Sludge Treatment Centre Permitting

Environmental Permit Variation Application - Swindon STC Resubmission

TW_STC_EPR_18a_SWN_ASD | Updated Resubmission 2.0

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Thames Water

EPR/BP3590SR/V002

Sludge Treatment Centre Permitting

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Updated Resubmission 2.0	November 2024	OCU numbering corrected. Sample points NGRs updated as per RFI	JK	MKM	MKM	HG

Contents

1. Introduction

This substantial variation application relates to a biological treatment permit for Swindon Sludge Treatment Centre (STC), located at the Swindon 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. The Swindon STW currently has a waste operation environmental permit for a non-hazardous sludge treatment site (EPR/BP3590SR/A001) for waste import and treatment by biological treatment. This application is for the purposes of varying the existing permitted activities to include the anaerobic digestion process as an installation activity. The site also has a separate environmental permit for the operation of Combined Heat and Power (CHP) plant and boilers, which have biogas as their primary fuel, with this being consolidated and becoming a directly listed activity to the primary listed activity at the site.

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

The previous permits in place at the site will be substantially varied and consolidated and remain in place as directly associated activities to this listed process.

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.

Activities at Swindon STC are subject to asset improvements. Please do not proceed to duly making until aspects of this investment and upgrade is confirmed to ensure the latest details of the application are included, as this application may be superseded by a replacement variation application.

1.1 Non-Technical Summary

This variation application is for a bespoke installation permit for the biological treatment of sludge, by anaerobic digestion, with a capacity above the relevant thresholds. The biological treatment of sludge includes treatment of the indigenous primary sludge and Surplus Activated Sludge (SAS) from the onsite aerobic treatment process and treatment of imported sewage sludges from other sites, arriving by road to a sludge import point. The indigenous sewage sludges are generated from the aerobic treatment of both waste waters from the sewer network arriving into the site at the Works Inlet, and, from imported waste materials, arriving by road transport into a dedicated waste import point at the Works Inlet. Aspects of sludge import, storage and recycling are covered by an existing waste treatment Environmental Permit, which is varied to become a listed installation activity.

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

The STC is located within the Swindon STW, north-west of the town of Swindon within a generally urban area.

The STC treats both indigenous sludges and imported sludges. Indigenous sludge is generated from the incoming flow to the STW, which passes through the aerobic treatment process, under the UWWTD. Indigenous primary sludges derived from the main flow are thickened via Primary Sludge Thickening Plant and pumped to the Sludge Blending Tank. Indigenous SAS is pumped to a SAS Buffer Tank before the sludge is thickened via SAS Thickening Plant and pumped to the Sludge Blending Tank. Thickening liquors are all returned to the Works Inlet for additional treatment via the site drainage and the Liquor Return Pumping Station 1. Thickened indigenous sludges are separately pumped to the Sludge Blending Tank, where the sludge is blended with imported sludges from other works.

Imports of sludge from other works are delivered to a Sludge Import Tank from tankers. Sludge imports are then pumped to the Sludge Blending Tank and mix with indigenous sludges. All such imports are subject to appropriate waste pre-acceptance and acceptance checks, prior to acceptance.

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

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

From the Sludge Blending Tank, mixed sludge is pumped to the Acid Phase Digester Tank. Sludge is pre-treated within the Acid Phase Digester Tank over an appropriate number of days with the addition of heat before the treated sludge is pumped to the Acid Phase Digestion Buffer Tank and further pumped to one of the Primary Digester Tanks at the site.

Following treatment over an appropriate number of days within the Primary Digester Tanks, digested sludge is transferred to one of the Secondary Digester Tanks. Sludge is held in the Secondary Digester Tanks for an appropriate retention time to ensure that the required level of pathogen kill is achieved in order to comply with the digested sludge cake output quality requirements. Sludge is then removed from the Secondary Digester Tank and subject to dewatering by Digested Sludge Dewatering Plant, before it is deposited on the adjacent cake pad. Digested sludge cake is stored on Cake Pad A prior to removal from the site, or transfer to one of the two other cake pads present at Swindon STC. Digested sludge cake is removed from the site under the Sludge Use in Agriculture Regulations (SUiAR)1989, and in accordance with the Biosolids Assurance Scheme (BAS). Dewatering liquors from dewatering the digested sludge is returned to the Works Inlet for additional treatment via the site drainage and the Liquor Return Pumping Station 2.

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

Imported treated sludge cake is offloaded onto an area of the cake pad so as to be stored separately from indigenous sludge cake. The waste stream is the same as that arising from the treatment of sludge within the Swindon STC with the same characteristics, composition and eventual end use - application to land. As such, the infrastructure which is acceptable for use for site cake is appropriate for the imported material.

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

Biogas from the Acid Phase Digester Tank and from the Primary Digester Tanks is captured and transferred to the double membrane Biogas Storage holder. The biogas transfer pipeline is mostly above ground and is equipped with condensate pots that capture entrained moisture from the generated biogas and allow it to be drained into

the site drainage system for treatment. The Biogas Storage holder, Acid Phase Digester Tank, Acid Phase Digestion Buffer Tank and Primary Digest Tanks are fitted with Pressure Release Valves (PRVs) as a safety precaution in the event of over pressurising the system.

The biogas is taken from the Biogas Storage holder for combustion in the CHP Engine, generating electricity for use both within the site and for export to the grid. Heat generated by the CHP Engine is used to maintain Primary Digester Tank temperatures via heat exchange, with two auxiliary Boilers available to provide additional heating as required. Boilers are dual fuelled by both biogas and natural gas. At 0.7MWth each they are too small to be considered as 'existing' combustion plant under the Medium Combustion Plant Directive.

In the event there is excess biogas, i.e. more than the CHP Engine or Boilers can utilise, or in the event that the CHP Engine or Boilers are unavailable, there is one ground mounted Emergency Flare. The Emergency Flare is utilised under 10% of the year or less than 876 hours per year. The CHP Engine and Boilers are currently operated under an Environmental Permit which will be consolidated with this permit variation.

There is one emergency standby generator that is currently permitted as a Specified Generator and MCP which is now an excluded generator that operates for less than 50 hours per annum for emergency purposes only to provide power to the STW and not a DAA.

2. Technical Description

This is a substantial variation for a bespoke installation permit under the Environmental Permitting (England and Wales) Regulations 2016 (as amended), following a change of interpretation of the Urban Waste Water Treatment Directive by the Environment Agency. It relates to a biological waste treatment permit for the Swindon STC, located at the Swindon 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, imported cess and septic tank derived wastes, and similar sewage derived materials to the Works Inlet for processing through the UWWTD treatment route. There are a number of Directly Associated Activities (DAAs), including the operation of biogas fuelled CHP Engine for the generation of electricity and heat at the site, which is classified as an 'existing' combustion source under the Medium Combustion Plant Directive (MCPD). There is also a waste activity, for the import of specified waste to the works inlet for treatment under the UWWTD. An additional waste activity, the import of treated sludge cake is also added to the permit by this variation.

The site holds an existing standard rules Environmental Permit, a waste operation EPR/BP3590SR/A001, allowing the import of specified waste to the site for treatment and recovery or disposal. This permit will be subject to a substantial variation to the new installation permit.

The site holds a second Environmental Permit under number EPR/CB3201HV/V002 for combustion plant, consisting of one biogas CHP Engine and two dual fuelled Boilers. This permit is to be consolidated to become a DAA to the main listed activity.

Site Location

The Swindon STC is located at Swindon STW, approximately 2 km north-west of the town of Swindon. The location is largely urban with business and retail premises to the east and south. The nearest residential receptors are approximately 170m to the south of the wider STW. To the west and north is open green space, including Swindon Lagoons Nature Reserve, giving way to further commercial and industrial premises. On the north-east boundary of the STW is an industrial estate with a number of uses including permitted waste sites for metal recycling, vehicle storage and depollution.

A surface water body, the River Ray, can be found approximately 100 m west of the site and is the nearest surface water body. There are also a number of lagoons which form the Swindon Lagoons Nature Reserve to the west of the site. The west of the STW is within a Flood Zone 2, including aspects of the STC including the acid phase digesters and two of the cake pads. This indicates there is an increased risk of flooding on the western side of the site, with between a 1 in 100 and 1 in 1,000 annual probability of river flooding. Most of the STC and the eastern side of the STW are within a Flood Zone 1, indicating that there is a low probability of river flooding (<1:1000 annual probability of flooding).

There are two statutory designated habitat sites within the relevant distances of the site. Radnor Street Cemetery is a Local Nature Reserve (LNR) located approximately 1.7 km south-east of the site and Rushey Platt Canalside Park is a LNR located approximately 1.7 km south of the site. There are no Special Areas of Conservations (SAC), Special Protection Area (SPA), or Ramsar sites within 10 km of the site and no Sites of Special Scientific Interest (SSSI) within 2 km of the site. There is one area of Ancient Woodland within 2 km of the site, an unnamed area of Ancient and Semi-natural Woodland approximately 1.6 km north-west of the site. There are 17 non-statutory designated local wildlife sites (LWS) within 2 km of the site.

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

A site plan, showing the permitted area of the Swindon STC and the wider STW can be found in Appendix A.2 while a process flow diagram summarising the sludge treatment process can be found in 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)	Total Operational Volume (m^3)	Construction
Sludge Import Tank	1	315	315	Steel
Sludge Blending Tank	1	500	500	Steel
Acid Phase Digestion Tank	1	1,075	1,075	Steel
Acid Phase Digestion Buffer Tank	1	100	100	Steel
Primary Digester Tanks	3	1,672	5,016	Steel
Secondary Digester Tanks	3	1,686	5,058	Steel

Waste Activities

The STC comprises of imports of waste for biological treatment and two additional waste activities (imports of non-hazardous waste to the head of the works and imports of non-hazardous waste to the cake pads). 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 Swindon STC by road, normally by tanker and consists of sludge from other Thames Water sites.

Imports of non-hazardous waste are considered a secondary waste operation to the main listed activity and consist of portable toilet waste along with cess, septic tank and similar sewage derived materials to the head of the works for processing through the UWWTD treatment and of digested sludge to the cake pad. Imports to the cake pad are for temporary storage, pending recovery offsite; and are a contingency option primarily that will not be routinely used.

Waste imports to the head of works consists of an offloading point for permitted imported wastes found close to the inlet of the wider STW. These wastes are imported by tanker and consist of liquids and associated sludges from domestic and municipal sources that are similar in composition to those materials derived from the sewer network and managed via the UWWTD route. No wastes are imported packaged in other ways than tankers. These operations are covered by the existing waste management license at the site. 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 using the site supplied flexible hose pipes to prevent misconnection issues.

The head of works import point is of engineered concrete and kerbed to one side. The head of works import area is connected to site drainage that returns to the main inlet of the wider STW. All transfers of waste are via the site supplied flexible hose pipes (to prevent misconnections) and through a data logger. The data logger records the

volume of waste material discharged, which discharges to the main inlet channel, where it combines with other sewer derived materials and is subject to aerobic treatment, under the UWWTD outside of the scope of this permit. A webcam covers the waste import area.

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

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

Sludge Processes

Indigenous primary sludge from the Primary Settlement Tanks is drawn off and pumped to a Primary Sludge Buffer Tank, which is outside of the scope of this permit. From the Primary Sludge Buffer Tank, sludge is pumped by one of two pumps via subsurface sludge line into the Primary Sludge Thickening Plant, where sludge is thickened. During the Primary Sludge Thickening, a polymer is dosed into each belt to aid dewatering of the sludge. The polymer, which is stored as a powder within a bulk bag, is made up using final effluent / potable water before it is stored within a day tank and dosed as required. The thickened sludge is then pumped via a subsurface sludge line to the Sludge Blending Tank where it mixes with indigenous SAS and imported sludge. Thickened sludge can also be pumped to the Sludge Import Tank and further pumped to the Sludge Blending Tank. Liquor from the Primary Sludge Thickening Plant gravitates to Liquor Return Pumping Station 1 before being returned to the Works Inlet for additional treatment through the UWWTD process. The Primary Sludge Buffer Tank, Primary Sludge Thickening Plant, Sludge Blending Tank and Sludge Import Tanks are connected to an OCU for odour abatement.

SAS from the aerobic treatment process is pumped to the SAS Buffer Tank, which is outside of the scope of the permit and then to SAS Thickening Plant for thickening, with the addition of a liquid polymer coagulant from an intermediate bulk container (IBC). The polymer is diluted with final effluent / potable water and stored in a day tank. Thickened SAS is then pumped via an aboveground sludge line to the Sludge Blending Tank where it mixes with indigenous primary sludge and imported sludge. Liquor from the SAS Thickening Plant is returned to the head of works via the Liquor Return Pumping Station 1.

The Sludge Blending Tank is an aboveground tank that is of steel construction and is connected to an OCU. It contains level controls, ultrasonic alarms and high-level floats that are connected to the site SCADA system to prevent over-filling. In the event of a high-level alarm, upstream processes are inhibited. From the Sludge Blending Tank, sludge is pumped via a subsurface sludge line to the Acid Phase Digester Tank.

Sludge can also be imported by road tanker from other waste water treatment sites to the Sludge Import Tank, via Sludge Screens. Imported sludge is discharged from tankers via two site-supplied import hoses (to avoid misconnections) and through data loggers, which record the volume of waste transferred and where the sludge is from. Access to the sludge logger is via a key fob issued to drivers. Imports take place on an area of concrete hardstanding and are discharged directly into the Sludge Import Tank. This tank is of steel construction, covered and aboveground and subject to external mixing to prevent settling. The sludge is then pumped via a subsurface sludge line to the Sludge Blending Tank where it mixes with indigenous primary sludge and SAS.

Pre-Digestion Processes

Swindon STC has one Acid Phase Digester Tank which receives batches of undigested sludge from the Sludge Blending Tank and one Acid Phase Digestion Buffer Tank which receives sludge that has been processed by the Acid Phase Digester Tank. The Acid Phase Digester Tank is of concrete construction and fitted with external insulation. The tank is an aboveground tank, is located on a concrete pad and is covered. Sludge is pre-treated

within the Acid Phase Digester Tank for an average of 2 days in order to improve the pathogen kill, increase the dewatering capability of the sludge and increases the biogas production in the downstream process. Heat is provided to the process by a dedicated heat exchange system located in a kiosk adjacent to the tank. Sludge is heated to approximately 38°C using heat received from the CHP Engine or heat generated by the auxiliary boilers on the site. As required, anti-foam is dosed into the sludge line within the heat exchange kiosk prevent occurrences of foaming. The tank is fitted with Pressure Relief Valves (PRVs) and Vacuum Relief Valves (VRVs) for safety that operate in an emergency. The tank has radar detection and pressure transducers that are monitored by the site SCADA system and would inhibit the feed pumps in the event of an alarm. There is also external mixing of the sludge to prevent settling within the tank. A biogas line transfers generated biogas to the Biogas Storage holder and is equipped with biogas pressure detectors which would inhibit operations in the event of an emergency. A condensate pot captures entrained moisture from the generated biogas and discharges it to the site drainage system where it is returned to the works inlet for further treatment. After the appropriate amount of time, sludge is pumped to the Acid Phase Digestion Buffer Tank.

The Acid Phase Digestion Buffer Tank is an above ground tank of steel construction that is covered. Sludge is then pumped via a subsurface sludge line to one of the three Primary Digester Tanks (PDTs) at the site. There is no mixing within the Acid Phase Digestion Buffer Tank but is fitted with a PRV and level transducers for safety. As required, anti-foam is dosed into the digester feed line to prevent occurrences of foaming within the PDTs.

Digestion Processes

Batches of sludge are pumped to one of the three PDTs which are of identical construction from the Acid Phase Digestion Buffer Tank. There is an alternative route for sludge to be pumped from the Sludge Blending Tank to the PDTs directly, if required. Each tank is aboveground, with a fixed roof and are constructed of steel with an external insulation to help maintain the temperature of the sludge within the tank. Additional heat input is provided via hot water from a heat exchange system that is located in one of the two heat exchange cabinets located near to the PDTs. Each tank extends slightly subsurface with a conical shaped bottom and is subject to biogas mixing and sludge recirculation. The PDTs operate on a continuous basis, with the normal retention time being approximately 12 days. Sludge is introduced to the PDT at the top of the tank and gravitates out via a limpet chamber that is located at the top of the tank into a common sludge manifold which transfers the sludge to the Secondary Digester Tank.

Each PDT is fitted with dual pressure and vacuum relief valves (PVRVs), is fitted with pressure transducers and float levels on both the limpet chamber and feed line to prevent overfilling of the tank. In the event of abnormal conditions, the digester feed pumps would be inhibited to prevent further sludge feeding from the Acid Phase Digestion Buffer Tank. Anti-foam can also be added to the PDTs as required although this is normally added at an earlier stage.

After the required duration, sludge gravitates to a Secondary Digester Tank through a subsurface sludge line that connects to a common sludge manifold. There are three Secondary Digester Tanks at Swindon STC which operate in parallel. In normal operation, one tank will be selected for filling, one tank will be emptying, and one tank will be holding sludge for digestion and pathogen kill. Each of the Secondary Digester Tanks are open topped, aboveground tanks that are of steel construction. The tanks have mechanical mixing and ultrasonic levels measure the level within each tank and is connected to the site SCADA system. In the event of a high level, the digester feed pumps will be inhibited to prevent overfilling of the Secondary Digester Tanks. After approximately two days, the Secondary Digester Tank is emptied, and the digested sludge gravitates to a common manifold and three pumps transfer the sludge for dewatering.

Following the Secondary Digester Tanks, Swindon STC has two dewatering routes. The Digested Sludge Belt Dewatering or the Digested Sludge Centrifuge Dewatering, adjacent to Cake Pad A. Digested sludge is pumped from the sludge manifold to the Digested Sludge Dewatering Plant by dedicated feed pumps. The belt presses dewater the digested sludge with the aid of a polymer coagulant. Polymer is made up from a bulk bag using final effluent / potable water in a mixing tank and stored in a day tank for dosing to each belt by dedicated pumps. Dewatered digested sludge is then transferred by covered conveyors to Cake Pad A. Liquor from the Digested

Sludge Dewatering Plant is returned via the site drainage and Liquor Return Pumping Station 2 for additional treatment. The Digested Sludge Dewatering Plant belt presses are subject to odour abatement via an OCU.

Alternatively, digested sludge is pumped from the common manifold via both above ground and below ground pipework to the Digested Sludge Centrifuge Dewatering. The centrifuge dewaters the digested sludge with the aid of a liquid polymer from an IBC that is stored within a bunded cabinet. The liquid polymer is diluted with final effluent / potable water in a make-up tank before being automatically dosed into the centrifuges. Dewatered digested sludge is then transferred by covered conveyors to Cake Pad A. Liquor is returned via the site drainage and Liquor Return Pumping Station 2 for additional treatment.

Cake Storage

Digested sludge on Cake Pad A is then removed from site under the Sludge Use in Agriculture Regulations 1989 (SUiAR), and in accordance with the Biosolids Assurance Scheme (BAS). Alternatively, digested sludge cake can be removed for stockpiling to one of the other two cake pads at Swindon STC, either Cake Pad B or C. Digested sludge cake can then be subsequently removed from the site from either of these pads.

In the event of non-conforming cake being produced at Swindon STC, it is transferred to Cake Pad C for an extended period of time to achieve the required level of pathogen kill and the area marked as containing non-conforming cake.

All three of the digested sludge Cake Pads at Swindon STC are open cake pads and constructed of engineered concrete with drainage. The drainage from each cake pad is returned via the site drainage to different Liquor Return Pumping Stations and treated via the UWWTD route. Although there are sensitive receptors who could be present for more than 6 hours located within 250 meters of all three cake pads, there is considered to be a low risk of bioaerosols from digested sludge cake and there are no residential properties within 250 metres of any of the cake pads.

Digested sludge cake imported from other STCs for temporary storage at Swindon STC provides contingency storage in the event of spreading to land being temporarily unavailable. These cake imports are deposited onto Cake Pad A.

Biogas

Biogas from the Acid Phase Digester Tank and the Primary Digester Tanks is captured and transferred via an aboveground biogas line to the double membrane Biogas Storage holder. The biogas transfer pipeline is fitted with condensate pots that capture entrained moisture from the generated biogas and allows for the moisture to be removed from the biogas and returned for treatment via the site drainage system. The Biogas Storage holder is a dual membrane type with an inner and outer bag that is fitted with biogas detection systems, monitored by the site SCADA system and PRVs that operate in an emergency as a safety precaution in the event of over pressurising the system. The Biogas Storage holder is fitted with lightning protection and a secure fence for physical security. When the levels within the Biogas Storage holder reaches a high setpoint, biogas is automatically diverted to an Emergency Flare located at the site. In the event of an emergency, slam shut valves found on the biogas line would isolate the supply.

The biogas is taken from the Biogas Storage holder, passing through biogas boosters and dehumidifiers, for combustion within a CHP Engine located externally within a self-contained unit that is designed for external use. The CHP Engine operate continuously on biogas with no back up fuels, is an Edina model and has a thermal input of 3.183 MWth which generates electricity for use within the site and low-grade heat to the boilers via a heat exchange system. Electricity generated by the CHP Engine is also exported from the site to the National Grid when there is an excess to the site needs. There are two carbon-based siloxane filters upstream of the CHP Engine, to remove impurities from the biogas prior to combustion. This is classified as 'existing' medium combustion plant, a Tranche A generator and permitted by the existing Combined Heat and Power Plant Environmental Permit (EPR/CB3201HV/V002). Emissions from the CHP Engine are via a 7 m high stack.

Low grade heat is supplied from the CHP Engine via heat exchange to the boilers in order to pre-heat the water supply to the boiler. This low-grade heat is supplemented by combustion of either indigenous biogas or natural gas to generate heat for the Acid Phase Digester Tank and Primary Digester Tanks, as required. The two boilers are located within the boiler house and are both dual fuel Strebel boilers which can combust either biogas or natural gas, with a thermal input of 0.7 MWth each. The two boilers do not require permitting as either MCP or SG as they are each less than 1MWth and do not generate electricity. Emissions from each boiler is via an 8 m high stack. In the event there is excess biogas within the Biogas Storage holder, i.e. more than the CHP Engine or boilers can utilise, or in the event that the CHP Engine or boilers are unavailable, there is a ground mounted Emergency Flare (waste biogas burner) which is used during periods of essential maintenance and emergency use. This is utilised under 10% of the year, less than 876 hours per year and operates automatically based on the levels of biogas within the Biogas Storage holder, which is controlled by the site SCADA System. The thermal input of combustion plant at the installation is approximately 4.583MWth.

Emergency Standby Generators

The STW has two emergency standby generators. One standby emergency standby generator is already permitted by the by the existing Combined Heat and Power Plant Environmental Permit (EPR/CB3201HV/V002) as a Tranche A generator as both a Specified Generator and Medium Combustion Plant. This is now an excluded generator that operates for less than 50 hours per annum for emergency purposes only to provide power to the STW and will be subject to a part surrender from the existing permit. The second emergency standby generator (10MWth) is not currently permitted but as of December 2023 is subject to advice via the enhanced pre-application service and separate Standard Rules application for an environmental permit, given it is above 5MWth+ and where the 2024/25 MCPD permitting/compliance date applies. Neither emergency standby generator is considered to be a Directly Associated Activity to the STC as neither meets the criteria under Guidance "Understanding the meaning of regulated facility" RGN2.

BAT Considerations

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

2.1 BAT 3; 6; 7: Return Liquors

The site does not have a Liquor Treatment Plant. Liquor treatment for waste waters arising within the permitted area is part of the waste water treatment process of the STW and does not fall within the permit boundary.

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

Return Liquor Monitoring is included in Appendix M.

2.2 Management of Diffuse Emissions – BAT 14

There are open top tanks within the permit boundary at Swindon STC, including the Secondary Digester Tanks.

Thames Water is committed to meeting the requirements of BAT 14 and 34. A full BAT risk assessment is required to determine the potential need to cover open topped tanks. Thames is not able to commit to covering tanks by the stated deadline of 31st March 2025, delivery timescales will be subject to the outcome of the PR24 and subsequent price review discussions.

TWUL request the Environment Agency includes an Improvement Condition in the determined permit which addresses a and b (below).

"For all open tanks post AD, confirm that Thames Water will undertake the following:

"a. If digestate is still biologically active and you are producing combustible biogas you will take steps to collect the biogas and direct this to your gas collection system in line with BAT 14.

b. For open tanks that do not produce an explosive environment (i.e. less biologically active) you will enclose, collect and direct the waste gas emissions to an appropriate abatement system in line with BAT 14 and 34."

2.3 Site Infrastructure

Management of emissions to water – BAT 19

Thames Water is committed to meeting the requirements of BAT. A full BAT risk assessment is required to determine the detailed design for Swindon secondary containment, the secondary containment options report (see Appendix G) is an outline solution that may be subject to change. Thames is not able to commit to secondary containment requirements by the stated deadline of December 2024 delivery timescales will be subject to the outcome of PR24 and subsequent price review discussions.

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

Process Controls

Anaerobic digestor operations are monitored automatically from the control centre at the site and outside of normal operational hours, from the regional control centre. Checks include digester health, temperature and operation. As described, tanks are equipped with appropriate high-level alarms and automatic cut off valves to minimise releases. The Acid Phase Digester Tank, Primary Digester Tanks and Biogas Storage are also fitted with dual pressure relief valves which operate in an emergency to minimise releases from over- or under-pressurisation. Site operations are covered by Thames Water's management system, including the preventative maintenance programme for the site.

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

- pH: At a conventional digestion site such as Swindon the processes is maintained around pH 7 but within the range 6.72 – 7.6 (this is % dry solids and digester load dependant) for healthy operation.
- alkalinity: Levels dependant on feedstock characteristics (primary sludge: surplus activated sludge (SAS) ratio). Conventional digestion typically, 3,500 - 5,000mg/litre range.
- temperature: minimum target of 38°C. This is maintained within the range 36-40°C.
- HRT (hydraulic retention time): minimum target is 15-days, there is no upper limit. Retention times shall not be less than 12-days during plant outages to keep the product pathogen kill efficiency control.
- OLR (organic loading rate): see table below - this is dependent on the primary/SAS ratio. Swindon fits into the third row of the table.
- Dry solids feed: see table above, Swindon has a target of 6%DS, but this can vary between 3-8%DS and impacts the HRT.

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

* mesophilic anaerobic digestion
[x] surplus activated sludge, arising from the UWWTD treatment route.

- VFA (volatile fatty acid) concentration: There is no specific range for VFAs as it depends on the feedstock. It is used as an indicator of digester health rather than a process control. The production of organic acids depends on the volume of solids fed to the digester. The typical range for VFAs in a primary digester is between 50 and 800 mg/L. When VFA concentrations climb above 1000 mg/L, the digesters 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 is stored on cake pads which are within 250 m of the nearest sensitive receptor, where people work for more than 6 hours at a time. See Appendix F for the site specific Bioaerosol Risk Assessment.

Other Items

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

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

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

Other Risk Assessments

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

2.4 Regulatory listing

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

The relevant listing under Schedule 1 is:

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

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

(i) biological treatment.

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

- Imports of waste, including sludge from other sewage treatment works;
- Blending of indigenous sludges and imported wastes/waste sludge prior to treatment;
- Pre-treatment of sewage sludge by acid phase digestion;
- Storage of digestate prior to dewatering;
- Dewatering of digested sewage sludge
- Transfer of 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 back to the head of the sewage treatment works;
- Combustion of biogas in a MCPD and Specified Generator (SG) compliant biogas CHP engine;
- Combustion of biogas or natural gas in boilers;
- Operation of an emergency flare;
- Storage of wastes, including waste oils; and
- Storage of raw materials.

The waste activities at the site are:

- Imports of waste to the works inlet for treatment through the UWWTD route (which is an existing permitted activity for this variation application); and
- Imports of digested sludge cake for temporary storage pending off-site removal;

The site will also include the following MCPD permitted activities, currently permitted by a bespoke permit (EPR/CB3201HV/V002) which will be consolidated with this substantial variation:

- Combustion of biogas in a MCPD and SG compliant biogas CHP Engine (with unlimited operating hours); and
- Combustion of diesel in a standby generator which since 1/3/2023 operates for emergency purposes only. This asset is already permitted in V002 and is not a DAA so will be subject to a part surrender; only the run hours are subject to change.

Combustion of biogas and natural gas also takes place within permitted combustion plant that comprises:

- 2x 0.7 MWth boilers; and

The two biogas boilers do not require permitting as either MCP or SG as they are each less than 1MWth and do not generate electricity.

The total thermal input of site is approximately 4.583 MW which is in routine use.

3. Form C2 Questions

1 About the permit

1a Discussions before your application

Enhanced pre-application advice was sort from the Environment Agency in November 2023. Enhanced advice was received on January 9th 2024 (EPR/CB3201HV/P002) with the following guidance:

- Confirmation on the permitting approach for the two standby diesel generators at Swindon to include a part surrender of the 3 MWth standby emergency generator from permit EPR/CB3201HV
- A separate standard rules application for the 10 MWth standby emergency generator is in process

Further Environment Agency advice received on February 27th in the form of a request for additional information, stating that the application for the Section 5.4 Installation would be a variation on the Standard Rules permit (EPR/BP3590SR/A001 SR2021 No 10: Anaerobic digestion of non-hazardous sludge at a waste water treatment works) as variation base. The second permit, EPR/CB3201HV/V003, would require consolidation with this variation.

1b Permit number

What is the permit number that this application relates to?

EPR/BP3590SR/A001 issued20/05/2009.

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

Swindon Sludge Treatment Centre

Swindon Sewage Treatment Works

Barnfield Road

Rodbourne

Swindon

Wiltshire

SN2 2DJ

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

2c Consolidating (combining) or updating existing permits

Yes

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

Yes

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

EPR/BP3590SR – Swindon Sewage Treatment Works

EPR/CB3201HV - Swindon Sewage Treatment Works

2d Treating batteries

2d1 Are you planning to treat batteries?

No, this application is not for the treatment of batteries

2e Ship recycling

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

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

2d Low impact installations (installations only)

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

No, this application is not for a low impact installation

2g Multi - operator installation

No. This is not a multi-operator installation

3 Your ability as an operator

3a Relevant offences

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

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

Event Name	Court	Date of hearing	Fine	Summary
EA v Thames Water Utilities Limited	Lewes Crown Court	3rd & 4th July 2023	Fine: £3,334,000.00 Prosecution Costs: £128,961.05 and victim surcharge of £120.00	Thames Water pleaded guilty to four charges under the Environmental Permitting (England and Wales) Regulations 2016. The detail of each summons is included below: Summons 1: Between 9 October 2017 and 14 October 2017 TW caused a water discharge activity, namely A discharge of sewage effluent from Crawley Sewage Treatment Works into the Gatwick Stream and the River Mole, except under and to the extent authorised by an environmental permit contrary to Regulation 38(1)(a) and Regulation 12(1)(b) of the Environmental Permitting (England and Wales) Regulations 2016. Summons 2: On and /or before 14 October 2017 TW did contravene condition 11 of environmental permit CNTM.1402 by failing to have capacity of not less than 11,000 m3 in the storm lagoon at Crawley Sewage Treatment Works contrary to Regulation 38(2) of the Environmental Permitting (England and Wales) Regulations 2016. Summons 3: Between 9 October 2017 and 14 October 2017 TW contravened condition 12 of environmental permit CNTM.1402 by failing to discharge when the rate of flow at the inlet sewer at Crawley Sewage Treatment Works is in excess of 840 l/s due to rainfall and /or snowmelt contrary to Regulation 38(2) of the Environmental Permitting (England and Wales) Regulations 2016. Summons 4: On and /or before 14 October 2017 TW did contravene condition 13 of environmental permit CNTM.1402 by failing to empty the storm lagoon at Crawley Sewage Treatment Works and return the contents for full treatment as soon as practicable after cessation of the overflow to the lagoon contrary to Regulation 38(2) of the

				Environmental Permitting (England and Wales) Regulations 2016.

3b Technical ability

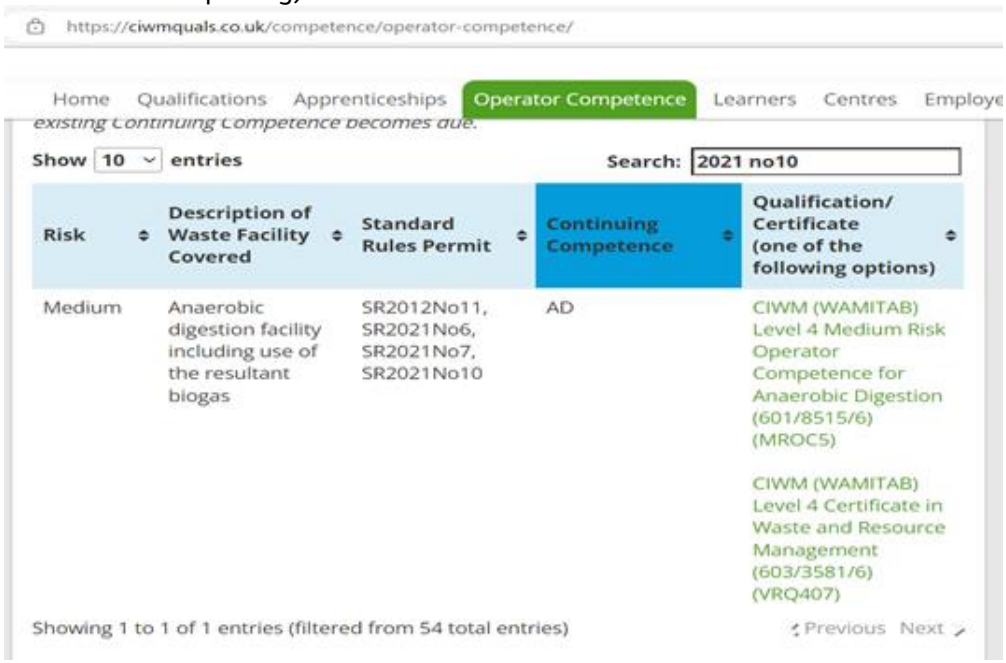
Thames Water uses WAMITAB qualified staff at their waste facilities. The relevant person for the site has been named below and full details have been provided separately on a spreadsheet.

Mr Michael Sheppard

Please see Appendix B for evidence of competency

Following discussions with CIWM (WAMITAB), Thames Water understands there are two routes to holding an appropriate CoTC for the permit as laid out in the screen shot below:

a) CIWM (WAMITAB) Level 4 medium risk operator competence for anaerobic digestion (MROC5)
b) CIWM (WAMITAB) Level 4 Certificate In waste and Resource Management – VRQ" and optional "VRQ407 – Principles and practices of managing a biological treatment processing facility (Anaerobic Digestion and Composting)"



Thames intend to follow option B at this site.

Thames Water understands from the CIWM website that the proposed option is acceptable.

3c Finances

Installations, waste operations and mining waste operations only.

Do you or any relevant person or a company in which you were a relevant person have current or past bankruptcy or insolvency proceedings against you?

No

3d Management systems

What management system will you provide for your regulated facility?

Identify the form of the management system from the list:

• Own management system

Thames Water has a SharePoint based Environmental Management System, with site specific elements and procedures linked from across the organisation Thames Water also has an Asset Management System accredited to ISO 55001 and an Energy Management System accredited to ISO 50001.

Scope

Thames Water has an EMS in place for its permitted assets.

Environmental Policy

Implementation of Thames Water's Environmental Policy is approved by the Thames Water Executive Committee of the Thames Water Board and is the responsibility of all employees, with the Chief Executive being accountable for its implementation. The policy covers all company activities, including this installation, and applies to all individuals who are employed by, or carry out work on behalf of, any Thames Water company including contractors, temporary staff and agency workers. The Management Systems Team is responsible for the implementation and assurance of the EMS, the site operations teams will be responsible for maintaining ongoing compliance with the EMS and managing the site.

Management and Responsibilities

The Management Systems Team (EMS specialists) have responsibility for the management and upkeep of the EMS. Compliance with specific elements of environmental legislation is managed by the relevant Business Areas across the Company. The Environmental Assurance Team maintain a Legal Register and, in consultation with Operations Teams, the environmental permitting team and other specialists, assess environmental risks for in-scope areas using a significance scoring method under normal, abnormal and emergency conditions. Significant environmental aspects and impacts consider legal and other requirements, cost to the business, scale of impact and interested parties.

Management Systems Team are responsible for setting internal environmental standards which are then implemented by the relevant business areas. The Standards and other relevant information are communicated through several routes. Incident and corrective action routes exist to promote continual improvement. The team run a programme of Management System Audits to determined adherence to the environmental policy and environmental standards.

Local operating procedures are the responsibility of the operational teams that operate the sewage works.

The defined roles and responsibilities are allocated to relevant personnel, depending on their job description, qualifications, knowledge, experience and training. Training and competency are based on specific roles.

Operational Control

Procedures are in place within the EMS to identify and control environmental issues arising from company activities. Each department is required to achieve operational control of its activities using standardised systems.

Routine sewage treatment operations and activities are recorded within the corporate management database, SAP. These include routine inspections, monitoring and maintenance tasks.

Non-routine activities, such as major overhauls/refurbishments, which involve the use of sub-contractors are assessed for health & safety concerns; relevant environmental risks and with accompanying method statements to respond to these. Contractors who are required to carry out major services are closely managed by operational or other staff to ensure that compliance with Thames Water's H&S and environmental policies is achieved. No contractors may work on site without having undergone a full site induction and being issued with a Thames Water Operational Safety Authorisation (TWOSA) for the task(s) they intend to complete.

Processes on site operate continuously, 24-hours per day, 7-days per week, apart from maintenance periods. The plant is designed to operate unattended with process parameters being monitored continuously. Operating logs are stored electronically.

Maintenance and Monitoring

Management will have the ultimate responsibility for the effective maintenance of plant throughout the company. The facility has named staff that are responsible for day-to-day maintenance operations and contractors are also used as required. All maintenance is logged on SAP. The following basic inspections and maintenance activities are indicative of those carried out on site:

- Daily operation of plant (24/7) involves visual inspection of operational assets;
- Daily inspection of temporary pipe work installed;
- Routine maintenance programme for plant; and
- Routine lubrication programme.

Personnel responsible for the inspection, testing and maintenance of pollution prevention infrastructure are trained to an appropriate level.

All regular maintenance of all plant and equipment will be completed on the time scale specified by the equipment manufacturer including routine inspections.

Environmental Improvement

Thames Water is committed to environmental improvements and has established environmental targets and plans relating to materials and waste management, transport, climate change mitigation and adaptation (energy efficiency and renewable energy generation), water resources, biodiversity, river water quality, and drainage asset performance. TWUL's Environmental Governance Board meets on a regular basis to provide strategic direction, and interrogative review, attached to any environmental issue of substantive concern including emerging risks as well as current topics.

Competence, Training and Training Records

Thames Water aims to ensure that all employees are in possession of the knowledge, skills and experience necessary to perform their role in accordance with the company's operating procedures and in full compliance with the law. Training needs are identified by the employee's immediate supervisor or line manager.

For those sites treating 'waste' as defined by the Waste Regulations 2011, coverage at all permitted sites by staff who hold the appropriate level of WAMITAB 'Certificate of technical Competence' is monitored centrally. This aspect of the staff training is currently being reviewed in light of the change in permitting requirements for sludge treatment centres.

For each internal training course held a Training Record is issued.

Induction training is carried out by the responsible line manager and consists of an introduction to the Company's Environmental Health and Safety Policy and description of emergency response and spill prevention procedures.

Staff receive specific training in the plant's operation and the environmental impact of the process as well as health and safety. The operators will have a detailed understanding of the operational procedures for the site for both normal and abnormal operation. As part of the training, operators will receive specific instructions relating to those aspects of plant operation that have the potential for a negative impact on the environment. This training will be provided by the equipment manufacturers or in-house staff as appropriate.

Contractors

There are several procedures to ensure contractors have the required skills and environmental competencies to carry out works at the site.

Initially, contractors are assessed by the procurement department for inclusion on the approved supplier list, which includes health and safety and environmental criteria for example, waste documentation such as waste carrier's licence/training certificates. Even when the contractors are on the approved supplier list, they are still further assessed for each specific contracted activity.

The contactor is required to submit a method statement prior to any commencement of work, identifying how work is to be undertaken and the associated risks. The method statement must be approved by the Site Manager, who will also identify any site hazards and issue an Authorisation to Work/Enter the site, following a site induction. When on-site, the contractor must carry this Authorisation to Work at all times.

Incidents, Non-Compliances and Complaints

Thames Water has procedures for incidents, non-compliances and environmental complaints.

Incidents are managed through corporate and site-specific procedures which ensure that all incidents are logged and that necessary preventative and/or corrective actions are taken.

Customer complaints are made via the Customer Services Centre which will log all complaints electronically. An action is raised to Waste Operations Control Centre (WOCC) who contact the CSM by telephone and email the complaint information to both the CSM and Performance Manager. The CSM and Performance Manager will review the complaint and take action to investigate the complaint. The CSM is responsible for contacting the customer and updating them on the outcome of the investigation and any actions taken. Where complaints relate to odour/noise/amenity, typical follow up action would include physical checks onsite of the operation of plant; offsite checks where needed; with all the actions taken being logged. Where appropriate, site management may contact the customer to discuss the outcome of the complaint, otherwise, there is a customer communication plan that identifies how and when contact will be made with customers and other stakeholders.

Information regarding complaints is recorded to allow determination of an appropriate response (corrective action) and identify what measures need to be taken in the future to prevent its reoccurrence (preventive action).

Communication

There are regular meetings held on site to discuss all aspects of the treatment works and performance against targets. These meetings include the operation and performance of the installation. Other communication methods to promote environmental management issues and continual improvement include: toolbox talks, environmental alerts, OSC portal forums, formalised event learning processes following an operational incident and compliance audits.

4 Consultation

Could the waste operation or installation involve releasing any substance into any of the following?

4a A sewer managed by a sewerage undertaker?

Yes. The site discharges into a drainage system of the wider sewage treatment works, controlled and operated by the applicant.

4b A harbour managed by a harbour authority?

No.

4c Directly into relevant territorial waters or coastal waters within the sea fisheries district of a local fisheries committee?

No.

4d Is the installation on a site for which:

4d1 a nuclear site licence is needed under section 1 of the Nuclear Installations Act 1965?

No.

4d2 a policy document for preventing major accidents is needed under regulation 5 of the Control of Major Accident Hazards Regulations 2015, or a safety report is needed under regulation 7 of those Regulations?

No.

5 Supporting information

5a Provide a plan or plans for the site

Please see Appendix A:

- A.1 Site Location Plan
- A.2 Installation Boundary and Emission Point Plan
- A.3 Site 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?

Yes.

See Appendix C for the Site Condition Report.

5c Provide a non-technical summary of your application

Please see earlier text, Section 1.

5d Risk of fire from sites storing combustible waste

No. The site processes sit outside the scope of the Environment Agency fire prevention plan guidance, as set out in the Environment Agency guidance.

5f Adding an installation

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

6 Environmental risk assessment

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

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

Designated site review

Site Name	Designation	Direction from site	Distance from site
Radnor Street Cemetery	LNR	South-east	1,700 m
Rushey Platt Canalside Park	LNR	South	1,700 m
Unnamed wood	Ancient & Semi-Natural Woodland	North-west	1,600 m
North Meadow & Clattinger Farm	SAC	North-west	13,400 m
n/a	Ramsar		
n/a	SSSI		
n/a	SPA		
List of Local Wildlife Sites			

Bradley's Meadow Cheney Manor Ponds Kingshill Canal and Old Railway Moredon and Haydon Wick Old Railway Line Mordeon Copse Mordeon Meadow 1 Mordeon Meadow 2 Mordeon Meadow 3 Moredon Railway Field Mouldon Hill Country Park Peatmoor Copse Radnor St. Cemetery River Ray Rivermead WWT Reserve Rushey Platt Canalside Park Shaw Forest Park Swindon Lagoons WWT Reserve	All sites <2,000 m

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

There are two statutory designated habitat sites within the relevant distances of the site. There are two Local Nature Reserves (LNRs) both approximately 1.7 km south and south-east of the site, Rushey Platt Canalside Park and Radnor Street Cemetery. There are no SACs, SPAs or Ramsar sites within 10 km of the site and no Sites of Special Scientific Interest (SSSI) within 2 km of the site. There is only one area of Ancient Woodland within 2 km of the site, an unnamed area of Ancient & Semi-Natural Woodland approximately 1.6 km to the north-west. There are 17 non-statutory designated local wildlife sites (LWS) within 2 km of the site.

Parts of the wider STW and the STC to be permitted are within a Flood Zone 2, indicating an increased risk of flooding on northern and eastern parts of the site, with between a 1 in 100 and 1 in 1,000 annual probability of river flooding. This includes two of the cake pads, the acid phase digester and CHP Engine. However, most of the STC is within a Flood Zone 1, indicating that there is a low probability of river flooding (<1:1000 annual probability of flooding).

The site is not located within a Source Protection Zone (SPZ) or within an Air Quality Management Area (AQMA), although there is one located approximately 2.5 km south-east of the site.

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 area, north-west of the town of Swindon. The nearest receptors are businesses based in a commercial/industrial park to the immediate south of the STW. The nearest residential receptors are approx. 150 m south-east of the site beyond the B4006 dual carriageway and a retail premises. Ecological receptors: there are two LNRs within 2 km of the site, Radnor Street Cemetery approx. 1.7 km south-east of the site and Rushey Platt Canalside Park approx. 1.7 km south of the site. There are no SAC, SPA or Ramsar sites within 10 km of the site and no SSSIs within 2 km of the site. There is one area of Ancient Woodland within 2 km of the site, an unnamed area 1.6 km to the north-west of the site and 17 Local Wildlife Sites within 2 km of the site.	The wastes handled at the site are primarily liquids and sludges, along with UWWTD derived material delivered by sewer. As such, there is no source of litter within the materials handled at the site. In the unlikely event pests or vermin are observed on site a suitable contractor is called in as soon as practicable.	X
Dust and bioaerosols	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Litter above. The impact of dust on human health will depend on the distance and wind direction. For bioaerosols this distance is 250 m.	The wastes handled at the site are liquids, sewage sludges and digested sludge cake, along with UWWTD derived material delivered by sewer. The site will not be handling inherently dusty or powdery wastes. Digested sludge cake retains a high moisture content and is not dusty. Sludge cake is stored on one of three cake pads. Cake Pad A normally receives the digested sludge cake for storage and is within 250 m of commercial and industrial estates to the south and to the east. The nearest receptors are 115 m south-east from Cake Pad A. Digested sludge cake can also be stored on the 'B' pad or 'C' pad, with the nearest receptors (an industrial unit) 50 m south and 130 m south of these two pads. Roads will be maintained to avoid the production of dust. Anerobic digestion of sludge takes place within a closed system. Digested sludge cake is stored on open cake pads which are within 250 m of sensitive receptors who may be present for more	✓

		than 6 hours however the risk from bioaerosols has been assessed to be low.	
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.	Air emissions have previously been assessed by the Environment Agency and deemed satisfactory. Use of the emergency flare is limited to emergency situations and during planned maintenance activities to either the CHP Engine or the boilers. There are multiple outlets at Swindon STC that use biogas to reduce the likelihood of flaring, for which incidents of flaring are recorded by the site. Pressure relief valves are not used routinely to control biogas volumes and would only operate in an emergency. Fugitive emissions to air are assessed in Table C3-3b(i). The site is not located within an AQMA.	X
Assessment of point source and fugitive emissions to water	The River Ray can be found on the STW's western boundary although is approx. 200 m from the nearest STC asset. To the west of the site are lagoons of the Swindon Lagoons Nature Reserve. Most of the STC and the eastern side of the STW are within a Flood Zone 1, indicating that there is a low probability of river flooding (<1:1000 annual probability of flooding). The west of the STW is within a Flood Zone 2, including aspects of the STC including the Acid Phase Digester Tank, Acid Phase Digestion Buffer Tank and two of the cake pads. This indicates there is an increased risk of flooding on the western side of the site, with between a 1 in 100 and 1 in 1,000 annual probability of river flooding. Surface water drainage within the site drains to the inlet of the adjacent sewage treatment works for full treatment prior to discharge.	The main product of the process is a digested sludge cake, which is normally stored within Flood Zone 1, on an engineered concrete pad that is equipped with drainage. Digested sludge cake can also be stored on further cake pads in Flood Zones 2 that are also of engineered concrete with drainage. Other aqueous discharges generated by process are limited (comprising biogas condensate, dewatering liquors and surface water run off). These sources are discharged to the on-site drainage system and returned to points within the UWWTD treatment process for further treatment. Due to the nature and small quantity of these emissions no further assessment of point source emissions is deemed necessary.	X
Assessment of odour	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Amenity issues above. The impact of emissions from odour on human receptors will depend on the distance and wind direction.	The wider sewage treatment works, which includes the area of the STC to be permitted has processes in place to minimise odour which includes physical containment, odour abatement, management systems, procedures and monitoring to control fugitive emissions of odour at the plant. Odour from the STC cannot be considered in isolation from the wider works. The sewage treatment works has an odour management plan, which is appended as Appendix E.	X

		Odour emissions are assessed in Table C3-3b(ii).	
Energy	Global atmosphere (direct and indirect emissions)	Use of biogas on site within the CHP Engine and/or boilers minimises the need to import non-renewable electricity from the National Grid. Export of renewable electricity to the National Grid can offset consumption of fossil fuels within the energy mix, lowering the carbon intensity of power. Good maintenance procedures will help the plant run efficiently and reduce site energy consumption. Use of LED lighting reduces site consumption.	X
Land and disposal of waste to other processes	Rivers and streams – see Assessment of point source and fugitive emissions to water above. Drainage systems/sewers. The site lies outside any Groundwater source protection zones (SPZ). Aquifers are classified as unproductive (solid deposits) and Secondary A (superficial deposits).	All waste streams are disposed of off-site for recovery or disposal and will continue to be transferred (and consigned where hazardous) to appropriately permitted facilities.	X
Noise and vibration	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, amenity and recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. The site is located in a mainly urban area, north-west of the town of Swindon. The nearest receptors are businesses based in a commercial/industrial park to the immediate south of the STW. The nearest residential receptors are approx. 150 m south-east of the site beyond the B4006 dual carriageway and a retail premises. Ecological receptors: there are two LNRs within 2 km of the site, Radnor Street Cemetery approx. 1.7 km south-east of the site and Rushey Platt Canalside Park approx. 1.7 km south of the site. There are no SAC, SPA or Ramsar sites within 10 km of the site and no SSSIs within 2 km of the site. There is one area of Ancient Woodland within 2 km of the site, an unnamed area 1.6 km to the north-west of the site and 17 Local Wildlife Sites within 2 km of the site.	Site design has been chosen to minimise the impact of noise on offsite receptors through building orientation, finishes and location of openings. Noise from plant and equipment will be minimised through purchasing decisions and a robust preventative maintenance programme There will be no sources of vibration within the facility. Noise and vibration emissions are assessed in Table C3-3b(iii).	X
Other issues (including visual impact)	Protected Species and Habitats	There are protected species (Bullhead, Water Vole, Protected Species Code 2) identified within the specified screening distance of the site (up to 500m). There are no protected habitats	X

		identified within the specified screening distance of the site (up to 500m).	
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 Engine 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. 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.	**X**

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

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

4. Form C3 Questions

1 – What activities are you applying to vary?

Table C3-1a – Types of activities

Installation name	Schedule 1 references	Description of the Activity	Activity Capacity	Annex I and II codes and descriptions	Non-hazardous waste treatment capacity
Swindon Sludge Treatment Works AR1	S5.4 A1 (b) (i) Recovery or a mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment Anaerobic digestion of permitted waste in three Primary Digester Tanks and three Secondary Digester Tanks followed by combustion of biogas produced from the process	From receipt of permitted waste through to digestion and recovery of by-products (digestate and biogas).	429 wet tonnes per day (Throughout based on 5,148 m^3/12 = 429 m^3 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	Maximum waste throughput 730,000 wet tonnes per annum including indigenous UWWTD derived sludge from within the wider Sewage Treatment Works. As per volume calculations in Note 1 below.

				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)	
Directly Associated Activities					
AR2	Imports of waste, including sludge from other sewage treatment works				
AR3	Blending of indigenous sludges and imported wastes/waste sludge prior to treatment;				
AR4	Pre-treatment of sewage sludge by acid phase digestion;				
AR5	Storage of digestate prior to dewatering;				
AR6	Dewatering of digested sewage sludge				
AR7	Transfer of treated dewatering liquors back to the head of the sewage treatment works;				
AR8	Transfer of surface water runoff back to the head of the sewage treatment works				
AR9	Storage of dewatered digested sludge cake prior to offsite recovery;				
AR10	Storage of biogas;				
AR11	Transfer of biogas condensate back to the head of the sewage treatment works				
AR12	Combustion of biogas in a MCPD and Specified Generator (SG) compliant biogas CHP Engine;				
AR13	Combustion of biogas or natural gas in boilers;				

AR14		Operation of an emergency flare;			
AR15		Storage of wastes, including waste oils; and			
AR16		Storage of raw materials.			
Specified Generator Activities					
Activity Reference	National Grid Reference and/or activity reference / emission point	Activity listed in the EP Regulations	Description of MCP and/or specified generator	Fuel	Operating hours limit per annum
AR17	CHP Engine 413041,185633 Ref (TW000000142756)	Schedule 25B – Specified generator	1 x 3.183 MWth CHP Engine	Biogas	Unlimited
AR18	413148,185696 Ref (TW0000000142044&45 Emergency Standby Generator)	Schedule 25B – Specified generator	1 x 3 MWth generator (non DAA; already permitted in V002)	Diesel (low sulphur)	Now 50 hours per annum as an excluded 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**
AR19	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 50,000 wet tonnes per annum
	Digested sludge cake for temporary storage pending off-site removal	R13: Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced).	n/a	Maximum waste throughput 2,000 wet tonnes per annum

		R3: Recycling or reclamation of organic substances which are not used as solvents		
For all Waste Operations		**Total capacity**	**15,064 wet tonnes**	**[a] + [b]**
		Total STC treatment capacity (tank volume)	12,064 wet tonnes	[a]
		Total cake pad storage capacity	3,000 wet tonnes	[b]
For waste imports to the head of the works		Annual throughput (tonnes each year)	Imports: 50,000 wet tonnes	
For waste imports of digested sludge cake for temporary storage		Annual throughput (tonnes each year)	Imports: 2,000 wet tonnes	
Note 1: Treatment Calculation based on: **Unthickened Primary Sludge: 8.36 tds/day: worse case 1.30% dry solids = 643 m3/day = 234,850 m3/year** **Unthickened SAS: 9.08 tds/day: worse case 0.90% dry solids = 1,009 m3/day = 368,304 m3/year** **Imports - Liquid: 9.56 tds/day: worse case 3.00% dry solids = 319 m3/day = 116,307 m3/year** **Total combined import calculation: 719,461 m3/year, rounded to 730,000 m3/year**				

Table 1b Types of waste accepted

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

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

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

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

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

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 permanent 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/CB3201HV/V002 are in bold.

Emission point reference and location	Source	Pollutant or Parameter	Combustion Technology	Emission Limit	Unit	Reference Period	Monitoring Frequency	Monitoring standard or method [Note 1]
A1	**Stacks on engines operational before 20 December 2018** **CHP Engine Ref (TW000000142756** **Schedule 25B – Specified generator Tranche A**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**Biogas**	**500**	**mg/m^3**	**Periodic (average over one hours)**	**Annual**	**MCERTS BS EN 14792**
		Carbon monoxide		**1,400**	**mg/m^3**			**MCERTS BS EN 15058**
		Temperature **OR** **Exit Velocity**		**To ensure effective plume breakaway, gas engine exhaust gas temperature where the exhaust leaves the engine shall be no less than 2000°C;** **OR** **Minimum stack exit velocity of 15 m/s or 12 m/s where stack volume flow is less than 0.5 m^3 /s.**	**-** **-**	**Periodic (average over one hours)**	**Annual**	**-** **-**
A2	**Auxiliary Boiler 1**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**Biogas**	**No limit set**	**None**	**None**	**None**	**None**

		Carbon monoxide		**No limit set**	**None**	**None**	**None**	**None**
A3	**Auxiliary Boiler 2**	**Oxides of Nitrogen (NO and NO_2 expressed as NO_2)**	**Biogas**	**No limit set**	**None**	**None**	**None**	**None**
		Carbon monoxide		**No limit set**	**None**	**None**	**None**	**None**
A4	**Auxiliary Flare**	**Oxides of Nitrogen**	**Biogas**	**No limit set**	**None**	**Hourly**	**Annual**	**Record of operating hours**
		Carbon monoxide		**No limit set**	**None**			
A6	Acid Phase Digester Tank PRV	-	-	-	-	-	-	-
A7	Acid Phase Digestion Buffer Tank PRV	-	-	-	-	-	-	-
A8	Primary Digester Tank PRV	-	-	-	-	-	-	-
A9	Primary Digester Tank PRV	-	-	-	-	-	-	-
A10	Primary Digester Tank PRV	-	-	-	-	-	-	-
A11	Biogas Storage PRV	-	-	-	-	-	-	-
A12	OCU 6	Hydrogen Sulphide	-	No limit set	-	Average over sampling period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis or US EPA M11
		Ammonia	-	20	mg/m^3			EN ISO 21877 CEN TS 1369 for sampling

								Or NIOSH 6016 for analysis
A13	OCU 3	Hydrogen Sulphide	-	No limit set	-	Average over sampling period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis or US EPA M11
		Ammonia	-	20	mg/m^3			EN ISO 21877 CEN TS 1369 for sampling Or NIOSH 6016 for analysis

Note 1: Monitoring requirements are defined at a temperature of 273.15 K; a pressure of 101.3 kPa and after correction for the water vapour content of the waste gases at a standardised O_2 content of 5% for engines.

Note 2: Monitoring to be undertaken in the even the auxiliary flare has been operational for more than 10 per cent of a year (876 hours). Record of operating hours to be submitted annually to the Environment Agency.

Note 3: No parameters set for their monitoring of this MCP at the current time. Emission Limit Values to apply from 1st January 2025

Table C3-2b – Emissions to Sewer

Emission point reference and location	Source	Parameter	Limit	Unit
T1 (SU 13332 85503)	Primary Sludge Thickening Liquors, SAS Belt Thickening Liquors, Biogas Condensate, OCU Waste Water, Digested Sludge Dewatering Liquor, Surface Water Run Off	No parameters set	No limit set	-
T2a, T2b (SU 13350 85502;	Head of Works Imports	No parameters set	No limit set	-

SU 13369 85507)				

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

3 – Operating techniques

3a - Technical standards

Table C3-3a – Technical Standards

Description of the schedule 1 activity or directly associated activity	Relevant technical guidance note or Best available techniques as described in BAT conclusions under IED	Document Reference
Anaerobic Digestion plant S5.4A1(b)(i); Storage of waste (DAA)	Commission Implementing Decision (EU) 2018/1147 of 10 August 2018 establishing best available techniques (BAT) conclusions for waste treatment, under Directive 2010/75/EU of the European Parliament and of the Council (notified under document C(2018) 5070) (Text with EEA relevance.) BAT Conclusions for Waste Treatment	

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

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

3b - General requirements

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

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

Risk Matrix and Terminology for Accident for Risk Assessment

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

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

Although screened out of the detailed Risk Assessment (Question C2 Q6), due to the nature of the processes, the anaerobic digestion operations and cake storage, along with biogas utilisation have the potential to generate fugitive emissions to air and water, which are subject to a number of process controls.

Table C3-3b(i) – Fugitive Emissions Risk Assessment

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
Emissions to air of NOx, SO_2, CO_2 and VOCs	Normal	Emissions to air and dispersion leading to inhalation by local human and animal receptors	High	Low	Medium	Activities are managed and operated in accordance with the site management system (including inspection and maintenance of equipment, including engine management systems), point source emissions to air (CHP Engine, boilers and emergency flare) have emission limits. CHP Engine stack height approx. 7 m, boiler flues approx. 8 m and emergency flare approx. 6 m. Site has a siloxane filter fitted on the main biogas pipeline connected to the CHP engine to remove impurities within the biogas. Previous modelling, which remains unchanged, did not find unacceptable impacts.	Low
Biogas transfer systems, Biogas Storage, CHP engine, emergency 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. The biogas system utilised is subject to regular preventative maintenance including a LDAR	Low

causing emissions of biogas		warming potential. Risk of fire and explosion				plan to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of methane monitors, pressure and flow sensors and with automatic slam-shut isolation valves to minimise the potential for release if a leak is detected. Personnel on site wear portable gas detectors in order to alert staff to presence of biogas. The 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, which is pre-set within the SCADA system. Use of emergency flare is recorded. PRVs are in place on the Biogas Storage holder to be operated in the event of failure of the emergency flare to prevent over-pressurisation and catastrophic failure.	
Catastrophic loss of biogas emissions from biogas transfer systems, Biogas Storage, CHP engine, Emergency Flare or PRVs	Abnormal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Odour impact. Global warming potential. Risk of significant fire and explosion	Low	High	Medium	The plant is designed to capture and utilise all biogas possible, combusting the biogas in order to maximise recovered value from the biological treatment of sludge. The biogas system utilised is subject to regular preventative maintenance including a LDAR plan to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of methane monitors, pressure and flow sensors and with automatic slam-shut isolation valves to minimise the potential for release if a leak is detected.	Medium

						The 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, which is pre-set within the SCADA system. Use of emergency flare is recorded. PRVs are in place on the Biogas Storage holder to be operated in the event of failure of the emergency flare to prevent over-pressurisation and catastrophic failure.	
Combustion of biogas within CHP engine and emergency flare. Combustion of biogas or natural gas within boilers	Normal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Global warming potential	High	Low	Medium	Combustion plant is regularly maintained and appropriately sized to manage volumes of gas. Combustion plant operates within permitted ELVs subject to routine monitoring against permit compliance. Combustion plant is located centrally. The CHP Engine and boilers are approx. 210 m from the nearest receptor, a commercial building to the south. The emergency flare is approx. 180 m from the same receptor. Residential receptors are further away.	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 as a result of digested sludge cake storage within open engineered cake pads at Swindon STC. There are three pads used. The main cake pad, which receives digested sludge cake, is approx. 110 m away from a commercial building and 280 m from residential properties. Cake Pad B is used for temporary storage and is approx. 50 m	Low

						from a commercial building and 310 m from residential properties. Cake Pad C is more central and a greater distance to receptors, approx. 130 m from commercial receptors and 380 m from residential receptors. Digested sludge cake on the three cake pads retains a high moisture content and is not prone to windblown dispersion leading to the generation of dust although the prevailing winds are generally from the south and west so wind-blown dispersion is less likely to impact the nearest off-site receptors. Internal site roads are made from concrete/asphalt and not prone to the generation of dust.	
Release of bioaerosols and dust from spillages	Abnormal	Emissions to air and dispersion leading to inhalation by local human and animal receptors with potential harm to health. Odour impact of bioaerosols. Nuisance impact of dust.	Low	Low	Low	Staff responsible for site housekeeping and cleaning of spillages in a timely manner. Spillages are more likely to occur around the sludge digestion assets which are located centrally, further from off-site receptors. 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. Roads are made from concrete/asphalt and not prone to the generation of dust.	Low
Spillage of liquids, including	Abnormal	Emissions to surface waters close to and downstream of site. Acute effect resulting	Low	Medium	Low	The closest surface water body is the River Ray, over 200 m from the nearest STC asset.	Low

chemicals and oils.		in loss of flora and fauna. Chronic effect resulting in deterioration of water quality Emissions to ground and ground water.				Lagoons can be found further to the west of the site. All combustion plant and associated fuel tanks are situated on concrete hardstanding Chemicals and oils all stored within suitably bunded tanks and IBCs with rainwater removed as required to maintain 110% capacities. The combustion assets are central to the site, away from surface water bodies. Handling and use of chemicals and oils is carried out by trained personnel. COSHH data sheets available. Spill kits available on site. Staff are trained in their use. There are no point source emissions to water with drainage system returning to the works for additional treatment.	
Spillage from storage and digestion tanks, overtopping of tanks, leakage from same tanks and from buried pipes	Abnormal	Emissions to surface waters close to and downstream of site. Acute effect resulting in loss of flora and fauna. Chronic effect resulting in deterioration of water quality Emissions to ground and ground water.	Low	Low	Low	The site lies outside any Groundwater Source Protection Zones (SPZ). Provision of suitable structurally integral tanks constructed from pre-cast concrete, or steel with glass reinforced plastic. All tanks are subject to asset inspection and proactive maintenance programme including regular visual inspection for cracks or weeping. The three Secondary Digester Tanks are not covered but are fitted with ultrasonic levels. Visual checks during regular day-to-day operations and scheduled preventative	Low

						maintenance of equipment, such as pumps, pipes, joins etc. Biogas condensate discharged back to the works inlet through site drainage system. Spill kits available on site. Staff are trained in their use.	
Generation of solid waste resulting in litter	Normal	Releases of litter to the environment. Visual nuisance and local loss of amenity	Low	Low	Low	Site operations do not give rise to large amounts of solid wastes and litter that would be prone to dispersion by wind. Rags are stored within skips and retain high moisture content. Waste is stored securely for collection by appropriately licensed approved contractors. Litter picking activities are completed as required.	Low

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

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

Table C3-3b(ii) – Odour Risk Assessment

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

H_2S/biogas emissions from uncovered tanks	Normal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	Low	Low	Low	Biogas will principally be generated in Primary Digester Tanks which are covered with fixed roofs. The nearest receptors are approx. 170 m north-east of the Primary Digester Tanks. Small amounts may be generated within the Secondary Digester Tanks which are uncovered and approx. 160 m from the nearest sensitive receptors. All tanks prior to Secondary Digester Tanks are covered. 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. Odour complaints have previously been received for the site associated with the inlet from nearby residential receptors although the inlet is covered and odour abated via an OCU.	Low
Loss of containment from biogas holder and biogas pipework	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	Low	Medium	Low	Biogas is principally stored within the double membrane Biogas Storage holder which is suitably sized to manage biogas generation. The biogas system utilised is subject to regular preventative maintenance including a LDAR plan to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of methane detectors, pressure and flow sensors and with isolation valves to minimise the potential for release if a leak is detected.	Low

						Personnel on site wear portable gas detectors in order to alert staff to presence of biogas. Physical protection measures in place for biogas holder, including fence and pipework is guarded. PRVs available to safely manage pressures within the biogas holder 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 subject to weekly visual/remote monitoring to ensure they are seated correctly which minimises biogas emissions. Biogas is principally stored within the double membrane Biogas Storage holder which is suitably sized to manage biogas generation and act as buffer storage for biogas. Biogas holder is located centrally. Site has a CHP Engine, two boilers and one emergency flare which are used in order of preference to maximise recovery of energy. CHP Engine and boilers are subject to regular maintenance to maintain maximum use of outlets, with flare maintained in good working order should it need to be used. The nearest receptor to the Biogas Storage holder is a commercial/industrial receptor approx. 180 m to the north-east.	Low

H_2S/biogas emitted when biogas cannot be combusted in engine, boilers or flare	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors Loss of amenity from odour nuisance	Low	Low	Low	Biogas is principally stored within the double membrane Biogas Storage holder which is suitably sized to manage biogas generation and act as buffer storage for biogas. Site has one CHP Engine, two boilers and one flare giving multiple outlets for biogas. The nearest receptor is a commercial/industrial receptor approx 180 m to the north-east of the Biogas Storage holder. CHP Engine 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 normally stored on one of three open cake pads prior to offsite removal and is inherently low odour material. The nearest receptor to the cake pads is a commercial receptor approx. 50 m south of Cake Pad B and the nearest sensitive residential receptors are approx. 280 m south-east of Cake Pad A. Should any non-conforming or odorous sludge cake be produced, this will be stored on Cake Pad C which is further from receptors and subject to process checks to identify root cause of production and removed from site expediently.	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 inline 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 Engine is acoustically baffled, self-contained and designed for external applications therefore noise emissions are already low.	Low

						CHP Engine is located away from sensitive receptors, within a central area of the site, approx. 200 m from the nearest receptor. Good maintenance of plant to ensure that excessive noise levels are not generated. Regular checks of noise mitigation measures fitted to items of plant. Such measures include silencers and baffles fitted to specific areas of plant. Where repair or replacement is required, the plant will, where possible, be taken out of service until repair or replacement of parts has been undertaken.	
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, 200 m from the nearest receptor. Good maintenance of fans to ensure that excessive noise levels are not generated. Where repair or replacement is required, this will be completed promptly.	Low
Operation of site vehicles	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Vehicle movements across the site subject to speed limit and one way system to reduce generation of noise. Shovel loading of digested sludge cake takes place on the engineered cake pads. The nearest of which is approx. 50 m from the nearest off-site receptors although this is	Low

						within an industrial/commercial park within close proximity to a bus station.	
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 are limited to daytime hours, and take place to an import point on the south of the site. The nearest sensitive receptors are a retail building approx. 40 m to the south. Residential receptors can be found 130m south, beyond the retail property and a dual carriage way. Vehicle movements are subject to a speed limit to reduce generation of noise.	Low
Vehicle movements – tanker deliveries of waste and bulk collections of digested sludge cake	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Vehicle movements across the site subject to speed limit to reduce generation of noise. Imports of sludge can be made 24/7 and take place to an import point located centrally, 48 approx. 160 m from the nearest sensitive receptors, a commercial/industrial premises to the north-east. Deliveries to cake pad are limited to day time only. Shovel loading of digested sludge cake takes place on the cake pads, normally on Cake Pad A which is approx. 110 m away from a commercial building and 280 m from residential properties. Operations can also take place on either Cake Pad B which is approx50 m from a commercial building and 310 m from residential properties, or, Cake Pad C,	Low

						approx130 m from commercial receptors and 380 m from residential receptors. Bulk collections normally take place during daytime only.	
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. Vehicle movements across the site subject to speed limit to reduce generation of noise and subject to a one-way system to reduce reversing obligations.	Low
Operation of emergency flare	Abnormal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Low	Medium	Use of the emergency flare is minimized by prioritizing use of the CHP Engine and boilers with use of the flare recorded. Emergency flare is located away from sensitive receptors, approx. 180 m from the nearest sensitive receptor.	Low

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

A site specific Accident Management Plan (AMP) is located in Appendix J

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

The installation has the potential to generate bioaerosols which may pose a risk to nearby sensitive receptors. 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

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

4 - Monitoring

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

The air emission points A1-A4 are monitored in accordance with EA guidance and the requirements of MCPD.

The site has a number of emission points to air. Points A1 (CHP Engine), A2 and A3 (2x boilers) are subject to gas monitoring in accordance with the requirements of existing permit requirements and EA guidance.

Hours of operation of the emergency flare (A4) 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 A12 and A13 (OCUs) will be subject to bi-annual testing.

There is no routine monitoring proposed for points A6 – A11 (PRVs).

Table C3-4a – Emission Monitoring

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A1 (CHP Stack)	SU 13050 85622	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".	MCERTS BS EN 14792
		Carbon monoxide – Annually		MCERTS BS EN 15058
		Temperature OR Exit Velocity – Annually		-
A2 (Boiler 1)	SU 13065 85622	Oxides of Nitrogen (NO and NO_2 expressed as NO_2) – none	-	-
		Carbon monoxide – none	-	-
A3 (Boiler 2)	SU 13088 85627	Oxides of Nitrogen (NO and NO_2 expressed as NO_2) – none	-	-
		Carbon monoxide – none	-	-
A4 (Emergency Flare)				BS EN 14792

	SU 13050 85596	Annual monitoring is only required when flare operates in excess of 10% of the time, taken on an annual assessment period : Oxides of Nitrogen Carbon monoxide	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	
A6 (Acid Phase Digester Tank PRV)	SU 13027 85637	n/a	n/a	-
A7 (Acid Phase Digestion Buffer Tank PRV)	SU 13021 85655	n/a	n/a	-
A8 (Primary Digester Tank PRV)	SU 13108 85623	n/a	n/a	-
A9 (Primary Digester Tank PRV)	SU 13129 85628	n/a	n/a	-
A10 (Primary Digester Tank PRV)	SU 13144 85632	n/a	n/a	-
A11 (Biogas Storage S1PRV)	SU 13101 85646	n/a	n/a	-
A12 (OCU 6)	SU 13161 85639	Hydrogen Sulphide – once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis or US EPA M11	
		Ammonia – once every 6 months	EN ISO 21877 CEN TS 1369 for sampling Or NIOSH 6016 for analysis	
A13 (OCU 3)	SU 13179 85586	Hydrogen Sulphide – once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis or US EPA M11	
		Ammonia – once every 6 months	EN ISO 21877 CEN TS 1369 for sampling Or NIOSH 6016 for analysis	
S1 (Liquor sampling point)	SU 13141 85690	n/a	MCERTS or ISO/IEC 17025 where available	
S2 (Liquor sampling point)	SU 13139 85596	n/a	MCERTS or ISO/IEC 17025 where available	

S3a (Liquor sampling point)	SU 13351 85505	n/a	MCERTS or ISO/IEC 17025 where available	
S3b (Liquor sampling point)	SU 13364 85508	n/a	MCERTS or ISO/IEC 17025 where available	

4b - Point source emissions to air only

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

No.

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

No.

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

No.

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

No.

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

No.

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

No.

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

No.

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

No.

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

As an existing operational site 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, a temporary sampling platform is utilised to provide

sufficient space, in accordance with standard industry practice, where sampling cannot be undertaken from the ground.

5 - Environmental impact assessment

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

No.

6 - Resource efficiency and climate change

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

The Acid Phase Digester Tank and Primary Digester Tanks are heated using the recovered heat from the CHP Engine supplemented by the boilers as required. The CHP Engine is suitably sized to maximise energy utilisation for the parasitic load, while minimising the use of the emergency flare. Heat generated from the CHP Engine is used to supplement heat generation and minimises the need to combust natural gas within the boilers.

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

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

The main site energy source is electricity from the CHP Engine supplemented by imported electricity from the National Grid. The site CHP Engine 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 Engine also provides useable heat for hot water to the Primary Digester Tanks, via heat exchangers. The boilers use natural gas to supplement recoverable heat and the emergency standby generator combusts diesel. Use of heat from the CHP Engine reduces the demand on supplementary fuels in the two boilers.

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

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

Describe the specific measures you use for improving your energy efficiency

The production and use of biogas to generate electricity and produce heat (which is used in the digestion 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, boilers and CHP Engine all within close proximity minimises transmission losses on site, improving the efficiency of the process.

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

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

See response to question 3c above.

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

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

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

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

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

5. Form C4 Questions

1 About the permit

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

The permit variation application is to vary an existing waste permit and include physical treatment of non-hazardous waste as a secondary activity waste operation to the main listed installation.

1b –types of waste accepted and restrictions

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

1c Deposit for recovery purposes

This is not a deposit for recovery application.

2 Point source emissions to air, water and land

Please see responses to form C3.

3 Operating techniques

3a Technical standards

Please see responses to form C3.

3b General requirements

Please see responses to form C3.

4 Monitoring

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

Please see responses to form C3.

4b Point source emissions to air only

Please see responses to form C3.

6. Form C6 Questions

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

Q1About the effluent – details and type, continued

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

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

1b Give this effluent a unique name

Liquor returns.

1d Have you obtained all the necessary permissions in addition to this environmental permit to be able to carry out the discharge (see C6 guidance notes for more details)?

Yes. The discharge is into the inlet of a sewage works controlled by the applicant.

Q2 About the effluent – how long will you need to discharge the effluent for?

2c Will the discharge take place all year?

Yes, the discharge will take place all year.

Q3 How much do you want to discharge?

3b What is the maximum volume of effluent you will discharge in a day?

2,453 Cubic metres.

3c What is the maximum rate of discharge?

28.39 Litres / second.

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

2,453 Cubic metres.

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

Q3b - The liquor arisings must come from the installation inputs as there is limited additional water inputs. The maximum volume of effluent discharged per day will consist of primary thickening liquors, post-digestion dewatering liquors and biogas condensate generated from the inputs and outputs to/from the Primary Digester Tanks.

Q3c – Maximum rate of discharge (L/second) is generated from the maximum volume of effluent per day [2,453.08m3 x 1000] / 86,400 seconds (24 x 60 x 60) from sources such as the thickening and dewatering.. This gives a value of 28.3921296 litres, rounded up to 28.39 litres per second.

Q3d – - The liquor arisings must come from the installation inputs as there is limited additional water inputs. The maximum volume of effluent discharged per day will consist of primary thickening liquors, post-digestion dewatering liquors and biogas condensate generated from the inputs and outputs to/from the Primary Digester Tanks.

Q4 No questions

Q5 Should your discharge be made to the foul sewer?

5a How far away is the nearest foul sewer from the boundary of the premises?

Not applicable, the site is located within the curtilage of a sewage treatment works and discharges into the works inlet via the site drainage system.

5b2 Discharges from all other premises including trade effluent

Not applicable, the site is located within the curtilage of a sewage treatment works and discharges into the works inlet via the site drainage system.

Q6 How will the effluent be treated?

6a Do you treat your effluent?

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

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

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

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

The final effluent discharge from the wider sewage treatment works is specified in Environmental Permit TH/CNTD.0017/010

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) and polymer to aid dewatering of sludge. A review of the appropriate MSDS data does not indicate the presence of 'specific substances' within those chemicals.

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

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

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

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

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

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

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

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

7f What is the maximum temperature of your discharge?

20°C back into the sewage works.

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

0°C.

Q8 Environmental risk assessments and modelling

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

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

8d Discharges to groundwater

The installation does not discharge to groundwater.

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

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

8f Environmental impact assessment

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

Q9 Monitoring arrangements

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

Not applicable to this installation.

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

No sampling point installed at present. Effluents will be sampled from the Sample points identified in Table C3-4a (approximately) within the installation.

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

No flow meter installed.

9e Does the flow monitor have an MCERTS certificate?

No. No flow meter installed.

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

No. Not installed as part of this installation.

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

Please see site emission point plan.

Q10 Where will the effluent discharge to?

10a Where the effluent discharges to

Non-tidal river, stream or canal.

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

SU 12710 85800.

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

River Ray, via the wider UWWTD sewage treatment works.

A5.4 Is the discharge into a:

Non-tidal river.

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

No.

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

No.

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

N/A

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

N/A

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

No.

Appendix A. Figures

A.1 Site Location Plan

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

A.2 Installation Boundary and Air Emission Point Plan

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

A.3 Site Impermeable and Permeable Surfaces Plan

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

A.4 Site Drainage Plan

See documents: TW_STC_EPR_18a_ SWNS1ZZ-DPL-001

A.5 Process Flow Diagram

See document: B22849AZ-SWNS1ZZ-LSX-DR-P-0002

A.6 Site Photographs

See document: TW_STC_EPR_18a_SWN_APPA.6

Appendix B. CoTC

See document: TW_STC_EPR_18a_SWN_APPB

Appendix C. Site Condition Report – H5

See document: TW_STC_EPR_18a_SWN_APPC

Appendix D. BAT Assessment

See document: TW_STC_EPR_18a_SWN_APPD

Appendix E. Odour Management Plan

Includes: Odour Management Plan and Odour Risk Assessment. See document: TW_STC_EPR_18a_SWN_APPE

Appendix F. Bioaerosol Risk Assessment

See document: TW_STC_EPR_18a_SWN_APPF

Appendix G. Containment Assessment

G.1 Containment Options Report (CIRIA 736)

See document: B22849AZ-JA- SWNS1ZZ-100-RP-Z-0001

G.2 Containment Assessment

See document: B22849AZ-JA- SWNS1ZZ-100-CA-P-0003

Appendix H. Leak Detection and Repair (LDAR) Plan

See document: TW_STC_EPR_18a_SWN_APPH

Appendix I. Residue Management Plan

I.1 Residue Management Plan

See document: TW_STC_EPR_18a_SWN_APPI.1

I.2 MSDS Zip File

See zip folder: TW_STC_EPR_18a_SWN_APPI.2

Appendix J. Accident Management Plan

See document: TW_STC_EPR_18a_SWN_APPJ

Appendix K. Acceptance of Third-Party Waste Imports

K.1 Acceptance of Third-Party Waste Imports

See document: TW_STC_EPR_18a_SWN_APPK.1

K.2 Acceptance of Thames Water Inter-Site Sludge and Cake

See document: TW_STC_EPR_18a_SWN_APPK.2

K.3 Example Waste Transfer Note

See document: TW_STC_EPR_18a_SWN_APPK.3

Appendix L. Air Quality Assessment

Not Required

Appendix M. Liquor Monitoring Proposal

See document: TW_STC_EPR_18a_SWN_APPM