhibited. A THP feed pump feeds sludge to the THP Pulper Tank and under normal conditions, each feed pump is dedicated to an individual THP Process stream (A or B stream), however, feed pump can be used to feed either stream. Final effluent is sometimes used to dilute the sludge if required to improve the transfer of the sludge.

Each of the THP Process streams is a batch process that operate in parallel and operates 24-7, consisting of a two-staged pre-treatment process for sludge to make it more available within the anaerobic digestion process. The THP Process combines medium pressure boiling of sludge and is followed by a rapid decompression which also sterilises the sludge, destroying pathogens in the sludge so it exceeds the requirements for subsequent use in agriculture.

In the THP Pulper Tank, fresh dewatered sludge is mixed with warmer sludge by an external recirculation pump and warmed by steam recovery from the THP Reactor Tanks. When a THP Reactor Tank is ready to receive sludge,

the required volume is pumped from the THP Pulper Tank to the duty THP Reactor Tank for treatment and the cycle commences. Once filled with sludge, the THP Reactor Tank is filled with steam until the required pressure and temperature is reached in order to hydrolyse the sludge. Once the hydrolysis has been completed, a valve is opened to gradually reduce the pressure with the steam released to the THP Pulper Tank for pre-heating of another batch of sludge. The sludge is then discharged via a second valve into the THP Flash Tank where any excess steam is vented back to the THP Pulper Tank and the sludge is transferred onwards to the THP Cooler, which use final effluent from site to lower the temperature to be more optimal for anaerobic digestion. The THP Flash Tank provides a thermal buffer to release excess energy from the sludge prior to it entering downstream processes.

The THP Process is typically a 90-minute process, with pressures of approximately 6 bar pressure and 165°C temperature used. Each THP Process stream consists of one THP Pulper Tank, three THP Reactor Tanks and one THP Flash Tank. Tanks are fitted with high-level floats to prevent overfilling and Pressure Relief Valves (PRVs) to prevent overpressurisation of the vessels, amongst other monitoring and safety features. All of the THP Process tanks are aboveground, enclosed tanks of steel construction that are situated within a bunded area on made ground.

As the warm foul air from the THP Process is malodourous and saturated with water, a foul gas system skid is found within each THP stream to reduce temperature and moisture content prior to further treatment of the condensate via the Pumper tank and gases via the anaerobic digestion process. Sludge from the THP Process combines within a sludge manifold and is split equally between two THP Process Gas Coolers followed by six individual THP Coolers to be cooled before it is pumped to one of the six Primary Digester Tanks that are found on the site. At this point, anti-foam from an Intermediate Bulk Containers (IBC) located on a bund is dosed into the sludge line downstream of the coolers, prior to the Primary Digestion Tanks.

Digestion Process

There are six concrete Primary Digester Tanks at Beckton STC which each have a membrane type Biogas Storage holder on top of each tank. The tanks are mostly aboveground but extend subsurface for approximately 6 m. Sludge is mixed via two mixer pumps and recirculation pumps which operate duty/standby to mix the incoming and existing sludge and to maximise biogas capture from the sludge while minimising foaming. There is no additional heat input, instead, the Primary Digester Tanks use the heat of the incoming hydrolysed sludge from the THP Process to maintain an optimal temperature. Primary Digester Tanks are fitted with PRVs for safety, radar level instruments to measure hydraulic levels and are subject to cleaning and emptying periodically. If ferric chloride dosing is required this takes place via a separate feed from a dedicated, bunded ferric chloride tank. After approximately 12 days residence time, digested sludge is pumped to two Digested Sludge Buffer Tanks (DSBTs) prior to dewatering.

The DSBT operate in parallel and are aboveground, flat-bottomed tanks, of steel construction with fixed roofs. The DSBTs are fitted with level controls and high-level switches to prevent overfilling. External mixer pumps prevent settling of solids prior to it being dewatered by the Digested Sludge Dewatering Plant found on the mezzanine floor of the Cake Barn. Dedicated press feed pumps transfers sludge from the DSBT to the Digested Sludge Dewatering Plant, where following the addition of a polymer coagulant from a bulk powder silo, digested sludge is dewatered and gravitates into the cake bay of the Cake Barn below. A bulk powder silo contains powdered polymer which is made up with final effluent or potable water and stored in a stock tank for use. A common line returns all of the dewatering liquors by gravity to the site drainage and Works Inlet for additional aerobic treatment via Liquor Return Pumping Station 5.

Cake

The Cake Barn is a fully enclosed and is subject to air abstraction and discharge to atmosphere without abatement via a 45 m tall stack. The Cake Barn is a large area of engineered hardstanding which receives the digested and dewatered sludge cake from the mezzanine floor above. Digested sludge cake is moved by a shovel loader (or similar mobile plant) into one large storage bay for regular removal from site.

Digested sludge cake is spread under the Sludge Use in Agriculture Regulations 1989 (SUiAR), and in accordance with the Biosolids Assurance Scheme (BAS). As the cake barn is enclosed and equipped with an air extraction system there is a low risk from bioaerosols from stored digested sludge cake. However sensitive receptors can be found within 250 m of the cake barn and stack. A site-specific Bioaerosol Risk Assessment can be found in Appendix F

Biogas

Biogas from the six Primary Digester Tanks is captured within roof mounted double membrane Biogas Storage holders on top of each Primary Digester Tank. The Biogas Storage holder volumes are adjusted by air blowers, in order to maintain a constant pressure, by inflating and deflating the inner bag within the outer bag depending on biogas volumes. A level transmitter monitors the biogas volume within the inner bag and is linked to SCADA. Each Biogas Storage holder is fitted with two pressure/vacuum relief valves (PVRVs) for safety that would vent to atmosphere in the event of excess pressure or relieve any vacuum in the Biogas Storage holder. The two PVRVs operate duty/assist and in the event of a PVRV operating, an alarm is raised on SCADA. Methane gas detectors linked to SCADA are fitted to detect any biogas leaks in the air space between the inner and outer biogas bag. Above ground biogas pipes transfer the biogas from the Biogas Storage holders for use within CHP engines, boilers and Emergency Flare. The biogas pipeline is fitted with condensate pots and foam pots that captures the entrained moisture and foam from the generated biogas and allow it to be drained to the site drainage system for treatment. This improves the quality of the biogas and reduces impurities that could reduce the efficiency of the CHP engines. Biogas combines within a common line and passes through biogas boosters that increase the pressure of the biogas and dehumidifiers that dry the biogas before it is delivered to the CHP engines, boilers or an emergency flare. A slam shut valve is present on the main biogas line and would automatically isolate the Biogas Storage holders in the event of an emergency situation.

The biogas is primarily used as a fuel within the three CHP engines that are present on site to generate electricity but biogas can also be combusted within one of the two boilers to generate steam for the THP. If neither the CHP engines nor the boilers are available, biogas can be diverted to the emergency flare.

Combustion Activities

The three CHP engines are all MWM TCG2020V20 models with a thermal input of 4.7 MWth and electrical output of 2 MW each. They generate electricity for use on site and heat which is passed via a heat exchange to maintain THP steam demand. These are 'existing' combustion plant and are permitted by the existing Combustion Plant Environmental Permit (EPR/PB3238RK/V003). In the event of additional heating being required in the form of steam for the THP, biogas may be used in the onsite auxiliary boilers. There are two dual fuelled composite boilers which can operate on both natural gas and biogas. Both of the boilers are GXC EN3500/1200 models with thermal input of 4.7 MWth each. Emissions from the three CHP engines and two boilers have individual flues which share a common, 45 m high stack. Standby generators are available on site to provide electricity to the site operations in the event of failure of the electricity grid. Standby generators use diesel fuel and are already permitted by the existing Environmental Permit (EPR/PB3238RK/V003) and are unchanged by this variation application.

There are two carbon-based siloxane filters located upstream of the CHP engines on the biogas line and operate in series to remove impurities from the biogas prior to combustion in the CHP engines.

In the event of excess biogas, measured via a high set-point on SCADA, due to CHP engines or boilers being unavailable or there being more biogas than the CHP engines or boilers can utilise, there is a ground mounted emergency flare which can combust biogas during periods of essential maintenance and emergency use. This is utilised under 10% of the year, or less than 876 hours per year and its use is recorded via SCADA.

BAT Considerations

A BAT gap analysis has been completed for the Sludge Treatment Centre against the associated BAT conclusions and this gap analysis is attached as Appendix D.

2.1 BAT 3; 6; 7: Return Liquors

The site does not have a Liquor Treatment Plant. Liquor treatment for waste waters arising within the permitted area is part of the waste water treatment process of the STW and does not fall within the permit boundary.

There are no direct emissions to water from the STC. The only indirect emissions are of the sludge related liquors, primarily sludge dewatering liquor, and surface (rain) waters, which are returned to the wastewater treatment works for aerobic treatment under Urban Wastewater Treatment Regulations.

Return Liquor Monitoring is included in Appendix M.

2.2 Management of Diffuse Emissions – BAT 14

Thames Water is committed to meeting the requirement of BAT. A full BAT risk assessment is required to determine the potential need to cover open topped tanks. Thames is not able to commit to covering tanks by the stated deadline of December 2024 delivery timescales will be subject to the outcome of PR24 and subsequent price review discussions.

2.3 Site Infrastructure

Management of emissions to water – BAT 19

Thames Water is committed to meeting the requirements of BAT. A full BAT risk assessment is required to determine the detailed design for Beckton secondary containment, the secondary containment options report (see Appendix G) is an outline solution that may be subject to change. Thames is not able to commit to secondary containment requirements by the stated deadline of December 2024 delivery timescales will be subject to the outcome of PR24 and subsequent price review discussions.

A figure showing the current site surfacing within the permit boundary is included within Appendix A, Figure A.3.

Process Controls

Anaerobic digester operations are monitored automatically from the control centre at the site 24-7. Checks include digester health, temperature and operation, including for the presence of foaming, which is treated with anti-foam as appropriate. As described, tanks are equipped with appropriate high-level alarms and automatic cut off valves to minimise releases. The THP Process and Primary Digester Tanks/Biogas Storage holders are also fitted with dual pressure relief valves which operate in emergency to minimise releases from over- or under-pressurisation. Site operations are covered by Thames Water's management system, including the preventative maintenance program for the site.

A range of process parameters are subject to routine monitoring or checking to ensure that the digestion process is operating optimally so that the required sewage cake output quality is achieved.

- pH: At a THP digestion site such as Beckton the processes is maintained around pH 8 but within the range 7.5-8.6 (this is % dry solids and digester load dependant) for healthy operation.
- alkalinity: Levels dependant on feedstock characteristics (primary sludge: surplus activated sludge (SAS) ratio). Advanced digestion (THP) typically, 5,000 - 10,000mg/litre (target range from 6,000-8,000 mg/litre) but is dependent on % dry solids and digester load.
- temperature: minimum target of 40°C for advanced digestion. This is maintained within the range 36-45°C for THP AD.
- HRT (hydraulic retention time): minimum target is 15-days, there is no upper limit. Retention times shall not be less than 12-days during plant outages to keep the product pathogen kill efficiency control.

- OLR (organic loading rate): see table below - this is dependent on the primary/SAS ratio. Beckton fits into the fourth row of the table.

- Dry solids feed: see table above, Beckton has a target of 10%DS, but this can vary between 8-14%DS and impacts the HRT.

Type of Digestion	0%- 35% SAS[x]	36%- 45% SAS	46%- 50% SAS	51%- 55% SAS	>55% SAS	Max Feed %DS
MAD* in Conventional Digestion	3	2.5	2	1.75	n/a	6
MAD after Pre-pasteurisation	4.5	4	3.5	3	n/a	7
MAD after Acid Hydrolysis	4.5	4	3.5	3	n/a	7
MAD after Thermal Hydrolysis	7	6.5	6	5.5	5.5	14

* mesophilic anaerobic digestion
[x] surplus activated sludge, arising from the UWWTD treatment route.

- VFA (volatile fatty acid) concentration: There is no specific range for VFAs as it depends on the feedstock. It is used as an indicator of digester health rather than a process control. The production of organic acids depends on the volume of solids fed to the Primary Digester Tanks. The typical range for VFAs in a Primary Digester Tanks is between 50 and 800 mg/L. When VFA concentrations climb above 1000 mg/L, the digester could be overloaded or experiencing other problems.

- Ammonia - Ammonia concentrations of 50 to 1000 mg/L are beneficial, but ammonia levels of 1500 to 3000 mg/L (pH greater than 7.4) could be inhibitory but not always. An ammonia concentration higher than 3000 mg/L for prolonged period is toxic.

- VFA to Alkalinity ratio: Very important parameter to monitor for digestion process. The VFA to alkalinity ratio of below 0.4 is good and above this threshold value means diminishing alkalinity and low pH i.e. sour digester content. As long as this ratio is maintained higher VFA and alkalinity digester content can be acceptable and the digestion process is deemed healthy. Anaerobic digestion process is always controlled based on holistic parameters but not based on single parameter.

Waste Tracking

Because of the nature of the waste accepted at the site for treatment, and the processes undertaken, the location of any specific load of waste cannot be tracked directly within the installation. Instead, tracking, if required, is based on the normal operational periods for treatment, which can locate the approximate location of the imported material with the process, based on the number of days post acceptance.

Odour

The facility has an Odour Management Plan which is supplied as Appendix E.

Bioaerosols

Digested sludge cake is stored in a totally enclosed cake barn which is within 250 m of the nearest sensitive receptor, where people live or work for more than 6 hours at a time. See Appendix F for the site specific bioaerosol risk assessment.

Other Items

Please see Appendix A, A.6 for photographs of key plant infrastructure.

A leak detection and repair (LDAR) plan has been prepared for the site and this is presented as Appendix H.

An air dispersion model has previously been provided for the site. Combustion processes on the site are currently permitted and there are no changes to these units as part of this application. As such, the previous modelling remains valid and all emission limits are unchanged.

Other Risk Assessments

There is no requirement for a fire prevention plan, due to the nature of the wastes treated at the site and the processes utilised, in accordance with Environment Agency guidance.

2.4 Regulatory listing

The installation is permitted as a Schedule 1 listed activity under the Environmental Permitting (England and Wales) Regulations 2016 (as amended).

The relevant listings under Schedule 1 are:

Section 1.1 Combustion activities

Part A(1) (a) Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts.

(existing listing)

Section 5.4 Disposal, recovery or a mix of disposal and recovery of non-hazardous waste

Part A(1) (b); Recovery or a mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving one or more of the following activities, and excluding activities covered by Council Directive 91/271/EEC—

(i) biological treatment;

(new listing)

The site includes the following Directly Associated Activities (DAA):

- **Biogas storage**
- **Emergency flare**
- **Oil storage**
- **Drainage – surface water drainage**
- **Drainage – condensate drainage system**
- **Water treatment – demineralisation plant**
- Imports of waste, including sludge from other sewage treatment works for treatment
- Transfer of dewatering liquors via site drainage back to the head of the sewage treatment works
- Blending of indigenous sludges and imported wastes/waste sludge prior to treatment
- Pre-treatment of sewage sludge by thermal hydrolysis plant (THP)

- Storage of digestate prior to dewatering;
- Dewatering of digested sewage sludge;
- Storage of dewatered digested sludge cake prior to offsite recovery;
- Operation of siloxane filters; and
- Storage of raw materials;

The waste activity at the site is:

Imports of waste to the works inlet for treatment through the UWWTD route, Directly associated activities at the installation which are in bold are currently permitted under permit EPR/PB3238RK/V003.

As part of the current listed activity at the site there is combustion plant, permitted under Schedule 1, S1.1 A1 of the Environmental Permitting (England and Wales) Regulations 2016 (as amended). This comprises:

- 3x 4.7 MWth CHP engines;
- 2x 4.7 MWth THP boilers;
- 12x emergency standby diesel generators including 4x Perkins engines with net rated thermal input of 3.8 MW each (which are existing MCP), 5x Finning CAT engines with net rated thermal input of 5.2 MW each (which are existing MCP) 1x FG Wilson Perkins standby generator for inlet works, net rated thermal input 4.8 MW (which is a new MCP) and 1x Finning CAT engines with net rated thermal input of 1.6 MW (which is existing MCP)
- Other combustion equipment with net rated thermal input less than 1 MW each, aggregated net rated thermal input approx. 1.4 MW.

Total thermal input of site is approximately 71.7 MW, of which approximately 23.5 MW is CHP plant and THP boiler combustion plant assets which are in regular use.

3. Form C2 Questions

1 About the permit

1a Discussions before your application

There have been no specific pre-application meetings with National Permitting about this application, although discussion have been had with local officers. Nature and heritage conservation screening was requested and received via email from the pre-application advice service of the Environment Agency.

1b Permit number

What is the permit number that this application relates to?

EPR/PB3238RK/V003 issued 30/11/2023

1c What is the site name, address, postcode and national grid reference?

Beckton Sludge Treatment Centre

Beckton Sewage Treatment Works

Jenkins Lane

Barking

Essex

IG11 0AD

2 About your proposed changes

2a Type of variation

This is a substantial variation.

2b Changes or additions to existing activities

Table C2-1 Proposed changes to current activities.

Name	Installation schedule 1 references	Description of the installation activity	Description of waste operations	Proposed changes document reference
Beckton STC	*Section 1.1 Part A(1)(a)*	Operation of combustion plant at the site, including CHP engines, boilers, emergency generators and flares		See application for EPR/PB3238RK/V003

Beckton STC	*Section 5.4 Part A(1) (b); i*	Biological treatment by means of Anaerobic digestion		This document

2c Consolidating (combining) or updating existing permits

Yes

2c1 Do you want to have a modern style permit?

Yes

2c2 Identify all the permits you want to consolidate (combine)

EPR/PB3238RK/V003 - Beckton Sewage Treatment Works Combustion Plant

2d Treating batteries

2d1 Are you planning to treat batteries?

No, this application is not for the treatment of batteries

2e Ship recycling

2e1 Is your activity covered by the Ship Recycling Regulations 2015?

No, this application is not covered by the Ship Recycling Regulations 2015

2f Low impact installations (installations only)

2f1 Are any of the regulated facilities low impact installations?

No, this application is not for a low impact installation

2g Multi - operator installation

No. This is not a multi-operator installation

3 Your ability as an operator

3a Relevant offences

3a1 Have you, or any other relevant person, been convicted of any relevant offence?

Yes. The applicant has been convicted of a relevant offence within the last 12 months.

Event Name	Court	Date of hearing	Fine	Summary

EA v Thames Water Utilities Limited	Lewes Crown Court	3rd & 4th July 2023	Fine: £3,334,000.00 Prosecution Costs: £128,961.05 and victim surcharge of £120.00	Thames Water pleaded guilty to four charges under the Environmental Permitting (England and Wales) Regulations 2016. The detail of each summons is included below: Summons 1: Between 9 October 2017 and 14 October 2017 TW caused a water discharge activity, namely A discharge of sewage effluent from Crawley Sewage Treatment Works into the Gatwick Stream and the River Mole, except under and to the extent authorised by an environmental permit contrary to Regulation 38(1)(a) and Regulation 12(1)(b) of the Environmental Permitting (England and Wales) Regulations 2016. Summons 2: On and /or before 14 October 2017 TW did contravene condition 11 of environmental permit CNTM.1402 by failing to have capacity of not less than 11,000 m3 in the storm lagoon at Crawley Sewage Treatment Works contrary to Regulation 38(2) of the Environmental Permitting (England and Wales) Regulations 2016. Summons 3: Between 9 October 2017 and 14 October 2017 TW contravened condition 12 of environmental permit CNTM.1402 by failing to discharge when the rate of flow at the inlet sewer at Crawley Sewage Treatment Works is in excess of 840 l/s due to rainfall and /or snowmelt contrary to Regulation 38(2) of the Environmental Permitting (England and Wales) Regulations 2016. Summons 4: On and /or before 14 October 2017 TW did contravene condition 13 of environmental permit CNTM.1402 by failing to empty the storm lagoon at Crawley Sewage Treatment Works and return the contents for full treatment as soon as practicable after cessation of the overflow to the lagoon contrary to Regulation 38(2) of the Environmental Permitting (England and Wales) Regulations 2016.

3b Technical ability

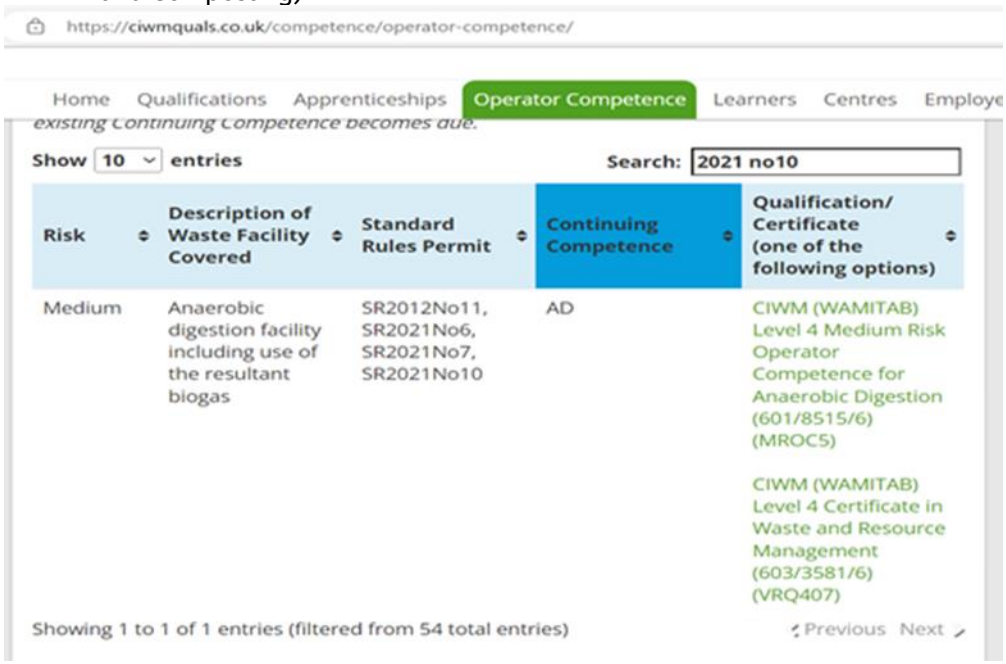
Thames Water uses WAMITAB qualified staff at their waste facilities. The relevant person for the site has been named below and full details have been provided separately on a spreadsheet.

Thiago Campos

Please see Appendix B for evidence of competency

Following discussions with CIWM (WAMITAB), Thames Water understands there are two routes to holding an appropriate CoTC for the permit as laid out in the screen shot below:

a) CIWM (WAMITAB) Level 4 medium risk operator competence for anaerobic digestion (MROC5)
b) CIWM (WAMITAB) Level 4 Certificate In waste and Resource Management – VRQ" and optional "VRQ407 – Principles and practices of managing a biological treatment processing facility (Anaerobic Digestion and Composting)"



Thames intend to follow option B at this site.

Thames Water understands from the CIWM website that the proposed option is acceptable.

3c Finances

Installations, waste operations and mining waste operations only.

Do you or any relevant person or a company in which you were a relevant person have current or past bankruptcy or insolvency proceedings against you?

No

3d Management systems

What management system will you provide for your regulated facility?

Identify the form of the management system from the list:

• Own management system

Thames Water has a SharePoint based Environmental Management System, with site specific elements and procedures linked from across the organisation Thames Water also has an Asset Management System accredited to ISO 55001 and an Energy Management System accredited to ISO 50001.

Scope

Thames Water has an EMS in place for its permitted assets.

Environmental Policy

Implementation of Thames Water's Environmental Policy is approved by the Thames Water Executive Committee of the Thames Water Board and is the responsibility of all employees, with the Chief Executive being accountable for its implementation. The policy covers all company activities, including this installation, and applies to all individuals who are employed by, or carry out work on behalf of, any Thames Water company including contractors, temporary staff and agency workers. The Management Systems Team is responsible for the implementation and assurance of the EMS, the site operations teams will be responsible for maintaining ongoing compliance with the EMS and managing the site.

Management and Responsibilities

The Management Systems Team (EMS specialists) have responsibility for the management and upkeep of the EMS. Compliance with specific elements of environmental legislation is managed by the relevant Business Areas across the Company. The Environmental Assurance Team maintain a Legal Register and, in consultation with Operations Teams, the environmental permitting team and other specialists, assess environmental risks for in-scope areas using a significance scoring method under normal, abnormal and emergency conditions. Significant environmental aspects and impacts consider legal and other requirements, cost to the business, scale of impact and interested parties.

Management Systems Team are responsible for setting internal environmental standards which are then implemented by the relevant business areas. The Standards and other relevant information are communicated through several routes. Incident and corrective action routes exist to promote continual improvement. The team run a programme of Management System Audits to determined adherence to the environmental policy and environmental standards.

Local operating procedures are the responsibility of the operational teams that operate the sewage works.

The defined roles and responsibilities are allocated to relevant personnel, depending on their job description, qualifications, knowledge, experience and training. Training and competency are based on specific roles.

Operational Control

Procedures are in place within the EMS to identify and control environmental issues arising from company activities. Each department is required to achieve operational control of its activities using standardised systems.

Routine sewage treatment operations and activities are recorded within the corporate management database, SAP. These include routine inspections, monitoring and maintenance tasks.

Non-routine activities, such as major overhauls/refurbishments, which involve the use of sub-contractors are assessed for health & safety concerns; relevant environmental risks and with accompanying method statements to respond to these. Contractors who are required to carry out major services are closely managed by operational or other staff to ensure that compliance with Thames Water's H&S and environmental policies is achieved. No contractors may work on site without having undergone a full site induction and being issued with a Thames Water Operational Safety Authorisation (TWOSA) for the task(s) they intend to complete.

Processes on site operate continuously, 24-hours per day, 7-days per week, apart from maintenance periods. The plant is designed to operate unattended with process parameters being monitored continuously. Operating logs are stored electronically.

Maintenance and Monitoring

Management will have the ultimate responsibility for the effective maintenance of plant throughout the company. The facility has named staff that are responsible for day-to-day maintenance operations and contractors are also used as required. All maintenance is logged on SAP. The following basic inspections and maintenance activities are indicative of those carried out on site:

- Daily operation of plant (24/7) involves visual inspection of operational assets;
- Daily inspection of temporary pipe work installed;
- Routine maintenance programme for plant; and
- Routine lubrication programme.

Personnel responsible for the inspection, testing and maintenance of pollution prevention infrastructure are trained to an appropriate level.

All regular maintenance of all plant and equipment will be completed on the time scale specified by the equipment manufacturer including routine inspections.

Environmental Improvement

Thames Water is committed to environmental improvements and has established environmental targets and plans relating to materials and waste management, transport, climate change mitigation and adaptation (energy efficiency and renewable energy generation), water resources, biodiversity, river water quality, and drainage asset performance. TWUL's Environmental Governance Board meets on a regular basis to provide strategic direction, and interrogative review, attached to any environmental issue of substantive concern including emerging risks as well as current topics.

Competence, Training and Training Records

Thames Water aims to ensure that all employees are in possession of the knowledge, skills and experience necessary to perform their role in accordance with the company's operating procedures and in full compliance with the law. Training needs are identified by the employee's immediate supervisor or line manager.

For those sites treating 'waste' as defined by the Waste Regulations 2011, coverage at all permitted sites by staff who hold the appropriate level of WAMITAB 'Certificate of technical Competence' is monitored centrally. This aspect of the staff training is currently being reviewed in light of the change in permitting requirements for sludge treatment centres.

For each internal training course held a Training Record is issued.

Induction training is carried out by the responsible line manager and consists of an introduction to the Company's Environmental Health and Safety Policy and description of emergency response and spill prevention procedures.

Staff receive specific training in the plant's operation and the environmental impact of the process as well as health and safety. The operators will have a detailed understanding of the operational procedures for the site for both normal and abnormal operation. As part of the training, operators will receive specific instructions relating to those aspects of plant operation that have the potential for a negative impact on the environment. This training will be provided by the equipment manufacturers or in-house staff as appropriate.

Contractors

There are several procedures to ensure contractors have the required skills and environmental competencies to carry out works at the site.

Initially, contractors are assessed by the procurement department for inclusion on the approved supplier list, which includes health and safety and environmental criteria for example, waste documentation such as waste carrier's licence/training certificates. Even when the contractors are on the approved supplier list, they are still further assessed for each specific contracted activity.

The contactor is required to submit a method statement prior to any commencement of work, identifying how work is to be undertaken and the associated risks. The method statement must be approved by the Site Manager, who will also identify any site hazards and issue an Authorisation to Work/Enter the site, following a site induction. When on-site, the contractor must carry this Authorisation to Work at all times.

Incidents, Non-Compliances and Complaints

Thames Water has procedures for incidents, non-compliances and environmental complaints.

Incidents are managed through corporate and site-specific procedures which ensure that all incidents are logged and that necessary preventative and/or corrective actions are taken.

Customer complaints are made via the Customer Services Centre which will log all complaints electronically. An action is raised to Waste Operations Control Centre (WOCC) who contact the CSM by telephone and email the complaint information to both the CSM and Performance Manager. The CSM and Performance Manager will review the complaint and take action to investigate the complaint. The CSM is responsible for contacting the customer and updating them on the outcome of the investigation and any actions taken. Where complaints relate to odour/noise/amenity, typical follow up action would include physical checks onsite of the operation of plant; offsite checks where needed; with all the actions taken being logged. Where appropriate, site management may contact the customer to discuss the outcome of the complaint, otherwise, there is a customer communication plan that identifies how and when contact will be made with customers and other stakeholders.

Information regarding complaints is recorded to allow determination of an appropriate response (corrective action) and identify what measures need to be taken in the future to prevent its reoccurrence (preventive action).

Communication

There are regular meetings held on site to discuss all aspects of the treatment works and performance against targets. These meetings include the operation and performance of the installation. Other communication methods to promote environmental management issues and continual improvement include: toolbox talks, environmental alerts, OSC portal forums, formalised event learning processes following an operational incident and compliance audits.

4 Consultation

Could the waste operation or installation involve releasing any substance into any of the following?

4a A sewer managed by a sewerage undertaker?

Yes. The site discharges into a drainage system of the wider sewage treatment works, controlled and operated by the applicant.

4b A harbour managed by a harbour authority?

No

4c Directly into relevant territorial waters or coastal waters within the sea fisheries district of a local fisheries committee?

No

4d Is the installation on a site for which:

4d1 a nuclear site licence is needed under section 1 of the Nuclear Installations Act 1965?

No

4d2 a policy document for preventing major accidents is needed under regulation 5 of the Control of Major Accident Hazards Regulations 2015, or a safety report is needed under regulation 7 of those Regulations?

Yes, Beckton Sewage Treatment Works is a Lower tier site under COMAH due to flammable liquids and gases. The existing policy document is unchanged.

5 Supporting information

5a Provide a plan or plans for the site

Please see Appendix A:

- A.1 Site location plan
- A.2 Installation Boundary and Emission Point Plan
- A.3 Site Surfacing Plan
- A.4 Site Drainage plan
- A.5 Process Flow Diagram of site operations
- A.6 Site Photographs

5b Do any of the variations you plan to make need extra land to be included in the permit?

Yes. See Appendix C for the Site Condition Report.

5c Provide a non-technical summary of your application

Please see earlier text, Chapter 1.

5d Risk of fire from sites storing combustible waste

No. The site processes sit outside the scope of the Environment Agency fire prevention plan guidance, as set out in the Environment Agency guidance document.

5f Adding an installation

Please see the response to Q5b for the baseline report which is in the H5 template.

6 Environmental risk assessment

An environmental risk assessment of the site changes has been carried out in line with the requirements of the Horizontal Guidance Note H1 and Guidance given on gov.uk. This guidance specifies the following approach to carrying out an environmental risk assessment for a proposed activity:

- Identify potential risks that your activity may present to the environment;
- Screen out those that are insignificant and don't need detailed assessment;
- Assess potentially significant risks in more detail if needed;
- Choose the right control measures, if needed; and
- Report your assessment.

Designated site review

Site Name	Designation	Direction from site	Distance from site
Ripple	LNR	North-east	1,800m
Epping Forest	SAC	North-west	7,000m
Lee Valley	Ramsar and SPA	North-west	10,300m
SSSI	n/a	n/a	n/a
MCZ	n/a	n/a	n/a
Ancient Woodland	n/a	n/a	n/a
c			
Lady Trower Trust Playing Fields River Roding in Barking Mayes Brook and associated watercourses Royal Docks Twin Tumps and Thamesmere Beckton District Park and Newham City Farm The Greenway and Old Ford Nature Reserve Beckton Alps Beckton Meadows South The Ripple Nature Reserve East Ham Nature Reserve Beckton Sewage Treatment Works northern setting lagoon			All sites <2,000m

Gascoigne Road Pumping Station Rough Central Park Cuckold's Haven Nature Reserve Land between Langdon School and the A406 Barking Abbey Ruins and St Margaret's Churchyard The Old Orchard Site Thamesmead Historic Area and Wetlands Gallions Reach Park River Thames and tidal tributaries	

Data taken from MAGIC.gov.uk website, accessed August 2021. For habitat sites, the relevant distance for consideration are: International designations (SAC, MPA, SPA and Ramsar – 10 km); National designations (SSSI – 2 km); Local Nature Reserves, Local Wildlife Sites, Ancient Woodland (2 km)

Beckton STW is in close proximity to two designated habitats. The nearest is the Ripple LNR which is 1.8 km from the site. Epping Forest Special Area of Conservation (SAC) is 7 km from the site. There are no Marine Conservation Zones, Ramsar sites and Special Protection Areas (SPA) within 10 km of the site and no Sites of Special Scientific Interest within 2 km of the site. There are 22 non-designated, local wildlife sites within 2 km of the site and no areas of Ancient Woodland within 2 km of the site.

The site sits outside any source protection zones (SPZ).

Almost all of the STW site and the permitted area of the STC installation is within a Flood Zone 3 area that benefits from flood defences. This means that the STC would have a high probability of flooding without the local flood defences. These protect the area against a river flood with a 1% chance of happening each year, or a flood from the sea with a 0.5% chance of happening each year.

Beckton STW is located within an AQMA. The London Borough of Newham has declared the Newham AQMA (no. 2) for the whole of the Borough for both nitrogen dioxide NO_2 - Annual Mean and Particulate Matter PM_{10} - 24-Hour Mean.

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
Amenity issues: Litter, vermin and pests	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, amenity and recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. The site is located in a mainly industrial area of east London, close to major roads including the A13, the former Beckton gas works, commercial developments and the River Thames and River Roding. The nearest receptors are found in the south-western corner of the site with commercial receptors approx. 25 m from the STC. The nearest residential receptors are approx. 450 m south-west of the STC but may be closer to some aspects of the STW. Ecological receptors: There is one LNR within 2 km of the site, Ripple LNR and one SAC within 10 km of the site, Epping Forest SAC. There are no SPAs, Ramsar sites or MCZs within 10 km of the site and no SSSIs within 2 km of the site.	The wastes handled at the site are primarily liquids and sludges, along with UWWTD derived material delivered by sewer. As such, there is no source of litter within the materials handled at the site. In the unlikely event pests or vermin are observed on site a suitable contractor is called in as soon as practicable.	X
Dust and bioaerosols	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Litter above. The impact of dust on human health will depend on the distance and wind direction. For bioaerosols this distance is 250 m.	The wastes handled at the site are liquids, sewage sludges and digested sludge cake, along with UWWTD derived material delivered by sewer. The site will not be handling inherently dusty or powdery wastes. Digested sludge cake is handled within an enclosed cake barn which has continuous air extraction and therefore dust and bioaerosols will not impact on nearby receptors. A wheelwash is used by vehicles exiting the cake barn and roads will be maintained to avoid the production of dust. Anaerobic digestion of sludge takes place within a closed system. Digested sludge cake is stored within the enclosed cake barn and the risk from bioaerosols is low and monitoring is not required. The nearest receptors to the cake barn are approx. 140 m west. See Appendix F for the site-specific bioaerosol risk assessment.	X

Assessment of point source emissions to air Emissions deposited from air to land	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Amenity issues above. The impact of emissions from air on human health will depend on the distance and wind direction.	The site is located within an AQMA. Air emissions have previously been assessed by the Environment Agency and deemed satisfactory. Use of the emergency flare is limited to emergency situations and during planned maintenance activities to either the CHP engines or the boilers, normally operated by the SCADA system when set-points are reached. PVRVs are not used routinely to control biogas volumes and would only operate in an emergency. Fugitive emissions to air are assessed within Table C3-3b(i)	X
Assessment of point source and fugitive emissions to water	The nearest surface water body is the River Thames which is on the southern perimeter of the STC. The River Roding is approx. 400 m east of the STC but closer to the boundary of the STW. The majority of the STW and STC is in Flood Zone 3 area that benefits from flood defences. Surface water drainage within the site drains to the inlet of the adjacent sewage treatment works for full treatment prior to discharge.	The main product of the process is a digested sludge cake, which is stored within an enclosed cake barn. Other aqueous discharges generated by biological waste treatment and DAAs are limited (comprising only biogas condensate, boiler blowdown, dewatering liquors and surface water run off). These sources are discharged to the on-site drainage system where they are transferred to main sewage works inlet. Due to the nature and small quantity of these emissions no further assessment of point source emissions is deemed necessary.	X
Assessment of odour	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Amenity issues above. The impact of emissions from odour on human receptors will depend on the distance and wind direction.	The wider sewage treatment works, which includes the area of the STC to be permitted, has processes in place to minimise odour which includes physical containment, odour abatement, management systems, procedures and monitoring to control fugitive emissions of odour at the plant. The sewage treatment works has an odour management plan which is appended as Appendix E.	X
Energy	Global atmosphere (direct and indirect emissions)	Use of biogas on site within the CHP engines and/or boilers minimises the need to import non-renewable electricity and natural gas from the National Grid. Good maintenance procedures will help the plant run efficiently and reduce site energy consumption. Use of LED lighting reduces site consumption.	X

Land and disposal of waste to other processes	Rivers and streams – see Assessment of point source and fugitive emissions to water above. Drainage systems/sewers. The site lies outside any groundwater Source Protection Zones. Aquifers are classified as Secondary A (solid deposits) and Secondary (undifferentiated) (superficial deposits)	All waste streams are disposed of off-site for recovery or disposal and will continue to be transferred (and consigned where hazardous) to appropriately permitted facilities.	X
Noise and vibration	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, amenity and recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. The site is located in a mainly industrial area of east London, close to major roads including the A13, the former Beckton gas works, commercial developments and the River Thames and River Roding. The nearest receptors are found in the south-western corner of the site with commercial receptors approx. 25 m from the STC. The nearest residential receptors are approx. 450 m south-west of the STC but may be closer to some aspects of the STW. Ecological receptors: There is one LNR within 2 km of the site, Ripple LNR and one SAC within 10 km of the site, Epping Forest SAC. There are no SPAs, Ramsar sites or MCZs within 10 km of the site and no SSSIs within 2 km of the site.	Site design has been chosen to minimise the impact of noise on offsite receptors through building orientation, finishes and location of openings. All waste processing operations are located within an enclosed building. Noise from plant and equipment will be minimised through purchasing decisions and a robust preventative maintenance programme. There will be no sources of vibration within the facility. Noise and vibration emissions are assessed in Table C3-3b(iii).	X
Other issues (including visual impact)	Protected species and habitats	There is a protected species, namely Smelt (Osmerus eperlanus) identified within 500m of the site.	X
Climate Change	Risks of increased temperature impacts resulting in digesters heating beyond optimal operating temperature and increased odour potential from site process. For human health and ecological receptors, see notes for Amenity issues above.	Primary Digester Tanks may require reduced heat input to digester via heat exchange system and Primary Digester Tanks are insulated against worse impacts. Warmer temperatures may require less boiler input/use as a result of less heat demand, or increased heat dumping via air cooled radiator. If less biogas is used, the site may require a new consumptive biogas solution, e.g. a CHP engine or other technology that is appropriately sized to utilise additional biogas. However, the CHP engines will need to be replaced prior to 2050 when they reach the end of their operational lifespans.	X

		Pre-digestion tanks are already covered and OCUs to be utilised as appropriate. OCUs may require oversizing compared to current use.	
	Risks of increased storm events that causes surface water runoff exceeds capacity of site drainage system, or additional dewatering operations due to rainwater ingress, or caused bunds to infill. Increased precipitation may increase flooding on agricultural land, decreasing ability to spread digested sludge cake to land. For water environment receptors, see notes for Assessment of point source and fugitive emissions to water above	The STW design may require expansion or additional storm capacity; however, this would apply to UWWTD operations at the site rather than permitted activities. May need to increase bund or containment volume for sewage treatment works or individual assets. Land spreading activities could be restricted during very wet, winter months. Although the site has a large cake barn which would allow digested sludge cake to be stored prior to application, contingency plans to move digested sludge cake to other sites may be required.	**X**

Appendix 2 – Date of birth information for Relevant offences and/or Technical ability questions only

This information has been supplied separately for the ease of exclusion from the public register

4. Form C3 Questions

1 – What activities are you applying to vary?

Table 1a – Types of activities

Installation name	Schedule 1 references	Description of the Activity	Activity Capacity	Annex I and II codes and descriptions	Non-hazardous waste treatment capacity
Beckton STW Combustion Plant AR1	Section 1.1 A1 (a) Burning any fuel in an appliance with a rated thermal input of 50 megawatts or more	Combined Heat and Power (CHP) plant including the following equipment: • 3 x CHP engines, net rated thermal input of 4.7 MW each, fired on biogas generated on site. Existing MCP. • 2 x THP boilers, with net rated thermal input of 4.7 MW each, fired on biogas generated on site or natural gas. Existing MCP.	n/a	R1 Use principally as a fuel or other means to generate energy	N / A
Beckton STW Combustion Plant AR2		Emergency standby diesel generators (emergency plant), including the following equipment: • 4 x Perkins engines – ASP4 standby generators, net rated thermal input 3.8 MW each. Existing MCP. • 5 x Finning CAT engines – Power House standby generators, net rated thermal input 5.2 MW each. Existing MCP. • 1 x Finning CAT engine – Fine Screen standby generator. Net rated thermal input 1.6 MW. Existing MCP. note 1 • 1x FG Wilson Perkins standby generator for inlet works, net rated thermal input 4.8 MW. New MCP note 1	n/a		

Beckton STW Combustion Plant AR3		**Combustion equipment with net rated thermal input less than 1 MW each, aggregated net rated thermal input of 1.4 MW, including the following equipment:** • **1 x Perkins 2000-80 – Detritor standby generator, net rated thermal input 0.8 MW.** • **1 x Cummings B Series, 4 Cylinder Emergency Lighting standby generator, net rated thermal input 0.1 MW** • **2 x Potterton NXR3 – Admin Block boilers, net rated thermal input 0.2 MW each.** • **1 x Remeha Qunita Pro 115 – Operations Building boiler, net rated thermal input 0.1 MW**	**n/a**		
Beckton Sludge Treatment Works AR4	S5.4 A1 (b) (i) Recovery or a mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment Anaerobic digestion of permitted waste in six Primary Digester Tanks followed by combustion of biogas produced from the process	From receipt of permitted waste through to digestion and recovery of by-products (digestate and biogas).	1,983 wet tonnes per day (throughout based on 23,790 m3/12 = tbc m3 per day)	R3: Recycling reclamation of organic substances which are not used as solvents R13 Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage, pending collection, on the site where the waste is produced) D15: Storage pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where it is produced)	Maximum waste throughput 9,120,000 tonnes per annum including indigenous UWWTD derived sludge from within the wider Sewage Treatment Works As per volume calculations in Note 2 below.
Directly Associated Activities					

AR5	Biogas storage
AR6	Emergency flare
AR7	Oil Storage
AR8	Drainage - Surface water drainage
AR9	Drainage - Condensate drainage system
AR10	Water treatment – demineralisation plant
AR11	Imports of waste, including sludge from other sewage treatment works for treatment
AR12	Transfer of dewatering liquors via site drainage back to the head of the sewage treatment works
AR13	Blending of indigenous sludges and imported wastes/waste sludge prior to treatment
AR14	Pre-treatment of sewage sludge by thermal hydrolysis plant (THP)
AR15	Storage of digestate prior to dewatering
AR16	Dewatering of digested sewage sludge
AR17	Storage of dewatered digested sludge cake prior to offsite recovery
AR18	Operation of siloxane filters
AR19	Storage of raw materials

Waste Operations				
	Description of the waste operation	**Annex I (D codes) and Annex II (R codes) and descriptions**	**Hazardous waste treatment capacity**	**Non-hazardous waste treatment capacity**
AR20	Imports of wastes to the works inlet for treatment through the UWWTD route and screening of imports;	D13: Blending or mixing prior to submission to any of the operations numbered D1 to D12	n/a	Maximum waste throughput 75,000 wet tonnes per annum
For all Waste Operations		Total capacity	79,790 wet tonnes	[a] + [b]
		Total STC treatment capacity (tank volume)	78,290 wet tonnes	[a]
		Total Cake Barn storage capacity	1,500 wet tonnes	[b]

For waste imports to the head of the works	Annual throughput (tonnes each year)	Imports: 75,000 wet tonnes	

Note 1: Emissions to air from the new gas oil fired standby generator are at a new emission point A33. This will replace the existing gas oil fired standby generator for the current inlet works, with emissions to air from existing emission point A17. Emission point A17 will be retained in the permit solely to facilitate the transitioning from the existing to the new generator.

Note 2: Treatment Calculation based on:

Unthickened Primary: 60.00 tds/day: worse case 0.70% dry solids = 8,571 m3/day = 3,128,518 m3/year

Unthickened SAS: 48.00 tds/day: worse case 0.35% dry solids = 13,714 m3/day = 5,005,629 m3/year

Imports – Liquid: 12.00 tds/day: worse case 0.45% dry solids = 2,667 m3/day = 973,317 m3/year

Total combined import calculation: 9,107,463 m3/year, rounded to 9,120,000 m3/year

Table 1b Types of waste accepted

Table C3-1b(i): Waste accepted for anaerobic digestion

Waste Code	Description of Waste
19 02 06	sludges from physico/chemical treatment other than those mentioned in 19 02 05 (sewage sludge only)
19 06 06	digestate from anaerobic treatment of animal and vegetable waste (sewage sludge only)
19 08 05	sludges from treatment of urban wastewater
19 12 12	other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11 (sewage sludge only)

Table C3-1b(ii): Waste accepted at the head of the works import point

Waste Code	Description of Waste
16 10 02	aqueous liquid wastes other than those mentioned in 16 10 01 [note 1]
Note 1 – comprising but not limited to: Thickening and dewatering liquors, centrate and filtrate derived from TWUL processes Waste from a portable toilet	

2 – Point source emissions to air, water and land

Table C3-2a – Emissions to Air

Emission point reference and location (note 4)	Source	Parameter	Limit – these limits do not apply during start up or shut down	Unit	Reference period	Monitoring frequency	Monitoring standard or method (note 1)
A1	CHP Engine 1 fired on biogas	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	500 (note 1a)	mg/m^3	Hourly average	Annual	BS EN 14792
			190 Limit applies from 01/01/2030 (note 1b)	mg/m^3	Periodic	Annually from date of acceptance of first monitoring measurements under permit V003	
		Carbon Monoxide	1400	mg/m^3	Hourly average	Annual	BS EN 15058
		Sulphur Dioxide [Note 2]	350 (note 1a)	mg/m^3	Hourly average	Annual	BS EN 14791
			60 Limit applies from 01/01/2030 (note 1b)	mg/m^3	Periodic	Annually from date of acceptance of first monitoring measurements under permit V003	
		Total Volatile Organic Compounds	No limit set	mg/m^3	Hourly average	Annual	BS EN 12619 (a) BS EN 13526 (b)
A2	CHP Engine 2 fired on biogas	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	500 (note 1a)	mg/m^3	Hourly average	Annual	BS EN 14792
			190 Limit applies from 01/01/2030 (note 1b)	mg/m^3	Periodic	Annually from date of acceptance of first monitoring measurements under permit V003	

		Carbon Monoxide	1400	mg/m^3	Hourly average	Annual	BS EN 15058
		Sulphur Dioxide [Note 2]	350 (note 1a)	mg/m^3	Hourly average	Annual	BS EN 14791
			60 Limit applies from 01/01/2030 (note 1b)	mg/m^3	Periodic	Annually from date of acceptance of first monitoring measurements under permit V003	
		Total Volatile Organic Compounds	No limit set	mg/m^3	Hourly average	Annual	BS EN 12619 (a) BS EN 13526 (b)
A3	CHP Engine 3 fired on biogas	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	500 (note 1a)	mg/m^3	Hourly average	Annual	BS EN 14792
			190 Limit applies from 01/01/2030 (note 1b)	mg/m^3	Periodic	Annually from date of acceptance of first monitoring measurements under permit V003	
		Carbon Monoxide	1400	mg/m^3	Hourly average	Annual	BS EN 15058
		Sulphur Dioxide [Note 2]	350 (note 1a)	mg/m^3	Hourly average	Annual	BS EN 14791
			60 Limit applies from 01/01/2030 (note 1b)	mg/m^3	Periodic	Annually from date of acceptance of first monitoring measurements under permit V003	
		Total Volatile Organic Compounds	No limit set	mg/m^3	Hourly average	Annual	BS EN 12619 (a) BS EN 13526 (b)
A4	Boiler 1 fired on biogas or natural gas	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	250 Limit applies from 01/01/2030 (note 1b)	mg/m^3	Periodic	Annually from date of acceptance of first monitoring	BS EN 14792

						measurements under permit V003	
		Carbon Monoxide	No limit set	mg/m^3	Periodic	Annually from date of acceptance of first monitoring measurements under permit V003	BS EN 15058
A5	Boiler 2 fired on biogas or natural gas	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	250 Limit applies from 01/01/2030 (note 1b)	mg/m^3	Periodic	Annually from date of acceptance of first monitoring measurements under permit V003	BS EN 14792
		Carbon Monoxide	No limit set	- mg/m^3	Periodic	Annually from date of acceptance of first monitoring measurements under permit V003	BS EN 15058
A6	Emergency Flare stack	Combustion gases	No limit set	-	-	-	Record of operating hours
A7 – A10	4 x Perkins engines, ASP4, fired on diesel (Emergency standby)	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	No limit set	-	-	-	-
		Carbon Monoxide	No limit set	-	-	-	-
A11-A15	5 x Finning CAT engines, Power house standby generators, fired on diesel (Emergency standby) (note 5)	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	No limit set	-	-	-	-
		Carbon Monoxide	No limit set	-	-	-	-

A16	**1 x Finning CAT engine, fine screen standby generator, fired on diesel (Emergency standby) (note 5)**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**No limit set**	**-**	**-**	**-**	**-**
		Carbon Monoxide	**No limit set**	**-**	**-**	**-**	**-**
A17	**Perkins generator, Detritor Standby Generator, fired on diesel (Emergency standby) (note 3)**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**No limit set**	**-**	**-**	**-**	**-**
		Carbon Monoxide	**No limit set**	**-**	**-**	**-**	**-**
A18	**Cummings B generator, Emergency Lighting Standby Generator, fired on diesel (Emergency standby) (note 5)**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**No limit set**	**-**	**-**	**-**	**-**
		Carbon Monoxide	**No limit set**	**-**	**-**	**-**	**-**
A19	**Boilers Potterton Admin Block Boilers, heating and hot water, fired on natural gas**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**No limit set**	**-**	**-**	**-**	**-**
		Carbon Monoxide	**No limit set**	**-**	**-**	**-**	**-**
A20	**Boiler Remeha Qunita, Operations Buildings Boiler, heating and hot water, fired on natural gas**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**No limit set**	**-**	**-**	**-**	**-**
		Carbon Monoxide	**No limit set**	**-**	**-**	**-**	**-**

A21	THP Process Pressure Relief Valve	-	-	-	-	-	-
A22	Biogas Storage Holder Pressure Relief Valve	-	-	-	-	-	-
A23	Biogas Storage Holder Pressure Relief Valve	-	-	-	-	-	-
A24	Biogas Storage Holder Pressure Relief Valve	-	-	-	-	-	-
A25	Biogas Storage Holder Pressure Relief Valve	-	-	-	-	-	-
A26	Biogas Storage Holder Pressure Relief Valve	-	-	-	-	-	-
A27	Biogas Storage Holder Pressure Relief Valve	-	-	-	-	-	-
A28	OCU 3	Hydrogen Sulphide	No limit set	-	Average over sampling period	-	CEN TS 13649 for sampling NIOSH 6013 for analysis or US EPA M11
		Ammonia	20	mg/m^3	Average over sampling period	-	EN ISO 21877 CEN TS 1369 for sampling

							Or NIOSH 6016 for analysis
A29	OCU 4	Hydrogen Sulphide	No limit set	-	Average over sampling period	-	CEN TS 13649 for sampling NIOSH 6013 for analysis or US EPA M11
		Ammonia	20	mg/m³	Average over sampling period	-	EN ISO 21877 CEN TS 1369 for sampling Or NIOSH 6016 for analysis
A30	Cake Barn ventilation	-	-	-	-	-	-
A33 (note 3)	**Emergency standby 1x 4.8 MWth FG Wilson Perkins inlet works standby generator fired on gas oil (note 5)**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**No limit set**	mg/m³	**Periodic**	**Once within 4 months of the issue date of variation EPR/PB3238RK/V003 or the date when the generator is first put into operation, whichever is later, then, after 1,500 operating hours have elapsed and no less frequent then every 5 years**	**MCERTS** **BS EN 14792**
		Carbon Monoxide	**No limit set**	mg/m³	**Periodic**		**MCERTS** **BS EN 15058**

Note 1a: Existing emission limits and monitoring requirements are defined at a temperature of 273.15 K, a pressure of 101.3 kPa and after correction for the water vapour content of the waste gases at a standardised O_2 content of 15% for engines and 3% for boilers.

Note 1b: Future emission limits and monitoring requirements are defined at a temperature of 273.15 K, a pressure of 101.3 kPa and after correction for the water vapour content of the waste gases at a standardised O_2 content of 15% for engines and 3% for boilers.

Note 2: For emission points A1, A2 and A3, monitoring may be required if levels of hydrogen sulphide (H2S) in the biogas feedline are recorded above 1,900 ppm, during any month in this period or sulphur dioxide (SO_2) emissions in the stack are recorded above 350 mg/m³ (or 60 mg/m³ from 01/01/2030) over the same timescales.

Note 3: Emissions to air from the new gas oil fired standby generator are at a new emission point A33. This will replace the existing gas oil fired standby generator for the current inlet works, with emissions to air from existing emission point A17. Emission point A17 will be retained in the permit solely to facilitate the transitioning from the existing to the new generator.

Note 4: Emission points on site plan in Schedule 7 of this permit.

Note 5: Gas oil or equivalent substitute in accordance with table S2.1 of this permit.

Table C3-2b – Emissions to Sewer, effluent treatment plant or other transfer off-site – emission limits and monitoring requirements.

Emission point reference and location	Source	Parameter	Limit	Unit
T1 (NGR: TQ 44845 81816)	Picket Fence Thickener Liquors, OCU 3 Waste Water, Primary Sludge Thickener Liquors	No parameters set	No limit set	-
T2 (NGR: TQ 44940 81818)	SAS Thickener Liquors, Surface Water Run Off	No parameters set	No limit set	-
T3a (NGR: TQ 44940 81818)	SAS Thickening Liquors	No parameters set	No limit set	-
T3b (NGR: TQ 45079 81701)	SAS Thickener Liquors, Surface Water Run Off	No parameters set	No limit set	-
T4 (NGR: TQ 44940 81818)	Pre THP Dewatering Liquors, OCU 4 Waste Water, Boiler Blowdown, Biogas Condensate	No parameters set	No limit set	-
T5 (NGR: TQ 44940 81818)	Digested Sludge Dewatering Liquors			
T6 (NGR: TQ 44147 82012)	Cess/Domestic Waste Imports 1			
T7 (NGR: TQ 44547 81927)	Cess/Domestic Waste Imports 2			
Note: Existing emissions to sewer are replaced by new transfer points				

Table C3-2c – Process monitoring requirements

Emission point reference or source or description of point of measurement	Parameter	Monitoring frequency	Monitoring standard or method	Other specifications
Biogas as supplied to the CHP Plant (activity reference AR1 of table S1.1)	H_2S (as Sulphur) content of biogas	Monthly	-	Monitoring point to be in biogas feed line within the installation boundary.

3 – Operating techniques

3a - Technical standards

Description of the schedule 1 activity or directly associated activity	Relevant technical guidance note or Best available techniques as described in BAT conclusions under IED	Document Reference
Anaerobic Digestion plant S5.4A1(b)(i); Storage of waste (DAA)	Commission Implementing Decision (EU) 2018/1147 of 10 August 2018 establishing best available techniques (BAT) conclusions for waste treatment, under Directive 2010/75/EU of the European Parliament and of the Council (notified under document C(2018) 5070) (Text with EEA relevance.)	

3a1 Does your permit (in Table 1.2 Operating Techniques or similar table in the permit) have references to any of your own documents or parts of documents submitted as part of a previous application for this site?

Yes, please refer to ADMS modelling from the previous application which remains valid.

3b - General requirements

If the TGN or H1 assessment shows that emissions of substances not controlled by emission limits are an important issue, send us your plan for managing them.

Although screened out of the detailed Risk Assessment (Question C2 Q6), due to the nature of the process the installation has the potential to generate fugitive emissions to air and water, which are subject to a number of process controls.

Risk Matrix and Terminology for Accident for Risk Assessment

	Consequence		
Likelihood ↓	**Low**	**Medium**	**High**
Low	Low	Low	Medium
Medium	Low	Medium	High
High	Medium	High	High

Classification	Likelihood	Consequence	Risk
Low	Probability of an event is low and likely only to occur in the long-term (a yearly basis or less frequent).	Impact is low or a minor, short-term nuisance. Minor release to a non-sensitive receptor or pollution of water course. Non-permanent health effects to human health (preventable by appropriate PPE). Minor surface damage to buildings; structures; services; or the environment which can be repaired immediately.	A level of harm is possible although this may not be noticeable to a receptor and would be a short-term event without lasting effects. Level of harm can be reduced using industry best practice and appropriate management techniques.
Medium	It is probable that an event will occur periodically in the medium-term (twice yearly basis).	Impact is noticeable in the short to medium-term. Large release impacting on the receiving media killing flora and fauna and requires remediation. Nuisance causing non-permanent health effects to human health. Damage to buildings; structures; services; or the environment preventing short-term use and/or requiring repair.	A level of harm may arise to a receptor which is noticeable although not long-lasting and may require some remedial actions in order to prevent re-occurrences.
High	An event is very likely to occur in the short-term (monthly or weekly basis) and is almost inevitable over the long-term OR there is evidence at the receptor of harm or pollution.	Impact is significant, wide-ranging and long-lasting effect. Has a chronic or acute impact on human health. Very large release that has a major impact on flora and fauna which may be very difficult to remediate. Significant damage to buildings; structures; services; or the environment which prevents use long-term and may require complete replacement. May cause a long-term impact or contribute towards a global issue due to releases of greenhouse gases.	A level of harm is likely to arise to a receptor that is severe causing significant harm to human health or the environment without appropriate remedial and mitigation measures being implemented. Remedial works to infrastructure and processes is required in the long-term.

Although screened out of the detailed Risk Assessment (Question C2 Q6), due to the nature of the processes, the anaerobic digestion operations and digested sludge cake storage, along with biogas utilisation have the potential to generate fugitive emissions to air and water, which are subject to a number of process controls.

Table C3-3b(i) Fugitive emissions risk assessment

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
Emissions to air of NOx, SO_2, CO_2 and VOCs	Normal	Emissions to air and dispersion leading to inhalation by local human and animal receptors	High	Low	Medium	Activities are managed and operated in accordance with the site management system (including inspection and maintenance of equipment, including engine management systems), point source emissions to air (CHP engines, boilers and emergency flare stack) have emission limits. Multi-flue stack height approx. 45 m, shared between the CHP engines and boiler. Emergency flare approx. 8 m. Site has siloxane filters fitted on the main biogas pipeline connected to the CHP engines to remove impurities within the biogas.	Low
Biogas transfer systems, biogas storage, CHP engines, flares or PRVs failure causing emissions of biogas	Abnormal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Odour impact. Global warming potential. Risk of fire and explosion	Low	Medium	Low	The plant is designed to capture and utilise all biogas possible, combusting the biogas in order to maximise recovered value from the biological treatment of sludge. The biogas system utilised is subject to regular preventative maintenance, including a LDAR plan, to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of methane monitors,	Low

						pressure and flow sensors and with automatic slam-shut isolation valves to minimise the potential for release if a leak is detected. Personnel on site wear portable biogas detectors in order to alert staff to presence of biogas. An emergency flare) is utilised for the safe disposal of surplus biogas in the event of plant breakdown, or a surplus of biogas above the level that can be safely stored or utilised. Use of emergency flare is recorded. Dual duty/standby PVRVs are in place on the Primary Digester Tanks/Biogas Storage holders to be operated in the event of failure of the emergency flare to prevent over-pressurisation and catastrophic failure.	
Catastrophic loss of biogas emissions from biogas transfer systems, biogas storage tank, CHP engines, flares or PRVs	Abnormal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Odour impact. Global warming potential. Risk of significant fire and explosion	Low	High	Medium	The plant is designed to capture and utilise all biogas possible, combusting the biogas in order to maximise recovered value from the biological treatment of sludge. The biogas system utilised is subject to regular preventative maintenance including a LDAR plan to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of methane monitors, pressure and flow sensors and with automatic slam-shut isolation valves to minimise the potential for release if a leak is detected.	Medium

						An emergency flare is utilised for the safe disposal of surplus biogas in the event of plant breakdown, or a surplus of biogas above the level that can be safely stored or utilised. Use of emergency flare is recorded. Dual duty/standby PRVs are in place on the Primary Digester Tanks/Biogas Storage holders to be operated in the event of failure of the emergency flare to prevent over-pressurisation and catastrophic failure.	
Combustion of biogas within CHP engine and emergency flare. Combustion of biogas or natural gas within boilers	Normal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Global warming potential	High	Low	Medium	Combustion plant is regularly maintained and appropriately sized to manage volumes of biogas with multiple outlets providing contingency. Combustion plant operates within permitted ELVs subject to routine monitoring against permit compliance. The CHP engines and boilers flue are located approx. 100 m from the nearest receptors, a commercial building to the west. The emergency flare is approx. 40 m from the nearest receptors, a commercial building to the west.	Low
Release of steam from THP, vessels and tanks	Abnormal	Emissions to air and dispersion leading to inhalation by local human and animal receptors. Global warming potential	Low	Low	Low	THP is regularly maintained and operated by trained, competent personnel. Regular visual checks made of all equipment to identify potential faults.	Low

						THP tanks and vessels are fitted with PRVs to safely vent steam to atmosphere and prevent a catastrophic failure. THP is located within the central area of the STC approx. 80 m from sensitive receptors.	
Release of bioaerosols and dust	Normal	Emissions to air and dispersion leading to inhalation by local human and animal receptors. Odour impact of bioaerosols. Nuisance impact of dust.	Medium	Low	Low	The risk of bioaerosol and dust is largely minimised by storing the digested sludge cake within an enclosed cake barn within the central area of the site away from any receptors. Fast acting doors are installed on the vehicle entrance and exit, and vehicles pass through a wheelwash after exiting to reduce transfers to site roads. The nearest residential properties are over 1 km from the cake barn or OCU. The nearest receptors are commercial buildings approx. 145 m west. Roads are made from concrete/asphalt and not prone to the generation of dust.	Low
Release of bioaerosols and dust from spillages	Abnormal	Emissions to air and dispersion leading to inhalation by local human and animal receptors with potential harm to health. Odour impact of bioaerosols. Nuisance impact of dust.	Low	Low	Low	The risk of bioaerosol and dust is largely minimised by storing the digested sludge cake within an enclosed cake barn. The site is very large and spillages are most likely within the central area and further from sensitive receptors. Internal site roads are made from concrete/asphalt and not prone to the generation of dust. Vehicles exiting the cake barn pass through a wheelwash to reduce	Low

						incidents of transfer from the barn to site roads. Staff responsible for site housekeeping and cleaning of spillages in a timely manner.	
Spillage of liquids, including chemicals and oils.	Abnormal	Emissions to surface waters close to and downstream of site. Acute effect resulting in loss of flora and fauna. Chronic effect resulting in deterioration of water quality Emissions to ground and ground water.	Low	Medium	Low	The closes surface water body is the River Thames on the southern boundary where the works discharges final effluent from the UWWTD process. All combustion plant and associated fuel tanks are situated on concrete hardstanding Chemicals and oils all stored within suitably bunded tanks and IBCs with rainwater removed as required to maintain 110% capacities. Penstock valves available within chemical delivery areas to contain large spillages. Bulk fuel storage is not within close proximity to River Thames. Handling and use of chemicals and oils is carried out by trained personnel. COSHH data sheets available. Spill kits available on site.	Low
Spillage from storage and digestion tanks, overtopping of tanks, leakage from same tanks	Abnormal	Emissions to surface waters close to and downstream of site. Acute effect resulting in loss of flora and fauna. Chronic effect resulting in deterioration of water quality	Low	Low	Low	The installation lies outside any Groundwater Source Protection Zones (SPZ). Provision of suitable structurally integral tanks constructed from pre-cast concrete, or, steel with glass reinforced plastic. All tanks are subject to asset inspection and proactive maintenance programme including regular	Low

and from buried pipes		Emissions to ground and ground water.				visual inspection for cracks or weeping where possible on above ground assets. All tanks used for normal operations are covered. Tanks are fitted with levels and monitors. Visual checks during regular day-to-day operations and scheduled preventative maintenance of equipment, such as pumps, pipes, joins etc. Biogas condensate discharged back to the works inlet through site drainage system. Spill kits available on site. Staff are trained in their use	
Generation of solid waste resulting in litter	Normal	Releases of litter to the environment. Visual nuisance and local loss of amenity	Low	Low	Low	Site operations do not give rise to large amounts of solid wastes and litter that would be prone to dispersion by wind. Rags are stored within skips and retain high moisture content. Waste is stored securely for collection by appropriately licensed approved contractors. Litter picking activities are completed as required.	Low

Where the TGN or H1 assessment shows that odours are an important issue, send us your odour management plan.

Due to the nature of the process, the installation has the potential to generate odorous emissions resulting from the permitted activities. Odour management is a key operational objective, as summarised in the risk assessment table below. A copy of the site-specific odour management plan has been appended to this application as Appendix E.

Table C3-3b(ii) Odour risk assessment

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
H_2S/biogas emissions from uncovered tanks	Normal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	Low	Low	Low	All tanks used for sludge digestion at Beckton STC are enclosed. Biogas will principally be generated in Primary Digester Tanks and captured for storage within the roof-mounted Biogas Storage holders. Of the tanks used under normal operating conditions, only the SAS tank is uncovered. The nearest residential properties are over 1 km west from the covered Primary Digester Tanks and nearest commercial buildings approx. 25 m west. H_2S production is controlled through the digestion process which can be manually overridden if required. Ferric chloride dosing of hydrolysed sludge is used to control hydrogen sulphide levels in biogas and minimise odour.	Low
Loss of containment from Biogas Storage holder and biogas pipework	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors.	Low	Medium	Low	Biogas is principally stored within the roof mounted double membrane Biogas Storage holders on each digester which are suitably sized to manage biogas generation.	Low

		Loss of amenity from odour nuisance				The biogas system utilised is subject to regular preventative maintenance to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of methane monitors, pressure and flow sensors and with automatic slam shut isolation valves to minimise the potential for release if a leak is detected. Personnel on site wear portable biogas detectors in order to alert staff to presence of biogas. Physical protection measures in place for Primary Digester Tanks/Biogas Storage holders, including lightning protection, fencing and pipework is guarded. PRVs available to safely manage pressures within the Primary Digester Tanks/Biogas Storage holders and prevent under or over pressurization. Ferric chloride dosing used to control hydrogen sulphide levels in biogas and minimise odour. The amount the THP processes can be reduced in response to downstream constraints, reducing the volume of biogas generated.	
Activation of biogas pressure relief valve	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors	Low	Low	Low	PRVs and PVRVs are only activated in emergency situations to maintain safety within the biogas system and are re-seated/repaired promptly to minimize biogas emissions.	Low

		Loss of amenity from odour nuisance				PRV/PVRVs subject to monitoring via SCADA and visual checks by site personnel. Biogas is principally stored within the roof mounted double membrane Biogas Storage holders on each Primary Digester Tank which are suitably sized to manage biogas generation. Site has multiple outlets to use biogas - three CHP engines, two boilers and one emergency flare which are used in order of preference to maximise recovery of energy. CHP engines and boilers are subject to regular maintenance to maintain maximum use of outlets, with flare maintained in good working order should it need to be used. Ferric chloride dosing used to control hydrogen sulphide levels in biogas and minimise odour. The nearest residential properties over 1 km to the west and nearest commercial buildings approx. 25 m west.	
H_2S/biogas emitted when biogas cannot be combusted in engine, boilers or flare	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	Low	Low	Low	Biogas is principally stored within the roof mounted double membrane Biogas Storage holders on each Primary Digester Tank which are suitably sized to manage biogas generation and act as buffer storage for biogas. Site has multiple outlets to use biogas - three CHP engines, three boilers and an emergency flare which are used in order of preference to maximise recovery of energy.	Low

						The nearest residential properties over 1 km to the west and nearest commercial buildings approx. 25 m west. CHP engines and boilers are subject to regular maintenance to maintain maximum use of outlets, with flares maintained in good working order should they need to be used. Ferric chloride dosing of incoming sewages used to control hydrogen sulphide levels in biogas and minimise odour.	
Storage of treated digested sludge cake	Normal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	High	Low	Medium	Digested sludge cake is stored within an enclosed cake barn which is subject to continuous air extraction and is inherently low odour material. The cake barn is approx. 145 m from the nearest receptors and domestic receptors are over 1 km away. Should any odorous sludge cake be produced, this will be subject to process checks undertaken to identify root cause of production and removed from site expediently. The likelihood of non-compliant cake is reduced by the THP process	Low
Failure of odour control units	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	Low	High	Medium	Odour control units are subject to regular preventative maintenance. Media is replaced in line with the manufacturer's recommendations	Low

Storage of site generated wastes	Normal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	Low	Low	Low	Wastes generated on site are not inherently odorous and is stored securely for collection by appropriately licensed approved contractors.	Low

If the TGN or H1 assessment shows that noise or vibration are important issues, send us your noise or vibration management plan (or both)

The installation has the potential to generate noise as a result of the permitted activities. Potentially noisy activities are subject to a number of process controls and noise management is a key operational objective, as summarised in the risk assessment table below. Note there is no history of substantiated noise complaints relating to the site:

Table C3-3b(iii)Noise risk assessment

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
Operation of CHP engine	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors	High	Low	Medium	Combustion assets are all contained, either within a building or within self-contained units. These provide a level of containment of noise and contained units are acoustically baffled and designed for external applications. Therefore, noise emissions are already low. Nearest sensitive receptors are commercial properties approx. 120 m west of the CHP engines but are shielded by the boiler house. Good inspection regimes and maintenance of plant to ensure that excessive noise levels are not generated.	Low

						Regular checks of noise mitigation measures fitted to items of plant. Such measures include silencers and baffles fitted to specific areas of plant. Where repair or replacement is required, the plant will, where possible, be taken out of service until repair or replacement of parts has been undertaken.	
Operation of fans on air cooled radiators	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors	High	Low	Medium	Air cooled radiators do not give rise to high levels of noise and are only used as required. They are located approx. 120 m to the west but are shielded by the boiler house. Good maintenance of fans to ensure that excessive noise levels are not generated. Where repair or replacement is required, this will be completed promptly.	Low
Operation of site vehicles	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Vehicle movements across the site subject to speed limit and one way system to reduce generation of noise. Shovel loading of digested sludge cake takes place within the enclosed cake barn. Site is large and located within an industrial area of east London so site noise is against a background of noise emissions from other industrial sources.	Low
Vehicle movements -	Normal	Generation of noise with air transportation, causing loss	High	Low	Medium	Imports can be made 24/7 and take place to two import points on the south-west of site however access is via the main entrance on the north-west of the site. However, both these	Low

tanker deliveries of cess		of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.				areas are located away from sensitive residential receptors and within industrial/commercial zones. The closest receptors are approx. 75 m and 60 m south from the import points. Vehicle movements across the site subject to speed limit to reduce generation of noise.	
Vehicle movements - tanker deliveries of waste and bulk collections of digested sludge cake	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Vehicle movements across the site subject to speed limit to reduce generation of noise. Shovel loading of digested sludge cake takes place within the enclosed cake barn. Bulk collections normally take place during daytime only.	Low
Vehicle movements - tanker deliveries of chemicals and raw materials	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Deliveries likely to take place during daytime hours to delivery areas within the southern area of the site, furthest away from sensitive residential receptors. Vehicle movements across the site subject to speed limit to reduce generation of noise.	Low
Operation of emergency flare	Abnormal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Medium	High	The emergency flare is located approx. 40 m from the nearest sensitive receptors, which are commercial properties in a business park on the south-western perimeter.	Low

						Use of the emergency flares is minimized by prioritizing use of the three CHP engines and two boilers in order of priority. Use of the flare recorded. Site is located within an industrial area of east London so noise from the emergency flare is against a background of noise emissions from other industrial sources, including aviation and transport sources.	

Table C3-3b (iv) - Environmental Risk Assessment and Accident Management Plan

A site-specific Accident Management Plan is located in Appendix J.

Table C3-3b (v) - Bioaerosol Risk Assessment

The installation has the potential to generate bioaerosols which may pose a risk to nearby sensitive receptors. A site-specific bioaerosol risk assessment (SSBRA) is presented in Appendix F.

3c - Types and amounts of raw materials

Table C3-3c – Types and amounts of raw materials

Types and amounts of raw materials used by the installation are summarised in the site-specific Residue Management Plan (RMP) which is located in Appendix I.

4 - Monitoring

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

The site has a number of emission points to air. Points A1 – A5 (3x CHP engines; 2x boilers) are subject to gas monitoring in accordance with the requirements of existing permit requirements and EA guidance.

Hours of operation of the flare (A6) are monitored and logged. In the unlikely event that the total annual hours of operation exceed 10% of the hours in a year (876 hours), emissions from the flare as per the existing permit would be subject to monitoring in accordance with EA guidance.

Points A28 and A29 (OCUs) will have bi-annual testing.

There is no routine monitoring proposed for points A7 – A18, A33 (no.12 x backup generators) or A19 and A20 (2 x boilers supplying heating and hot water to admin and operations buildings).

There is no routine monitoring proposed for points A21 – A27 (PRVs) or A30 (Cake Barn ventilation).

Table C3-4a – Emission Monitoring

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A1 (CHP Engine 1)	TQ 44962 81702	Oxides of Nitrogen (NO and NO_2 expressed as NO_2) – Annually Carbon Monoxide – Annually Sulphur Dioxide – Annually Total Volatile Organic Compounds – Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	BS EN 14792 BS EN 15058 BS EN 14791 BS EN 12619 (A) BS13526 (B)
A2 (CHP Engine 2)	TQ 44962 81702	Oxides of Nitrogen (NO and NO_2 expressed as NO_2) – Annually Carbon Monoxide – Annually Sulphur Dioxide – Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	BS EN 14792 BS EN 15058 BS EN 14791 BS EN 12619 (A) BS13526 (B)

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
		Total Volatile Organic Compounds – Annually		
A3 (CHP Engine 3)	TQ 44962 81702	Oxides of Nitrogen (NO and NO_2 expressed as NO_2) – Annually Carbon Monoxide – Annually Sulphur Dioxide – Annually Total Volatile Organic Compounds – Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	BS EN 14792 BS EN 15058 BS EN 14791 BS EN 12619 (A) BS13526 (B)
A4 (Boiler 1)	TQ 44962 81702	Oxides of Nitrogen – no limit set Carbon monoxide – no limit set	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	BS EN 14792 BS EN 15058
A5 (Boiler 2)	TQ 44962 81702	Oxides of Nitrogen – no limit set Carbon monoxide – no limit set	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	BS EN 14792 BS EN 15058
A6 (Emergency Flare Stack)	TQ 44842 81806	Hours of operation – continuous and if over 876 hours then: Combustion gases - annually		BS EN 14792 BS EN 15058
A7 – A10 (4x Perkins Emergency Standby Engines ASP4)	TQ 44364 82108 TQ 44368 82108 TQ 44378 82109 TQ 44382 82109	n/a	n/a	-
A11- A15) (5 x Finning CAT Emergency Standby Engines, Power house)	TQ 44953 81910 TQ 44938 81912 TQ 44936 81913 TQ 44922 81916 TQ 44921 81916	n/a	n/a	-
A16 (1x Finning CAT Emergency Standby	TQ 44645 81952	n/a	n/a	-

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
engine, Fine Screen)				
A17 (Perkins Emergency Standby Generator, Detritor)	TQ 44260 81996	n/a	n/a	-
A18 (Cummings B Emergency Lighting Standby generator)	TQ 44958 81951	n/a	n/a	-
A19 (Boilers Potterton, Admin Block Boilers)	TQ 44445 82332	n/a	n/a	-
A20 (Boiler Remeha Quinta, Operation Building)	TQ 45026 81841	n/a	n/a	-
A21 (THP PRV)	TQ 44972 81669	n/a	n/a	-
A22 – A27 (Biogas Storage Holder PRVs)	TQ 44895 81696 TQ 44920 81709 TQ 44909 81669 TQ 44934 81682 TQ 44923 81642 TQ 44948 81655	n/a	n/a	-
A28 (OCU 3)	TQ 44919 81773	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	NIOSH 6013 for analysis
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis	
A29 – (OCU 4)	TQ 44977 81741	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	NIOSH 6013 for analysis
		Ammonia: Once every six months	EN ISO 21877	

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
			OR CEN TS 1369 for sampling NIOSH 6016 for analysis	
A32 (Cake Barn Ventilation)	TQ 45063 81692	n/a	n/a	-
A33 (emergency standby generator)	TQ 44385 81974 (approx..)	n/a	n/a	-
S1 (Liquor sampling point)	TQ 44859 81752	n/a	MCERTS or ISO/IEC 17025 where available	
S2 (Liquor sampling point)	TQ 45068 81597	n/a	MCERTS or ISO/IEC 17025 where available	
S3a (Liquor sampling point)	TQ 45055 81644	n/a	MCERTS or ISO/IEC 17025 where available	
S3b (Liquor sampling point)	TQ 45091 81667	n/a	MCERTS or ISO/IEC 17025 where available	
S4 (Liquor sampling point)	TQ 45007 81677	n/a	MCERTS or ISO/IEC 17025 where available	
S5 (Liquor sampling point)	TQ 45024 81675	n/a	MCERTS or ISO/IEC 17025 where available	

4b - Point source emissions to air only

4b1 Has the sampling location been designed to meet BS EN 15259 clause 6.2 and 6.3?

No.

4b2 Are the sample ports large enough for monitoring equipment and positioned in accordance with section 6 and appendix A of BS EN 15259?

No.

4b3 Is access adjacent to the ports large enough to provide sufficient working area, support and clearance for a sample team to work safely with their equipment throughout the duration of the test?

No.

4b4 Are the sample location(s) at least 5 HD from the stack exit

No.

4b5 Are the sample location(s) at least 2 HD upstream from any bend or obstruction?

No.

4b6 Are the sample location(s) at least 5 HD downstream from any bend or obstruction?

No.

4b7 Does the sample plane have a constant cross sectional area?

No.

4b8 If horizontal, is the duct square or rectangular (unless it is less than or equal to 0.35 m in diameter)

No.

4b9 If you have answered 'No' to any of the questions 4b1 to 4b8 above, provide an assessment to how the standards in BS EN 15259 will be met.

As an existing operational site entering environmental permitting for the first time, sampling locations and sampling ports may not meet all of the requirements for BS EN 15259, but these are being checked onsite. Where a permanent sampling platform is not provided, temporary sampling platform is utilised to provide sufficient space, in accordance with standard industry practice, where sampling cannot be undertaken from the ground.

5 - Environmental impact assessment

5a Have your proposals been the subject of an environmental impact assessment under Council Directive 85/337/EEC of 27 June 1985 [Environmental Impact Assessment]?

No.

6 - Resource efficiency and climate change

6a - Describe the basic measures for improving how energy efficient your activities are

The Primary Digester Tanks are heated via the incoming sludge from the THP and do not require any additional heating input. The THP utilises heat exchangers to minimise energy use between batches. The CHP engines are suitably sized to maximise energy utilisation for the parasitic load, while minimising the use of the flare. Heat generated from the CHP engines is used to supplement steam raising within the auxiliary boilers.

Maintenance activities and low energy lighting is installed across the plant contribute towards energy efficiency.

6b - Provide a breakdown of any changes to the energy your activities use up and create

The main site energy source is electricity from the CHP engines supplemented by imported electricity from the National Grid and natural gas from the National Gas Grid. Diesel fuel is used for stand-by generator purposes only. The site CHP engines combusts indigenous biogas with the electricity used on site. The CHP engines also provides useable heat to the auxiliary boilers for raising steam to be used within the THP, via heat exchangers.

The boilers use biogas or imported natural gas, when required, to meet additional demands from the THP. Use of heat from the CHP engines reduces the demand on biogas and natural gas. in the boilers.

6c - Have you entered into, or will you enter into, a climate change levy agreement?

No, the activities are not eligible to take part in the CCL Scheme.

Describe the specific measures you use for improving your energy efficiency

The production and use of biogas to generate electricity and produce heat (which is used into the THP) on site minimises the use of fossil fuels onsite, whilst recovering biological wastes. Location of the heat exchange, boilers, CHP engines and THP all within close proximity minimises transmission losses on site, improving the efficiency of the process. Thames Water has a 100% renewable energy supplier.

Regular and proactive maintenance of pumps and insulation of pipework will improve efficiency and minimise the electrical demands and heat losses on site.

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

See response to question 3c above.

The processes take digested sludge which would otherwise require additional disposal and recover energy and nutrients which can be put to beneficial use.

Small quantities of chemical raw materials are required to control and maintain the process. These are all proven materials that are extensively used within the water industry.

The other main raw materials are used in the generation of electricity and heat and maintenance of combustion plant which is supplied to the treatment process.

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

The facility is a waste treatment plant, and the primary wastes produced through the processes on site are maintenance wastes. Production of maintenance waste is minimised by ensuring that preventative maintenance is carried out based on a combination of manufacturers' best practice and operational experience.

5. Form C4 Questions

1 What waste operations are you applying for?

The permit application is for one waste operation for the import of non-hazardous waste for treatment to the works inlet;.

For the full list of permitted activities and DAAs at this site, see Table C3—1a above.

1b –types of waste accepted and restrictions

The EWC list is included in the responses to form C3.

1c Deposit for recovery purposes

This is not a deposit for recovery application.

2 Point source emissions to air, water and land

There are no point source emissions to air, water and land associated with this waste operation.

3 Operating techniques

3a Technical standards

Please see responses to form C3 above.

3b General requirements

Please see responses to form C3 above.

4 Monitoring

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

Please see responses to form C3 above

4b Point source emissions to air only

There are no point source emissions to air associated with this waste operation

6. Form C6 Questions

The relevant questions within the form are those applicable to effluent and / or surface water run-off arising from the operation of an installation.

Q1About the effluent – details and type, continued

1a Give a brief description of the effluent discharge you want a permit for, for example, treated domestic sewage effluent

This effluent is a mixture of waste liquors from the operation of the installation for the anaerobic treatment of separated sewage sludge. It primarily comprises of dewatering liquors returned to the work inlet following the dewatering of sludge and dewatering of treated sewage sludge within the installation. Lower volume constituents will include rainfall; biogas condensate; boiler waste waters; contaminated run off and washdown water. The only wastes treated within the installation are sewage related, either being separated from the UWWTD flow in the wider works, or comprise of waste imports, principally of sludge from smaller satellite treatment works.

1b Give this effluent a unique name

Liquor returns.

1d Have you obtained all the necessary permissions in addition to this environmental permit to be able to carry out the discharge (see C6 guidance notes for more details)?

Yes. The discharge is into the inlet of a sewage works controlled by the applicant.

Q2 About the effluent – how long will you need to discharge the effluent for?

2c Will the discharge take place all year?

Yes, the discharge will take place all year.

Q3 How much do you want to discharge?

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

26,856 m3

3c What is the maximum rate of discharge?

310.83 litres/second.

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

26,856 m3

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

Q3b –The liquor arisings must come from the installation inputs as there is limited additional water inputs. The maximum volume of effluent discharged per day will consist of primary thickening liquors, post-digestion dewatering liquors and biogas condensate generated from the inputs and outputs to/from the Primary Digester Tanks.

Q3c – Maximum rate of discharge (L/second) is generated from the maximum volume of effluent per day [26,856.01 m^3 x 1000] / 86,400 (24 x 60 x 60) from sources such as thickening and dewatering. This gives a value of 310.83344907 litres, rounded up to 310.83 litres per second.

Q3d – The liquor arisings must come from the installation inputs as there is limited additional water inputs. The maximum volume of effluent discharged per day will consist of primary thickening liquors, post-digestion dewatering liquors and biogas condensate generated from the inputs and outputs to/from the Primary Digester Tanks.

Q4 No questions

Q5 Should your discharge be made to the foul sewer?

5a How far away is the nearest foul sewer from the boundary of the premises?

Not applicable, the site is located within the curtilage of a sewage treatment works and discharges into the works inlet via the site drainage system.

5b2 Discharges from all other premises including trade effluent

Not applicable, the site is located within the curtilage of a sewage treatment works and discharges into the works inlet via the site drainage system.

Q6 How will the effluent be treated?

6a Do you treat your effluent?

No. The Effluent generated by the process of treating sludge within the installation of the installation is returned to the inlet of the wider Beckton STW, where it is subject to aerobic treated in a mixture with UWWTD related waste waters.

6b Fill in Table 2 for each stage of the treatments carried out on your effluent in the order in which they are carried out

Order of Treatment	Code Number	Description
First	09	Primary settlement within sewage works
Second	31	Activated sludge process
Third	21	Sand filtration

6c You must provide details on a separate sheet of the final effluent discharge quality that the overall treatment system is designed to achieve

The final effluent discharge from the wider sewage treatment works is specified in Environmental Permit TH/CSSA.0360/019. Q7 What will be in the effluent?

7b Are any of the specific substances listed in 'Risk assessment for treated sewage or trade effluent discharges to surface water or groundwater' added to or present in the effluent as a result of the activities on the site?

At present, no sampling or analysis for all substances listed within the referenced risk assessment at the site has been undertaken. Only limited chemicals are added to the process within the installation boundary, primarily antifoam (in low doses, as required) and polymer to aid dewatering of sludge. A review of the appropriate MSDS data does not indicate the presence of 'specific substances' within those chemicals.

Sampling and analysis of the liquor returns to fully characterise the waste streams in accordance with BAT 3 will be undertaken at the site, in line with what is technically achievable, as per the commitment to undertake a chemical analysis of the installation's effluents as per "Return Liquors: BAT 3, 6, 7" within Appendix M.

7c Have any of the specific substances listed in 'Risk assessment for treated sewage or trade effluent discharges to surface water or groundwater' been detected in samples of the effluent or in the sewerage catchment upstream of the discharge?

At present, no routine sampling or analysis for all substances listed within the referenced risk assessment at the site has been undertaken either for effluent from the installation or within the wider sewerage catchment. Thames Water commits to undertaking a chemical analysis of the installation's effluents as per "Return Liquors: BAT 3, 6, 7" within Appendix M.

7d Are there any other harmful or specific substances in your effluent not mentioned in 'Risk assessment for treated sewage or trade effluent discharges to surface water or groundwater'?

At present, no sampling or analysis for all substances listed within the referenced risk assessment at the site has been undertaken. A review of the MSDS sheets for chemicals used within the installation does not indicate the presence of any other harmful or specific substances. Thames Water commits to undertaking a chemical analysis of the installation's effluents as per "Return Liquors: BAT 3, 6, 7" within Appendix M.

7e If you have answered 'No' to any of questions 7a to 7d provide details on a separate sheet of how you have established that the effluent is not likely to contain specific substances

Thames Water commits to undertaking a chemical analysis of the installation's effluents as per "Return Liquors: BAT 3, 6, 7" within Appendix M.

A review has been undertaken of the relevant MSDS sheets for chemical used routinely within the installation to look for substances identified within the risk assessments listed.

7f What is the maximum temperature of your discharge?

20°C back into the sewage works.

7g What is the maximum expected temperature change compared to the incoming water supply?

0°C.

Q8 Environmental risk assessments and modelling

8b Discharges to lakes, estuaries, coastal waters or bathing waters

The installation does not discharge to lakes, estuaries, coastal waters or bathing waters.

8d Discharges to groundwater

The installation does not discharge to groundwater.

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

No modelling has been undertaken on the output from the installation at present. The final effluent discharge from the wider works, which includes the installation arisings has previously been subjected to modelling as part of the environmental permitting discharge application process.

8f Environmental impact assessment

No environmental impact assessment has been carried out on the installation, as it is an existing facility.

Q9 Monitoring arrangements

9a What is the national grid reference of the inlet sampling point? (for example, SJ 12345 67890)

Not applicable to this installation.

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

No sampling point installed at present. Effluents will be sampled from the Sample point identified in Table C3-4a (approximately) within the installation.

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

No flow meter installed.

9e Does the flow monitor have an MCERTS certificate?

No. No flow meter installed.

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

No. Not installed as part of this installation.

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

Please see site emission point plan.

Q10 Where will the effluent discharge to?

10a Where the effluent discharges to

Tidal river, tidal stream, estuary or coastal waters. **10b Is this effluent discharged through more than one outlet?**

Yes.

10c If you answered yes to question 10b above make sure you show clearly on your discharge point appendix or appendices and site plan that this one effluent can discharge to more than one discharge point

Beckton STW discharges via three outfalls:

1. TQ 4547 8167 (Main Outfall)
2. TQ 4540 8211 (Aux Outfall)
3. TQ 4547 8151 (Tideway Outfall)

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

A4.1 Give the discharge point a unique name For example, 'Outlet 1' (you must use this name to identify the discharge point on the plan)

Outlet 1.

A4.2 Give the national grid reference of the discharge point

TQ 45470 81670

A4.3 Give the name of the watercourse, canal or the main watercourse it is a tributary of if you know it

River Thames

A4.4 Is the discharge into a:

Tidal river

A4.5 Does the discharge reach the watercourse by flowing through a surface water sewer?

No.

A4.6 Is the discharge point above the mean low water spring tide mark?

Yes. The discharge point is above the mean low water spring tide mark and this relates to a fixed pre-existing discharge point to the River Thames.

A4.7 How is the effluent dispersed?

Open Pipe system (final effluent outfall)

A4.8 Give details, on a separate sheet, of the design of the diffuser system

n/a

A4.9 Is the discharge made to a roadside drain or ditch?

No.

Appendix A. Figures

A.1 Site Location Plan

See document: B22849AM-JAC-BKN-DR-0001

A.2 Installation Boundary and Air Emission Points Plan

See document: B22849AM-JAC_BKN_DR-0002

A.3 Site Impermeable and Permeable Surfaces Plan

See document: B22849AM-JAC-BKN-DR-0003

A.4 Site Drainage Plan

See documents: TW_STC_EPR_15a_ BKNS1ZZ-DPL-001

A.5 Process Flow Diagram

See document: B22849AZ-BECKS1ZZ-LSX-DR-P-0001

A.6 Site Photographs

See document: TW_STC_EPR_15a_BKN_APPA.6

Appendix B. CoTC

See document: TW_STC_EPR_15a_ BKN_APPB

Appendix C. Site Condition Report – H5

See document: TW_STC_EPR_15a_BKN_APPC

Appendix D. BAT Assessment

See document: TW_STC_EPR_15a_ BKN_APPD

Appendix E. Odour Management Plan

Includes: Odour Management Plan and Odour Risk Assessment. See document: TW_STC_EPR_15_ BKN_APPE

Appendix F. Bioaerosol Risk Assessment

See document: TW_STC_EPR_15a_ BKN_APPF

Appendix G. Containment Assessment

G.1 Containment Options Report (CIRIA 736)

See document: B22849AZ-JA- BECKS1ZZ-100-RP-Z-0001

G.2 Containment Assessment

See document: B22849AZ-JA- BECKS1ZZ-100-CA-P-0001

Appendix H. Leak Detection and Repair (LDAR) Plan

See document: TW_STC_EPR_15a_ BKN_APPH

Appendix I. Residue Management Plan

I.1 Residue Management Plan

See document: TW_STC_EPR_15a_ BKN_APPI.1

I.2 MSDS Zip File

See zip folder: TW_STC_EPR_15a_BKN_APPI.2

Appendix J. Accident Prevention and Management Plan

See document: TW_STC_EPR_15a_BKN_APPJ

Appendix K. Acceptance of Third-Party Waste Imports

K.1 Acceptance of Third-Party Waste Imports

See document: TW_STC_EPR_15a_ BKN_APPK.1

K.2 Acceptance of TWUL Inter-Site Sludge and Cake

See document: TW_STC_EPR_15a_ BKN_APPK.2

Appendix L. Air Quality Assessment

Not Required

Appendix M. Liquor Monitoring Proposal

See document: TW_STC_EPR_15a_BKN_APPM