Sludge Treatment Centre Permitting

Environmental Permit Variation Application - Basingstoke Sludge Treatment Centre

Resubmission

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Contents

1. Introduction

This substantial variation application relates to a biological treatment permit for the Basingstoke Sludge Treatment Centre (STC), located at the Basingstoke 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 and blending with imported waste of a similar nature to indigenous 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, EPR/CB3201GE/A001, for the operation of CHP engines will be merged and remain in place as directly associated 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 sludges from other sites, arriving by road to a dedicated sludge 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 dedicated waste import point near to the works inlet.

The operation of a biogas fuelled Combined Heat and Power (CHP) engines and a dual fuelled 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.

The STC is located within the Basingstoke STW, north-east of the town of Basingstoke and close to the village of Chineham.

The STC treats both indigenous sludges and imported sludges. Indigenous sludge is generated from the incoming flow, which passes through the aerobic treatment process under the UWWTD. 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 Return Liquor Pumping Station 1 and 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. Liquor returns to the inlet of the works via the site drainage.

Imports of sludge from other works are delivered to a sludge offloading point and Sludge Import Tank from tankers, is screened and pumped to Pre-THP Dewatering Feed Tank. All such imports are subject to appropriate waste pre-acceptance and acceptance checks, prior to acceptance. Indigenous sludge and imported sludge combine in the Pre-THP Dewatering Feed Tank and are pumped to the Pre-THP Dewatering Plant.

The STC comprises an offloading point for permitted imported tankered wastes close to the main entrance to the wider STW on land owned by Thames Water. This material is passed to the inlet where it joins the main works flow and via screens to the primary settlement tanks. The waste arrives at the STC via tanker. 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 Indigenous Sludge Blending Tank and pumped to the Sludge Buffer Tank and mixed with imported sludge from other works in the Pre-THP Dewatering Feed Tank. From the Pre-THP Dewatering Feed Tank, sludge is dewatered in Pre-THP Dewatering Plant and pumped to a Thermal Hydrolysis Plant (THP) Feed Silo. Liquor is returned to the head of the works via the site drainage. Undigested sludge cake can also be imported to Basingstoke via a dedicated Cake Import Facility with the sludge rewet before it 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 and odour abated system. From the THP Process, sludge is transferred to one of the three Primary Digester Tanks at the site. Following treatment over an appropriate number of days within the Primary Digester Tanks, digested sludge is transferred to the Digested Sludge Transfer Tank. The Primary Digester Tanks and Digested Sludge Transfer Tank are all steel construction and above ground tanks.

From the Digested Sludge Transfer Tank, digested sludge is pumped via a partially subsurface sludge line to one of two concrete Digested Sludge Buffer Tanks, prior to dewatering of the digested sludge inside the cake barn using a powder polymer coagulant. Dewatered sludge is conveyed into the cake barn, a semi-enclosed and covered building, prior to removal from the site under the Sludge Use in Agriculture Regulations 1989 (SUiAR), and in accordance with the Biosolids Assurance Scheme (BAS). Liquor from the Digested Sludge Dewatering Plant is pumped to the Liquor Treatment Plant (LTP) for treatment before returning to the Works Inlet. Undigested sludge cake (raw cake) may be imported to the cake pad for temporary storage in a contingency prior to digestion via the Cake Import Facility, for example, in the event that the Cake Import Facility is temporarily unavailable for use.

A second listed activity at the site is for a LTP to aerobically treat the dewatering liquors generated by the dewatering of sludge. The liquors are passed to the LTP and ammonia levels are reduced through biological treatment. Following treatment, the treated liquor is returned to head of the works for treatment through the UWWTD flow.

Biogas from the Primary Digester Tanks is captured and transferred to the double membrane Biogas Storage holder. 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 holder for combustion in 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. In the event that additional steam is required by the THP process, biogas or diesel may be used in the onsite dual-fuelled 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 a waste activity for the import of treated sludge cake from other works, for temporary storage in 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 an area within the cake barn, so as to be stored separately to indigenous sludge cake. The waste stream is the same as that arising from the treatment of sludge within the Basingstoke 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.

2. Technical Description

This is a substantial variation for a bespoke installation permit under the Environmental Permitting (England and Wales) Regulations 2016 (as amended), following a change of interpretation of the UWWTD by the Environment Agency. It relates to a biological waste treatment permit for the Basingstoke Sludge Treatment Centre (Basingstoke STC), located at the Basingstoke 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 (DAAs), including the operation of combustion plant for the generation of electricity and heat at the site, which is classified as an 'existing' combustion source under the Medium Combustion Plant Directive (MCPD).

The combustion plant, consisting of two biogas CHP engines and one dual fuelled boiler that are covered by an existing environmental permit under number EPR/CB3201GE/A001. This permit is subject to a substantial variation to convert it to an installation permit with the CHP engines and boiler becoming a DAA to the listed activity.

Location

The Basingstoke site is located in a rural area, approximately 5 km north-east of the town of Basingstoke, Hampshire and east of the village of Chineham and the A33. The Chineham Energy Recovery Facility is located immediately to the west of the STW, otherwise the site is surrounded on all sides by open fields and tree cover. The nearest receptors are a farm approximately 375 m north of the site and residential receptors approximately 650 m to the north-west. Farms can also be found approximately 750 m south-west and south-east of the site.

A small stream, Petty's Brook, runs approximately west to east along the STW's northern perimeter and flows to the River Loddon which is found to the east and south-east, approximately 120 m from the site at the nearest 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 peripheral parts of the STW including assets within the STC are within a Flood Zone 2 indicating an increased risk of flooding on northern and eastern parts of the site, with between a 1 in 100 and 1 in 1,000 annual probability of river flooding.

There are four statutory designated habitat sites within the relevant distances of the site. The closest is a Local Nature Reserve (LNR), Chineham Woods LNR, approximately 700 m west of the site. The Mill Field LNR and Daneshill Park Woods LNR are both south-west of the site, at a distance of 1.5 km and 1.8 km respectively. There is one Special Protection Area (SPA), Thames Heath Basins, which is 7.5 km to the north-east. There are no Special Areas of Conservations (SAC) or Ramsar sites within 10 km of the site and no Sites of Special Scientific Interest (SSSI) within 2 km of the site. There 11 areas of Ancient Woodland within 2 km of the site, the closest is approximately 60 m to the north-east, Forked Copse Ancient and Semi-natural Woodland. There are 49 non-statutory designated local wildlife sites (LWS) within 2 km of the site including LWS that are within 50 m of the STC.

The site is not within a Source Protection Zone (SPZ) and is not within an Air Quality Management Area (AQMA). A site plan, showing the permitted area of the Basingstoke STC and the wider STW can be found in Appendix A.2 while a process flow diagram summarising the sludge treatment process can be found in AppendixA.5. A site tank inventory is included below, followed by the site process description which identifies where tanks are located within the sludge treatment process.

Site Tank Inventory

Tank Purpose	Number	Operational Volume (m^3)	Total Operational Volume (m3)	Material
Picket Fence Thickener	2	410	820	Steel
Consolidation Tank	1	136	136	Concrete
Indigenous Sludge Blending Tank	1	42	42	Steel
Sludge Import Tank	1	86	86	Steel
Sludge Buffer Tank	1	152	152	Steel
Pre-THP Dewatering Feed Tank	1	152	152	Steel
Primary Digester Tanks	3	3,233	9,699	Steel
Digested Sludge Transfer Tank	1	62	62	Steel
Digested Sludge Buffer Tanks	2	1,587	3,174	Concrete
Liquor Buffer Tank	1	1000 approx.	1000 approx.	Steel
LTP Reactor Tank	1	1,640	1,640	Concrete
THP Feed Silo	1	507	507	Steel
THP Process - THP Pulper tank	1	15	15	Steel
THP Process - THP Reactor Tank	4	5	5	Steel
THP Process -THP Flash Tank	1	12	12	Steel

Waste Activities

The STC comprises of imports of waste for biological treatment and two additional waste activities (imports of non-hazardous waste to the head of the works and imports of non-hazardous waste to the cake barns). Biological treatment processes at the installation are for indigenous sludge separated from the UWWTD areas of the site and for treatment processes for imported sludge that arrives at Basingstoke STC, normally by tanker and consists of sludge 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 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 wastes close to the main entrance to the wider STW on land owned by Thames Water, which forms an existing waste activity for the site. 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.

Imports of cess waste can be made 24/7 at Basingstoke STC and takes place on engineered concrete impermeable surface with kerbing and sleeping policemen forming a bund around the import point and drainage that is connected to the site drainage. There is one import hose site supplied flexible hose pipe (to prevent misconnections) connected to the data logger and waste materials gravitate to a pumping station that pumps all waste and drainage to the works Inlet. At the works Inlet, the imported waste combines with the incoming main sewer, is screened and passes to the UWWTD route for aerobic treatment. There is a webcam covering the waste import area.

This application includes a second additional waste operation at the same site 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 Basingstoke 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 thickened within two open, Picket Fence Thickeners (PFTs). Both PFTs are above ground, enclosed and of steel construction. A rotating arm scrapes sludge into a central sump where a pump transfers the thickened sludge via a partially aboveground pipe to the Indigenous Sludge Blending Tank or Sludge Buffer Tank. Thickened primary sludge blends with thickened indigenous Surplus Activated Sludge (SAS) in the Indigenous Sludge Blending Tank and is pumped to the Sludge Buffer Tank. The PFTs are fitted with a number of safety features including a sludge blanket detector and high-level floats connected to the site Supervisory Control and Data Acquisition (SCADA) system, which would inhibit the transfer pumps if a high-level within the tank is reached. Liquor from the PFTs is returned via Return Liquor Pumping Station 1 and the site drainage system to the Works Inlet for additional treatment through the STW.

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, stored in a day tank and dosed to each belt thickener to aid coagulation of the SAS. Liquor from the SAS Thickening Plant is returned via Return Liquor Pumping Station 1 and the site drainage system to the Works Inlet for additional treatment through the STW. The thickened SAS is then pumped to the Indigenous Sludge Blending Tank where it is mixed with thickened indigenous primary sludge. Level sensors on the SAS Thickening Plant monitor the operations and would inhibit the belt thickener feed pumps in the event of abnormal operations. The Indigenous Sludge Blending Tank is an above ground tank of steel construction, that mixes the primary sludge and SAS with external mixer/chopper pumps prior to pumping to the Sludge Buffer Tank and the THP process.

There is also a Consolidation Tank at Basingstoke STC which can be used in to temporarily store sludge. This Consolidation Tank is uncovered, square and of concrete construction. Sludge is manually pumped in for storage and manually pumped out following the resumption of normal site activities.

Sludge from other waste water treatment sites can also be imported to Basingstoke STC via an offloading point consisting of a data logger and two site supplied flexible hose pipe (to prevent misconnections) into a point near to the THP process. This import point is located on engineered concrete and is fitted with surface drainage that returns to the site drainage. Imported sludge passes through a grit pot, to remove stones, and through the data

logger before it is transferred via a subsurface pipe into the above ground Sludge Import Tank, which is enclosed and of steel construction. The data logger records where the sludge is from and the percentage dry solids of the sludge and is able to accept sludge during the site operational hours, as required.

Imported sludge is screened to remove inorganic material, which is discharged into skips for disposal offsite with the screened sludge pumped into the Pre-THP Dewatering Feed Tank, where it mixes with indigenous sludge. This tank is an above ground tank of steel construction and is fitted with external air mixing to prevent settling of sludge within the tank. Screened imported sludge is then subject to dewatering in Pre-THP Dewatering Plant with the additional of polymer is made up using final effluent / potable water. Polymer from the polymer silo is used to aid coagulation and is dosed to each belt. The dewatered sludge is then pumped to the THP Feed Silo to be mixed with imported cake. The THP Feed Silo is an above ground, enclosed steel tank. Liquor from the Pre-THP Dewatering Plant is returned to the Return Liquor Pumping Station 2 and the site drainage system to the Works Inlet for additional treatment through the STW. Pre-THP Dewatering Plant and the THP Feed Silo are subject to odour abatement via a two-stage Odour Control Unit (OCU).

Indigenous thickened sludge from the Indigenous Sludge Blending Tank is pumped to the Sludge Buffer Tank, which is of steel construction, and above ground. Indigenous sludge is then pumped to the Pre-THP Dewatering Feed Tank where it is mixed with the imported sludges and subject to further dewatering on the Pre-THP Dewatering Plant, as above, with the thickened indigenous sludge being pumped to the THP Feed Silo.

Undigested sludge cake can also be imported at Basingstoke STC, with a dedicated Cake Import Facility towards the east of the THP that is partly enclosed. A data logger is present within the Cake Import Facility which is used to record the originating site and allocate a pre-defined percentage dry solid for the imported cake and allows for imports of permitted waste imported via road going vehicles, normally from lorries. After recording the required information on the data logger, the vehicle reverses towards a cake import bunker to discharge the cake, which is weighed and transferred via two screw pumps to the THP Feed Silo. Sludge is rewetted as required with liquid sludge. The Cake Import Facility is able to accept cake during operational hours as required and is odour abated via a two-stage OCU.

Prior to being subject to the THP process, the sludge needs to be rewetted to ensure a relatively consistent feed is provided to the THP in order to achieve optimal performance. Final effluent or liquid sludge is used in place of potable water to reduce the dry solid content to the optimal amount, and this wet sludge is pumped to the THP from the THP Feed Silo. The THP is a single stream process consisting of one THP Pulper Tank, four 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 136°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.

In the THP Pulper Tank, fresh 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. 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 THP Pulper Tank for pre-heating of another batch of sludge. A second valve, at the bottom of the THP 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 vented back to the THP Pulper Tank, with the sludge discharged from the THP Flash Tank into THP coolers that use final effluent from site to lower the temperature to be more optimal for anaerobic digestion.

Each THP Pulper Tank, Reactor and THP 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 found within each THP stream to reduce temperature and moisture content prior to further treatment of this gas.

After being hydrolysed and cooled, the warm sludge is pumped to one of the three Primary Digester Tanks on site. Each of the three Primary Digester Tanks are of identical construction, are above ground with fixed roofs and of steel construction, with an insulating outer cladding to maintain the digester temperature. Each tank extends 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 at mid-level of the Primary Digester Tank with mixing of the sludge via external recirculation pumps. Digested sludge is continuously transferred through a limpet chamber at the top of each digester into the Digested Sludge Transfer Tank. Each Primary Digester Tank is fitted with dual Pressure and Vacuum Relief Valves (PVRVs) and are monitored via the site SCADA system for high and low pressure, presence of a vacuum and the level of sludge within the tank via float switches and ultrasonic levels. In the event of abnormal conditions, the digester feed pumps would be inhibited to prevent further sludge feeding from the THP. There is no external heat input to the Primary Digester Tanks, which maintain their temperature via in the incoming hydrolysed sludge and the external insulation cladding.

After the required duration, sludge is transferred to the Digested Sludge Transfer Tank, an above ground, enclosed tank that is of steel construction. The Digested Sludge Transfer Tank acts as a buffer between the digestion and dewatering processes. This Digested Sludge Transfer Tank is fitted with a gas mixing system and safety systems which are connected to the site SCADA system, which are the same as the safety systems within the Primary Digester Tanks.

Digested sludge is transferred via a partially subsurface sludge line from the Digested Sludge Transfer Tank to two Digested Sludge Buffer Tanks located adjacent to the cake barn. Both Digested Sludge Buffer Tanks are above ground and of concrete construction, used to hold digested sludge prior to dewatering. Both Digested Sludge Buffer Tanks are uncovered and fitted with external air mixing to prevent settling of the sludge. A high-level float within each tank monitors the level of sludge within each tank, connected to SCADA and will inhibit the transfer pumps in the event of a high-level being reached. Digested sludge is introduced at a high level and removed from near the base of the tank by belt press feed pumps. The pumps are configured to transfer sludge from either Digested Sludge Buffer Tank to one of the Digested Sludge Dewatering Plant that are located within the sludge dewatering area of the Cake Barn. The Digested Sludge Dewatering Plant dewaters the digested sludge with the aid of a polymer coagulant. The polymer is made up from a bulk bag with the addition of final effluent / potable water in a make-up tank and stored within a storage tank. Dewatered digested sludge is conveyed to the adjacent cake barn for temporary storage.

Liquor Treatment Plant (LTP)

Dewatering liquors are transferred to the LTP which forms the second listed activity at the site due to the LTP process exceeding 50 m^3 (or 50 tonnes) per day which is the relevant threshold. The treatment is considered a waste disposal activity because the LTP is a treatment for disposal activity. The treated liquors are returned to the UWWTD treatment route at the inlet, which is itself is a permitted disposal activity and the effluent outputs are discharged direct to the environment.

This LTP is of concrete construction and uncovered. Liquors are pumped into the LTP and are subject to agitation via blowers in order to achieve de-ammonification through a biological process that oxidises ammonia to nitrates. Caustic can also be dosed into the LTP to prevent pH levels falling too much and aid ammonia removal efficiency. Following treatment, liquids are returned via site drainage to the UWWTD plant for aerobic treatment.

Cake Storage

The Cake Barn is semi-enclosed with digested sludge cake deposited beneath the conveyor and moved to one of the temporary storage bays inside of the Cake Barn, prior to removal from site. In the event of non-compliant sludge being produced at Basingstoke STC, it is stored within one of the storage bays for an extended period of

time and marked with a 'NC' sign to prevent it being removed from site. The semi-enclosed cake barn is on made ground, consisting of engineered concrete with channel drainage to manage liquid run-offs.

There is also an open cake pad at Basingstoke STC which is used to store undigested sludge cake imports prior to anaerobic digestion via the site Cake Import Facility and THP process. The cake pad is made ground constructed of engineered concrete fitted with drainage, which is returned to the works inlet by the site drainage system.

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). There is considered to be a low risk of bioaerosols from digested sludge cake in the semi-enclosed cake barn or on the cake pad, with no sensitive receptors within 250 m of the cake pad for more than 6 hours at a time. 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 via a common biogas line that is predominantly aboveground, to the double membrane Biogas Storage holder. The biogas transfer pipeline is fitted with a condensate pots that captures entrained moisture from the generated biogas. These pots allow moisture to be removed from the biogas and returned for treatment via the site drainage system. The Biogas Storage holder is a dual membrane type with an inner and outer bag that is fitted with biogas detection systems and Pressure Relief Valves that operate in an emergency as a safety precaution in the event of over pressurising the system. The Biogas Storage holder is fitted with lightning protection and a secure fence for physical security. Biogas passes through chiller units and biogas boosters via an aboveground pipe to the CHP engines or boiler. When the levels within the Biogas Storage holder 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.

The biogas is taken from the biogas holder for combustion within two Edina MWM TCG2020 V12 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 2.868 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. There are two carbon-based siloxane filters upstream of the CHP engines, to remove impurities from the biogas prior to combustion. This is classified as an 'existing' combustion plant under the Medium Combustion Plant Directive and permitted by the existing Combined Heat and Power Plant Environmental Permit (EPR/CB3201GE/A001). 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 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 a Dan Stoker Opti Combi 400 model and has a thermal input of 3.130 MW. 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 via a small reverse osmosis boiler water treatment plant. In the event there is excess biogas, there is a ground mounted emergency flare which is used during periods of essential maintenance and emergency use. This is utilised under 10% of the year, less than 876 hours per year. The thermal input of combustion plant at the site is approximately 9 MW.

Emergency Standby Generators

The site has three emergency standby generators at the site which provide back-up power to the site in the event of a grid failure.

- THP Generator
- Northside Generator
- Southside Generator

The Northside and Southside generators do not meet the requirements of a DAA and are excluded from the scope of this permit. The THP Generator is currently an excluded generator but is required to be included within the Environmental Permit via this permit application as a DAA excluded generator because it will meet the requirements under Guidance note "Understanding the meaning of regulated facility" RGN2. This is because this emergency standby generator meets the criteria for inclusion as DAAs and is located within the installation permit boundary as described below:

- The THP Emergency Generator is directly associated with the installation and the installation will be the "principal user" of the electricity generated in the event of a site-wide loss of power. The emergency standby generator provides 100% of the power generated to the THP process.
- The THP Emergency Generator has a technical connection with the listed activities at the installation with output of the activity, electrical power, used with the treatment of waste in the THP Process at the installation.
- The THP Emergency Generator is capable of having a (limited) potential effect on air quality as emissions to air will occur during periods of operation.

The DAA excluded generator 2 is located at emission point A5, as indicated on the site plan in Appendix A.

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 site has a Liquor Treatment Plant which treats some dewatering liquors. Liquor treatment for other 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 via the liquor treatment plant where it is treated to reduce ammonia loading before being returned to the wastewater treatment works for aerobic treatment under the Urban Wastewater Treatment Directive.

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 Basingstoke STC primarily the Digested Sludge Buffer 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 the 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 Basingstoke 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 holder 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.

- At a THP digestion site such as Basingstoke the processes are 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. Basingstoke fits into the last row of the table.
- Dry solids feed: see table below, Basingstoke 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 but not on a 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 cake barn, and their location can be identified on this basis. For undigested sludge cake imports, these are accepted at the Cake Import Facility or separately on the cake pad and their location can be identified on this basis.

Odour

The facility has an odour management plan which is supplied as Appendix E.

Bioaerosols

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

Other Items

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

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

Other Risk Assessments

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

2.4 Regulatory listing

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

The relevant listings under Schedule 1 are:

Section 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.

Part A(1) (a) Disposal of non-hazardous waste with a capacity exceeding 50 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 concerning urban waste-water treatment(a)—

(i) biological treatment;

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

- Imports of waste, including sludge from other sewage treatment works;
- Blending of indigenous sludges and imported wastes/waste sludge prior to treatment;
- Pre-treatment of sewage sludge by thermal hydrolysis plant (THP);
- Storage of digestate prior to dewatering;
- Dewatering of digested sewage sludge
- Transfer of treated dewatering liquors back to the head of the sewage treatment works;
- Transfer of surface water runoff back to the head 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 head of the sewage treatment works;
- Combustion of biogas in a MCPD and Specified Generator (SG) compliant biogas CHP engines and boiler;
- Operation of an emergency flare;
- Operation of siloxane filter plant;
- Storage of diesel
- Storage of wastes, including waste oils; and
- Storage of raw materials.
- Operation of the THP standby emergency generator 2

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 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:

- 2x 2.868 MWth CHP engines;

- 1x 3.130 MWth boiler;

In addition, there are three standby generators that operate for emergency use only at the site, outside of MCPD. Following assessment against RGN2, one is within the scope of this permit as a DAA. This is the THP generator, which is for emergency use only (<50hrs per annum) and has a thermal input of 0.4 MWth. This is an excluded generator and too small to be a MCP.

Total thermal input of site is approximately 8.866 MWth in regular use.

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/CB3201GE/A001 issued 15/07/2016.

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

Basingstoke Sludge Treatment Centre

Basingstoke Sewage Treatment Works

Whitmarsh Lane

Chineham

Basingstoke

Hampshire

RG24 8LL

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

Name	Installation schedule 1 references	Description of the installation activity	Description of waste operations	Proposed changes document reference
Basingstoke STC	*Section 5.4 Part A(1) (a); i*	Biological treatment for disposal by means of aerobic treatment		
Basingstoke 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/CB3201GE – Basingstoke Sewage Treatment Works.

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

Event Name	Court	Date of hearing	Fine	Summary
				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

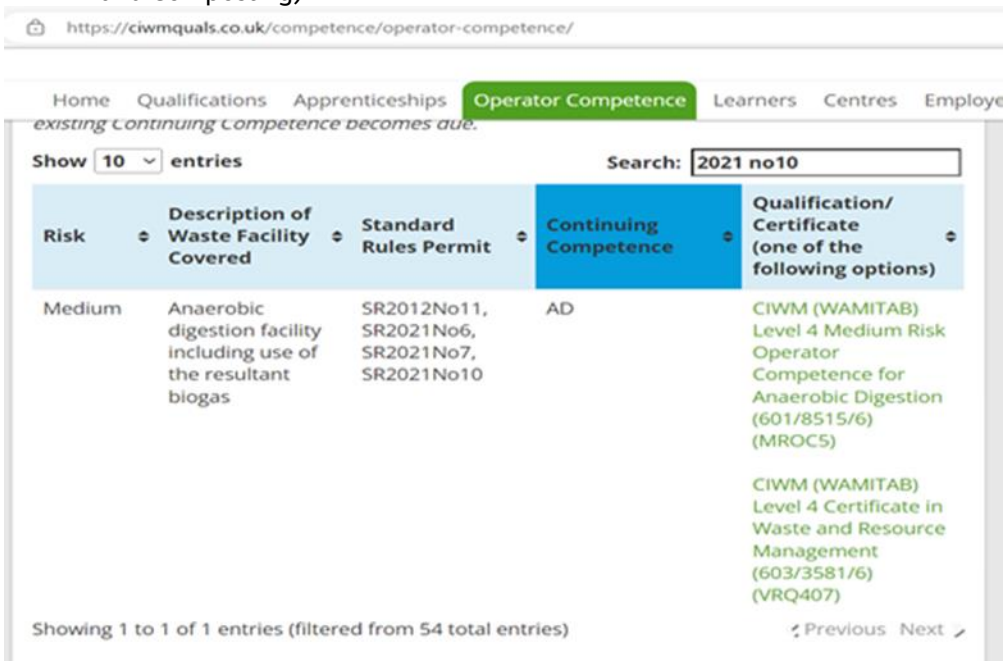
Thames Water uses WAMITAB qualified staff at their waste facilities. The relevant person for the site has been named below and full details have been provided separately on a spreadsheet.

Wayne North

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 for:

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

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

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
Thames Basin Heaths	SPA	North-east	7,500 m
n/a	SAC	n/a	n/a
n/a	Ramsar	n/a	n/a
n/a	MPZ	n/a	n/a
n/a	SSSI	n/a	n/a
Chineham Woods	LNR	West	700 m
The Mill Field	LNR	South-west	1,500 m
Daneshill Park Woods	LNR	South-west	1,800 m
Virnells/Hodds Copses	Ancient and Semi-natural Woodland	South	1,800 m
Unknown	Ancient Replanted Woodland	South-west	1,100 m
Great Sorrells Copse	Ancient and Semi-natural Woodland	West	1,300 m
Long Copse	Ancient and Semi-natural Woodland	West	1,800 m
Ashmoor Copse	Ancient and Semi-natural Woodland	South-east	1,700 m
Bottom Row	Ancient and Semi-natural Woodland	South	660 m
Buckfield Copse	Ancient and Semi-natural Woodland	North	1,300 m
Forked Copse	Ancient and Semi-natural Woodland	North-east	60 m
Gravelly Bottom Copse	Ancient Replanted Woodland	South	1,300 m
Round Copse	Ancient and Semi-natural Woodland	South-east	1,600 m
Rushes Row	Ancient and Semi-natural Woodland	South-east	530 m

List of Local Wildlife Sites	
Bells Copse Lower River Row Bottom Row Buckfield Copse Blacklands Farm Meadow Stream Page's Copse, Sherfield on Loddon Round Copse, Sherfield on Loddon Moulshay Farm Break Upper River Row Ashmore Copse Forked Copse River Lyde Blackland's Farm (2) Little Bowlings Farm Wood River Lyde Fen (site 286) Long Copse, Sherfield on Loddon River Loddon & Lower Mill Fen Petty's Brook Strip Whitmarsh Lane & Piece Ashmoor Lane Plantation, Hodd's Copse East Brick Hill Copse Small Copse, Old Basing and Lychpit Hodd's & Virnell's Copses Bushyleaze Copse Round Copse, Old Basing and Lychpit Gravelly Bottom Copse Sherfield Village Green Rushes Row Bain's Wood Guinea Copse Cufaude Lane Copse Pyott's Hill Copse (32a Pyott's Hill) Daneshill Drive Copse Razor's Farm woodland strip Long Copse, Chineham Great Binfield Copse Little Basing Fields Petty's Copse Bramley Training Area - Compartment 4 Bramley Training Area - Ragg Copse Great Binfields Copse (North-West) Great Binfields Copse North B Basing Fen & Wood Toll House Copse Thornhill Grassland	All sites <2,000 m

List of Local Wildlife Sites	
Maynards Wood & Bank	
Baker's Copse	
Daneshill Park Woods	
Little Baker's Copse	
Chineham Business Park / Petty's Brook Great	
Sorrell's Copse	
Wooded Moat off Farm View Drive, Chineham	

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

There are four statutory designated habitat sites within the relevant distances of the site. The closest is Chineham Woods LNR, approximately 700 m to the west of the site. The Mill Field LNR and Daneshill Park Woods LNR are both south-west of the site, at a distance of approximately 1.5 km and 1.8 km respectively. There is one SPA, Thames Heath Basins, which is located approximately 7.5 km to the north-east of the site. There are no SACs or Ramsar sites within 10 km of the site and no SSSIs within 2 km of the site. There 11 areas of Ancient Woodland within 2 km of the site, the closest located approximately 60 m to the north-east of the site, referred to as Forked Copse Ancient and Semi-natural Woodland. There are 49 non-statutory designated LWSs within 2 km of the site, the closest of which is Petty's Copse, which can be found less than 50 m to the north of the installation's boundary.

Most of the STW and STC is within a Flood Zone 1, indicating that there is a low probability of fluvial flooding (<1:1000 annual probability of flooding). However, peripheral parts of the STW including assets within the STC including both the cess waste import point and sludge import point and parts of the THP process are within a Flood Zone 2 indicating an increased risk of flooding on the northern and eastern parts of the site, with between a 1 in 100 and 1 in 1,000 annual probability of fluvial flooding.

The site is not located within the boundaries of a Source Protection Zone (SPZ).

This site is not located within the boundaries of an Air Quality Management Area (AQMA).

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 rural area approx. 5 km north-east of the town of Basingstoke and 600 m east of the A33 and village of Chineham. The nearest receptor is a farm approx. 375 m north of the site and residential receptors approximately 650 m to the north-west. Farms can also be found approximately 750 m south-west and south-east of the site. Ecological receptors: There are four statutory designated habitat sites within the relevant distances of the site. The closest is Chineham Woods LNR, approximately 700 m to the west of the site. The Mill Field LNR and Daneshill Park Woods LNR are both south-west of the site, at a distance of approximately 1.5 km and 1.8 km respectively. There is one SPA, Thames Heath Basins, which is located approximately 7.5 km to the north-east of the site. There are no SACs or Ramsar sites within 10 km of the site and no SSSIs within 2 km of the site. There 11 areas of Ancient Woodland within 2 km of the site, the closest located approximately 60 m to the north-east of the site, referred to as Forked Copse Ancient and Semi-natural Woodland. There are 49 non-statutory designated LWSs within 2 km of the site, the closest of which is Petty's Copse, which can be found less than 50 m to the north of the installation's boundary.	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 is 250 m.	The wastes handled at the site are liquids, sewage sludges, primary sludge 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 and undigested sludge cake retains a high moisture content and is not dusty. Sludge cake is stored centrally away from sensitive receptors, approx. 260 m from an industrial site to the east of the site and approx. 400 m from a farm to the north of the site.	**X**

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
		Roads will be maintained to avoid the production of dust. A wheelwash is used for vehicles exiting the cake barn. Anerobic digestion of sludge takes place within a closed system. Digested sludge cake is stored in the semi-enclosed cake barn in the centre of the site, more than 250 m away from sensitive receptors and the risk from bioaerosols is low and monitoring is not required. Please see Appendix F for the site specific bioaerosol risk assessment.	
Assessment of point source emissions to air Emissions deposited from air to land	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Amenity issues above. The impact of emissions from air on human health will depend on the distance and wind direction.	The site is not located within an AQMA. Air emissions have previously been assessed by the Environment Agency and deemed satisfactory. Use of the emergency flare is limited to emergency situations and during planned maintenance activities to either the CHP engines or the boiler. There are multiple outlets at Basingstoke STC that use biogas to reduce the likelihood of flaring, for which incidents of flaring are recorded by the site. Pressure relief valves 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).	X
Assessment of point source and fugitive emissions to water	Surface water drainage within the site drains to the inlet of the adjacent sewage treatment works for full treatment prior to discharge. Petty's Brook can be found on the STW's northern perimeter and close to parts of the STC, and flows to the River Loddon which is found to the east and south-east, approximately 120 m from the site at the nearest point. Most of the STW and STC is within a Flood Zone 1, indicating that there is a low probability of fluvial flooding (<1:1000 annual probability of flooding). The cess waste and sludge waste import points and some of the THP process plant and tanks are within a Flood Zone 2 indicating an increased risk of flooding on the northern and eastern parts of the site,	The main product of the process is a digested sludge cake, which is stored within Flood Zone 1, inside of a semi-enclosed cake barn on a concrete pad which is made of engineered concrete that is equipped with drainage. Other aqueous discharges generated by process are limited (comprising biogas condensate, dewatering liquors and surface water run off). These sources are discharged to the on-site drainage system where they are transferred to main sewage works inlet, some of which are pumped to a liquor treatment plant/liquor holding tank first.	X

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
	with between a 1 in 100 and 1 in 1,000 annual probability of fluvial flooding.	Due to the nature and small quantity of these emissions no further assessment of point source emissions is deemed necessary.	
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 engine and/or boiler minimises the need to import non-renewable electricity from the National Grid. Export of renewable electricity to the National 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.	**X**
Land and disposal of waste to other processes	Rivers and streams – see Assessment of point source and fugitive emissions to water above. Drainage systems/sewers. The site lies outside any groundwater Source Protection Zones (SPZ). Aquifers are classified as unproductive (solid deposits) and no superficial deposit features found.	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.	Site design has been chosen to minimise the impact of noise on offsite receptors through building orientation, finishes and location of openings.	**X**

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
	The site is located in a rural area approx. 5 km north-east of the town of Basingstoke and 600 m east of the A33 and village of Chineham. The nearest receptor is a farm approx. 375 m north of the site and residential receptors approximately 650 m to the north-west. Farms can also be found approximately 750 m south-west and south-east of the site. Ecological receptors: There are four statutory designated habitat sites within the relevant distances of the site. The closest is Chineham Woods LNR, approximately 700 m to the west of the site. The Mill Field LNR and Daneshill Park Woods LNR are both south-west of the site, at a distance of approximately 1.5 km and 1.8 km respectively. There is one SPA, Thames Heath Basins, which is located approximately 7.5 km to the north-east of the site. There are no SACs or Ramsar sites within 10 km of the site and no SSSIs within 2 km of the site. There 11 areas of Ancient Woodland within 2 km of the site, the closest located approximately 60 m to the north-east of the site, referred to as Forked Copse Ancient and Semi-natural Woodland. There are 49 non-statutory designated LWSs within 2 km of the site, the closest of which is Petty's Copse, which can be found less than 50 m to the north of the installation's boundary.	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).	
Other issues (including visual impact)	Protected Species and Habitats	There are records of protected species (Bullhead and Unidentified Lamprey) within the specified screening distance (up to 500m) of the site. There are also protected habitats (Chalk Rivers, Coastal and Floodplain, and Grazing Marsh) located within the specified screening distance (up to 500m) of the site.	**X**
Climate Change	Risks of increased temperature impacts resulting in digesters heating beyond optimal operating temperature and increased odour potential from site process. For human health and ecological receptors, see notes for Amenity issues above.	Digesters may require reduced heat input to digester via heat exchange system and digesters are insulated against worse impacts. Warmer temperatures may require less boiler input/use as a result of less heat demand, or, increased heat dumping via air cooled radiator. If less biogas is used, the site may require a new consumptive biogas solution e.g. a CHP engine or other technology that is appropriately sized to utilise additional biogas. However, the CHP engines will need to be replaced prior to 2050 when they reach the end of their operational lifespans.	**X**

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

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

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

4. Form C3 Questions

1 – What activities are you applying to vary?

Table 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
Basingstoke Sludge 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 three digesters 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).	808 wet tonnes per day (throughput based on 9,699m^3/12 = 808.25 m^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) D15 Storage pending any of the operations numbered D1 to D14 (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 As per volume calculation in Note 1 below
Basingstoke Sludge Treatment Works	S5.4 A1 (a) (i) Disposal of non-hazardous waste with a capacity exceeding 75	From receipt of process site process liquors to biological	>50 tonnes per day	D8 Biological treatment resulting in final compounds or mixtures	Maximum waste throughput 820,000 wet tonnes per annum

AR2	tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment. Biological treatment by aeration of process liquors in 1 liquor treatment plant followed by discharge back to the works inlet of the STW via site drainage	treatment and discharge of treated liquids to site drainage.		which are discarded by any of the operations numbered D1 to D12. D15 Storage pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where the waste is produced).	
Directly Associated Activities					
AR3	Imports of waste, including sludge from other sewage treatment works				
AR4	Blending of indigenous sludges and imported wastes/waste sludge prior to treatment				
AR5	Pre-treatment of sewage sludge by thermal hydrolysis plant (THP);				
AR6	Storage of digestate prior to dewatering;				
AR7	Dewatering of digested sewage sludge				
AR8	Transfer of treated dewatering liquors back to the head of the sewage treatment works;				
AR9	Transfer of surface water runoff back to the head of the sewage treatment works;				
AR10	Storage of dewatered digested sludge cake prior to offsite recovery;				
AR11	Storage of biogas;				
AR12	Transfer of biogas condensate via site drainage back to the head of the sewage treatment works;				
AR13	Combustion of biogas in a MCPD and Specified Generator (SG) compliant biogas CHP engines and boiler;				
AR14	Operation of an emergency flare;				
AR15	Operation of siloxane filter plant				
AR16	Storage of diesel				
AR17	Storage of wastes, including waste oils; and				

AR18	Storage of raw materials.			
AR19	Operation of the THP standby emergency generator 2			
Waste Operations				
	Description of the waste operation	**Annex I (D codes) and Annex II (R codes) and descriptions**	**Hazardous waste treatment capacity**	**Non-hazardous waste treatment capacity**
AR20	Imports of wastes to the works inlet for treatment through the UWWTD route	D13: Blending or mixing prior to submission to any of the operations numbered D1 to D12	n/a	Maximum waste throughput 70,000 wet tonnes per annum
	Import of waste: 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 2,000 wet tonnes per annum
		Total Capacity	**23,850 wet tonnes**	**[a] + [b]**
For all Waste Operations		Total STC treatment capacity (tank volume)	17,350 wet tonnes	[a]
		Total cake barn and cake pad storage capacity	6,500 wet tonnes	[b]
For waste imports to the head of the works		Annual throughput (tonnes each year)	Imports: 70,000 wet tonnes	
For waste imports of digested sludge cake for temporary storage		Annual throughput (tonnes each year)	Imports: 2,000 wet tonnes	
Note 1: Import Calculation based on:				

Unthickened Primary Sludge: 5.20 tds/day; worse case 0.90% dry solids = 578 m3/day = 210,889 m3/year
Unthickened SAS: 5.20 tds/day; worse case 0.70% dry solids =743 m3/day = 271,143 m3/year
Imports - Liquid 10.40 tds/day; worse case 3.00% dry solids = 347 m3/day = 126,533 m3/year
Imports Cake 31.20 tds/day; worse case 10.00% dry solids = 312 m3/day = 113,880 m3/year
Total Combined import calculation 722,445 m3/year; rounded to 730,000 m3/year

Table 1b Types of waste accepted

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

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

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

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

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

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)

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

Entries in bold are currently permitted under permit EPR/CB3201GE

Emission point reference and location	Source	Parameter	Quantity	Unit	Reference Period	Monitoring frequency	Monitoring standard or method
A1a	**CHP Engine A [note 1]**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**500**	**mg/m3**	**Hourly mean**	**Annually. The first annual monitoring event to be undertaken as part of the engine commissioning**	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air"
		Carbon monoxide	**1,400**	**mg/m3**			
A1b	**CHP Engine B [note 1]**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**500**	**mg/m3**	**Hourly mean**	**Annually. The first annual monitoring event to**	

Emission point reference and location	Source	Parameter	Quantity	Unit	Reference Period	Monitoring frequency	Monitoring standard or method
		Carbon monoxide	**1,400**	**mg/m3**		**be undertaken as part of the engine commissioning**	
A1c	**Boiler [Note 2]**	**No parameter set**	**No limit set**	**-**	**-**	**Annual monitoring of the boiler is only required if notified by the Environment Agency (based on percentage usage of firing on biogas)**	
A2	**Emergency standby biogas flare**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**No limit set**	**-**	**-**	**Annual monitoring is only required when flare operates in excess of 10% of the time, taken on an annual assessment period.**	
A5	Emergency Generator (THP Plant)	-	-	-	-	-	-
A6	THP Pressure Relief Valve	-	-	-	-	-	-
A7	Primary Digester 1 Pressure Relief Valve	-	-	-	-	-	-
A8	Primary Digester 2 Pressure Relief Valve	-	-	-	-	-	-
A9	Primary Digester 3 Pressure Relief Valve	-	-	-	-	-	-
A10	Sludge Buffer Tank Pressure Relief Valve	-	-	-	-	-	-

Emission point reference and location	Source	Parameter	Quantity	Unit	Reference Period	Monitoring frequency	Monitoring standard or method
A11	Biogas Holder Pressure Relief Valve	-	-	-	-	-	-
A12	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

Note 1: These limits are based on normal operating conditions and load – temperature 0°C (273K); pressure: 101.3 kPa and oxygen: 5 per cent (dry gas). The measurement uncertainty specified in LFTGN08 v2 2010 shall apply.

Note 2: As the boiler shares a common windshield with the two CHP engines, this will form part of an aggregated MCP of > 5 MWth for permitting from 1st January 2024, as per current MCP requirements.

Note 3: No parameters set for their monitoring of this MCP at the current time. Emission Limit Values to apply from 1st January 2029

Table C3-2b – Emissions to Sewer

Emission point reference and location	Source	Parameter	Limit	Unit
T1 (as per site plan Appendix A.2)	Picket Fence Thickener Liquors, SAS Thickening Liquors, Pre-THP Dewatering Liquors, Biogas Condensate, OCU Waste Waters, Boiler Waste Waters, Reverse Osmosis Waste Water, Liquor Buffer Tank Desludge Flows, Surface Water Run Off	No parameters set	No limit set	-
T2 (as per site plan Appendix A.2)	Treated Sludge, Treated LTP Liquors	No parameters set	No limit set	-

T3 (as per site plan Appendix A.2)	Head of Works Import	No parameters set	No limit set	-

There are no permitted emissions to sewer 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); Liquor Treatment plant S5.4A1a(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 digested sludge cake storage, along with biogas utilisation have the potential to generate fugitive emissions to air and water, which are subject to a number of process controls.

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

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
Emissions to air of NOx, SO_2, CO_2 and VOCs	Normal	Emissions to air and dispersion leading to inhalation by local human and animal receptors	High	Low	Medium	Activities are managed and operated in accordance with the site management system (including inspection and maintenance of equipment, including engine management systems), point source emissions to air (CHP engines, boiler and emergency flare stack) have emission limits. Flare stack height approx. 8 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 engine to remove impurities within the biogas. Previous modelling, which remains unchanged, did not find unacceptable impacts.	Low
Biogas transfer systems, biogas storage tank, biogas engines, flares or PRVs failure causing emissions of biogas	Abnormal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Odour impact. Global warming potential. Risk of fire and explosion	Low	Medium	Low	The plant is designed to capture and utilise all biogas possible, combusting the biogas in order to maximise recovered value from the biological treatment of sludge. The biogas system utilised is subject to regular preventative maintenance, including a LDAR plan to minimise the potential for leaks	Low

						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 gas detectors in order to alert staff to presence of biogas. A waste biogas burner (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 to be operated in the event of failure of the emergency flare to prevent overpressurisation and catastrophic failure.	
Catastrophic loss of biogas emissions from biogas transfer systems, biogas storage tank, biogas engines, flares or PRVs	Abnormal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Odour impact. Global warming potential. Risk of significant fire and explosion	Low	High	Medium	The plant is designed to capture and utilise all biogas possible, combusting the biogas in order to maximise recovered value from the biological treatment of sludge. The biogas system utilised is subject to regular preventative maintenance including an 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. A waste biogas burner (emergency flare) is utilised for the safe disposal of surplus biogas in the event of plant breakdown, or a surplus of	Medium

						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 to be operated in the event of failure of the emergency flare to prevent overpressurisation and catastrophic failure.	
Combustion of biogas within CHP engine 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 east of the site, away from sensitive receptors. The nearest receptor is a farm approx. 475 m north of the combustion plant and the energy from waste plant that is approx. 475 m west of the 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. THP tanks and vessels are fitted with PRVs to safely vent steam to atmosphere and prevent a catastrophic failure.	Low

						THP is located within the towards the eastern end of the site away from sensitive receptors, approx. 415 m away from the nearest farm.	
Release of bioaerosols and dust	Normal	Emissions to air and dispersion leading to inhalation by local human and animal receptors. Odour impact of bioaerosols. Nuisance impact of dust.	Low	Low	Low	The risk of bioaerosol and dust is largely minimised by storing the digested sludge cake within a semi-enclosed cake barn. Although the barn is not fully enclosed, a solid wall only reaches approx. 3 m high and there is an area of freeboard on the wall between the top of the digested sludge cake and the top of the wall. The nearest receptor is the energy from waste plant, approx. 250 m west of the cake barn and the nearest sensitive residential receptors are approx. 400 m north of the cake barn. A second storage area is an uncovered cake pad for undigested sludge cake imports next to the cake barn which is 330 m from the energy from waste plant and 415 m to the nearest farm. This pad has a similar 3 m high retaining wall and freeboard which would limit windblown dispersion. However, digested sludge cake and undigested sludge cake both retain high moisture content meaning they are not prone to windblown dispersion and generation of dust. Refer to the Bioaerosol Risk Assessment in Appendix F. Vehicle access and egress from the cake barn is via a wheelwash facility which minimises the transfer of cake to internal roads which could generate emissions of dust. The internal roads	Low

						are made from concrete/asphalt and not prone to the generation of dust.	
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	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 Primary Digester Tanks are largely made ground meaning spillages can be more easily contained and cleaned. Roads are made from concrete/asphalt and not prone to the generation of dust.	Low
Spillage of liquids, including chemicals and oils.	Abnormal	Emissions to surface waters close to and downstream of site. Acute effect resulting in loss of flora and fauna. Chronic effect resulting in deterioration of water quality Emissions to ground and ground water.	Low	Medium	Low	The closes surface water body is Petty's Brook on the Northern boundary of the STW and close to the cess waste import point. Chemicals and oils all stored within suitably bunded tanks and IBCs with rainwater removed as required to maintain 110% capacities. Penstock valves available within chemical delivery areas to contain large spillages. Handling and use of chemicals and oils is carried out by trained personnel. COSHH data sheets available. Spill kits available on site.	Low

						There are no point source emissions to water with drainage system pumping back to works inlet.	
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.	Medium	Low	Low	The site lies outside any Groundwater Source Protection Zones (SPZ). Provision of suitably 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. 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.	Low
Generation of solid waste resulting in litter	Normal	Releases of litter to the environment. Visual	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	Low

		nuisance and local loss of amenity				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.	

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 approx. 380 m north of the digesters. Small amounts may be generated uncovered tanks, that are located approx. 440 m from nearest residential receptor and 45 m from the energy from waste plant to the west. H_2S production is controlled through the digestion process which can be manually overridden if required. Chemical dosing, if	Low

						required can be used in the UWWTD area of the site.	
Loss of containment from biogas holder and biogas pipework	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors. Loss of amenity from odour nuisance	Low	Medium	Low	Biogas is principally stored within the Biogas Storage holder which is suitably sized to manage biogas generation. The biogas system utilised is subject to regular preventative maintenance including an 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 gas detectors in order to alert staff to presence of biogas. Physical protection measures in place for Biogas Storage, including fence and pipework is guarded. PRVs available to safely manage pressures within the Biogas Storage and prevent under or over pressurization.	Low
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 monitoring via SCADA and visual checks by site personnel.	Low

						Biogas is principally stored within the Biogas Storage holder which is 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. The nearest receptor is a farm approx. 450 m north of the biogas holder.	
H_2S/biogas emitted when biogas cannot be combusted in engine, 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 the Biogas Storage holder which is 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 receptor is a farm approx. 450 m north of the biogas holder. 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	High	Low	Medium	Digested sludge cake is stored within a covered semi-enclosed cake barn and is inherently low odour material. The nearest receptor is the	Low

		inhalation by local human receptors Loss of amenity from odour nuisance				energy from waste plant, approx. 250 m west of the cake barn and the nearest sensitive residential receptors are approx. 400 m north of the cake barn. Undigested sludge cake can be stored on an open engineered cake pad which is 330 m from the energy from waste plant and 415 m to the nearest farm. 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 engine	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 east of the site, approx. 475 m from the nearest receptor. 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, 475 m from the nearest receptor.	Low

						Good maintenance of fans to ensure that excessive noise levels are not generated. Where repair or replacement is required, this will be completed promptly.	
Operation of site vehicles	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Vehicle movements across the site subject to speed limit and one way system to reduce generation of noise. Shovel loading of digested sludge cake mainly takes place within the enclosed cake barn. Deliveries to cake pad 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 can be made 24/7 and take place to an import point on the west of site adjacent to the energy from waste plant with the nearest residential receptor approx. 450 m to the north. Vehicle movements are subject to a speed limit to reduce generation of noise and a turning circle limits reversing obligations.	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,	High	Low	Medium	Imports of sludge and cake take place on the east of the site and can only be made during site opening hours and not 24/7. Vehicle movements across the site subject to speed limit to reduce generation of noise and subject to a one-way system to reduce reversing obligations.	Low

		causing loss of amenity to local human receptors.				Shovel loading of digested sludge cake takes place in the semi-enclosed cake barn or on the engineered cake pad which is located away from sensitive human receptors, in the eastern part of the site, 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 subject to speed limit to reduce generation of noise and subject to a one-way system to reduce reversing obligations.	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 flares is minimized by prioritizing use of the CHP engines and boiler with use of the flare recorded. Emergency flare is located away from sensitive receptors, over 480 m from the nearest sensitive receptor.	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

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

4 – Monitoring

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

The air emission points A1(a, b and c) and A2 are monitored in accordance with EA guidance and the requirements of MCPD.

4b - Point source emissions to air only

The site has a number of emission points to air. Points A1a and A1b (two CHP engines) and A1c (boiler) are via a multi-stack flue and subject to emissions monitoring in accordance with the requirements of existing permit requirements and EA guidance.

Hours of operation of the flare, emission point A2, 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.

Emission point A12 (OCU) will be monitored on a six monthly basis.

There is no routine monitoring proposed for point A5 (standby emergency generator), A6-A11 for PRVs.

Table C3-4a – Emission Monitoring

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A1a CHP Engine A	SU 67769 55289	Oxides of Nitrogen Carbon Monoxide Sulphur dioxide VOCs – testing requirement only; No ELV	BS EN 14792 BS EN 15058 BS EN 14791 BS EN 12619	
A1b CHP Engine B	SU 67769 55289	Oxides of Nitrogen Carbon Monoxide Sulphur dioxide VOCs – testing requirement only; No ELV	BS EN 14792 BS EN 15058 BS EN 14791 BS EN 12619	
A1c Boiler	SU 67769 55289	Oxides of Nitrogen – Run hours/ No limit set	BS EN 14792 BS EN 15058	

		Carbon monoxide – Run hours / No limit set	Or No limit set	
A2 Emergency standby biogas flare	SU 67715 55255	Hours of operation – continuous and if over 876 hours then: Oxides of Nitrogen – Annual Carbon Monoxide – Annual	BS EN 14792 BS EN 15058	
A5 emergency Generator (THP plant)	SU 67733 55310	Oxides of Nitrogen – Run hours/ No limit set Carbon monoxide – Run hours / No limit set	BS EN 14792 BS EN 15058 Or No limit set	
A6 THP Pressure Release Valve (PRV)	SU 67760 55336	n/a	n/a	-
A7 Primary Digester Tanks PRV	SU 67717 55355	n/a	n/a	-
A8 Primary Digester Tanks PRV	SU 67720 55330	n/a	n/a	-
A9 Primary Digester Tanks PRV	SU 67723 55306	n/a	n/a	-
A10 Digested Sludge Buffer Tank PRV	SU 67729 55355	n/a	n/a	-
A11 Biogas Storage PRV	SU 67723 55278	n/a	n/a	-
A12 THP OCU	SU 67752 55318	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 CENTS 1369 for sampling NIOSH 6016 for analysis	
S1 (Liquor sampling point)	SU 67429 55335	n/a	MCERTS or ISO/IEC 17025 Where available	
S2 (Liquor sampling point)	SU 67467 55299	n/a	MCERTS or ISO/IEC 17025 Where available	

4b - Point source emissions to air only

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

No.

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

No.

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

No.

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

No.

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

No.

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

No.

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

No.

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

No.

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

As an existing permitted site, sampling locations and sampling ports remain as at present, but may not meet all of the requirements for BS EN 15259. This is being checked onsite. Due to the size of the existing CHP engines and boiler, a permanent sampling platform is not provided, however, a temporary sampling platform is utilised to provide sufficient space, in accordance with standard industry practice and current permit compliance monitoring, 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 CHP engines is used to supplement steam raising within the auxiliary 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 which also provides recoverable heat to the THP process via the boiler, which can also combust biogas. Diesel fuel is used by the boiler as a back-up fuel and for standby generator purposes in the event of a failure of the electricity supply.

The site CHP engines combusts indigenous biogas with the electricity used on site and additional electricity exported from the site to the National Grid when there is an excess. The CHP engines also provides useable heat to the boiler to generate steam within the THP process via heat exchanges, with this recovered heat supplemented by combustion of biogas or diesel as a back-up fuel. Use of heat from the CHP engines reduces the demand on biogas or diesel in the 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 into the THP) on site minimises the use of fossil fuels onsite, whilst recovering biological wastes. Location of the heat exchange, boilers, CHP engines and THP all within close proximity minimises transmission losses on site, improving the efficiency of the process. Thames Water has a 100% renewable energy supplier.

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

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

See response to question 3c above.

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

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

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

All raw materials are purchased via approved suppliers in accordance with quality standards/quality systems to pre-established material specifications, as recommended by manufacturers, with preference given to materials with lower environmental impacts where possible.

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.

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 thickening processes within the installation and dewatering processes within the installation. Lower volume constituents will include rainfall; biogas condensate; 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?

1,650 Cubic metres.

3c What is the maximum rate of discharge?

19.09 Litres / second.

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

1,650 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, Liquor Treatment Plant effluent 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 [1,649.692m^3 x 1000] / 86,400 (24 x 60 x 60) from sources such as thickening and dewatering. This gives a value of 19.0936574 litres, rounded up to 19.09 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?

Yes. The Effluent generated by the process of treating sludge within the installation is returned to the inlet of the wider Basingstoke STW via the site drainage system, with some drainage passing through the LTP. It is the subject to aerobic treatment in a mixture with UWWTD related waste waters.

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

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

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

The final effluent discharge from the wider sewage treatment works is specified in Environmental Permit TH/CTCR.0875/009.

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 within 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.

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 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

SU6803055190.

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

The River Loddon, a tributary of the River Thames, 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.

Appendix A. Figures

A.1 Site Location Plan

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

A.2 Installation Boundary and Air Emission Points

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

A.3 Site Impermeable and Permeable Surface Plan

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

A.4 Site Drainage Plan

See document: B22849AM-JAC-BGE-DR-0004

A.5 Process Flow Diagram

See document: B22849AZ-JA- BASISS1ZZ-LSX-DR-P-0003

A.6 Site Photographs

See document: TW_STC_EPR_14a_BGE_APPA.6

Appendix B. CoTC

See document: TW_STC_EPR_14a_BGE_APPB

Appendix C. Site Condition Report – H5

See document: TW_STC_EPR_14a_BGE_APPC

Appendix D. BAT Assessment

See BAT Assessment spreadsheet: TW_STC_EPR_14a_BGE_APPD

Appendix E. Odour Management Plan

See document: TW_STC_EPR_14a_BGE_APPE

Appendix F. Bioaerosol Risk Assessment

See document: TW_STC_EPR_14a_BGE_APPF

Appendix G. Containment Assessment

G.1 Containment Options Report (CIRIA 736)

See document: B22849AZ-JA-BASIS1ZZ-100-RP-C-0001.pdf

G.2 Containment Assessment

See document: B22849AZ-JA- BASIS1ZZ-100-CA-P-0001.xlsx

Appendix H. Leak Detection and Repair (LDAR) Plan

See document: TW_STC_EPR_14a_BGE_APPH

Appendix I. Residue Management Plan

I.1 Residue Management Plan

See document: TW_STC_EPR_14a_BGE_APPI.1

I.2 MSDS Zip File

See document: TW_STC_EPR_14a_BGE_APPI.2

Appendix J. Accident Prevention and Management Plan

See document: TW_STC_EPR_14a_BGE_APPJ

Appendix K. Acceptance of Third-Party Waste Imports

K.1 Acceptance of Third-Party Waste Imports

See document: TW_STC_EPR_14a_BGE_APPK.1

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

See document: TW_STC_EPR_14a_BGE_APPK.2

Appendix L. Air Quality Assessment

Not required.

Appendix M. Liquor Monitoring Proposal

See document: TW_STC_EPR_14a_BGE_APPM