

Permitting Decisions – Variation Permit

Document recording our decision-making process following the requirement for waste and wastewater sewerage treatment activities permitted as an installation subject to Chapter II of the Industrial Emissions Directive under the Environmental Permitting (England & Wales) Regulations 2016 (as amended)

We have decided to grant the permit for Crossness Sludge Treatment Centre (STC) operated by Thames Water Utilities Limited.

The permit number is EPR/PB3239AW/V005.

Purpose of this document

On 2 April 2019, the Environment Agency confirmed to the Water and Sewerage Companies (WaSCs) operating in England that their sewage sludge anaerobic digestion (AD) facilities needed to comply with the Industrial Emissions Directive (IED).

The IED entered into force on 6 January 2011 and was transposed into UK law on 20 February 2013. The IED recast the Directive on integrated pollution prevention and control (IPPC) and introduced a revised schedule of industrial activities falling within the scope of its permitting requirements. The schedule of waste management activities includes the recovery of non-hazardous waste with a capacity exceeding 75 tonnes per day involving biological treatment, but excludes activities covered by the Urban Waste Water Treatment Regulations (UWWTR).

In July 2014 we deferred the need for the WaSCs to submit permit applications for these facilities to allow for further consideration of whether they were already covered under the UWWTR. All the UK environmental regulators subsequently concluded this was not the case, and therefore they come within the scope of the IED.

The IED seeks to achieve a high level of protection for the environment, taken as a whole, from the harmful effects of industrial activities. It does so by requiring each of the industrial installations to be operated under a permit with conditions based around the use of best available techniques (BAT).

The IED set a deadline of 7 January 2014 for existing installations to obtain an environmental permit. Therefore, the implementation of this aspect of the IED

had been delayed for over five years at the point of our confirmation to the WaSCs on 2 April 2019.

The BAT Conclusions for Waste Treatment was published on 17 August 2018 following a European Union wide review of BAT, implementing decision (EU) 2018/1147 of 10 August 2018. BAT applies to new waste sewage sludge treatment not covered by the UWWTR. The installation operations at Crossness Sludge Treatment Centre (STC) are existing but will be brought under environmental regulation for the first time and are required to operate using BAT.

Given the delay in implementing the IED in England, we subsequently have sought to ensure that all sewage sludge AD facilities obtain and operate under an environmental permit in as short a timescale as can reasonably be achieved. We asked the WaSCs to provide a definitive list of all facilities used to carry out biological treatment of sewage sludge. A submission schedule was provided to the WaSCs, allowing applications for these facilities to be submitted to us in stages between 1 April 2021 and 1 October 2022. This application is part of this programme of work.

The application is for a variation to add a Section 5.4 A(1) (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.

Directly Associated Activities (DAAs) that now part of the permit include;

- Raw materials storage
- Digestate storage and treatment
- Emergency flare operation
- Gas storage
- Physical treatment of waste (including screening, pressing, thickening, centrifugation / dewatering)
- Uncontaminated surface water collection for reuse, and discharge
- Air collection and treatment prior to release to the atmosphere.

The permit has been reviewed against the requirements of the Medium Combustion Plant Directive (MCPD) for 2025 and 2030 and relevant conditions and monitoring requirements have been added.

This permit also allows for a further two waste operations relating to import of sludge and liquid waste to the head of works and the temporary storage of cake not produced on site.

We consider in reaching this decision that we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

This decision document provides a record of the decision-making process. It:

- summarises the decision making process in the decision considerations section to show how the main relevant factors have been taken into account
- highlights key issues in the determination
- shows how we have considered the consultation responses

Unless the decision document specifies otherwise, we have accepted the operator's proposals.

This permitting decision should be read in conjunction with the environmental permit.

Key issues of the decision

Best Available Techniques (BAT)

Article 3(12) of the IED defines BAT conclusions as:

a document containing the parts of a BAT reference document [BREF] laying down the conclusions on best available techniques, their description, information to assess their applicability, the emission levels associated with the best available techniques, associated monitoring, associated consumption levels and, where appropriate, relevant site remediation measures.

The *emission levels associated with the best available techniques* (BAT-AELs) in IED BAT conclusions are mandatory emission levels. These are generally numerical limits on point source emissions to water and air. We recognise that many sludge treatment facilities were constructed prior to the current permitting requirements and their design may not be readily compatible with the best available techniques as described in the BREF and BAT conclusions. Where this is the case, risk assessments and alternative proposals can be used to demonstrate that an equivalent level of environmental protection is being or can be achieved. Where an operator is not yet compliant with relevant BAT conclusions, we may accept an application where the operator describes how they will meet the required BAT conclusion within an acceptable timeframe. The Waste Treatment (2018) BREF provides a minimum standard of operation across the waste industrial sector. Alongside BAT-AELs, the BREF outlines general BAT conclusions, which apply to all waste sectors. It also contains BAT conclusions specifically for waste sectors which waste water treatment works operate within, namely; the biological treatment of waste and the treatment of water-based liquid wastes.

Thames Water Utilities Limited (referred to in this document as the 'operator') provided supporting information with their application to demonstrate that their methods of operating are in accordance with the relevant BAT conclusions. We have assessed these documents. In this *Key issues* section, we provide a commentary of the following areas which helped determine how the operator will operate in accordance with the relevant BAT conclusions:

- Secondary containment (BAT conclusion 19)
- Inventory of waste waters (BAT conclusion 3)
- Point source emissions to water – indirect emissions (BAT conclusions 7 and 20)
- Odour management (BAT conclusion 12)

Where this document does not discuss a BAT conclusion in detail, we have accepted the operator's supporting information and justifications that they are compliant with the respective BAT conclusion.

Bespoke permit conditions

The technical determination of this application identified key issues where the operator struggled to show how they would meet the relevant BAT conclusion requirements. These are standard pieces of information and evidence which would be expected upon receipt of a new bespoke permit application for a new anaerobic digestion installation facility. In this application, we identified that the operator was unable to provide detailed supporting evidence that key issues would achieve BAT conclusion requirements. These key issues were:

- Sufficient secondary containment measures (permit conditions 3.2.3 and 3.2.4).
- Preventing waste water emissions to the waste water treatment works during storm overflow (permit conditions 3.2.5 and 3.2.6).

We have performed an assessment of these aspects during the permit determination. A detailed account of these assessments is outlined in the sections below. Where we have not been able to fully assess the operator's proposals to meet BAT conclusion requirements but have received commitments to implement BAT, we have set time sensitive improvement conditions alongside backstop bespoke permit conditions.

Improvement conditions alone would not contain sufficient legal certainty to require an operator to have BAT in place. However, we acknowledge that this application is for an existing activity which has been operating for several years and we recognised that a pragmatic approach was needed to bring this unpermitted installation activity into environmental regulation.

To issue permits without agreeing that an activity fully meets BAT is in essence a permitted local enforcement position (LEP). LEPs are used by the Environment Agency for activities operating outside of a permit. This method will be implemented by setting prescriptive bespoke conditions in the permit for the outstanding BAT issue. These bespoke conditions include the definitive requirement plus a deadline for those techniques to be implemented – a backstop. We have also set improvement conditions for the timely submissions of detailed plans. Should an operator not comply with an improvement condition, a bespoke condition will be in place for the Environment Agency to enforce against.

For these improvement conditions, we have set a final deadline of 31 March 2025. It should be noted that the implementation date for operators to be compliant with the Waste Treatment BAT conclusions was 17 August 2022. Our deadline specified in the improvement condition provides a sufficient timeframe in which the operator can produce detailed plans to meet BAT and a timetable for their implementation. Where operators do not satisfy the requirements of the improvement condition by 31 March 2025, the Environment Agency may commence enforcement action against the WaSC. Failure of the WaSCs to

achieve BAT or failure to take steps to implement BAT by the backstop will be at the operator's risk.

Secondary containment

Secondary containment is a fundamental principle of pollution prevention at industrial sites and waste management facilities. We assess secondary containment provision when determining permit applications. Secondary/tertiary containment is an appropriate protective measure and is a standard requirement of an environmental permit. The Waste Treatment BREF includes BAT conclusion 19 which identifies several relevant techniques *to prevent or, where that is not practicable, to reduce emissions to soil and water.*

WaSC anaerobic digestion facilities store and treat significant volumes of waste sludge and liquids that have the potential to cause pollution to land, air and water and to impact detrimentally on any nearby sensitive habitats or areas of human occupation (also known as sensitive receptors). These facilities are co-located with wastewater treatment works (WwTW) and, by the nature of these operations, are usually located near to watercourses. They have tended to have little in the way of secondary containment, such as impermeable surfacing or bunding, that would protect the environment in the event of a loss of containment.

The most common receptors we consider could be impacted by a loss of containment include groundwater (aquifers), water courses, designated conservation areas (such as Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites), the adjacent WwTW and nearby human receptors such as residential and commercial premises.

Given the number, significance and complexity of the WaSC's sludge AD facilities, we have provided advice on what they should have regard to when assessing their facilities. We consider that this advice, and the timescales afforded to the WaSCs to submit information in support of their permit applications, is above and beyond that which would typically be given to permit applicants.

We advised the WaSCs to provide two main components of assessment aimed at clearly identifying where a facility has sufficient measures in place to protect sensitive receptors, and where improvements may need to be implemented.

The two components were:

- Containment assessment against the recommendations of CIRIA C736 guidance - *Containment systems for the prevention of pollution: Secondary, tertiary and other measures for industrial and commercial premises* (2014).
- Completion of the ADBA tool to identify sources, pathways and receptors, and risks.

We also advised applicants to submit spill modelling as supporting evidence to demonstrate the effectiveness of current containment measures and assess any identified necessary improvements.

We advised the WaSCs (including this operator) of the requirements of containment assessments on multiple occasions, including:

- At a workshop held by Water UK in February 2020 (Water UK members are UK water and wastewater service suppliers for England, Scotland, Wales and Northern Ireland, the operator is a member of Water UK) – Presentation Title: Permitting Overview – Including section on containment – Surfacing, bunding and capacity, presented by a Senior Permitting Officer of the Environment Agency National Permitting Service.
- Written advice sent in March 2021 by us including.
 - Sector specific pre-application advice note.
 - BAT gap analysis template tool.
- Presentation on 14 July 2021, delivered to Water UK, titled, *IED Permitting TaF + Spill Modelling*, which the operator attended, in which spill modelling was specifically discussed, along with a reiteration of application requirements. Spill modelling seminar presented by a Member of the Project Steering Group of CIRIA C736.

There are also various additional references to containment in guidance that is widely disseminated in the industry including:

- Waste Treatment BAT Conclusions.
- *Environmental permitting guidance on the control of emissions* (gov.uk).
- *How to comply with your environmental permit. Additional guidance for: Anaerobic Digestion* Reference LIT 8737 Report version 1.0 dated November 2013.
- *Appropriate measures for the biological treatment of waste* – consultation document and response comments.
- *Biological waste treatment: appropriate measures for permitted facilities - Guidance - GOV.UK* (www.gov.uk)
- *Emissions control - Non-hazardous and inert waste: appropriate measures for permitted facilities* - This is not directly applicable to biological treatment but will be replicated in the appropriate measures as mentioned in the above bullet point.
- *SR2021 No 10: anaerobic digestion of non-hazardous sludge at a waste water treatment works, including the use of the resultant biogas*. This specifically applies to sludge AD facilities.

CIRIA C736

CIRIA C736 is considered the industry containment assessment standard of choice and is based on the source-pathway-receptor approach to risk

assessment. It provides a clear methodology for demonstrating BAT, appropriate measures and compliance with permit conditions.

It is applicable for identifying and managing the risk of storing substances which may be hazardous to the environment and applies to activities ranging from small commercial premises to large chemical facilities. It primarily considers the potential consequences of tank failure and provides a risk assessment methodology to support a classification system for containment, providing different levels of performance for different risks. The aim is to break the pathway between source and receptor.

The guidance provides containment options and examples of good practice, but it is not prescriptive and there may be circumstances where it could be appropriate to use other methods where at least an equivalent level of environmental protection is provided, however this would need to be provided at the point of permit determination.

Due to the nature of sewage sludge, waste cake or waste liquors, it is clear that this would be considered to be both a short and long-term hazard to the environment if released. Given the locations of sites that deal with these materials generally, it is reasonable to conclude that any major tank failure at an individual site will have the potential to cause significant damage to sensitive receptors.

Where CIRIA C736 measures are not considered to be relevant or appropriate for a specific facility, an explanation should be provided using a risk-based approach. For existing facilities where measures cannot easily be achieved, we expect site based specific risk assessments associated measures and any alternative measures to be proposed at permit determination which achieve at least an equivalent standard to provide at least the same level of environmental protection. It should be recognised however that CIRIA C736 includes specific guidance for operators who need to implement secondary containment provisions at existing facilities.

Newly built facilities and assets should be designed and built to CIRIA C736 report recommendations or to at least an equivalent approved standard. Newly built facilities and assets not designed and built to CIRIA C736 report recommendations, or to at least an equivalent approved standard would not be considered to provide suitable primary and secondary containment, and as such would not comply with BAT. Existing facilities may be unlikely to be compliant with CIRIA C736 due to the viability of retrofitting to meet the recommendations. However, the same containment assessments are still required, and improvements should be proposed to demonstrate at least equivalent appropriate measures of environmental protection.

ADBA tool and guidance

The ADBA tool and guidance have been specifically designed as a guide for secondary containment for anaerobic digestion. The guide states “Both the guide and the classification tool draw upon the principles and methodologies within CIRIA C736. The principles within CIRIA C736 are generally accepted as good practice in the design and construction of containment systems. The principles of CIRIA C736 are distilled into this accessible guide, which attempts to draw out the parts relevant to the AD sector”.

The tool itself is clearly set out to provide an inventory of sources, pathways and receptors and aligns with the containment system class types in CIRIA C736. It provides risk ratings and allows mitigation measures to be considered.

Alternative assessment methods

Where our guidance refers to CIRIA C736 it also allows for other equivalent approved standards. This does provide operators with the option of using other approved standards, but they must offer at least the same level of environmental protection.

Where CIRIA C736 and ADBA tool assessments, or equivalent approved standards, are not provided, it is difficult or impossible to satisfactorily assess permit applications for compliance with BAT, appropriate measures or an environmental permit.

Assessment of this facility

The operator did submit an assessment which has given regard to CIRIA C736, including proposals for improvements.

- The operator did submit a completed ADBA tool.
- The operator did submit spill modelling.
- The operator provided initial secondary containment proposals in accordance with Environment Agency guidance, *Control and monitor emissions for your environmental permit*.
- Detailed secondary containment design will be provided to the Environment Agency in response to improvement conditions (IC3)

The containment options proposed by Crossness STC included the installation of bund walls and impermeable surfacing at modelled locations in order to prevent a loss of containment beyond Crossness STC permit boundary. The spill model is based upon the failure of the strategic sludge storage tanks, advanced anaerobic digesters and post digestion storage tank. The proposed solution met the requirements of section 4.2.1 of CIRIA 736 that requires “Where two or more tanks are installed within the same bund, the recommended capacity of the bund is the greater of:

1. 110% of the capacity of the largest tank within the bund.

2. 25% of the total capacity of all the tanks within the bund, except where tanks are hydraulically linked in which case they should be treated as if they were a single tank.

The final containment volume for the area of secondary containment is 23,623m³ which provides 25% of the total capacity of all tanks within the bunds identified.

Reasons for accepting secondary containment proposals

The Environment Agency recognises that the operator's proposals for secondary containment measures at the installation are not complete. Our established environmental permitting process outlines that where information is missing or insufficient, that information can be requested. Where information is unsatisfactory, we may proceed to return an application as not duly made or refuse a duly made application. Our processes state that we generally don't set improvement conditions that require BAT to be demonstrated at some date after the permit application has been consulted on and determined. Generally, we should be satisfied whether operations will use BAT at the appropriate time, and we should make that assessment at the time we issue any permit or variation.

However, we recognise that this industrial activity is already existing and being undertaken and consider it appropriate, where possible, to bring these activities into environmental regulation as an installation. While the current operations are a pollution risk, the operator is not introducing new risks to the environment. It is important to note that any applications including new plant and bulk tanks would require a demonstration that secondary containment is designed in line with CIRIA C736 (or possible equivalent alternative) before a permit could be issued.

While detailed secondary containment infrastructure design was not supplied, the proposals describe what they plan to implement and follow the primary requirements for bund design (as outlined in our guidance *Control and monitor emissions for your environmental permit*). The operator has also confirmed that the secondary containment measures will be designed in compliance with CIRIA C736 by a qualified structural engineer. We have received an effective risk assessment which demonstrates the extent and impact of bulk tank failure on the receiving environment. This was via a spill modelling assessment 'J840 – STC IED Containment, December 2023' based on the failure of worst-case tanks. These risk assessments/spill models show that the proposed containment strategies would contain effluent/digestate on site.

The section, *Bespoke permit conditions* of this document, provides a general explanation why we have issued this permit without a full determination of various key issues with the application.

We have included an improvement condition in the permit for the operator to progress the proposals submitted within the application and to provide additional details as they are developed and implemented. We require that the proposals must be implemented by 31 March 2025.

Emissions to air – Combustion

Biogas generated through the AD of waste contains a high quantity of methane and is often used to provide energy to onsite operations. Biogas is commonly combusted within on-site combined heat and power engines (CHP) or boilers. CHP engines produce heat and electricity. Heat is used to provide energy in the form of steam or hot water and is directed to the anaerobic digestion plant processes, while electricity can be utilised to power other plant on site.

Combustion of biogas or other fuels such as natural gas produces waste gas emissions which are discharged to the atmosphere via a stack. The combustion of biogas releases the following products of combustion; oxides of nitrogen (expressed as NO₂), sulphur dioxide (SO₂), carbon monoxide (CO) and volatile organic compounds (VOC).

While the WaSC anaerobic digestion activity has not until now been regulated under the Environmental Permitting (England and Wales) Regulations 2016 (EPR) as an installation, across the sector, the combustion plant may have been permitted. Some combustion plant in this sector will already have permits as standalone medium combustion plant. If emissions have previously been assessed, our approach is not to undertake any additional assessment unless there is a site-specific reason to do so. If emissions had not been previously assessed, or there had been subsequent changes, we would require a WaSC to undertake a new quantitative air risk assessment during determination.

This installation uses combustion plant to provide power and heat to the plant and anaerobic digestion process which are currently permitted under Chapter 1 of Schedule 1 of EPR: Section 1.1 Combustion Activities - Part A (1) (a) Burning any fuel in an appliance with a rated thermal input of 50 or more megawatts. The combustion plant on site includes:

Combined Heat and Power (CHP) plant including the following equipment:

- 3 x CHP engines, net rated thermal input of 4.68 MW each, fired on biogas generated on site. Existing MCP.
- 2 x auxiliary boilers, net rated thermal input of 4.749 MW each, fired on biogas generated on site or natural gas. Existing MCP.

Emergency standby diesel generators (emergency plant), including the following equipment:

- 4 x Man Paxman engines, net rated thermal input 5.2 MW each. Existing MCP.
- 2 x MTU engines, net rated thermal input 5.6 MW each. Existing MCP.

Combustion equipment with net rated thermal input less than 1 MW each, aggregated net rated thermal input approx. 1.2 MW.

The emissions from the combustion plant at Crossness STC, have previously been assessed and we are not aware of any subsequent changes to plant. Therefore, we have not carried out any further assessments.

We have ensured that individual combustion plant is subject to the required emission limit value (ELV) as stated in the permit. This includes those required by the Medium Combustion Plant Directive (MCPD) which are currently in effect, or which have a future effective date. See Table S3.1 in the permit.

We have included improvement condition 5 in the permit which requires the Operator to assess methane slip resulting from the combustion of biogas via the CHP engines. Following an assessment of the data, the Environment Agency shall consider whether emission limits for volatile organic compounds are applicable for this installation.

Indirect emissions of waste water

AD installations produce a series of liquid wastes. These waste waters (also known as 'liquid digestate' or 'liquors') are discharged to the adjacent WwTW. As explained at the start of this document, WwTW are regulated under separate legislation, the UWWTR and does not form part of this installation. The discharge of waste waters to the WwTW is therefore a point source emission and classed under the Waste Treatment BREF as an indirect emission to water. This AD has been in operation for several years but previously unpermitted as an installation.

The waste water discharged to the WwTW is not currently subject to monitoring or control. Waste waters, after discharge to the WwTW and treatment under UWWTR are discharged to surface waters (rivers, streams) or in some cases direct to the sea. Across the sewage sludge industry, a wide variety of incoming wastes, trade effluents and indigenous sewage sludges are treated via anaerobic digestion (combined they are subject to regulation under the EPR). Once discharged into the main WwTW, any pollutants within the discharge will be diluted with no control over the level of pollutants emitted to the works. This means that across the sewage sludge industry, there is no knowledge of the extent of pollutants entering the main works for treatment. This lack of knowledge means that WaSCs do not know if their WwTW are capable of treating the waste waters produced at an AD installation.

Description of waste water discharge

Effluent is generated on site during the dewatering and thickening of indigenous and imported sludges prior to the AD process, the dewatering of digestate following AD, the production of biogas condensate and via OCU waste waters.

The waste waters are discharged to the adjacent Crossness WwTW. Any treatment of this effluent once it arrives at the WwTW is currently regulated under the UWWTR process, not under control of an environmental permit. However, the effluent being discharged from the WwTW is controlled by a permit. As the

UWWTR waste water is discharged to a watercourse, we consider the effluent generated through the AD process and DAA activities constitutes an indirect discharge to water.

As such operators of an installation must establish and maintain inventories, including information about the characteristics and composition of waste waters in accordance with BAT conclusion 3 of the Waste Treatment BREF. BAT conclusion 3 states:

In order to facilitate the reduction of emissions to water and air, BAT is to establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system, that incorporates all of the following features which are identified for waste water as:

Information about the characteristics of the waste water streams, such as:

- *average values and variability of flow, pH, temperature, and conductivity;*
- *average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, priority substances / micropollutants);*
- *data on bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge))*

The operator did not have this data prior to submitting their application for a bespoke installation permit. The Environment Agency has found that across the waste water sector, WaSCs have not undertaken a comprehensive analysis of their emissions from the installation activities to the WwTW. In general, WaSC installations accept trade effluents (via consented discharges in the catchment), indigenous sludges and separate waste streams via road tanker. The waste materials treated via the AD plant are potentially diverse and the composition of the feedstock and treated digestates could contain significant variation in pollutants.

Operators of installations under the Waste Treatment BREF must establish an emissions inventory. The operator should be compliant with this BAT conclusion requirement at the point of submitting a permit application. The waste water emissions inventory informs treatment methodologies, environmental risk assessments and monitoring requirements. However, across the sector, this information is not available. The Environment Agency recognises that the operator's emissions discharged to the WwTW have never been fully quantified, and therefore, accept that emissions to the WwTW have not been subject to a quantitative risk assessment. In addition, the operator also cannot demonstrate that they are compliant with BAT AELs for indirect discharges to water (as specified within BAT conclusion 20 of the Waste Treatment BREF).

The waste water discharged to the WwTW is treated via the requirements under the UWWTR. However, this approach may not effectively treat all the pollutants

that could enter the WwTW after discharge from the installation. For example, characteristic treatment methods at WwTW do not typically treat and remove heavy metals or other specified pollutants from the waste water.

We understand and recognise that this industrial activity is already existing and consider it appropriate, where possible, to bring these activities into environmental regulation as an installation. While the operations are a pollution risk, the operator is not introducing new risks to the environment. It is important to note that any applications including a new emission to water would require a demonstration that emissions would not adversely impact any receiving waters, or breach relevant BAT AELs before a permit could be issued.

Our guidance, [Surface water pollution risk assessment for your environmental permit](#), indicates that establishing a representative composition of the waste water streams requires a number of samples over a long period (12 – 36 samples). The scope of pollutants to be identified in the waste water depends on what substances are likely to be within the waste water at the point it is discharged from the installation. To determine what is in the waste water, the operator will need to examine and have a good understanding of the inputs to the installation. It is the responsibility of the operator producing the effluents/waste waters/liquors to understand what pollutants need to be assessed based on their understanding of the waste waters.

To establish a waste water inventory and to facilitate a quantitative risk assessment from this indirect emission point, we have set improvement conditions. Our processes state that we generally don't set improvement conditions that require BAT to be demonstrated at some date after the permit application has been consulted on and determined. Generally, we should be satisfied whether operations will be BAT at the appropriate time, and we should make that assessment at the time we issue any permit or variation. However, for the reasons set out above, this assessment is not possible due to the lack of data in this area across the WaSC sector. We consider setting improvement conditions as a pragmatic approach to identify what is in the waste water to then implement future improvements.

The permit includes improvement conditions IC6a, IC6b and IC6c. There are three stages to this improvement programme. The first (IC6a) requires the operator to submit and carry out a sampling and analysis program and gather the relevant data on the waste water. In accordance with the Waste Treatment BREF, the IC requires the operator to determine the composition of the pollutants which have BAT-AELs (these include heavy metals). Due to the variety of inputs to the waste treatment process and the unknown composition of the waste waters proposed for discharge to the WwTW, we cannot consider this effluent as straightforwardly a 'biodegradable waste'. Therefore, the IC also sets the requirement on the operator to establish an inventory of pollutants of 'all relevant substances'. The scope of pollutants the operator must identify depends on what

substances are likely to be within the waste water at the point it is discharged from the installation. To determine what is in the waste water, the operator will need to examine and have a good understanding of the inputs to the installation. This installation accepts waste inputs from; indigenous and imported sludges.

Due to this variety of inputs and the requirements for a minimum of 12 samples, we have specified that this monitoring period be for at least a year to determine a representative understanding of the discharge.

The Environment Agency recognises that 12 months is a long period but establishing the composition of the waste water will facilitate long term improvements and ensure that all potential pollutants are able to be controlled.

On completion of IC6a, ICb requires the operator to undertake a full assessment of the results providing a summary of the sample results, a completed H1 risk assessment(s) and detailed modelling (where necessary) with an assessment made against the parameters specified in the relevant environmental standards as specified within our guidance. We also require the operator to submit proposals and/or additional measures required to prevent or minimise any significant emissions from the installation along with timescales for implementation. IC6c requires the implementation of any relevant improvements identified.

The operator has provided written confirmation that it will initiate a sampling programme to determine the composition of the waste water.

The overarching aim of the improvement programme is to establish comprehensively what the operators of AD installations discharge to WwTW and to drive long term improvements. The lack of existing data across the industry means that the Environment Agency, rather than refusing environmental permit applications, facilitates a process for WaSC operators to achieve BAT and to meet environmental standards for long term environmental protection.

Odour management

The Waste Treatment BREF outlines techniques for minimising the impact from odour pollution from operations which are likely to cause odour. Anaerobic digestion and the handling/storage of various waste sludges and organic wastes can be highly odorous. The Waste Treatment BREF includes general BAT conclusions which operators must implement (BAT 10 and 12 where odour nuisance at sensitive receptors is expected and/or has been substantiated).

These include:

- BAT 10 – Monitoring of odour emissions
- BAT 12 – Odour management plan
- BAT 13 – Techniques to reduce odour emissions

- BAT 14 – Reduce diffuse emissions to air

Odour and BAT

BAT requires that processing and treatment of odorous wastes be carried out in a sealed system. This means that tank(s)/vessel or area(s) must be connected to an odour abatement system. Odorous gas streams are to be directed to the abatement plant to be treated prior to release to the atmosphere via emission stacks. The stacks are point source emissions to air.

BAT-associated emission levels (BAT-AELs) for the treatment of water based liquid wastes (the dewatering and thickening activity identified as a directly associated activity of the AD process) are identified as Hydrogen chloride (HCl), Ammonia (NH₃), and Total volatile organic compounds (TVOC), however the monitoring only applies when the substance concerned is identified as relevant in the waste gas stream based on the inventory mentioned in BAT 3.

As the operator has not provided evidence to demonstrate that these substances are not present in the emission, we have specified these limits in the permit as, not more than 5mg/m³ for HCl, not more than 20mg/m³ for TVOC and no more than 20 mg/Nm³ for NH₃.

For the biological treatment of waste relating to the AD process we require that odour concentrations are limited to less than 1,000 ou_E/Nm³ at the point of release or, in the case of an ammonia release, no more than 20 mg/Nm³. The upper BAT-AEL limit for ammonia is specified in the permit.

This odour control technology meets the requirement of BAT 34 and 53 which identifies relevant appropriate techniques for the reduction of odour as biofilters, adsorption and wet scrubbing. With wet scrubbers being used in combination with a biofilter which reflects OCUs on site.

The site also has a dispersion stack at emission point A33. This does not meet the requirements of BAT 34 and as such we have included IC8 and IC10 in the permit to address which which we have discussed further below.

Odour management plan

The site is required to have an odour management plan in place that details the measures and procedures to prevent or otherwise minimise, odour releases from the site. The plan forms part of the permit.

Air/odour abatement systems

Crossness STC operates 8 odour control units (OCU):

- OCU 1 at emission point A26 consist of a bio-trickling filter and two carbon filters and serves the Picket Fence Thickeners (PFTs) and supernatant Well
- OCU 4 at emission point A27 consists of a biofilter and carbon filter and serves the primary sludge thickening plant.
- OCU 5 at emission point A28 consists of a biofilter and serves the PFTs.
- OCU 8 at emission point A29 consists of two stage biofilter serving the primary sludge blending tank and SAS blending tank

- OCU 9 at emission point A30 consists of a two stage biofilter serving the sludge buffer tanks
- OCU 10 at emission point A31 consists of a two stage biofilter and carbon filter serving the primary Sludge Buffer Tanks (UWWTD), THP related tanks, digested sludge buffer tanks, sludge dewatering presses and return liquor pumping station 3.
- OCU 11 at emission point A34 consists of a biofilter and dry scrubber serving liquor return pumping station 1.
- OCU 12 at emission point A35 consists of a biofilter and dry scrubber serving the liquor return pumping station 2.

To verify the effectiveness of the odour management systems in place at Crossness STC, we have requested that the operator carry out a review of the abatement plant on site, to determine whether the measures have been effective and adequate to prevent and where not possible minimise emissions released to air including; but not limited to odour, NH₃, TVOC and HCl. The required review is included in the permit in the form of an improvement condition which is part of the improvement programme detailed in table S1.3.

Odour conclusions

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise odour and to prevent pollution from odour.

Improvement conditions

Primary tank/vessel condition

We recognise that many sludge storage and treatment vessels were constructed prior to the current permitting requirements and their design may not be compatible with BAT as described in the relevant BREF documents. The operator provided an inventory of their tanks and described the condition of those assets. Comprehensive evidence was not provided to assess the condition of the tanks and determine whether they are suitable for containing potentially polluting wastes and waste waters. However, as these tanks are already existing and perform an ongoing industrial operation, we have set an improvement condition in the permit to address any potential deficiencies in the existing site's primary containment.

IC4 requires the operator to review (undertaken by an appropriately qualified engineer) the physical condition of the primary containment and establish a program of works to implement any necessary individual measures to ensure that the primary containment is fit for purpose. The Environment Agency will review these submissions with regard to the guidance, *CIRIA C736 Containment systems for the prevention of pollution*.

Buffer storage capacity – storm overflow

Waste water discharges to the waste water treatment works (WwTW) after treatment in the installation and post AD treatment. As set out in the permit and described in this document under section, *Indirect emissions of waste water*, this emission will be subject to monitoring, further risk assessment, a scheme of improvements and emission limits. WwTW hold permits to discharge their downstream effluent to surface waters (rivers and streams). These permits include conditions which permit the unmonitored discharge of sewage when a defined overflow setting is reached during periods of heavy rainfall or snow melt.

During the permit determination, we asked the operator to explain how they prevent emissions from the installation from discharging to surface waters and bypassing treatment during this period storm scenarios. Should the emissions from the installation bypass the WwTW, the installation could cause pollution.

The applicant advised “Thames Water confirms liquor returns to the WwTW inlet will be relocated downstream of the ‘storm separation point’. This will prevent waste-water emissions from the installation by passing the WwTW treatment process and being emitted directly to surface water during storm conditions.”

In the above description, the operator was unable to demonstrate how waste water from the installation is prevented from being discharged to surface water via the WwTW during storm conditions. We have therefore set an improvement condition, IC5. IC5 requires the operator to submit a report for the Environment Agency’s approval which sets out the contingency measures to provide appropriate buffer storage for this waste water when the receiving WwTW are in storm overflow conditions. Furthermore, we have set permit conditions (3.2.5 and 3.2.6) which prevents the discharge of waste water from the installation in storm scenarios should the operator fail to successfully reach agreement with the Environment Agency on the requirements of IC5.

We recognise that as an existing industrial operation, the operator does not have all the necessary control measures to protect the environment. Therefore, we consider the combination of improvement conditions and permit conditions as an appropriate method to ensure that future measures will be implemented to prevent the uncontrolled discharge of waste water to surface waters (via the WwTW) during storm conditions.

Stability of whole digestate

The Waste Treatment BREF indicates that to prevent diffuse pollution to air, waste which potentially poses a risk should be stored in enclosed buildings or equipment. Solid digestates, also described as sludge cake are routinely stored externally before being removed from the site. Instead of requiring the sludge cake to be covered and fugitive emissions to be collected and abated we are requiring operators to determine the stability of this material. A digestate or sludge cake which is unstable will produce fugitive emissions including biogas, odour and ammonia. The operator has not presented evidence of the stability of

the externally stored digestates. Stability is defined in the specification for digestate, BSI PAS 110:2014. The standard defines digestate stability as the 'point at which the rate of biological activity has slowed to an acceptably low and consistent level and will not significantly increase under favourable, altered conditions'. The wider water industry does not have reliable data on the stability of the digestate they produce. We have therefore set an improvement condition (IC11) for the operator to produce stability data for their output digestate. This improvement condition applies to all sludge treatment installations and will enable the Environment Agency to gather data to understand the levels of stability across the industry. Where operators produce digestates which have not been stabilised by the AD process, the Environment Agency will require an operator to:

- Improve the stability of the AD process (for example longer residence times)
- Enclose cake storage areas and treat diffuse gas emissions.

Furthermore, this data will feed into future work with the industry in establishing a benchmark to determine stability of the digestate.

The stability of the digestate depends on numerous factors, including type of feedstock, pre-treatment and digestion process and how this is managed in terms of organic load and residence time. For example, shortening residence times will increase the organic load and reduce the degree to which organic matter within the digester is converted to gas. Where this happens the digestate will be more active and capable of further biodegradation.

The method for understanding the stability of the digestate is by determining the residual biogas potential within the digestate. Residual biogas potential can be worked out by using the methodology, OFW004-005 [N6] as outlined within *BSI PAS 110: Producing Quality Anaerobic Digestate or an equivalent methodology for determining digestate stability*. We have not specified a threshold for residual biogas potential. The threshold defined within PAS 110 is part of a published standard operators use for producing an 'end-of-waste' digestate and not necessarily for establishing a definitive assessment of the potential for biogas generation. However, establishing the residual biogas potential will contribute to the operator's understanding of how stable the anaerobic digestion process has been.

This IC will allow the operator to gather evidence and produce an evaluation of their digestate. There are no definitive thresholds for the operator to meet.

Methane slip

We have included improvement condition IC7 in the permit which requires the operator to assess methane slip resulting from the combustion of biogas via the CHP engines. Following an assessment of the data, the Environment Agency

shall consider whether emission limits for volatile organic compounds are applicable for this installation.

Effectiveness of abatement systems

The installation includes industrial processes which produce waste gas and odour emissions that are discharged to air via vents or stacks. BAT conclusion 14 of the Waste Treatment BREF states that emissions from diffuse sources should use techniques like, collecting and directing the emissions to an appropriate abatement system via an air extraction system and/or air suction systems close to the emission sources. This installation includes the storage and treatment of wastes in tanks and buildings. To prevent diffuse emissions of pollutants such as odour, ammonia and VOCs, emissions are extracted and treated by an air abatement system. The abatement technology used at Crossness STC is adsorption, biofilters and wet scrubbers. The treated air stream is then discharged to atmosphere via a stack.

As part of the determination we reviewed the operator's abatement plant and its suitability in providing effective abatement to diffuse air emissions.

Additionally, to verify whether existing measures have been effective and adequate to prevent and/or minimise emissions released to air, we have set an improvement condition (IC8). The improvement condition requires the operator to demonstrate via determining the composition of waste gas emissions, monitoring and additional risk assessment that the existing abatement system effectively treats the emissions to air. Where further improvements are identified, the operator is required to implement these measures. It should be noted that a review of the existing system could determine that the existing systems are not suitable for the waste gas emissions. Should a review identify that a new abatement system is required, the improvement condition indicates that a variation application is needed.

Any new abatement plant should be designed to reduce odours and where required ammonia. For new abatement plant, an operator will need to ensure that new abatement systems achieve the BAT AEL for odour or limits defined by the plant design, whichever is less. The BAT AEL for odour concentration is 1,000 ou_E/m^3 . Should the operator seek to install an abatement system which cannot meet this requirement, it is unlikely that the abatement plant will be BAT.

Abatement systems from dispersion stacks

The installation includes industrial processes which produce waste gas and odour emissions. BAT conclusion 14 of the Waste Treatment BREF states that emissions from diffuse sources should use techniques like, *collecting and directing the emissions to an appropriate abatement system via an air extraction system and/or air suction systems close to the emission sources*. This installation

includes the storage of wastes in the cake barn and the operator extracts these emissions to air via a dispersion stack. There is no odour abatement system in place to prevent or reduce diffuse emissions. Therefore, the dispersion of the waste gases does not demonstrate compliance with BAT conclusion 14 of the Waste Treatment BREF.

The operator's application did not propose an abatement technique for preventing or reducing emissions from the dispersion stack.

On the 11th of June 2024 we wrote to the applicant to request that they demonstrate how emissions from the diffuse emission stack would meet the requirements of BAT 14d and BAT 34. Further stating that should they not be able to provide an explanation of the OCU technology to be implemented, as they are an existing site we would will implement an improvement condition for OCU technology to be implemented. The applicant responded and advised that "TWUL acknowledge that the EA will issue an IC in the IED permit for the Crossness cake barn stack."

We understand and recognise that this industrial activity is already existing and consider it appropriate, where possible, to bring these activities into up-to-date environmental regulation. The current site waste gas control measures are not in line with BAT. While the operations are a pollution risk, this permit does not introduce new risks to the environment. For these reasons, we consider setting an improvement condition for determining an abatement system after a permit has been granted as a pragmatic approach to ensure operations are brought into regulation and provisions are in place to ensure that appropriate abatement systems will be proposed. Subsequently, improvement condition (IC10) sets out how we expect the operator to propose an effective abatement system for their waste gas emissions. It involves selecting abatement technologies which will suitably treat the odorous compounds and waste gases with detailed evidence.

Any new abatement plant should be designed to reduce odours and where required, ammonia. For the abatement plant or systems which the operator will propose as a result of IC10, an operator will need to ensure that new abatement systems achieve the BAT AEL for odour or limits defined by the plant design, whichever is less. We have therefore set, as a minimum, the BAT AEL for odour concentration of 1,000 ouE/m³ in this permit. Should the operator seek to install an abatement system which cannot meet this requirement, it is unlikely that the abatement plant will be BAT.

Additionally, we have set a further improvement condition (IC8) to verify that the chosen abatement system operates effectively. This is to substantiate the conclusions established in IC10 whether the new abatement systems have been effective and adequate to prevent and/or minimise emissions released to air. The improvement condition requires the operator to demonstrate via determining the composition of waste gas emissions, monitoring and additional risk assessment

that the installed abatement system effectively treats the emissions to air. Where further improvements are identified, the operator is required to implement these measures.

Head of works

This permit also allows a further bespoke waste operation AR13 relating to the import of industrial sludge and liquid waste to the *head of works* (HoW). HoW means the discharge location where separately imported wastes are discharged into the WwTW. The waste operations associated with the head of works is either via the direct discharge of tankered waste into the WwTW or the temporary storage (and blending) of waste in a storage tank before discharge of the waste liquids into the WwTW. Once the discharged wastes enter the WwTW, this emission leaves regulatory control of The Environmental Permitting (England & Wales) Regulations 2016. The discharged waste is mixed with liquids in the WwTW and is regulated separately under the requirements of the Urban Waste Water Treatment Regulations. The HoW activity undertaken at Crossness WwTW involves effluents and waste waters in the form of sludge and liquid only, will be tankered to the HoW. The discharge from the HoW is therefore classed as an indirect emission to water. In this case, the River Thames. This activity is not related to the on-site anaerobic digestion installation.

The operator applied for this as an additional regulated activity as part of the IED permitting process. This variation ensures that the activity reflects up-to-date permit conditions.

Across the waste water treatment sector, existing HoW permits allow for the reception and discharge of waste into the WwTW without the appropriate controls for a point source emission to sewer. The imported wastes discharged to the WwTW is treated via the requirements under the UWWTR. However, this approach may not effectively treat all the pollutants that could enter the WwTW after discharge from HoW activity.

We understand and recognise that this industrial activity is already existing and consider it appropriate, where possible, to bring these activities into up-to-date environmental regulation. While the operations are a pollution risk, this permit does not introduce new risks to the environment. The operator submitted a list of waste codes for discharge to sewer as part of the HoW activity.

It is important to note that any applications adding new waste codes would change the emission to sewer and would require a demonstration that emissions would not adversely impact any receiving waters, or breach relevant environmental standards before a permit could be issued.

This variation ensures that the HoW activity and associated discharge are permitted to modern standards by implementing the following:

- Included the HoW activity as a bespoke waste operation within the IED permit.
- Added an emission point for the discharge of HoW waste to the main wastewater treatment works (WwTW). This will facilitate sampling and monitoring of the discharge. This discharge is classed as an indirect emission to water.
- Included all the HoW waste codes applied for where already accepted.
- Added improvement conditions requiring the operator to determine the composition¹ of the waste stream discharged into the WwTW (monitoring over 12 months). It will also require the operator to perform a quantitative risk assessment of the impact of these waste streams downstream at the main river and implement improvements to prevent pollution to the watercourse.

As similarly outlined in the Key issues section, *Indirect emissions to waste water*, this application does not include a demonstration that the existing indirect discharge via the HoW to the River Thames is not causing pollution. Across the WaSC sector, there is little or no data available to determine the impacts from HoW activities. Therefore, to establish a waste water inventory and to facilitate a quantitative risk assessment from this indirect emission point we have set improvement conditions. Our processes state that we generally should perform risk assessments at the time we issue any permit or variation. However, for the reasons set out above, we consider setting improvement conditions as a pragmatic approach to identify what pollutants are present in the HoW discharge to then implement future improvements.

The permit includes improvement conditions IC9a, IC9b and IC9c. There are three stages to this improvement programme. The first (IC9a) requires the operator to submit and carry out a sampling and analysis program and gather the relevant data on the waste being accepted. In accordance with our guidance, Non-hazardous and inert waste: appropriate measures for permitted facilities - Guidance - GOV.UK (www.gov.uk), the IC requires the operator to fully characterise the liquid/sludge waste discharged to Crossness wastewater treatment works (WwTW). The scope of pollutants the operator must identify depends on what substances are likely to be within the incoming waste at the HoW. Due to the variety of industrial wastes accepted and the requirements for a minimum of 12 samples, we have specified that this monitoring period be for at least a year to determine a representative understanding of the discharge.

¹ 'Composition' means:

- Average values and variability of flow, pH, temperature and conductivity.
- Average concentration and load values of all relevant substances and their variability.
- Data on bioeliminability.

The Environment Agency recognises that 12 months is a long period but establishing the composition of the waste streams discharge from the HoW will facilitate long term improvements and ensure that all potential pollutants are able to be controlled.

On completion of IC9a, IC9b requires the operator to undertake a full assessment of the results providing a summary of the sample results, a completed H1 risk assessment and detailed modelling (where necessary) with an assessment made against the parameters specified in the relevant environmental standards as specified within our guidance. We also require the operator to submit proposals and/or additional measures required to prevent or minimise any significant emissions from the installation along with timescales for implementation. IC8c requires the implementation of any relevant improvements identified and may require the operator to limit wastes accepted at the HoW.

The operator has provided written confirmation that it will initiate a sampling programme to determine the composition of the discharged waste streams. The lack of existing data across the industry means that the Environment Agency, rather than refusing an environmental permit application, facilitates a process for WaSC operators to understand their emissions and to meet environmental standards for long term environmental protection. This process will enable the Environment Agency to set environmental limits on the discharge for substances of concern. In addition, implementing permit conditions and establishing that the movement of waste from the HoW to the WwTW is a point source emission, corrects historic irregular permitting arrangements.

Bespoke waste activities and other issues

The operator also applied for a waste activity in relation to the temporary storage of cake. Digested cake produced at other Thames water sites will be stored in designated bays prior to transfer off site. Cake that is temporarily stored on site will not undergo any treatment and must be kept separate from any cake produced as a result of activities AR1 to AR12 referenced in table S1.1.

Decision considerations

Confidential information

A claim for commercial or industrial confidentiality has not been made.

The decision was taken in accordance with our guidance on confidentiality.

Identifying confidential information

We have not identified information provided as part of the application that we consider to be confidential.

The decision was taken in accordance with our guidance on confidentiality.

Consultation

The consultation requirements were identified in accordance with the Environmental Permitting (England and Wales) Regulations (2016) and our public participation statement.

The application was publicised on the GOV.UK website.

We consulted:

- Local authority – Environmental Protection Department - No response was received.
- UK Health Security Agency (Previously Public Health England) and the relevant Director of Public Health – See consultation responses section.
- Health and Safety Executive - No response was received
- Food Standards Agency - No response was received

The comments and our responses are summarised in the [consultation responses](#) section.

Operator

We are satisfied that the operator is the person who will have control over the operation of the facility after the grant of the permit. The decision was taken in accordance with our guidance on legal operator for environmental permits.

The regulated facility

We considered the extent and nature of the facility at the site in accordance with RGN2 'Understanding the meaning of regulated facility', Appendix 2 of RGN2

'Defining the scope of the installation', Appendix 1 of RGN 2 'Interpretation of Schedule 1', guidance on waste recovery plans and permits

The extent of the facility is defined in the site plan and in the permit. The activities are defined in table S1.1 of the permit.

The site

The operator has provided a plan which we consider to be satisfactory.

The plans show the location of the part of the installation to which this permit applies on that site.

The plan is included in the permit.

Site condition report

The operator has provided a description of the condition of the site, which we consider is satisfactory. The decision was taken in accordance with our guidance on site condition reports and baseline reporting under the Industrial Emissions Directive.

Nature conservation, landscape, heritage and protected species and habitat designations

We have checked the location of the application to assess if it is within the screening distances we consider relevant for impacts on nature conservation, landscape, heritage and protected species and habitat designations. The application is within our screening distances for these designations.

The site is situated approximately 2,000m from Abbey Wood SSSI. The protected site is qualified by geological features therefore the only point of exposure may come from the effects of biogas combustion and subsequent release of particulates or chemical weathering from acid rain.

The combustion plant has not been altered through this variation and the effects of combustion plant on protected habitats has been previously assessed and screened out.

If the operator follows appropriate combustion plant guidance and operates within the limits of the permit, there will be no significant impact on the protected habitat.

We have assessed the application and its potential to affect sites of nature conservation, landscape, heritage and protected species and habitat designations identified in the nature conservation screening report as part of the permitting process.

We consider that the application will not affect any site of nature conservation, landscape and heritage, and/or protected species or habitats identified.

We have consulted Natural England on our Habitats Regulation. This was sent for information only.

The decision was taken in accordance with our guidance.

Environmental risk

We have reviewed the operator's assessment of the environmental risk from the facility.

The operator's risk assessment is unsatisfactory and required additional Environment Agency assessment.

See the key issues for more information. We were unable to fully assess all elements of the operators' risk assessment during determination of the application. The sludge treatment activities are existing and have not been previously regulated as an installation. We have set a number of improvement conditions requiring the Operator to submit updated and finalised assessments in a number of areas; including but not limited to the following:

Secondary Containment:

A fully worked up finalised secondary containment assessment in accordance with published guidance, validated and signed off by competent individuals using the methodologies set out in CIRIA C736 and BAT requirements most notably BAT conclusion 19 of the Waste Treatment BREF/BAT conclusions specifically referencing secondary containment.

Emissions of process wastewater:

The installation activities generate process wastewater. Effluent arises from pre-treatment operations such as sludge dewatering and thickening as well as post-treatment (via anaerobic digestion) where final dewatering occurs using centrifuges. These emissions are discharged to the adjacent WwTW for treatment. However, the emission characteristics have not been characterised through sampling and analysis at the time of the application. BATc 3 is to establish and maintain an inventory of wastewater streams including (from the Waste Treatment BREF/BAT conclusions):

- (i) *information about the characteristics of the waste to be treated and the waste treatment processes, including:*
 - a. *simplified process flow sheets that show the origin of the emissions;*
 - b. *descriptions of process-integrated techniques and waste water/waste gas treatment at source including their performances;*

- (ii) *information about the characteristics of the waste water streams, such as:*
- a. *average values and variability of flow, pH, temperature, and conductivity;*
 - b. *average concentration and load values of relevant substances and their variability (e.g. COD/TOC, nitrogen species, phosphorus, metals, priority substances/micropollutants);* (
 - c. *data on bioeliminability (e.g. BOD, BOD to COD ratio, Zahn-Wellens test, biological inhibition potential (e.g. inhibition of activated sludge)) (see BAT 52);*

To ensure that the wastewater streams are fully characterised and an analysis of any pollutants of concern are undertaken, we have included improvement conditions (IC6a, IC6b and IC6c) requiring a sampling programme, analysis, and proposals for any additional measures required to prevent or minimise any significant emissions from the installation along with timescales for implementation. BAT associated emission levels (BAT-AELs) have been applied to the emission points [insert emission points] on the permit. The limits apply if a pollutant of concern is identified in the wastewater characterisation. The emission limits can be found in table S3.2 of the permit.

Discharge of waste to the HoW:

Waste is currently accepted and discharged to the HoW. At the time of application, an analysis of the impact of acceptance of these wastes had not been undertaken or submitted. To ensure that the fate of the impact on receiving water bodies is assessed from this activity, we have included improvement conditions requiring a sampling programme, analysis, and proposals for any additional measures required to prevent or minimise any significant emissions from the receipt of waste to the HoW along with timescales for implementation, for Environment Agency approval, with measures to be implemented as approved.

Disperse stack emissions

The installation activity produces diffuse emission from the storage of cake which are emitted via a dispersion stack. However, characteristics have not been characterised through sampling and analysis at the time of the application in line with BATc 3 which requires that the operator must establish and maintain an inventory of waste gas streams including (from the Waste Treatment BREF/BAT conclusions), and the emission have not been abated in line with BAT 14d and BAT 34. To ensure that these diffuse emissions are characterised and abated in line with BAT we have set improvement conditions IC8 and IC10.

General operating techniques

We have reviewed the techniques used by the operator and compared these with the relevant guidance notes and we consider them to represent appropriate techniques for the facility.

Where there are measures approaching BAT, we have where appropriate implemented an improvement programme. The improvements set out in table S1.3 must be completed by the times stipulated in that table or the backstop conditions identified in the permit.

We have reviewed the techniques against the Best Available Techniques (BAT) Reference Document for Waste Treatment (BAT conclusions), Biological waste treatment: appropriate measures for permitted facilities - 1. When appropriate measures apply - Guidance - GOV.UK (www.gov.uk) and Non-hazardous and inert waste: appropriate measures for permitted facilities.

The operating techniques that the operator must use are specified in table S1.2 in the environmental permit.

Operating techniques for emissions that do not screen out as insignificant

The combustion plant at this facility remains unchanged from the existing permit. The engines and boilers will not change as a result of this permit variation.

We consider that the emission limits included in the installation permit reflect the BAT for the sector.

Indirect emissions to water

Indirect emissions to water arising from sludge treatment operations cannot be screened out as insignificant due to insufficient information available at the time of determination of the permit. To establish if any emissions are of significance or may have an impact on the receiving waters, we have included improvement conditions that provide a framework for the operator to carry out sampling, analysis and to submit proposals to prevent or minimise any significant emissions from the installation along with timescales for implementation, with proposals to be implemented as approved. The permit includes the emission limits for substances with BAT associated emission levels (BAT-AEL). The limits apply if the sampling program identifies the listed substances as present in the discharge (emission points S1, S2 and S3). The parameters and limits may be found in table S3.2 of the permit.

The permit conditions enable compliance with relevant BAT reference documents (BREFs) and BAT Conclusions, and Emission Limit Values (ELVs) deliver compliance with BAT-AEL. We consider that the emission limits included in the installation permit reflect the BAT for the sector.

National Air Pollution Control Programme

We have considered the National Air Pollution Control Programme as required by the National Emissions Ceilings Regulations 2018. By setting emission limit values in line with technical guidance we are minimising emissions to air. This will aid the delivery of national air quality targets. We do not consider that we need to include any additional conditions in this permit.

Odour management

We have reviewed the odour management plan in accordance with our guidance on odour management.

We consider that the odour management plan is satisfactory and we approve this plan excluding the OCU monitoring frequency specified in section 5.1 as the applicant has provided no quantified evidence to demonstrate why monitoring frequencies can be reduced. The permit therefore requires monitoring frequencies in line with requirements set out in table S3.4.

We have approved the odour management plan as we consider it to be appropriate measures based on information available to us at the current time. The operator should not take our approval of this plan to mean that the measures in the plan are considered to cover every circumstance throughout the life of the permit.

The operator should keep the plans under constant review and revise them annually or if necessary sooner if there have been complaints arising from operations on site or if circumstances change. This is in accordance with our guidance 'Control and monitor emissions for your environmental permit'.

The plan has been incorporated into the operating techniques S1.2.

While we consider that the plan is satisfactory, we have included an improvement condition IC8 to review the effectiveness of the abatement in place. We have also set IC10 which requires the abatement of emission point A33 which is identified as a dispersion stack. Further information on this has been included in the key issues section. Where further improvements are identified, the operator is required to implement these measures in accordance with Environment Agency approval or a variation to the permit if required.

Use of conditions other than those from the template

Based on the information in the application, we consider that we need to include conditions other than those in our permit template. See the Key issues section for more details on the bespoke permit conditions we have set in this permit.

Raw materials

We have specified limits and controls on the use of raw materials and fuels.

Waste types

We have specified the permitted waste types, descriptions and quantities, which can be accepted at the regulated facility.

We are satisfied that the operator can accept these wastes for the following reasons:

- they are suitable for the proposed activities
- the proposed infrastructure is appropriate; and
- the environmental risk assessment is acceptable.

Pre-operational conditions

Based on the information in the application, we consider that we need to include pre-operational conditions.

The pre-operational condition PO1 relates to activity AR13 and requires that prior to accepting new waste streams for existing permitted waste codes identified in table S2.3 for discharge into the head of works at emission point, the operator shall undertake an assessment of the fate and impact on the receiving waters and updating the environmental risk assessment established in IC9b, the additional measures/abatement implementation plan as approved under IC9b and in accordance with the sampling plan as approved under IC9a.

It provides that the acceptance of the new liquid/sludge waste streams under existing waste codes shall only commence following:

- submission of the above risk assessment
- Submission of any recommendations for additional measure/abatement considered to be required for the waste to be accepted, and with
- written approval from the Environment Agency and the submission of written confirmation to the Environment Agency that any additional measures/abatement considered to be required have been implemented and completed as approved.

This pre-operational condition has been set as a result of the varying characteristics and waste streams that may be accepted under approved EWC codes from varying new sources. It will allow for any new waste sources under currently accepted EWCs to be accepted for discharge to the HoW with

agreement and evidence to demonstrate that emissions would not adversely impact any receiving waters, or breach relevant AELs.

Improvement programme

Based on the information on the application, we consider that we need to include an improvement programme. See the Key issues section for more details on the bespoke permit conditions we have set in this permit

Emission Limits

Emission Limit Values (ELVs) and equivalent parameters or technical measures based on Best Available Techniques (BAT) have been added for emissions to air and indirect discharges of waste water to surface waters.

Emission limit values are derived from:

- Waste Treatment BREF for BAT associated emission limits.
- Schedule 25A of the Environmental Permitting (England and Wales) (Amendment) Regulations 2018.

Emissions to air

Combustion appliances

Biogas is produced as a result of the AD process. Combustion of the produced biogas takes place in three combined heat and power (CHP) engines and two boilers. The engine produces heat and electricity that may be used to power on site processes while boilers provide additional heat to the AD processes. The boilers also utilise natural gas as a backup fuel. Combustion of biogas discharges pollutants to the air via stacks and exhausts. We have therefore applied emission limits to the following substances;

- Nitrogen oxides
- Sulphur dioxide
- Carbon monoxide

For further detail of emission limits, refer to table S3.1 of the permit.

Odour abatement system

There are eight, point source emissions to air from an odour control units. The odour control unit discharges emissions to the air via a stack. BAT requires that BAT-AELs of 20 mg/Nm³ for Ammonia (NH₃) be applied when biological treatment of waste is carried out. Anaerobic digestion is a biological process therefore the limit is included in the permit.

The Waste Treatment BREF provides examples of wastes that would be considered as water-based liquid wastes. These include wastes under the category '19 08 wastes from waste water treatment plants not otherwise specified' as there are channelled emissions of odorous air from the treatment of these wastes, we have included BAT-AELs of 5 mg/Nm³ Hydrogen Chloride (HCL) and 20 mg/Nm³ of Total Volatile Organic Compounds (TVOC). It should be noted that the limits for HCL and TVOC only apply when the substances of concern are identified in the waste gas streams characterised in BAT conclusion 3. Improvement condition IC8 requires full investigation and characterisation of waste gas streams within 6 months of completion of IC8 to determine if these substances are present. A full characterisation of waste gas streams was not available at the time of submission of the application.

For emission point A33 the site will need to propose new abatement plant as outlined in OC10. New abatement plant should be designed to reduce odours and where required, ammonia. For the abatement plant or systems which the operator will propose as a result of IC10, the operator will need to ensure that new abatement systems achieve the BAT AEL for odour or limits defined by the plant design, whichever is less. We have therefore set, as a minimum, the BAT AEL for odour concentration of 1,000 ouE/m³ in this permit. Should the operator seek to install an abatement system which cannot meet this requirement, it is unlikely that the abatement plant will be BAT.

Emissions to water

There are no emissions of waste waters direct to a receiving water body. The operator will discharge waste waters to the waste water treatment works prior to discharge to the River Thames. The Waste Treatment BREF specifies BAT AELs for indirect emissions to a water body. Where non-hazardous wastes are imported for storage, blending or treatment prior to discharge into the wastewater treatment works, the permitted waste operation ceases once the waste is mixed with the waste waters in the WwTW. BAT AELs or emission limits will be applied to the discharge into the wastewater treatment works for substances of concern.

The BAT AELs are appropriate for the activity defined under the BREF as 'Treatment of water-based liquid waste'. The BREF provides examples of wastes that would be considered as water-based liquid wastes. These include wastes under the category '19 08 wastes from waste water treatment plants not otherwise specified'. The treatment of this waste including dewatering, thickening treatment through AD the subsequent discharge to the waste water treatment works will be subject to the BAT AELs specified within BAT conclusion 20 (Table 6.2 of the Waste Treatment BREF).

As outlined within the Key issues section, *Indirect emissions of waste water*, the operator did not provide a composition of the waste water (in line with BAT conclusion 3), therefore, all BAT AELs have been applied. We have set

improvement condition (IC6a) for the operator to determine the composition of the waste in a waste inventory. The limits will only apply when the substance concerned is identified as relevant in the waste water inventory.

Until the operator has completed IC6a, the permit specifies limits for:

- Hydrocarbon oil index (HOI) (mg/l).
- Free cyanide (CN⁻) (mg/l).
- Adsorbable organically bound halogens (AOX) (mg/l).
- Metals and metalloids; arsenic (expressed as As), cadmium (expressed as Cd), chromium (expressed as Cr), hexavalent chromium (expressed as Cr(VI)), copper (expressed as Cu), lead (expressed as Pb), nickel (expressed as Ni), mercury (expressed as Hg), zinc (expressed as Zn) (µg/l).

Monitoring

We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified.

We made these decisions in accordance with the Waste Treatment Best Available Techniques BAT conclusions.

Based on the information in the application we are satisfied that the operator's techniques, personnel and equipment have either MCERTS certification or MCERTS accreditation as appropriate.

Reporting

We have specified reporting in the permit.

We made these decisions in accordance with the Waste Treatment BAT conclusions.

Management System

We are not aware of any reason to consider that the operator will not have the management system to enable it to comply with the permit conditions.

The decision was taken in accordance with the guidance on operator competence and how to develop a management system for environmental permits.

Technical Competence

Technical competence is required for activities permitted.

The operator is a member of the CIWM/WAMITAB scheme.

We are satisfied that the operator is technically competent.

Previous performance

We have assessed operator competence. There is no known reason to consider the operator will not comply with the permit conditions.

We have checked our systems to ensure that all relevant convictions have been declared.

Relevant convictions were found and declared in the application. We considered relevant convictions as part of the determination process.

Financial competence

There is no known reason to consider that the operator will not be financially able to comply with the permit conditions.

Growth duty

We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit.

Paragraph 1.3 of the guidance says:

“The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation.”

We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.

We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.

Consultation Responses

The following summarises the responses to consultation with other organisations, our notice on GOV.UK for the public and the way in which we have considered these in the determination process.

Responses from organisations listed in the consultation section:

Response received from UK Health and Safety Executive.

Brief summary of issues raised: Concerns for odour and fugitive emissions, however the measures provided to minimise these have left no significant concerns.

Summary of actions taken: No action required. The permit will include emission limits in line with BAT.