Sludge Treatment Centre Permitting

Environmental Permit Variation Application - Crawley STC RESUBMISSION

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Thames Water

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Sludge Treatment Centre Permitting

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Contents

1. Introduction

This substantial variation application relates to a biological treatment permit for the Crawley Sludge Treatment Centre (STC), located at the Crawley 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 ('sludge') 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 blending of separated sludge from the main aerobic treatment flow, thickening of sludge, thermal hydrolysis process, anaerobic digestion of sludge, 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 operation of biogas engines and standby generators will be merged and remain in place as other permitted activities to this listed process. This application is for the purposes of varying the existing permitted activities to include the anaerobic digestion process as an installation activity.

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 sludge and Surplus Activated Sludge (SAS) from the onsite aerobic treatment process and treatment of imported sewage sludge cake from other sites, arriving by road to a cake import point. 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 waste import point near to the Works Inlet.

The operation of biogas fuelled Combined Heat and Power (CHP) engines and a dual fuelled heat recovery boiler for the generation of electricity and heat at the site, (which are classified as 'existing' combustion sources under the Medium Combustion Plant Directive), although already permitted will be classified as a directly associated activities to this main listed activity.

There is a waste activity at the site for the import of portable toilet and similar wastes to the inlet for treatment through the UWWTD treatment route at the site

The STC is located within the Crawley STW, north of the town of Crawley and near to London Gatwick airport.

The STC treats both indigenous sludges and imported sludge cake. Indigenous sludge is generated from the incoming flow to the STW, which passes through the aerobic treatment process under the UWWTD. Indigenous sludge is then pumped to two Picket Fence Thickeners (PFTs) and is thickened. Liquor weirs over the edge of the PFTs and returns to the Works Inlet via the site drainage. SAS from elsewhere in the UWWTD process is thickened using SAS Thickening Plant with the addition of a liquid polymer to aid coagulation. Filtrate returns to the Works Inlet via the site drainage.

The STC comprises an offloading point for permitted imported tankered wastes toward the west of the installation. The waste arrives at the STC via tanker and is discharged and is pumped to the inlet, where it combines with other sewer derived materials and subject to aerobic treatment, under the UWWTD.

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

Indigenous thickened primary sludge and SAS is mixed in the Sludge Blending Tank before being pumped to the Thermal Hydrolysis Plant (THP) Dewatering Feed Buffer Tank. The blended sludge is pumped to Pre-THP Dewatering Plant, where sludge is dewatered with the addition of a powder polymer from a silo and liquor returns to the Works Inlet via site drainage. Thickened sludge is then pumped to the THP Feed Silo. Undigested sludge cake can also be imported to Crawley STC via a cake hopper within the Cake Import Facility. Imported cake is transferred via screw conveyors to the THP Feed Silo to be mixed with indigenous sludge.

Thickened, blended sludges from the THP Feed Silo are then subject to a THP Process with the application of temperature and pressure, used to enhance the digestion of the sludge, in an enclosed system. From the THP Process, sludge is transferred to one of the two Primary Digester Tanks at the site. The Primary Digester Tanks are above ground tanks of concrete construction. Following treatment over an appropriate number of days within the Primary Digester Tanks, digested sludge is transferred to the Digested Sludge Buffer Tank and then is pumped for dewatering in the Digested Sludge Dewatering Plant. As required, digested sludge can be temporarily stored within one of the Sludge Contingency Tanks. The Digested Sludge Dewatering Plant uses a powder polymer to aid coagulation with the liquor returning to the Works Inlet via the site drainage for further treatment. Dewatered sludge is conveyed into the enclosed and odour abated cake barn, prior to removal from the site under the Sludge Use in Agriculture Regulations 1989 (SUiAR), and in accordance with the Biosolids Assurance Scheme (BAS). Undigested sludge can also be imported to the cake barn (in the Raw Sludge Zone) for temporary storage in the event that the cake import facility is unavailable for use.

Biogas from the Primary Digester Tanks is captured and transferred to one of the two double membrane Biogas Storage holders. The biogas transfer pipeline is equipped with condensate pots that capture entrained moisture from the generated biogas and allow it to be drained into the site drainage system for treatment. The Biogas Storage holder, THP vessels and Primary Digester Tanks are fitted with pressure release valves (PRVs) as a safety precaution in the event of over pressurising the system.

The biogas is taken from the Biogas Storage holders for combustion in the CHP Engines, generating electricity for use both within the site and for export to the grid, and steam to the THP process. This is classified as an 'existing' combustion plant under the Medium Combustion Plant Directive (MCPD). The biogas pipeline is equipped with a siloxane filter to remove entrained siloxane from the biogas. In the event that additional steam is required by the THP process, biogas or diesel may be used in the onsite dual-fuelled heat recovery boiler. An emergency flare is available for use during periods of essential maintenance and for emergency use. The flare is utilised under 10% of the year or less than 876 hours per year. The CHP Engines and boiler are currently operated under an Environmental Permit which will be merged with this permit.

This application includes the import of treated sludge cake from other works, for temporary storage within the cake barn, pending offsite recovery. All such imports will be subject to appropriate waste pre-acceptance and acceptance checks, prior to import, including checking whether the incoming cake complies with the requirements of SUiAR and BAS.

Imported treated sludge cake is offloaded into the Digested Sludge Zone in 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 Crawley 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.

Crawley STC also has three diesel emergency generators currently operated under the existing Environmental Permit which will be merged with this permit. Since 1/3/2023 these are now run as excluded generators and one of these at 0.6MWth is below the threshold of being a MCP (the others being 1.4MWth and 1.2MWth).

2. Technical Description

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

Scope

The variation application covers the biological treatment of sewage sludge, both indigenous and imported from other waste water treatment sites, by anaerobic digestion, with a capacity above the relevant thresholds. It also permits the acceptance of portable toilet wastes along with cess, septic tank, and similar sewage derived materials, to the Works Inlet for processing through the Urban Waste Water Treatment Directive (UWWTD) treatment route. There are a number of directly associated activities, including the operation of combustion plant for the generation of electricity and heat at the site, which when at 1, or above 1MWth, is classified as 'existing' MCP's under the Medium Combustion Plant Directive (MCPD).

The combustion plant, consisting of three diesel generators, two biogas CHP Engines and one dual fuelled boiler that are covered by an existing Environmental Permit under number EPR/HP3632TS/V004. This permit is subject to a substantial variation to convert it to an installation permit with the CHP Engines and boiler becoming a Directly Associated Activity (DAA) to the listed activity.

Site Location

The Crawley STC site is located approximately 5 km north-east of the town of Crawley, West Sussex and close to London Gatwick airport. To the north of the site is an area of woodland and car parking associated with London Gatwick Airport while to the east is a balancing pond and further woodland and greenspaces. To the south is green space and the Radford Road, which is a residential road. To the west of the site is a railway line and a commercial business park.

The nearest surface water body is the Gatwick Stream, which flows south to north along the western boundary of the STC, approximately 30 metres from the boundary at the closest point near the cess/waste import point. A balancing pond can also be found towards the north-east of the site entrance. Most of the STW and STC is within a Flood Zone 1, indicating that there is a low probability of river flooding (<1:1000 annual probability of flooding). However, assets within the south-west corner of STC including the cess/waste import point and an internal road are within a Flood Zone 2 indicating an increased risk of flooding, with between a 1 in 100 and 1 in 1,000 annual probability of river flooding.

There is only designated habitat site within the relevant distance of Crawley STC. There is a Local Nature Reserve (LNR) approximately 1.7 km south of the site, Grattons Park LNR. There are no National Nature Reserves or Sites of Special Scientific Interest (SSSIs) within 2 km of the site. There are no Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Marine Protected Areas (MPAs) or RAMSAR sites within 10 km of the site. There are 23 areas of Ancient & Semi-Natural Woodland within 2 km of the site, with closest on the northern boundary of the wider STW but not within 50 m of the STC. There are two Local Wildlife Sites (LWS) within the relevant distance of the site.

The site is not within a Source Protection Zone (SPZ). The site is not within an Air Quality Management Area (AQMA).

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

Site Tank Inventory

Tank Purpose	Number	Operational Volume (m^3)	Total Operational Volume (m3)	Construction
Picket Fence Thickener	2	522	1,044	Concrete
Sludge Blending Tank	1	59	59	Steel
THP Dewatering Feed Buffer Tank	1	448	448	Concrete
THP Feed Silo	1	195	195	Steel
THP Process	1	n/a		Steel
THP Process – THP Pulper Tank	1	18,3	18.3	Steel
THP Process – THP Reactor Tank	3	4.9	14.7	Steel
THP Process – THP Flash Tank	1	18.3	18.3	Steel
Primary Digester Tank	2	1,966	3,932	Concrete
Digested Sludge Buffer Tank	1	177	177	Steel
Sludge Contingency Tank	4	680	2,720	Concrete
Pre-THP polymer silo	1	24 tonnes		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 Cess/Waste Import Point and imports of non-hazardous waste to the cake barn). Biological treatment processes at the installation are for indigenous sludge separated from the UWWTD areas of the site and for treatment processes for imported cake that arrives at Crawley STC, normally by tanker and consists of undigested cake from other Thames Water sites, which forms a waste activity for the site.

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

Imports of cake to the cake barns are for temporary storage, pending recovery offsite; and are a contingency option primarily that will not be routinely used.

Waste imports to the head of the works consist of an offloading point for permitted imported tankered waste near to the inlet of the wider STW. These wastes are imported by tanker and consist of liquids and associated sludges from domestic and municipal sources that are similar in composition to those materials derived from the sewer network and managed via the UWWTD route. No wastes are imported packaged in other ways than tankers. Access

to the offloading points is controlled by the issue of keys by Thames Water to approved contractors only, who have undergone appropriate waste pre-acceptance checks on the material they wish to import. These keys enable the delivery tankers to discharge waste into the works, through a data logger which records the volume of waste transferred. All transfers of waste are via the site supplied flexible hose pipe (to prevent misconnections) and through a data logger.

Imports take place on an impermeable engineered concrete surface which is bunded by concrete sleeping policemen on three sides. The fourth side is kerbed and the bunded area falls to drainage, that is connected to the site drainage. The import area is covered by a webcam and provided with barrier and bollard protection for the import equipment. There is one import hose connected to the data logger and waste materials discharge straight to the inlet pumping station, where they are pumped to the inlet of the STW. At the inlet, the imported wastes combine with the incoming main sewer and is subject to aerobic treatment via the UWWTD route.

This application includes 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 whether 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 Crawley 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

Indigenous primary sludge is drawn off the Primary Settlement Tanks, thickened within one of two Picket Fence Thickeners (PFTs). The PFTs are the first stage of the permitted installation with all processes prior to the tanks forming part of the UWWTD process. The two PFTs are aboveground and of steel construction on a concrete base. Sludge is pumped in at a high level, where a rotating arm scrapes sludge into a central sump and thickened sludge is then pumped from the PFT to the Sludge Blending Tank. Liquor from the PFTs weirs out of the tank and gravitates to Liquor Return Pumping Station 1, where it is pumped back to the Works Inlet without any form of liquor treatment. The two PFTs are odour abated by an Odour Control Unit (OCU). High-level alarms prevent sludge being transferred into the PFTs if they are too full and pumps can be configured to transfer sludge to either of the PFTs, to allow for routine maintenance.

SAS from the aerobic process is pumped for thickening in the SAS Thickening Plant. A liquid polymer from an Intermediate Bulk Container (IBC) is made up using final effluent /potable water and transferred to a holding tank and dosed to each belt thickener to aid coagulation of the SAS. Liquor from the SAS Thickening Plant gravitates to Liquor Return Pumping Station 3 before it is pumped back to the Works Inlet for further treatment. Thickened SAS is then pumped to SAS Screens, where rag and inorganic material is removed, and then pumped to the Sludge Blending Tank where is mixed with indigenous primary sludge.

The Sludge Blending Tank is an aboveground tank of steel construction. It is covered, connected to an OCU and subject to mixing via external pumps. The tank is equipped with safety features and connected to the site Supervisory Control and Data Acquisition (SCADA) system. Level-floats and an ultrasonic measure monitor the level of sludge within the Sludge Blending Tank and would inhibit transfer pumps in the event of a high-level alert to prevent overfilling of the Sludge Blending Tank. From the Sludge Blending Tank, mixed sludge is pumped to the THP Dewatering Feed Buffer Tank. The THP Dewatering Feed Buffer Tank is an aboveground tank of concrete construction. This THP Dewatering Feed Buffer Tank is partially covered and subject to mixing to prevent settling of sludge. Sludge from the THP Dewatering Feed Buffer Tank is pumped via an aboveground sludge line to the Pre-THP dewatering Plant for dewatering.

There are two belt presses which receive the mixed, thickened sludge for further dewatering prior to the THP Process. A polymer coagulant from a polymer silo is made up with final effluent / potable water in a make-up tank

and transferred to a storage tank before it is dosed to each belt. The Pre-THP dewatering Plant are connected to an OCU. Dewatered sludge gravitates to a hopper beneath each belt and is pumped to the THP Feed Silo. Liquor from the Pre-THP dewatering Plant gravitates to the Liquor Return Pumping Station 2 and is pumped back to the Works Inlet for further treatment.

There is also an import point at Crawley STC which receives undigested sludge cake from other sewage treatment works for biological treatment. Waste is received via the Cake Import Facility located within the centre of the STC by road, normally from covered lorries. Vehicles reverse into the cake import facility and deposit waste directly into a large hopper. Waste volumes and the originating site are recorded by the delivery driver and the entire cake import facility is subject to both odour abatement via an OCU and local exhaust ventilation. From the hopper, two auger and screw pumps transfer the sludge directly to the THP Feed Silo via aboveground transfer lines. Where required, final effluent is used to rewet the sludge to improve pumping. In the event of the cake import facility being unavailable, undigested sludge cake can be accepted within the Raw Sludge Zone of the Cake Barn, for temporary storage pending transfer to the Cake Import Facility at a later date. All such imports will be subject to appropriate waste pre-acceptance and acceptance checks, prior to import.

The THP Feed Silo is an aboveground steel tank. It is connected to an OCU for odour abatement and receives the undigested sludge cake imports and the dewatered indigenous sludges. A probe monitors the level of sludge within the THP Feed Silo and inhibits transfer pumps in the event of a high-level alert to prevent overfilling of the THP Feed Silo. Sludge gravitates out of the THP Feed Silo and is pumped to the THP Process by one of two THP sludge pumps, which run on a duty/standby basis with sludge diluted by final effluent prior to entry into the THP Pulper Tank.

The THP is a single stream process consisting of one THP Pulper Tank, three THP Reactor Tanks and one THP Flash Tank. The THP process takes place within aboveground, enclosed steel tanks on engineered concrete that is connected to the site drainage system. The THP process pre-treats sludge to 175°C and 6 bar of pressure for 30 minutes. The THP is a batch process that operate 24-7, combining medium pressure boiling of sludge, followed by a rapid decompression to break down larger organic molecules, making them more easily digestible by the microbes in the digestion process. The process also sterilises the sludge, destroying harmful pathogens in the sludge so it exceeds the requirements for subsequent use in agriculture. All drainage and liquids generated from the THP process return to the Works Inlet for further treatment via Liquor Return Pumping Station 2.

In the THP Pulper Tank, dewatered sludge is preheated via recovered steam from the Reactors and Flash Tank; and mixed with warmer sludges to provide a homogenous blend to each of the THP Reactor Tanks. When a batch of sludge is called for, the required volume is pumped from the Pulper to one of the Reactors for treatment and the cycle commences. Recirculation pumps within the THP Pulper Tank prevent settling of the sludge.

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 THP Flash Tank. The THP Flash Tank provides a thermal buffer to release excess energy from the sludge prior to it entering downstream processes. Steam from the THP Flash Tank is returned to the THP Pulper Tank to pre-heat incoming sludge. The hydrolysed sludge is discharged from the Flash Tank into a common line and is blended with sludge being recirculated from the Primary Digester Tanks. The common line splits between two individual sludge coolers that use final effluent from site to lower the temperature to be more optimal for anaerobic digestion. Cooled sludge is then pumped to one of the two Primary Digester Tanks at the site.

Each THP Pulper Tank, Reactor 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 is malodourous and saturated with water, a foul gas system skid is used to reduce temperature and moisture content prior to further treatment of this gas.

There are two Primary Digester Tanks at Crawley STC which receive the hydrolysed sludge for treatment. Three re-circulation pumps operate to mix the sludge and re-circulate the sludge. Both of the Primary Digester Tanks

are of identical concrete construction, are above ground with fixed roofs. Both Primary Digester Tanks extend slightly subsurface, with a conical shaped bottom. The Primary Digester Tanks operate on a continuous basis, with the normal retention time being approximately 12 days. Fresh, hydrolysed sludge is introduced into the top of the Primary Digester Tank with mixing of the sludge via external recirculation pumps. Digested sludge is continuously transferred by gravity through a limpet chamber at the top of each Primary Digester Tanks and gravitates via a common line to the Digested Sludge Buffer Tank. Each Primary Digester Tanks is fitted with dual pressure relief valves (PRVs) and are monitored via the site SCADA system using temperature probes, radar levels to measure the level of sludge within each digester and anti-foam is added, as required from an Intermediate Bulk Container (IBC) to prevent foaming. There is no external heat input to the Primary Digester Tanks, which maintain their temperature via in the incoming hydrolysed sludge.

After the required duration, digested sludge gravitates via an aboveground sludge line to the Digested Sludge Buffer Tank, an above ground tank that is of steel construction. Sludge enters the tank a mid-level and exits sub-surface before it is pumped by one of two pumps through one of two subsurface sludge lines for dewatering. Crossovers exist between the two pumps and two sludge lines to allow for continuous operations during periods of planned maintenance. The Digested Sludge Buffer Tank has a high-level alarm that monitors the level of sludge within the tank that is connected to the site SCADA system and sludge will automatically transfer from the Digested Sludge Buffer Tank into one of the Sludge Contingency Tanks in the event of a high-level. Recirculation pumps continually mix the sludge to prevent settling within this tank.

Sludge Contingency Tanks at Crawley STC are used for secondary storage of sludge in an emergency. Each Sludge Contingency Tanks is an open, square tank of concrete construction. High-level alarms are fitted to the Sludge Contingency Tank to monitor the level of sludge within a tank. Sludge is temporarily held within the Sludge Contingency Tank as required and returned via pumps to the Digested Sludge Buffer Tank as soon as possible.

Pumps transfer the digested sludge for dewatering within the Digested Sludge Dewatering Plant that are located outside of the Cake Barn. The Digested Sludge Dewatering Plant dewater the digested sludge with the aid of a polymer coagulant. The polymer is made up from a bulk bag with the addition of either final effluent water or potable water using final effluent / potable water in a make-up tank and stored within a storage tank for dosing to each of the belts. Dewatered digested sludge is conveyed to the adjacent enclosed Cake Barn for temporary storage via a conveyor belt. Liquor from the dewatering is transferred to the Liquor Return Pumping Station 3 and pumped back to the inlet for further treatment.

Cake Storage

The Cake Barn is fully enclosed and odour abated via an OCU. Digested sludge cake is deposited beneath the conveyor and moved to a storage bay in the Digested Sludge Zone prior to removal from site. In the event of non-compliant sludge being produced at Crawley STC, it is stored within one of the storage bays for an extended period of time. Imported undigested sludge cake can also be stored within a Raw Sludge Zone of the Cake Barn in the event that the cake import facility is unable to accept waste. This undigested sludge cake is removed to the cake import facility at a later date.

Digested sludge cake is then removed from site under the Sludge Use in Agriculture Regulations 1989 (SUiAR), and in accordance with the Biosolids Assurance Scheme (BAS). A site-specific bioaerosol risk assessment for the STC is provided as Appendix F.

Biogas

Biogas from the Primary Digester Tanks is captured and transferred to two double membrane Biogas Storage holders for storage via a biogas transfer pipeline which is largely aboveground. The biogas transfer pipeline is fitted with a condensate pot that captures entrained moisture from the generated biogas and allows moisture to be removed from the biogas and returned to the head of works for treatment via Liquor Return Pumping Station 3. The Biogas Storage holders are a dual membrane type with an inner and outer bag that is fitted with biogas detection systems and Pressure Relief Valves (PRVs) that operate in an emergency as a safety precaution in the event of over pressurising the system. There is an ultrasonic level device within each Biogas Storage holder that

measures the volume of biogas within each of the inner bag and hydrogen sulphide monitors. Safety systems are also monitored by the site SCADA system. The Biogas Storage holders are fitted with lightning protection and a secure fence for physical security. Biogas from each Biogas Storage holder passes through separate biogas boosters and chiller units via an aboveground pipe to the CHP Engines or steam raising boiler. When the levels within the Biogas Storage reaches a high setpoint, biogas is automatically diverted to an emergency flare located at the site. In the event of an emergency, slam shut valves found on the biogas line would isolate the supply to one of the Biogas Storage holders.

Crawley STC has an auto regenerative siloxane removal system which removes impurities from the biogas prior to combustion within the CHP Engines. This is located between the biogas boosters and CHP Engines and an emission point via a small stack.

The biogas is taken from the Biogas Storage holders for combustion within two Jenbacher CHP Engines that are located externally within self-contained units designed for external use. Both CHP Engines operate continuously on biogas with no back up fuels. The two CHP Engines each have a thermal input of 1.5 MW, generating electricity for use within the site and heat to the THP process. Electricity generated by the CHP Engines is also exported from the site to the National Grid when there is an excess to the site needs.

The CHP Engines are classified as 'existing' combustion plant under the Medium Combustion Plant Directive and a Tranche A specified generator, and along with three diesel generators, are permitted by the existing Combined Heat and Power Plant and Standby Diesel Generators Environmental Permit (EPR/HP3632TS/V004). Emissions from the two CHP Engines are via a 15 m high, multi-flue common stack (that is shared with the boiler).

Low grade heat is supplied from the CHP Engines via heat exchange to the THP waste heat recovery boiler in order to pre-heat the water supply to the boiler. This low-grade heat is supplemented by combustion of either indigenous biogas or diesel to generate steam for the THP process as it is required. The boiler is dual fuelled and has a thermal input of 2.2MWth. Emissions from the boiler is via the 15-meter high, multi-flue common stack (that is shared with the CHP Engines). The boiler is supplied with water from a water treatment plant which uses a small quantity of chemicals to treat water before use. In the event there is excess biogas, there is a ground mounted emergency flare which is used during periods of essential maintenance and emergency use. The flare is utilised under 10% of the year, less than 876 hours per year.

Emergency Standby Generators

The site has three existing, permitted, standby emergency generators. Since 1/3/2023 each of the generators operate for up to 50 hours per year meeting the definition of an excluded generator. Bunded fuel tanks supply the generators with diesel.

Liquor returns from the installation are passed, via the site wide drainage system, back to the inlet of the sewage works, which is within the wider site.

This sewage works is also controlled by the applicant. The wider works treats the returned liquors in a mixture with UWWTD materials, though primary settlement, an activated sludge process, and sand filtration, in order to reduce the BOD and ammonia loading on the returned liquors, prior to discharge to surface water.

BAT Considerations

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

2.1 BAT 3; 6; 7: Return Liquors

The Crawley STC 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

There are open top tanks within the permit boundary at Crawley STC including the Digested Sludge Buffer Tank, and the Sludge Contingency Tanks.

Thames Water is committed to meeting the requirements 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 Crawley 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 the 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 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 Crawley 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. Crawley fits into the fourth row of the table.

- Dry solids feed: see table below, Crawley 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 digester. The typical range for VFAs in a primary digester 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 based 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.

For digested cake imports, these are stored separately in the Digested Sludge Zone in the Cake Barn, and their location can be identified on this basis.

On occasion, as a contingency, undigested sludge cake is imported from other Thames Water sites to site for temporary storage, pending transfer to the THP plant for treatment. The undigested sludge cake is imported by Ro-Ro for temporary storage and directed to a suitable offloading area in the cake barn.

Odour

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

Bioaerosols

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

Other Items

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

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

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

Other Risk Assessments

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

2.4 Regulatory listing

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

The relevant listing under Schedule 1 is:

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.

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

- Imports of waste, including sludge from other sewage treatment works for treatment;
- Blending of indigenous sludges and imported wastes/waste sludge prior to treatment;
- Pre-treatment of sewage sludge by thermal hydrolysis plant (THP) including operation of associated boiler;
- Storage of digestate prior to dewatering;
- Dewatering of digested sewage sludge
- Transfer of dewatering liquors back to the works inlet of the sewage treatment works;
- Transfer of surface water runoff back to the works inlet of the sewage treatment works;
- Storage of dewatered digested sludge cake prior to offsite recovery;
- Storage of biogas;
- Transfer of biogas condensate via site drainage back to the works inlet of the sewage treatment works;

- Combustion of biogas in MCPD and Specified Generator (SG) compliant biogas CHP engines and biogas or diesel in MCPD boiler;
- Operation of siloxane filter plant
- Operation of an emergency flare;
- Storage of diesel
- Storage of wastes, including waste oils; 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;
- Imports of digested sludge cake for temporary storage pending off-site removal; and

In addition to the listed activity at the site, there is directly associated activity of a biogas combustion plant which is classified as 'existing' MCP and also a Tranche A Specified Generator, covered by the Medium Combustion Plant Directive under Schedule 25A and B of the Environmental Permitting (England and Wales) Regulations 2016 (as amended). This comprises of 2 x 1.5 MWth CHP Engines which run solely on biogas.

The biogas heat recovery boiler which is a 2.2 MWth boiler is not a generator and will need to comply with emission limits for MCP by 01/01/2030.

In addition, there are three, currently permitted, standby emergency generators which are now run solely as excluded generators. One of the generators is rated at 0.6 MWth, one is rated at 1.4 MWth and one is rated at 1.2 MWth. None of these is a DAA to sludge treatment.

Total thermal input of site is approximately 8.4 MW, of which approximately 5.2 MW is in routine use at the STC.

3. Form C2 Questions

1 About the permit

1a Discussions before your application

The pre-application process is currently not available due to Environment Agency resourcing issues, discussions have been held with the local area Environment Agency staff. 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/HP3632TS/V004 issued 27/04/2020

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

Crawley Sludge Treatment Centre
Crawley Sewage Treatment Works
Radford Road
Tinsley Green
Crawley
West Sussex
RH10 3NW

NGR: TQ 29019 40110

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
Crawley STC	*Section 5.4 Part A(1) (b); i*	Biological treatment by means of Anaerobic digestion		This document
Crawley Sewage Treatment Works			Operation of CHP Engines and boiler, now a DAA to installation	

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/HP3632TS – Crawley CHP Plant and Standby Diesel Generators.

2d Treating batteries

2d1 Are you planning to treat batteries?

No, this application is not for the treatment of batteries.

2e Ship recycling

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

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

2d Low impact installations (installations only)

2d1 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	Hearing Date 03 - 04 July 2023	£3,334,000.00 (fine)Costs £128,961.05 and victim surcharge of £120.00	Thames Water pleaded guilty to four charges under the Environmental Permitting (England and Wales) Regulations 2016. The detail of each summons is included below: Summons 1: Between 9 October 2017 and 14 October 2017 TW caused a water discharge activity, namely A discharge of

				sewage effluent from Crawley Sewage Treatment Works into the Gatwick Stream and the River Mole, except under and to the extent authorised by an environmental permit contrary to Regulation 38(1)(a) and Regulation 12(1)(b) of the Environmental Permitting (England and Wales) Regulations 2016. Summons 2: On and /or before 14 October 2017 TW did contravene condition 11 of environmental permit CNTM.1402 by failing to have capacity of not less than 11,000 m3 in the storm lagoon at Crawley Sewage Treatment Works contrary to Regulation 38(2) of the Environmental Permitting (England and Wales) Regulations 2016. Summons 3: Between 9 October 2017 and 14 October 2017 TW contravened condition 12 of environmental permit CNTM.1402 by failing to discharge when the rate of flow at the inlet sewer at Crawley Sewage Treatment Works is in excess of 840 l/s due to rainfall and /or snowmelt contrary to Regulation 38(2) of the Environmental Permitting (England and Wales) Regulations 2016. Summons 4: On and /or before 14 October 2017 TW did contravene condition 13 of environmental permit CNTM.1402 by failing to empty the storm lagoon at Crawley Sewage Treatment Works and return the contents for full treatment as soon as practicable after cessation of the overflow to the lagoon contrary to Regulation 38(2) of the Environmental Permitting (England and Wales) Regulations 2016.

3b Technical ability

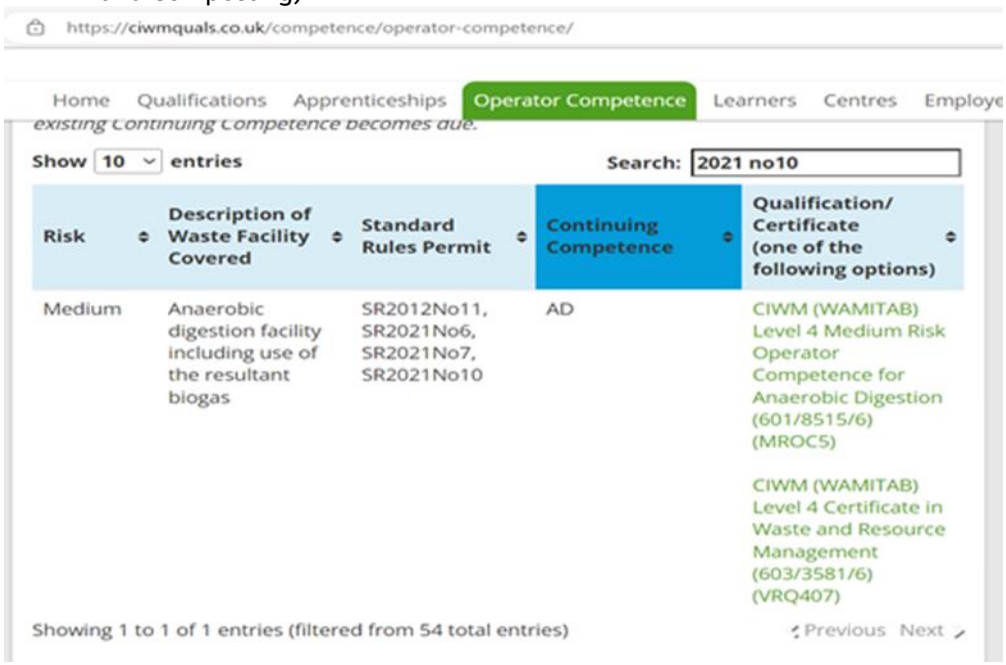
Thames Water uses WAMITAB qualified staff at their waste facilities. The relevant person for the site has been named below and full details have been provided separately on a spreadsheet.

Mr Matt Evans

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?

No.

5 Supporting information

5a Provide a plan or plans for the site

Please see Appendix A:

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

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

Yes. See Appendix C for the Site Condition Report.

5c Provide a non-technical summary of your application

Please see earlier text, 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.

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
Grattons Park	Local Nature Reserve	South	1,700 m
SAC	n/a		
SPA	n/a		
SSSI	n/a		
Ramsar	n/a		
Unnamed Woodland	Ancient & Semi-Natural Woodland	North	0 m
Unnamed Woodland	Ancient & Semi-Natural Woodland	North-east	550 m
Unnamed Woodland	Ancient & Semi-Natural Woodland	West	595 m
Black Corner Wood	Ancient & Semi-Natural Woodland	South-east	720 m
Titchmeres Wood	Ancient & Semi-Natural Woodland	South-East	750 m
Unnamed Woodland	Ancient & Semi-Natural Woodland	East	830 m
Forge Wood, Three Acre Plantation, The Birches	Ancient & Semi-Natural Woodland	South-east	1,075 m
Rowley Wood	Ancient & Semi-Natural Woodland	South-west	1,255 m
Unnamed Woodland	Ancient & Semi-Natural Woodland	South	1,350 m
Unnamed Woodland	Ancient & Semi-Natural Woodland	East	1,350 m
Wellfield Copse	Ancient & Semi-Natural Woodland	South-east	1,380 m
Summerveres Wood	Ancient & Semi-Natural Woodland	South	1,390 m

Tinslow Shaw, Mine Pit Wood	Ancient & Semi-Natural Woodland	South	1,400 m
Unnamed Woodland	Ancient & Semi-Natural Woodland	South-east	1,400 m
Unnamed Woodland	Ancient & Semi-Natural Woodland	South	1,400 m
Unnamed Woodland	Ancient & Semi-Natural Woodland	South-east	1,430 m
Unnamed Woodland	Ancient & Semi-Natural Woodland	South-east	1,500 m
The Lag, Furze Field, 6acre Grattans, Fenbridge	Ancient & Semi-Natural Woodland	South	1,650 m
Unnamed Woodland	Ancient & Semi-Natural Woodland	South-east	1,800 m
Bridgelands Shaw	Ancient & Semi-Natural Woodland	South-east	1,840 m
Unnamed Woodland	Ancient & Semi-Natural Woodland	North-east	1,930 m
Heathyground Wood	Ancient & Semi-Natural Woodland	South-east	1,980 m
Unnamed Woodland	Ancient & Semi-Natural Woodland	North-east	2,000 m
List of Local Wildlife Sites			
Rowley Wood Horleyland Wood			All sites <2,000 m

Data taken from MAGIC.gov.uk website, accessed January 2022. 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, Local Wildlife Sites (LWS) and Ancient Woodland (AW) (2km).

There is only one designated habitat site within the relevant distance of Crawley STC. There is a LNR approximately 1.7 km south of the site, Grattons Park LNR. There are no National Nature Reserves or SSSIs within 2 km of the site. There are no SAC, SPA, MPA or Ramsar sites within 10 km of the site. There are 23 areas of Ancient & Semi-Natural Woodland within 2 km of the site, with closest on the northern boundary of the wider STW. There are two LWSs within 2 km of the site.

The majority of the site sits within Flood Zone 1 (>1:1000 annual probability of river flooding) however parts of the site are within a Flood Zone 2 area with a medium annual probability of flooding (between a 1:100 and 1:1000 annual probability of flooding). This includes the cess waste import point and internal site road to the west of the permitted area.

The site sits outside any Source Protection Zones (SPZ).

The site is not within an Air Quality Management Area (AQMA). The nearest AQMA, the AQMA No.3 (Horley) which was declared by Reigate and Banstead Borough Council, is approximately 1.25 km north of the STW. A

second AQMA, the Hazelwick Air Quality Management Area (Crawley Borough Council), can be found approximately 1.5 km south of the STW.

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
Amenity issues: Litter, vermin and pests	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, amenity and recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. The site is located in a mixed area of both commercial and agricultural land, close to London Gatwick airport. The nearest receptors are residential property approx. 270 m to the south-east and a commercial property approx. 270 m to the west. A railway and road are found to the west. Ecological receptors: There are no SCAs, SPAs or RAMSAR sites within 10km of site. There are no SSSI within 2km of the site. There is one LNR within 2km of the site, Grattons Park approx. 1.7 km south of the site. There are two LWSs within 2 km of the site and the closest, Horleyland Wood is approx. 300m north of the site.	The wastes handled at the site are primarily liquids and sludges, along with UWWTD derived material delivered by sewer. As such, there is no source of litter within the materials handled at the site. In the unlikely event pests or vermin are observed on site a suitable contractor is called in as soon as practicable.	X
Dust and bioaerosols	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Litter above. The impact of dust on human health will depend on the distance and wind direction. For bioaerosols, this distance is 250 m.	The wastes handled at the site are liquids, sewage sludges and digested sludge cake, along with UWWTD derived material delivered by sewer. The site will not be handling inherently dusty or powdery wastes. Digested sludge cake retains a high moisture content and is not dusty. Cake is stored within a totally enclosed and ventilated cake barn towards the south of the site that is over 250 m from the nearest off-site receptors. Roads will be maintained to avoid the production of dust. Anaerobic digestion of sludge takes place within a closed system. Digested sludge cake is stored in the fully enclosed and odour abated cake barn and the risk from bioaerosols is low and monitoring is not required.	✓
Assessment of point source emissions to air	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.	Air emissions have previously been assessed by the Environment Agency and deemed satisfactory.	X

Emissions deposited from air to land	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.	Use of the emergency flare is limited to emergency situations and during planned maintenance activities to either the CHP Engines or the boiler. There are multiple outlets at Crawley STC that use biogas to reduce the likelihood of flaring, for which incidents of flaring are recorded by the site. Pressure relief valves (PRVs) are not used routinely to control biogas volumes and would only operate in an emergency. Fugitive emissions to air are assessed in Table C3-3b(i). The site is not located within an AQMA.	
Assessment of point source and fugitive emissions to water	The closest surface water body is the Gatwick Stream, which is found on the western boundary of the STC. It is approximately 30 meters from the boundary at the closest point. Most of the STW and STC is within a Flood Zone 1, indicating that there is a low probability of river flooding (<1:1000 annual probability of flooding). However, assets within the south-west corner of STC including the cess/waste import point and an internal road are within a Flood Zone 2 indicating an increased risk of flooding, with between a 1 in 100 and 1 in 1,000 annual probability of river flooding. Surface water drainage within the site drains to the inlet of the adjacent sewage treatment works for full treatment prior to discharge.	The main product of the process is a digested sludge cake, which is stored within a Flood Zone 1. The digested sludge cake is stored within a fully enclosed cake barn. Other aqueous discharges generated by process are limited (comprising biogas condensate, dewatering liquors and surface water run off). These sources are discharged to the onsite drainage system where they are transferred to main sewage works inlet for further treatment. Due to the nature and small quantity of these emissions no further assessment of point source emissions is deemed necessary	**X**
Assessment of odour	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Amenity issues above. The impact of emissions from odour on human receptors will depend on the distance and wind direction.	The wider sewage treatment works, which includes the area of the STC to be permitted has processes in place to minimise odour which includes physical containment, odour abatement, management systems, procedures and monitoring to control fugitive emissions of odour at the plant. Odour from the STC cannot be considered in isolation from the wider works. The sewage treatment works has an odour management plan, which is appended as Appendix E. Odour emissions are assessed in Table C3-3b(ii).	**X**
Energy	Global atmosphere (direct and indirect emissions)	Use of biogas on site within the CHP Engines and/or boiler minimises the need to import non-renewable electricity from the National Grid. Export of renewable electricity to the National	**X**

		Grid can offset consumption of fossil fuels within the energy mix, lowering the carbon intensity of power. Good maintenance procedures will help the plant run efficiently and reduce site energy consumption. Use of LED lighting reduces site consumption	
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 unproductive (solid deposits) and Secondary A (superficial deposits).	All waste streams are disposed of off-site for recovery or disposal and will continue to be transferred (and consigned where hazardous) to appropriately permitted facilities.	**X**
Noise and vibration	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, amenity and recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. The site is located in a mixed area of both commercial and agricultural land, close to London Gatwick airport. The nearest receptors are residential property approx. 170 m to the north-east. A railway and road are found to the west. Ecological receptors: There are no SCAs, SPAs or RAMSAR sites within 10km of site. There are no SSSI within 2km of the site. There is one LNR within 2km of the site, Grattons Park approx. 1.7 km south of the site. There are two LWSs within 2 km of the site and the closest, Horleyland Wood is approx. 300m north of the site.	Site design has been chosen to minimise the impact of noise on offsite receptors through building orientation, finishes and location of openings. Noise from plant and equipment will be minimised through purchasing decisions and a robust preventative maintenance programme. There will be no sources of vibration within the facility. Noise and vibration emissions are assessed in Table C3-3b(iii).	**X**
Other issues (including visual impact)	Protected Species and Habitats	There are records of protected species (Brown Trout, Bullhead, Code 2) within the specified screening distance (up to 500m) of the site. There are no protected habitats located within the specified screening distance of the site.	**X**
Climate Change	Risks of increased temperature impacts resulting in digesters heating beyond optimal operating temperature and increased odour potential from site process. For human health and ecological receptors, see notes for Amenity issues above.	Primary Digester Tanks may require reduced heat input to digester via heat exchange system and Primary Digester Tanks are insulated against worse impacts. Warmer temperatures may require less boiler input/use as a result of less heat demand, or, increased heat dumping via air cooled radiator. If less biogas is used, the site may require a new consumptive biogas solution e.g.	**X**

		a CHP Engine or other technology that is appropriately sized to utilise additional biogas. However, the CHP Engine will need to be replaced prior to 2050 when they reach the end of their operational lifespans.	
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 large cake barn which would allow digested sludge cake to be stored prior to application, contingency plans to move digested sludge cake to other sites may be required.	**X**

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

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

4. Form C3 Questions

1 – What activities are you applying to vary?

Table 1a – Types of activities

Installation name	Schedule 1 references	Description of the Activity	Activity Capacity	Annex I and II codes and descriptions	Non-hazardous waste treatment capacity
Crawley Sewage Treatment Works AR1	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 two 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).	309 tonnes per day (throughput based on 3712m^3/12 = 309m^3 / day)	R1 Use principally as a fuel or other means to generate energy 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)	Maximum waste throughput 730,000 wet tonnes per annum including indigenous UWWTD derived sludge from within the wider Sewage Treatment Works (see Note 1 for calculation)
Directly Associated Activities					
AR2	Imports of waste, including sludge from other sewage treatment works for treatment;				
AR3	Blending of indigenous sludges and imported wastes/waste sludge prior to treatment;				
AR4	Pre-treatment of sewage sludge by thermal hydrolysis plant (THP) including operation of associated boiler;				
AR5	Storage of digestate prior to dewatering;				
AR6	Dewatering of digested sewage sludge;				
AR7	Transfer of dewatering liquors back to the works inlet of the sewage treatment works;				
AR8	Transfer of surface water runoff back to the works inlet of the sewage treatment works;				
AR9	Storage of dewatered digested sludge cake prior to offsite recovery;				

AR10	Storage of biogas;				
AR11	Transfer of biogas condensate via site drainage back to the works inlet of the sewage treatment works;				
AR12	Combustion of biogas in a MCPD and Specified Generator (SG) compliant biogas CHP unit and biogas or diesel in MCPD boiler;				
AR13	Operation of siloxane filter plant;				
AR14	Operation of an emergency flare;				
AR15	Storage of diesel;				
AR16	Storage of wastes, including waste oils; and				
AR17	Storage of raw materials.				
Specified Generator Activities					
Activity Reference	National Grid Reference and/or activity reference / emission point	Activity listed in the EP Regulations	Description of MCP and/or specified generator	Fuel	Operating hours limit per annum
AR18	CHP1 529053,140041	Schedule 25B – Specified generator	1 x 1.5 MWth spark ignition engine	Biogas	Not restricted
AR19	CHP2 529053,140041	Schedule 25B – Specified generator	1 x 1.5 MWth spark ignition engine	Biogas	Not restricted
AR20	Emergency generator WEP760S 528932,140091	Excluded generator (too small to be a MCP)	1 x 0.60 MWth diesel engine	Diesel	50
AR21	Emergency generator TWUWWP00005761 528879,140259	Excluded generator	1 x 1.4 MWth diesel engine	Diesel	50
AR22	Emergency generator STHC634H1 528855,140315	Excluded generator	1 x 1.2 MWth diesel engine	Diesel	50

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**

AR23	Imports of wastes to the Works Inlet for treatment through the UWWTD route	D13: D13 Blending or mixing prior to submission to any of the operations numbered D1 to D12	n/a	Maximum waste throughput 65,000 wet tonnes per annum
AR24	Import of waste: Digested sludge cake for temporary storage pending off-site removal	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)	n/a	Maximum waste throughput 1,000 wet tonnes per annum
For all Waste Operations		**Total storage capacity**	**11,126 wet tonnes**	**[a] + [b]**
		Total STC treatment capacity (tank volume)	8,626 wet tonnes	[a]
		Total cake barn storage capacity	2,500 wet tonnes	[b]
For waste imports to the head of the works		Annual throughput (tonnes each year)	Imports: 65,000 wet tonnes	
For waste imports of digested sludge cake for temporary storage		Annual throughput (tonnes each year)	Imports: 1,000 wet tonnes	

Note 1: Treatment Calculation based on:

Unthickened Primary: 6.82 tds/day; worse case 0.06% dry solids = 1,137 m^3/day = 414,938 m3/year

Unthickened SAS: 3.72 tds/day; worse case 0.50% dry solids = 744 m^3/day = 271,596 m^3/year

Imports Cake 20.46 tds/day; worse case 20.00% dry solids =102 m^3/day = 37,344 m^3/year

Total Combined import calculation 1,983 m^3/day; or 723,879 rounded to 730,000 m^3/year

Table 1b Types of waste accepted

Table C3-1b(i): Waste Accepted for Anaerobic Digestion

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

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

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

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

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

Lines in bold are currently permitted under permit EPR/HP3632TS/V004

Emission point reference and location	Source	Parameter	Limit	Unit	Reference Period	Monitoring Frequency	Monitoring Standard or method
A6	**CHP1**	**Oxides of nitrogen (NO and NO2 expressed as NO2)**	**500**	**mg/m^3**	**Hourly average**	**Annually [note1]**	**BS EN 14792**
		Carbon Monoxide	**1,400**	**mg/m^3**			**BS EN 15058**
		Volatile Organic Compounds (VOCs)	**No limit set**	**-**			**BS EN 12619:2013**
A7	**CHP2**	**Oxides of nitrogen (NO and NO2 expressed as NO2)**	**500**	**mg/m^3**	**Hourly average**	**Annually [note1]**	**BS EN 14792**
		Carbon Monoxide	**1,400**	**mg/m^3**			**BS EN 15058**
		Volatile Organic Compounds (VOCs)	**No limit set**	**-**			**BS EN 12619:2013**
A8	**Boiler**	**-**	**-**	**-**	**-**	**-**	**Permanent sampling access not required [Note 3]**
A9	**Flare Stack**	**Oxides of nitrogen (NO and NO2 expressed as NO2)**	**150**	**mg/m^3**	**Hourly average**	**Annually [note2]**	**BS EN 14792**
		Carbon Monoxide	**50**	**mg/m^3**	**Hourly average**	**Annually [note2]**	**BS EN 15058**
		Volatile Organic Compounds (VOCs)	**10**	**mg/m^3**	**Hourly average**	**Annually [note2]**	**BS EN 12619:2013**

A10	THP PRV	-	-	-	-	-	-
A11	Primary Digester PRV	-	-	-	-	-	-
A12	Primary Digester PRV	-	-	-	-	-	-
A13	Biogas Holder PRV	-	-	-	-	-	-
A14	Biogas Holder PRV	-	-	-	-	-	-
A15	OCU 1	Hydrogen Sulphide	No limit set	-	Average over sampling period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis or US EPA M11
		Ammonia	20	mg/m^3			EN ISO 21877 CEN TS 1369 for sampling Or NIOSH 6016 for analysis
A16	OCU 2	Hydrogen Sulphide	No limit set	-	Average over sampling period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis or US EPA M11
		Ammonia	20	mg/m^3			EN ISO 21877 CEN TS 1369 for sampling Or NIOSH 6016 for analysis
A17	THP OCU	Hydrogen Sulphide	No limit set	-	Average over sampling period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis or US EPA M11
		Ammonia	20	mg/m^3			EN ISO 21877

							CEN TS 1369 for sampling Or NIOSH 6016 for analysis
A18	Siloxane Filter Stack	-	-	-	-	-	-

Note 1: Reference conditions are the concentration in dry air at a temperature of 273 K, at a pressure of 101.3 kPa and with an oxygen content of 5% dry.

Note 2: Monitoring is unnecessary where the flare is active for <10% of the year.

Note 3: No parameters set for the monitoring of this MCP at the current time. Emission Limit Values to apply from 1st January 2030.

Table C3-2b – Emissions to Sewer

Emission point reference and location	Source	Parameter	Limit	Unit
T1 on site plan (TQ 28969 40184)	Picket Fence Thickener Liquors, OCU Waste Waters	No parameters set	No limit set	-
T2 on site plan (TQ 28973 40186)	Pre-THP Dewatering Liquors, THP Cooler Waste Waters	No parameters set	No limit set	-
T3 on site plan (TQ 28937 40089)	SAS Thickening Liquors, Digested Sludge Dewatering Liquors, Biogas Condensate, OCU Waste Waters	No parameters set	No limit set	-

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

Although screened out of the detailed Risk Assessment (Question C2 Q6), due to the nature of the processes, the anaerobic digestion operations, and 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, boiler and emergency flare stack) have emission limits. Flare stack height approx. 6 m, CHP and boiler multi-flue stack approx. 15 m. Site has a siloxane filter fitted on the main biogas pipeline connected to the CHP Engines to remove impurities within the biogas. Previous modelling, which remains unchanged, did not find unacceptable impacts.	Low
Biogas transfer systems, biogas storage tank, CHP engines, flare or PRVs failure	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

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 pressure and flow sensors and with 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. A flare stack (emergency flare) is utilised for the safe disposal of surplus biogas in the event of plant breakdown, or a surplus of biogas above the level that can be safely stored or utilised. Use of emergency flare is recorded. PRVs are in place on the Biogas Storage holders to be operated in the event of failure of the emergency flare to prevent over-pressurisation and catastrophic failure.	
Catastrophic loss of biogas emissions from biogas transfer systems, biogas storage tank, CHP engines, flare or PRVs	Abnormal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Odour impact. Global warming potential. Risk of significant fire and explosion	Low	High	Medium	The plant is designed to capture and utilise all biogas possible, combusting the biogas in order to maximise recovered value from the biological treatment of sludge. The biogas system utilised is subject to regular preventative maintenance, including a LDAR plan, to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of pressure and flow	Medium

						sensors and with isolation valves to minimise the potential for release if a leak is detected. A flare stack (emergency flare) is utilised for the safe disposal of surplus biogas in the event of plant breakdown, or a surplus of biogas above the level that can be safely stored or utilised. Use of emergency flare is recorded. PRVs are in place on the Biogas Storage holder 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 diesel within the boiler	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. Combustion plant operates within permitted ELVs subject to routine monitoring against permit compliance. All combustion plant is located in south of the site, away from sensitive receptors. The nearest receptor is a residential property approx. 260 m south of the combustion plant.	Low
Release of steam from THP, vessels and tanks	Abnormal	Emissions to air and dispersion leading to inhalation by local human and animal receptors. Global warming potential	Low	Low	Low	THP is regularly maintained and operated by trained, competent personnel. Regular visual checks made of all equipment to identify potential faults.	Low

						THP tanks and vessels are fitted with PRVs to safely vent steam to atmosphere and prevent a catastrophic failure. THP is located within centre of the site away from sensitive receptors, approx. 300 m away from commercial properties to the west.	
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 minimised by storing the digested sludge cake within an enclosed cake barn that is odour abated via an OCU. The nearest receptor is a residential property, approx. 260 m south of the cake barn. Internal site roads are made from concrete/asphalt and not prone to the generation of dust.	Low
Release of bioaerosols and dust from spillages	Abnormal	Emissions to air and dispersion leading to inhalation by local human and animal receptors with potential harm to health. Odour impact of bioaerosols. Nuisance impact of dust.	Low	Low	Low	The risk of bioaerosol and dust is largely minimised by storing the digested sludge cake within an enclosed cake barn. Staff responsible for site housekeeping and cleaning of spillages in a timely manner. Sludge retains a high moisture content and is not prone to windblown dispersion which could cause the generation of dust in the event of a spillage. Areas around the THP and digester tanks are largely made ground meaning spillages can be more easily contained and cleaned. Roads are	Low

						made from concrete/asphalt and not prone to the generation of dust.	
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 closest surface water body is the Gatwick Stream, which is found on the western boundary of the STC. It is approximately 30 meters from the boundary at the closest point. Chemicals and oils all stored within suitably bunded tanks and IBCs with rainwater removed as required to maintain 110% capacities. Handling and use of chemicals and oils is carried out by trained personnel. COSHH data sheets available. Spill kits available on site. 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 and from buried pipes	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	Low	Low	The installation lies outside any Groundwater Source Protection Zones (SPZ). Provision of suitable structurally integral tanks constructed from concrete or steel and glass reinforced plastic/insulation (where needed). All tanks are subject to asset inspection and proactive maintenance programme including regular visual inspection for cracks or weeping. Not all tanks are covered although tanks are fitted with levels and monitors.	Low

						Visual checks during regular day-to-day operations and scheduled preventative maintenance of equipment, such as pumps, pipes, joins etc. Spill kits available on site. Staff are trained in their use Biogas condensate discharged back to the Works Inlet through site drainage system. 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. Litter picking activities are completed as required.	Low

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

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

Table C3-3b(ii) Odour risk assessment

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
H_2S/biogas emissions from uncovered tanks	Normal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	High	Low	Medium	Biogas will principally be generated in Primary Digester Tanks which are covered with fixed roofs. The nearest receptors are a commercial premises approx. 290 m west and a residential property approx. 290 m south of the Primary Digester Tanks. Small amounts may be generated within the Digested Sludge Buffer Tank and Sludge Contingency Tanks which are uncovered tanks. These tanks are approx. 285 m from the nearest receptors, a residential property to the south. H_2S production is controlled through the digestion process which can be manually overridden if required. Chemical dosing, if required can be used in the UWWTD area of the site.	Low
Loss of containment from biogas holders 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 two double membrane Biogas Storage holders which are suitably sized to manage biogas generation for the site. 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	Low

						comprehensive array of pressure and flow sensors and with 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 Biogas Storage holders, including fence and pipework is guarded. PRVs available to safely manage pressures within the biogas holders and prevent under or over pressurization.	
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 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 visual checks by site personnel. Biogas is principally stored within two double membrane Biogas Storage holders which are suitably sized to manage biogas generation and act as buffer storage for biogas. Site has two CHP Engines, one boiler and one flare which are used in order of preference to maximise recovery of energy. CHP Engines and boiler are subject to regular maintenance to maintain maximum use of outlets, with flare maintained in good working order should it need to be used.	Low

						The nearest receptors are a commercial premises approx. 290 m west and a residential property approx. 290 m south of Biogas Storage 1. The same receptors are the nearest ones to Biogas Storage 2 but are slightly further away.	
H_2S/biogas emitted when biogas cannot be combusted in CHP engines, boiler 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 two double membrane Biogas Storage holders which are suitably sized to manage biogas generation and act as buffer storage for biogas. Site has two CHP Engines, one boiler and one flare giving multiple outlets for biogas. The nearest receptors are a commercial premises approx. 290 m west and a residential property approx. 290 m south of Biogas Storage 1. The same receptors are the nearest ones to Biogas Storage 2 but are slightly further away. CHP Engines and boiler are subject to regular maintenance to maintain maximum use of outlets, with flare maintained in good working order should it need to be used.	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	High	Low	Medium	Digested sludge cake is stored within an enclosed cake barn and is inherently low odour material. The cake barn is subject to odour abatement via an OCU. The nearest receptor is a residential property, approx. 260 m south of the cake barn.	Low

						Should any odorous sludge cake be produced, this will be subject to process checks undertaken to identify root cause of production and removed from site expediently.	
Failure of odour control units	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	Low	High	Medium	Odour control units are subject to regular preventative maintenance. Media is replaced in line with the manufacturer's recommendations	Low
Storage of site generated wastes	Normal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	Low	Low	Low	Wastes generated on site are not inherently odorous and is stored securely for collection by appropriately licensed approved contractors.	Low

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

The installation has the potential to generate noise as a result of the permitted activities. Potentially noisy activities are subject to a number of process controls and noise management is a key operational objective, as summarised in the risk assessment table below.

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	The CHP Engines are acoustically baffled, self-contained and designed for external applications therefore noise emissions are already low. CHP Engines are located away from sensitive receptors, in the centre of the site and shielded by other buildings. The nearest receptors are, approx. 270 m south from the CHP Engines, being residential properties. 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 away from sensitive human receptors, which are approx. 270 m south and are residential properties. Good inspection regimes and maintenance of fans to ensure that excessive noise levels are not generated. Where repair or replacement is required, this will be completed promptly.	Low

Operation of site vehicles	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Vehicle movements across the site subject to speed limit and one way system is in place within some areas, to reduce generation of noise. Shovel loading of digested sludge cake mainly takes place within the enclosed cake barn. Tanker deliveries limited to daytime only.	Low
Vehicle movements - tanker deliveries of cess	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Imports normally take place before 10 pm at night but can take place 24/7. Vehicle movements across the site are subject to a speed limit to reduce generation of noise. The cess waste import point is towards the east of the site and the nearest receptors are the commercial premises, are approx. 260 m to the west, beyond a railway line.	Low
Vehicle movements - tanker deliveries of sludge and cake	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Imports of sludge and cake take place to the centre of the site and can only be made during site opening hours and not 24/7. Shielding by other buildings reduces impacts of noise. The nearest receptors are the commercial premises, approx. 260 m to the west, beyond a railway line. Vehicle movements across the site are subject to speed limit to reduce generation of noise.	Low

						Shovel loading of digested sludge cake takes place in the fully enclosed cake barn, over 250 m from the nearest receptors.	
Vehicle movements - tanker deliveries of chemicals and raw materials	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Deliveries likely to take place during daytime hours to delivery areas within the central or eastern areas of the site. Vehicle movements across the site are subject to speed limit to reduce generation of noise.	Low
Operation of emergency flare	Abnormal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Low	Medium	Use of the emergency flare is minimized by prioritizing use of the CHP Engines and boiler with use of the flare recorded. Emergency flare is located approx. 260 m from the nearest sensitive receptor, residential properties towards the south.	Low

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

A site specific Accident 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. As summarised in the site specific bioaerosol risk assessment (BRA) which is located in Appendix F:

3c - Types and amounts of raw materials

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

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

4 - Monitoring

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

Air emission points A1-A5 have been removed under previous variation applications. Points A6 and A7 (CHP Engines), A8 (boiler), A9 (flare stack) are subject to emissions monitoring in accordance with the requirements of existing permit requirements and EA guidance.

Odour Control Units (A15-A17) will have bi-annual testing.

Hours of operation of the flare stack (A9) 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.

There is no routine monitoring proposed for points A10-A14 (PRVs), or A18 (Siloxane filter stack).

Table C3-4a- Emission Monitoring

Monitoring point	NGR	Monitoring Frequency	Methodology (standard)	Assessment procedures
A6 (CHP 1)	TQ 29051 40048	Oxides of Nitrogen (NO and NO2 expressed as NO2) – hourly average Carbon monoxide – hourly average Volatile Organic Compounds – Hourly average	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	BS EN 14792 BS EN 15058 BS EN 12619:2013
A7 (CHP 2)	TQ 29054 40053	Oxides of Nitrogen (NO and NO2 expressed as NO2) – hourly average Carbon monoxide – hourly average Volatile Organic Compounds – Hourly average	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	BS EN 14792 BS EN 15058 BS EN 12619:2013

A8 (Boiler)	**TQ 29055 40046**	**-**	**n/a**	**-**
A9 (Flare Stack)	**TQ 29065 40050**	**Annual monitoring is only required when flare operates in excess of 10% of the time, taken on an annual assessment period.**	**n/a**	**-**
A10 (THP PRV)	TQ 29009 40156	n/a	n/a	-
A11 (Primary Digester PRV)	TQ 29018 40097	n/a	n/a	-
A12 (Primary Digester PRV)	TQ 29033 40085	n/a	n/a	-
A13 (Biogas Holder PRV)	TQ 29021 40066	n/a	n/a	-
A14 (Biogas Holder PRV)	TQ 29028 40159	n/a	n/a	-
A15 (OCU 1)	TQ 29048 40159	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	
A16 (OCU 2)	TQ 29002 40190	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	
A17 (THP OCU)	TQ 28985 40132	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	
A18 (Siloxane Filter Stack)	TQ 29047 40054	n/a	n/a	-
S1 (Liquor sampling point)	TQ 28958 40167	n/a	MCERTS or ISO/IEC 17025 where available	-
S2 (Liquor sampling point)	TQ 29026 40141	n/a	MCERTS or ISO/IEC 17025 where available	-
S3 (Liquor sampling point)	TQ 29065 40058	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.

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

5 - Environmental impact assessment

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

No.

6 - Resource efficiency and climate change

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

The Primary Digester Tanks are heated by the incoming sludge from the THP process and do not require any additional heat input. Primary digester Tanks are all suitably insulated to maintain optimum temperature.

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 exhaust gases of the CHP Engines is used to supplement steam raising within the waste heat boiler.

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

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

The main site energy source is electricity from the CHP Engines supplemented by imported electricity from the National Grid. The site CHP Engines combusts indigenous biogas with the electricity either used on site or exported to the public supply via National Grid if there is a surplus. The CHP Engines also provides useable heat for steam raising to the waste heat boiler, via heat exchangers, which is supplied to the THP process. The boiler use diesel or biogas to supplement recoverable heat. Use of heat from the CHP Engine reduces the demand on supplementary fuels in the waste heat boiler.

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 in the THP process) on site minimises the use of fossil fuels onsite and within the energy mix for the Nation al Grid, whilst recovering

biological wastes. Location of the heat exchange, boiler and CHP Engines 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 recover energy and nutrients which can be put to beneficial use.

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

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

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

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

5. Form C4 Questions

1 About the permit

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

The original CHP permit was a waste level permit. This has now been incorporated within the installation permit as a DAA. This permit application is for a new waste operation for temporary storage of non-hazardous waste as a secondary activity waste operation 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; siloxane filtrate; 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?

2,317 Cubic metres

3c What is the maximum rate of discharge?

26.8 Litres / second

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

2,2317 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 [2317.12m^3 x 1000] / 86400 from sources such as thickening and dewatering. This gives a value of 26.8220 litres, rounded up to 26.8 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 treated in a mixture with UWWTD related waste waters.

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

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

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

The final effluent discharge from the wider sewage treatment works is specified in Environmental Permit TH/CNTM.1402/003.

Q7 What will be in the effluent?

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

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

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

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

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

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

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

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

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

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

7f What is the maximum temperature of your discharge?

20°C back into the sewage works

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

0°C

Q8 Environmental risk assessments and modelling

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

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

8d Discharges to groundwater

The installation does not discharge to groundwater

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

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

8f Environmental impact assessment

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

Q9 Monitoring arrangements

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

Not applicable to this installation

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

No sampling point installed at present. Effluents will be sampled from the Sample 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

Non-tidal river, stream or canal

Appendix 5 – Discharges to non-tidal river, stream or canal

A5.1 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

A5.2 Give the national grid reference of the discharge point

TQ 28800 40200

A5.3 Give the name of the watercourse, canal or the main watercourse it is a tributary of if you know it

Gatwick Stream, via the wider UWWTD sewage treatment works

A5.4 Is the discharge into a:

Non-tidal river

A5.5 Does the discharge reach the watercourse or canal by flowing through a surface water sewer?

No

A5.6 Does the watercourse dry up for part of the year?

No

A5.61 If the watercourse does dry up for part of the year can you indicate a typical period when the surface water runs dry each year – start and finish (in months)

N / A

A5.6.2 If the watercourse does dry up for part of the year, how many metres downstream of the discharge is it before the discharged effluent soaks in?

N / A

A5.7 Is the discharge made to a roadside drain or ditch?

No

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 A. Figures

A.1 Site Location Plan

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

A.2 Installation Boundary and Air Emission Points

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

A.3 Site Impermeable and Permeable Surface Plan

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

A.4 Site Drainage Plan

See document: CRAWS1ZZ-DPL-001.pdf

A.5 Process Flow Diagram

See document: B22849AZ-JA-CRAWS1ZZ-LSX-DR-P-0001

A.6 Site Photographs

See document: TW_STC_EPR_22a_CWY_APPA.6

Appendix B. CoTC

See document: TW_STC_EPR_22a_CWY_APPB

Appendix C. Site Condition Report – H5

See document: TW_STC_EPR_22a_CWY_APPC

Appendix D. BAT Assessment

See attached BAT Gap Analysis Spreadsheet: TW_STC_EPR_22a_CWY_APPD

Appendix E. Odour Management Plan

Includes Odour Management Plan and Odour Risk Assessment: TW_STC_EPR_22a_CWY_APPE

Appendix F. Bioaerosol Risk Assessment

See document: TW_STC_EPR_22a_CWY_APPF

Appendix G. Containment Assessment

G.1 Containment Options Report (CIRIA 736)

See document: B22849AZ-JA-CRAWS1ZZ-100-RP-Z-0001

G.2 Containment Assessment

See document: B22849AZ-JA-CRAWS1ZZ-100-CA-P-0002

Appendix H. Leak and Detection and Repair Plan (LDAR)

See document: TW_STC_EPR_22a_CWY_APPH

Appendix I. Residue Management Plan

I.1 Residue Management Plan

See document: TW_STC_EPR_22a_CWY_APPI.1

I.2 MSDS Zip File

See zip folder: TW_STC_EPR_22a_CWY_APPI.2

Appendix J. Accident Prevention and Management Plan

See document: TW_STC_EPR_22a_CWY_APPJ

Appendix K. Acceptance of Third-Party Waste Imports

K.1 Acceptance of Third-Party Waste Imports

See document: TW_STC_EPR_22a_CWY_APPK.1

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

See document: TW_STC_EPR_22a_CWY_APPK.2

Appendix L. Air Quality Assessment

Not required

Appendix M. Liquor Monitoring Proposal

See document: TW_STC_EPR_22a_CWY_APPM