Sludge Treatment Centre Permitting

Environmental Permit Variation Application - Wargrave STC Resubmission

TW_STC_EPR_26a_WGE_ASD | Resubmission

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Thames Water

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Sludge Treatment Centre Permitting

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1. Introduction

This substantial variation application relates to a biological treatment permit for the Wargrave Sludge Treatment Centre (STC), located at the Wargrave 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 wastewater treatment stream at the site along with the importation of similar wastes such as cess wastes and interworks sludge and cake transfers, were regulated under the Urban Waste Water Treatment Directive (UWWTD), and Environmental Permitting Regulations as exempt or waste management activities, although some works had parts of the process, specifically biogas utilisation covered by the Environmental Permitting regime.

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

The previous permit in place at the site, EPR/UP3737QP/A001, for the operation of the CHP engine will be merged and remain in place as a directly associated activity to this listed process. This application is for the purposes of varying the existing permitted activities to include the anaerobic digestion process as an installation activity.

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

1.1 Non-Technical Summary

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

The biological treatment of sludge includes treatment of the indigenous sewage sludge and Surplus Activated Sludge (SAS) from the onsite aerobic treatment process and treatment of imported sewage sludges from other sites, arriving by road to a dedicated import point. The indigenous sewage sludges are generated from the aerobic treatment of both waste waters from the sewer network arriving into site at the works inlet, and, from imported waste materials, arriving by road transport into a dedicated cess waste import point.

The storage of biogas and operation of a biogas fuelled Combined Heat and Power (CHP) engine for the generation of electricity, which is classified as an 'existing' combustion source under the Medium Combustion Plant Directive (MCPD), and already permitted, will be classified as a Directly Associated Activity to the me main listed activity. A dual fuelled boiler for the generation of electricity and heat at the site will be classified as a Directly Associated Activity to the main listed activity.

The site is located in a mainly semi-rural location within the administrative area of Wokingham. The site is surrounded by fields, woodland and the River Loddon to the west and the fruit wholesaler operations of Sheeplands Farm / Hall Hunter Partnership to the immediate north, east and south of the site. Beyond this the edges of the settlements of Twyford and Wargrave are located to the South-East and North-East of the site respectively.

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

sludge is drawn off the Primary Settlement Tanks (PSTs) and is pumped to a Primary Sludge Buffer Tanks, which sit outside the scope of the permit application. Primary sludge is pumped out and thickened on a Primary Thickening Plant and then pumped to the Digester Feed Tank. SAS pumped to the SAS Buffer Tanks before being thickened in the SAS Thickening Plant and pumped to the Digester Feed Tank – the SAS Buffer tanks also sit outside the scope of the permit application. Liquors from Primary Thickening Plant are returned to the works inlet via the Liquor Buffer Tank 1 and Liquor Return Pumping Station 1 for further treatment. Liquors from the SAS thickening Plant is returned to the works inlet via Liquor Return Pumping station 2. Indigenous thickened sludge and imported sludge are both pumped to the Digester Feed Tank where they are mixed.

The Wargrave STC also accepts imports of sludge from other Thames Water facilities. All such imports are subject to appropriate waste pre-acceptance and acceptance checks, prior to acceptance. Sludge discharges through the hose and logger unit and into the Sludge Import Tank, which is then pumped to screens and then transferred to a Screened Sludge Import Buffer Tank and then pumped to the Digester Feed Tank.

The Wargrave STC accepts tankered wastes to an import area within the site boundary but outside of the perimeter fence located on land owned by Thames Water. The cess is transferred into the Cess / Waste Import Tank, where it is then transferred to the Works Inlet. 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.

The sludge pumped to the Digester Feed Tank, once thickened, is pumped to one of the two Primary Digester Tanks on the site. Sludge within the Primary Digester Tanks is heated via dedicated heat exchange systems using heat generated on site by the CHP engine or boiler. The Primary Digester Tanks are above ground and of steel construction with fixed roofs and fitted with Pressure Relief Valves (PRVs).

Following treatment over an appropriate number of days within the Primary Digester Tanks, sludge is pumped to one of four Secondary Digester Tanks. Digested 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 digested sludge cake output quality requirements.

Digested sludge is pumped from the Secondary Digester Tanks to digested sludge Dewatering Plant by dedicated pumps. Whilst there are two centrifuges on site, they operate one at a time in the Digested Sludge Dewatering Building. Digested sludge is dewatered with a polymer and then the digested sludge cake falls to a conveyor and is transferred outside to the cake pad area. Liquor is pumped to the site drainage system to be returned to the inlet for treatment via Liquor Buffer Tank 2 and Liquor Return Pumping Station 3.

Digested sludge cake is deposited and stored on the open cake pad, an engineered area of hardstanding, prior to removal from the site under the Sludge Use in Agriculture Regulations 1989 (SUiAR), and in accordance with the Biosolids Assurance Scheme (BAS).

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 on the cake pad. The waste stream is the same as that arising from the treatment of sludge within the Wargrave 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 Primary Digester Tanks is captured and transferred to a double membrane Biogas Storage holder at the site. The biogas transfer pipeline is equipped with condensate pots that capture entrained moisture from the generated biogas and allow it to be drained into the site drainage system for treatment. The Biogas Storage holder is fitted with 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 one CHP engine with the vast majority of the generated electricity used on site.

In the event that additional heating is required for the Primary Digester Tanks, there is a dual fuelled auxiliary boiler that can combust biogas or diesel fuel. An emergency flare is available for use during periods of essential maintenance and for emergency use. The emergency flare is utilised under 10% of the year or less than 876 hours per year.

The site has two emergency standby generators that are used for emergency purposes. These have been assessed against RGN2 and do not meet the definition of a DAA.

2. Technical Description

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

Scope

This variation application is for the biological treatment of sewage sludge, both indigenous and imported from other waste water treatment sites, by anaerobic digestion, with a capacity above the relevant thresholds. It also permits the acceptance of portable toilet wastes along with cess, septic tank, and similar sewage derived materials, to the works inlet for processing through the UWWTD treatment route, along with the import of treated sewage cake from other sites for temporary storage pending offsite treatment on the cake pad.

There are a number of Directly Associated Activities (DAAs), including the operation of a biogas fuelled CHP engine for the generation of electricity and heat at the site, which is classified as an 'existing' combustion source under the MCPD and operation of dual fuelled boiler for generation of heat. The site is manned 07:30 to 15:00hrs with operations then monitored remotely from the Regional Operations Centre.

The CHP engine is covered by an existing environmental permit under number EPR/UP3737QP/A001. This permit is subject to a substantial variation to convert it to an installation permit with the CHP engine becoming a DAA to the listed activity.

Location

The Wargrave STC site is located in a mainly semi-rural location within the administrative area of Wokingham. The site is surrounded by fields, woodland and the River Loddon to the west and the fruit wholesaler operations of Sheeplands Farm / Hall Hunter Partnership to the immediate north, east and south of the site. Beyond this the edges of the settlements of Twyford and Wargrave are located approximately 490 m and 960 m to the South-East and North-East of the site respectively. The nearest sensitive receptors are commercial premises located approximately 25m to the South and include a furniture installation company and a sketch studio. The nearest residential dwellings are static homes at Sheeplands Farm located approximately 195m to the North-East of the site.

Chilterns Beechwoods Special Area of Conservation (SAC) represents the only statutory designated nature conservation site located within the specified screening distance from the site situated approximately 9.7km to North-East of the site. There are no Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs) within 2km of the site and no Special Protection Areas (SPA), Marine Protection Areas (MPA) or Ramsar sites within 10 km of the site.

There are six non-statutory designated Local Wildlife Sites (LWS's) within 2 km of the site, the closest of which is located within 50m of the western boundary of the Wargrave STW and is associated with the River Loddon. There are no areas of Ancient Woodland within 2 km of the site.

There are also designations for protected species within the screening distance of the site.

The STC and associated assets are located predominately within Flood Zone 2 (area with medium risk of flooding, with between a 1:100 and 1:1,000 annual probability of river flooding). The western areas of the wider Wargrave STW are located within Flood Zone 3 (area with high risk of flooding indicating a 1:100 or greater annual probability of river flooding or 1:200 or greater annual probability of sea flooding).

The site sits within the boundaries of Source Protection Zones (SPZ) 2 and 3.

The site is not located within or adjacent to the boundaries of an Air Quality Management Area (AQMA).

A site plan, showing the permitted area of the Wargrave STC and the wider STW can be found in A.2 Site Layout while a Process Flow Diagram summarising the sludge treatment process can be found in A.5 Process Flow Diagram. A site tank inventory is included below, followed by the site process description which identifies where tanks are located within the sludge treatment process.

Table 2.1 Site tank inventory

Tank Purpose	Number	Operational Volume (m^3)	Total Operational Volume (m^3)	Construction
Sludge Import Buffer Tank	1	62	62	Steel
Screened Sludge Import Buffer Tank	1	7.5	7.5	Steel
Digester Feed Tank	1	343	343	Concrete
Liquor Buffer Tank 1	1	223	223	Steel
Liquor Buffer Tank 2	1	343	343	Concrete
Primary Digester Tank	2	2,200	4,400	Steel
Secondary Digester Tank	4	733	1,466	Steel
Diesel Tank (boiler)	1	6,818		Steel

Waste Activities

The biological treatment of sludge includes treatment of the indigenous sewage sludges from the onsite aerobic treatment process and treatment of imported sewage sludges from other sites, arriving by road to a waste import point. The indigenous sewage sludges are generated from the aerobic treatment of both waste waters from the sewer network arriving into site at the works inlet, and, from imported waste materials, arriving by road transport into a cess waste import point

The STC comprises of imports of waste for biological treatment and two additional activities (imports of non-hazardous waste to the head of the works and imports of non-hazardous waste to the cake pad). 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 Wargrave STC by tanker and consists of sludge from other Thames Water sites, which forms a waste activity for the site.

Imports of non-hazardous waste are considered a secondary waste operation to the main listed activity and consist of consist of portable toilet waste along with cess, septic tank and similar sewage derived materials to the cess waste import point 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 the works to an offloading point for permitted imported tankered wastes close to the main entrance to the wider STW on land owned by Thames Water and is under webcam coverage, providing coverage to the area of waste imports to the cess logger. 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.

The import area is bunded and connected to the site drainage with a concrete hardstand floor and kerbing. There is one data logger and site supplied flexible hose pipe (to prevent misconnections) at this location and the cess from the tankers is discharged through the hose and logger unit. Access to the offloading points is controlled by the issue of key fobs by Thames Water to approved contractors only, who have undergone appropriate waste pre-acceptance checks on the material they wish to import. These key fobs enable the delivery tankers to discharge waste into the works, through a data logger, which records the volume of waste transferred. The cess is transferred into the Cess / Waste Import Tank, and then transfers via the subsurface gravity line to the Works Inlet where the waste combines with the incoming main sewer and passes to the UWWTD route for aerobic treatment. The Cess / Waste Import Tank is above ground, open topped and of concrete construction.

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

All imported cake will be stored on an impermeable surface within the 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 is drawn off the PSTs and is pumped to Primary Sludge Buffer Tanks, which sit outside the scope of the permit application. The primary sludge is thickened on a Primary Thickening Plant and then pumped to the Digester Feed Tank where they are mixed with indigenous SAS and imported sludge.

SAS from the Final Sedimentation Tanks (FSTs) is pumped to one of two steel SAS Buffer Tanks, which are outside the scope of this permit application. SAS is then pumped to the SAS Thickening Plant.

The Thickening Plant are connected to OCU 1 for odour abatement. At this point a liquid polymer from an Intermediate Bulk Container (IBC) in the polymer kiosk is used, where final effluent / potable water is added to dilute the polymer and is stored in a make-up tank before the dose is added. Liquor from the Primary Thickening Plant is transferred to the Liquor Buffer Tank 1, an enclosed, aboveground tank of steel construction, connected to OCU 1. This tank has a level monitor connected to SCADA system in order to prevent overfilling and liquors are returned over the course of 24 hours. Primary Thickening Plant liquors in the Liquor Buffer Tank 1 are returned to the works inlet via the Liquor Return Pumping Station 1 and Liquor Buffer Tank 1 for treatment through the aerobic treatment route via site drainage. Liquor from the SAS Thickening Plant is returned to the works inlet via the Liquor Return Pumping Station 2. Safety systems are in place which inhibit the feed pumps or belts from operating if there are blockages. From this point the thickened sludges are pumped to the Digester Feed Tank.

The Wargrave STC also accepts the import of sludge from other waste water treatment sites via an offloading point. At this Sludge Import Point the sludge discharges through the site supplied flexible hose pipe (to prevent misconnections) and logger unit and into the Sludge Import Tank. Access to the sludge logger is via a key fob that is issued to drivers and the logger records the volume of sludge transferred and the originating site. The sludge is then pumped to screens to remove inorganic material and rag and then transferred to a Screened Sludge Import Tank before being pumped to the Digester Feed Tank. The Sludge Import Tank is open topped, above ground and of steel construction and the Screened Sludge Buffer Tank is above ground, covered and of steel construction.

Digestion Processes

Thickened sludge is then pumped by the duty/standby pumps to one of the two Primary Digester Tanks on the site with the pumps having the ability to serve either of the Primary Digester Tanks. The sludge line passes through the Boiler House and joins the recirculation line on the heat exchange system, where there is one heat exchange system per Primary Digester Tank. During this process the hot water from the CHP engine/boiler heats the sludge and the hot sludge then re-joins the feed line to the Primary Digester Tanks.

The two Primary Digester Tanks at the site consist of aboveground tanks constructed of steel and glass reinforced insulation. Both Primary Digester Tanks have fixed roofs with small conical bottoms leading to a de-gritting sump. The contents of each Primary Digester Tank are subject to biogas mixing, whilst the contents undergo anaerobic digestion. The Primary Digester Tanks operate on a continuous basis, receiving batches of sludge at the top of each tank that is pumped sequentially into each tank in turn. The Primary Digester Tanks at the site have a normal retention time of approximately 12 days. Each Primary Digester Tank is fitted with a high-pressure alarm, dual PRVs, ultrasonic levels measuring sludge levels and are connected to the site SCADA system and interlocks inhibit the digester feed pumps if a high alarm is triggered.

Heat exchange systems for each digester are located within the Boiler House, which provides external heat input to each Primary Digester Tank. The heat exchanges use heat generated on site by either the CHP engine or by the boiler. Sludge is drawn from the base of each Primary Digester Tank, via a pump through a heat exchanger and returned mid-way up the Primary Digester Tank; with sludge also joining the sludge line from the heat exchanger. Probes monitor the temperature within each Primary Digester Tank.

After the required duration, digested sludge is transferred from the Primary Digester Tank to the primary digested sludge sump, where digested sludge enters the top of the Secondary Digester Tanks from sub-surface sludge lines. There are four Secondary Digester Tanks at the site and operate in series, with one tank filled with sludge (and holding sludge), one tank being filled with sludge, one tank being emptied for dewatering at the Dewatering Plant and the fourth tank at one of these stages. The four Secondary Digester Tanks are all above ground, open topped, of steel construction with slightly conical bottoms. The Secondary Digester Tanks have a normal retention time of approximately 90 hours per tank. All four Secondary Digester Tanks are subject to air mixing via a compressed air system to prevent settling, has ultrasonic levels to monitor and measure the levels of sludge in each of the Secondary Digester Tanks. There are also valves present on each Secondary Digester Tank on PLC timers that would be closed off if a high level of sludge is triggered.

Digested sludge is then pumped from the Secondary Digester Tanks for dewatering by dedicated pumps to the Dewatering Plant. Digested sludge is dewatered with a polymer that is automatically made up from a bulk bag system using final effluent / potable water in a Make-up Tank and dosed from a Day Tank. Digested sludge cake falls to a conveyor inside the Digested Sludge Dewatering Building and is transferred outside to the cake pad area. Liquor gravitates to a common line and the liquor is then pumped to the site drainage system and is returned to the inlet for treatment via the Liquor Buffer Tank and Liquor Return Pumping Station 3.

Cake Storage

The cake pad is open and comprises an area of engineered hardstanding with two bays and bounded by low level concrete boundary walls. Any non-conforming sludge is isolated and matured with all digested sludge cake exports prohibited while this takes place.

During abnormal operations, e.g. taking a digester out of service for maintenance, a temporary trailer centrifuge using polymer from an IBC can be used to dewater raw sludge for transferring to another Thames Water site.

This application includes a second additional waste operation at the same site for the import of non-hazardous, treated dewatered sludge cake from other works, for temporary storage 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 Wargrave 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.

A site-specific bioaerosol risk assessment for the STC is provided as Appendix F.

Biogas

The Biogas Storage holder at the site is a double membrane holder with an inner and outer bag that is blown to maintain pressure and has a methane detector for safety. The Biogas Storage holder is fitted with PRVs which operate in an emergency as a safety precaution in the event of over pressurising the system and there are slam shut lines on the biogas line. The Biogas Storage holder is also fitted with lightning protection and ATEX lighting and a secure fence for physical security. There are carbon siloxane filters on the biogas line to the CHP engine. Condensate from the condensate pots and condensate traps drain to the site drainage for further treatment.

The biogas is taken from the Biogas Storage holder for combustion in one CHP engine on-site, and only diverts to the emergency flare for safety. The vast majority of electricity generated by the CHP engine is used on site. Recoverable low-grade heat from the CHP engine is passed via heat exchange to maintain the Primary Digester Tank temperature. Emissions from the CHP engine are via a single stack that is approximately 6 m tall. There are two carbon-based siloxane filters upstream of the CHP engine between the CHP engine and the Biogas Storage in order to remove impurities from the biogas prior to combustion. In the event of additional heating being required by the Primary Digester Tanks, this is provided by the onsite Strebel boiler. The flue for the boiler exits the building via the roof with the stack height estimated at approximately 4m. The boiler is dual fuelled and can run using either diesel oil or biogas. The boiler is less than 1 MWth and is too small to be considered as combustion plan for the scope of the MCPD.

In the event of there being excess biogas, i.e. more than the CHP engine or the boiler can utilise, or in the event that the CHP engine or boiler are unavailable, there is a single ground mounted emergency flare stack approximately 4m in height, which automatically operates on a high level of biogas within the Biogas Storage holder. This is utilised under 10% of the year, less than 876 hours per year.

Emergency Standby Generators

The STW also has two emergency standby generators that are used for emergency purposes only and regular testing. These have been assessed and neither generator is considered 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 Wargrave STC including the Sludge Import Tank and Secondary Digester Tanks (x4).

Thames Water is committed to meeting the requirements of BAT. A full BAT risk assessment is required to determine the potential need to cover open topped tanks. Thames is not able to commit to covering tanks by the stated deadline of December 2024 delivery timescales will be subject to the outcome of PR24 and subsequent price review discussions.

2.3 Site Infrastructure

Management of emissions to water – BAT 19

Thames Water is committed to meeting the requirements of BAT. A full BAT risk assessment is required to determine the detailed design for Wargrave 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 Primary Digester Tanks and Biogas Storage holders are also fitted with dual pressure relief valves which operate in an emergency to minimise releases from over- or under-pressurisation. Site operations are covered by Thames Water's management system, including the preventative maintenance programme for the site.

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

- pH: At a conventional digestion site such as Wargrave 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. Wargrave fits into the first row of the table.
- Dry solids feed: see table below, Wargrave has a target of 6%DS, but this can vary between 3-8%DS and impacts the HRT.

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

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

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

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

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

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.

Bioaerosol

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

Other Items

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

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

An air dispersion model using ADMS has been prepared for the air emissions from combustion plants at the site and is provided as Appendix L to this application. The key findings are that the impact from the emissions are acceptable from an air quality perspective.

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.

In addition to the listed activity at the site, there is a DAA of a biogas combustion plant covered by specified generator controls.

The site includes the following DAAs:

- Imports of waste, including sludge from other sewage treatment works for treatment;
- Blending of indigenous sludges and imported wastes/waste sludge prior to treatment;
- Storage of digestate prior to dewatering;
- Dewatering of digested sewage sludge;
- Transfer of dewatering liquors via site drainage back to the head of the sewage treatment works;
- Transfer of surface water runoff via site drainage back to the head of the sewage treatment works;
- Storage of dewatered digested sludge cake prior to offsite recovery;
- Storage of biogas;
- Transfer of biogas condensate via site drainage back to the head of the sewage treatment works;
- Combustion of biogas in a biogas CHP Engine (that is a Tranche B Specified Generator) and biogas or diesel oil in a boiler;
- Operation of an emergency flare;
- Operation of a siloxane filter;
- Storage of diesel;

- Storage of wastes, including waste oils; and,
- Storage of raw materials.

The waste activities at the site are:

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

In addition to the listed activity at the site, there is a DAA of a biogas combustion plant. The CHP engine is an 'existing' MCP and also a specified generator. This comprises:

- 1x 1.4 MWth CHP engine; and,
- 1x 0.70 MWth boiler.

Total thermal input of STC is approximately 2.1 MWth.

2.5 Combustion Plant

Wargrave CHP Engine	
MCP specific identifier*	Wargrave STC CHP Engine 1
12-digit grid reference or latitude/longitude	E 477953 N 177231
Rated thermal input (MW) of the MCP	1.4
Type of MCP (diesel engine, gas turbine, other engine or other MCP)	Other engine
Type of fuels used: gas oil (diesel), natural gas, gaseous fuels other than natural gas, landfill gas	Biogas
Date when the new MCP was first put into operation (DD/MM/YYYY)	13/01/2017
Sector of activity of the MCP or the facility in which it is applied (NACE code**)	E37.0.0
Expected number of annual operating hours of the MCP and average load in use	8,760
Where the option of exemption under Article 6(8) is used the operator (as identified on Form A) should sign a declaration here that the MCP will not be operated more than the number of hours referred to in this paragraph	n/a

Wargrave Boiler 1 (too small to be a mcp)	
MCP specific identifier*	Wargrave STC Boiler 1
12-digit grid reference or latitude/longitude	E 477959 N 177240
Rated thermal input (MW) of the MCP	0.70
Type of MCP (diesel engine, gas turbine, other engine or other MCP)	Boiler
Type of fuels used: gas oil (diesel), natural gas, gaseous fuels other than natural gas, landfill gas	Dual fuelled (Biogas or diesel)
Date when the new MCP was first put into operation	1991
Sector of activity of the MCP or the facility in which it is applied (NACE code**)	E37.0.0
Expected number of annual operating hours of the MCP and average load in use	6,000
Where the option of exemption under Article 6(8) is used the operator (as identified on Form A) should sign a declaration here that the MCP will not be operated more than the number of hours referred to in this paragraph	n/a

3. Form C2 Questions

1 About the permit

1a Discussions before your application

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

1b Permit number

EPR/UP3737QP/A001 issued 28/05/2019

1c What is the site name, address, postcode of the site?

Wargrave Sludge Treatment Centre

Wargrave Sewage Treatment Works

Wargrave Rd,

Wargrave,

Reading,

RG10 8DJ

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
Wargrave STC	*Section 5.4 Part A(1) (b); i*	Biological treatment by means of Anaerobic digestion		This document
Wargrave CHP Engine			Operation of CHP engine a 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/UP3737QP – Wargrave Sewage Treatment Works (CHP Engine).

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

Event Name	Court	Date of hearing	Fine	Summary
				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

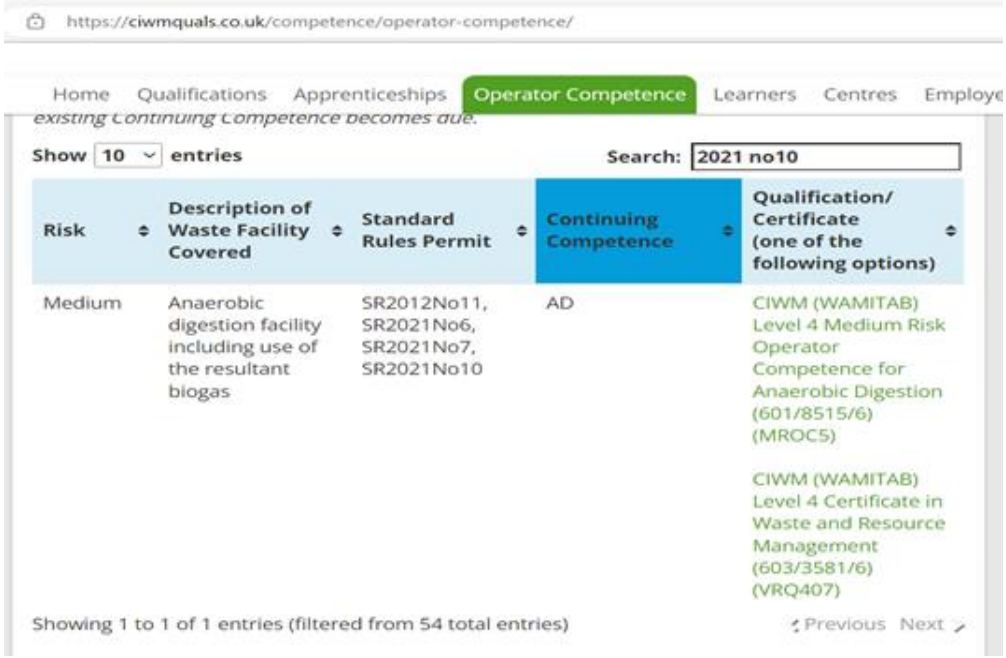
Thames Water uses WAMITAB qualified staff at their waste facilities. The relevant person for the site has been named below and full details have been provided separately on a spreadsheet:

Emma Wagstaff

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

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

Yes. See Appendix C for the Site Condition Report.

5c Provide a non-technical summary of your application

Please see earlier text in Section 1.

5d Risk of fire from sites storing combustible waste

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

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

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
Chilterns Beechwoods	SAC	North-east	9,700 m
n/a	SSSI	n/a	n/a
n/a	LNR	n/a	n/a
n/a	MPA	n/a	n/a
n/a	Ramsar	n/a	n/a
n/a	SPA	n/a	n/a
n/a	Ancient Woodland	n/a	n/a
List of Local Wildlife Sites			

Ruscombe and Vale Woods (Ruscombe Wood) Ruscombe Village Pond Twyford Gravel Pits (Loddon Reserve & Charvil Country Park) Loddon River (part) Shiplake Marsh Warren Wood	All sites <2,000 m

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

Chilterns Beechwoods SAC is the only statutory designated nature conservation site located within the relevant distance from the site situated approximately 9.7km to North-East of the site. There are no SSSIs within 2km of the site and no SPA's, MPA's or Ramsar sites within 10 km of the site.

There are no designated Local or National Nature Reserves within 2 km of the Wargrave STW.

There are six non-statutory designated LWS's within 2 km of the site, the closest of which is located within 50m of the western boundary of the Wargrave STW and is associated with the River Loddon.

There are no areas of Ancient Woodland within 2 km of the site.

There are no protected habitat records within the specified screening distance (within 500m) of the site. There are however records of protected species within the specified screening distance (within 500m) of the site, namely the adjacent river is designated as a migratory route for both European eels and Atlantic salmon. There are also records of water voles present.

The site sits within the boundaries of Source Protection Zones (SPZ) 2 and 3.

The STC and associated assets are located predominately within Flood Zone 2 (area with medium risk of flooding, with between a 1:100 and 1:1,000 annual probability of river flooding). The western area of the wider Wargrave STW are located within Flood Zone 3 (area with high risk of flooding indicating a 1:100 or greater annual probability of river flooding or 1:200 or greater annual probability of sea flooding).

The site is not located within or adjacent to the boundaries of an Air Quality Management Area (AQMA). The nearest AQMA to the site is located approximately 1.3km to the South-East of the site within the settlement of Twyford. The AQMA has been declared in December 2015 for the following pollutants: Nitrogen dioxide (NO_2) – Annual Mean.

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
Amenity issues: Litter, vermin and pests	The site is located in a mainly semi-rural location with the edges of the settlements of Twyford and Wargrave located approximately 490 m and 960 m to the South-East and North-East of the site respectively. The nearest residential dwellings are static homes at Sheeplands Farm, Herons Reach, Riverways Farm, Loddon Park Farm located approximately 195m, 280m, 295m and 315 m to the North-East, West and South of the site respectively. The nearest commercial premises are located approximately 25m to the South and include a furniture installation company and a sketch studio. The Piggott School is also located approximately 290m to the East. Ecological receptors: Chilterns Beechwoods SAC is located approximately 9.7km to North-East of the site. There are no SSSI's within 2km of the site and no SPA's, MPA's or Ramsar sites within 10 km of the site. There are no designated Local or National Nature Reserves within 2 km of the Wargrave STW. There are six non-statutory designated LWS's within 2 km of the site, the closest of which is located within 50m of the western boundary of the Wargrave STW and is associated with the River Loddon. There are no areas of Ancient Woodland 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 a cake pad. The closest commercial properties to the cake pad are located approximately 25 m to the South. The closest residential receptors to the cake pad are a series of static homes located approximately 195m to the North-East. Roads will be maintained to avoid the production of dust. Anaerobic digestion of sludge takes place within a closed system. Digested sludge cake is stored within an open cake pad which are	✓

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
		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. The nearest receptors to the cake pad are approximately 25 m to the South. Please see Appendix F for the site specific bioaerosol risk assessment.	
Assessment of point source emissions to air Emissions deposited from air to land	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. For human health and ecological receptors, see notes for Amenity issues above. The impact of emissions from air on human health will depend on the distance and wind direction.	ADMS modelling indicates impact from the emissions are acceptable. The site is not located adjacent to or within the boundaries of an AQMA. Pressure relief valves are not used routinely to control biogas volumes and would only operate in an emergency. There are multiple outlets at Wargrave STC that use biogas. The emergency flare is used only during periods when there is a larger volume of biogas than the CHP engine and boiler are able to manage. Fugitive emissions to air are assessed in Table C3-3b(i). Please see Appendix L for AQMS report.	✓
Assessment of point source and fugitive emissions to water	The River Loddon, a designated Main River and tributary of the River Thames, is located approximately 40 m to the West of the wider Wargrave STW. An un-named drain runs along the southern boundary of the site and outfalls into the River Loddon. A further drain runs along part of the western and northern boundaries of the wider Wargrave STW and connects into a further drain, which flows in a northerly direction outfalling into the River Loddon. The site is located predominately within Flood Zone 2 (area with medium risk of flooding, with between a 1:100 and 1:1,000 annual probability of river flooding). The western areas of the wider Wargrave STW are located within Flood Zone 3 (area with high risk of flooding indicating a 1:100 or greater annual probability of river flooding or 1:200 or greater annual probability of sea flooding).	The main product of the process is a digested sludge cake, which is stored within Flood Zone 2, on an engineered concrete pad equipped with drainage holes that gravitate to a drainage channel which gravitates to the site drainage before it is returned to the works inlet. Other aqueous discharges generated by process are limited (comprising only biogas condensate, liquor, wash water and surface water run off). These sources are discharged to the on-site drainage system where they are transferred to main sewage works inlet. Due to the nature and small quantity of these emissions no further assessment of point source emissions is deemed necessary.	X

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
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 Wargrave STW, 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 STW has an odour management plan, which is appended as Appendix E. Odour emissions are assessed in Table C3-3b(ii).	X
Energy	Global atmosphere (direct and indirect emissions)	Use of biogas on site within the CHP engine to generate electricity which is utilised on site reduces the demand for non-renewable electricity. Use of additional biogas within the site boiler minimises the need to use non-renewable diesel fuel. Good maintenance procedures will help the plant to run efficiently and reduce site energy consumption. Use of LED lighting minimises electricity imports and 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 sits within the boundaries of Groundwater Source Protection Zones (SPZ) 2 and 3. Aquifers are classified as Principal (bedrock deposits) and Secondary A (superficial drift)	All waste streams are disposed of off-site for recovery or disposal and will continue to be transferred (and consigned where hazardous) to appropriately permitted facilities.	X
Noise and vibration	Human health receptors: Single houses or groups of houses (estates, villages etc.). Schools and hospitals. Footpaths, amenity and recreation areas such as playing fields and playgrounds. Industrial estates and rail stations. The site is located in a mainly semi-rural location with the edges of the settlements of Twyford and Wargrave located approximately 490 m and 960 m to the South-East and North-East of the site respectively. The	Site design has been chosen to minimise the impact of noise on offsite receptors through building orientation, finishes and location of openings. Combustion plant is internal within a self-contained unit or building and acoustically shielded from nearby receptors.	X

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
	nearest residential dwellings are static homes at Sheeplands Farm, Herons Reach, Riverways Farm, Loddon Park Farm located approximately 195m, 280m, 295m and 315 m to the North-East, West and South of the site respectively. The nearest commercial premises are located approximately 25m to the South and include a furniture installation company and a sketch studio. The Piggott School is also located approximately 290m to the East. Ecological receptors: Chilterns Beechwoods SAC is located approximately 9.7km to North-East of the site. There are no SSSI's within 2km of the site and no SPA's, MPA's or Ramsar sites within 10 km of the site. There are no designated Local or National Nature Reserves within 2 km of the Wargrave STW. There are six non-statutory designated LWS's within 2 km of the site, the closest of which is located within 50m of the western boundary of the Wargrave STW and is associated with the River Loddon. There are no areas of Ancient Woodland within 2 km of the site.	Noise from plant and equipment will be minimised through purchasing decisions and a robust preventative maintenance programme. There will be no sources of vibration within the facility. Noise and vibration emissions are assessed in See Table C3-3b(iii).	
Other issues (including visual impact)	Protected Species and Habitats	There are no protected habitat records within the specified screening distance (within 500m) of the site. There are however records of protected species within the specified screening distance (within 500m) of the site, namely the adjacent river is designated as a migratory route for both European eels and Atlantic salmon. There are also records of European eels and Water Voles present. The installation does not discharge directly to the river and the final effluent discharge is regulated under a separate environmental permit which takes into account these designations.	**X**
Climate Change	Risks of increased temperature impacts resulting in digesters heating beyond optimal operating temperature and increased odour potential from site process. For human health and ecological receptors, see notes for Amenity issues above.	Primary Digester Tanks may require reduced heat input to digester via heat exchange system and Primary Digester Tanks are insulated against worse impacts. Warmer temperatures may require less boiler input/use as a result of less heat demand, or, increased heat dumping via air cooled radiator. If less biogas is used, the site may require a new consumptive biogas solution e.g.	**X**

Consideration	Receptors	Discussion	Detailed Environmental Risk Assessment?
		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 lifespan.	
Climate Change	Risks of increased storm events that causes surface water runoff exceeds capacity of site drainage system, or additional dewatering operations due to rainwater ingress, or caused bunds to infill. Increased precipitation may increase flooding on agricultural land, decreasing ability to spread digested sludge cake to land. For water environment receptors, see notes for Assessment of point source and fugitive emissions to water above	The STW design may require expansion or additional storm capacity; however, this would apply to UWWTD operations at the site rather than permitted activities. May need to increase bund or containment volume for sewage treatment works or individual assets. Land spreading activities could be restricted during very wet, winter months. Although the site has a large cake 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
Wargrave Sewage Treatment Works AR1	S5.4 A1 (b) (i) Recovery or a mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment activity is anaerobic digestion) involving biological treatment. Anaerobic digestion of permitted waste in two Primary Digester Tanks and four 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).	379 wet tonnes per day (throughput based on 4,546m3/12 =379m3 per day)	R3: Recycling reclamation of organic substances which are not used as solvents R13 Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where the waste is produced) D15: Storage pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where it is produced	Maximum waste throughput 600,000 wet tonnes per annum including indigenous UWWTD derived sludge from within the wider Wargrave STW. As per volume calculations in Note 1 below
Directly Associated Activities					
AR2	Imports of waste, including sludge from other sewage treatment works for treatment				
AR3	Blending of indigenous sludges and imported wastes/waste sludge prior to treatment				
AR4	Storage of digestate prior to dewatering				
AR5	Dewatering of digested sewage sludge				
AR6	Transfer of dewatering liquors via site drainage back to the head of the sewage treatment works				
AR7	Transfer of surface water runoff via site drainage back to the head of the sewage treatment works				
AR8	Storage of dewatered digested sludge cake prior to offsite recovery				

AR9	Storage of biogas
AR10	Transfer of biogas condensate via site drainage back to the head of the sewage treatment works
AR11	Combustion of biogas in a biogas CHP engine (that is a Tranche B Specified Generator) and biogas or diesel oil in a boiler
AR12	Operation of an emergency flare
AR13	Operation of a siloxane filter
AR14	Storage of diesel
AR15	Storage of wastes, including waste oils
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 1 SU 7794 7723	Schedule 25B – Specified generator	1 x 1.4 MWth CHP engine	Biogas	Unlimited
AR18	TWUL combustion plant numbers 5 and 8	Excluded generators	1 x 1.0 MWth emergency back up generator 1 x 1.6 MWth emergency back up generator	Diesel	Back-up generators operated for the purpose of testing for no more than 50 hours per annum

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 20,000 tonnes per annum

	Digested sludge cake for temporary storage pending off-site removal	R3: Recycling or reclamation of organic substances which are not used as solvents 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 500 tonnes per annum
For all Waste Operations		**Total Capacity**	**10,389 wet tonnes**	**[a] + [b]**
		Total STC treatment capacity (tank volume)	7,889 wet tonnes	[a]
		Total cake pad storage capacity	2,500 wet tonnes	[b]
For waste imports to the head of the works		Annual throughput (tonnes each year)	Imports: 20,000 wet tonnes	
For waste imports of digested sludge cake for temporary storage		Annual throughput (tonnes each year)	Imports: 500 wet tonnes	
Note 1: Import Calculation based on: Unthickened Primary Sludge: 9.57 tds/day; worse case 1.50% dry solids = 638 m3/day = 232,927 m3/year Unthickened SAS: 4.50 tds/day; worse case 0.50% dry solids = 899 m3/day = 328,216 m3/year Imports – Liquid: 0.44 tds/day; worse case 0.50% dry solids = 87 m3/day = 31,763 m3/year Total Combined import calculation 592,906 m3/year; rounded to 600,000 m3/year				

Table 1b Types of waste accepted

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

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

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

Waste Code	Description of Waste
16 10 02	aqueous liquid wastes other than those mentioned in 16 10 01 [note 1]
Note 1 – comprising but not limited to: Thickening and dewatering liquors, centrate and liquor 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 permeant deposit of inorganic hazardous waste to land for construction or land reclamation?

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

2 – Point source emissions to air, water and land

Table C3-2a – Emissions to Air

Lines in bold are currently permitted under permit EPR/UP3737QP/A001

Emission point reference and location	Source	Parameter	Limit	Unit	Reference Period	Monitoring Frequency	Monitoring standard or method
A1	CHP Engine 1 (existing Medium Combustion Plant which is an engine fuelled on biogas) [Note 1]	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	190	mg/m^3	In line with TGN M5	Not specified	EA TGN M5
		Sulphur Dioxide	10	mg/m^3	Not specified	Not specified	Not specified
A2	Boiler (dual fuel)	Oxides of Nitrogen (NO and NO_2 expressed as NO_2)	-	-	-	-	-
		Carbon Monoxide	-	-	-	-	-
A3	Emergency Flare [Note 2] [Note 3]	-	-	-	-	-	-
A4	Primary Digester Tank PRV	-	-	-	-	-	-
A5	Primary Digester Tank PRV	-	-	-	-	-	-
A6	Biogas Storage holder PRV	-	-	-	-	-	-
A7	OCU 1	Hydrogen Sulphide	No limit set	-	Average over sampling period	Once every 6 months	CEN TS 13649 for sampling NIOSH 6013 for analysis or US EPA M11

Emission point reference and location	Source	Parameter	Limit	Unit	Reference Period	Monitoring Frequency	Monitoring standard or method
		Ammonia	20	mg/m^3			EN ISO 21877 CEN TS 1369 for sampling Or NIOSH 6016 for analysis

Note 1: These limits are based on footnote 1 of existing permit EPR/UP3737QP. 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 O2 content of 15% for engines.

Note 2: These limits are based on normal operating conditions and load – temperature 0°C (273K); pressure: 101.3 kPa and oxygen: 3 per cent (dry gas). The measurement uncertainty specified in LFTGN05 v2 2010 shall apply.

Note 3: Monitoring to be undertaken in the even the emergency flare has been operational for more than 10 per cent of a year (876 hours).

Table C3-2b – Emissions to Sewer

Emission point reference and location	Source	Parameter	Limit	Unit
T1 (as per site plan, Appendix A2) (SU 78052 77339)	Primary Sludge Thickening Liquor, SAS Thickening Liquor, Digested Sludge Dewatering Liquor, Biogas Condensate, OCU Waste Water, Surface Water Run Off	No parameters set	No limit set	-
T2 (as per site plan, Appendix A2) (SU 77910 77194)	Head of Works import	No parameters set	No limit set	-

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

3 – Operating techniques

3a - Technical standards

Description of the schedule 1 activity or directly associated activity	Relevant technical guidance note or Best available techniques as described in BAT conclusions under IED	Document Reference
Anaerobic Digestion plant S5.4A1(b)(i); Storage of waste (DAA)	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?

No.

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

	Consequence		
Likelihood ↓	**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, boiler and emergency flare stack) have emission limits. Emergency flare stack height of approx. 4 m, CHP engine stack height is approx. 6 m and boiler flue approx. 4 m (exiting through boiler house roof). Site has a siloxane filter fitted on the main biogas pipeline connected to the CHP engine to remove impurities within the biogas. Air emissions modelling has been completed and shows that CHP engine and boiler are acceptable from an air quality perspective.	Low
Biogas transfer systems, Biogas storage, CHP engine, flare or PRVs failure causing emissions of biogas	Abnormal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Odour impact. Global warming potential. Risk of fire and explosion.	Low	Medium	Low	The plant is designed to capture and utilise all biogas possible, combusting the biogas in order to maximise recovered value from the biological treatment of sludge. The biogas system utilised is subject to regular preventative maintenance, including a LDAR plan to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of pressure and flow	Low

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

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						sensors and with isolation valves to minimise the potential for release if a leak is detected. Personnel on site wear portable biogas detectors in order to alert staff to presence of biogas. An emergency flare stack is utilised for the safe disposal of surplus biogas in the event of plant breakdown, or a surplus of biogas above the level that can be safely stored or utilised. Use of emergency flare is recorded. PRVs are in place on the Biogas Storage holder to be operated in the event of failure of the emergency flare to prevent over pressurisation and catastrophic failure.	
Combustion of biogas within CHP engine and emergency flare. Combustion of biogas or diesel within boiler	Normal	Emissions to air and dispersion leading to: inhalation by local human and animal receptors. Global warming potential.	High	Low	Medium	Combustion plant is regularly maintained and appropriately sized to manage volumes of biogas. Combustion plant operates within permitted ELVs subject to routine monitoring against permit compliance. CHP engine stack and boiler flue are located at the southern area of the site with the emergency flare located in the north-eastern area of the site. The nearest receptors are approximately 50m to the South of the CHP engine stack and boiler flue emission point and	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						approximately 100m to the South of the emergency flare emission point.	
Release of bioaerosols and dust	Normal	Emissions to air and dispersion leading to inhalation by local human and animal receptors. Odour impact of bioaerosols. Nuisance impact of dust.	High	Medium	High	Digested sludge cake storage is stored within an open, engineered cake pad which could give rise to dust and bioaerosol. This is located within the eastern side of the site, with the closest commercial properties (furniture installations and sketch studios) located approximately 25 m to the South of the cake pad. The closest residential receptors to the cake pad are a series of static homes located approximately 195m to the North-East of the cake pad boundary. The risk of bioaerosol and dust is largely minimised by storage of the digested sludge cake at the northern end of the cake pad away from the nearest receptors, which increases the separation distance. The cake pad is also bounded by low level concrete boundary walls with intermittent trees and hedgerow vegetation along the southern boundary of varying size, shape and maturity. This provides a degree of partial shielding between the boundary of the cake pad and the nearest receptors. Roads are made from concrete/asphalt and not prone to the generation of dust.	Low
Release of bioaerosols and	Abnormal	Emissions to air and dispersion leading to	Low	Low	Low	Digested sludge cake storage is stored within an open, engineered cake pad. This is located	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
dust from spillages		inhalation by local human and animal receptors with potential harm to health. Odour impact of bioaerosols. Nuisance impact of dust.				within the eastern side of the site, and the risk of bioaerosol and dust is largely minimised by storage of the digested sludge cake at the northern end of the cake pad away from the nearest receptors, which increases the separation distance. Internal site roads are made from concrete/asphalt and not prone to the generation of dust. 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. Staff responsible for site housekeeping and cleaning of spillages in a timely manner.	
Spillage of liquids, including chemicals and oils.	Abnormal	Emissions to surface waters close to and downstream of site. Acute effect resulting in loss of flora and fauna. Chronic effect resulting in deterioration of water quality. Emissions to ground and ground water.	Low	High	Medium	The River Loddon, a designated Main River and tributary of the River Thames, is located approximately 40 m to the West of the wider Wargrave STW. The closest surface water body comprises an un-named drain, which runs along the southern boundary of the site and outfalls into the River Loddon. The site sits within the boundaries of Source Protection Zones (SPZ) 2 and 3. Chemicals and oils all stored within suitably bunded tanks and IBCs with rainwater removed as required to maintain 110% capacities.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						Some chemicals stored internally within buildings. Handling and use of chemicals and oils is carried out by trained personnel. COSHH data sheets available. Spill kits available on site. There are no point source emissions to water with drainage system pumping back to works inlet.	
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	High	Medium	The site sits within the boundaries of Source Protection Zones (SPZ) 2 and 3. The closest surface water body comprises an un-named drain, which runs along the southern boundary of the site, and outfalls into the River Loddon. Provision of suitably structurally integral tanks constructed from steel and glass reinforced plastic or concrete. All tanks are subject to asset inspection and proactive maintenance programme including regular visual inspection for cracks or weeping. Due to some assets being subsurface, it may not be possible to identify all leaks immediately. Visual checks during regular day-to-day operations and scheduled preventative maintenance of equipment, such as pumps,	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						pipes, joins etc. Biogas condensate drains to the 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
H2S/biogas emissions from uncovered tanks	Normal	Emissions to air and dispersion leading to	High	Low	Medium	Biogas will principally be generated in Primary Digester Tanks which are covered with fixed	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
		inhalation by local human receptors. Loss of amenity from odour nuisance.				roofs. The nearest receptors are approx. 40 m to the South. Biogas is also generated in smaller quantities within Secondary Digester Tanks, which are all uncovered tanks. The Secondary Digester Tanks are located in the central area of the site and approx. 80 m from the nearest sensitive receptors, located to the South. H_2S production is controlled through the digestion process which can be manually overridden, if required.	
Loss of containment from biogas holders and biogas pipework	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors. Loss of amenity from odour nuisance.	Low	Medium	Low	Biogas is principally stored within the double membrane Biogas Storage holder which is suitably sized to manage biogas generation for the site. The biogas system utilised is subject to regular preventative maintenance, including a LDAR plan to minimise the potential for leaks occurring. The system is also protected with a comprehensive array of pressure and flow sensors and with isolation valves to minimise the potential for release if a leak is detected. The biogas pipelines are mainly aboveground. Personnel on site wear portable biogas detectors in order to alert staff to presence of biogas.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						Physical protection measures in place around the digester/ Biogas Storage holder, including lightning protection and some pipework is guarded, as required. PRVs present on the Biogas Storage holder to safely manage biogas pressures and prevent under or over pressurization. PRVs are monitored by site staff and re-seated/repaired in the event of activation to minimise the emissions to air.	
Activation of biogas pressure relief valve	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors. Loss of amenity from odour nuisance.	Low	Low	Low	PRVs are only activated in emergency situations to maintain safety within the biogas system and are re-seated/repaired promptly to minimize biogas emissions. PRV subject to monitoring via visual checks by site personnel. Biogas is principally stored within the double membrane Biogas Storage holder which is suitably sized to manage biogas generation. Site has multiple outlets to use biogas - one CHP engine, one boiler and one emergency flare which are used in order of preference to maximise recovery of energy. CHP engine and boiler are subject to regular maintenance to maintain maximum use of	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						outlets, with the emergency flare maintained in good working order should it need to be used. The nearest receptor is approx. 60 m to the South of the Biogas Storage holder.	
H2S/biogas emitted when biogas cannot be combusted in engine, boiler or flare	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors. Loss of amenity from odour nuisance.	Low	Low	Low	Biogas is principally stored within the double membrane Biogas Storage holder which is suitably sized to manage biogas generation and act as buffer storage when biogas cannot be combusted. Site has one CHP engine, one boiler and one emergency flare giving multiple outlets for biogas. The nearest receptors are approx. 60 m to the South of the Biogas Storage holder. The CHP engine is subject to regular maintenance to maintain maximum use of outlets, with the emergency flare maintained in good working order should they need to be used.	Low
Storage of treated digested sludge cake	Normal	Emissions to air and dispersion leading to inhalation by local human receptors. Loss of amenity from odour nuisance.	High	Low	Medium	Digested sludge cake storage is stored within an open, engineered cake pad. Digested sludge cake is an inherently low odour material. The cake pad is located within the eastern side of the site, with the closest receptors comprising commercial properties (furniture installations and sketch studios) located approximately 25 m to the South of the cake	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						pad. The closest residential receptors to the cake pad are a series of static homes located approximately 195m to the North-East of the cake pad boundary. Should any odorous sludge cake be produced, this will be subject to process checks undertaken to identify root cause of production and removed from site expediently.	
Failure of odour control units	Abnormal	Emissions to air and dispersion leading to inhalation by local human receptors. Loss of amenity from odour nuisance.	Low	High	Medium	Odour control units are subject to regular preventative maintenance. Media is replaced in line with the manufacturer's recommendations.	Low
Storage of site generated wastes	Normal	Emissions to air and dispersion leading to inhalation by local human receptors. Loss of amenity from odour nuisance.	Low	Low	Low	Wastes generated on site are not inherently odorous and is stored securely for collection by appropriately licensed approved contractors.	Low

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

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

Table C3-3b(iii)Noise risk assessment

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
Operation of CHP engine	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Low	Medium	The CHP engine is acoustically baffled, self-contained and designed for external applications therefore noise emissions are already low. The CHP engine is located in the southern area of the site, with the nearest receptors located approx. 50 m to the South of the CHP engine. Good maintenance of plant to ensure that excessive noise levels are not generated. Regular checks of noise mitigation measures fitted to items of plant. Such measures include silencers and baffles fitted to specific areas of plant. Where repair or replacement is required, the plant will, where possible, be taken out of service until repair or replacement of parts has been undertaken.	Low
Operation of fans on air cooled radiators	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Low	Medium	Air cooled radiators do not give rise to high levels of noise and are only used as required. They are located approx. 60 m from the nearest sensitive receptors (commercial properties to the south). Good inspection regimes and maintenance of fans to ensure that excessive noise levels are not generated. Where repair or replacement is required, this will be completed promptly.	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
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 subject to one-way system to reduce generation of noise. Shovel loading of digested sludge cake takes place within an open, engineered cake pad. The closest receptors to the cake pad are commercial properties (furniture installations and sketch studios) located approximately 25 m to the South. The closest residential receptors to the cake pad are a series of static homes located approximately 195m to the North-East of the cake pad boundary. Shovel loading is not a continuous operation. Impact of noise is considered against other industrial noise from nearby receptors and located away from sensitive residential receptors.	Low
Vehicle movements - tanker deliveries of waste sludge and bulk collections of digested sludge cake	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Imports of waste sludge are limited to daytime hours only and arrive into a point within the central areas of the site. 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 within an open, engineered cake pad. The closest receptors to the cake pad are commercial properties (furniture installations and sketch studios) located approximately 25 m to the South. The closest residential receptors to the cake pad are a series of static	Low

Activity/Hazard	Normal or Abnormal	Environmental Impact (Pathway-Receptor)	Likelihood	Consequence	Risk	Risk Management	Residual Risk
						homes located approximately 195m to the North-East of the cake pad boundary.	
Vehicle movements - tanker deliveries of chemicals and raw materials	Normal	Generation of noise with air transportation, causing loss of amenity to local human receptors. Generation of vibration with ground transmission, causing loss of amenity to local human receptors.	High	Low	Medium	Deliveries likely to take place during daytime hours to dedicated delivery areas. Vehicle movements across the site subject to speed limit and one-way system to reduce generation of noise.	Low
Operation of emergency flare	Abnormal	Generation of noise with air transportation, causing loss of amenity to local human receptors.	High	Low	Medium	Use of the emergency flare is minimized by prioritizing use of the CHP engine and boiler. Use of the emergency flare is recorded. The emergency flare is located away from sensitive receptors, which are located approx. 100 m to the South of the emergency flare emission point.	Low

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

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

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

The installation has the potential to generate bioaerosols which may pose a risk to nearby sensitive receptors. As summarised in the site-specific bioaerosol risk assessment 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 site has a number of emission points to air. Points A1 (CHP engine) is subject to emissions monitoring in accordance with the requirements of existing permit requirements and EA guidance.

A2 (boiler)will be subject to biogas monitoring in accordance with the requirements of EA guidance as required.

Hours of operation of the emergency flare (emission point A3) 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 emergency flare would be subject to monitoring in accordance with EA guidance.

Emission point A7 (OCU) will be monitored on a six-monthly basis.

There is no routine monitoring proposed for the PRVs (A4 – A6).

Table C3-4a – Emission Monitoring

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A1 CHP Engine 1	SU 77943 77239	Oxides of Nitrogen (NO and NO2 expressed as NO2) – Annually Sulphur Dioxide – Annually	In line with TGN M5	In line with TGN M5
A2 Boiler	SU 77957 77233	-	-	-
A3 Emergency flare	SU 77953 77300	Annual monitoring is only required when flare operates in excess of 10% of the time, taken on an annual assessment period. Oxides of Nitrogen (NO and NO2 expressed as NO2) – Annually	In accordance with Environment Agency guidance note M2 "Monitoring of stack emissions to air".	BS EN 14792
A4 Primary Digester Tanks PRV	SU 77971 77251	n/a	n/a	-
A5 Primary Digester Tanks PRV	SU 77987 77263	n/a	n/a	-

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A6 Biogas Storage holder PRV	SU 77971 77269	n/a	n/a	-
A7 OCU 1	SU 77898 77287	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling NIOSH 6013 for analysis OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CENTS 1369 for sampling NIOSH 6016 for analysis	
S1 (Liquor sampling point)	SU 77997 77270	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, however, a temporary sampling platform is utilised to provide sufficient space, in accordance with standard industry practice, where sampling cannot be undertaken from the ground.

5 – Environmental impact assessment

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

No.

6 – Resource efficiency and climate change

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

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

Maintenance activities and low energy lighting is installed across the plant. The heating water from the CHP engine is located in close proximity to the digester heat exchangers and transferred in insulated pipes to minimise heat losses in transmission.

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

The CHP engine, combusting indigenous biogas, is a source of energy and where the vast majority of generated power is utilised on site. The CHP also provides useable heat for hot water to the Primary Digester Tanks via heat exchange.

The main site energy source is electricity imports from the public supply via National Grid to supply the treatment process.

Biogas is also combusted in the boiler on site to meet additional heat demands from the Primary Digester Tanks, but the boiler is dual fuelled and can also use fuel oil when there is insufficient biogas.

Use of waste heat from the CHP engine reduces the demand on the boiler.

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

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

Describe the specific measures you use for improving your energy efficiency

The production and use of biogas to generate electricity for on-site usage and produce heat (which is used in the digestion process) minimises the use of fossil fuels whilst recovering biological wastes. Location of the heat exchange, boiler, CHP engine and Primary Digester Tanks 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 for? Waste operations which do not form part of an installation

The original CHP engine permit was issued under Specified Generator Controls (Tranche B) permit. This has now been incorporated within the installation permit as a DAA. This permit application is for two new waste operations for physical treatment of non-hazardous waste and for temporary storage of non-hazardous waste as a secondary activity waste operation to the main listed installation.

1b –types of waste accepted and restrictions

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

1c Deposit for recovery purposes

This is not a deposit for recovery application.

2 Point source emissions to air, water and land

Please see responses to form C3.

3 Operating techniques

3a Technical standards

Please see responses to form C3.

3b General requirements

Please see responses to form C3.

4 Monitoring

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

Please see responses to form C3.

4b Point source emissions to air only

Please see responses to form C3.

6. Form C6 Questions

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

Q1About the effluent – details and type, continued

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

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

1b Give this effluent a unique name

Liquor returns.

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

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

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

2c Will the discharge take place all year?

Yes, the discharge will take place all year.

Q3 How much do you want to discharge?

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

1,560 Cubic metres

3c What is the maximum rate of discharge?

18.05 Litres / second

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

1,560 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, biogas condensate generated from the inputs and outputs to/from the Primary Digester Tanks.

Q3c – Maximum rate of discharge (L/second) is generated from the maximum volume of effluent per day [1,559.68 m^3 x 1000] / 86,400 (24 x 60 x 60) from sources such as thickening and dewatering. This gives a value of 18.05185 litres, rounded up to 18.1 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, 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 Wargrave STW where it is subject to aerobic treatment in a mixture with UWWTD related waste waters.

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

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

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

The final effluent discharge from the wider Wargrave STW is specified in Environmental Permit TH/CTCR.2079/008.

Q7 What will be in the effluent?

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

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

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

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

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

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

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

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

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

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

7f What is the maximum temperature of your discharge?

20°C back into the sewage works.

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

0°C.

Q8 Environmental risk assessments and modelling

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

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

8d Discharges to groundwater

The installation does not discharge to groundwater.

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

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

8f Environmental impact assessment

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

Q9 Monitoring arrangements

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

Not applicable to this installation.

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

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

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

No flow meter installed.

9e Does the flow monitor have an MCERTS certificate?

No. No flow meter installed.

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

No. Not installed as part of this installation.

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

Please see site emission point plan.

Q10 Where will the effluent discharge to?

10a Where the effluent discharges to

The Grid Reference (SU 77760 77830) on the Environmental Permit TH/CTCR.2079/008 notes the discharge is to land adjacent to Loddon Drive, although it is assumed that this Grid Reference is incorrect. The effluent discharge is to a non - tidal river, stream or canal, to a channel on the northern boundary of the site which joins the River Loddon.

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

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

Final effluent discharge.

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

SU 77760 77830.

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

Discharge is via the wider UWWTD sewage treatment works. The Grid Reference (SU 77760 77830) on the Environmental Permit TH/CTCR.2079/008 notes the discharge is to land adjacent to Loddon Drive, although it is assumed that this Grid Reference is incorrect and that the effluent discharge is actually non - tidal river, stream or canal, most likely to the River Loddon to the west of the site.

A5.4 Is the discharge into a:

It is assumed that discharge is into a non-tidal river, most likely the River Loddon.

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

No.

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

No.

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

N / A.

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

N / A.

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

No.

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

No.

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

N / A.

Appendix A. Figures

A.1 Site Location Plan

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

A.2 Installation Boundary and Air Emission Points

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

A.3 Site Impermeable and Permeable Surface Plan

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

A.4 Site Drainage Plan

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

A.5 Process Flow Diagram

See document: B22849AZ-JA- WARGS1ZZ-LSX-DR-P-0003

A.6 Site Photographs

See document: TW_STC_EPR_26a_WGE_AppA.6

Appendix B. CoTC

See document: TW_STC_EPR_26a_WGE_APPB

Appendix C. Site Condition Report - H5

See document: TW_STC_EPR_26a_WGE_APPC

Appendix D. BAT Assessment

See BAT Assessment Spreadsheet: TW_STC_EPR_26a_WGE_APPD

Appendix E. Odour Management

See document: TW_STC_EPR_26a_WGE_APPE

Appendix F. Bioaerosol Risk Assessment

See document: TW_STC_EPR_26a_WGE_APPF

Appendix G. Containment Assessment

G.1 Containment Options Report (CIRIA 736)

See document: B22849AZ-JA- WARGS1ZZ-100-RP-Z-0001.pdf

G.2 Containment Assessment

See document: B22849AZ-JA-WARGS1ZZ-100-CA-P-0001.xlsx

Appendix H. Leak Detection and Repair Plan (LDAR)

See document: TW_STC_EPR_26a_WGE_APPH

Appendix I. Residue Management Plan

I.1 Residue Management Plan

See document: TW_STC_EPR_26a_WGE_APPI.1

I.2 MSDS Zip File

See document: TW_STC_EPR_26a_WGE_APPI.2

Appendix J. Accident Prevention and Management Plan

See document: TW_STC_EPR_26a_WGE_APPJ

Appendix K. Acceptance of Third-Party Waste Imports

K.1 Acceptance of Third-Party Waste Imports

See document: TW_STC_EPR_26a_WGE_APPK.1

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

See document: TW_STC_EPR_26a_WGE_APPK.2.

Appendix L. Air Quality Assessment

See document: TW_STC_EPR_26a_WGE_APPL.

Appendix M. Liquor Monitoring Proposal

See document: TW_STC_EPR_26a_WGE_APPM