Sludge Treatment Centre Permitting

Environmental Permit Variation Application - Crossness Sludge Treatment Centre

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1. Introduction

This substantial variation application relates to a biological treatment permit for the Crossness Sludge Treatment Centre (STC), located at the Crossness 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 and cake transfers, 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, blending of indigenous sludge 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 previous permit in place at the site for the listed activity operation of combustion plant EPR/PB3239AW/V003 will be merged and remain in place as Directly Associated Activities (DAA) to this listed process. 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 Environmental Permit (EPR/UP3737PQ) 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 and is outside the scope of this permit variation application. This incineration plant is non-operational and will remain so.

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 sludge import points. The indigenous sewage sludges are generated from the aerobic treatment of both waste waters from the sewer network arriving into the site at the works inlet, and, from imported waste materials, arriving by road transport into a dedicated waste import point 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 all other combustion plant at the facility, which is classified as a 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 Crossness STC is located within the Crossness STW, south of the River Thames and near to the Thamesmead area of the London Borough of Bexley.

The STC treats both indigenous sludges and imported sludges. Indigenous sludge is generated from the incoming flow to the STW, which is screened, passes to the Primary Settlement Tanks and through the aerobic treatment process under the UWWTD. Indigenous sludges derived from the main flow are then subject to sludge thickening processes and thickened sludge is transferred to either a Primary Sludge Blending Tank or SAS Blending Tank, which are connected to an Odour Control Unit. Liquors from Primary Sludge and SAS thickening processes are returned via Liquor Return Pumping Stations to the head of the works for treatment via the urban waste water treatment route.

Additional Sludge Buffer Tanks are available to be used for the storage of sludge as required if sludge cannot be processed by the Thermal Hydrolysis Plant (THP). Imports of sludge from other works are delivered by tankers to import points and pumped to the Sludge Buffer Tanks. Imported sludges are pumped to the Sludge Blending Tanks where they combine with indigenous sludge. All such imports are subject to appropriate waste pre-acceptance and acceptance checks, prior to import. Similarly sludge may also be discharged into the THP High Energy Blending Tank.

The STC comprises of an offloading point for permitted imported wastes close to the works inlet of the STW. Wastes are imported via tanker to the Works Inlet for treatment through the aerobic treatment process via the UWWTD at the site. 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 vehicles are directed to the offloading point, which is an impermeable surfaced area, equipped with sealed drainage and kerbing to reduce the risk of spillages. Incoming tankers park in the offloading area, and hook up to the offloading point, using the site supplied flexible hose pipes to prevent misconnection issues. The offloading then proceeds, with the inlet point discharging via a dedicated pipeline into the incoming flow to the site.

Sludge from the two Blending Tanks is pumped to the THP High Energy Blending Tank and further pumped to THP Blended Sludge Tanks and to Pre THP Dewatering Feed Tanks via Sludge Screens. Sludge is then dewatered in Pre THP Dewatering Plant and pumped to the THP Feed Silo. Tanks between the two Sludge Blending Tanks and THP Feed Silo are odour abated as required via Odour Control Units (OCUs). Sludge from the THP Feed Silo 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. Liquor from all the Pre THP Dewatering Plant is returned via Liquor Return Pumping Stations to the Works Inlet for treatment via the urban waste water treatment route. From the THP, sludge is cooled and transferred to one of the eight anaerobic Primary Digester Tanks at the site. The Primary Digester Tanks are of concrete construction with a Biogas Storage Holder in the headspace of each Primary Digester Tank.

Following treatment over an appropriate number of days within the Primary Digester Tanks, digested sludge is transferred to two enclosed, Digested Sludge Buffer Tanks. From these Digested Sludge Buffer Tanks, sludge is dewatered by Digested Sludge Dewatering Plant the dewatered sludge then 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 Plant is returned via Liquor Return Pumping Stations to the Works Inlet for treatment via the urban waste water treatment route. The Digested Sludge Buffer Tanks and Digested Sludge Dewatering Plant are odour abated via an OCU.

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. Individual biogas lines from each Biogas Storage Holder join a common line transferring the biogas for use on site within the CHP engines, boilers, or emergency flare. The biogas lines are fitted with foam trap pots and condensate pots which captures entrained foam and moisture for discharge to the site drainage system. The Biogas Storage Holders are fitted with Pressure and Vacuum Release Valves (PVRVs) 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/PB3239AW/V003 as a s1.1A1 listed combustion plant activity due to their thermal input exceeding 50MW. This permit remains as at present.

In the event that additional heating is required for the THP, this is provided by the two onsite boilers. In the event there is excess biogas, i.e. more than the CHP engines or boilers can utilise, or in the event that the CHP engines or boilers are unavailable, there are two ground mounted emergency flares. These are utilised under 10% of the year or less than 876 hours per year.

This application includes the import of treated sludge cake from other works, for temporary storage within the site Cake Barn. All such imports will be subject to appropriate waste pre-acceptance and acceptance checks, prior to import, including confirming that the incoming cake complies with the requirements of both SUiAR and BAS.

Imported treated sludge cake is offloaded into an area within the cake barn, so as to be stored separately to indigenous sludge cake. The waste stream is the same as that arising from the treatment of sludge within the Crossness STC with the same characteristics, composition and eventual end use – application to land. As such, the infrastructure which is acceptable for use for site cake is appropriate for the imported material. Cake is stored on an impermeable engineered surface within the cake barn, for the shortest time practicable, the duration depending on factors such as prevailing weather and availability of the landbank.

The STW includes a number of Emergency Standby Generators and other combustion assets that are already permitted.

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 UWWTD by the Environment Agency. It relates to a biological waste treatment permit for the Crossness STC, located at the Crossness 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 UWWTD treatment route along with the import of treated sewage cake from other sites for temporary storage pending offsite transfer in the Cake Barn. There are a number of DAAs, including the operation of a Thermal Hydrolysis Plant (THP) for pre-treatment. The site's existing listed activity is for a combustion plant with an aggregated thermal input of greater than 50MW.

The biogas CHP engines and associated boilers are covered by an existing s1.1A1 environmental permit EPR/PB3239AW/V003. This permit is subject to a substantial variation to add a new listed activity of anaerobic digestion for recovery.

Site Location

The Crossness site is located immediately south of the River Thames, separated by the Thames Path, in an area of the London Borough of Bexley. Although the site is immediately bounded by open and green space on all sides, the wider area is suburban in nature with a mixture of uses. To the east is the Riverside Resource Recovery Waste Incinerator (approx. 300 m to the east) and a number of warehouses and distribution centres (approx. 500 m to the east). To the south, is the A2016 Eastern Way and further warehouse units (approx. 300 m to the south) and a large school (approx. 700 m to the south). To the west is a large residential development with some commercial premises (approx. 250m to the west). The site is located within the boundaries of AQMA, namely the Bexley AQMA, which was declared by Bexley Borough Council for Particulate Matter PM10 (24-hour mean) and Nitrogen Dioxide NO_2 (Annual Mean).

The whole of the STW and STC is within a Flood Zone 3 in an area that benefits from flood defences. This indicates that the land within this zone would have a high probability of flooding without the local flood defences. These protect the area against a river flood with a 1:100 annual probability of flooding as a result. The site sits outside the boundaries of any Source Protection Zones.

A Local Nature Reserve (LNR) is located immediately adjacent to the site (namely Crossness LNR), whilst Abbey Wood Site of Special Scientific Interest (SSSI) is located approximately 1.5 km to the South-West of the site. There are 20 Local Wildlife Sites (LWSs) within 200m of the site including Crossness Sewage Treatment Works Pond (within the wider sewage treatment works site), Erith Marshes (adjacent) and River Thames and Tidal Tributaries (immediate North of the site). The closest area of ancient and semi-natural woodland habitat is Lesnes Abbey Woods located approximately 1.2km to the South-West of the site. There are no Ramsar sites, Special Protection Areas (SPAs), Marine Protection Areas (MPAs) or Special Areas of Conservation (SACs) within 10 km of the site.

There are also records of protected species and habitat within the specified screening distance of the site.

A site plan, showing the permitted area of the Crossness STC and wider STW can be found in Appendix A.2 while a process flow diagram summarising the sludge treatment process can be found in A.5 Process Flow Diagram. A site tank inventory is included below, followed by the site process description, which identifies where tanks are located within the sludge treatment process.

Table 2.1 Site tank inventory

Tank Purpose	Number	Operational Volume (m^3)	Total Operational Volume (m^3)	Construction
Picket Fence Thickeners	6	1,856	11,136	Steel
Primary Sludge Blending Tank	1	3,655	3,655	Concrete
SAS Blending Tank	1	3,655	3,655	Concrete
Sludge Buffer Tanks	12	4,000	48,000	Concrete
THP High Energy Blending Tank	1	30	30	Steel
THP Blended Sludge Tanks	2	235	470	Steel
Pre-THP Dewatering Feed Tanks	2	183	366	
THP Feed Silos	2	85	170	Steel
THP Process	1	Consisting of the following		
Pulper Tank	1	34	34	Steel
Reactor Tanks	4	13	52	Steel
Flash Tank	1	42	42	Steel
Primary Digester Tanks	8	3,330	26,640	Concrete
Digested Sludge Buffer Tanks	2	250	500	Steel
		Overall Total	94,750	
Polymer Tank (for Primary Sludge Thickening)	1	10 tonnes		Steel
Polymer Tank (for SAS Thickening)	1	10 tonnes		Steel
Polymer Silo (for Pre THP Dewatering)	1	30		Steel
Polymer Silo (for Digested Sludge Dewatering)	1	30		Steel
Main diesel storage tanks	2	350		Steel

Waste Activities

The STC comprises of imports of waste for biological treatment and two additional waste activities (imports of non-hazardous waste to the head of the works and imports of non-hazardous waste to the Cake Barn). 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 Crossness STC by tanker and consists of sludge from other Thames Water sites, which forms a waste activity for the site.

Waste 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 and waste imports to the Cake Barn. Import to the Cake Barn are for temporary storage of digested sludge, pending recovery offsite. These imports are a contingency option primarily and will not be routinely used.

Waste imports to the Works Inlet consists of an offloading point for permitted imported wastes that is located close to the STW entrance. 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 other than by tanker. 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 import area is of engineered concrete, is kerbed and connected to the site drainage. Incoming tankers park in the offloading area and hook up to the offloading point, via the site supplied flexible hose pipe (to prevent misconnections). Imported waste materials goes through the data logger that records the volume of waste material discharged and through a partially above ground and partially subsurface pipe before feeding into one of the STW screens, in order to remove inorganic materials, before the imported material is mixed with the main incoming sewer derived material. A webcam covers the waste import area.

A second additional waste operation at the same site is for the import of non-hazardous treated, dewatered sludge cake from other works, for temporary storage pending transfer offsite. All such imports will be subject to appropriate waste pre-acceptance and acceptance checks, prior to import, including checking that the incoming cake complies with the requirements of SUiAR and BAS. The waste stream is the same as that arising from the treatment of sludge within the Crossness STC with the same characteristics, composition and eventual end use - application to land. As such, the infrastructure which is acceptable for use for site cake is appropriate for the imported material.

Cake is stored on an impermeable surface within the Cake Barn, for the shortest time practicable, the duration depending on factors such as prevailing weather and availability of the landbank.

Sludge Processes

Flow from the incoming sewer and imported waste is pumped for screening and grit removal, prior to entering into the aerobic treatment process within the Primary Settlement Tanks (PSTs). The aerobic treatment process is split into three streams – A, B and C streams. Sludge may arise via three distinct routes, which are all thickened and then blended within one of the two Sludge Blending Tanks. Sludges imported to the site from other waste water treatment sites may be discharged via the Sludge Buffer Tanks.

Primary sludge from PSTs in the A and B stream is pumped via a subsurface pipe into Picket Fence Thickeners (PFTs), which are located within the central area of the site. The PFTs are steel construction reinforced with fibreglass, with fixed roofs. The PFTs are connected to an odour control unit (OCU) to manage odour emissions. Each PFT tank has a small conical base which extends subsurface and a rotating arm which scraps sludge into a central sump where two pumps, operating on a duty/assist basis, pump the sludge via an aboveground pipe to the Primary Sludge Blending Tank. The PFTs are fitted with a number of safety features and one-way valves on the feed pumps. Liquor from the PFTs is returned via Liquor Return Pumping Station 2 to the site drainage system for additional treatment through the STW. Liquor Return Pumping Station 2 is connected to an OCU.

A second sludge stream is from the PSTs in C stream which is thickened by the Primary Sludge Thickening Plant. Primary sludge from the PSTs is pumped to the Primary Sludge Buffer Tanks - which are outside of the scope of this permit - before being pumped to the Primary Sludge Thickening Plant. The Primary Sludge Thickening Plant is odour abated via an OCU. Five gravity belt thickeners operate to thicken the sludge, with the addition of a polymer (from a bulk powder silo system) mixed with final effluent/potable water to aid coagulation, and the generated liquor is returned via the site drainage and Liquor Return Pumping Station 1 to the Works Inlet for treatment. Thickened sludge is then pumped via a subsurface pipe to the Primary Sludge Blending Tank. Liquor Return Pumping Station 1 is connected to an OCU.

The third sludge stream is SAS from the UWWTD process, which is pumped via a subsurface pipe to the SAS Buffer Tank, which is outside of the scope of this permit. Pumps transfer the SAS to the SAS Thickening Plant that are located within two buildings, where a polymer (from a bulk powder silo system) mixed with final effluent/potable water is added to aid coagulation. Liquors are returned via Liquor Return Pumping Station 1 to the site drainage to the works for treatment. The thickened sludge falls into a hopper and is transferred via a subsurface pipe to the SAS Blending Tank.

Sludge from other works is accepted to sludge import points via site-supplied transfer hoses (to prevent misconnections). Records are kept of the volume of sludge transferred and the originating site. Sludge is discharged into a Sludge Buffer Tank, before being pumped to either the Primary Sludge Buffer Tank or the SAS Blending Tank, where the imported sludge combines with indigenous sludge. Similarly, sludge may also be discharged into the THP High Energy Blending Tank.

The Primary Sludge Blending Tank and SAS Blending Tank are of concrete construction, covered with fixed roofs and are connected to an OCU. The Primary Sludge Blending Tank can receive a mixture of thickened primary sludge and thickened SAS while SAS Blending Tank receives thickened SAS. Both Sludge Blending Tanks are subject to mixing via dedicated mixer pumps. As required, sludge can be transferred from the Sludge Blending Tanks to Sludge Buffer Tanks.

Thermal Hydrolysis Processes

From the two Sludge Blending Tanks, sludge is pumped via an aboveground pipe bridge from each tank via dedicated pumps, to the THP High Energy Blending Tank, which is found within the footprint of the THP and is the first step of the THP Process. Pumping is inhibited by both high levels within the THP Blended Sludge Tanks and low levels within the two Sludge Blending Tanks.

In the event of there being insufficient THP capacity to process sludge, e.g. if the THP is offline for maintenance, storage capacity is available to store both SAS and primary sludge in 12 Sludge Buffer Tanks. Tanks are used to temporarily store sludge prior to treatment within the THP Process with sludge gravitating from the two Sludge Blending Tanks before it is returned from the Sludge Buffer Tanks to either of the two Sludge Blending Tanks for treatment via the THP.

Thickened sludges combine within the THP High Energy Blending Tank, an above ground steel tank that is odour abated via an OCU and has an external mixer pump. The sludges are blended in order to achieve a homogenous blend of SAS and primary sludges for downstream processes. This blended sludge gravitates to THP Blended Sludge Tanks where further mixing takes place. The THP High Energy Blending Tank contains a high-level switch to prevent overtopping of the tank, that is monitored by Supervisory Control and Data Acquisition (SCADA) equipment and odour abated via an OCU.

The THP Blended Sludge Tanks are of steel construction, covered and odour abated via an OCU. Levels within the THP Blended Sludge Tanks are monitored and is controlled via SCADA with tanks filling equally and high-level floats to prevent overfilling. The mixed sludge is then pumped to Sludge Screens, which remove further rag and inorganic material which is discharged into skips for offsite transfer and disposal, with the screened sludge entering into two Pre THP Dewatering Feed Tanks. The Pre THP Dewatering Feed Tanks are of steel construction, covered, odour abated via an OCU, and feeds sludge via dedicated pumps to the Pre THP Dewatering Plant, which dewaters

the sludge prior to the THP Process. The THP Dewatering Feed Tanks have high level floats to prevent overfilling and are monitored via SCADA.

A polymer is added to each Pre THP Dewatering Plant feed line to aid coagulation, with the polymer being made up from a bulk powder system mixed with final effluent/potable water and stored in a day tank for use. The liquors from the Pre THP Dewatering Plant combines and returns via a common line to site drainage Liquor Return Pumping Station 3 and Liquor Return Pumping Station 1, where it is pumped back to the inlet for treatment. Thickened sludges fall into hoppers and is pumped, via dedicated pumps, to the top of the THP Feed Silo. Malodourous air from the sludge hoppers is subject to odour abatement via an OCU.

There are two aboveground THP Feed Silos, which are each dedicated to a THP Process stream. The THP Feed Silos are monitored by high level alarms linked to SCADA and if the levels within the THP Feed Silos reaches the high set point, all of the Pre THP Dewatering Plant are inhibited. The THP Feed Silos act as a buffer capacity for the THP Process and are of steel construction, each with a THP Feed Pump Hopper that feeds the Pulper Tank via a THP Feed Pump. THP Feed Silos are connected to an OCU. Normally, each feed pump is dedicated to an individual THP Process stream (A or B stream), but each feed pump can be used to feed either stream.

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 to make the sludge more biodegradable within the anaerobic digestion process. THP Process combines medium pressure boiling of sludge and is followed by a rapid decompression to break down larger organic molecules, making them more easily digestible by the microbes in the anaerobic digestion process. The process also sterilises the sludge, destroying pathogens in the sludge so it exceeds the requirements for subsequent use in agriculture.

In the Pulper Tank, fresh dewatered sludge is preheated via recovered steam from the Reactor Tank and the Flash Tank; and mixed with warmer sludges to provide a homogenous blend to each of the Reactor Tanks. When a batch of sludge is called for, the required volume is pumped from the Pulper Tank to one of the Reactor Tanks for treatment and the cycle commences. Once filled with sludge, the Reactor 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 Pulper Tank for pre-heating of another batch of sludge. A second valve, at the bottom of the Reactor Tank is then opened and the sludge is discharged to the Flash Tank. The Flash Tank provides a thermal buffer to release excess energy from the sludge prior to it entering downstream processes. Steam from the Flash Tank is vented back to the Pulper Tank, with the sludge discharged from the tank into THP Coolers that use final effluent from site to lower the temperature to be more optimal for anaerobic digestion in the Primary Digester Tanks. At this point, anti-foam from an Intermediate Bulk Containers (IBC) located on a bund is dosed in, prior to transfer of sludge to the Primary Digester Tanks

The THP Process is typically a 90-minute process, with pressures of approximately 5.8 bar pressure and 160°C temperature used within the process, which takes place aboveground and in an entirely bunded area with drainage returning to the Works Inlet for further treatment. Each Pulper Tank, Reactor Tank and Flash Tank is fitted with a high-level switch to prevent overfilling and a bursting disc to prevent over-pressurisation, amongst other monitoring and safety features. 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 Process stream to reduce temperature and moisture content prior to further treatment of this gas.

Digestion Processes

Digester feed pumps transfer the hydrolysed sludge from the THP Process to the Primary Digester Tanks. Each Primary Digester Tank also has a sludge recirculation pump that operates continuously to return cooler sludge, from near the base of each tank to combine with the warmer hydrolysed sludge in order to maintain optimum temperature – there is no additional heat input to the Primary Digester Tanks. Separate mixer pumps are used to aid biogas collection and re-circulation of sludge within each Primary Digester Tank to minimise foaming. All eight Primary Digester Tanks are of the same concrete construction, slightly conical based and with a membrane type Biogas Storage Holder on top of each tank. 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 iron dosing is

required, this takes place via a separate feed for removal of contaminants. After approximately 12 days residence time, digested sludge is pumped via a subsurface pipe to two Digested Sludge Buffer Tanks prior to dewatering.

The Digested Sludge Buffer Tanks are located outside of the Cake Barn and operate in parallel. The Digested Sludge Buffer Tanks are flat-bottomed, of steel construction and 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 first floor of the Cake Barn. Dedicated feed pumps transfers sludge from the Digested Sludge Buffer Tanks to Digested Sludge Dewatering Plant, where following the addition of a polymer coagulant, 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/potable water and stored in a day tank for use. A common line returns all of the dewatering liquors by gravity to the site drainage, via Liquor Return Pumping Station 4 and Liquor Return Pumping Station 1 to the Works Inlet for additional treatment.

The Cake Barn is fully enclosed and subject to air abstraction and discharge to atmosphere, with an engineered floor that has three cake bays that receive digested sludge cake from the Digested Sludge Dewatering Plant above. Digested sludge cake is removed from the three bays by shovel loader vehicles and temporarily stored within one large bay prior to being removed from the site. Digested sludge cake is subject to removal from site under the Sludge Use in Agriculture Regulations 1989 (SUiAR), and in accordance with the BAS. A site-specific Bioaerosol Risk Assessment is appended to this application in Appendix F.

Biogas

Biogas from the Primary Digester Tanks is captured in 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. Methane gas detectors linked to SCADA are fitted to detect any biogas leaks in the air space between the inner and outer biogas bag and level transmitters monitor the biogas volume within the inner bag which 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.

The above ground biogas transfer pipeline is equipped with condensate pots and foam pots that capture entrained moisture and foam from the generated biogas and allow it to be drained to the site drainage system and Liquor Return Pumping Station 1 for treatment through the UWWTD system. This improves the quality of the biogas and reduces impurities that could reduce the efficiency of the CHP engines. Biogas 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 emergency flares. 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 fuel within the three CHP engines that are present on site to generate electricity, but it 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 one of the two emergency flares.

The three CHP engines are all MWM TGC 2020 V20 models with a thermal input of 4.68 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 Process steam demand, via lagged and insulated pipework. These are 'existing' combustion plant and are permitted by the existing Combustion Plant Environmental Permit (EPR/PB3239AW/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 4.749 MWth each. Emissions from the three CHP engines and two boilers have individual flues which share a common, 45m high stack.

Two carbon-based siloxane filters are 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. A third standby filter is available in the event of one filter being offline.

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 are two ground mounted emergency flares which can combust biogas. These are utilised under 10% of the year, less than 876 hours per year and its use is recorded via SCADA.

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.

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 Crossness 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 digestor operations are monitored automatically from the control centre at the site and outside of normal operational hours, from the regional control centre. Checks include digester health, temperature and operation. As described, tanks are equipped with appropriate high-level alarms and automatic cut off valves to minimise releases. The Primary Digester Tanks, THP Process vessels and Biogas Storage Holders are also fitted with dual pressure relief valves which operate in an emergency to minimise releases from over- or under-pressurisation. Site operations are covered by Thames Water's management system, including the preventative maintenance programme 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 Crossness 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. Crossness fits into the fourth row of the table.
- Dry solids feed: see table below, Crossness 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 Tank. The typical range for VFAs in a Primary Digester Tank 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.

Cake imports are stored separately in the cake barn, and their location can be identified on this basis.

Odour

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

Bioaerosols

Digested sludge cake at Crossness is handled within an enclosed cake barn and is in excess of 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

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

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

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 DAAs:

- **Storage of biogas;**
- **Emergency flares;**
- **Oil Storage;**
- **Drainage – surface water drainage system;**
- **Drainage – condensate drainage system;**
- **Water treatment – demineralisation plant**

- Imports of waste, including sludge from other sewage treatment works for treatment
- Blending of indigenous sludges and imported wastes/waste sludge prior to treatment
- Storage of digestate prior to dewatering;
- Pre-treatment of sewage sludge by Thermal Hydrolysis Plant (THP);
- Dewatering of digested sewage sludge;
- Transfer of dewatering liquors via site drainage back to the head of the sewage treatment works;
- Storage of dewatered digested sludge cake prior to offsite recovery;
- Operation of siloxane filter plant; and,
- Storage of raw materials.

The waste activities at the site are:

- Imports of waste to the works inlet for treatment through the UWWTD route ; and,
- Imports of digested sludge cake for temporary storage pending off-site removal .

DAAs at the installation which are in bold are currently permitted under permit EPR/PB3239AW/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 4.68 MWth CHP engine;
- 2x 4.749 MWth boilers;
- 6x emergency standby diesel generators including 4x Man Paxman engines with net rated thermal input of 5.2 MW each (which are existing MCP) and 2x MTU engines with net rated thermal input of 5.6 MW each (which are existing MCP and within the scope of the existing s1.1 listing); and,
- Other combustion equipment with net rated thermal input less than 1 MW each, aggregated net rated thermal input approx. 1.2 MW.

The CHP engines comprise a Tranche A generator under Specified Generator Controls. Total thermal input of site is approximately 57 MW.

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. 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/PB3239AW/V003 determined 23/02/2021.

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

Crossness Sludge Treatment Centre

Crossness Sewage Treatment Works

Belvedere Road

Thamesmead

London

SE2 9AQ

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
Crossness 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/PB3239AW/V003

Name	Installation schedule 1 references	Description of the installation activity	Description of waste operations	Proposed changes document reference
Crossness STC	*Section 5.4 Part A(1) (b); i*	Biological treatment by means of Anaerobic digestion		This document
Crossness STC			Imports of non-hazardous waste for treatment and/or temporary storage	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/PB3239AW/V003 - Crossness STW Combustion Plant

2d Treating batteries

The installation is not 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

Event Name	Court	Date of hearing	Fine	Summary
				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

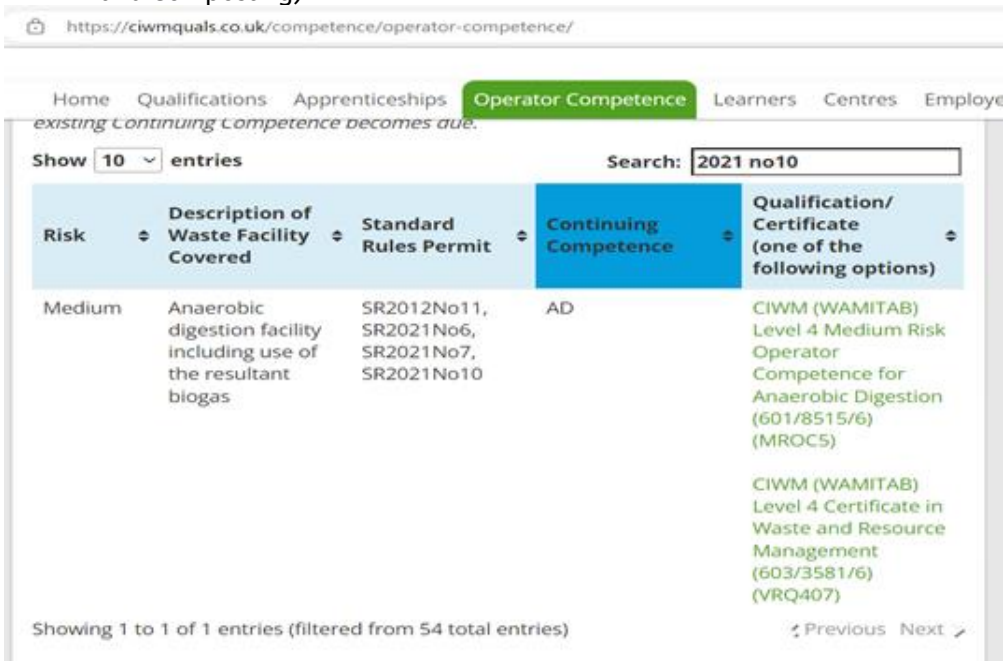
Thames Water uses WAMITAB qualified staff at their waste facilities. The relevant person for the site has been named below and full details have been provided separately on a spreadsheet:

Mr Dean Horsley.

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, Crossness 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 for:

- A.1 Site Location Plan
- A.2 Installation Boundary and Air Emission Points
- A.3 Site Impermeable and Permeable Surface Plan
- A.4 Site Drainage Plan
- A.5 Process Flow Diagram
- A.6 Site Photographs

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

See Appendix C for the Site Condition Report.

5c Provide a non-technical summary of your application

Please see earlier text in Section 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
Abbey Wood	SSSI	South-West	1.5 km
Crossness	LNR	East	0m
Lesnes Abbey Woods	LNR	South-West	1.2 km
n/a	SAC	n/a	n/a
n/a	SPA	n/a	n/a
n/a	Ramsar	n/a	n/a
n/a	NNR	n/a	n/a
n/a	MPA	n/a	n/a
Lesnes Abbey Woods	Ancient & Semi-Natural Woodland	South-West	1.2 km

Site Name	Designation	Direction from site	Distance from site
List of Local Wildlife Sites			
Scratton's Farm Ecopark Franks Park, Belvedere Crossness Sewage Treatment Works Pond Belvedere Dykes Dagenham Breach and the lower Beam River in Dagenham Lower River Beam and Ford Works Ditches River Thames and tidal tributaries Lesnes Abbey Woods and Bostall Woods Ridgeway in Greenwich Tump 53 Nature Park Southmere Park &Yarnton Way/Viridion Way The Ridgeway Crossway Park and Tump 52 Erith Marshes Goresbrook and the Ship & Shovel Sewer Gallions Reach Park Twin Tumps and Thamesmere Thamesview Golf Course Crossways Lake Nature Reserve and Thameside Walk Scrub Rainham Railsides			All sites <2,000 m

Data taken from MAGIC.gov.uk website, accessed January 2023 and also from the EA Pre-Application Nature and Heritage Conservation Screening Report (May 2022) for the site. For habitat sites, the relevant distance for consideration are: International designations (SAC, MPA, SPA and Ramsar - 10km); National designations (SSSI – 2km); Local and National Nature Reserves, LWSs and areas of Ancient Woodland (2km).

The Crossness Sewage Treatment Works is in close proximity to a number of designated habitats and the nearest one to the site, Crossness LNR is located along the eastern perimeter of the site. A second LNR, Lesnes Abbey Woods, is located approximately 1.2 km to the South-West of the site and the Abbey Wood SSSI is located approximately 1.5 km to the South-West of the site.

There are no SACs, Ramsar sites or MPAs within 10 km of the site and no NNRs within 2km of the site.

There is one area of Ancient Woodland within 2 km of the site, comprising Lesnes Abbey Woods Ancient and Semi-Natural Woodland located approximately 1.2km to the South-West of the site.

There are 20 non-statutory designated LWS's, which are located within 2 km of the site of Crossness Sewage Treatment Works, including the Crossness Sewage Treatment Works Pond LWS, Erith Marshes LWS and River Thames and Tidal Tributaries LWS.

There are also records of protected species (protected fish and protected fish migratory routes) located within the specified screening distance (up to 500m) of the site associated with the River Thames and its tidal tributaries. There are also protected habitats (Mudflats, Coastal and Floodplain Grazing Marsh and Mudflats)

located within the specified screening distance (up to 500m) of the site associated with the southern banks of the River Thames. The Coastal Saltmarsh Mudflats at this location are a designated Priority Habitat.

The site sits outside the boundaries of a Source Protection Zone (SPZ).

The majority of the site sits within a Flood Zone 3 that is protected by flood defences and is immediately adjacent to a Flood Zone 3 area with a high annual probability of flooding, having a 1:100 or greater annual probability of flooding. The permitted area of the site sits fully within a Flood Zone 3 protected area.

The site is completely within an AQMA, namely the Bexley AQMA, declared by Bexley Borough Council for particulate matter PM10 (24 hour mean) and Nitrogen dioxide NO_2 - Annual 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 immediately South of the River Thames and immediately bounded on three sides by open, green space. However, the wider area is suburban in nature and the Thames Path footpath separates the site from the River Thames while the A2016 runs to the South of the site. The nearest industrial premises are located approximately 300 m to the East of the site and commercial premises are located approximately 500 m to the East. The nearest residential dwellings are located approximately 250 m to the West of the site. Ecological receptors: There are no SACs, SPAs, MPAs or RAMSAR sites within 10km of site. A LNR is located immediately adjacent to the site whilst a further LNR and SSSI can be found approximately 1.2 km and 1.5 km to the South-West of the site. There is one area of Ancient Woodland within 2 km of the site located approximately 1.2km to the South-West. There are 20 non-statutory designated LWS's within 2 km of the Crossness Sewage Treatment Works.	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 and is stored within a totally enclosed cake barn with continuous air extraction, and therefore dust and bioaerosols will not impact on nearby receptors. A wheel wash is used for vehicles exiting the digested sludge cake barn. Roads will be maintained to avoid the production of dust.	√

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
		Anerobic 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. Please see Appendix F for the site specific bioaerosol risk assessment.	
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 completely within an AQMA, namely the Bexley AQMA, declared by Bexley Borough Council for particulate matter PM10 (24 hour mean) and Nitrogen dioxide NO2 - Annual Mean. 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 boilers. Pressure/vacuum relief valves are not used routinely to control biogas volumes and would only operate in an emergency. Activation of PVRVs would cause an alarm on the SCADA system. Fugitive emissions to air are assessed in Table C3-3b(i).	X
Assessment of point source and fugitive emissions to water	The River Thames is located immediately to the North of the site. The whole of the works is in Flood Zone 3 area that benefits from flood defences. Surface water drainage within the site drains to the sewer 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 processes are limited (comprising only biogas condensate, 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.	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,	X

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
	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.	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.	
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 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 electricity consumption. Insulated hot water pipes minimises heat losses during transmission.	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 (SPZ). Aquifers are classified as Secondary A (bedrock 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 immediately South of the River Thames and immediately bounded on three sides by open, green space. However, the wider area is suburban in nature and the Thames Path footpath separates the site from the River Thames while the A2016 runs to the South of the site. The nearest industrial premises are located approximately 300m to the East of the site and commercial premises are located approximately 500 m to the East. The nearest residential dwellings are located approximately 250m to the West of the site.	Site design minimises 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

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
	Ecological receptors: There are no SCAs, SPAs, MPAs or RAMSAR sites within 10km of site. A LNR is located immediately adjacent to the site whilst a further LNR and SSSI can be found approximately 1.2 km and 1.5 km to the South-West of the site. There is one area of Ancient Woodland within 2 km of the site located approximately 1.2km to the South-West. There are 20 non-statutory designated LWS's within 2 km of the Crossness Sewage Treatment Works.		
Other issues (including visual impact)	Protected Species & Habitats	There are records of protected species -protected fish (Smelt, European Eel) and protected fish migratory routes (for Smelt, European Eel, Atlantic Salmon, Twaite Shad, Allis Shad, River Lamprey and Sea Lamprey) located within the specified screening distance (up to 500m) of the site associated with the River Thames and its tidal tributaries. There is also protected habitat (Coastal Saltmarsh Mudflats located within the specified screening distance (up to 50m) of the site associated with the southern banks of the River Thames. The installation does not discharge directly to the above watercourse and the final effluent discharge is regulated under a separate environmental permit which takes into account these designations.	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 current CHP engines will need to be replaced prior to 2050 when they reach the end of their operational lifespans.	X

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
		Pre-digestion tanks are already covered and OCU's to be utilised as appropriate. OCU's may require oversizing compared to current use.	
Climate Change	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 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 C3-1a – 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
Crossness STW Combustion Plant AR1	S1.1 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: - 3x CHP engines, net rated thermal input of 4.68MW each, fired on biogas generated on site. Existing MCP. - 2 x CHP auxiliary boilers, net rated thermal input of 4.749MW each, fired on biogas generated on site or natural gas. Existing MCP.		R1 Use principally as a fuel or other means to generate energy	N / A
Crossness STW Combustion Plant AR2		Emergency standby diesel generators (emergency plant), including the following equipment: - 4 x Man Paxman engines, net rated thermal input 5.2MW each. Existing MCP. - 2 x MTU engines, net rated thermal input 5.6MW each. Existing MCP.			

Crossness STW Combustion Plant AR3		**Combustion equipment with net rated thermal input less than 1MW each, aggregated net thermal input approx. 1.2MW**			
Crossness 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 eight 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).	2,220 wet tonnes per day (throughput based on 26,640m3/12 = 2,220m3 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 7,530,000 wet tonnes per annum including indigenous UWWTD derived sludge from within the wider Sewage Treatment Works, as per volume calculations in Note 1 below.
Directly Associated Activities					
AR5	**Storage of biogas**				
AR6	**Emergency flares**				
AR7	**Oil Storage**				
AR8	**Drainage – surface water drainage system**				
AR9	**Drainage – condensate drainage system**				
AR10	**Water treatment – demineralisation plant**				
AR11	Imports of waste, including sludge from other sewage treatment works for treatment				

AR12	Blending of indigenous sludges and imported wastes/waste sludge prior to treatment				
AR13	Storage of digestate prior to dewatering				
AR14	Pre-treatment of sewage sludge by THP				
AR15	Dewatering of digested sewage sludge				
AR16	Transfer of dewatering liquors via site drainage back to the head of the sewage treatment works				
AR17	Storage of dewatered digested sludge cake prior to offsite recovery				
AR18	Operation of siloxane filter plant				
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 25,000 wet tonnes per annum	
	Digested sludge cake for temporary storage pending off-site removal	R13: Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced). R3: Recycling or reclamation of organic substances which are not used as solvents	n/a	Maximum waste throughput 2,000 wet tonnes per annum	
For all Waste Operations		**Total capacity**	**99,250 wet tonnes**	**[a] + [b]**	

	Total STC treatment capacity (tank volume)	94,750m3	[a]
	Total cake storage capacity	4,500 wet tonnes	[b]
For waste imports to the head of the works	**Annual throughput (tonnes each year)**	**Imports: 25,000 wet tonnes**	
For waste imports of digested sludge cake for temporary storage	Annual throughput (tonnes each year)	Imports: 2,000 wet tonnes	
Note 1: Import Calculation based on: Primary Sludge: 118.83 tds/day; worse case 1.00% dry solids = 11,883 m3/day = 4,337,190 m3/year SAS: 61.21 tds/day; worse case 0.70% dry solids = 8,745 m3/day = 3,191,871 m3/year Total Combined import calculation 7,529,061 m3/year; rounded to 7,530,000 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 waste water
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 3]
Note 1 – comprising but not limited to:	

Thickening and dewatering liquors, centrate and filtrate derived from TWUL processes Waste from a portable toilet

Table C3-1b(iii): Waste accepted for temporary storage and transfer off-site

Waste Code	Description of Waste
19 06 06	digestate from anaerobic treatment of animal and vegetable waste (sewage sludge only)

1c Recovery of hazardous waste on land

Are you applying for a waste recovery activity involving the permeant deposit of inorganic hazardous waste to land for construction or land reclamation?

No - Where the answer is no, there is no requirement to answer further questions in 1c.

2 – Point source emissions to air, water and land

Table C3-2a – Emissions to Air

Air emission points currently permitted under permit EPR/PB3239AW/V003 are in bold.

Emission point reference and location	Source	Parameter	Quantity	Reference period	Monitoring frequency	Monitoring standard or method
A1, [Point A1 on site plan]	**Spark Ignition Engine fired on biogas**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**500 mg/m^3 [Note 1]**	**Hourly average**	**Annual**	**BS EN 14792 [Note 1]**
		Carbon Monoxide	**1,400 mg/m^3 [Note 1]**	**Hourly average**	**Annual**	**BS EN 15058 [Note 1]**
		Total Volatile Organic Compounds	**No limit set**	**Hourly average**	**Annual**	**BS EN 12619 (a) BS EN 13526 (b)**

Emission point reference and location	Source	Parameter	Quantity	Reference period	Monitoring frequency	Monitoring standard or method
						[Note 1]
A2, [Point A2 on site plan]	Spark Ignition Engine fired on biogas	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	500 mg/m^3 [Note 1]	Hourly average	Annual	BS EN 14792 [Note 1]
		Carbon Monoxide	1,400 mg/m^3 [Note 1]	Hourly average	Annual	BS EN 15058 [Note 1]
		Total Volatile Organic Compounds	No limit set	Hourly average	Annual	BS EN 12619 (a) BS EN 13526 (b) [Note 1]
A3, [Point A3 on site plan]	Spark Ignition Engine fired on biogas	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	500 mg/m^3 [Note 1]	Hourly average	Annual	BS EN 14792 [Note 1]
		Carbon Monoxide	1,400 mg/m^3 [Note 1]	Hourly average	Annual	BS EN 15058 [Note 1]
		Total Volatile Organic Compounds	No limit set	Hourly average	Annual	BS EN 12619 (a) BS EN 13526 (b) [Note 1]
A4 [Point A4 on site plan]	CHP Auxiliary Boiler 1)fired on biogas or natural gas)	Combustion gases	No limit set	-	-	Record of operating hours
		Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	No limit set	-	-	-
		Carbon Monoxide	No limit set	-	-	-
		Sulphur dioxide	No limit set	-	-	-
A5 [Point A5 on site plan]	CHP Auxiliary Boiler 2 (fired on biogas or natural gas)	Combustion gases	No limit set	-	-	Record of operating hours

Emission point reference and location	Source	Parameter	Quantity	Reference period	Monitoring frequency	Monitoring standard or method
		Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	No limit set	-	-	-
		Carbon Monoxide	No limit set	-	-	-
		Sulphur dioxide	No limit set	-	-	-
A6 [Point A6 on site plan]	Emergency Flare stack	Combustion gases	-	Hourly average	Monitoring to be undertaken in the event the flare has been operational for more than 10% of a year (876 hours)	Record of operating hours
		Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	150 mg/m^3			BS EN 14792
		Carbon Monoxide	50 mg/m^3			BS EN 15058
		Total VOCs	10 mg/m^3			BS EN 12619
A7 [Point A7 on site plan]	Second Emergency Flare stack	Combustion gases	-	Hourly average	Monitoring to be undertaken in the event the flare has been operational for more than 10% of a year (876 hours)	Record of operating hours
		Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	150 mg/m3			BS EN 14792
		Carbon Monoxide	50 mg/m^3			BS EN 15058
		Total VOCs	10 mg/m^3			BS EN 12619
	4 x Paxman Engines, diesel fired, emergency standby	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	No limit set	-	-	-

Emission point reference and location	Source	Parameter	Quantity	Reference period	Monitoring frequency	Monitoring standard or method
A8 – A11 [Points A8-A11 on site plan]	**(Individually above 5MWth net each)**	**Carbon Monoxide**	**No limit set**	-	-	-
A12 and A13 [Points A12 and A13 on site plan]	**2 x MTU Engines, diesel fired, emergency standby** **(Individually above 5MWth net each)**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**No limit set**	-	-	-
		Carbon Monoxide	**No limit set**	-	-	-
A14 [Point A14 on site plan]	**Powerhouse emergency lighting diesel generator**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**No limit set**	-	-	-
		Carbon Monoxide	**No limit set**	-	-	-
A15 and A16 [Points A15 and A16 on site plan]	**2 x Hot water boiler, Webster House**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**No limit set**	-	-	-
		Carbon Monoxide	**No limit set**	-	-	-
A17 [Point A17 on site plan]	**SPG standby diesel generator**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**No limit set**	-	-	-
		Carbon Monoxide	**No limit set**	-	-	-
A18 – A25 [Points A18-A25 on site plan]	Biogas Holder 1-8, biogas storage relief vents	No parameter set	None	N/A	-	-
A26	OCU 1 (for PFT Supernatant Well)	Hydrogen sulphide	No limit set	Average over sample period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11

Emission point reference and location	**Source**	**Parameter**	**Quantity**	Reference period	Monitoring frequency	**Monitoring standard or method**
		Ammonia	20 mg/m^3		Once every 6 months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis
A27	OCU 4 (for GBT Building)	Hydrogen sulphide	No limit set	Average over sample period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11
		Ammonia	20 mg/m^3		Once every 6 months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis
A28	OCU 5 (for Picket Fence Thickeners)	Hydrogen sulphide	No limit set	Average over sample period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11
		Ammonia	20 mg/m^3		Once every 6 months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis
A29	OCU 8 (for Sludge Blending Tanks no.3 and no.4)	Hydrogen sulphide	No limit set	Average over sample period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11

Emission point reference and location	**Source**	**Parameter**	**Quantity**	Reference period	Monitoring frequency	**Monitoring standard or method**
		Ammonia	20 mg/m^3		Once every 6 months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis
A30	OCU 9 (for Sludge Buffer Tanks)	Hydrogen sulphide	No limit set	Average over sample period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11
		Ammonia	20 mg/m^3		Once every 6 months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis
A31 [Note 2]	OCU 10 (for THP, Post Digestion Storage Tank and Sludge Dewatering Presses)	Hydrogen sulphide	No limit set	Average over sample period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11
		Ammonia	20 mg/m^3		Once every 6 months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis
A32	THP tanks PRVs	No parameter set	None	N/A	-	-

Emission point reference and location	**Source**	**Parameter**	**Quantity**	Reference period	Monitoring frequency	**Monitoring standard or method**
A33	Cake Barn Stack (for Cake Barn ventilation system)	No parameter set	None	N/A	-	-
A34	OCU 11 – Liquor Return Pumping Station 1	Hydrogen sulphide	No limit set	Average over sample period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11
		Ammonia	20 mg/m^3		Once every 6 months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis
A35	OCU 12 – Liquor Return Pumping Station 2	Hydrogen sulphide	No limit set	Average over sample period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11
		Ammonia	20 mg/m^3		Once every 6 months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis

Note 1: Reference conditions are dry air 273k at a pressure of 101.3kPa with an Oxygen content of 5% (dry gas).

Note 2: A new OCU is being installed at the site which will abate Sludge Buffer Tanks and Gravity Belt Thickeners, redirecting the extracted air that is currently abated by OCU10. OCU 10 will remain operational for abatement of the remaining functions.

Table C3-2b – Emissions to Sewer

Emission point reference and location	Source	Parameter	Limit	Unit
T1(TQ 48591 80882)	Gravity Belt Thickener Liquors, SAS Thickening Belt Liquors, THP Centrifuge Liquors, Boiler Blowdown, Digested Sludge Dewatering Liquors, OCU Waste Waters, Surface Water Run Off	No parameters set	No limit set	-
T2(TQ 48807 80710)	Picket Fence Thickener Liquor, OCU Waste Water	No parameters set	No limit set	-
T3 (TQ 48991 80715)	OCU Waste Water	No parameters set	No limit set	-
T4 (TQ 48129 80768)	Head of Works imports	No parameters set	No limit set	-
Note: Existing emissions to sewer are replaced by new transfer points				

There are no permitted emissions to water or land from the activities covered by this permit.

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.) BAT Conclusions for Waste Treatment.	

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

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

Classification	Probability	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 stacks) have emission limits. Flare stack height approx. 8m (large) and 6m (small), CHP engines and boilers share a common 45 m stack. Site has a siloxane filter fitted on the main biogas pipeline connected upstream of the CHP engines. to remove impurities within the biogas. Biogas pipeline has foam and condensate traps to remove impurities. Previous modelling, which remains unchanged, did not find unacceptable impacts.	Low
Biogas transfer systems, biogas storage holder, biogas engines, flares or PRVs	Abnormal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Odour impact. Global	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.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
failure causing emissions of biogas		warming potential. Risk of fire and explosion				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. Personnel on site wear portable biogas detectors in order to alert staff to presence of biogas. Two waste biogas burners (emergency flares) are 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, which is pre-set within the SCADA system. 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	Abnormal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Odour impact. Global	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.	Medium

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
storage tank, biogas engines, flares or PRVs		warming potential. Risk of significant fire and explosion				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. Two waste biogas burners (emergency flares) are 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, which is pre-set within the SCADA system. 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.	
Combustion of biogas within CHP engines 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.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						All combustion plant is located centrally, away from sensitive receptors. The nearest receptor, residential properties, are in excess of 630 m to the west of the multi-flue stack.	
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. 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 site away from sensitive receptors (c. 750 m).	Low
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.	Low	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 wheel wash after exiting to reduce transfers to site roads. The cake barn is in excess of 600 m from nearby sensitive receptors, residential properties to the West and the LNR/LWS to the east and LWS's within the site and to the immediate north and south of the site.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						Digested sludge cake retains a high moisture content and is not prone to windblown dispersion leading to the generation of dust. Internal site roads are made from concrete/asphalt and not prone to the generation of dust. Please see Appendix F for the site specific bioaerosol risk assessment.	
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	Medium	Low	The risk of bioaerosol and dust is largely minimised by storing the digested sludge cake within an enclosed cake barn. Site is very large and medium consequence of a spillage would only occur at locations closer to sensitive receptors, e.g. near site boundaries. Internal site roads are made from concrete/asphalt and not prone to the generation of dust. Vehicles exiting the cake barn pass through a wheel wash to reduce incidents of transfer from the barn to site roads. Staff responsible for site housekeeping and cleaning of spillages in a timely manner. Please see Appendix F for the site specific bioaerosol risk assessment.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
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 northern boundary. The site lies outside the boundaries of any groundwater Source Protection Zones (SPZ) All combustion plant and associated fuel tanks are situated on concrete hardstanding. Chemicals and oils all stored within bunded tanks and IBCs. Tanks and bunds are subject to regular inspection with defects addressed, e.g. rainwater removed as required to maintain 110% capacities. Bulk fuel storage is not within close proximity to the River Thames. Handling and use of chemicals and oils is carried out by trained personnel. COSHH data sheets available. Spill kits available on site. Staff are trained in their use. There are no point source emissions to water with drainage system pumping back to works inlet.	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	Low	Low	Low	The site lies outside the boundaries of 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	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
and from buried pipes		deterioration of water quality Emissions to ground and ground water.				subject to asset inspection and proactive maintenance programme including regular 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. There are no point source emissions to water with drainage system pumping back to works inlet.	
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.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						Litter picking activities are completed as required.	

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	Biogas will principally be generated in Primary Digester Tanks and captured for storage within the roof-mounted Biogas Storage Holders. The nearest residential properties approx. 760 m to the West from the covered Primary Digester Tanks and the nearest commercial buildings are located approx. 780 m to the east. H_2S production is controlled through the digestion process which can be manually overridden if required. Iron dosing of hydrolysed sludge is used to control hydrogen sulphide levels in biogas and minimise odour.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
Loss of containment from biogas holder and biogas pipework	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	Low	Medium	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. 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. 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 biogas holders and prevent under or over pressurization. Iron dosing used to control hydrogen sulphide levels in biogas and minimise odour.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						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 Loss of amenity from odour nuisance	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. PRVs subject to monitoring and visual checks by site personnel. Biogas is principally stored within the Biogas Storage Holders, which are suitably sized to manage biogas generation. Site has multiple outlets to use biogas - three CHP engines, two boilers and two flares 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 flares maintained in good working order should they need to be used. Iron dosing used to control hydrogen sulphide levels in biogas and minimise odour. The nearest residential and commercial receptors are located approx. 700 m from the biogas holders.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
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 Biogas Storage Holders 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 two flares which are used in order of preference to maximise recovery of energy. The nearest residential and commercial receptors are located approx. 700 m from the biogas holders. 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. Iron dosing of incoming sewages used to control hydrogen sulphide levels in biogas and minimise odour.	Low
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	Medium	Low	Medium	Digested sludge cake is stored within an enclosed cake barn which is subject to continuous air extraction within the central part of the site away from sensitive receptors and is inherently low odour material. Should any odorous sludge cake be produced, this will be subject to process checks	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						undertaken to identify root cause of production and removed from site expediently.	
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 are 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.

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 engines	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 residential properties, although these receptors are located well away from the combustion assets, in excess of 600 m to the west of the CHP engines. Good maintenance of plant to ensure that excessive noise levels are not generated. 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.	Low
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. 600 m from nearest sensitive human receptors. Good maintenance of fans to ensure that excessive noise levels are not generated.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						Where repair or replacement is required, this will be completed promptly.	
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	Medium	High	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.	Low
Vehicle movements - tanker deliveries of sludge 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	Medium	High	Imports can be made 24/7 and take place to an import point on the West of site, but still in excess of 230 m from nearby residential receptors. 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.	Medium
Vehicle movements - tanker deliveries	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Low	Medium	Deliveries likely to take place during daytime hours to delivery areas within the central area of the site.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
of chemicals and raw materials		Generation of vibration with ground transmission, causing loss of amenity to local human receptors.				Vehicle movements across the site subject to speed limit to reduce generation of noise.	
Operation of emergency flare	Abnormal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Low	Medium	Use of the emergency flares is minimized by prioritizing use of the CHP engines and boilers with use of the flare recorded via SCADA. The emergency flare is located away from sensitive receptors, in excess of 750 m from the nearest residential or commercial property.	Low

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

A site specific Accident Prevention and Management Plan (AMP) 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. Please see the site-specific bioaerosol risk assessment 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 included in **Error! Reference source not found.**.

4 - Monitoring

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

The air emission points A1-A7 are monitored in accordance with EA guidance.

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 flares (A6 & A7) 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 A26-A31, A34 and A35, OCUs will have bi-annual testing.

There is no routine monitoring proposed for points A8 – A14, A17 (8 x backup generators) or A15 and A16 (2 x boilers supplying hot water to admin buildings, stores and workshop).

There is no routine monitoring proposed for points A18 – A25 and A32 (PRVs) and A33 (Cake Barn Stack).

Table C3-4a – Emission Monitoring

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A1 – Spark ignition engine	TQ 48672 80945	Oxides of Nitrogen – Annual	BS EN 14792	
		Carbon Monoxide – Annual	BS EN 15058	
		Total VOC's – Annual	BS EN 12619 BS13526	
A2 – Spark ignition engine	TQ 48672 80945	Oxides of Nitrogen – Annual	BS EN 14792	
		Carbon Monoxide – Annual	BS EN 15058	
		Total VOC's – Annual	BS EN 12619 BS13526	
A3 – Spark ignition engine	TQ 48672 80945	Oxides of Nitrogen – Annual	BS EN 14792	
		Carbon Monoxide – Annual	BS EN 15058	

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
		Total VOC's – Annual	BS EN 12619 BS13526	
A4 – CHP auxiliary boiler	TQ 48672 80945	Combustion gases	Record of operating hours	
		Oxides of Nitrogen	-	
		Carbon Monoxide	-	
		Sulphur dioxide	-	
A5 – CHP auxiliary boiler	TQ 48672 80945	Combustion gases	Record of operating hours	
		Oxides of Nitrogen	-	
		Carbon Monoxide	-	
		Sulphur dioxide	-	
A6 – Emergency flare 1	TQ 48930 80875	Combustion gases	Record of operating hours	
		Oxides of Nitrogen	BS EN 14792	
		Carbon Monoxide	BS EN 15058	
		Total VOCs	BS EN 12619	
A7 – Emergency flare 2	TQ 48927 80867	Combustion gases	Record of operating hours	
		Oxides of Nitrogen	BS EN 14792	
		Carbon Monoxide	BS EN 15058	
		Total VOCs	BS EN 12619	
A8 – Paxman engine	TQ 48775 80700	Oxides of Nitrogen	-	
		Carbon Monoxide	-	
		Sulphur dioxide	-	
		Particulates	-	
A9 – Paxman engine	TQ 48783 80696	Oxides of Nitrogen	-	
		Carbon Monoxide	-	
		Sulphur dioxide	-	
		Particulates	-	
A10 – Paxman engine	TQ 48742 80719	Oxides of Nitrogen	-	
		Carbon Monoxide	-	
		Sulphur dioxide	-	
		Particulates	-	
A11 – Paxman engine	TQ 48733 80724	Oxides of Nitrogen	-	

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
		Carbon Monoxide	-	
		Sulphur dioxide	-	
		Particulates	-	
A12 – MTU engine	TQ 48727 80727	Oxides of Nitrogen	-	
		Carbon Monoxide	-	
		Sulphur dioxide	-	
		Particulates	-	
A13 – MTU engine	TQ 48722 80729	Oxides of Nitrogen	-	
		Carbon Monoxide	-	
		Sulphur dioxide	-	
		Particulates	-	
A14 – Emergency diesel generator	TQ 48717 80719	Oxides of Nitrogen	-	
		Carbon Monoxide	-	
		Sulphur dioxide	-	
		Particulates	-	
A15 – Hot water boiler	TQ 48689 80572	Oxides of Nitrogen	-	
		Carbon Monoxide	-	
		Sulphur dioxide	-	
		Particulates	-	
A16 – Hot water boiler	TQ 48685 80567	Oxides of Nitrogen	-	
		Carbon Monoxide	-	
		Sulphur dioxide	-	
		Particulates	-	
A17 – Standby diesel generator	TQ 49140 80696	Oxides of Nitrogen	-	
		Carbon Monoxide	-	
		Sulphur dioxide	-	
		Particulates	-	
A18 – Biogas holder PRV	TQ 48824 80934	n/a	-	
A19 – Biogas holder PRV	TQ 48811 80908	n/a	-	
A20 – Biogas holder PRV	TQ 48851 80918	n/a	-	
A21 – Biogas holder PRV	TQ 48835 80892	n/a	-	

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A22 – Biogas holder PRV	TQ 48878 80904	n/a	-	
A23 – Biogas holder PRV	TQ 48863 80876	n/a	-	
A24 – Biogas holder PRV	TQ 48906 80888	n/a	-	
A25 – Biogas holder PRV	TQ 48891 80863	n/a	-	
A26 – OCU 1	TQ 48788 80719	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis	
A27 – OCU 4	TQ 48787 80951	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis	
A28 – OCU 5	TQ 48744 80743	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling	

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
			NIOSH 6016 for analysis	
A29 – OCU 8	TQ 48778 80871	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis	
A30 – OCU 9	TQ 48982 80781	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis	
A31 – OCU 10	TQ 48669 80982	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis	
A32 – THP tanks PRVs	TQ 48736 80915	n/a	-	

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A33 – Cake Barn Stack	TQ 48714 81012	n/a	-	-
A34 – OCU 11	TQ 48583 80885	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis	
A35 – OCU 12	TQ 48787 80720	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis	
S1 (Liquor Transfer Point) Return Liquor Pumping Station 1	TQ 48605 80885	n/a	MCERTS or ISO/IEC 17025 where available	
S2 (Liquor Transfer Point) Return Liquor Pumping Station 2	TQ 48795 80717	n/a	MCERTS or ISO/IEC 17025 where available	
S3 (Liquor Transfer Point) OCU Waste Water	TQ 48993 80789	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 sampling locations and sampling ports may not meet all of the requirements for BS EN 15259, but these are being checked onsite. Due to the size of the CHP and boiler, a permanent sampling platform is not provided, however, a temporary sampling platform is utilised to provide sufficient space, in accordance with standard industry practice and BS EN 15259 when sampling is required.

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 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. Diesel fuel is used for stand-by generator purposes only. The site CHP engine 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 diesel is also combusted, when required, to meet additional heat demands from the THP. Use of heat from the CHP engines reduces the demand on biogas and natural gas. in the boilers.

Diesel from diesel tanks is used as a back-up fuel in the event of the loss of power to the entire site via the six emergency standby generators.

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.

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 recovers 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 About the permit

1a What waste operations are you applying to vary?, Waste operations which do not form part of an installation

This permit application is for two new waste operations for waste imports to the head of the works and waste imports temporary storage as secondary activities to the main listed installation.

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

Please see responses to form C3.

3 Operating techniques

3a Technical standards

Please see responses to form C3.

3b General requirements

Please see responses to form C3.

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.

4b Point source emissions to air only

Please see responses to form C3.

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 treated sewage sludge and thickening processes within the installation. Lower volume constituents will include rainfall; biogas condensate; boiler blowdown water; 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?

21,056 Cubic metres

3c What is the maximum rate of discharge?

243.70 Litres / second

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

21,056 Cubic metres

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 [21,055.9m^3 x1,000 / 86,400] from sources such as thickening and dewatering. This gives a value of 243.702546, rounded to 243.70 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 is returned to the inlet of the wider STW, where it is subject to aerobic treatment 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.0362/008.

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), 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 points 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.

10b Is this effluent discharged through more than one outlet?

No.

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

N / A.

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 49087 80830.

A4.3 Give the name of the tidal river, tidal stream, estuary or area of coastal water 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? For example, open pipe or diffuser system

Open Pipe system.

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

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-CNS-DR-0001

A.2 Installation Boundary and Air Emission Points

See document: B22849AM-JAC-CNS-DR-0002

A.3 Site Impermeable and Permeable Surface Plan

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

A.4 Site Drainage Plan

See document: CNSS1ZZ_DPL_001

A.5 Process Flow Diagram

See document: B22849AZ-CROSS1ZZ-LSX-DR-P-0002

A.6 Site Photographs

See document: TW_STC_EPR_05a_CNS_APPA.6

Appendix B. CoTC

For the qualifications of the site manager, see document: TW_STC_EPR_05a_CNS_APPB

Appendix C. Site Condition Report – H5

See document: TW_STC_EPR_05a_CNS_APPC

Appendix D. BAT Assessment

Please see the appended BAT Assessment Spreadsheet: TW_STC_EPR_05a_CNS_AppD

Appendix E. Odour Management Plan

Includes: Odour Management Plan and Odour Risk Assessment. See document: TW_STC_EPR_05a_CNS_APPE

Appendix F. Bioaerosol Risk Assessment

See document: TW_STC_EPR_05a_CNS_APPF

Appendix G. Containment Assessment

G.1 Containment Options Report (CIRIA 736)

See document: B22849AZ-JA-CROSS1ZZ-100-RP-Z-0001

G.2 Containment Assessment

See document: B22849AZ-JA-CROSS1ZZ-100-CA-P-0001

Appendix H. Leak Detection and Repair Plan (LDAR)

See document: TW_STC_EPR_05a_CNS_APPH

Appendix I. Residue Management Plan

I.1 Residue Management Plan

See document: TW_STC_EPR_05a_CNS_APPI.1

I.2 MSDS Zip File

See zip folder: TW_STC_EPR_05a_CNS_APPI.2

Appendix J. Accident Prevention and Management Plan

See documents: TW_STC_EPR_05a_CNS_APPJ

Appendix K. Acceptance of Third-Party Waste Imports

K.1 Acceptance of Third-Party Waste Imports

See document: TW_STC_EPR_05a_CNS_APPK.1

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

See document: TW_STC_EPR_05a_CNS_APPK.2.

Appendix L. Air Quality Assessment

Not required.

Appendix M. Liquor Monitoring

See document: TW_STC_EPR_05a_CNS_APPM