Sludge Treatment Centre Permitting

Environmental Permit Application - Banbury Sludge Treatment Centre

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Thames Water

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Contents

1. Introduction

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

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

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

Banbury STC does not currently hold an Environmental Permit but instead operates under a T21 waste exemption for recovery of waste at a waste water treatment works and with Regulatory Position Statement 109 allowing for operations of a combustion asset in the absence of an Environmental Permit.

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 application is for a new bespoke installation permit for the biological treatment of sludge, by anaerobic digestion, with a capacity above the relevant thresholds under the Environmental Permitting (England and Wales) Regulations 2016 (as amended), following a change of interpretation of the Urban Waste Water Treatment Directive by the Environment Agency.

The biological treatment of sludge includes treatment of the indigenous sewage sludges and Surplus Activated Sludge (SAS) from the onsite aerobic treatment process and treatment of imported sewage sludges from other sites, arriving by road to a sludge import point. The indigenous sewage sludges are generated from the aerobic treatment of both waste waters from the sewer network arriving into site at the works inlet, and, from imported waste materials, arriving by road transport into a dedicated waste import point near the works inlet. There are a number of directly associated activities including the storage of biogas and operation of a biogas fuelled Combined Heat and Power (CHP) engine and boilers for the generation of electricity and heat at the site which are currently exempt from the requirements of the Medium Combustion Plant Directive.

The site is located within an industrial area but is bounded on two sides by green spaces and undeveloped land, east of the town of Banbury, Oxfordshire.

The STC treats both indigenous sludges and imported sludges. Indigenous sludge is generated from the incoming flow to the STW, which passes to the primary settlement tanks and through the aerobic treatment process under the UWWTD. Indigenous sludges derived from the main flow are then subject to sludge thickening processes and transferred to the Sludge Blending Tank. Imports of sludge from other works are delivered to a sludge offloading point, is screened and pumped to the Sludge Blending Tank. All such imports are subject to appropriate waste pre-acceptance and acceptance checks, prior to import. This part of the process is subject to odour control via an odour control unit (OCU). Indigenous and imported sludge combine in the Sludge Blending Tank and are pumped to the Sludge Buffer Tank.

There is a second offloading point at the STC for imported waste close to the works inlet of the sewage treatment works. Wastes, consisting of cess, septic tank and similar sewage related wastes, are imported via tanker to the head of the works / works inlet for treatment through the aerobic treatment at the works, routed via the UWWTD assets.. Wastes arrive at the site via tanker vehicles.

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 approved as suitable for treatment via the UWWTD route, the waste carriers are authorised to access the waste import area. Wastes will be subject to appropriate waste acceptance checks in accordance with Thames Water procedures on site, in line with the guidance in 'appropriate measures'. Incoming tanker vehicles will be directed to the inlet offloading point, which is an impermeable surfaced area, equipped with sealed drainage and kerbing to reduce the risk of spillages.

The inlet is located upstream of the rag and grit screens and storm offtake and discharged wastes are passed from tankers to the treatment processes on site in a mixture with the sewer delivered urban waste water.

Incoming tankers park in the offloading area and hook up to the offloading point. The offloading then proceeds, with the inlet point discharging directly into and combining with the main UWWTD flow at the inlet. Offloading is undertaken in line with Thames Water waste acceptance procedures. In the event that there are operational issues with the works, including operating in storm conditions, waste imports will be diverted to other appropriately permitted works.

From the Sludge Buffer Tank, mixed sludge is pumped to one of the four primary anerobic digesters at the site. These above ground fixed roof tanks are of glass coated steel construction with external insulation, fitted with roof mounted pressure relief valves.

Following treatment over an appropriate number of days within the Primary Digester Tanks, sludge is transferred to one of three, open topped, above ground Secondary Digester Tanks located at the site. Digested sludge is held in these tanks for an appropriate retention time to ensure that the required level of pathogen kill is achieved and in ensure compliance with Biosolids Assurance Scheme (BAS).

Digested sludge is then transferred to the enclosed digested sludge dewatering belts, where digested sludge is subject to dewatering and conveyed to the Cake Drop Zone directly outside the dewatering building. Digested sludge cake is subject to transfer to a larger storage area on the Cake Pad for storage prior to removal from site under the Sludge Use in Agriculture Regulations 1989, and in accordance with the BAS. Dewatering liquors are returned via the site drainage system to the works inlet.

Biogas from the primary digesters is captured and transferred to a double membrane biogas holder for storage. 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 and Primary Digester Tanks are fitted with pressure release valves as a safety precaution in the event of over pressurising the system.

The biogas is taken from the biogas holder for combustion in a CHP engine, generating electricity for use within the site or export to the grid, and heat to maintain primary digester temperature. If additional heating is required for the primary digesters, biogas may be used in the onsite boilers to provide heat to the digesters which are dual fuelled with natural gas. In the event of an emergency, or to support essential maintenance, so circumstances where there is more biogas than the CHP engine or boilers can utilise, there is a ground mounted emergency flare. This is utilised under 10% of the year or less than 876 hours per year.

Currently at Banbury STC, there is an older CHP engine (which is too small to be classified as an 'existing' combustion plant under the Medium Combustion Plant Directive) with a new/replacement CHP engine (which is classified as a 'new' combustion plant under the Medium Combustion Plant Directive) being commissioned from the end of Q2 2023 onwards. However, the two engines will not run concurrently but both CHP engines are included within this permit application for transitioning as the existing CHP engine needs to be available until the end of the commissioning process for the new CHP engine.

Thames Water imports treated sludge cake from other works, for temporary storage on the site cake pad, 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.

Cake is offloaded into a bay, and visually checked. The waste stream is the same as that arising from the treatment of sludge within the Banbury 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.

All imported cake is stored on an impermeable cake pad, for the shortest time practicable, the duration depending on factors such as prevailing weather and availability of the landbank.

2. Technical Description

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

Scope

The 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. There are a number of Directly Associated Activities (DAAs), including the operation of a biogas fuelled CHP engine for the generation of electricity and heat at the site.

Operations at the Banbury site do not fit within the requirements of the appropriate standard rules permit (SR2021 No 10) due to:

- Requirement for additional EWC codes over those in the standard rules set;
- The site is within 200 metres of the nearest receptor as measured from any combustion stack or stacks, unless the stacks are at least 7 metres high, and the effective stack height of each stack is greater than 3 metres;
- The site is located within 10 metres of any water course, namely an un-named river running along the northern boundary of the site which outfalls into the River Cherwell; and
- The site storing digestate fibre in the open on a cake pad that is within 250 metres of the nearest sensitive receptor, namely commercial properties to the south of the cake pad.

Site Location

The Banbury site is located approximately 1.5 km east of the town of Banbury, Oxfordshire. The site is towards the south of a large industrial estate, adjacent to a commercial waste transfer station. To the north are a number of industrial and commercial units forming areas of the industrial estate. To the east is an area of woodland and green space leading to a number of large industrial warehouses and the M40 motorway. To the south is further green space, in the form of agricultural fields along with further industrial warehouses. To the west is green space and a railway line.

The nearest designated habitat site to Banbury STC is the Neithrop Field Cutting, a SSSI, which is approximately 3,300 m to the north-west. There are no SAC, SPA, MPA or Ramsar sites located within 10 km of the site and no Local or National Nature Reserves or SSSIs within 2 km of this site. There is no ancient wood land within 2 km of the site. There are two non-statutory designated local wildlife sites (LWS) within 2 km of the site, the River Cherwell LWS which is south of the site and Warkworth Hall Farm Pastures LWS which is south-east of the site.

A “coastal and floodplain grazing marsh”, which is a protected habitat can be found approximately 200 m south of the STW, beyond the railway line.

The whole of the STC and the wider STW is within a Flood Zone 1 with a low probability of flooding (< 1 in 1,000 annual probability of river flooding).

The site is not located within or adjacent to the boundaries of an AQMA.

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

A site plan, showing the Urban Waste Water Treatment Directive (UWWTD) wider sewage treatment works and the permitted area of the STC can be found in Appendix A, Figure A.2 Site layout, while a block flow diagram summarising the sludge treatment process can be found in Appendix A, Figure A.5 Process Flow Diagram. A site tank inventory is included below, followed by the site process description which identifies where tanks are located within the sludge treatment process.

Site tank inventory

Tank Purpose	Number	Operational Volume (m^3)	Construction	Covered
Sludge Reception Tank	1	157	Concrete	Yes
Primary Picket Fence Thickener	2	110	Steel	Yes
Sludge Blending Tank	1	39	Concrete	Yes
Sludge Buffer Tank	1	100	Steel	Yes
Primary Digester	3	1,408	Steel	Yes
	1	1,367	Steel	Yes
Secondary Digesters	3	899	Steel	No
Digested Sludge Polymer Silo	1	25 tonnes	Steel	Yes

Waste Activities

The STC comprises of imports of waste for biological treatment and two other waste activities. Biological treatment processes at the installation are for indigenous sludges separated from the UWWTD areas of the site and for treatment processes for imported sludge that arrives at Banbury STC by road, normally by tanker and consists of sludge from other Thames Water sites, which forms a waste activity for the site.

Waste imports of non-hazardous waste to the STC are considered a secondary waste operation to the main listed activity and consist of cess waste to the head of the works and waste imports to the cake pad. Imports to the cake pad are for temporary storage, pending recovery offsite. These imports are a contingency option primarily and will not be routinely used.

The site currently accepts imports of cess waste via road to a location close to the inlet of the works. There is one data logger and hose at this location and the cess from the tankers is discharged through the hose and logger unit, currently between 06:30 and 17:00hrs. Waste imports 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. 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. These keys enable the delivery tankers to discharge waste into the works, through a data logger, which records the volume of waste transferred. This imported waste material is handled via the UWWTD treatment route. It is screened and passes to the primary settlement tanks (PSTs), which is outside of the scope of this permit.

Banbury STC also receives imported treated sludge cake. Imported treated sludge cake is imported from other works, for temporary storage on the site cake pad. All such imports are subject to appropriate waste pre-acceptance and acceptance checks, prior to import, including checking that the incoming cake complies with the requirements of SUiAR and BAS.

Treated sludge cake is offloaded into a bay, and visually checked. The waste stream is the same as that arising from the treatment of sludge within the Banbury 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.

All imported cake is stored on an impermeable cake pad, for the shortest time practicable, the duration depending on factors such as prevailing weather and availability of the landbank. Treated sludge cake is then subject to export from the site for recovery via application to land via an approved supplier.

Sludge Processes

Indigenous sludge is removed from the PSTs and pumped to two Primary Picket Fence Thickeners (PFTs), at which point the sludge is within the permitted activities of the STC Environmental Permit at the site. These two tanks are of steel construction, covered and connected to an OCU. The rotating arm inside of the tank slowly rotates and scrapes sludge into a central sump where pumps transfer the thickened sludge to a Sludge Blending Tank, where it is mixed with imported sludge. A high-level alarm in the Sludge Blending Tank inhibits the PFT transfer pumps in order to prevent overfilling of the Sludge Blending Tank. Separate pumps transfer the mixed sludge, via inline macerators, from the Sludge Blending Tank to the Sludge Buffer Tank. Supernatant from the PFTs weirs over the side of the tank and drains to the return liquor pumping station, where it is pumped back to the head of the works.

The Banbury STC also accepts the import of sludge from other Thames Water facilities for biological treatment. At the Imported Sludge Reception Area, the sludge discharges through one of the three transfer hose and logger units and into a Reception Tank. Access to the sludge logger is via a key fob that is issued to drivers and the logger records the volume of sludge transferred and the originating site. The Sludge Reception Tank is of concrete construction, is slightly recessed into sloping ground and enclosed. Imported sludge from the Sludge Reception Tank gravitates via subsurface pipes to the imported sludge pumping station and is pumped via screens (which remove rag and inorganic content) to a Sludge Blending Tank, where it mixes with indigenous sludge. Separate pumps transfer the mixed sludge, via inline macerators, from the Sludge Blending Tank to the Sludge Buffer Tank. Inhibitors in the Sludge Blending Tank prevents pumping of imported sludge at a high set point, in order to prevent overfilling of the Sludge Blending Tank. An Odour Control Unit (OCU) is fitted which serves the imported Sludge Reception Tank, sludge screens, Sludge Blending Tank and Sludge Buffer Tank.

The Sludge Buffer Tank receives mixed sludges from the Sludge Blending Tank and acts as both a mixing tank and a balancing tank to smooth process inputs to the anaerobic digesters. This Sludge Buffer Tank is above ground and of steel construction. An external mixer draws sludge from a low level and introduces it at a high level in order to prevent settling of the sludge. High-level alarms in the Sludge Buffer Tank inhibit the pumps in the Sludge Blending Tank in order to prevent overfilling of the Sludge Buffer Tank. The Sludge Buffer Tank is odour abated and shares an OCU with the Sludge Reception Tank, sludge screens and Sludge Blending Tank. Mixed sludge is pumped via subsurface pipes to one of the four anaerobic digester tanks from the Sludge Buffer Tank, via one of four pumps each of which is dedicated to a single tank.

Digestion Processes

The four Primary Anaerobic Digester Tanks are of similar construction; three of the tanks are mixed with biogas, while the fourth tank is slightly smaller and is mechanically mixed. All four tanks are of steel construction with frost protected glass coating, insulated and equipped with a fixed roof. Each digester receives approximately 80m^3 of sludge per day which mixes with the returning sludge from the heat exchanges to be introduced near to the top of each tank. Digested sludge is continuously transferred out of the tanks through a limpet chamber, following treatment for a minimum of 15 days and gravitates to the Secondary Digester Tanks.

All digesters are equipped with high level alarms and are monitored continuously for digester health, including process monitoring, for example foaming, either from the STW control centre or remotely outside of staffed hours from the regional control centre. Tanks are also fitted with dual pressure relief valves (PRVs) for safety in order to prevent over-pressurisation within the tanks. Level controls within each tank inhibit additional feeding of sludge by digester feed pumps while a high-level overflow discharges to the limpet chamber in the event of a blockage. Foaming of the digesters is treated with anti-foam as required. Mixing of the tanks occurs via two systems; firstly gas mixing of tanks 1-3 using biogas that is removed from near the roof and inserted through gas lances at the bottom of the tank and a central paddle within tank 4 slowly rotating to agitate the sludge within the tank. The second method is via sludge re-circulation through the heat exchange systems that is present on each tank. For all four tanks, sludge is abstracted from the bottom of the tank and pumped through a heat exchange system and put back in near to the top. The heat exchange uses heat from the CHP engine, backed up by additional heat from the larger boiler in the first instance or smaller boilers in the second instance.

Following treatment over a minimum of 15 days within the primary digesters, sludge gravitates to one of three, open topped, above ground, steel, secondary digestion tanks located at the site. Tanks operate in parallel, via batch processing holding sludge for a minimum of 48 hours with the tanks operating in rotation, with one tank being filled, one tank holding sludge and one tank discharging to be dewatered. Digested sludge is held in these tanks to ensure that the required level of pathogen kill is achieved in order to comply with digested sludge cake output quality requirements. Following treatment, digested sludge gravitates out of the secondary digesters and is then pumped for dewatering. The digested sludge dewatering plant consists of two beltpresses that are housed within a building. Digested sludge is dewatered with the addition of a polymer to aid coagulation, before it is transferred by a single conveyor belt and deposited on the engineered digested cake pad. Polymer is made up from a bulk powder silo using potable water and is automatically made up and dosed to each press, as required. Press liquors from the process gravitate to the return liquor pumping station, where they return to the head of the works for treatment via the UWWT process.

The cake pad consists of two stages. Digested sludge cake is deposited onto a Cake Drop Zone adjacent to the dewatering building before being moved to one of three large storage bays. The storage bays are filled sequentially. In the event of a non-conformance being identified the material is segregated in one of these bays This would allow remedial action to be undertaken which could include reprocessing or increased retention time on the cake pad.

Digested sludge cake from other STCs can also be imported for temporary storage at Banbury STC to provide contingency storage in the event of spreading to land being temporarily unavailable.

Digested sludge cake is removed from site under the Sludge Use in Agriculture Regulations 1989 (SuiAR), and in accordance with the Biosolids Assurance Scheme (BAS).

The whole of the cake pad is engineered concrete and all drainage from the cake pad returns via a number of gully drains to the site drainage where it is pumped back to the head of the works by the returns liquor pumping station for additional aerobic treatment.

The site-specific bioaerosol risk assessment for the STC is provided in Appendix F.

Biogas

Biogas from the primary digesters is transferred to the double membrane biogas holder which has a total storage volume of 1,125 m^3. 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 through the UWWTD system. An ultrasonic level detector within the biogas holder measures the gap between the inner and outer bag to indicate the volume of biogas being stored, with SCADA controlled set points associated to the operations (or cessation) of the CHP engine and emergency flare. The biogas storage holder is fitted with a lighting protection system and is fitted with pressure release valves, as a safety precaution in the event of over pressurising the system that would vent to atmosphere in an emergency situation. The primary digesters are similarly equipped with pressure relief valves to prevent over pressurisation.

The biogas is taken from the biogas holder and through gas boosters, primarily for combustion in a CHP engine, but it can also be used within one of the site boilers. There is a single older CHP engine at Banbury STC, operated under RPS109, which is being replaced from Q2 2023 onwards by a new engine. The older CHP engine, subject to replacement, is, a Mercedes Benz model with an aggregated thermal input of 0.6MWth. This engine is therefore too small to be considered as an 'existing' combustion plant under the Medium Combustion Plant Directive. . The replacement CHP engine, with a 1.1 MWth thermal input, being commissioned Summer 2023 onwards, will be a 'new' MCP. The two CHP engines will not be run concurrently and will generate electricity for use within the site and heat to maintain primary digester temperature, via heat exchangers. For completeness, the location of the existing CHP engine and new CHP engine are both shown on the site plan and both emission points are listed within the Table of Emissions to Air. However, the new CHP Engine will not enter service until it has completed commissioning and at which point, the old CHP engine will be decommissioned.

In the event that additional heating is required for the primary digesters, biogas may be used in the onsite boilers to provide heat to the digesters. There are three dual fuelled boilers which run on both biogas and natural gas. There is one large Strebel boiler with a thermal input of 1.4MWth and two smaller DeDietrich boilers with thermal inputs of 0.4MWth, with the larger boiler acting to support digester temperatures in the first instance and the smaller boilers acting as back-up. The large boiler is classified as an 'existing' plant under the MCPD. The two smaller boilers fall below the threshold for MCPD. In an emergency event or to support essential maintenance there is a ground mounted emergency flare which consumes biogas. This is utilised under 10% of the year, less than 876 hours per year. The thermal input of combustion plant at the site is below 4MW.

A twin stream siloxane filter is located between the biogas holder and the CHP engine on the biogas line and operates in series to remove impurities from the biogas prior to combustion in the CHP engine. Along with the condensate pots and a new de-humidifier, this improves the quality of the biogas and reduces impurities that could reduce engine efficiency. Fire alarms and smoke detectors are located within the boiler house and would automatically close down and isolate the gas supply in the event of an emergency situation.

An air dispersion model using ADMS has been prepared for the air emissions from combustion plants at the site. Air emission modelling is for the emissions from the new CHP engine that will enter the earliest stages of commissioning from the end of Q2 of 2023 and does not include the current CHP engine given that is shortly to be decommissioned. The assessment does not predict exceedances of the EQS as a result of the operation of combustion plant at locations of relevant public exposure. The potential for air quality effects are highly localised and the impact at sensitive human health receptors is insignificant in accordance with EA guidance.

BAT Considerations

A BAT gap analysis has been completed for the sludge treatment centre against the associated BAT conclusions and this gap analysis is attached as Appendix D. Further infrastructure assessment will be completed if required for this site, to a standard and timescale as per sector guidance and as agreed with the Environment Agency.

Return Liquors: BAT 3, 6, 7.

The site does not have a liquor treatment plant. Liquor treatment for waste waters returns arising within the permitted area and treatment of imports to the inlets is part of the urban waste water treatment process of the STW and does not fall within the permit boundary. Thames Water commits to:

a) undertaking (using a UKAS accredited laboratory where available) a chemical analysis of the waste water which tests for ALL pollutants which we expect to find in the discharge (not just Ammonia, BOD, Solids, flow, pH and data on bio-eliminability) and that we will use an appropriate 'minimum reporting value' (MRV) (usually 10% of the environmental quality standards (EQS) where this is analytically achievable).

b) the sampling and chemical analysis being undertaken in line with guidance Surface water pollution risk assessment for your environmental permit - GOV.UK (www.gov.uk) for all pollutants we expect to find

TWUL are committed to providing information about the characteristics of the wastewater streams at Banbury and are undertaking a review of our commitment to BAT 3, 6 and 7 further details of which are set out below.

Our review includes, but is not limited to, requesting companies providing national laboratory services to provide information relating to their capacity to analyse return liquor matrix for the determinants listed in the guidance you refer to in question 6 a).

Such information is essential in order for us to complete the review of our current Liquor monitoring proposal and delivery of BAT 3, 6, and 7. We plan to complete this at the earliest opportunity and at the point of writing these enquires remain open with each of the laboratories.

We will provide and updated proposal to the Environment Agency in line with a revised IED programme and in the meantime, we would like to assure you of our commitment to sample liquor returns at Banbury, our commitment to BAT 3, 6, and 7 and the following:

A summary of the sampling and analysis methodology of the effluent discharged and specify the likely pollutants in the effluent (guidance Monitoring discharges to water: guidance on selecting a monitoring approach - GOV.UK (www.gov.uk) and Surface water pollution risk assessment for your environmental permit - GOV.UK (www.gov.uk)).

Under the BREF guidance BAT conclusion 3 Thames Water should establish and maintain an inventory of wastewater and waste gas streams. Thames Water will carry out a sampling and analysis methodology of the effluent discharged at defined and recorded locations. All Thames Water staff involved in the sampling, analysis and reporting will be trained personnel, accredited to MCERTS standards or appropriate alternatives. Thames Water sampling procedures will include details such as:

- precise location of the discharge sampling point including a grid reference.
- sampling process.
- storage conditions and transport of samples.
- types of bottles or containers and their closures.

A management system will be used to ensure the results are recorded and subject to review to include, but not be limited to, the following procedures:

- sampling programme, including procedures for resampling.
- data review and reporting
- training and audit.

A written statement with a commitment to undertake the sampling and analysis in line with BAT3.

The purpose of BAT3 in relation to return liquors is to establish and maintain an inventory of wastewater streams, as part of the environmental management system, to facilitate the reduction of emissions to water. In accordance with BAT3 the following data will be provided:

- Simplified process flow sheets that show the origin of the emissions. Flow calculation based on an assessment of throughput may be used.
- Descriptions of process-integrated techniques and wastewater treatment at source including their performances. Chemicals used for thickening and dewatering should also be stated.
- Thickening and dewatering liquors, which comprise the major component of the returns, will be subject to monitoring for: Ammonia; BOD; solids; flow and pH.
- Data on bio-eliminability (e.g. BOD)

Thames Water is committed to providing information about the characteristics of the identified liquor return sampling points, namely average values and variability of calculated daily flows. In addition, Thames Water is committed to further undertake the sampling and analysis of ammonia, BOD, solids and pH.

A written statement with a commitment that those undertaking the sampling and analysis will be by accredited to MCERTs or provide evidence of equivalent standards.

Thames Water is committed to sampling and analysis in accordance with MCERTS or ISO/IEC 17025.

The chemical analysis of the effluent and liquor return samples will be analysed in a United Kingdom Accreditation Service (UKAS) accredited laboratory.

A revised plan which identifies the effluent sampling point(s) and emission point for the effluent discharge from the installation AND the NGR of the effluent/s sampling point

Thames Water has identified process/drainage lines at Banbury STC which take return liquors and wastewater from the sludge treatment area back to the head of works. The primary wastewater streams identified are as follows:

- Primary sludge thickening liquors
- Surplus activated sludge (SAS) thickening liquors
- Post digestion sludge dewatering liquors
- Biogas condensate
- OCU Liquors

Other streams identified are:

- Site surface rain run-off
- Washdown for maintenance and cleaning

Primary Thickening Liquors

Primary sludge is produced in sedimentation tanks downstream of the site inlet works, where the majority of primary solids are settled and separated from the main wastewater flow. Picket fence thickeners are used to produce a thickened sludge and a liquor. On average approximately 409 m^3/d of primary thickening liquors is produced. Solids captured from the thickening process equipment in operation are analysed as it is a key thickening performance measure. The above solids are associated with a biological demand (measured as BOD); hence the objective is to keep them as low as possible. The ammonia concentration at this point is only that of the effluent stream itself.

SAS Thickening Liquors

On average approximately 438 m^3/d of liquor is produced in the thickening of SAS. The thickening equipment used onsite at Banbury STC is belt thickeners. Polymer solution is input into the thickening process, as well as the biological surplus activated sludge from the final settlement tanks onsite. The solids levels coming off the thickening equipment in operation are monitored to ensure the equipment is performing as required. The aim is to capture as many solids as possible and not return them to add un-necessary load back to the effluent stream. Ammonia concentration is that of the final effluent (urban wastewater).

Post Digestion

Digested biological sludge is dewatered using a sludge dewatering belt to produce a solid cake, with the separated liquors being returned to the head of works. Like in the thickening processes, a polymer solution and final effluent is used. On average approximately 569m^3/d of post digestion dewatering liquors are produced. As with the thickening equipment, solids levels off the dewatering equipment in operation is monitored. The ammonia concentration in the dewatering liquors is higher in the dewatering liquors than in the thickening liquor streams.

Biogas Condensate

A very small volume, approximately 1 m^3/d in total, of condensate is produced from gas condensate traps on biogas lines. The result of this is a liquid waste stream made up mostly of condensed water vapour. The condensate trap systems are sealed, with no chemical addition. There is no solids, BOD or ammonia load in the condensate.

OCU liquors

OCU liquor are returned to head of works in low volumes as indicated in B22849AM-JAC-BBY-DR-0002

Site Surface Rain Run-off

There are surface water drains in the sludge treatment area of Banbury STW which are returned to the head of the works.

Washdown for Maintenance and Cleaning

There is maintenance and cleaning within the sludge treatment area onsite at Banbury STW. These flows will only contain biological sludges produced onsite and final effluent from the wash water system. Flows will be adequately diluted.

Sample Location

We propose to sample the wastewater streams described above as set out in Table 1. This table lists the location identified as sampling point, the waste waters present. These are sample location are shown on the site plan (B22849AM-JAC-BBY-DR-0002) with return flows shown in the Process Flow Diagram (B22849AZ-JA-BANBS1ZZ-LSX-DR-P-0002).

Table 1: Sample point

Sample Point	Grid Reference
S1: Primary Thickening Liquors, SAS Belt thickening liquors, Digested Sludge dewatering Liquors, Biogas Condensate OCU returns, Surface Water run off	SP 47173 40196

Location of Liquor Return

The waste water emissions identified in this document enter the inlet after the storm overflow and therefore these emissions cannot bypass the WwTW treatment or be emitted as a direct discharge to water

2.1 Management of Diffuse Emissions – BAT 14

There are open top tanks within the permit boundary at Banbury STC, including the Secondary Digester Tanks (x3). Thames Water commits to covering permitted open top tanks at the facility in accordance with the IED and BAT 14. Thames Water will take a risk-based approach, including use of PAS110, to determine our approach to abatement if required for individual tanks at Banbury. Thames Water confirm that our approach to abatement includes use of a biogas system if required. Engineering design assessment may result in replacement of tanks or reduction in number of applicable tanks. Our programme of delivery will need to be phased so that for each location a minimum number of existing AD tanks are always in continued operation to ensure process requirements are met. Thames Water will use PAS110 to determine whether individual tanks are biologically active. Non-biologically active tanks will be considered in accordance with the guidance Covering Slurry Lagoons (publishing.service.gov.uk).

2.2 Site Infrastructure

The site infrastructure is not currently fully compliant with the requirements of BAT, specifically with regards to containment and surfacing. A CIRIA 736 assessment of containment has been carried out, along with optioneering to identify potential suitable containment options in the event of a loss of primary containment. This is presented as Appendix G.

Where required to provide suitable containment in the event of a spillage event, the installation boundary may extend to areas of the site which includes tanks and structures that are not part of the biological treatment process. These tanks and structures are outside of the scope of the permit variation application and subsequent Environmental Permit and have been marked accordingly on the site plan. They are labelled as "Tanks Excluded from Permit Scope" in Figure A.2 Site layout of Appendix A.

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 the risk of overtopping. The Digester Tanks and biogas holders are also fitted with dual pressure relief valves which operate in an emergency to minimise releases from over- or under-pressurisation. Site operations are covered by Thames Water's management system, including the preventative maintenance programme for the site.

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

- pH: At a conventional digestion site such as Banbury the processes is maintained around pH 7 but within the range 6.72 – 7.6 (this is % dry solids and digester load dependant) for healthy operation.
- alkalinity: Levels dependant on feedstock characteristics (primary sludge: surplus activated sludge (SAS) ratio). Conventional digestion typically, 3,500 – 5,000mg/litre range.
- temperature: minimum target of 38°C. This is maintained within the range 36-40°C.
- 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. Banbury fits into the first row of the table.
- Dry solids feed: see table below, Banbury has a target of 6%DS, but this can vary between 3-8%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 Tank is between 50 and 800 mg/L. When VFA concentrations climb above 1000 mg/L, the digester could be overloaded or experiencing other problems.

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

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

Odour

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

Bioaerosol

Digested sludge cake storage is stored within an open, engineered cake pad, which is within 250 m of the nearest sensitive receptor, where people live or work for more than 6 hours at a time. See Appendix F for the site specific Bioaerosol Risk Assessment,

Other Items

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

Please see Appendix A, Site Photographs 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

2.3 Regulatory Listing

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

The relevant listing under Schedule 1 is:

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

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

(i) biological treatment;

In addition to the listed activity at the site, there is a directly associated activity of a biogas combustion plant which is 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).

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

- Imports of waste, including sludge from other sewage treatment works and imports of municipal liquids or sludges similar in composition to UWWTD derived materials;
- Blending of indigenous sludges and imported wastes/waste sludges prior to treatment;
- Storage of digestate prior to dewatering;
- Dewatering of digested sewage sludge;
- Transfer of dewatering liquors via site drainage back to the head of the sewage treatment works;
- Transfer of surface water run-off via site drainage back to the head of the sewage treatment works;
- Storage of dewatered digested sludge cake prior to offsite recovery;
- Storage of biogas
- Combustion of biogas in MCPD (SG) compliant biogas CHP engine and boiler units;
- Transfer of biogas condensate via site drainage back to the head of the sewage treatment works;
- Emergency flare;
- Operation of a siloxane filter;
- Storage of waste; and
- Storage of raw materials

The waste activities at the site are:

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

In addition to the listed activity at the site, there is a directly associated activity of a biogas combustion plant which is also a specified generator, covered by the Medium Combustion Plant Directive under Schedule 25A and/or B of the Environmental Permitting (England and Wales) Regulations 2016 (as amended). This currently comprises of the following plant:

- 1x 0.6 MWth existing CHP engine (subject to decommissioning later in 2023 as it is being replaced by a new engine of 1.1MWth)
- 3x boilers, one of which has a thermal input of 1.4MWth and two of which have a thermal input of 0.4MWth
- 1x 1.1 MWth new CHP engine (being commissioned in 2023)

Total thermal input of site is approximately 3.3 MW, of which approximately 3.3 MW is in regular use (after the commissioning of the new CHP engine).

2.4 Combustion Plant

Banbury CHP 1(existing CHP engine) -NB: this unit is too small to be a MCP and being replaced by a new engine	
MCP specific identifier*	Banbury CHP 1 10139017
12 - digit grid reference or latitude/longitude	SP 47040 40262
Rated thermal input (MW) of the MCP	0.6
Type of MCP (diesel engine, gas turbine, other engine or other MCP)	Other engine
Type of fuels used: gas oil (diesel), natural gas, gaseous fuels other than natural gas	Biogas
Date when the new MCP was first put into operation (DD/MM/YYYY)	01/10/2005
Sector of activity of the MCP or the facility in which it is applied (NACE code**)	E37.0.0
Expected number of annual operating hours of the MCP and average load in use	8,000; assume up to 100% load when in use
Where the option of exemption under Article 6(8) is used the operator (as identified on Form A) should sign a declaration here that the MCP will not be operated more than the number of hours referred to in this paragraph	n/a

Banbury CHP 2(replacement CHP engine; new MCP and SG)	
MCP specific identifier*	Jenbacher JMC 312 GS-BL
12-digit grid reference or latitude/longitude	NGR 447050, 240265
Rated thermal input (MW) of the MCP	1.1MWth
Type of MCP (diesel engine, gas turbine, other engine or other MCP)	Other engine
Type of fuels used: gas oil (diesel), natural gas, gaseous fuels other than natural gas	Biogas
Date when the new MCP was first put into operation (DD/MM/YYYY)	01/6/2023 (estimate at time of submission)
Sector of activity of the MCP or the facility in which it is applied (NACE code**)	E37.0.0
Expected number of annual operating hours of the MCP and average load in use	c. 8,000/unrestricted; assume up to 100% load when in use
Where the option of exemption under Article 6(8) is used the operator (as identified on Form A) should sign a declaration here that the MCP will not be operated more than the number of hours referred to in this paragraph	n/a

Banbury Boiler 1	
MCP specific identifier*	Banbury Boiler 1 10157997
12 - digit grid reference or latitude/longitude	SP 47046 40252
Rated thermal input (MW) of the MCP	1.4
Type of MCP (diesel engine, gas turbine, other engine or other MCP)	Boiler
Type of fuels used: gas oil (diesel), natural gas, gaseous fuels other than natural gas	Dual fuelled (Biogas or natural gas)
Date when the new MCP was first put into operation (DD/MM/YYYY)	Pre 2015
Sector of activity of the MCP or the facility in which it is applied (NACE code**)	E37.0.0
Expected number of annual operating hours of the MCP and average load in use	Up to 8,000; assume up to 100% load when in use (modelled operating all year on a very conservative assumption)
Where the option of exemption under Article 6(8) is used the operator (as identified on Form A) should sign a declaration here that the MCP will not be operated more than the number of hours referred to in this paragraph	n/a

Banbury Boiler 2 (NB: too small to constitute a MCP; included for completeness)	
MCP specific identifier*	Banbury Boiler 2 10037709
12-digit grid reference or latitude/longitude	SP 47046 40252
Rated thermal input (MW) of the MCP	c. 0.4
Type of MCP (diesel engine, gas turbine, other engine or other MCP)	Boiler
Type of fuels used: gas oil (diesel), natural gas, gaseous fuels other than natural gas	Dual fuelled (Biogas or natural gas)
Date when the new MCP was first put into operation (DD/MM/YYYY)	Pre 2015
Sector of activity of the MCP or the facility in which it is applied (NACE code**)	E37.0.0
Expected number of annual operating hours of the MCP and average load in use	Too small to be in scope of modelling (Assume unrestricted use; typically, c. 500hrs; up to 100% load when in use)
Where the option of exemption under Article 6(8) is used the operator (as identified on Form A) should sign a declaration here that the MCP will not be operated more than the number of hours referred to in this paragraph	n/a

Banbury Boiler 3 (NB: too small to constitute a MCP; included for completeness)	
MCP specific identifier*	Banbury Boiler 3 10037783
12 - digit grid reference or latitude/longitude	SP 47046 40252
Rated thermal input (MW) of the MCP	c. 0.4
Type of MCP (diesel engine, gas turbine, other engine or other MCP)	Boiler
Type of fuels used: gas oil (diesel), natural gas, gaseous fuels other than natural gas	Dual fuelled (Biogas or natural gas)
Date when the new MCP was first put into operation (DD/MM/YYYY)	Pre 2015
Sector of activity of the MCP or the facility in which it is applied (NACE code**)	E37.0.0
Expected number of annual operating hours of the MCP and average load in use	Too small to be in scope of modelling (Assume unrestricted use; typically, c. 500hours; up to 100% load when in use)
Where the option of exemption under Article 6(8) is used the operator (as identified on Form A) should sign a declaration here that the MCP will not be operated more than the number of hours referred to in this paragraph	n/a

3. Form A1 Questions

4. Form B2 Questions

1 About the permit

1a Discussions before your application

There have been no specific pre-application meetings with National Permitting about this application, however, some discussions have been held with local area EA officers. Nature and heritage conservation screening was requested and received via email from the pre-application advice service of the Environment Agency.

1b Is the permit for a site or for mobile plant?

This application relates to a site.

2 About the site

2a What is the site name, address, postcode and national grid reference?

Banbury Sludge Treatment Centre;

Banbury Sewage Treatment Works;

Thorp Mead;

Thorp Industrial Estate;

Banbury;

Oxfordshire;

OX16 4RZ.

NGR SP 47026 40277.

2b What type of regulated facility are you applying for?

This application relates to a bespoke installation

2c If you are applying for more than one regulated facility on your site, what are their types and their grid references?

This application is for a single regulated facility, namely an installation.

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

2e Treating batteries

2e1 Are you planning to treat batteries?

No, this application is not for the treatment of batteries

2f Ship recycling

2f1 Is your activity covered by the Ship Recycling Regulations 2015?

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

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 TWUL – Henley STW	Aylesbury Crown Court	26-Feb-21	£2,300,000.00 £87,944.00 (costs)	TWUL pleaded guilty to one charge (Count 2) and one charge (Count 1) lay on the file after a not guilty plea. Count 1: Between the 17th day of April 2016 and 26th April 2016 at Henley Sewage Treatment Works, Fawley, Henley-On-Thames, Oxfordshire, you failed to comply with or contravened an environmental permit, namely CNTD.D61 Schedule 01 Condition 1 (1), in that the works was not operated and effluent was not treated in a manner which so far as reasonably practicable minimised the polluting effects of the discharge made from the works on controlled waters. Contrary to Regulation 38(2) of the Environmental Permitting (England and Wales) Regulations 2016 Count 2: On the 23rd day of April 2016 at Henley Sewage Treatment Works, Fawley, Henley-On-Thames, Oxfordshire you contravened Regulation 12 (1) (b) of the Environmental Permitting (England and Wales) Regulations 2016 by causing a water discharge activity, namely the discharge of partially treated effluent consisting of ammoniacal nitrogen into the

				Fawley Court Ditch and Fawley Court Stream except under and to the extent authorised by an environmental permit. Contrary to Regulations 38(1) (a) and 12 (1) (b) of the Environmental Permitting (England and Wales) Regulations 2016.
EA v TWUL	Aylesbury Crown Court	21 & 26 May 2021	£4,000,000 £84,669 (costs)	Three charges as follows: i) Depositing of controlled waste on land contrary to section 33(1)(a) and section 33(6) of the Environmental Protection Act 1990 – on 8 February 2016; ii) Causing a water discharge activity, contrary to Regulation 12(1)(b) and Regulation 38(1)(a) of the Environmental Permitting (England Wales) Regulations 2019 – on 8 February 2016 & iii) Failure to comply with an environmental permit condition, contrary to Regulation 38(2) of the Environmental Permitting (England and Wales) Regulations 2016 – on or about 8 February 2016. Plus, four subsequent charges taken into consideration (TICs), with the first (TIC 1) considered alongside the third charge.
EA v Thames Water – Hinksey/Seacourt Stream	Aylesbury Crown Court	19-Nov-21	£4,000,000.00 £90,713.52 (costs) and victim's surcharge of £170	TWUL pleaded guilty to one charge: Between 23 – 27 July 2016, in breach of Condition 2 of permit CAWM.0064 for an emergency overflow, TW failed to have a documented maintenance programme covering maintenance of the syphon/downstream sewer, resulting in a discharge due to its own act or default and undue delay identifying the asset and source of pollution, in contravention of Reg 38(2) of the EPR 2016.

3b Technical ability

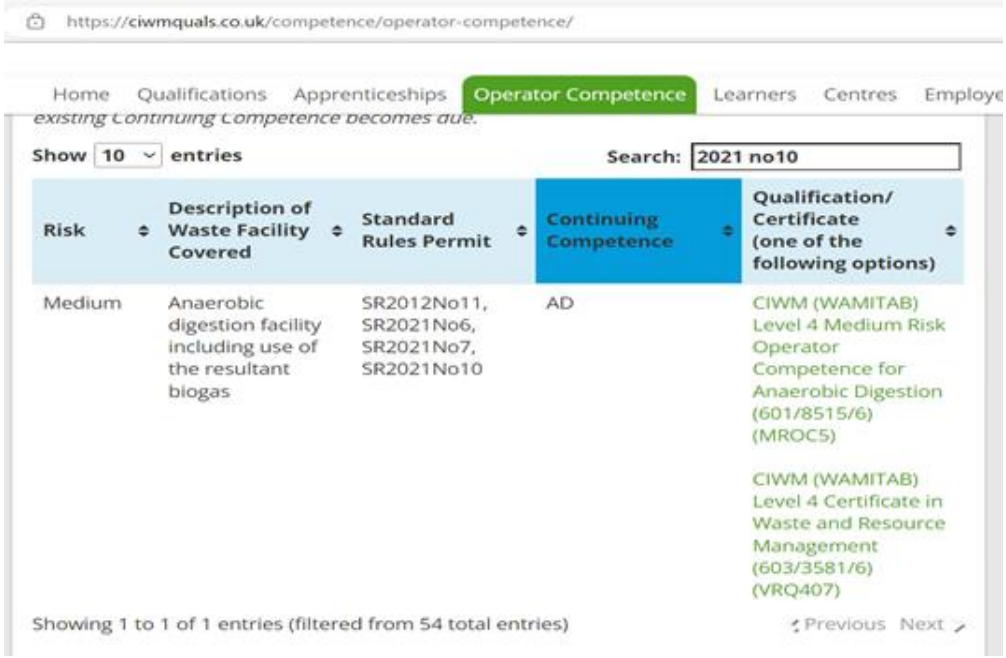
Thames Water uses WAMITAB qualified staff at their waste facilities. The relevant person for the site has been named below and full details have been provided separately on a spreadsheet

Mrs Diana Goodwin

Please see Appendix B for evidence of competency

Following original communications with the Environment Agency and 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, as has previously been explained in the RFI for the previous application at Hogsmill (April 2022).

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 Site layout
- A.3 Site Impermeable and permeable surfaces 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? Provide the relevant sections of a site condition/baseline report if this applies

See Appendix C for the Site Condition Report.

5c Provide a non-technical summary of your application

Please see earlier text in Section 1.

5d Are you applying for an activity that includes the storage of combustible wastes?

No. The site processes sit outside the scope of the Environment Agency fire prevention plan guidance, as set out in the Environment Agency guidance document 'Appropriate measures for the biological treatment of waste'.

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
Neithrop Fields Cutting	SSSI	North-West	3,300 m
Farthinghoe	Local Nature Reserve	East	4200 m
River Cherwell	Local Wildlife Site	South	<2,000 m
Warkworth Hall Farm Pastures	Local Wildlife Site	South-east	<2,000 m

Data taken from MAGIC.gov.uk website, accessed December 2022. For habitat sites, the relevant distance for consideration are: International designations (SAC, MPA, SPA and Ramsar - 10km); National designations (SSSI – 2km); Nature reserves and ancient woodlands (2km)

The nearest designated habitat site to Banbury Sewage Treatment Works is the Neithrop Field Cutting, a SSSI, which is approximately 3,300 m to the North-West. There are no SAC, SPA, MPA or Ramsar sites located within 10 km of the site and no Local or National Nature Reserves or ancient woodlands within 2 km of this site. There are two local wildlife sites (LWS) within 2 km of the site, River Cherwell LWS which is south of the site and Warkworth Hall Farm Pastures LWS which is south-east of the site.

The site sits outside a groundwater Source Protection Zone (SPZ). The permitted area of the site sits within a Flood Zone 1, with a very low probability of flooding (< 1 in 1,000 annual probability of river flooding) but a small area of the site periphery of the STW may sit within a Flood Zone 2, with a low risk of flooding (> 1:100 annual probability of flooding).

The site is close to two AQMAs. The Cherwell District Council Air Quality Management Area no. 2 is 1,600 m West and the Cherwell District Council Air Quality Management Area No. 1 is 1,700 m North of the site. Both AQMAs are for Nitrogen Dioxide (NO_2).

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 an industrial area, between the Banbury conurbation and the M40 motorway. The site gives way to rural land to the south and west. The nearest commercial and industrial premises are on the immediate North-Western boundary including a commercial waste transfer station and commercial premises, with further large industrial warehouses to the east and south-east. The nearest residential dwellings are located 375 m North West of the site and the M40 is 400 m to the East, separated by a number of commercial properties. Ecological receptors: There are no SCAs, SPAs or RAMSAR sites within 10km of site. There are no SSSIs or LNRs within 2km of the site. The nearest designated site is the Neithrop Fields Cutting SSSI, 3.3 km away. There are two local wildlife sites (LWS) within 2 km of the site, River Cherwell LWS which is south of the site and Warkworth Hall Farm Pastures LWS which is south-east of the site.	The wastes handled at the site are primarily liquids and sludges, along with UWWTD derived material delivered by sewer. As such, there is no source of litter within the materials handled at the site. In the unlikely event pests or vermin are observed on site a suitable contractor is called in as soon as practicable.	X
Dust and bioaerosols	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Litter above. The impact of dust on human health will depend on the distance and wind direction. For bioaerosols this is 250m.	The wastes handled at the site are liquids, sewage sludges and sewage cake, along with UWWTD derived material delivered by sewer. The site will not be handling inherently dusty or powdery wastes. Digested sludge cake retains a high moisture content and is not dusty. Digested sludge cake storage is located on the eastern side of the site, away from residential receptors and approx. 115m from the nearest industrial warehouses. Roads will be maintained to avoid the production of dust. Anerobic digestion of sludge takes place within a closed system. Digested sludge cake is stored on the cake pad within 250m of sensitive receptors however the risk from bioaerosols is considered to be of low risk.	✓

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.	ADMS modelling for the new CHP engine has been supplied demonstrating that there is no significant impact from the operation of the engine. Use of the emergency flare is limited to emergency situations and during planned maintenance activities to either the CHP engine or boilers. 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 B3-3b(i).	X
Assessment of point source and fugitive emissions to water	The River Cherwell is located 750m West of the wider sewage treatment works site boundary. A minor tributary runs close to the East and Southern site boundary from a balancing pond within the industrial estate. The wider sewage treatment works is mostly within a Flood Zone 1 and the newly permitted sewage treatment activities are fully located within Flood Zone 1, with a low probability of river flooding. Surface water drainage within the site is returned to the Return Liquor Pumping Station which consists of two submersible pumps which pumps to the PST feed chamber.	The main product of the process is a digested sludge cake, which is stored within Flood Zone 1, on an area of concrete hardstanding that is equipped with drainage. Other aqueous discharges generated by process are limited (comprising only biogas condensate, dewatering liquors, and surface water run off). These sources are discharged to the on-site drainage system where they are transferred to main sewage works inlet. Due to the nature and small quantity of these emissions no further assessment of point source emissions is deemed necessary.	X
Assessment of odour	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. 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 B3-3b(ii).	X
Energy	Global atmosphere (direct and indirect emissions)	Use of biogas on site within the CHP engine and/or boilers minimises the need to import non-renewable electricity and gas from the National Grids. Export of surplus renewable electricity from the site to the National Grid can offset consumption of fossil fuels within the energy mix, lowering the carbon intensity of power.	X

		Good maintenance procedures will help plant run efficiently and reduce energy consumption.	
Land and disposal of waste to other processes	Rivers and streams – see Assessment of point source and fugitive emissions to water above. Drainage systems/sewers. The site lies outside any Groundwater Source Protection Zones (SPZ). Aquifers are classified as Secondary (undifferentiated) (solid deposits) and unproductive (superficial deposits).	All waste streams are disposed of off-site for recovery or disposal and will continue to be transferred (and consigned where hazardous) to appropriately permitted facilities.	X
Noise and vibration	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, amenity and recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. The site is located in an industrial area, between the Banbury conurbation and the M40 motorway. The site gives way to rural land to the south and west. The nearest commercial and industrial premises are on the immediate North-Western boundary including a commercial waste transfer station and commercial premises, with further large industrial warehouses to the east and south-east. The nearest residential dwellings are located 375 m North West of the site and the M40 is 400 m to the East, separated by a number of commercial properties. Ecological receptors: There are no SCAs, SPAs or RAMSAR sites within 10km of site. There are no SSSIs, ancient woodlands or LNRs within 2km of the site. The nearest designated site is the Neithrop Fields Cutting SSSI, 3.3 km away. There are two local wildlife sites (LWS) within 2 km of the site, River Cherwell LWS which is south of the site and Warkworth Hall Farm Pastures LWS which is south-east of the site.	Site design has been chosen to minimise the impact of noise on offsite receptors through building orientation, building design, finishes and location of openings. Combustion plant is located away from nearby receptors and inside of buildings or enclosed containers. Noise from plant and equipment will be minimised through purchasing decisions and a robust preventative maintenance programme. Waste deliveries are only accepted during operational hours. Operation of shovel loaders and similar vehicles predominantly takes place on the cake pad which is located away from sensitive receptors. There will be no sources of vibration within the facility. Noise and vibration emissions are assessed in Table B3-3b(iii).	X
Other issues (including visual impact)	Protected Habitats and Species	There are no protected species records within the specified screening distance (within 500m) of the site. There are however records of protected habitats within the specified screening distance (within 500m) of the site, namely the presence of Coastal and Floodplain Grazing Marsh, located to the south of the site.	X
Climate Change	Risks of increased temperature impacts resulting in digesters heating beyond optimal operating temperature and increased odour from sewage	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	X

	process. For human health and ecological receptors, see notes for Amenity issues above.	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 gas engine that is appropriately sized to utilise additional biogas. However, the new CHP engine has been recently installed and is appropriately sized for the site's biogas yields. Pre-digestion tanks are already covered and OCU's to be utilised as appropriate. OCU's may require oversizing compared to current use.	
	Risks of increased storm events that causes surface water runoff exceeds capacity of site drainage system, or additional dewatering operations due to rainwater ingress, or caused bunds to infill. Increased precipitation may increase flooding on agricultural land, decreasing ability to spread digested sludge cake to land. For water environment receptors, see notes for Assessment of point source and fugitive emissions to water above	The STW design may require expansion or additional storm capacity; however, this would apply to UWWTD operations at the site rather than permitted activities. May need to increase bund or containment volume for sewage treatment works or individual assets. Land spreading activities could be prevented during very wet, winter months. Although the site has a large cake pad 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.	

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

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

5. Form B3 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
Banbury Sludge Treatment Centre (Sewage Treatment Works) AR1	S5.4 A1 (b) (i) Recovery or a mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment Anaerobic digestion of permitted waste in seven primary and secondary 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). Includes both indigenous and imported sludge.	373 wet tonnes per day (throughput based on 5,591 m3/15 = 372.73 m3 per day)	R3: Recycling reclamation of organic substances which are not used as solvents R13 Storage of waste pending any of the operations numbered R1 to R 12 (excluding temporary storage, pending collection, on the site where the waste is produced)	Maximum waste throughput 475,000 wet tonnes per annum including indigenous UWWTD derived sludge from within the wider Sewage Treatment Works, as per volume calculations in Note 1 below
Directly Associated Activities					
AR2	Imports of waste, including sludge from other sewage treatment works and imports of municipal liquids or sludges similar in composition to UWWTD derived materials				
AR3	Blending of indigenous sludges and imported wastes/waste sludges prior to treatment				
AR4	Storage of digestate prior to dewatering;				
AR5	Dewatering of digested sewage sludge;				
AR5	Transfer of dewatering liquors via site drainage back to the head of the sewage treatment works;				
AR7	Transfer of surface water run-off via site drainage back to the head of the sewage treatment works;				
AR8	Storage of dewatered digested sludge cake prior to offsite recovery;				

AR9	Biogas storage			
AR10	Combustion of biogas in MCPD and SG compliant biogas CHP engine and boiler units			
AR11	Transfer of biogas condensate via site drainage back to the head of the sewage treatment works;			
AR12	Emergency flare operation			
AR13	Operation of a siloxane filter			
AR14	Storage of waste;			
AR15	Storage of raw materials			
Waste Operations				
	Description of the waste operation	**Annex I (D codes) and Annex II (R codes) and descriptions**	**Hazardous waste treatment capacity**	**Non-hazardous waste treatment capacity**
AR16	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 35,000 wet tonnes per annum
AR17	Imports of wastes: digested sludge cake for temporary storage pending off-site removal	R13: Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced). R3: Recycling or reclamation of organic substances which are not used as solvents		Maximum waste throughput 1,000 wet tonnes per annum
For all Waste Operations		Total STC treatment capacity	8,804 wet tonnes	
		Total cake pad storage capacity	3,500 tonnes	
For waste imports to the head of the works		Annual throughput (tonnes each year)	Imports: 35,000 wet tonnes	
For waste imports of digested sludge cake for temporary storage		Annual throughput (tonnes each year)	Imports: 1,000 wet tonnes	

Note 1: Import Calculation based on:
Primary Sludge: 3.12 tds/day; worse case 0.50% dry solids = 625 m^3/day = 228,000 m^3/year
SAS: 2.34 tds/day; worse case 0.70% dry solids = 335 m^3/day = 122,143 m^3/year
Imports 10.15 tds/day; worse case 3.00% dry solids = 338 m^3/day = 123,500m^3/year
Total Combined import calculation 473,643 m^3/year; rounded to 475,000 m^3/year

Table 1b Types of waste accepted.

Table B3-1b(i): Waste accepted into anerobic digestion import point - 123,500 m^3 per annum

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 B3-1b(ii): Waste accepted at the head of the works import point – 35,000 wet tonnes per annum

Waste Code	Description of Waste
16 10 02	aqueous liquid wastes other than those mentioned in 16 10 01 [note 1]
19 09 02	sludges from water clarification
19 13 08	aqueous liquid wastes and aqueous concentrates from groundwater remediation
Note 1 – comprising but not limited to: Liquors Waste from a portable toilet Final effluent from water treatment works	

Table B3-1b(iii): Waste accepted Cake Pad for temporary storage and transfer – 1,000 wet tonnes per annum

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

1c Recovery of hazardous waste on land

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

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

2 – Point source emissions to air, water and land

Table B3-2a – Emissions to Air

Emission point reference and location	Source	Parameter	Quantity	Unit
A1	CHP Engine 1 (existing CHP engine subject to replacement; too small to constitute an existing MCP)) [Note 1] [Note 4]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	-	
		Carbon Monoxide	-	
A2	Auxiliary Boiler 1 (on biogas) NB:	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Run hours recording/No limit set/'29/30	-

	the second backup fuel is natural gas		MCPD ELVs apply	
		Sulphur Dioxide Carbon Monoxide	Run hours recording/No limit set/'29/30 MCPD ELVs apply	-
A3	Auxiliary Boiler 2 NB: Below 1MWth unit is dual fuel; biogas; the second backup fuel is natural gas	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Run hours recording/ No limit set	-
		Carbon Monoxide	Run hours recording/No limit set	-
A4	Auxiliary Boiler 3 NB: Below 1MWth unit is dual fuel; biogas; the second backup fuel is natural gas	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	Run hours recording/No limit set	-
		Carbon Monoxide	Run hours recording/No limit set	-
A5	Emergency Flare [note 2]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	[note 3]	
		Carbon Monoxide	[note 3]	
A6	Biogas holder Pressure Relief Valve	-	No limit set	-
A7	Digester Pressure Relief Valve	-	No limit set	-

A8	Digester Pressure Relief Valve	-	No limit set	-
A9	Digester Pressure Relief Valve	-	No limit set	-
A10	Digester Pressure Relief Valve	-	No limit set	-
A13	OCU 1	Hydrogen Sulphide	No limit set	-
		Ammonia	20	mg/m^3
A14	OCU 2	Hydrogen Sulphide	No limit set	-
		Ammonia	20	mg/m^3
A15	New CHP Engine [Note 5]	Sulphur dioxide	40	mg/m^3
		Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	190	mg/m^3
		Carbon monoxide	No limit set	-

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: These limits are based on normal operating conditions and load – temperature 0°C (273K); pressure: 101.3 kPa and oxygen: 3 per cent (dry gas). The measurement uncertainty specified in LFTGN05 v2 2010 shall apply.

Note 3: Monitoring to be undertaken in the event the auxiliary flare has been operational for more than 10 per cent of a year (876 hours). Record of operating hours to be submitted annually to the Environment Agency.

Note 4: When the new CHP Engine has been commissioned, CHP Engine 1 will be decommissioned, there will no longer be a requirement to monitor or report on emissions from A1. The Environment Agency will be notified when the old engine has been decommissioned to remove the reporting requirements.

Note 5: The new CHP Engine will require monitoring and reporting on emissions from A15 following the completion of commissioning and commencement of normal operations. The Environment Agency will be notified of the completion of commissioning and when the new CHP Engine enters into normal operation. Monitoring requirements are defined at a temperature of 273.15K, a pressure of 101.3kPa and after correction for the water vapour content of the waste gases at a standardised O2 content of 15% for engines and gas turbines and 3% for all other MCPs.

Table B3-2b – Emissions to Sewer

Emission point reference and location	Source	Parameter	Limit	Unit
T1 (as per site plan, Appendix A2)	Primary PFT Liquors, SAS Belt Thickening Liquors, Digested Sludge Dewatering Liquors, Biogas Condensate, Surface Water Run Off	No parameters set	No limit set	-
T2 (as per site plan, Appendix A2)	Head of Works import	No parameters set	No limit set	-

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

3 – Operating techniques

3a - Technical standards

Description of the schedule 1 activity or directly associated activity	Relevant technical guidance note or Best available techniques as described in BAT conclusions under IED	Document Reference
Anaerobic Digestion plant S5.4A1(b)(i); Storage of waste (DAA)	Biological waste treatment: appropriate measures for permitted facilities BAT Conclusions for Waste Treatment	https://www.gov.uk/guidance/biological-waste-treatment-appropriate-measures-for-permitted-facilities/1-when-appropriate-measures-apply 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.)

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 B2 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 of Consequences

Classification	Definition
Low	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 (easily prevented by appropriate use of PPE) Minor surface damage to a building, structure, service or the environment which can be repaired immediately
Medium	Impact is noticeable in the short to medium term Large release impacting on the receiving media which kills flora and fauna and requires remediation Nuisance causing non-permanent health effects to human health Damage to buildings, structures and services which prevents use in the short-term and/or requires a specialist repair
High	Impact is significant, wide-ranging and long lasting effect Has either 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 a single or multiple building, structure and service which prevents use over a 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

Classification of Likelihood

Classification	Definition
Low	Probability of an event is low and likely only to occur in the long term (a yearly basis or less frequent)
Medium	It is probable that an event will occur periodically in the medium term (twice yearly basis)
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

The following categorisation of risk has been developed and the terminology adopted as follows:

Term	Definition
Low	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 measures and techniques
Medium	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-occurances.
High	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 B2 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 B3-3b(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 engine, boilers and emergency flare stack) have emission limits for NOx, CO, SO_2 as relevant. Flare stack height approx. 4m, CHP engine (existing) approx. 3m, new CHP engine 7m and boilers are 4m (large) and 3m (2 x small). Site has a siloxane filter fitted on the main biogas pipeline connected upstream of the CHP engine. to remove impurities within the biogas. Biogas pipeline has condensate traps to remove impurities.	Low
Gas transfer systems, gas	Abnormal	Emissions to air and dispersion leading to:	Low	Medium	Low	The plant is designed to capture and utilise all biogas possible, combusting the biogas in	Low

storage holder, gas engine, flares or PRVs failure causing emissions of biogas		inhalation by local human and animal receptors. Odour impact. Global warming potential. Risk of fire and explosion				order to maximise recovered value from the biological treatment of sludge. The gas system utilised is subject to regular preventative maintenance to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of methane monitors, pressure and flow sensors and with automatic slam shut isolation valves to minimise the potential for release if a leak is detected. Personnel on site wear portable gas detectors in order to alert staff to presence of biogas. An emergency flare is utilised for the safe disposal of surplus gas in the event of plant breakdown, or a surplus of gas above the level that can be safely stored or utilised. Use of emergency flare is recorded. PRVs are in place on the biogas holder to be operated in the event of failure of the emergency flare to prevent over pressurisation and catastrophic failure.	
Catastrophic loss of biogas emissions from gas transfer systems, gas storage tank, gas engine, 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 to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of	Medium

						methane monitors, pressure and flow sensors and with automatic slam shut isolation valves to minimise the potential for release if a leak is detected. One waste biogas burner (emergency flares) are utilised for the safe disposal of surplus gas in the event of plant breakdown, or a surplus of biogas above the level that can be safely stored or utilised, which is pre-set within the SCADA system. Use of emergency flare is recorded via SCADA. Dual duty/standby PVRVs are in place on the biogas holder to be operated in the event of failure of the emergency flare to prevent overpressurisation and catastrophic failure. Activation of any PVRV causes an alarm on the SCADA system.	
Combustion of biogas within CHP engine and emergency flare. Combustion of biogas or natural gas within boilers	Normal	Emissions to air and dispersion leading to inhalation by local human and animal receptors. Global warming potential	High	Low	Medium	Combustion plant is regularly maintained and appropriately sized to manage volumes of biogas. More than one outlet provides contingency in the event of planned maintenance. Combustion plant will operate within permitted ELVs subject to routine monitoring against permit compliance. All combustion plant is located centrally. The nearest receptor, an industrial unit is approx. 60m west of the combustion plant and the nearest residential receptor is approx. 440m north-west.	Low

Release of bioaerosols and dust	Normal	Emissions to air and dispersion leading to inhalation by local human and animal receptors. Odour impact of bioaerosols. Nuisance impact of dust.	High	Medium	High	The risk of bioaerosol and dust is as a result of digested sludge cake storage within the open, engineered pad. This is within the eastern side of the site, approx. 100m from the nearest receptors – industrial warehouses to the north-west and north-east. Fugitive emissions risk is reduced by the cake pad being slightly recessed and screened towards the north-east by vegetation and trees. Tanks and structures provide a degree of screening to the north-west. Digested sludge cake on the pad retains a high moisture content and is not prone to windblown dispersion leading to the generation of dust. Internal site roads are made from concrete/asphalt and not prone to the generation of dust.	Low
Release of bioaerosols and dust from spillages	Abnormal	Emissions to air and dispersion leading to inhalation by local human and animal receptors with potential harm to health. Odour impact of bioaerosols. Nuisance impact of dust.	Low	Medium	Low	Staff responsible for site housekeeping and cleaning of spillages in a timely manner. Spill kits available on site. Staff are trained in their use. Sludge retains a high moisture content and is not prone to windblown dispersion which could cause the generation of dust. Internal site 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 closest surface water is a balancing pond approx. 100m north-east of any oil storage. Chemicals are stored further away. All combustion plant and associated fuel tanks are situated on concrete hardstanding. Chemicals and oils all stored within suitably bunded tanks and IBCs. Tanks and bunds are subject to regular inspection with defects addressed, e.g. rainwater removed as required to maintain 110% capacities. Handling and use of chemicals and oils is carried out by trained personnel. COSHH data sheets available. Spill kits available on site. Staff are trained in their use There are no point source emissions to water with drainage system pumping back to works inlet.	Low
Spillage from storage and digestion tanks, overtopping of tanks, leakage from same tanks 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	Medium	Medium	The site lies outside any Groundwater Source Protection Zones (SPZ). Provision of suitable structurally integral tanks constructed from pre-cast concrete, or steel with glass reinforced plastic. All tanks are subject to asset inspection and proactive maintenance programme including regular visual inspection for cracks or weeping where possible on above ground assets.	Low

						Visual checks during regular day-to-day operations and scheduled preventative maintenance of equipment, such as pumps, pipes, joins etc. Biogas condensate discharged back to the works inlet through site drainage system. Spill kits available on site. Staff are trained in their use There are no point source emissions to water with drainage system pumping back to works inlet.	
Generation of solid waste resulting in litter	Normal	Releases of litter to the environment. Visual nuisance and local loss of amenity	Low	Low	Low	Site operations do not give rise to large amounts of solid wastes and litter that would be prone to dispersion by wind. Rags are stored within skips and retain high moisture content. Waste is stored securely for collection by appropriately licensed approved contractors. Litter picking activities are completed as required.	Low

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

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

Table B3-3b(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 digestion tanks which are covered with fixed roofs. The nearest residential properties approx. 375m west from the covered digesters and nearest commercial buildings approx. 25m north on the site perimeter. Small amounts may be generated within secondary digesters which are located on the east of site away from residential receptors but within proximity of industrial receptors (70m) and are uncovered. No other uncovered tanks within STC permitted area. H_2S production is controlled through the digestion process which can be manually overridden if required.	Low
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 double membrane biogas holder which is suitably sized to manage biogas generation. The biogas system utilised is subject to regular preventative maintenance to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of methane monitors, pressure and flow sensors	Low

						and with automatic slam shut 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 holders, including lightning protection, fencing and pipework is guarded. PRVs available to safely manage pressures within the biogas holders and prevent under or over pressurization.	
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	Medium	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. Biogas is principally stored within the double membrane biogas holder which is suitably sized to manage biogas generation and act as buffer storage for biogas. Site has multiple outlets to use biogas - one CHP engine (the old and new CHP engines will not run concurrently), one large boiler, two small boilers and one flare which are used in order of preference to maximise recovery of energy. CHP engine and boilers are subject to regular maintenance to maintain maximum use of	Low

						outlets, with flare maintained in good working order should they need to be used. The nearest residential receptors are approx. 400m from biogas holders and commercial receptors are approx. 40m from biogas holders.	
H_2S/biogas emitted when biogas cannot be combusted in engine, boilers or flare	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	Low	Low	Low	Biogas is principally stored within the double membrane biogas holder which is suitably sized to manage biogas generation and act as buffer storage when biogas cannot be combusted. Site has multiple outlets to use biogas - one CHP engine (the old and new CHP engines will not run concurrently), one large boiler, two small boilers and one flare which can be used if one of the assets is offline. The nearest residential receptors are approx. 400m from biogas holders and commercial receptors are approx. 40m from biogas holders. CHP engine and boilers are subject to regular maintenance to maintain maximum use of outlets, with flares maintained in good working order should they need to be used.	Low
Storage of treated digested sludge cake	Normal	Emissions to air and dispersion leading to inhalation by local human receptors	High	Medium	High	Digested sludge cake is stored on an open cake pad on the eastern side of the site with an industrial warehouse approx. 115m to the north-west. The nearest residential receptors are approx. 430m to the north-west of the cake	Low

		Loss of amenity from odour nuisance				pad. Digested sludge cake is an inherently low odour material and air dispersion is reduced by shielding provided by vegetation screening and site assets between industrial receptors and the presence of site assets and an industrial estate between residential receptors. 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 inline with the manufacturers 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 B3-3b(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 engine is acoustically baffled, self-contained and designed for external applications therefore noise emissions are already low. The nearest residential properties approx. 375m away, nearest commercial buildings approx. 65m north of the CHP engine, on the site perimeter Good inspection regimes and maintenance of plant to ensure that excessive noise levels are not generated. Regular checks of noise mitigation measures fitted to items of plant. Such measures include silencers and baffles fitted to specific areas of plant. Where repair or replacement is required, the plant will, where possible, be taken out of service until repair or replacement of parts has been undertaken.	Low
Operation of fans on air cooled radiators	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors	High	Low	Medium	Air cooled radiators do not give rise to high levels of noise and are only used as required. They are located approx. 65m from nearest sensitive receptors. Good maintenance of fans to ensure that excessive noise levels are not generated.	Low

						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 to reduce generation of noise. Size of the site and in particular the cake pad reduces reversing obligations. Shovel loading of digested sludge cake takes place on the open, engineered pad during day time hours only. Infrequent movements of vehicles need to be considered within the context of background noise from the Thorp Industrial Estate (including a commercial waste transfer station), Central M40 industrial estate and proximity to the M40 motorway.	Low
Vehicle movements - waste deliveries, sludge deliveries and bulk collections of digested sludge cake	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Imports take place during day time hours only to points which are central to the site, against background noise from local roads and industrial users. Vehicle movements across the site subject to speed limit to reduce generation of noise. Shovel loading of digested sludge cake takes place on the open, engineered pad during daytime hours only. Bulk collections normally take place during daytime only.	Low

Vehicle movements - tanker deliveries of chemicals and raw materials	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Deliveries likely to take place during daytime hours to delivery areas within the central area of the site. Vehicle movements across the site subject to speed limit to reduce generation of noise.	Low
Operation of emergency flare	Abnormal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Low	Medium	Use of the emergency flares is minimized by prioritizing use of the CHP and boilers with use of the flare recorded. Emergency flare is located away from sensitive receptors, approx. 150m from the nearest industrial receptor and over 500m from the nearest residential receptor.	Low

Table B3-3b (iv) - Environmental Risk Assessment and Accident Management Plan

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
Major fire and/or explosion causing the release of polluting materials to air, water or land.	Emissions to air and dispersion leading to inhalation by local human receptors. Respiratory irritation, illness and nuisance to local population Emissions to ground and ground water of digestate contaminating soil and/or groundwater. Run-off from site polluting surface water courses. Harm to aquatic flora and fauna and chronic effect on water quality. Injury to staff, fire fighters or arsonists/vandals.	Low	High	Medium	Follow site Incident Response Plan and inform relevant authorities. Management systems requires DSEAR assessment which is adhered to by site operations. Designated ATEX zones on site and lightning protection system in place around biogas holder. Fire alarm systems installed and maintained. Biogas contained within a closed system and monitored for safety. Automatic cut off valve to biogas supply to stop gas glows, electric temperature sensor, pressure monitors, flame arrestors, etc. Warning signs clearly displayed and staff wear gas alarms to alert to the presence of biogas. All visitors subject to site inductions and accompanied. Permit-to-work system in place. Preventative maintenance programme and maintenance plans are in place in order to maintain equipment effectively. Smoking only permitted in designated areas of site.	Low

Minor fire causing the release of polluting materials to air, water or land	Emissions to air and dispersion leading to inhalation by local human receptors. Respiratory irritation, illness and nuisance to local population Emissions to ground and ground water of digestate contaminating soil and/or groundwater. Run-off from site polluting surface water courses. Harm to aquatic flora and fauna and chronic effect on water quality. Injury to staff, fire fighters or arsonists/vandals.	Low	Medium	Low	Follow site Incident Response Plan and inform relevant authorities. Management systems requires DSEAR assessment which is adhered to by site operations. Designated ATEX zones on site and lightning protection system in place around biogas holder. Fire alarm systems installed and maintained. Biogas contained within a closed system and monitored for safety. Automatic cut off valve to biogas supply to stop gas glows, electric temperature sensor, pressure monitors, flame arrestors, etc. Warning signs clearly displayed and staff wear gas alarms to alert to the presence of biogas. All visitors subject to site inductions and accompanied. Permit-to-work system in place. Preventative maintenance programme and maintenance plans are in place in order to maintain equipment effectively. Smoking only permitted in designated areas of site.	Low
Failure to contain firefighting water	Emissions to ground and ground water of contaminated firefighting water entering soil and/or groundwater. Run-off from site to surface water courses. Harm to aquatic flora and fauna.	Low	Medium	Low	Likelihood of firefighting water being generated is low as the risk of fire is low. Follow site Incident Response Plan and inform relevant authorities.	Low

	Chronic effect on water quality				Site surfaces fall to the site drainage system which has been designed to sufficient capacity to contain firefighting water Arrange for off-site tankering of firefighting water, if required.	
Accidental explosion of biogas	Emissions to air and dispersion leading to inhalation by local human receptors. Respiratory irritation, illness and nuisance to local population. Injury to staff, fire fighters or arsonists/vandals. Pollution of water or land	Low	High	Medium	Follow site Incident Response Plan and inform relevant authorities. Management systems requires DSEAR assessment which is adhered to by site operations. Designated ATEX zones on site and lightning protection system in place around biogas holder. Fire alarm systems installed and maintained. Biogas contained within a closed system and monitored for safety. Automatic cut off valve to biogas supply to stop gas glows, electric temperature sensor, pressure monitors, flame arrestors, etc. Lightning protection system installed Likelihood reduced by availability of multiple on site uses of biogas (one CHP engine (as the old and new CHP engines will not run concurrently), three boilers and one emergency flare) and use of pressure release valves as a safety measure.	Low
Significant leak of biogas to atmosphere	Emissions to air and dispersion leading to inhalation by local human receptors. Respiratory irritation, illness and nuisance to local population.	Low	High	Medium	Site assets are protected by physical means to prevent vehicle strike by use of kerbing and barriers, and exposed pipework is guarded by barriers in places.	Low

	Global warming potential of greenhouse gases.				Regular proactive and preventative maintenance and regular visual checks. PRVs are present to avoid overpressurisation of biogas system. Methane detectors are in place between the two layers of biogas membranes which will raise the alarm should a leak of biogas be detected	
Leaks of emission to air, but principally NOx.	Emissions to air and dispersion leading to harm to protected nature conservation sites – SSSIs, SAC and SPA. Harm to protected site through toxic contamination, nutrient enrichment, disturbance etc.	Medium	Low	Low	The nearest designated habitat site is a SSSI that is 3.3km from the site. There are no LNRs within 2 km. Site is not within an AQMA. Emissions modelling for the new CHP engine has been supplied demonstrating that there is no significant impact from the operation of the engine.Site operations will be subject to emission limits under current Regulations with infrastructure designed to minimise uncontrolled releases. Checks, monitoring and preventative maintenance will further minimise fugitive emissions.	Low
Spillage of sludges or liquid during tanker transfer operations e.g. pipework leaks	Emissions to ground and ground water of materials entering soil and/or groundwater. Run-off of liquids from site to surface water courses. Harm to aquatic flora and fauna. Chronic effect on water quality	Low	Low	Low	Transfer operations of waste materials is largely an automatic process controlled by the Process Controllers and parameters set within the SCADA system. All pipework is standardised, including tanker couplings. Tanker offloading areas (digesters and inlet) are concrete with kerbing to prevent release to ground. Tanker offloading operations are supervised.	Low

					In event of a spillage, follow site spillage response plan and inform relevant site personnel and relevant authorities. Spill kits are provided around the site which can be used to contain a spillage and direct it towards site drainage. Site drainage returns to works inlet providing treatment process for sludge or arrange off-site tankering of waste to another site. Sludge is relatively viscous and not highly mobile.	
Spillage of raw materials during (e.g. polymer, anti-foam) during use, transfer and disposal operations.	Emissions to ground and ground water of materials entering soil and/or groundwater. Run-off of liquids from site to surface water courses. Harm to aquatic flora and fauna. Chronic effect on water quality	Low	Medium	Low	Raw materials are stored on made ground, within bunded containers or on bunds to contain spillages of 110% of the volume. Regular inspections for leaks and damaged, with remedial action as required. Contents of bunds are regularly checked during environmental audits and after periods of heavy rainfall and emptied as required. In event of a spillage, follow site spillage response plan and inform relevant site personnel. COSHH data sheets available. Deliveries to site are made by approved suppliers. Use of raw materials is carried out by trained personnel or automatically controlled processes. In the event of a spillage, spill kits are provided around the site which can be used to contain a spillage and direct it towards site drainage if suitable. Staff are trained in their use.	Low

					Site drainage returns to works inlet providing treatment process for suitable materials or arrange off-site tankering of waste, if required. It is unlikely for run-off to leave site due to drainage and size of site.	
Spillage of sludges (e.g. raw sludge, digested sludge) during processing and transfer operations e.g. tank overtopping, pipework leaks	Emissions to ground and ground water of materials entering soil and/or groundwater. Run-off of liquids from site to surface water courses. Harm to aquatic flora and fauna. Chronic effect on water quality	Low	Low	Low	Processing and transfer operations of waste materials is largely an automatic process controlled by the Process Controllers and parameters set within the SCADA system. Storage and digestion tanks are fitted with sensors to monitor levels within a tank and can inhibit additional pumping if high alarms activate. Preventative maintenance programme and maintenance plans are in place in order to maintain equipment effectively and minimise the risk of spillages. In event of a spillage, follow site spillage response plan and inform relevant site personnel and relevant authorities. Spill kits are provided around the site which can be used to contain a spillage and direct it towards site drainage. Staff are trained in their use. Site drainage returns to works inlet providing treatment process for sludge or arrange off-site tankering of waste to another site. Sludge is relatively viscous and not highly mobile.	Low

Failure of sludge storage tanks / digester tanks	Emissions to ground and ground water of materials entering soil and/or groundwater. Run-off of liquids from site to surface water courses. Harm to aquatic flora and fauna. Chronic effect on water quality.	Low	High	Medium	Follow site Incident Response Plan and inform relevant authorities. Regular infrastructure inspections for tanks and pipework and planned preventive maintenance system in place. Regular visual inspections for tanks and pipework where this is aboveground and visible, and reactive maintenance. In-line flow monitoring in key locations and tank level monitoring would identify losses and enable a quick response. Tanks are mostly found on made ground with the exception of the primary picket fence thickeners and storage tanks. Made ground is connected to site drainage which returns to works inlet. Sludge is relatively viscous and not highly mobile limiting the distance it can spread in a short time period.	Low
All on-site hazards: machinery	Direct physical contact with human population and /or livestock after gaining unauthorised access to the installation Bodily injury	Low	High	Medium	Direct physical contact is minimised by activity being carried out within enclosed digesters. Site activities are managed and operated in accordance with a management system. Site physical security measures, including perimeter fence and access control to prevent unauthorised access. Assets are protected by various physical means including kerbing and barriers to prevent vehicle strikes.	Low

					Vehicles equipped with reversing alarms. Use of banksmen as appropriate.	
Vandalism causing the release of polluting materials to air (smoke or fumes), water or land.	Emissions to air and dispersion leading to inhalation by local human receptors. Respiratory irritation, illness and nuisance to local population Emissions to ground and ground water of digestate contaminating soil and/or groundwater. Run-off from site polluting surface water courses. Harm to aquatic flora and fauna and chronic effect on water quality. Injury to staff, fire fighters or arsonists/vandals.	Low	High	Medium	Unauthorised access is unlikely to happen and minimised by physical site security measures and effective management systems. Site has perimeter fence and access control barrier entry for all vehicular access. Additional security fences around some assets and other assets are kept within locked containers or buildings. Warning signs are displayed.	Low
Flooding from rivers, streams and groundwater	Emissions to surface water course and harm to aquatic flora and fauna. Infiltration to ground and groundwater. Harm to aquatic flora and fauna and chronic effect on water quality.	Low	Medium	Low	Site is in a Flood Zone 1 with a low annual likelihood of flooding from rivers. General wider works designed to minimise risk of localised works flooding due to storm surges. Follow site Incident Response Plan and inform relevant authorities. Take appropriate corrective and preventative actions to minimise environmental impact	Low

Flooding due to drain blockages and/or excessive rainfall causing localised on-site surface water flooding	Emissions to surface water course and harm to aquatic flora and fauna. Infiltration to ground and groundwater. Harm to aquatic flora and fauna and chronic effect on water quality.	Low	Low	Low	Site wide drainage system linked to main sewage works, which includes additional capacity in storm tanks within the works to manage additional flows. Follow site Incident Response Plan and inform relevant authorities. Take appropriate corrective and preventative actions to minimise environmental impact.	Low
Loss of mains power leading to failure of pumps / control systems and possible leaks and escape of sludge.	Emissions to ground and ground water of materials entering soil and/or groundwater. Run-off of liquids from site to surface water courses. Harm to aquatic flora and fauna.	Low	Medium	Low	Emergency generators provide site-wide back-up power / contingency plans to provide power to critical operations in the event of an electrical outage at the STW. Failsafe systems in place to ensure sludge remains in situ in the event of a loss of power and that systems are promptly returned into operation. Site wide drainage system linked to main sewage works in the event of a spillage.	Low

Table B3-3b (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 (SSBRA) below, this risk is subject to process controls and abatement in order to prevent and minimise this risk:

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk

Release of bioaerosols from anaerobic digestion process	Emissions to air and dispersion leading to inhalation by local human and animal receptors.	Low	Medium	Low	The anaerobic digestion process is enclosed within primary digester tanks with no point source emissions. Gaseous emission are drawn off the digesters through a biogas system for combustion.	Low
Release of bioaerosols from digested sludge storage	Emissions to air and dispersion leading to inhalation by local human and animal receptors.	Low	Medium	Low	The risk of bioaerosols from digested sludge cake has been assessed under COSHH by TWUL and determined to be low risk. Digested sludge cake is post treatment, so pathogen content is significantly reduced. Digested sludge cake is stored on an open cake pad which is less than 250m from a sensitive receptor, where people live or work for more than 6 hours at a time. An industrial warehouse can be found approx. 115m north-west of the cake pad. There are no residential receptors within 250m of the cake pad. The cake pad is slightly recessed below ground level, with a surrounding wall. A line of trees/bushes of varying size, shape and maturity can be found above the pad, which separates the cake pad from the site perimeter and provides shielding to wind-blown dispersion.	Low
Release of bioaerosols from spillages of sludge	Emissions to air and dispersion leading to inhalation by local human and animal receptors.	Low	Low	Low	The risk of bioaerosols from digested sludge cake has been assessed under COSHH by TWUL and determined to be low risk. Staff are responsible for cleaning of spillages in a timely manner reducing the impact of a spillage in generating windblown bioaerosols. Staff use good practice washdown methods to minimise generation	Low

					of spray which could lead to bioaerosol generation. Spill kits are available on site and staff are trained in their use. Spillages generating bioaerosols are unlikely to impact on a sensitive receptor for more than 6 hours at a time	

3c – Types and amounts of raw materials

Table B3-3c – Types and amounts of raw materials

Name of the installation:	Banbury STC				
Schedule 1 Activity	Description of raw material and composition	Maximum storage amount (tonnes or as stated)	Annual throughput (tonnes per annum or as stated)	Description of the use of the raw material including any main hazards (include safety data sheets	Alternatives
	Digested Sludge polymer (Klampress) Product Name: Flopam FO4808XXR	25 tonnes stored within a polymer silo	10 tonnes	Agent used in sludge thickening process	Standard industry chemical
	SAS thickening belts polymer Product Name: Flopam EM 640 HIB	5,000 litres store in 1,000 litre IBCs on portable bunds	5,000 litres	Agent used in sludge thickening process	Standard industry chemical
	Anti-foam Product: Flofoam H 16	6x 20 KG kegs, stored within a building on a bund	Used as required [note 1]	Agent used to control foaming within digester tanks.	Standard industry chemical
	Lubricating oils (existing engine) Product name: Mobil Pegasus 605 Ultra	1,000 litres stored in double skinned tanks	700 litres	Equipment lubricant	
	Lubricating oils (new engine) Product name: Shell Mysella S7 N Ultra	300 litres clean oil stored in double skinned tanks. Waste oil	1,000 litres	Equipment lubricant. As this is a new engine, the exact details are based on anticipated use	

		to a 5,000 litre double skinned tank		and run hours of the engine and subject to change.	
	Glycol coolant Product name: Texaco Delo XLC Antifreeze/Coolant – Premixed 40/60	2,000 litres stored in a bunded IBCs	1,000 litres	CHP engine coolant	
Note 1: Anti-foam treatment is only used to treat foaming in the digesters.					
Raw material use is subject to change as a result of internal procurement requirements in order to identify opportunities for change (for economic, environmental, operational resiliency and market forces). The current list reflects raw materials used at the STC at the time of writing the application					

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-A4 (existing CHP engine and boilers) are to be monitored in accordance with EA guidance and the requirements of MCPD (subject to confirmation of monitoring requirements).

Point A15 (new CHP engine) will be monitored following commissioning.

Hours of operation of the flare (A5) 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 would be subject to monitoring in accordance with EA guidance.

Points A13 and A14, 2x OCUs will have bi-annual testing.

There is no routine monitoring proposed for points PRVs A6 – A10 (1x biogas holder and 4x digester tank).

Table B3-4a – Emission Monitoring

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A1 (CHP Engine 1)	SP 47035 40261	Unit is being replaced once A15 commissioning complete. Testing/ELVs therefore not anticipated during transitioning period.		
A2 (Boiler)	SP 47037 40253	Oxides of Nitrogen – Annual/No limit set	BS EN 14792 BS EN 15058 Or No limit set	

		Carbon monoxide - Annual / No limit set		
A3 (Boiler)	SP 47048 40244	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	
A4 (Boiler)	SP 47051 40246	Oxides of Nitrogen –Run hours/ No limit set Carbon monoxide – Annual / No limit set	BS EN 14792 BS EN 15058 Or No limit set	
A5 (Emergency Flare)	SP 47122 40244	Hours of operation – continuous and if over 876 hours then: Oxides of Nitrogen – Annual Carbon Monoxide – Annual	BS EN 14792 BS EN 15058	
A6 (Biogas holder PRV)	SP 47001 40256	n/a	n/a	
A7 (Digester PRV)	SP 47001 40277	n/a	n/a	
A8 (Digester PRV)	SP 47013 40284	n/a	n/a	
A9 (Digester PRV)	SP 47025 40294	n/a	n/a	
A10 (Digester PRV)	SP 47038 40303	n/a	n/a	
A13 (OCU 1)	SP 47050 40223	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling OR US EPA M11	NIOSH 6013 for analysis
		Ammonia: Once every six months	EN ISO 21877 OR CENTS 1369 for sampling NIOSH 6016 for analysis	
A14 (OCU 2)	SP 47076 40218	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling OR US EPA M11	NIOSH 6013 for analysis
		Ammonia: Once every six months	EN ISO 21877 OR	

			CENTS 1369 for sampling NIOSH 6016 for analysis	
A15 (New CHP Engine)	Approx: SP 47060 40260	Oxides of Nitrogen – Every 3 years Carbon Monoxide – Every 3 years Sulphur dioxide – Every 3 years VOCs – testing requirement only; No ELV	BS EN 14792 BS EN 15058 BS EN 14791 BS EN 12619	
S1 (Sample point for all liquors)	SP 47173 40196	n/a	MCERTS or ISO/IEC 17025	

4b - Point source emissions to air only

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

No.

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

No.

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

No.

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

No.

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

No.

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

No.

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

No.

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

No.

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

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

The new CHP engine has a permanent testing platform.

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 digesters are all suitably insulated. The CHP engine is suitably sized to maximise energy utilisation for the parasitic load, while minimising the use of the flare.

Low energy lighting and LED lighting is installed across the plant. The heating water from the CHP engine and boilers is transferred across the site to the digester heat exchangers in heavily lagged pipes to minimise heat losses in transmission.

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

The CHP engine at the site combusts indigenous biogas and supplies electrical power to treatment processes at the site. The Banbury site also exports electricity to the grid when in surplus. When in deficit, electricity used on site is supplemented by National Grid imports. The CHP also provides useable heat for hot water to the digesters, via heat exchangers.

The site boilers provide additional heat, when required by the digestion process, to supplement the heat recovered from the CHP engine. The boilers are dual fuelled using biogas or natural gas, imported from the gas grid, when there is insufficient biogas available. Use of heat from the CHP engine reduces the demand on natural gas. in the boilers.

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

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

Describe the specific measures you use for improving your energy efficiency

The production and use of biogas to generate electricity and produce heat (which is used into the digestion process) on site minimises the use of fossil fuels whilst recovering biological wastes. Location of the heat exchange, boilers, CHP and digesters within close proximity minimises transmission losses on site, improving the efficiency of the process.

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

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

See response to question 3c above.

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

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

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

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

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

7 – Installations that include a combustion plant (excluding waste incinerators)

7a - List all your combustion plant at the site and provide thermal input and operating hours for each

Please see the information provided within the Technical Summary which lists combustion plant at Banbury STC.

7b – Do any of your combustion plants have a net rated thermal input of 1 or more MW and is not an excluded MCP?

Yes, please see the following table from Appendix 1, Question 13

Appendix 1, Question 13 Information to be provided by the operator to the competent authority for each Medium Combustion Plant as identified in Annex I of Medium Combustion Plant Directive (EU/2015/2193)
See information within MCP Tables in Technical Summary, Section 2.4

7c – Is the aggregated net thermal input of your combustion plant more than 20 MW?

No.

6. Form B4 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 permit application is for physical treatment of non-hazardous waste as a secondary activity waste operation to the main listed installation.

1b –types of waste accepted and restrictions

The EWC list is included in the responses to form B3.

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 B3

3 Operating techniques

3a Technical standards

Please see responses to form B3

3b General requirements

Please see responses to form B3

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 B3

4b Point source emissions to air only

Please see responses to form B3

7. Form B6 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 liquors from PFT's and SAS belts and dewatering liquors returned to the work inlet following the dewatering of treated sewage sludge. 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 B6 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?

1,420 Cubic metres

3c What is the maximum rate of discharge?

16.43 Litres / second

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

1,420 cubic metres

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

Q3b – based on the maximum site input of 1,420 tonnes per day to the digesters, assuming 1 tonne = 1 cubic metre. The liquor arisings must come from the installation inputs as there is limited additional water inputs (primarily boiler feed water). Actual discharge will be slightly lower as no allowance has been made for water entrained in the produced sewage cake.

Q3c – this is based on [1,420m^3 x 1000] / 86,400. Arisings from sources such as dewatering are constant as the plant runs continuously. This gives a value of 16.435185litres, rounded up to 16.43 litres per second.

Q3d – based on the maximum site input of 1,420 tonnes per day to the digesters, assuming 1 tonne = 1 cubic metre. The liquor arisings must come from the installation inputs as there is limited additional water inputs (for example, additional input from boiler feed water, which is a closed system). Actual discharge will be slightly lower as no allowance has been made for water entrained in the produced sewage cake.

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 sewer 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 sewer treatment works and discharges into the works inlet via the site drainage system.

Q6 How will the effluent be treated?

6a Do you treat your effluent?

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

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

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

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

The final effluent discharge from the wider Banbury STW is specified in Environmental Permit TH/CNTD.0021/011.

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 which tests for ALL pollutants which we expect to find in the discharge (as per "**Return Liquors: BAT 3, 6, 7"** within the Technical Summary).

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 which tests for ALL pollutants which we expect to find in the discharge.

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 which tests for ALL pollutants which we expect to find in the discharge.

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 which tests for ALL pollutants and will establish the presence (or confirm the absence)of specific substances .

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 at the following points (approximately) within the installation:

Sample Point	NGR
S1 (Liquor transfer point) All liquors	SP 47173 40196

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

The effluent discharge is to a 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)

Final effluent discharge.

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

SP 4695 3972.

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

River Cherwell 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-BBY-DR-0001

A.2 Site layout

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

A.3 Site Impermeable and permeable surfaces plan

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

A.4 Site Drainage Plan

See document: BANBS1ZZ_DPL_001 and BANBS1ZZ_DPL_002

A.5 Process Flow Diagram

See document: B22849AZ-JA-BANBS1ZZ-LSX-DR-P-0002

A.6 Site Photographs

Please see separate document TW_STC_EPR_11a_BBY_AppA.6 for Site Photographs

Appendix B. CoTC

Please see separate document TW_STC_EPR_11a_BBY_AppB

Appendix C. Site Condition Report – H5

SITE CONDITION REPORT TEMPLATE

For full details, see H5 *SCR guide for applicants* v2.0 4 August 2008

COMPLETE SECTIONS 1-3 AND SUBMIT WITH APPLICATION

DURING THE LIFE OF THE PERMIT: MAINTAIN SECTIONS 4-7

AT SURRENDER: ADD NEW DOC REFERENCE IN 1.0; COMPLETE SECTIONS 8-10; & SUBMIT WITH YOUR SURRENDER APPLICATION.

1.0 SITE DETAILS	
Name of the applicant	Thames Water Utilities Limited
Activity address	Banbury Sludge Treatment Centre Banbury Sewage Treatment Works Thorp Mead Thorp Industrial Estate Oxfordshire OX16 4RZ
National grid reference	NGR SP 47026 40277

Document reference and dates for Site Condition Report at permit application and surrender	Environmental Permit Application – Banbury Sludge Treatment Centre Document number: TW_STC_EPR_11a Date: May 2023

Document references for site plans (including location and boundaries)	Please see site plans in Appendix A and Appendix L Air Quality Assessment.

Note:

In Part A of the application form you must give us details of the site's location and provide us with a site plan. We need a detailed site plan (or plans) showing:

- Site location, the area covered by the site condition report, and the location and nature of the activities and/or waste facilities on the site.
- Locations of receptors, sources of emissions/releases, and monitoring points.
- Site drainage.
- Site surfacing.

If this information is not shown on the site plan required by Part A of the application form then you should submit the additional plan or plans with this site condition report.

2.0 Condition of the land at permit issue	
Environmental setting including: • geology • hydrogeology • surface waters	The River Cherwell is found south of the railway line forming the southern border of the wider site. This is about 440m south-west of the installation. The installation does not directly release to this watercourse, but the wider TWUL sewage works does. The closest surface water is a balancing pond approx. 100m north-east of the site. According to the Environment Agency's online flood maps, the site is subject to a very low risk of flooding from rivers and the sea, and from surface water flooding. The cake pad has a higher risk of surface water flooding, with a small part at high risk. The geology of the site is a bedrock of sedimentary mudstone which is shallow marine in origin, from the Charmouth Mudstone Formation. There is no information recorded on the superficial deposits. Aquifers are classified as Secondary (undifferentiated) (solid deposits) and unproductive (superficial deposits).
Pollution history including: • pollution incidents that may have affected land • historical land-uses and associated contaminants • any visual/olfactory evidence of existing contamination • evidence of damage to pollution prevention measures	The site is located approximately 1.5 km east of the town of Banbury, Oxfordshire. The installation activities at the site are part of a wider TWUL operated sewage treatment works which handles and treats material which is similar in composition and makeup to the wastes treated within the installation. The wider area was mainly agricultural, including areas for allotments until the 1970s. The Banbury Corporate Sewage Works and Irrigation Works is first recorded in the records to the East of the current site, from 1900s. An Isolation Hospital including a sewage tank could be found between the1920s and 1950s. By the 1950s structures and tanks of the Sewage Works (Borough of Banbury/Spital Farm Sewage Works) are present on the current site. The sewage works was developed and increased in size by the 1970s. By the

	1990s the works had expanded further within the footprint of the current site Gas works are present from the 1900s, west of the site adjacent to the railway line. Two railway lines form a boundary to the south of the site from the 1900s, with an additional railway line, which was found slightly further north than the present line, running through site from 1900s to the 1940s, however this has been dismantled by the 1950s and it is absent by the 1970s. The M40 motorway was built towards the east of the site in the 1980s and opened in the 1990s. An industrial estate has developed to the north and the east of the site from the 1970s, growing over time and getting closer in proximity to the site since this time. The whole site is outside of a Source Protection Zone. Environment Agency data on pollution incidents identifies three incidents associated within close proximity of the site. One incident located within the site led to a Category 2 (significant) incident on water caused by crude sewage. There was one Category 2 (significant) incident on water impacting on the balancing pond offsite and one Category 1 (major) incident on water associated with the River Cherwell, south of the railway line, associated with pesticides and biocides.
Evidence of historic contamination, for example, historical site investigation, assessment, remediation and verification reports (where available)	Unknown – although the works was operated as a sewage farm in its earliest phase, the site will therefore be contaminated with sewage related compounds, including e.coli and heavy metals.
Baseline soil and groundwater reference data	None collected. Substances that may be present by storage and use within the newly permitted installation are listed within the Tables of the Residue Management Plan. These substances (or similar substances used in the same processes) have been used historically at the site since it first operated. The following substances may be 'relevant hazardous substances': • Oil • Grease

	• Anti-freeze These substances are stored with the CHP engine, and are used in their routine operation and maintenance. All other hazardous substances have been removed from assessment as they are not considered relevant. This is because storage and use are controlled at the site. Substances are stored within suitably engineered containers/with containment and volumes are small enough for spillage to be contained prior to reaching a sensitive environment. Use of substances is carefully managed to minimise the likelihood of an accidental release.
Supporting information	• Source information identifying environmental setting and pollution incidents • Historical Ordnance Survey plans • Site reconnaissance • Historical investigation / assessment / remediation / verification reports • Baseline soil and groundwater reference data

3.0 Permitted activities	
Permitted activities	Operation of an anaerobic digestion plant for sewage sludge waste and imported sewage sludge wastes and combustion of biogas within a CHP engine to generate electricity for use on site.
Non-permitted activities undertaken	Discharging of waste Storage of waste Storage of biogas Physical blending of wastes Storage of raw materials
Document references for: • plan showing activity layout; and • environmental risk assessment.	Please see the Technical Summary in Chapter 2 of the main application document

Note:

In Part B of the application form you must tell us about the activities that you will undertake at the site. You must also give us an environmental risk assessment. This risk assessment must be based on our guidance (*Environmental Risk Assessment - EPR H1*) or use an equivalent approach.

It is essential that you identify in your environmental risk assessment all the substances used and produced that could pollute the soil or groundwater if there were an accident, or if measures to protect land fail.

These include substances that would be classified as 'dangerous' under the Control of Major Accident Hazards (COMAH) regulations and also raw materials, fuels, intermediates, products, wastes and effluents.

If your submitted environmental risk assessment does not adequately address the risks to soil and groundwater we may need to request further information from you or even refuse your permit application.

4.0 Changes to the activity	
Have there been any changes to the activity boundary?	If yes, provide a plan showing the changes to the activity boundary.
Have there been any changes to the permitted activities?	If yes, provide a description of the changes to the permitted activities
Have any 'dangerous substances' not identified in the Application Site Condition Report been used or produced as a result of the permitted activities?	If yes, list of them
Checklist of supporting information	• Plan showing any changes to the boundary (where relevant) • Description of the changes to the permitted activities (where relevant) • List of 'dangerous substances' used/produced by the permitted activities that were not identified in the Application Site Condition Report (where relevant)

5.0 Measures taken to protect land	
Use records that you collected during the life of the permit to summarise whether pollution prevention measures worked. If you can't, you need to collect land and/or groundwater data to assess whether the land has deteriorated.	
Checklist of supporting information	• Inspection records and summary of findings of inspections for all pollution prevention measures • Records of maintenance, repair and replacement of pollution prevention measures

6.0 Pollution incidents that may have had an impact on land, and their remediation	
Summarise any pollution incidents that may have damaged the land. Describe how you investigated and remedied each one. If you can't, you need to collect land and /or groundwater reference data to assess whether the land has deteriorated while you've been there.	
Checklist of supporting information	• Records of pollution incidents that may have impacted on land • Records of their investigation and remediation

7.0 Soil gas and water quality monitoring (where undertaken)

Provide details of any soil gas and/or water monitoring you did. Include a summary of the findings. Say whether it shows that the land deteriorated as a result of the permitted activities. If it did, outline how you investigated and remedied this.	
Checklist of supporting information	• **Description of soil gas and/or water monitoring undertaken** • **Monitoring results (including graphs)**

8.0 Decommissioning and removal of pollution risk

Describe how the site was decommissioned. Demonstrate that all sources of pollution risk have been removed. Describe whether the decommissioning had any impact on the land. Outline how you investigated and remedied this.	
Checklist of supporting information	• **Site closure plan** • **List of potential sources of pollution risk** • **Investigation and remediation reports (where relevant)**

9.0 Reference data and remediation (where relevant)

Say whether you had to collect land and/or groundwater data. Or say that you didn't need to because the information from sections 3, 4, 5 and 6 of the Surrender Site Condition Report shows that the land has not deteriorated. If you did collect land and/or groundwater reference data, summarise what this entailed, and what your data found. Say whether the data shows that the condition of the land has deteriorated, or whether the land at the site is in a "satisfactory state". If it isn't, summarise what you did to remedy this. Confirm that the land is now in a "satisfactory state" at surrender.	
Checklist of supporting information	• Land and/or groundwater data collected at application (if collected) • Land and/or groundwater data collected at surrender (where needed) • Assessment of satisfactory state • Remediation and verification reports (where undertaken)

10.0 Statement of site condition

Using the information from sections 3 to 7, give a statement about the condition of the land at the site. This should confirm that:

- the permitted activities have stopped
- decommissioning is complete, and the pollution risk has been removed
- the land is in a satisfactory condition.

Appendix D. BAT Assessment

Please see appended BAT spreadsheet: TW_STC_EPR_BBY_11a_AppD

Appendix E. Odour Management Plan

Please see separate document TW_STC_EPR_11a_BBY_AppE

Appendix F. Bioaerosol Risk Assessment

Please see separate document: TW_STC_EPR_11a_BBY_AppF

Appendix G. Containment Options Report (CIRIA 736)

Please see separate documents: B22849AZ-JA-XXXXS1ZZ-100-RP-Z-0001 and B22849AZ-JA-XXXXS1ZZ-100-CA-P-0001

Appendix H. Leak Detection and Repair (LDAR) Plan

Please see separate document: TW_STC_EPR_11a_BBY_AppH

Appendix I. Residue Management Plan

Please see separate document: TW_STC_EPR_11a_BBY_AppI.1 and TW_STC_EPR_11a_BBY_AppI.2 (ZIP file of Material Safety Data Sheets)

Appendix J. Accident Management Plan

Please see separate document: TW_STC_EPR_11a_BBY_AppJ

Appendix K. 1. Acceptance of Third Party Waste Imports

Please see separate document: TW_STC_EPR_11a_BBY_AppK.1

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

Please see separate document: TW_STC_EPR_11a_BBY_AppK.2

Appendix L. Air Quality Assessment

Please see separate document: TW_STC_EPR_11a_BBY_AppL