Sludge Treatment Centre Permitting

Environmental Permit Variation Application - Oxford Sludge Treatment Centre Resubmission

TW_STC_EPR_25a_OXF_ASD | Resubmission - Final

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Thames Water

EPR/MP3038LQ/V006

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Contents

Introduction

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

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

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

The previous permits in place at the site for the importation of inter-site sludge for digestion and tankered waste to the Head of works (inlet) (EPR/BB3500MP) and for the operation of CHP engines and emergency standby generators (EPR/MP3038LQ) will be merged and the CHP engines remain in place as Directly Associated Activities (DAAs) to this listed process. The two currently permitted 2.7MWth standby generators (Generators 1 and 2), previously operated for triad, are now defined as excluded generators given that from 1/3/2023 they are only run for maintenance testing/black start for up to 50hrs per unit per annum (excluding support to genuine emergencies). Given they are **not** DAAs to sludge treatment, the MCP permitting/compliance dates of 1/1/2029-1/1/2030 are relevant.

In addition, the boilers at the site are being replaced and two additional emergency generators added to the permit as DAAs (Generators 3 and 4) and will constitute new MCPs.

This application is for the purposes of varying the existing permitted activities to include the anaerobic digestion process as an installation activity.

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

Non-Technical Summary

This variation application is for a bespoke installation permit for the biological treatment of sludge by anaerobic digestion, with capacity above the relevant thresholds. The biological treatment of sludge includes treatment of the indigenous sewage sludge and Surplus Activated Sludge (SAS) from the onsite aerobic treatment process and treatment of imported sewage sludges from other sites, arriving by road to dedicated sludge import points. The indigenous sludges are generated from the aerobic treatment of both waste waters from the sewer network arriving into the site at the works inlet, and, from imported waste materials, arriving by road transport into a dedicated waste import point near to the Head of Works. There is a second listed activity at the site for the aerobic treatment of liquors in a liquor treatment plant.

The operation of three biogas fuelled Combined Heat and Power (CHP) engines, (which are classified as 'existing' combustion sources under the Medium Combustion Plant Directive (MCPD)), although already permitted will be classified as a DAA to this main listed activity. There are also two new boilers at the site, which are classified as 'new' combustion sources under the MCPD. There are also two existing emergency standby generators (Generators

3 and 4) that provide power to the STC in the event of a grid failure, which are added to the permit as a DAA whilst meeting the definition of an excluded generator.

The STC is located within the Oxford STW, south of Littlemore and to the south of Oxford.

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. Primary sludge is pumped to two Primary Picket Fence Thickeners (PFTs) and is thickened and transferred to the Sludge Blending Tank. Supernatant liquor weirs back to the inlet of the works via the site drainage. SAS from the UWWTD process is thickened using belt presses with the addition of a liquid polymer to aid coagulation and transferred to the Sludge Buffer Tank. Liquor returns to the inlet of the works via the Liquor Return Pumping Station.

Imports of sludge from other works is delivered to a sludge offloading point via tankers, is screened and pumped to the Sludge Buffer Tank. All such imports are subject to appropriate waste pre-acceptance and acceptance checks, prior to acceptance. Indigenous SAS and imported sludge combine in the Sludge Buffer Tank and are pumped to the Screened Sludge Holding Tank. This is combined with thickened indigenous primary sludge at the Sludge Blending Tank.

There is a second offloading point at the STC for permitted imported tankered wastes toward the south-west of the installation. This waste activity is already permitted. This waste arrives at the site via tanker vehicles, is passed to the inlet where it joins the main works flow and via screens to the aerobic treatment at the works, via the UWWTD.

All imports will be assessed using the Thames Water standard waste pre-acceptance checks to ensure that they are appropriate for treatment via the UWWTD. Once pre-approved as suitable for treatment via the UWWTD route, the waste carriers are approved. Wastes will be subject to appropriate waste acceptance checks in accordance with Thames Water procedures. Incoming tanker vehicles 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 Head of Works import is located upstream of the rag and grit screens and storm offtake and discharged wastes are passed from tankers to the urban waste water treatment processes.

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 flow at the inlet.

Blended indigenous and imported sludge is pumped to the Pre- Thermal Hydrolysis Plant (THP) Dewatering Feed Tank. The blended sludge is pumped to pre-THP dewatering plant, where sludge is thickened with the addition of a powder polymer from a silo and liquor returned to the Liquor Treatment Plant. Undigested, thickened sludge is then pumped to the THP Feed Silo.

Undigested, thickened sludge can also be imported to Oxford STC via a dedicated cake hopper within the Cake Import Facility. Imported cake is re-wetted as required, transferred via screw conveyors to the THP Feed Silo to be mixed with indigenous sludge. This waste import activity is already permitted.

Thickened, blended sludges from the THP Feed Silo are then subject to a THP process with the application of temperature and pressure, used to enhance the digestion of the sludge, in an enclosed system. From the THP, sludge is transferred to one of the four anaerobic Primary Digester Tanks at the site. Primary Digester Tanks one and two have biogas holders in the head space, are of concrete construction and mostly above ground. Primary Digester Tanks three and four are of steel construction with fixed roofs. Following treatment over an appropriate number of days within the Primary Digester Tanks, digested sludge is transferred to the Digested Sludge Buffer Tank (Half Tank). This is half of an open, concrete tank, used for storage. In the event this tank reaches capacity, excess digested sludge will transfer to the adjacent, Digested Sludge Buffer Tank (Whole Tank). Digested sludge is then transferred to one of two Digested Sludge Sludge Buffer Feed Tanks, then to the final Pre-Dewatering Feed Tank. Digested sludge is then pumped for dewatering in the digested sludge dewatering building. The four presses use a polymer, made up from a powder polymer that is mixed with final effluent / potable water before being

dosed to each belt to aid coagulation, with the filtrate returning to the Liquor Treatment Plant (LTP) Balancing Tank. Dewatered sludge is conveyed into the semi-enclosed barn, prior to removal from the site under the Sludge Use in Agriculture Regulations 1989 (SUiAR), and in accordance with the Biosolids Assurance Scheme (BAS). Undigested, thickened sludge (raw cake) may also be imported to the additional cake pad for temporary storage prior to digestion in a contingency, for example, in the event that the cake import facility is temporarily unavailable for use.

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

Biogas from the Primary Digester Tanks is captured and stored in one of three holders: a dual membrane biogas holder, and two biogas holders in the head spaces of Primary Digester Tanks one and two. 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 holders, THP vessels 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 storage vessel for combustion in the CHP engines, generating electricity for use both within the site and for export to the grid, and steam to the THP process. These are classified as 'existing' combustion plant under the MCPD (noting sizes 2 x 2.016MWth; 1 x 2.466MWth). In the event additional heat and steam is required, there are two dual-fuel boilers at the site which are new MCPs. An emergency flare is available for use during periods of essential maintenance and for emergency use. The flare is utilised under 10% of the year or less than 876 hours per year. The combustion plant is currently operated under an Environmental Permit which will be merged with this permit.

Oxford STW also has a total of four emergency standby generators (Generators 1-4). Generators 1 and 2 are already permitted Tranche A standby generators which were operated for less than 100 hours a year (for triad running) but since 1/3/2023 are now operated as excluded generators. Generators 3 and 4 ,two emergency standby generators servicing the THP and LTP of the STC (Generator 3 NGR: SP 54230 02110 and Generator 4 NGR: SP 54502 01999) have been assessed under RGN2 and determined to be DAAs to the listed activities at the site, as they are linked to providing emergency power needs to sludge treatment (as DAAs and meeting the definition of an excluded generator, one supporting the THP and the other the LTP).

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

Imported treated sludge cake is offloaded into a cake pad, so as to be stored separately to indigenous sludge cake. The waste stream is the same as that arising from the treatment of sludge within the Oxford 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.

Technical Description

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

Scope

The variation application covers the biological treatment of sewage sludge, both indigenous and imported from other waste water treatment sites, by anaerobic digestion, with a capacity above the relevant thresholds. It also permits the acceptance of portable toilet wastes along with cess, septic tank, and similar sewage derived materials, to the works inlet for processing through the UWWTD treatment route. There are a number of DAAs, including the operation of combustion plant for the generation of electricity and heat at the site, which is classified as an 'existing' combustion source under the MCPD. Only the three CHP engines form a Specified Generator (aggregated to <50 MWth) since Generators 1 and 2 (2.7MWth each) are no longer run in triad and meet the definition of an excluded generator (and are not DAAs). Two additional emergency standby generators (Generators 3 and 4) are DAAs and excluded generators which operate outside of the requirements of MCPD and are not part of the specified generator. The four diesel generators at the site have been assessed using RGN2, to determine how they fit within the permit. The two currently permitted 2.7MWth emergency standby generators (Generator 1at NGR SP 54340 01865 and Generator 2 at NGR SP 54247 02013) at the site are not shown on the site plan as they are not linked to the installation operation. The two generators, (Generator 3 at NGR SP 54230 02110 and Generator 4 at SP 54502 01999) are DAA's to the installation and are shown on the site plan. These two units are to provide emergency power to the STC, specifically for the THP and for the LTP.

The combustion plant, consisting of, three biogas CHP engines and two dual fuelled boiler that are covered by an existing Environmental Permit under number EPR/MP3038LQ/V005. The two existing boilers are being replaced by two new, dual fuel boilers, operating on biogas or natural gas, due to be commissioned during 2023. The emission points remain at a similar location, although the numbering has changed to reflect the new source of the emission. The site holds a second environmental permit, a waste operation standard rules permit, EPR/BB3500MP/A001, Oxford Sewage Treatment Works Sludge Import Facility which allows for the import of specified wastes. Both permits are subject to a substantial variation to convert it to an installation permit with the CHP engines and new boilers becoming a DAA to the listed activity.

Operations at the Oxford 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 total aggregated rated thermal input for combustion plant is greater than 5 megawatts; and
- 250 metres of the nearest sensitive receptor where any processing or storage of digestate fibre is in the open; or 200 metres of the nearest sensitive receptor in any case where the stack is less than 7 metres high, unless its "effective" stack height is at least 3 metres.

Site Location

The Oxford STW site is located approximately 5km south-east of the centre if Oxford and less than 1km south of Littlemore. To the north of the site, there is Grenoble Road, with a commercial estate on the other side. To the east of the site, there is an area of farmland with a small stream from the Littlemore Brook, followed by another commercial estate and residential area. The area south of the site is made up of farmland. West of the site is made up of small areas of woodland and shrubs, with a caravan site and residential area following this, as well as more commercial estates.

There is also a small stream from the Littlemore Brook which runs north to south to the east of the site. This is approximately 100m from the cake barn at its closest point. The STW and STC is within Flood Zone 1, indicating that there is a low probability of river flooding (<1:1000 annual probability of flooding).

There are six designated habitat sites within the relevant distances of Oxford STC. There are three Special Areas of Conservation (SACs) approximately 8.5km to the south, 6.5km to the north-west and 7.2km to the west of the STC. These are Little Wittenham, Oxford Meadows and Cothill Fen. There are two Sites of Special Scientific Interest (SSSIs) located approximately 2km and 1.2km to the north-west of the site, namely Iffley Meadows and Littlemore Railway Cutting. There are no National Nature Reserves (NNRs) or Local Nature Reserves (LNRs) within 2km of the site and there are no Special Protection Areas (SPAs), Marine Protection Areas (MPAs) or Ramsar sites within 10km of the STC. There is one Ancient and Semi-Natural Woodland site located approximately 1.9km to the west of Oxford STC, referred to as Radley Large Wood, together with eight Local Wildlife Sites (LWSs) within 2km of the STC.

There is also a designated species record identified within 500m of the site.

The site is not within the boundaries of a Source Protection Zone (SPZ). The site is not within an Air Quality Management Area (AQMA). However, it is adjacent to the boundaries of the City of Oxford AQMA, located immediately north of the site.

A site plan, showing the UWWTD wider STW and the permitted area of the Oxford STC can be found in Appendix A.2. While a process flow diagram summarising the sludge treatment process can be found in Appendix A.5. 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
Primary Picket Fence Thickener	2	400	Steel
Sludge Buffer Tank	1	170	Steel
Screened Sludge Holding Tank	1	600	Steel
Sludge Blending Tank	2	249	Steel
		214	
Pre THP Dewatering Feed Tank	1	36	Steel
THP Feed Silos	2	300	Steel
THP Reactors	6	22	Steel
THP Flash Tanks	2	30.3	Steel
Primary Digester Tanks	4	Primary Digester Tank1&2 2,365 x 2	Concrete

Tank Purpose	Number	Operational Volume (m^3)	Construction
		Primary Digester Tank 3&4 1,696 x 2	Steel
Digested Sludge Buffer Tank (Half Tank)	1	700	Concrete
Digested Sludge Buffer Tank (Whole)	1	1,830	Concrete
Digested Sludge Buffer Feed Tanks	2	395	Concrete
Pre-Dewatering Feed Tank	1	65	Steel
Liquor Treatment Plant Balancing Tank	1	810	Concrete
Liquor Treatment Plant (in two lanes)	1	1,480 x 2	Concrete
Liquor Treatment Plant Decant Chamber	1	515	Concrete
Pre-THP Polymer Silo	1	35 tonnes	Steel
Digested Sludge Polymer Silo	1	35 tonnes	Steel
Diesel for Generator 3 (THP)	1	35,000 litres	Steel
Diesel for Generator 4 (LTP)	1	20,000 litres	Steel

Waste Activities

The STC comprises of imports of waste for biological treatment, two existing waste activities that are already permitted and one new waste activity. 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 Oxford 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 wate operation to the main listed activity and consist of portable toilet wastes along with cess, septic tank, and similar sewage derived materials, to the works inlet for processing through the UWWTD treatment; and waste imports, comprising of raw (undigested) sludge, to the cake import facility.

An additional waste operation will be for waste imports, comprising of either digested sludge to the cake pad for temporary storage pending recovery offsite; or for temporary storage of raw sludge prior to treatment on site. These imports are a contingency option primarily and will not be routinely used.

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

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

Dewatered, digested sludge cake imported, from other Thames Water treatment sites for temporary storage pending transfer offsite, is stored in a designated area of the cake pad. The cake is checked for conformity with the requirements of BAS. It is identified as being compliant and stored pending off-site land application. All imported cake will be stored on an impermeably surfaced cake pad, for the shortest time practicable, the duration depending on factors such as prevailing weather and availability of the landbank. Imported cake is not imported for the purpose of mixing, treatment or blending with the outputs from the indigenous anaerobic digestion process.

On occasion, as a contingency, raw thickened cake is imported from other Thames Water sites to site for temporary storage, pending transfer to the THP plant for treatment. The raw cake is imported by Ro Ro for temporary storage and directed to a suitable offloading area on the cake pad. Any runoff is captured by the cake pad drainage system and transferred to the site wide drainage system for return to the inlet.

Sludge Processes

Indigenous primary sludge is drawn off the PSTs and thickened within one of two Primary PFT Tanks. The Primary PFTs are the first stage of the permitted installation with all processes prior to the tanks forming part of the UWWTD process. The two Primary PFT Tanks are above ground and of steel construction on a concrete base, with some subsurface elements and are connected to an OCU. Sludge is pumped in at a high level and thickened sludge is then pumped from the Primary PFTs to the Sludge Blending Tank, which is connected to the same OCU. Supernatant from the PFTs weirs out of the tank and gravitates to a Liquor Return Pumping Station, where it is pumped back to the works inlet without any form of liquor treatment. High-level alarms prevent sludge being transferred into the tanks if they are full and the tanks are connected to the site SCADA system.

SAS from the aerobic process is pumped to the SAS Holding Tank, which is outside of the scope of this permit. SAS is then pumped to the SAS thickening building and thickened using two belt presses with liquid polymer from an Intermediate Bulk Container (IBC). Polymer is diluted using final effluent water and put into a feed tank to be pumped onto each belt. Liquor is returned to head of the works via a Liquor Return Pumping Station. Thickened SAS is pumped to a covered Sludge Buffer Tank outside the SAS thickening building where it is mixed with sludge imported from other works. This tank is above ground, steel construction with a concrete surround for spillage control and has mixer pumps to prevent settling.

SAS from other works is accepted into an inter-site transfer point for biological treatment and is pumped into the Sludge Buffer Tank outside of the SAS thickening building mentioned earlier. Inter-site transfers can be accepted 24/7 via two site-supplied transfer hoses and sludge loggers. 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. Two macerator feed pumps pump from this Sludge Buffer Tank to the sludge screens. Screenings of inorganic material and rag are deposited in a skip for offsite disposal.

From the Sludge Buffer Tank, thickened sludge goes through the SAS thickening building, part above ground and below ground, then pumped into the covered Screened Sludge Holding Tank. It is then pumped subsurface to the Sludge Blending Tank to be mixed with the indigenous thickened primary sludge. The Sludge Blending Tank provides a consistent blend of sludge to the THP. This tank is attached to an OCU, covered and fitted with SCADA connected safety systems including high level controls. Blended sludge is then pumped to the Pre-THP Dewatering Feed Tank.

Thermal Hydrolysis Plant

At the THP process, sludge is transferred to a Pre-THP Dewatering Feed Tank before it is subject to dewatering. This tank is a covered, above ground tank of steel construction and odour abated via an OCU. Sludge enters the tank at a high level and discharges at a low level. From the Pre-THP Dewatering Feed Tank, sludge is pumped to Pre-THP Dewatering Plant where it is dewatered with powder polymer, then transferred above ground to a THP Feed Silo. The Pre-THP Dewatering Plant and THP Feed Silos are connected to the same OCU as the Pre-THP Dewatering Feed Buffer Tank. Liquor from dewatering is pumped to the LTP Decant Chamber, bypassing the liquor treatment process. From the LTP Decant Chamber tank, liquors return to the works inlet via Liquor Return Pumping Station 2.

There is also a sludge import point at Oxford STC which receives undigested, thickened sludge from other sewage treatment works for biological treatment. Waste is received in the Cake Import Facility, which is near to the site entrance within the north of the STC, from covered lorries via a cake hopper. The Cake Import Facility is partially below ground and of concrete construction within an engineered concrete area. Vehicles reverse into the Cake Import Facility and deposit waste directly into a large hopper. Sludge is then pumped through screw pumps, using final effluent to remain wet to the THP Feed Silo. Dilution set points are dependent upon where the sludge has come from to determine the required dilution of the sludge. Imported sludge is pumped into the THP sludge feed silos where it mixes with the thickened sludge from the pre-THP belts. The building is odour controlled with an OCU and ventilated, with gas detectors for safety. Safety features on imports are trigged by a high-level alarm in the THP Feed Silo, which would inhibit the screw pumps and prevent imports being accepted. Sludge is pumped into the top of the THP Feed Silo and splits evenly between the two silos. It gravitates to screw pumps and is pumped to the THP process.

From the THP Feed Silo, sludge is put through the THP process. The THP is a single stream process consisting of three pairs of THP Reactors and two THP Flash Tanks. The THP process takes place within above ground, enclosed steel tanks on engineered concrete that is connected to the site drainage system. The THP process pre-treats sludge to 155°C and 6 bar of pressure for 2.5 hours in total. The THP is a batch process that operate 24-7, combining medium pressure boiling of sludge, followed by a rapid decompression to break down larger organic molecules, making them more easily digestible by the microbes in the digestion process. The process also sterilises the sludge, destroying harmful pathogens in the sludge.

Sludge is pumped from the THP Feed Silo to the THP Reactor, where the cycle commences. Once filled with sludge, the THP Reactor is filled with steam until the required pressure and temperature is reached in order to hydrolyse the sludge. Once the hydrolysis has been completed, a valve is opened to reduce the pressure with the steam released. A second valve, at the bottom of the THP Reactor is then opened and the sludge is discharged to the THP Flash Tank. The THP Flash Tank has a stone trap and provide a thermal buffer to release excess energy from the sludge prior to it entering downstream processes. The hydrolysed sludge is discharged from the THP Flash Tank into a common line and is blended with sludge being recirculated from the Primary Digester Tanks. The common line splits between two individual sludge coolers that use final effluent from site to lower the temperature to be more optimal for anaerobic digestion. Cooled sludge is then pumped to one of the four Primary Digester Tanks at the site.

Digestion Processes

There are four Primary Digester Tanks at Oxford STC which receive the hydrolysed sludge for treatment. Primary Digester Tanks 1 and 2 are of concrete construction and are mostly above ground, with approximately 3m being subsurface. These have biogas holders in the head space. Both of the tanks have recently been refurbished with a new biodome in the head space. The tanks have dual Pressure Relief Valves (PRVs) and are connected to SCADA which monitors the low or high levels of pressure. They have mixer pumps as well as re-circulation pumps.

Primary Digester Tanks 3 and 4 are of steel construction with fixed roofs. They also have mixer and re-circulation pumps which join the feed line. These tanks have dual PRVs, high level alarms, pressure monitors and activation of these would inhibit the digestor feed pumps. There is no additional heat input to the digesters, with the Primary Digester Tanks using heat of the incoming sludge to maintain temperature. Primary Digester Tanks 3 and 4 use anti-foam dosed manually from an IBC while Primary Digester Tanks 1 and 2 use a final effluent shower spray to knock down foaming. Sludge is digested for 15 days and is then transferred to the Digested Sludge Buffer Tank (Half Tank). Primary Digester Tanks are emptied and cleaned on a pre-determined schedule and grit can be removed from the base of each tank. Digested sludge from Primary Digester Tanks is continuously transferred via gravity to the Digested Sludge Buffer Tank (Half Tank).

The Digested Sludge Buffer Tank (Half Tank) is half of one rectangular shaped tank that is of concrete construction. This tank is mainly above ground. From the Digested Sludge Buffer Tank (Half Tank), digested sludge can discharge into an overflow Digested Sludge Buffer Tank (Whole), however this is only used as a short-term contingency storage tank in times of abnormal flow or as a result of maintenance to downstream tanks and processes. Pumps located in the gallery of the tanks transfer digested sludge to the Digested Sludge Buffer Feed Tank through a subsurface sludge line. High levels in the Digested Sludge Buffer Tank (Half Tank) would inhibit the THP process and the Digested Sludge Buffer Tank is therefore used as a balancing tank and to prevent inhibiting the THP processes at Oxford STC.

High level alarms would inhibit the feed pumps transferring sludge to the Digested Sludge Buffer Feed Tank, and the sludge is fed from below ground with mixing of the sludge via mixer pumps. Pumps transfer sludge from the Digested Sludge Buffer Feed Tank to the final Pre-Dewatering Feed Tank, outside of the digested sludge dewatering building. The Pre-Dewatering Feed Tank is above ground, covered, steel tank without an odour control.

Transfer pumps located outside of the digested sludge dewatering building, transfer the digested sludge for dewatering within one of four belt presses inside the dewatering building. The belt presses dewater the digested sludge with the aid of a polymer coagulant. The polymer is made up from a bulk bag with the addition of potable water / final effluent in a make-up tank and stored within a storage tank for dosing to each of the belts. There are four transfer pumps which transfer sludge to each belt. Filtrate from the dewatering is gravitates to the LTP Balancing Tank of the LTP.

Liquor Treatment Plant

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

The LTP consists of a Liquor Treatment Plant Balancing Tank and the treatment plant itself. The LTP Balancing Tank is connected to its own OCU for odour abatement.

This LTP Balancing Tank is of concrete construction and covered, mostly subsurface and receives liquors from the digested sludge dewatering plant. THP liquors bypass the LTP Balancing Tank and go straight to the Decant Chamber of the LTP. Digested sludge dewatering liquors pumped into the LTP are subject treatment with caustic soda (sodium hydroxide) and anti-foam, which are dosed from a silo and an IBC respectively. The chemical delivery area is bunded with a penstock valve. The LTP is a Sequencing Batch Reactor that consists of two treatment lanes that are of concrete construction. The LTPs treats the liquors in order to produce an effluent that is suitable for

return to the inlet for treatment. Liquors are agitated via blowers in order to achieve de-ammonification through a biological process that oxidises ammonia to nitrates. There is one blower for each treatment lane and treatment is over a six-hour process with a four-hour fill and aeration time with the blowers running and monitoring demand for oxygen and monitoring of the pH. There is then one hour of settling time followed by one hour of decanting into a Liquor Treatment Plant Decant Chamber, before the liquors are pumped back to the inlet.

Cake Storage

Dewatered digested sludge cake is conveyed to the cake barn, a semi-enclosed covered building where it is removed from site. In the event of non-compliant sludge being produced at Oxford STC, it is stored within one of the storage bays for an extended period of time. The site also benefits from a separate cake pad located to the south of the cake barn which provides for storage of digested cake in a contingency. Digested sludge cake is then removed from site under the Sludge Use in Agriculture Regulations 1989 (SUiAR), and in accordance with the BAS. The site-specific bioaerosol risk assessment for the STC is provided in Appendix F.

Imported undigested sludge is temporarily stored on the additional cake pad in a contingency when the THP is unable to accept additional cake imports. This undigested sludge is then treated by Oxford STC via the cake import facility.

Biogas

Biogas from the Primary Digester Tanks is captured and transferred to one of three biogas holders for storage via a biogas transfer pipeline which is largely above ground: a double membrane biogas holder near Primary Digester Tanks 3 and 4 captures biogas from these digesters and the two biogas holders in the head space of Primary Digester Tanks 1 and 2 capture biogas from these digesters. The dual membrane biogas holder has an approximate storage volume of 1,150m^3 and the biogas holders above Primary Digester Tanks 1 and 2 each have an approximate storage volume of 1,911m^3 giving a total biogas holder volume of approximately 4,972 m^3. The biogas transfer pipelines are fitted with condensate pots that captures entrained moisture from the generated biogas and allows moisture to be removed from the biogas and returned to the head of works for treatment via the site drainage system. The double membrane biogas holder has an inner and outer bag, and the biogas holders in Primary Digester Tanks 1 and 2 are comprised of dual membrane biogas holders on top of the Primary Digester Tanks. All biogas storage holders are fitted with biogas detection systems and PRVs that operate in an emergency as a safety precaution in the event of over pressurising the system. There is an ultrasonic level device within each biogas holder that measures the volume of biogas within the inner bag and hydrogen sulphide monitors.

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

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

The biogas is taken from the biogas holders for combustion within two Jenbacher CHP engines which share a common flue which is 14.6m tall and one Caterpillar CHP engine with its own flue which stands at 15m. These are located externally within self-contained units. The two Jenbacher CHP engines operate continuously on biogas with no back up fuels, and the Caterpillar CHP engine runs in the event there is enough biogas for three engines. The Jenbacher CHP engines each have a thermal input of 2.016MWth and the Caterpillar CHP has a thermal input of 2.466MWth, generating electricity for use within the site and heat to the THP process. Electricity generated by the CHP engines is also exported from the site to the National Grid when there is an excess to the site needs.

The three CHP engines are classified as 'existing' combustion plant under the Medium Combustion Plant Directive and a Tranche A specified generator, along with two 2.7MWth emergency standby generators, which is permitted by the existing Combined Heat and Power Plant and Standby Diesel Generators Environmental Permit (EPR/MP3038LQ/V005). Note that from 1/3/2023 Standby diesel generators (1 & 2; 2.7MWth each) are no longer used for TRIAD operation, which will make these units excluded generators, as they will become emergency use only. These two currently permitted generators (Generator 1at NGR SP 54340 01865 and Generator 2 at NGR SP 54247 02013) are not shown on the site emission point plan as they do not serve the installation. In addition, there are also two other emergency generators (Generator 3 NGR: SP 54230 02110 and Generator 4 NGR: SP 54502 01999) at the site, which are excluded generators as they operate for under 50 hours per annum for testing purposes only. They have been assessed under RGN2 and determined to serve the installation, one for emergency power to the THP and the other the LTP. These two generators are shown on the site plan as emission points A29 and A30.

Low grade heat is supplied from the CHP engines via heat exchange to the THP waste heat recovery boiler in order to pre-heat the water supply to the boiler. The waste heat recovery boiler has a thermal input of 0.597 MWth and does not have supplementary firing using another fuel. This low-grade heat is supplemented by combustion of either indigenous biogas or natural gas to generate steam for the THP process as it is required within two dual fuelled boilers. The new boilers will operate on biogas or natural gas and will be commissioned during 2023, replacing two old boilers that are currently listed in V0005 as they are non-operational. The boilers are supplied with water from a water treatment plant which uses a small quantity of chemicals to treat water before use.

In the event there is excess biogas, there is a ground mounted emergency flare which is used during periods of essential maintenance and emergency use. The flare is utilised under 10% of the year, less than 876 hours per year.

Air dispersal modelling for the combustion plant at Oxford is provided as Appendix L Air Quality Assessment.

BAT Considerations

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

BAT 3, 6, 7: Return Liquors

The site has a liquor treatment plant which treats some dewatering liquors. Liquor treatment for other waste waters arising within the permitted area is part of the waste-water treatment process of the STW and does not fall within the permit boundary.

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

Return Liquor Monitoring

Thames Water commits to 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); and

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.

Liquor Monitoring Proposal

TWUL are committed to providing information about the characteristics of the wastewater streams at Oxford 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 Slough, our commitment to BAT 3, 6, and 7 and the following:

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

Under the BREF guidance Best Available Techniques (BAT) conclusion 3 Thames Water should establish and maintain an inventory of waste water and waste gas streams. Thames Water will carry out the 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 the Environment Agency's (EA) Monitoring Certification Scheme (MCERTS) standards or appropriate alternatives. Thames Water will ensure to document sampling procedures with 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.

b) 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:

I. Simplified process flow sheets that show the origin of the emissions. Flow calculation based on an assessment of throughput may be used.

II. Descriptions of process-integrated techniques and wastewater treatment at source including their performances. Chemicals used for thickening and dewatering should also be stated.
III. Thickening and dewatering liquors, which comprise the major component of the returns, will be subject to monitoring for: Ammonia; BOD; solids; flow and pH.
IV. 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.

c) 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 perform 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.

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

Thames Water has identified process/drainage lines, at Slough STW, which return liquors and wastewater from the sludge treatment area to the head of works. The primary wastewater streams identified as follows:

- Picket fence thicker liquors.
- Surplus Activated Sludge (SAS) thickening liquors.
- Pre-Thermal Hydrolysis Plant (THP) dewatering liquors
- Digested Sludge dewatering liquors.
- Biogas condensate.
- OCU waste waters

Other streams identified are:
- Site surface rain run-off.
- Washdown for maintenance and cleaning.

1) <u>Picket Fence Thickener liquors</u>

The Picket Fence Thickening (PFT) process produces approximately 785 m^3/day liquor, which drains together with the SAS thickening liquors back to the works inlet. The PFTs tanks receive pumped sludge from the primary settlement tanks. The PFT thickening process relies solely on settlement and no polymer is added. Solids captured from the thickening process equipment in operation are analysed as it is a key thickening performance measure and also has a significant effect on the cost of treatment. The solids are associated with a biological demand (measured as BOD) hence the objective is to keep them as low possible. The ammonia loading at this point is expected to be significantly low.

2) <u>SAS Thickening liquors</u>

SAS thickening produces approximately 1096 m^3/d or liquors. The sludge is thickened using belt thickeners with addition of a bulk powder polymer used to aid coagulation. 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. The ammonia loading at this point is also expected to be significantly low.

3) Pre-THP Sludge Dewatering Liquors

Sludge is subjected to thickening prior to THP using sludge belt presses. A feedstock of primary biological sludge is combined with polymer solution to produce a thickened sludge and a liquor. Approximately 597 m^3/d of pre digestion dewatering liquors is produced. 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. The ammonia loading at this point is also expected to be significantly low.

4) Digested Sludge Dewatering Liquors

Digested biological sludge is dewatered using Bucher presses to produce a solid cake. A polymer is used in the dewatering process to aid in binding the solids and predominantly remains in the thickened sludge solids. 392 m^3/d of post digestion dewatering liquors are produced. Due to Thermal hydrolysis digestion the ammonia concentration is significantly higher than the other liquor return waste water streams.

5) Biogas Condensate

A very small volume, approximately 1m^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.

6) OCU Liquors

Four OCU's within this permit application between them produce a total of approximately 329m3/ day of OCU liquors.

Site Surface Rain Run-off

There are surface water drains in the sludge treatment area of Oxford 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 Oxford STW. These flows will only contain biological sludges produced onsite and final effluent from the wash water system. Flows will be adequately diluted.

Liquor Treatment

The waste waters identified above are treated through an Activated Sludge Sequencing Batch Reactor (SBR) Liquor Treatment plant. Solids are sent back to the Urban Waste Water Activated sludge plant. Anti-foam and caustic soda are added to the post digestion sludge dewatering liquors. Liquors are decanted to the decant chamber where they combine with the pre THP Liquor before being pumped to the Head of the Works.

Liquor Treatment plant returns

Approximately 353 m3/d of Liquor Treatment Plant liquors from the treatment plant is returned to the inlet works.

Approximately 39 m3/d of Liquor Treatment Plant (SAS) is returned to the Urban Wastewater Treatment (UWWT) process works.

Sample Locations

We propose to sample the wastewater streams described above as set out below in Table 1 which lists the locations identified as sampling points and waste waters present. These flows are also shown in the accompanying documents: Process Flow Diagram (A.5) and the sample locations in Site Layout (A.2).

Table 1: Sample points

Sample Point	NGR
S1 PFT Liquors, SAS Thickening Liquors, OCU Waste Waters, Biogas Condensate, Surface Water Run Off	SP 54358 02011
S2 Liquor Treatment Plant Liquors, Pre-THP Dewatering Liquors	SP 54358 02011
S3 Liquor Treatment Plant Sludge (SAS)	SP 54503 01982

Composite Sampling

The returns identified above combine as indicated in Table 1 and the Process flow diagram.

Thames Water will sample each location listed in Table 1 in accordance with Environment Agency Guidance. Where individual flow proportional samples are taken at each sample point, each flow proportional composite sample may be combined to provide a single flow proportional 'bulk' composite sample for analysis. Return flow data will be used to ensure the single bulk composite sample is representative of the total flow returned.

Location of Liquor Returns.

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.

Management of Diffuse Emissions – BAT 14

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 Oxford. 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).

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 of Appendix A.

A SAS Holding Tank has been excluded as Thames Water understands the Environment Agency has confirmed that assets containing unthickened sludge, prior to thickening are excluded from IED AD and remain part of UWWT process. A decommissioned biogas holding tank is not in use and has been excluded from the permit boundary.

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

There are open top tanks within the permit boundary at Oxford STC, including the Digested Sludge Buffer Tank (Half Tank), Digested Sludge Buffer Tank (Whole) and Digested Sludge Buffer Feed Tanks for which evaluation proposals are provided above for the control of diffuse emissions.

Process Controls

Anaerobic digestor operations are monitored automatically from the control centre at the site and outside of normal operational hours, from the regional control centre. Checks include digester health, temperature and operation. As described, tanks are equipped with appropriate high-level alarms and automatic cut off valves to minimise releases. The 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.

- At a THP digestion site such as Oxford the processes are maintained around pH 8 but within the range 7.5-8.6 (this is % dry solids and digester load dependant) for healthy operation.
- alkalinity: Levels dependant on feedstock characteristics (primary sludge: surplus activated sludge (SAS) ratio). Advanced digestion (THP) typically, 5,000 – 10,000mg/litre (target range from 6,000-8,000 mg/litre) but is dependent on % dry solids and digester load.
- temperature: minimum target of 40°C for advanced digestion. This is maintained within the range 36-45°C for THP AD.
- HRT (hydraulic retention time): minimum target is 15-days, there is no upper limit. Retention times shall not be less than 12-days during plant outages to keep the product pathogen kill efficiency control.
- OLR (organic loading rate): see table below – this is dependent on the primary/SAS ratio. Oxford fits into the fourth row of the table.
- Dry solids feed: see table below, Oxford has a target of 10%DS, but this can vary between 8-14%DS and impacts the HRT.

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

* mesophilic anaerobic digestion

[x] surplus activated sludge, arising from the UWWTD treatment route.

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

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

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

Waste Tracking

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

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

Odour

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

Bioaerosols

Digested sludge cake at Oxford is stored in a semi-enclosed cake barn and on a 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, A.6 for photographs of key plant infrastructure.

Other Risk Assessments

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

Emergency Standby Generators

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

- Generator 1: 2.7 MW emergency standby generators (which operates for emergency use only);
- Generator 2: 2.7 MW emergency standby generators (which operates for emergency use only);

- Generator 3: 2.632 MWth emergency standby generator (which is a DAA and operates for emergency use only); and
- Generator 4: 1.583 MWth emergency standby generator (which is a DAA and operates for emergency use only).

Generators 1 and 2 are already permitted as Tranche A generators by Environmental Permit EPR/MP3038LQ/V005. As of March 2023, the two Tranche A 2.7MWth generators ceased to participate in Triad and became excluded generators (2.7MWth emergency standby generators). The two 2.7MWth emergency standby generators are located at SP5434001865 and SP5424702013 as per the details within the Environmental Permit.

Generators 3 and 4 are currently excluded generators but are requested to be included within the Environmental Permit by this variation application as DAA excluded generators because they will meet the requirements under Guidance "Understanding the meaning of regulated facility" RGN2. This is because both of the emergency standby generators meet the criteria for inclusion as DAAs and are located within the installation permit boundary as described below:

1. Both emergency standby generators are directly associated with the installation and the installation will be the "principal user" of the electricity generated in the event of a site-wide loss of power. The THP standby emergency generator provides 100% of the power generated to the THP. The LTP standby emergency generator provides 100% of the power generated to the LTP.

2. Both emergency standby generators have a technical connection with the listed activities at the installation with output of the activity, electrical power, used with the treatment of waste in the THP and LTP at the installation.

3. Both emergency standby generators are capable of having a (limited) potential effect on air quality as emissions to air will occur during periods of operation.

These DAA excluded generators are located at emission points A29 and A30 as indicated by the site plan in Appendix A.

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.

Part A(1) (a) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving one or more of the following activities, and excluding activities covered by Council Directive 91/271/EEC concerning urban waste-water treatment(a)—

(i) biological treatment;

The site includes the following DAAs:

- Imports of waste, including sludge and undigested cake from other sewage treatment works and imports of municipal liquid or sludges similar in composition to UWWTD derived materials;
- Blending of indigenous sludges and imported wastes/waste sludge prior to treatment;
- Pre-treatment of sewage sludge by Thermal Hydrolysis Plant (THP);
- Storage of digestate prior to dewatering;
- Dewatering of digested sewage sludge
- Transfer of treated dewatering liquors back to the head of the sewage treatment works;
- Transfer of surface water runoff back to the head of the sewage treatment works;
- Storage of dewatered digested sludge cake prior to offsite recovery;
- Storage of biogas;
- Transfer of biogas condensate via site drainage back to the head of the sewage treatment works;
- Combustion of biogas in a MCPD and/or Specified Generator (SG) compliant biogas CHP engines and boilers;
- Operation of an emergency flare;
- Operation of a siloxane filter plant;
- Storage of diesel;
- Storage of wastes, including waste oils;
- Storage of raw materials; and,
- Operation of standby emergency generators (Generators 3 and 4 for THP and LTP).

The waste activities at the site are:

- Imports of waste to the works inlet for treatment through the UWWTD route (an existing activity);
- Imports of primary sludge to the cake import facility (an existing activity);.and,
- Imports of digested sludge cake for temporary storage pending off-site removal (a new activity).

In addition to the listed activity at the site, there is a DAA of a biogas combustion plant, which is also a specified generator, covered by the MCPD under Schedule 25A and B of the Environmental Permitting (England and Wales) Regulations 2016 (as amended). This comprises:

- 1x 2.466 MWth CHP engine;
- 2x 2.016 MWth CHP engines;
- 1x 0.597 MWth output Heat Recovery Boiler;
- *2x 2.33 MWth dual fuelled boilers* (to be removed)
- **2x 4.71MWth dual fuelled boilers (new boilers to be added)**

- 2x 2.7 MW emergency standby generators (which operates for emergency use only are not DAAs and where the 2029/30 MCPD permitting/compliance dates are relevant);
- 1x 2.632 MWth emergency standby generator (which is a DAA and operates for emergency use only); and
- 1x 1.583 MWth emergency standby generator (which is a DAA and operates for emergency use only).

The two boilers to be removed are shown in italics, with the two boilers to be added as new sources shown in bold.

The three CHP engines form a Schedule 25B Specified Generator. Total thermal input for this Specified Generator is 6.498 MWth.

The total thermal input of the STC is approximately 20.73MWth of which approximately 16.515 MWth is in regular use.

Form A1 Questions

Form C2 Questions

1 About the permit

1a Discussions before your application

The pre-application process is currently not available due to Environment Agency resourcing issues, discussions have been held with the local area Environment Agency staff. Nature and heritage conservation screening was requested and received via email from the pre-application advice service of the Environment Agency.

1b Permit number

What is the permit number that this application relates to?

MP3038LQ/V005 determined 23/12/2020.

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

Oxford Sludge Treatment Centre

Oxford Sewage Treatment Works

Grenoble Road,

Sandford-on-Thames,

Oxford,

OX4 4YU

2 About your proposed changes

2a Type of variation

This is a substantial variation.

2b Changes or additions to existing activities

Table C2-1 Proposed changes to current activities.

Name	Installation schedule 1 references	Description of the installation activity	Description of waste operations	Proposed changes document reference
Oxford STC	*Section 5.4 Part A(1) (b); i*	Biological treatment by means of Anaerobic digestion		This document
Oxford STC	*Section 5.4 Part A(1) (a); i*	Biological treatment for disposal by means of aerobic treatment		

Name	Installation schedule 1 references	Description of the installation activity	Description of waste operations	Proposed changes document reference
Oxford Sewage Treatment Works			Operation of CHP engines and boilers, now a DAA to installation	
Oxford Sludge Import Facility			Operation of a waste import facility for non-hazardous waste treatment	

2c Consolidating (combining) or updating existing permits

Yes.

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

Yes.

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

MP3038LQ/V005 – Oxford Combined Heat and Power Plant (determined 23/12/2020)

BB3500MP/A001 – Oxford Sewage Treatment Works Sludge Import Facility (issued 08/07/2014).

2d Treating batteries

2d1 Are you planning to treat batteries?

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

2e Ship recycling

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

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

2d Low impact installations (installations only)

2d1 Are any of the regulated facilities low impact installations?

No, this application is not for a low impact installation.

2g Multi - operator installation

No. This is not a multi-operator installation.

3 Your ability as an operator

3a Relevant offences

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

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

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

Event Name	Court	Date of hearing	Fine	Summary
				Summons 4: On and /or before 14 October 2017 TW did contravene condition 13 of environmental permit CNTM.1402 by failing to empty the storm lagoon at Crawley Sewage Treatment Works and return the contents for full treatment as soon as practicable after cessation of the overflow to the lagoon contrary to Regulation 38(2) of the Environmental Permitting (England and Wales) Regulations 2016.

3b Technical ability

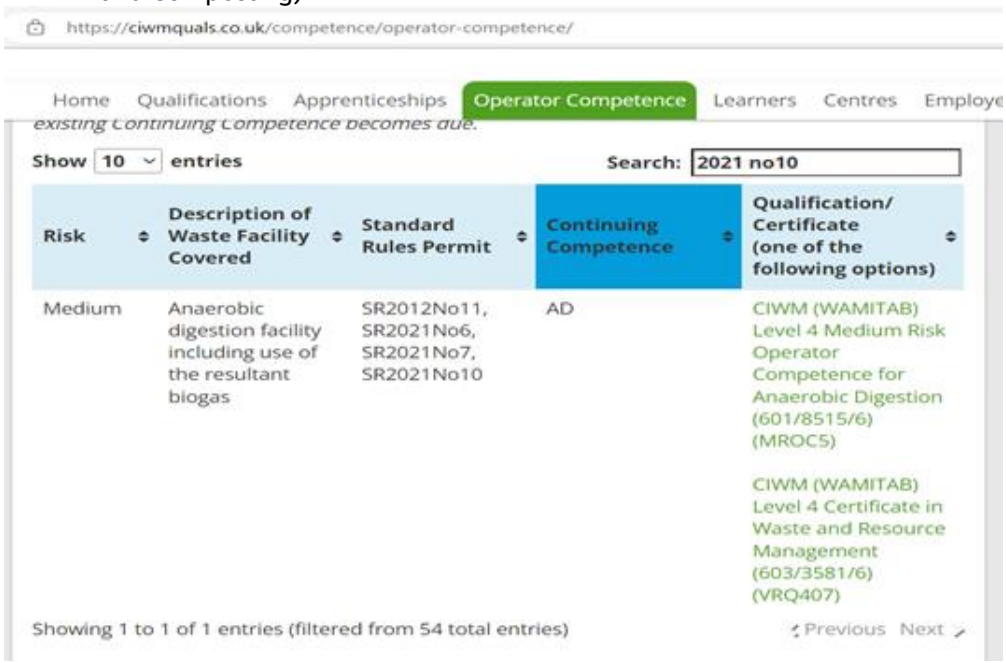
Thames Water uses WAMITAB qualified staff at their waste facilities. The relevant person for the site has been named below and full details have been provided separately on a spreadsheet:

David Furness

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 a 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:

- A.1 Site location plan
- A.2 Installation Boundary and Emission Points
- 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?

See Appendix C for the Site Condition Report.

5c Provide a non-technical summary of your application

Please see earlier text in Section 1.

5d Risk of fire from sites storing combustible waste

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

5f Adding an installation

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

6 Environmental risk assessment

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

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

Designated site review

Site Name	Designation	Direction from site	Distance from site
Little Wittenham	SAC	South	8,500 m
Oxford Meadows	SAC	North-west	6,500 m
Cothill Fen	SAC	West	7,200 m
Iffley Meadows	SSSI	North-west	2,000 m
Littlemore Railway Cutting	SSSI	North-west	1,200 m

Site Name	Designation	Direction from site	Distance from site
n/a	MPA	n/a	n/a
n/a	Ramsar	n/a	n/a
n/a	SPA	n/a	n/a
n/a	LNR	n/a	n/a
Radley Large Wood	Ancient & Semi-Natural Woodland	West	1,900 m
List of Local Wildlife Sites			
Sandford Brake Radley Large Wood Wetland south of Iffley Meadows Fiddlers Elbow Marsh Kennington Memorial Field Bypass Swamp Heyford Hill Lane Pasture Lower Farm Bottom Hay Meadow			All sites <2,000 m

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

Oxford Meadows SAC, Cothill Fen SAC and Little Wittenham SAC are all located within the relevant distance from the site situated approximately 6.5km, 7.2km and 8.5km to North-West, West and South of the site respectively. There are two SSSI designations within 2 km of the site, the nearest is situated approximately 1.2 km to the North-West (Littlemore Railway Cutting). There are no SPAs, MPAs or Ramsar sites within 10 km of the site.

There are no designated Local or National Nature Reserves within 2 km of the Oxford Sewage Treatment Works.

There is one area of Ancient Woodland within 2 km of the site, comprising Radley Large Wood Ancient and Semi-Natural Woodland located approximately 1.9km to the West of the Oxford Sewage Treatment Works.

There are eight non-statutory designated LWS's within 2 km of the site, the closest of which is located approximately 1.1km to the West of the Oxford Sewage Treatment Works.

There are no protected habitat records within the specified screening distance (within 500m) of the site. There are however records of a designated species within the specified screening distance (within 500m) of the site.

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

The site sits within Flood Zone 1 with low probability of flooding (<1:1000 annual probability of flooding).

The site is located adjacent to the boundaries of the City of Oxford Air Quality Management Area (AQMA) located to the immediate North of the site. The AQMA has been declared in September 2010 for the following pollutants: Nitrogen dioxide (NO_2) – Annual Mean.

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
Amenity issues: Litter, vermin and pests	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, amenity and recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. The site is located in a mainly urban fringe location on the edges of the settlement of Oxford. The nearest residential dwellings (Tenacre Caravan Park) are located approximately 110 m to the West of the site. The nearest commercial and industrial premises are located approximately 50m to the North and North-West, comprising The Oxford Science Park accessed off Grenoble Road. Shakespeare's Way, a Public Right of Way (Ref: 335 13/10), borders the southern and western boundaries of the wider Sewage Treatment Works. Ecological receptors: Oxford Meadows SAC, Cothill Fen SAC and Little Wittenham SAC are all located within the relevant distance from the site situated approximately 6.5km, 7.2km and 8.5km to North-West, West and South of the site respectively. There are two SSSI designations within 2 km of the site, the nearest is situated approximately 1.2 km to the North-West (Littlemore Railway Cutting). There are no SPAs, MPAs or Ramsar sites within 10 km of the site. There are no designated Local or National Nature Reserves within 2 km of the Oxford Sewage Treatment Works. There is one area of Ancient Woodland and eight non-statutory designated LWS's within 2 km of the site. The closest Ancient Woodland is Radley Large Wood located approximately 1.9km to the West of the wider Sewage Treatment Works and the closest LWS is located approximately 1.1km to the West of the wider STW.	The wastes handled at the site are primarily liquids and sludges, along with UWWTD derived material delivered by sewer. As such, there is no source of litter within the materials handled at the site. In the unlikely event pests or vermin are observed on site a suitable contractor is called in as soon as practicable.	X
Dust and bioaerosols	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Litter above. The impact of dust on human health will depend on the distance and wind direction. For bioaerosols this is 250 m.	The wastes handled at the site are liquids, sewage sludges and digested sludge cake, along with UWWTD derived material delivered by sewer. The site will not be handling inherently dusty or powdery wastes. Digested sludge cake is mostly handled within a semi enclosed cake barn. Therefore, dust and bioaerosols will not impact on nearby receptors, with the closest to this area of the site approximately 220 m to the North. Digested sludge cake and raw (untreated) cake can be handled on the cake pads. The closest receptors are approximately 230 m to the north-east.	✓

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
		Roads will be maintained to avoid the production of dust. Anaerobic digestion of sludge takes place within a closed system. Digested sludge cake is stored within the semi enclosed cake barn. The nearest receptors to the cake barn are approximately 220 m to the North (Oxford Science Park). The site specific bioaerosol risk assessment is presented as Appendix F	
Assessment of point source emissions to air Emissions deposited from air to land	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Amenity issues above. The impact of emissions from air on human health will depend on the distance and wind direction.	The site is located adjacent to the boundaries of the City of Oxford AQMA located to the immediate North of the site. The AQMA has been declared in September 2010 for the following pollutants: Nitrogen dioxide (NO2) – Annual Mean. An AQIA concluded that the operation of the assessed combustion plant are acceptable from an air quality perspective. The full report can be found as Appendix L. The emergency flare is used only during periods when there is a larger volume of biogas than the CHP engine and boilers are able to manage. Fugitive emissions to air are assessed in Table C3-3b(i).	X
Assessment of point source and fugitive emissions to water	Littlemore Brook and Northfield Brook, both designated Main Rivers, are located approximately 210 m and 315 m to the North and North-East of the site respectively. An un-named tributary of Littlemore Brook is located approximately 100 m to the East of the site The site sits within Flood Zone 1 with low probability of flooding. The majority of drainage returns to the site drainage via the liquor treatment plant (LTP). Some drainage bypasses the LTP and returns straight to the inlet.	The main product of the process is a digested sludge cake, which is stored within Flood Zone 1 inside of a semi enclosed cake barn and equipped with an engineered drainage system that returns to the works inlet. Other aqueous discharges generated by process are limited (comprising only biogas condensate, filter	X

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
		press liquors, wash water 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.	
Assessment of odour	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Amenity issues above. The impact of emissions from odour on human receptors will depend on the distance and wind direction.	The wider sewage treatment works, which includes the area of the STC to be permitted has processes in place to minimise odour which includes physical containment, odour abatement, management systems, procedures and monitoring to control fugitive emissions of odour at the plant. Odour from the STC cannot be considered in isolation from the wider works. The sewage treatment works has an odour management plan, which is appended as Appendix E. Odour emissions are assessed in Table C3-3b(ii).	X
Energy	Global atmosphere (direct and indirect emissions)	Use of biogas on site within the CHP engines and boilers to generate electricity which is exported to the National Grid reduces the demand for non-renewable electricity. Use of additional biogas within the site boilers minimises the need to import non-renewable natural gas from the gas grid. Export of renewable electricity to the National Grid can offset consumption of fossil fuels within the energy mix, lowering the carbon intensity of power.	X

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
		Good maintenance procedures will help the plant to run efficiently and reduce energy consumption. Use of LED lighting minimises electricity imports and 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. Aquifers are classified as Secondary A (bedrock deposits) and Secondary – Undifferentiated (superficial drift)	All waste streams are disposed of off-site for recovery or disposal and will continue to be transferred (and consigned where hazardous) to appropriately permitted facilities.	X
Noise and vibration	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, amenity and recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. The site is located in a mainly urban fringe location on the edges of the settlement of Oxford. The nearest residential dwellings are located approximately 110 m to the West of the site. The nearest commercial and industrial premises are located approximately 50m to the North and North-West, comprising The Oxford Science Park accessed off Grenoble Road. Shakespeare's Way, a Public Right of Way (Ref: 335 13/10), borders the southern and western boundaries of the wider Sewage Treatment Works. Ecological receptors: Oxford Meadows SAC, Cothill Fen SAC and Little Wittenham SAC are all located within the relevant distance from the site situated approximately 6.5km, 7.2km and 8.5km to North-West, West and South of the site respectively. There are two SSSI designations within 2 km of the site, the nearest is situated approximately 1.2 km to the North-West (Littlemore Railway Cutting). There are no SPAs, MPAs or Ramsar sites within 10 km of the site. There are no designated Local or National Nature Reserves within 2 km of the Oxford Sewage Treatment Works. There is one area of Ancient Woodland and eight non-statutory designated LWS's within 2 km of the site. The closest Ancient Woodland is Radley Large Wood located approximately 1.9km to the West of the wider Sewage Treatment Works and the closest LWS is located approximately 1.1km to the West of the wider STW.	Site design has been chosen to minimise the impact of noise on offsite receptors through building orientation, finishes and location of openings. Combustion plant is internal and acoustically shielded from nearby receptors within self-contained units or within a building. Noise from plant and equipment will be minimised through purchasing decisions and a robust preventative maintenance programme. There will be no sources of vibration within the facility. Noise and vibration emissions are assessed in See Table C3-3b(iii).	X

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
Other issues (including visual impact)	Designated species – water voles	There are no protected habitat records within the specified screening distance (within 500m) of the site. There are however records of a designated species, namely water voles, close to the site. The water voles are identified in conjunction with the water course, which the wider sewage works discharges to. There is no direct release from the installation to the water course and the impact on the water course was assessed as part of the permitting process for the main works discharge consent.	X
Climate Change	Risks of increased temperature impacts resulting in digesters heating beyond optimal operating temperature and increased odour potential from site process. For human health and ecological receptors, see notes for Amenity issues above.	Digesters may require reduced heat input to digester via heat exchange system and digesters are insulated against worse impacts. Warmer temperatures may require less boiler input/use as a result of less heat demand, or increased heat dumping via air cooled radiator. If less biogas is used, the site may require a new consumptive biogas solution, e.g. a CHP engine or other technology that is appropriately sized to utilise additional biogas. However, the CHP engines will need to be replaced prior to 2050 when they reach the end of their operational lifespans. Pre-digestion tanks are already covered and OCUs to be utilised as appropriate. OCUs may require oversizing compared to current use.	X
	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.	X

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
		May need to increase bund or containment volume for sewage treatment works or individual assets. Land spreading activities could be restricted during very wet, winter months. Although the site has a large cake 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 supplied separately for the ease of exclusion from the public register.

Form C3 Questions

1 – What activities are you applying to vary?

Table C3-1a – Types of activities

Installation name	Schedule 1 references	Description of the Activity	Activity Capacity	Annex I and II codes and descriptions	Non-hazardous waste treatment capacity
Oxford Sludge Treatment Centre 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 four 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).	700 wet tonnes per day (throughput based on 10460m3/15 = 697.33m3 per day	R1 Use principally as a fuel or other means to generate energy R3: Recycling reclamation of organic substances which are not used as solvents R13 Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage, pending collection, on the site where the waste is produced) D15: Storage pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where it is produced)	Maximum waste throughput 1,000,000 wet tonnes per annum including indigenous UWWTD derived sludge from within the wider Sewage Treatment Works. As per volume calculations in Note 1 below.
Oxford Sludge Treatment Centre	S5.4 A1 (a) (i) Disposal of non-hazardous waste with a capacity exceeding 75	From receipt of process site process liquors to biological	>50 wet tonnes per day	D8 Biological treatment resulting in final compounds or mixtures	Maximum waste 350,000 wet tonnes per annum. As

AR2	tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment. Biological treatment by aeration of process liquors in 1 liquor treatment plant followed by discharge back to the works inlet of the STW via site drainage	treatment and discharge of treated liquids to site drainage.		which are discarded by any of the operations numbered D1 to D12 D 15 Storage pending any of the operations numbered D 1 to D 14 (excluding temporary storage, pending collection, on the site where the waste is produced)	per volume calculations in Note 1 below.
Directly Associated Activities					
AR3	Imports of waste, including sludge and undigested cake from other sewage treatment works and imports of municipal liquid or sludges similar in composition to UWWTD derived materials				
AR4	Blending of indigenous sludges and imported wastes/waste sludge prior to treatment				
AR5	Pre-treatment of sewage sludge by thermal hydrolysis plant (THP);				
AR6	Storage of digestate prior to dewatering;				
AR7	Dewatering of digested sewage sludge				
AR8	Transfer of treated dewatering liquors back to the head of the sewage treatment works;				
AR9	Transfer of surface water runoff back to the head of the sewage treatment works;				
AR10	Storage of dewatered digested sludge cake prior to offsite recovery;				
AR11	Storage of biogas;				
AR12	Transfer of biogas condensate via site drainage back to the head of the sewage treatment works;				
AR13	Combustion of biogas in a MCPD and/or Specified Generator (SG) compliant biogas CHP engines and boilers;				
AR14	Operation of an emergency flare;				
AR15	Operation of a siloxane filter plant				
AR16	Storage of diesel				

AR17	Storage of wastes, including waste oils				
AR18	Storage of raw materials; and				
AR19	Operation of standby emergency generators (Generators 3 and 4 for THP and LTP)				
Specified Generator Activities					
Activity reference	National Grid Reference and or activity reference/emission point	Activity listed in the EP Regulations	Description of MCP and/or Specified Generator	Fuel	Operating hours limit per annum
AR20	SP5434001865 SP5424702013	Schedule 25B – Specified generator	2x 2.7MWth emergency standby generators (Generators 1 and 2). **Note now meeting the definition of an excluded generator in terms of consideration in V006**.	Diesel	<50 hours per year for testing and maintenance
	A1, A10, A11		2x 2.016 MWth Jenbacher CHPs burning biogas [Note 2] 1x 2.466 MWth Caterpillar CHP burning biogas [Note 2]	Biogas	Unlimited
Note 2 – The three CHP engines are DAAs to the installation and part of the specified generator					
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**	
AR21	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 30,000 wet tonnes per annum	
	Digested sludge cake for temporary storage pending off-site removal	R13: Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection,	n/a	Maximum waste throughput 1,000 wet tonnes per annum	

		on the site where it is produced). R3: Recycling or reclamation of organic substances which are not used as solvents		
AR22	Imports of sludge to the cake import facility	R3: Recycling reclamation of organic substances which are not used as solvents R13 Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage, pending collection, on the site where the waste is produced)	n/a	Maximum waste throughput 72,000 wet tonnes per annum

For all Waste Operations	**Total capacity**	**24,654 wet tonnes**	**= [a] + [b]**
	Total STC treatment capacity (tank volume)	18,654 wet tonnes	[a]
	Total cake barn and cake pad storage capacity	6,000 wet tonnes	[b]
For waste imports to the head of the works	Annual throughput (tonnes each year)	Imports: 30,000 wet tonnes	
For waste imports of digested sludge cake for temporary storage	Annual throughput (tonnes each year)	Imports: 1,000 wet tonnes	
For waste imports to the cake import facility	Annual throughput (tonnes each year)	Imports: 72,000 wet tonnes	

Note: AR1 Import Calculation is based on:
Primary Sludge: 9.35 tds/day; worse case 0.75% dry solids = 1,247m3/day = 455,000 m3/year
SAS: 8.01 tds/day; worse case 0.70% dry solids = 1,145 m3/day = 417,857 m3/year
Imports:-

Liquid Sludge 10.02 tds/day; worse case 3.00% dry solids = 334 m3/day = 121,875 m3/year

Cake 39.40 tds/day; worse case 20.00% dry solids = 197 m3/day = 71,906 m3/year.

Total Combined Import Calculation: 994,732 m3/year rounded to 1,000,000 m3/year

Note: AR2 Calculation is based on the following rounded to 350,000 m3/year:

Post Digestion	Max Volume	
Digested sludge	325,000	m3/year
polymer mass post digestion	146	tds/year
polymer concentration	0.30%	
polymer volume	48,750	m3/year
Combined feed to dewatering	373,750	m3/year
dewatering cake dry solids	40%	
cake volume	36,563	m3/year
liquors to LTP	337,188	m3/year
Allocation for surface water	4,950	m3/year
Combined to LTP	342,138	m3/year

Table C3-1b Types of waste accepted

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

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

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

Waste Code	Description of Waste
16 10 02	aqueous liquid wastes other than those mentioned in 16 10 01 [note 1]
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: Thickening and dewatering liquors, centrate and filtrate derived from TWUL processes Waste from a portable toilet Chlorinated water from TWUL potable water network	

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

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

1c Recovery of hazardous waste on land

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

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

2 – Point source emissions to air, water and land

Table C3-2a – Emissions to Air

Air emission points currently permitted under permit EPR/MP3038LQ/V005 are in bold.

Emission point reference and location [Note 1]	Source	Parameter	Limit	Unit	Reference Period	Monitoring frequency	Monitoring standard or method [Note 2]
A1	**CHP Engine 1** **Exhaust of Caterpillar CHP engine via 14m unimpeded vertical stack**	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	1,033	mg/Nm^3	Hourly mean	Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air"

Emission point reference and location [Note 1]	Source	Parameter	Limit	Unit	Reference Period	Monitoring frequency	Monitoring standard or method [Note 2]
A10	**CHP Engine 2** **Exhaust of Jenbacher CHP engine 1 via individual 15m unimpeded vertical stacks**	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	500	mg/Nm^3	Hourly mean	Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air"
		Carbon Monoxide	1,400	mg/Nm^3			
		Total Volatile Organic Compounds	No limit	mg/Nm^3			
A11	**CHP Engine 3** **Exhaust of Jenbacher CHP engine 2 via individual 15m unimpeded vertical stacks**	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	500	mg/Nm^3	Hourly mean	Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air"
		Carbon Monoxide	1,400	mg/Nm^3			
		Total Volatile Organic Compounds	No limit	mg/Nm^3			
A14	**Emergency Flare**	No limits set	-	-	-	[Note 3]	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air"
A15	THP PRV	-	-	-	-	-	-
A16	Digester PRV	-	-	-	-	-	-
A17	Digester PRV	-	-	-	-	-	-
A18	Digester PRV	-	-	-	-	-	-

Emission point reference and location [Note 1]	**Source**	**Parameter**	**Limit**	**Unit**	Reference Period	Monitoring frequency	Monitoring standard or method [Note 2]
A19	Digester PRV	-	-	-	-	-	-
A20	Biogas Holder PRV	-	-	-	-	-	-
A21	Siloxane Filter	-	-	-	-	-	-
A23	OCU2	Hydrogen sulphide	No limit set	-	Average over sampling period	Once every 6 months	CEN TS 13649 for sampling. NIOSH 6013 for analysis OR US EPA M11
		Ammonia	20	Mg/m3		Once every 6 months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis
A24	OCU3	Hydrogen sulphide	No limit set	-	Average over sampling period	Once every 6 months	CEN TS 13649 for sampling. NIOSH 6013 for analysis OR US EPA M11
		Ammonia	20	Mg/m3		Once every 6 months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis
A25	OCU4	Hydrogen sulphide	No limit set	-	Average over sampling period	Once every 6 months	CEN TS 13649 for sampling. NIOSH 6013 for analysis

Emission point reference and location [Note 1]	**Source**	**Parameter**	**Limit**	**Unit**	Reference Period	Monitoring frequency	Monitoring standard or method [Note 2]
							OR US EPA M11
		Ammonia	20	Mg/m3		Once every 6 months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis
A26	OCU5	Hydrogen sulphide	No limit set	-	Average over sampling period	Once every 6 months	CEN TS 13649 for sampling. NIOSH 6013 for analysis OR US EPA M11
		Ammonia	20	Mg/m3		Once every 6 months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis
A27	New boiler 1 (dual fuelled boiler) on biogas gas	Carbon Monoxide	No limit set	mg/Nm^3	Hourly mean	Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air"
		Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	200	mg/Nm^3	Hourly mean	Annually	
		Sulphur Dioxide	100	mg/Nm^3	Hourly mean	Annually	
	New boiler 1 (dual fuelled boiler) on natural gas	Carbon Monoxide	No limit set	mg/Nm^3	Hourly mean	Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack
		Oxides of Nitrogen (NO and NO_2	100	mg/Nm^3	Hourly mean	Annually	

Emission point reference and location [Note 1]	**Source**	**Parameter**	**Limit**	**Unit**	Reference Period	Monitoring frequency	Monitoring standard or method [Note 2]
		expressed as NO_2)					emissions to air"
A28	New boiler 2 (dual fueled boiler) on biogas gas	Carbon Monoxide	No limit set	mg/Nm^3	Hourly mean	Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air"
		Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	200	mg/Nm^3	Hourly mean	Annually	
		Sulphur Dioxide	100	mg/Nm^3	Hourly mean	Annually	
	New boiler 2(dual fueled boiler) on natural gas	Carbon Monoxide	No limit set	mg/Nm^3	Hourly mean	Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air"
		Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	100	mg/Nm^3	Hourly mean	Annually	
A29	Emergency Generator (DAA to THP) (Generator 3) An excluded generator which operates for less than 50 hours per year [Note 4]	-	-	-	-	-	-
A30	Emergency Generator (DAA to LTP) (Generator 4) An excluded generator which operates for less than 50 hours per year [Note 4]	-	-	-	-	-	-
SP 54340 01865	**2.7 MWth Emergency Standby Generator (Generator 1)** **From 1/3/2023 operated as an**	-	-	-	-	-	-

Emission point reference and location [Note 1]	Source	Parameter	Limit	Unit	Reference Period	Monitoring frequency	Monitoring standard or method [Note 2]
	excluded generator; not a DAA to sludge treatment; 2029/30 MCPD permitting/compliance dates apply.						
SP 54247 02013	**2.7 MWth Emergency Standby Generator (Generator 2)** **. From 1/3/2023 operated as an excluded generator; not a DAA to sludge treatment; 2029/30 MCPD permitting/compliance dates apply.**	-	-	-	-	-	-

Note 1: Emission points A2 to A9 are no longer in use

Note 2: These limits do not apply during start up and shut down. Uncertainty allowance for biogas engines are as stated in EA guidance LFTGN08 v2 2010.

Note 3: Annual monitoring is only required when flare operates in excess of 10% of the time (876 hours per annum), taken on an annual assessment period. Record of operating hours to be submitted annually to the Environment Agency.

Note 4: A29 and A30 are DAAs to the installation

Table C3-2b – Emissions to Sewer

Emission point reference and location	Source	Parameter	Limit	Unit
T1	PFT Liquors, SAS Thickening Liquors, OCU Waste Water, Biogas Condensate, Surface Water Run Off	No parameters set	No limit set	-
T2a/T2b/T2c	Treated Liquors, Pre-THP Dewatering Liquors to Head of Works	No parameters set	No limit set	-
T3	Treated Sludge to UWWTD	No parameters set	No limit set	-
T4	Head of Works Import	No parameters set	No limit set	-

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

3 – Operating techniques

3a – Table 3 – 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.)

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

Yes, please refer to ADMS modelling from the previous application (V005) which remains valid.

3b - General requirements

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

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

Risk Matrix and Terminology for Accident for Risk Assessment

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

Classification 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.

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.

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-occurrences.
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 C2 Q6), due to the nature of the processes, the anaerobic digestion operations and cake storage, along with biogas utilisation have the potential to generate fugitive emissions to air and water, which are subject to a number of process controls.

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

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
Emissions to air of NOx, SO_2, CO_2 and VOCs	Normal	Emissions to air and dispersion leading to inhalation by local human and animal receptors.	High	Low	Medium	Activities are managed and operated in accordance with the site management system (including inspection and maintenance of equipment, including engine management systems), point source emissions to air (CHP engines, boilers and emergency flare stack) have emission limits. Jenbacher CHP stack 14.6m high, Caterpillar CHP stack 14m high and boilers share the multi-flue stack approx. 18m. Site has a siloxane filter fitted on the main biogas pipeline connected to the CHP engines to remove impurities within the biogas. ADMS modelling concluded that emissions to air from the combustion plant at Oxford STC are acceptable.	Low
Biogas transfer systems, biogas storage holder, CHP engines, flare or PRVs failure	Abnormal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Odour impact. Global	Low	Medium	Low	The plant is designed to capture and utilise all biogas possible, combusting the biogas in order to maximise recovered value from the biological treatment of sludge.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
causing emissions of biogas		warming potential. Risk of fire and explosion.				The biogas system utilised is subject to regular preventative maintenance including a LDAR plan to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of pressure and flow sensors and with isolation valves to minimise the potential for release if a leak is detected. Personnel on site wear portable biogas detectors in order to alert staff to presence of biogas. A flare stack (emergency flare) is utilised for the safe disposal of surplus biogas in the event of plant breakdown, or a surplus of biogas above the level that can be safely stored or utilised. Use of emergency flare is recorded. PRVs are in place on the biogas holders to be operated in the event of failure of the emergency flare to prevent over-pressurisation and catastrophic failure.	
Catastrophic loss of biogas emissions from biogas transfer systems, biogas storage holder, CHP engines,	Abnormal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Odour impact. Global warming potential. Risk of significant fire and explosion.	Low	High	Medium	The plant is designed to capture and utilise all biogas possible, combusting the biogas in order to maximise recovered value from the biological treatment of sludge. The biogas system utilised is subject to regular preventative maintenance including a LDAR plan to minimise the potential for leaks	Medium

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
emergency flare or PRVs						occurring. The system is also protected with a comprehensive array of pressure and flow sensors and with isolation valves to minimise the potential for release if a leak is detected. A flare stack (emergency flare) is utilised for the safe disposal of surplus biogas in the event of plant breakdown, or a surplus of biogas above the level that can be safely stored or utilised. Use of emergency flare is recorded. PRVs are in place on the biogas holder to be operated in the event of failure of the emergency flare to prevent over-pressurisation and catastrophic failure.	
Combustion of biogas within CHP engines and emergency flare. Combustion of biogas or natural gas within the boiler	Normal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Global warming potential.	High	Low	Medium	Combustion plant is regularly maintained and appropriately sized to manage volumes of biogas. Combustion plant operates within permitted ELVs subject to routine monitoring against permit compliance. The combustion plant is located in northwest of the site, away from sensitive receptors. The nearest receptor is a commercial property approx. 103m north of the boilers.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
Release of steam from THP, vessels and tanks	Abnormal	Emissions to air and dispersion leading to inhalation by local human and animal receptors. Global warming potential.	Low	Low	Low	THP is regularly maintained and operated by trained, competent personnel. Regular visual checks made of all equipment to identify potential faults. THP tanks and vessels are fitted with PRVs to safely vent steam to atmosphere and prevent a catastrophic failure. THP is located to the north of the site away from sensitive receptors, approx. 70m away from commercial properties to the north.	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	Low	Medium	The risk of bioaerosol and dust is reduced by storing the digested sludge cake within a semi-enclosed cake barn. The nearest receptor is a commercial property (a hotel), approx. 240m north of the cake barn. The additional cake pad for imported primary sludge and strategic storage is not covered or odour abated. The nearest sensitive receptor is 240m northeast of the cake pad. Screening by vegetation to the south and east which reduces fugitive emission risks. Storage in this location is not a regular occurrence. Digested sludge cake on the pad retains a high moisture content and is not prone to	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						windblown dispersion leading to the generation of dust. Internal site roads are made from concrete/asphalt and not prone to the generation of dust. Please see Appendix F for the site specific bioaerosol risk assessment	
Release of bioaerosols and dust from spillages	Abnormal	Emissions to air and dispersion leading to inhalation by local human and animal receptors with potential harm to health. Odour impact of bioaerosols. Nuisance impact of dust.	Low	Low	Low	The risk of bioaerosol and dust is largely minimised by storing the digested sludge cake within a semi-enclosed cake barn and the distance of the cake pad from sensitive receptors. Staff responsible for site housekeeping and cleaning of spillages in a timely manner. Sludge retains a high moisture content and is not prone to windblown dispersion which could cause the generation of dust in the event of a spillage. Areas around the THP and Primary Digester Tanks are largely made ground meaning spillages can be more easily contained and cleaned. Roads are made from concrete/asphalt and not prone to the generation of dust.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
Spillage of liquids, including chemicals and oils.	Abnormal	Emissions to surface waters close to and downstream of site. Acute effect resulting in loss of flora and fauna. Chronic effect resulting in deterioration of water quality. Emissions to ground and ground water.	Low	Medium	Low	The closest surface water body is an unnamed lagoon immediately south of the STW. There is another unnamed stream which connects to the Littlemore Brook. It is 85m east of the site at its closest point. Chemicals and oils all stored within suitably bunded tanks and IBCs with rainwater removed as required to maintain 110% capacities. Handling and use of chemicals and oils is carried out by trained personnel. COSHH data sheets available. Spill kits available on site. The majority of the works drainage pumps back to the inlet via the liquor treatment plant, with some drainage around the cake barn bypassing the plant and going straight to the inlet. There are a small number of gullies on the roads in the site which drain directly to surface water. The gullies are point source emissions to surface water.	Low
Spillage from storage and digestion tanks, overtopping of tanks, leakage from same tanks	Abnormal	Emissions to surface waters close to and downstream of site. Acute effect resulting in loss of flora and fauna. Chronic effect resulting in	Low	Low	Low	The site lies outside the boundaries of any groundwater Source Protection Zones (SPZ). Provision of suitably structurally integral tanks constructed from concrete or steel and glass reinforced plastic/insulation (where needed).	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
and from buried pipes		deterioration of water quality. Emissions to ground and ground water.				All tanks are subject to asset inspection and proactive maintenance programme including regular visual inspection for cracks or weeping. Not all tanks are covered although tanks are fitted with levels and monitors. Visual checks during regular day-to-day operations and scheduled preventative maintenance of equipment, such as pumps, pipes, joins etc. Spill kits available on site. Staff are trained in their use. Biogas condensate discharged back to the works inlet through site drainage system. The majority of the works drainage pumps back to the inlet via the liquor treatment plant, with some drainage around the cake barn bypassing the plant and going straight to the inlet. There are a small number of gullies on the roads in the site which drain directly to surface water. The gullies are point source emissions to surface water.	
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.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						Waste is stored securely for collection by appropriately licensed approved contractors. Litter picking activities are completed as required.	

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

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

Table C3-3b(ii) Odour risk assessment

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
H_2S/biogas emissions from uncovered tanks	Normal	Emissions to air and dispersion leading to inhalation by local human receptors, Loss of amenity from odour nuisance,	High	Low	Medium	Biogas will principally be generated in Primary Digester Tanks which are covered with fixed roofs. The nearest receptors to Primary Digester Tanks 3 and 4 are commercial premises approx. 140m north and 180m west. The nearest receptor to Primary Digester Tanks 1 and 2 are commercial premises approx. 200m to the north and 230m to the west. Small amounts of odour may be generated within the Digested Sludge Buffer Tanks and	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						Digested Sludge Buffer Feed Tanks which are uncovered tanks. These tanks are approx. 180m from the nearest receptors, commercial properties to the north. H_2S production is controlled through the digestion process which can be manually overridden if required. Chemical dosing, if required can be used in the UWWTD area of the site.	
Loss of containment from biogas holders and biogas pipework	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors, Loss of amenity from odour nuisance,	Low	Medium	Low	Biogas is principally stored within three double membrane biogas holders which are suitably sized to manage biogas generation for the site. The biogas system utilised is subject to regular preventative maintenance including a LDAR plan to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of pressure and flow sensors and with isolation valves to minimise the potential for release if a leak is detected. Personnel on site wear portable biogas detectors in order to alert staff to presence of biogas. Physical protection measures in place for biogas holders, including fences and pipework is guarded.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						PRVs available to safely manage pressures within the biogas holders and prevent under or over pressurization.	
Activation of biogas pressure relief valve	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors, Loss of amenity from odour nuisance,	Low	Low	Low	PRVs are only activated in emergency situations to maintain safety within the biogas system and are re-seated/repaired promptly to minimize biogas emissions. PRVs subject to visual checks by site personnel. Biogas is principally stored within one double membrane biogas holder and in the membrane biogas holders on top of Primary Digester Tanks1 and 2, which are suitably sized to manage biogas generation and act as buffer storage for biogas. Site has three CHP engines, two boilers and one flare which are used in order of preference to maximise recovery of energy. CHP engines and boilers are subject to regular maintenance to maintain maximum use of outlets, with flare maintained in good working order should it need to be used. The nearest receptors to are commercial premises approx. 110m north and 160m west of the double membrane biogas holder. The same receptors are the nearest ones to Primary	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						Digester Tanks 1 and 2 but are slightly further away.	
H_2S/biogas emitted when biogas cannot be combusted in CHP engines, 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 one double membrane biogas holder and biogas holders on top of Primary Digester Tanks1 and 2, which are suitably sized to manage biogas generation and act as buffer storage for biogas. Site has three CHP engines, two boilers, as well as one flare which are used in order of preference to maximise recovery of energy. The nearest receptors to are commercial premises approx. 110m north and 160m west of the double membrane biogas holder. The same receptors are the nearest ones to Primary Digester Tanks 1 and 2 but are slightly further away. CHP engines and boilers are subject to regular maintenance to maintain maximum use of outlets, with flare maintained in good working order should it need to be used.	Low
Storage of treated digested sludge cake	Normal	Emissions to air and dispersion leading to inhalation by local human receptors, Loss of amenity from odour nuisance,	High	Low	Medium	Digested sludge cake is stored within a covered cake barn and is inherently low odour material. The nearest receptor is a commercial property, approx. 240m north of the cake barn. Should any odorous sludge cake be produced, this will be subject to process checks	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						undertaken to identify root cause of production and removed from site expediently.	
Storage of raw (untreated) sludge cake	Normal	Emissions to air and dispersion leading to inhalation by local human receptors, Loss of amenity from odour nuisance,	High	Low	Medium	The additional cake pad is for imported primary sludge and strategic storage. This is not covered with the nearest sensitive receptor is 240m northeast of the cake pad. Sludge is stored temporarily prior to being processed on site via the THP plant and cake import facility. Odorous cake should not be imported as it will be quarantined on the site producing the cake.	Low
Failure of odour control units	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors, Loss of amenity from odour nuisance,	Low	High	Medium	Odour control units are subject to regular preventative maintenance. Media is replaced in line with the manufacturer's recommendations,	Low
Storage of site generated wastes	Normal	Emissions to air and dispersion leading to inhalation by local human receptors, Loss of amenity from odour nuisance,	Low	Low	Low	Wastes generated on site are not inherently odorous and is stored securely for collection by appropriately licensed approved contractors.	Low

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

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

Table C3-3b(iii)Noise risk assessment

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
Operation of CHP engine	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Low	Medium	The CHP engines are acoustically baffled, self-contained and designed for external applications therefore noise emissions are already low. CHP engines are located away from sensitive receptors, in the west of the site and shielded by other buildings. The nearest receptor is a commercial property approx. 160m west of the CHP engines. Good maintenance of plant to ensure that excessive noise levels are not generated. Regular checks of noise mitigation measures fitted to items of plant. Such measures include silencers and baffles fitted to specific areas of plant. Where repair or replacement is required, the plant will, where possible, be taken out of service until repair or replacement of parts has been undertaken.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
Operation of boilers	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Low	Medium	Boilers are not sources of significant noise. The nearest receptor is a commercial building approx. 103m north of the boiler house. New boilers within the boiler house are replacing the existing 1 x 2 boilers in the current CHP Plant Permit and temporary (Byworth) hire boiler (currently subject to a LEP). Doors to boiler house will be closed under normal conditions. The boilers are new but good maintenance of plant will ensure that excessive noise levels are not generated. Noise mitigation measures fitted to boilers are regularly checked. Where repair or replacement is required, the plant will, where possible, be taken out of service until repair or replacement of parts has been undertaken.	Low
Operation of fans on air cooled radiators	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Low	Medium	Air cooled radiators do not give rise to high levels of noise and are only used as required. They are located away from sensitive human receptors, which are approx. 160m north and are commercial properties. Good maintenance of fans to ensure that excessive noise levels are not generated.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						Where repair or replacement is required, this will be completed promptly.	
Operation of site vehicles	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Vehicle movements across the site subject to speed limit and one way system is in place within some areas, to reduce generation of noise. Shovel loading of digested sludge cake mainly takes place within the covered cake barn. Tanker deliveries limited to daytime only.	Low
Vehicle movements - tanker deliveries of cess	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Imports of cess waste currently made between 6.30am to 5.00pm, Monday to Friday. Vehicle movements across the site are subject to a speed limit to reduce generation of noise. The cess waste import point is towards the west of the site and the nearest receptors are the residential premises, are approx. 90m to the west.	Low
Vehicle movements - tanker deliveries of sludge and cake	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission,	High	Low	Medium	Imports of sludge and cake take place to the centre, north and east of the site and can only be made during site opening hours and not 24/7. Shielding by other buildings reduces impacts of noise. The nearest sensitive receptor is 270m northeast of the cake pad. Cake imports are also made to the cake	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
		causing loss of amenity to local human receptors.				import facility, which is 75 m from the nearest receptors, however, these deliveries are made within the enclosed building. Liquid sludge is delivered to a point within the centre of the site, approx. 175m from the nearest receptors towards the north. Vehicle movements across the site are subject to speed limit to reduce generation of noise. Shovel loading of digested sludge cake takes place in the covered cake barn, 240 m from the nearest receptors.	
Vehicle movements - tanker deliveries of chemicals and raw materials	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Deliveries likely to take place during daytime hours to delivery areas within the central areas of the site. Vehicle movements across the site are subject to speed limit to reduce generation of noise.	Low
Operation of emergency flare	Abnormal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Low	Medium	Use of the emergency flare is minimized by prioritizing use of the CHP engines and boilers with use of the flare recorded.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						Emergency flare is located approx. 210m from the nearest sensitive receptor, commercial properties northwest of the site.	

Table C3-3b (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 holders. Fire alarm systems installed and maintained. Biogas contained within a closed system and monitored for safety and subject to a LDAR plan. Automatic cut off valve to biogas supply to stop biogas flows, 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	Low

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
					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.	
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 holders. 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 biogas flows, 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.	Low

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
					Preventative maintenance programme and maintenance plans are in place in order to maintain equipment effectively. Smoking only permitted in designated areas of site.	
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. Chronic effect on water quality.	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. Site drainage returns to works inlet providing containment and treatment process for fire water. Arrange for off-site tankering of firefighting water, if required.	Low
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 biogas flows, electric	Low

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
					temperature sensor, pressure monitors, flame arrestors, etc. Lightning protection system installed. Likelihood reduced by availability of multiple on site uses of biogas (CHP engines, boilers and emergency flare) and use of pressure release valves as a safety measure.	
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. Global warming potential of greenhouse gases.	Low	High	Medium	Site assets are protected by physical means to prevent vehicle strike and exposed pipework is guarded. Regular proactive and preventative maintenance including a LDAR plan and regular visual checks. Pressure relief valves are present to avoid over-pressurisation of biogas system. Gas detectors are in place between the two layers of biogas membranes which will raise the alarm should a leak of biogas be detected.	Low
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 site is not located within an AQMA. There are six designated habitat sites within the relevant distances of Oxford STC. There are three SACs approximately 8.5km south, 6.5km north-west and 7.2km west of the STC. These are Little Wittenham, Oxford Meadows and Cothill Fen. There are two SSSIs approximately 2km and 1.2km north-west of the site, Iffley Meadows and Littlemore Railway Cutting. There are no Local or National	Low

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
					Nature Reserves within 2km of the site and there are no SPAs, MPAs or Ramsar sites within 10km. There is one Ancient and Semi-Natural Woodland site approximately 1.9km west of Oxford STC, Radley Large Wood, as well as eight LWSs within 2km. Air emissions modelling submitted shows that deposition and impacts on habitats sites are acceptable from an air quality perspective. 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.	
Spillage of raw materials during (e.g. diesel, polymer) 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	The site sits outside of any Groundwater Source Protection Zones (SPZ). Raw materials are stored on made ground, within bunded containers/silos or on bunds to contain spillages of 110% of the volume. Regular inspections for leaks and damage, with remedial action as required. Contents of bunds are regularly checked during environmental audits and after periods of heavy rainfall and emptied as required.	Low

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
					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 minor 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. Most site drainage returns to works inlet via the liquor treatment plant, with a small amount returning to the inlet and bypassing the plant, providing treatment process for suitable materials, or arrange off-site tankering of waste, if required.	
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	All pipework is standardised, including tanker couplings. Tanker offloading point is of concrete construction with kerbing, bunding and drainage to prevent release to ground. 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. Most site drainage returns to works inlet via the liquor treatment plant, with a small amount	Low

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
					returning to the inlet and bypassing the plant, providing treatment process for suitable materials, or arrange off-site tankering of waste, if required. Sludge is relatively viscous and not highly mobile.	
Spillage of sludges (e.g. primary 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. 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 Most site drainage returns to works inlet via the liquor treatment plant, with a small amount returning to the inlet and bypassing the plant, providing treatment process for suitable materials, or arrange off-site tankering of waste, if required.	Low
Spillage of cake (e.g. raw (untreated) cake, digested cake) during	Emissions to ground and ground water of materials entering soil and/or groundwater.	Low	Low	Low	Cake import is of materials that are not highly mobile. Cake import reception takes place on made ground with drainage to prevent release to ground or water.	Low

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
processing and transfer operations	Harm to aquatic flora and fauna.				All cake is directed from delivery vehicles into a suitably sized hopper to accommodate deliveries and then into a silo by dedicated pumps. Cake imports to the cake pad takes place on made ground with drainage to prevent release to ground or water. Offloading operations are supervised. 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 allow it to be collected and processed/stored.	
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	Medium	Low	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 and reactive maintenance. In-line flow monitoring in key locations and tank level monitoring would identify losses and enable a quick response. Primary Picket Fence Thickener tanks are located on a concrete base with a gravel surround. THP process tanks and Primary Digester Tanks are all found on made ground and connected to site	Low

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
					drainage which returns to works inlet via liquor treatment plant with some gravel infill. Made ground reduces infiltration to soil and drainage directs spillages back to the head of the works for treatment. Sludge is relatively viscous and not highly mobile limiting the distance it can spread in a short time period.	
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, CCTV and access control to prevent unauthorised access. Assets are protected by various physical means including fencing, kerbing and bollards to prevent vehicle strikes. Site has a partial one-way traffic management system to minimise the need to reverse but some areas are two-way. Use of banksmen as appropriate. Vehicles equipped with reversing alarms.	Low
Vandalism causing the release of polluting materials to air (smoke	Emissions to air and dispersion leading to inhalation by local human receptors. Respiratory	Low	High	Medium	Unauthorised access is unlikely to happen and minimised by physical site security measures and effective management systems.	Low

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
or fumes), water or land.	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.				Site has perimeter fence, CCTV and access-controlled 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.	
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	Low	Low	The Oxford STC sits within Flood Zone 1 with a low probability of flooding. General wider works designed to minimise risk of localised works flooding due to storm surges. Potentially polluting substances stored within suitable containers and provided with bunds to contain spillages. Follow site Incident Response Plan and inform relevant authorities. Take appropriate corrective and preventative actions to minimise environmental impact.	Low

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
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.	Medium	Low	Low	The majority of the works drainage pumps back to the inlet via the liquor treatment plant, with some drainage around the cake barn bypassing the plant and going straight to the inlet, 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	Site CHP engines are able to supply electricity to the site using biogas supplies on site. Emergency generators provide back-up power / contingency plans to provide power to critical operations in the event of an electrical outage. 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
Vandalism	Damage to plant or equipment on site due to unauthorized access to the site.	Low	Medium	Low	Site accessed restricted at all times, including electronically controlled gates and 2 metre fencing. CCTV present at site.	Low

Activity/Hazard	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
					During normal operating hours, there is a culture of challenge around non-staff on site	

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

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

3c – Types and amounts of raw materials

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

Name of the installation:	Oxford 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**
S5.4 A1 (b) (i)	SAS Polymer (liquid) Product name: Flopam EM840TBD	5,000L stored in1,000 L IBCs on portable bunds	20,000 litres	For SAS thickening plant	Standard industry chemical
S5.4 A1 (b) (i)	Pre-THP Polyelectrolyte (powder) Product name: F04698XXR	35 tonnes in pre-THP bunded silo	140 tonnes	For pre-THP dewatering	Standard industry chemical
S5.4 A1 (b) (i)	Digested sludge polyelectrolyte (powder) Product name: F04698XXR	35 tonnes in bunded silo adjacent to Digested Sludge Dewatering House	305 tonnes	For digested sludge dewatering	Standard industry chemical
S5.4 A1 (b) (i)	Sodium Hydroxide (Caustic Soda) Product name: Brenntag 47% Sodium Hydroxide solution	200L stored in 25 litres drums on portable bunds	800L	Digested sludge dewatering plant cleaning chemical	-
S5.4 A1 (b) (i)	Hydrogen Peroxide Product name: Brenntag 35% Hydrogen Peroxide solution	160 KG stored in 20 kg drums on portable bunds	640 KG	Digested sludge dewatering plant cleaning chemical	-

Name of the installation:	Oxford 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**
	Phosphoric Acid Product name: Brenntag 75% Phosphoric Acid solution	180 KG stored in 20 kg drums on portable bunds	720 KG	Digested sludge dewatering cleaning chemical	-
S5.4 A1 (b) (i)	Sodium Chloride salt pebbles Product name: Brenntag/British salt Aquasol	300 KG stored in 25 kg bags internally within a building. Then dosed into a 400 litres bunded brine tank.	7 tonnes	Permanent boiler treatment plant chemicals for Waste Heat Recovery Boiler: water softening resin regeneration	-
S5.4 A1 (b) (i)	Sodium Chloride Product name: Brenntag/British salt sodium chloride (<=100%)	10 tonnes bunded tank. Then dosed into a 400 litres bunded brine tank.	60 tonnes	Permanent boiler and THP treatment chemicals and THP water: softening resin regeneration	-
S5.4 A1 (b) (i)	Sodium Bisulphite Product name: Nalco 77211	400 litre bunded drums Then dosed into a 400 litres bunded brine tank.in	4,000 litres per annum	Permanent boiler and waste heat recovery boiler and THP treatment chemicals	-

Name of the installation:	Oxford 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**
		boiler rooms.		(oxygen scavenger)	
S5.4 A1 (b) (i)	Sodium Hydroxide (Caustic Soda) Product name: Nalco 77224	400 litre bunded drums	4,000 litres per annum	Waste heat recovery boiler, fired boiler and THP treatment chemicals (pH correction)	-
S5.4 A1 (b) (i)	Phosphate Polymer Product name: Nalco Nexguard 22310	400 litre bunded drums	4,000 litres per annum	Permanent boiler and waste heat recovery boiler and THP treatment chemicals	-
S5.4 A1 (b) (i)	Sodium Hydroxide flocculant Product name: B-A1-S	8 x 5.4 KG bottles stored on portable bunds	60 KG	Steam boiler treatment chemical used within long-term hire boiler	-
S5.4 A1 (b) (i)	Nitrogen Product name: BOC Nitrogen (gas) (100%)	5 x 75 KG cylinders located within a building in THP	4,500 KG	Used on actuated valves of biogas bags to purge gas lines	-
S5.4 A1 (a) (i)	Sodium Hydroxide (Caustic Soda) Product name: Brenntag 47%	63,000L tank located in a concrete bund	2,000 tonnes	Dosed into the Liquor Treatment Plant for pH control	-

Name of the installation:	Oxford 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**
	Sodium Hydroxide solution				
S5.4 A1 (a) (i) And S5.4 A1 (b) (i)	Anti-Foam Product name: FloFoam D60F	6,000 litres. Stored in 2x 1,000 litre IBCs in a bunded dosing kiosk and 4x 1,000 litre IBCs on portable bunds	10,000 litres	Dosed into the Liquor Treatment Plant to reduce foaming. Dosed in to PDTs as required to reduce foaming.	-
S5.4 A1 (b) (i)	Lubricating oils Product name: Mobil Pegasus 705	5,000 litres in double skinned tanks (2,500 litres clean oil and 2,500 litres waste oil).	4,000 litres	Equipment lubricant (CHP 2 & 3)	-
S5.4 A1 (b) (i)	Lubricating oils Product name: Mobil Pegasus 605 Ultra 40	2,500 litres in double skinned tanks (1,250 litres clean oil and 1,250 litres dirty oil)	1,500 litres	Equipment lubricant (CHP 1)	-
S5.4 A1 (b) (i)	Glycol coolant Product name: Texaco Delo XLC Antifreeze/Coolant - Premixed 40/60	3,000 litres stored in three bunded 1,000 litre IBCs	4,000 litres	CHP engine coolant (CHP 1, 2 &3)	-

Name of the installation:	Oxford 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**
S5.4 A1 (a) (i) and S5.4 A1 (b) (i)	Diesel for the DAA standby generators 3 and 4 (at LTP and THP) Product name: WP White diesel	35,000 litres (THP) 20,000 litres (LTP) bunded fuel tanks	Approx. 16,000 litres*	Fuel used within emergency generator. Monthly testing	-
*16,000 litres used during monthly testing for back-up generators but excludes fuel used from emergency use during periods of grid failure.					
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

Points A2-A9 have been removed via previous permit variations.

A1, A10-A11, A27 and A28 are monitored in accordance with EA guidance as applicable and the requirements of MCPD. Points A1, A10 and A11 (CHP engines), A27 and A28 (boilers), A14 (flare stack) are subject to gas monitoring in accordance with the requirements of existing permit requirements and EA guidance.

Hours of operation of the flare stack (A14) are monitored and logged. In the unlikely event that the total annual hours of operation exceed 10% of the hours in a year (876 hours), emissions from the flare as per the existing permit would be subject to monitoring in accordance with EA guidance.

Points A23-A26, OCUs will have bi-annual testing.

Points A29 and A30 (Generators 3 and 4), excluded generators <5 MWth, are included on the basis of being DAAs and where 2029/30 MCPD permitting/compliance dates are applicable. No routine monitoring is proposed.

(Excluded generators located at SP 54340 01865 and SP 54247 02013 (Generators 1 and 2) now hold relevance to the 2029/30 MCPD permitting/compliance date alone given they are no longer run in triad and are not DAAs. No routine monitoring is proposed).

There is no routine monitoring proposed for points A15-A20 (PRVs)) or A21 (Siloxane filter stack).

Table C3-4a – Emission Monitoring

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A1 (CHP Engine 1 /Caterpillar CHP)	SP 54275 01982	Oxides of Nitrogen (NO and NO_2 expressed as NO_2) – Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	
A10 (CHP Engine 2 / Jenbacher CHP engine 1)	SP 54253 02005	Oxides of Nitrogen (NO and NO_2 expressed as NO_2) – Annually Carbon Monoxide – Annually Total Volatile Organic Compounds–- Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	
A11 (CHP Engine 3 / Jenbacher CHP engine 2)	SP 54254 02005	Oxides of Nitrogen (NO and NO_2 expressed as NO_2) – Annually Carbon Monoxide – Annually Total Volatile Organic Compounds–- Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	
A14 (Emergency Biogas Flare)	SP 54227 01971	Annual monitoring is only required when flare operates in excess of 10% of the time, taken on an annual assessment period.	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	
A15 (THP PRV)	SP 54249 02104	n/a		
A16 (Digester PRV)	SP 54304 02007	n/a		
A17 (Digester PRV)	SP 54318 01983	n/a		
A18 (Digester PRV)	SP 54222 02032	n/a		

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A19 (Digester PRV)	SP 54217 02049	n/a		
A20 (Biogas Holder PRV)	SP 54184 02081	n/a		
A21 (Siloxane Filter)	SP 54267 02016	n/a		
A23 (OCU2)*	SP 54296 01953	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis	
A24 (OCU3)*	SP 54363 01996	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis	
A25 (OCU4)*	SP 54247 02123	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis	
A26 (OCU5)*	SP 54456 02059	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CEN TS 1369 for sampling NIOSH 6016 for analysis	

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A27 – New boiler 1 (when burning biogas)	SP 54274 02111	Oxides of Nitrogen (NO and NO_2 expressed as NO_2) – Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	
		Sulphur dioxide – annually		
A27 – New boiler 1 (when burning natural gas)	SP 54274 02111	Oxides of Nitrogen (NO and NO_2 expressed as NO_2) – Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	
A28 – New boiler 2 (when burning biogas)	SP 54274 02111	Oxides of Nitrogen (NO and NO_2 expressed as NO_2) – Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	
		Sulphur dioxide – annually		
A28 – New boiler 2 (when burning natural gas	SP 54274 02111	Oxides of Nitrogen (NO and NO_2 expressed as NO_2) – Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	
A29 (DAA Excluded Generator) (Generator 3)	SP 54230 02110	n/a		
A30 (DAA Excluded Generator) (Emergency Generator 4)	SP 54502 01999	n/a		
(Specified Generator SP 54340 01865 (Generator 1))	(SP 54340 01865)	(n/a)		
(Specified Generator SP 54247 02013 (Generator 2))	(SP 54247 02013)	(n/a)		

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
S1 (Liquor sampling point)	SP 54358 02011	n/a	MCERTS or ISO/IEC 17025	
S2 (Liquor sampling point)	SP 54498 01987	n/a	MCERTS or ISO/IEC 17025	
S3 (Liquor sampling point)	SP 54503 01982	n/a	MCERTS or ISO/IEC 17025	
* HCl and TVOC will be monitored if determined to be relevant in the waste gas inventory.				

4b - Point source emissions to air only

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

No.

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

No.

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

No.

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

No.

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

No.

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

No.

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

No.

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

No.

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

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

5 - Environmental impact assessment

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

No.

6 - Resource efficiency and climate change

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

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

The CHP engines are suitably sized to maximise energy utilisation for the parasitic load, while minimising the use of the flare. Heat generated from the exhaust gases of the CHP engines is used to supplement steam raising within the site boilers.

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

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

The main site energy source is electricity from the CHP engines supplemented by imported electricity from the National Grid. The site CHP engines combusts indigenous biogas with the electricity either used on site or exported to the public supply via National Grid if there is a surplus. The CHP engines also provides useable heat to the waste heat boiler, via heat exchangers, which is supplied to the THP process. Use of heat from the CHP engines reduces the demand on supplementary fuels in the boilers. Imported natural gas is combusted in the two site boilers to meet the additional steam demands of the THP process.

Diesel from diesel tanks is used as a back-up fuel in the event of the loss of power via two emergency generators, one of which provides power directly to the THP process and one of which provides power directly to the LTP process.

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 steam (which is used in the THP process) on site minimises the use of fossil fuels onsite and within the energy mix for the Nation al Grid, whilst recovering biological wastes. Location of the heat exchange, heat recovery boiler and CHP engines all within close

proximity minimises transmission losses on site, improving the efficiency of the process. The site boilers are located adjacent to the THP 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.

Form C4 Questions

1 About the permit

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

The original CHP permit (EPR/MP3038LQ/V005) and Import permit (EPR/BB3500MP /A001) were both waste level permits. These have now been incorporated within the installation permit as a DAAs.

1b –types of waste accepted and restrictions

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

1c Deposit for recovery purposes

This is not a deposit for recovery application.

2 Point source emissions to air, water and land

Please see responses to form C3.

3 Operating techniques

3a Technical standards

Please see responses to form C3.

3b General requirements

Please see responses to form C3.

4 Monitoring

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

Please see responses to form C3.

4b Point source emissions to air only

Please see responses to form C3.

Form C6 Questions

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

Q1About the effluent – details and type, continued

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

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

1b Give this effluent a unique name

Liquor returns.

1d Have you obtained all the necessary permissions in addition to this environmental permit to be able to carry out the discharge (see 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?

3,200 Cubic metres.

3c What is the maximum rate of discharge?

37.03 litres/second

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

3,200 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 3,200 tonnes, 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 [3,200m^3 x 1000] / 86,400 seconds (24 x 60 x 60). Arisings from sources such as dewatering are constant as the plant runs continuously. This gives a value of 37.034722 litres, rounded up to 37.03 litres per second.

Q3d – based on the maximum daily site input of 3,200 tonnes, 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.

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, with most drainage passing through the LTP.

Q6 How will the effluent be treated?

6a Do you treat your effluent?

Yes. The Effluent generated by the process of treating sludge within the installation is returned to the inlet of the wider sewage treatment works via the site drainage system, with some drainage passing through the LTP. It is then 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	Final settlement (Sand filtration)

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

The final effluent discharge from the wider sewage treatment works is specified in Environmental Permit TH/CTCR.0709/010.

Q7 What will be in the effluent?

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

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

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

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

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

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

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

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 sampling point) PFT Liquors, SAS Thickening Liquors, OCU Waste Water, Biogas Condensate, Surface Water Run Off	SP 54358 02011
S2 (Liquor sampling point) LTP Liquors, Pre-THP Dewatering Liquors	SP 54358 02011
S3 (Liquor sampling point) LTP Sludge (SAS)	SP 54503 01982

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

No flow meter installed.

9e Does the flow monitor have an MCERTS certificate?

No. No flow meter installed.

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

No. Not installed as part of this installation.

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

Please see site emission point plan.

Q10 Where will the effluent discharge to?

10a Where the effluent discharges to

Non-tidal river, stream or canal.

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

No.

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

N /A

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

A5.1 Give the discharge point a unique name For example, 'Outlet 1' (you must use this name to identify the discharge point on the plan)

Outlet 1.

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

SP5439002230.

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

Pottery Stream, via the wider UWWTD sewage treatment works.

A5.4 Is the discharge into a:

Non-tidal river.

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

No.

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

No.

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

N / A.

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

N / A.

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

No.

Form C2.5 Questions

1a Discussions before your application

Nature and heritage conservation screening was requested and received via email from the pre-application advice service of the Environment Agency.

1b Permit number

What is the permit number that this application relates to?

MP3038LQ/V005 determined 23/12/2020.

1c Site details

What is the name, address and postcode of the site?

Oxford Sludge Treatment Centre

Oxford Sewage Treatment Works

Grenoble Road,

Sandford-on-Thames,

Oxford,

OX4 4YU

1d Listed activities

Please see responses to form C3, Table C3-1a, for all listed activities at the site.

The proposed change to the existing activities at the site is the addition of new Medium Combustion Plant, specifically two dual fuelled boilers that will be classified as 'new' combustion plant.

1e Type of variation

Substantial variation

1f Changes to existing activities

The variation is to change the existing waste activities to become DAAs to two listed activities, which are the biological treatment of waste (a listed activity) under S5.4 A1 (b) (i) and S5.4 A1 (a) (i).

The two standby diesel generators listed in V005 (1 x 2 @ 2.7MWth each) noting as run in triad (Generators 1 & 2) are now excluded generators (no longer run in triad) and are not DAAs to sludge treatment. This revised status will reflect how they are considered in V006.

Two 'existing' standby diesel generators (Generators 3 and 4) are DAA excluded generators, that operate in an emergency to provide power as a DAA to the listed activity, are added to the permit and shown on the site plan as emission points A29 and A30. Both generators will operate for less than 50 hours per year each, for testing and maintenance.

Two 'new' dual fuel boilers which combust biogas and natural gas and supply steam and heat to the THP process are being added. These are classified as 'new' combustion plant as they are being put into operation after 20th December 2018. Each boiler has a capacity of 4.71 MWth.

2 Emissions to air

2a Is your permit variation application for the addition of a new or existing MCP onto your existing IED Installation (ie A1, A2 or Part B)?

Yes

A BAT assessment for the installation is provided as Appendix D BAT Assessment. Impacts associated with boiler operation and fuel storage are included within the Environmental Risk Assessments completed in Section 0.

A full emissions inventory table has been provided above, Table C3-4a of Section 5.

2b Is your permit variation application to add a new MCP(s) and there will now be a total aggregated thermal input of 20 MW thermal or more?

Yes –although the total thermal input of MCP in routine use is 16.515 MWTh given existence of excluded generators

2c Permit variation application for an MCP and/or SG which is not a current IED installation:

Is your permit application for a MCP and/or SG which is

2c1 A unit greater than or equal to 20MW thermal

No

2c2 A unit that burns waste biomass as described in Article 3(18)(b) of the Medium Combustion Plant Directive?

No

If the answer to either 2c1 or 2c2 is yes you should confirm whether the plant falls under the description of an Environmental Permitting Regulations (EPR) Part B activity as set out below:

2c3 Do any of the MCPs and/or SG on site meet the criteria of a EPR Schedule 1, Part 2, Chapter 1, section 1.1 Part B activity?

n/a

2c4 Do any of the MCPs on site meet the criteria of a EPR Schedule 1, Part 2, Chapter 5, section 5.1 Part B activity?

n/a

Air emissions risk assessment

2d If your application is to add an MCP only which is standalone, does it require an air emissions risk assessment to assess the risk to habitats?

Yes – See Appendix L Air Quality Assessment.

2e Do you want to declare that your existing MCP(s) will meet new MCP emission limit values (ELVs) from the medium combustion plant directive (MCPD) in order to demonstrate a low risk impact to habitats under a stage 1 or 2 air emissions risk assessment? If you do make this voluntary declaration we will include new MCP ELVs in your permit.

No

2f If your application is to add an SG (which may also be an MCP) which is standalone are you required to carry out dispersion modelling to assess the risk to human health and habitats from proposed emissions to air?

n/a – the application is to add MCP only

2g If your application is to add MCP to your existing IED installation you must submit a revised air emissions risk assessment to demonstrate that modelling is not required, or a modelling report and modelling input files to demonstrate that the impacts of your proposals will be acceptable.

Please see details provided in Appendix L Air Quality Assessment.

2h Does your application refer to an existing Mining Waste activity?

No

2i Information for MCP/SG

A completed combustion plant list is included below in Table C2.5-1a

3 MCP/SG Emissions Monitoring

3a Where you are applying to vary an IED installation describe the measures you use for monitoring emissions by referring to each emission point in Table 2 above

See Table C3-4a for details of Emissions Monitoring at the site

3b - Point source emissions to air at IED installations only

3b1 Has the sampling location been designed to meet BS EN 15259 clause 6.2 and 6.3?

No.

3b2 Are the sample ports large enough for monitoring equipment and positioned in accordance with section 6 and appendix A of BS EN 15259?

No.

3b3 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.

3b4 Are the sample location(s) at least 5 HD from the stack exit

No.

3b5 Are the sample location(s) at least 2 HD upstream from any bend or obstruction?

No.

3b6 Are the sample location(s) at least 5 HD downstream from any bend or obstruction?

No.

3b7 Does the sample plane have a constant cross sectional area?

No.

3b8 If horizontal, is the duct square or rectangular (unless it is less than or equal to 0.35 m in diameter)

No.

3b9 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.

The 'new' boilers will make use of an existing stack so the existing sampling locations and sampling ports may not meet all of the requirements for BS EN 15259. Where a permanent sampling platform is not provided, temporary sampling platform is utilised to provide sufficient space, in accordance with standard industry practice, where sampling cannot be undertaken from the ground.

4 Supporting information

4a Provide a non-technical summary of your application to vary your existing permit

A non-technical summary for the permit variation, including details of the combustion plant is provided in Section 1.

4b If your application is to vary an IED installation or waste operation is the boundary of your existing site being extended to accommodate the addition of a MCP/SG*?

Yes. The application to vary the permit requires the boundary of the existing site to be extended to accommodate aspects of the new installation, including the new MCP.

See the site plan in Appendix A.2 Installation Boundary and Emission Points Plan for the amended site plan. A Site Condition Report is appended as Appendix C

Site Condition Report – H5.

* Does not apply to stand-alone MCP/SG permits

4c Existing MCP 1-5MWth or Tranche A SG requiring compliance by 1st January 2030.

Yes.

The application includes a request to include existing MCP1-5 MWth with a post-dated compliance deadline into this permit variation. Two existing standby emergency generators (Generators 3 and 4) that are DAA excluded generators, as per the details provided within Section 1 and Section 2 are to be added. These are shown on the site plan as Emission Points A29 and A30.

Table C2.5-1a – Combustion Plant List

Plant name	New Boiler 1	New Boiler 2	DAA Excluded Generator (Generator 3)	DAA Excluded Generator (Generator 4)
NACE code (Annex 1 required information)	E37.00	E37.00	E37.00	E37.00
Traceable identifier for the individual plant or generator (annex 1 required information)	Boiler 1 (SP 54277 02110)	Boiler 2 (SP 54278 02109)	Generator 3 (SP 54230 02110)	Generator 4 (SP 54502 01999)
Plant manufacturer	Yorkshireman	Yorkshireman	Cummins India	Volvo
Model name	Not available; refer to other provided plant identifiers	Not available; refer to other provided plant identifiers	KTA 38 G5	TAD 1642 GE
Easting	454274	454274	454230	454502
Northing	202111	202111	202110	201999
Latitude				
Longitude				
Date operation started (Annex 1 required information)	01/10/2023	01/10/2023	Pre 2018	01/12/2013
Rated thermal input of the individual MCP or generator in MW thermal (Annex 1 required information)	4.71 MWth	4.71 MWth	2.632 MWth	1.583 MWth
Total rated thermal input of all plant or generators on site in MW thermal	26.13 MWth	26.13 MWth	26.13 MWth	26.13 MWth
Technology or type (annex 1 required information)	Boiler	Boiler	Back-up generator	Back-up generator
Main fuel type used (annex 1 required information)	Biogas	Biogas	Gas Oil	Gas Oil
Secondary fuel type used (annex 1 required information if plant is dual fired or uses a secondary fuel as a back up)	Natural Gas	Natural Gas	n/a	n/a
Is the secondary fuel used as a back up? and/or does the plant co fire using the secondary fuel?	Back up	Back up	n/a	n/a

Percentage of secondary fuel type used	n/a	n/a	n/a	n/a
Will the medium combustion plant be operated as a limited operating hours plant? (Annex 1 required information)	No	No	Yes - <50 hours per annum	Yes - <50 hours per annum
Annual load factor as a percentage	100%	100%	n/a	n/a
Background nitrogen dioxide (NO2) in ug/m3	16	16	16	16
Stack height (metres)	18m	18m	3m	3m
What is the exhaust gas flow rate (Nm3/s)?	2.459	2.459	Unknown	unknown
Is the plant in an Air Quality Management Area (AQMA) for a declared pollutant?	No	No	No	No
What is the name of the AQMA?	n/a	n/a	n/a	n/a
What is the name of the local authority?	Oxford City Council	Oxford City Council	Oxford City Council	Oxford City Council
Closest human receptor (metres)	103	103	88	274
Human receptor details	Commercial property	Commercial property	Commercial property	Commercial property
Closest ecological receptor (metres)	1,306	1,306	1,263	1,683
Ecological receptor details	SSSI	SSSI	SSSI	SSSI
Will secondary abatement be fitted to the plant?	No	No	No	No
What type of secondary abatement will be fitted?	n/a	n/a	n/a	n/a
Date of capacity market of balancing service agreement or FiT accreditation (MM/YYYY)	n/a	n/a	n/a	n/a

Appendix A. Figures

A.1 Site location plan

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

A.2 Installation Boundary and Emission Points Plan

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

A.3 Site impermeable and permeable surfaces plan

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

A.4 Site Drainage Plan

See document: OXFS1ZZ_DPL_001

A.5 Process Flow Diagram

See document: B22849AZ-OXFS1ZZ-LSX-DR-P-0001

A.6 Site Photographs

See document: TW_STC_EPR_25a_OXF_AppA.6

Appendix B. CoTC

For the qualifications of the site manager, see document: TW_STC_EPR_25a_OXF_APPB

Appendix C. Site Condition Report – H5

Please see document: TW_STC_EPR_25a_OXF_APPC

Appendix D. BAT Assessment

Please see the appended BAT Assessment Spreadsheet: TW_STC_EPR_25a_OXF_AppD.

Appendix E. Odour Management Plan

Please see the appended BAT Assessment Spreadsheet: TW_STC_EPR_25a_OXF_AppE.

Appendix F. Bioaerosol Risk Assessment

Please see separate document: TW_STC_EPR_25a_OXF_AppF

Appendix G. Containment Assessment

G.1 Containment Options Report (CIRIA 736)

See document: B22849AZ-JA-OXFS1ZZ-100-RP-Z-0001

G.2 Containment Assessment

See document: B22849AZ-JA-OXFS1ZZ-100-CA-P-0001

Appendix H. Leak Detection and Repair (LDAR) Plan

Please see separate document: TW_STC_EPR_25a_OXF_AppH

Appendix I. Residue Management Plan

I.1 Residue Management Plan

See document: TW_STC_EPR_25a_OXF_APPI.1

I.2 MSDS

See ZIP file: TW_STC_EPR_25a_OXF_APPI.2

Appendix J. Accident Management Plan

Please see separate document: TW_STC_EPR_25a_OXF_AppJ

Appendix K.

K.1 Acceptance of Third-Party Waste Imports

See document: TW_STC_EPR_25a_OXF_APPK.1

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

See document: TW_STC_EPR_25a_OXF_APPK.2

Appendix L. Air Quality Assessment

Please see separate document: TW_STC_EPR_25a_OXF_AppL