

Response to Long Reach RFI – 5th September 2023

Date:	7 September 2023	Jacobs UK Ltd
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Document no:	TW_STC_EPR_06a_LGR_RFI	
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Schedule

Unfortunately the application payment you sent is incorrect. The correct application charge is £21,215. This leaves a balance of £1,241 to pay for the bioaerosol assessment listed as emission management plan below. Please provide the outstanding fee.

- £13,984 application fee for - S5.4 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.
- £3,965 variation application fee for the physical treatment of non-hazardous waste relating to the waste import to the head of the works. Please note the screening of these wastes before entering the WWTW may mean this activity could be an installation, if the capacity is over 50 tonnes a day. In Form C3 Table C3-1a AR22 you indicate a annual capacity of 100,000 tonnes, this could mean that the treatment capacity is around 274 tonnes a day. Please explain how this is still a waste activity, otherwise, you will need to submit an installation application for this activity under this application.

Additional Assessments (see below for further details)

- Odour management plan – a fixed charge of £1,246
- Habitats assessment – a fixed charge of £779
- Emission Management Plan – a fixed charge of £1,241 (the bioaerosol assessment referenced above).

Response

With respect to the screening of waste imports, the screening undertaken is not specific to the imports, it occurs after the imports have joined the main UWWTD flow, and is undertaken as part of the UWWTD processes on site, in common with at other permitted sites where this issue has not been raised.

With respect to outstanding fees, we have confirmation from Thames Water's payment team that the outstanding Long Reach IED permit fee has been processed and subject to goods receipt being applied should credit your account on 15.09.23, referencing the permit application number.

Bioaerosol Risk Assessment

Your facility is within 250 metres of a sensitive receptor (defined under guidance Bioaerosol monitoring at regulated facilities – use of M9: RPS 209 – GOV.UK (www.gov.uk) as "a place where people live or work for more than 6 hours at a time"). You provided 'Long Reach STC

Bioaerosol risk assessment, dated 17 May 2022'. Within this document, you have provided section 3.1 'Next steps' advising that you will carry bioaerosol sampling in line with M9 guidance, but provided no information on sampling locations, and not included all relevant sources. i.e. Odour control biofilters. It states that the testing will be carried out before the end of October 2022.

Update and resubmit your Bioaerosol risk assessment to include all relevant bioaerosol sources, and confirm the sampling locations (National Grid references). It should also demonstrate how the methodology used is in line with guidance Bioaerosol monitoring at regulated facilities – use of M9: RPS 209 – GOV.UK (www.gov.uk).

Answer BRA: Please see the appended updated TW_STC_EPR_06b_LGR_APPF

Provide information in Application form C2 General- varying a bespoke permit

1. Q3b Technical Ability. The nominated technically competent person is stated as Mr. Graham Hills [name redacted by TWUL].

- a. *The activity that you have applied for requires CIWM (WAMITAB) Level 4 Medium Risk Operator Competence for Anaerobic Digestion (MROC5). As a minimum to progress your application, provide evidence of registration for an appropriate scheme, or evidence of how you will provide the relevant technical competence at permit issue.*

Answer 1

Please note we enclose revised details for our nominated TCM our original nomination having change roles since our original application.

Please also see appended TW_STC_EPR_06a_LGR_AppB which contains the relevant evidence for our nominated TCM and an updated Form C2 (TW_STC_EPR_06b_LGR_FC2)

2. Q3d Management Systems

a. In the technical summary provided, 3d management systems, it does not describe any interaction between Thames Water Utilities Limited (TWUL) and Finning (UK) Limited management systems. Finning operate the biogas combustion plant permit which will become a directly associated activity to your installation activity. The inter-relationships and operating responsibilities between operators TWUL and Finning must be detailed including how material feeds into processes run by another operator on the same site. The point where responsibility for the material moves from one to the other must be made clear in the information supplied by both applicants.

b. The legal operator of the facility must have sufficient legal control. Provide a written statement which explains how TWUL have control over the permitted activities within the permit boundary. The statement must show how activities are controlled in an emergency, have day-to-day operational control, how the operator will prevent pollution outside the site boundary and detail each operator's pipe work and infrastructure ownership/responsibility.

Our guidance, Legal operator and competence requirements: environmental permits – GOV.UK (www.gov.uk) provides information to operators to demonstrate this control. In particular, the section "What a legal operator is" will assist you in producing clear details to demonstrate to us that TWUL is the operator for this permitted area.

More information on management systems can be found in our guidance, Develop a management system: environmental permits – GOV.UK (www.gov.uk). This step is essential in understanding the fundamental principle of who is in control of the permit.

c. In the non-technical summary, you stated that 'Digested sludge cake' is handled within an enclosed cake barn and is stored within a totally enclosed and abated cake barn, however we can see no further mention of what abatement is in place for the cake barn. Update the non-technical summary to include an explanation of the cake barn abatement.

Answer 2a)

Thames Water and Finnings (UK) Ltd have aligned management systems for the operation of the permitted assets. A permitted multi operator facility has been in place since 2007.

Both parties understand which assets are their responsibility, and where the two asset bases interact, which is set out in the contract agreement between the two parties. Maintenance and replacement requirements are the responsibility of the party controlling the specific asset. There is a physical fence delineating the control areas for each party.

There are limited movements of materials across the permit boundary between Thames Water control and Finning (UK) Ltd control.

These are primarily biogas, transferred from Thames Water control to Finning (UK) Ltd control, via the biogas pipelines at the site. Limited condensate and other waste waters from the Finning (UK) Ltd controlled assets is transferred back across the permit boundary via the site drainage system, for treatment via the UWWTD route at the works. Responsibility for where the materials moves between each operator is at the physical fence line. All maintenance type wastes associated with the biological treatment of waste is produced within the Thames Water permitted area and the management of this waste is the responsibility of Thames Water, as per the details of Residue Management Plan (as supplied).

Biogas is transferred between the two parties, on the basis of maximising the recovery of energy and minimising the use of the flare. Weekly reports are prepared by both parties to check biogas transfer volumes and energy outputs, as well as availability of assets to ensure effective control.

Maintenance schedules are prepared on an annual basis, checked as needed to ensure that they are suitably aligned, particularly during periods where any required maintenance is required to the boilers, flare or CHP engine. On a weekly basis, there is an additional update from both parties to ensure that the current status of assets is understood and any required reactive maintenance can be carried out by one or other party without impacting on the other.

Where assets are needed to be taken offline for maintenance or other reason, this is communicated well in advance with an acknowledgement from the other party required prior to commencing the works. This to prevent impacts of changes to material feeds negatively effecting the other party.

In the event of an emergency or otherwise unplanned scenario which could impact on the biogas system, both parties have 24 hour staffed contact numbers for the other party to alert them to an issue and allow contingency measures to be activated as appropriate.

Answer 2b)

Following a review of the appropriate Environment Agency guidance RGN2, Thames Water Utilities Limited (TWUL) can confirm that they remain, as at present, the legal operator for the purposes of the permit.

TWUL has day-to-day control of the facility, automatically monitoring and conducting operation of the facility using TWUL staff from the on-site control room. Outside of normal operation hours, a regional control centre monitors and control operations. TWUL have control of the financial and investment decisions associated with their assets within the permit. Maintenance operations and day to day management of the assets are undertaken by staff over whom the 'hire / fire' decision is made by TWUL. This means that they are the defined operator.

Answer 2c) This has now been updated. The cake barn is abated via OCU4, labelled as A16 on the emission point plan (B22849AM-JAC-LGR-DR-0002). OCU4 draws air by three variable speed Extraction Fans through an Activated-Carbon Annular filter.

3. Q5 Supporting Information

Site Plan and tank naming discrepancies. The revised application supporting document (TW_STC_EPR_06a | Revised) identifies the site boundary, six primary digesters and three tanks called secondary digesters. However, the Long Reach Options Report states two secondary digesters and eight primary digester tanks. Also, the Long Reach Accident Management Plan states six primary tanks, two intermediate tanks, one secondary tank and one dewatering tank.

- a) *Confirm and clarify the number and name of tanks,*
- b) *Identify clearly where they are on site plan*
- c) *Resubmit the above mentioned documents, ensuring tanks are named consistently.*

Develop a management system: environmental permits - GOV.UK (www.gov.uk)

d) Do any of the variations you plan to make need extra land to be included in the permit. You have answered yes to this question and provided appendix C, H5 template site condition report. Sections 4-10 of this report have not been completed. Provide completed section 4 of site condition report with a map which shows how the applied for land is extended from the current permit area.

Answer 3a)

Please refer to Long Reach STW Process Flow Diagram for correct naming convention for tanks at Long Reach STC. (document: B22849AZ-JA-LREAS1ZZ-LSX-DR-P-0003)

Answer 3b)

An updated site plan is provided as B22849AM-JAC-LGR-DR-0002

Answer 3c) An updated Technical Summary is provided as Annex 4.

The updated Long Reach Options Report is provided as attachment B22849AZ-JA-LREAS1ZZ-100-RP-Z-0001

The Long Reach Accident Management Plan is provided as attachment TW_STC_EPR_06a_LGR_AppJ, August 2023.

Answer 3d) An updated Site Condition Report is provided as document TW_STC_EPR_06b_LGR_APPC and the 'Current Permit Area' PDF that shows how the applied for land is extended from the current permit area.

4. Q6 Environmental risk assessment

a. The assessment provides a site tank inventory. However there are discrepancies with maps and documents listed above, namely the revised application supporting document (TW_STC_EPR_06a | Revised), Long Reach Options Report and Long Reach Accident Management Plan in relation to number of tanks and naming of tanks. Resubmit the tank inventory ensuring numbering and naming of tanks is consistent with the documents mentioned above.

b. We believe you store and potentially treat waste in open tanks which produce diffuse emissions to air. Under guidance Risk assessments for your environmental permit, you must identify risks, explain what the environmental impact could be and explain what measures you will take to reduce those risks.

Confirm and identify any open tanks used to store and/or treat waste. You must clearly demonstrate how you will meet the requirements set out in BAT 14 which are to contain diffuse emissions. Section 7 of guidance, Biological waste treatment: appropriate measures for permitted facilities provides further information on what is required.

c. If open tanks are identified, submit a risk assessment which proposes methods for containing and abating emissions from open tanks in line with BAT, or provide alternative measures with evidence of how they will provide the same level of environmental protection to BAT.

Note: To confirm any proposals submitted, you must provide evidence to demonstrate how you will meet Best available techniques: environmental permits - GOV.UK (www.gov.uk). Specifically BAT 14 requires that tanks containing biologically active materials that have the potential to generate diffuse emissions must be carried out in enclosed equipment. Open tanks storing biologically active waste processed through anaerobic digestion may produce varying levels of biogas (depending on the effectiveness of the digestion process). Storing waste in open tanks which produces uncontrolled emissions of biogas is not BAT.

The type of enclosure will depend on how effective your anaerobic digestion process has been and how stable the stored process digestate is. If there has been an effective digestion process and stable digestate is produced, tanks must be covered and waste gases treated via a BAT appropriate abatement plant. Whereas if the digestion process is not effective and produces biologically active digestate enclosures must be capable of containing biogas and channelling this gas to appropriate storage or utilisation plant such as CHP engines or biogas upgrading plant. Demonstrating that your anaerobic digestion process has been effective, and that digestate stored in any open tanks is stable must be supported by evidence. Evidence of digestate stability can be determined by showing that the anaerobic digestion process is effective based on process parameters specified within the Waste Treatment BAT conclusions. It can also be investigated by testing residual biogas potential using the methodology in PAS 110 PAS110_2014.pdf (wrap.org.uk) 'Annex A (normative) Minimum anaerobic digestate stability requirements', or an equivalent standard/methodology.

For any tanks identified as not biologically active, we require that you submit proposals for the covering of tanks in line with guidance Covering Slurry Lagoons (publishing.service.gov.uk), Biological waste treatment: appropriate measures for permitted facilities - 1. When appropriate measures apply - Guidance - GOV.UK (www.gov.uk) and BAT 14.

We would require these steps to be carried out through the completion of improvement conditions. At this stage, we need you to demonstrate that you will commit to making these infrastructure changes for the various types of open tank activities.

Answer 4a)

The site tank inventory is updated and replaced with the following Table.

Tank Purpose	Number	Operational Volume (m ³)	Construction
Picket Fence Thickeners	4	884	Steel
Sludge Import Tank	1	251	Steel
High Energy Blending Tank	1	10	Steel
Pre-THP Storage Tank	2	59	Steel
THP Screened Sludge Holding Tank	2	59	Steel
THP Feed Silo	1	73	Steel
THP Pulper Tank	1	34	Steel
THP Reactor Tank	3	13	Steel
THP Flash Tank	1	42	Steel
Digester Feed Tanks	2	254	Steel
Primary Digestion Tank	8	2,000	Steel
Sequential Primary Digestion Tank	1	3,739	Concrete
Emergency Storage Tank	1	3,739	Concrete
Main Dewatering Press Buffer Tank	1	3739	Concrete/Steel

Local Press Buffer Tank	1	35	Steel
Liquor Buffer Tank	1	200	Concrete
Polymer Tank (for SAS dewatering)	1	25 tonnes	Steel
Polymer Silo (for THP)	1	25 tonnes	Steel
Polymer Silo (for digested sludge)	1	35 tonnes	Steel
Boiler Diesel Tank	1	79,704 litres	Steel
Boiler Diesel Day Tank	1	2,100 litres	Steel
Workshop tank (for site vehicles)	1	8,000 litres	Steel

Answer 4b) and 4c)

There is a single open top tank within the permit boundary at Long Reach STC, namely the Emergency Storage tank.

Thames Water commits to following BAT 14 and depending on the risk posed by the waste in terms of diffuse emissions to air, will use the appropriate BAT 14 techniques which includes BAT 14d. Any proposed solutions, such as coverings and collection systems, will be subject to a risk- based approach to determine our approach to abatement if required for individual tanks.

Thames Water confirm that our approach to abatement includes use of a biogas system if required. Engineering design assessment may result in replacement of tanks or reduction in number of applicable tanks. Our programme of delivery will need to be phased so that for each location a minimum number of existing AD tanks are always in continued operation to ensure process requirements are met. Thames Water will determine whether individual tanks are biologically active. Any abatement technology implemented would be in line with BAT 14 and BAT 34 and would be appropriately sized odour control units, depending upon the outcomes of a risk-based approach, which includes monitoring and modelling of any releases.

5. Table 3 – Technical standards.

You have stated in your response “Will be updated as and when the EA guidance is issued”, and identified LFTGNO8: guidance for Monitoring landfill gas engine emissions. Under guidance Part C3 varying a bespoke installation permit (publishing.service.gov.uk) you must identify any relevant guidance in Technical guidance for regulated industry sectors: environmental permitting

- GOV.UK (www.gov.uk), and relevant best available techniques (BAT). It should also be noted that LFTGNO8 is superseded Biological waste treatment: appropriate measures for permitted facilities - Guidance - GOV.UK (www.gov.uk). Provide an updated C3 form identifying the relevant technical standards that your site will comply with.

Answer 5)

Please see appended updated form, TW_STC_EPR_06b_LGR_FC3

Table C3-3a is updated to include:

Table 3 – Technical standards

Fill in a separate table for each activity at the installation.

Installation name	Long Reach STC	
Description of the schedule 1 activity or directly associated activity	Best available technique (BATC, BREF or TGN reference) (see footnote below)	Document reference (if appropriate)
S5.4A1	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)	

6. Q4a – Monitoring.

This requires you to outline how you provide environmental monitoring for various emission types, for example, bio - aerosols monitoring, surface water or groundwater, noise, ambient air monitoring, process and land monitoring. You must describe the frequency of any monitoring, the measurement methodology you will use and the procedure for evaluating your results. You must provide a permanent means of access to monitoring points.

For all relevant emissions as outlined in guidance Part C3 varying a bespoke installation permit (publishing.service.gov.uk), provide:

- a. The national grid reference of the monitoring point for point source emissions
- b. The frequency of monitoring.
- c. The methodology used for monitoring. You should use recognized standards such as British EN standards or ISO standards.
- d. The procedures (written documents) you follow to assess the measures.

Answer 6)

Table C3-4a – Emission Monitoring

Monitoring point	NGR	Monitoring frequency	Methodology (standard)	Assessment procedures
A4 (Emergency Flare)	TQ 55357 76528	Annual monitoring is only required when flare operates in excess of 10% of the time, taken on an annual assessment period. Oxides of Nitrogen – Hourly average	As per "Guidance for monitoring enclosed landfill gas flares". LFTGN05 v2 2010. Permanent sampling access not required.	BS EN 14792
A5 (Emergency Flare)	TQ 55362 76524	Annual monitoring is only required when flare operates in excess of 10% of the time, taken on an annual assessment period. Oxides of Nitrogen – Hourly average		BS EN 14792
A8 (Boiler 1)	TQ 55324 76561	No limit set	No monitoring set	
A9 (Boiler 2)	TQ 55333 76555	No limit set	No monitoring set	
A10 (Boiler 3)	TQ 55339 76545	No limit set	No monitoring set	
A11 (Boiler 4)	TQ 55344 76542	No limit set	No monitoring set	
A13 (OCU 1)	TQ 55263 76382	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR	

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			CENTS 1369 for sampling NIOSH 6016 for analysis	
A14 (OCU 2)	TQ 55368 76443	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CENTS 1369 for sampling NIOSH 6016 for analysis	
A15 (OCU 3)	TQ 55400 76432	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CENTS 1369 for sampling NIOSH 6016 for analysis	
A16 (OCU 4)	TQ 55297 76346	Hydrogen sulphide Once every six months	CEN TS 13649 for sampling OR US EPA M11	
		Ammonia: Once every six months	EN ISO 21877 OR CENTS 1369 for sampling NIOSH 6016 for analysis	
A17 (PRV – THP)	TQ 55427 76458	n/a	n/a	
A18 (PRV – Primary Digestion Tanks)	TQ 55434 76529	n/a	n/a	
A19 (PRV – Primary Digestion Tanks)	TQ 55448 76516	n/a	n/a	

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A20 (PRV – Primary Digestion Tanks)	TQ 55421 76515	n/a	n/a	
A21 (PRV – Primary Digestion Tanks)	TQ 55434 76503	n/a	n/a	
A22 (PRV – Primary Digestion Tanks)	TQ 55396 76489	n/a	n/a	
A23 (PRV – Primary Digestion Tanks)	TQ 55410 76476	n/a	n/a	
A24 (PRV – Primary Digestion Tanks)	TQ 55383 76476	n/a	n/a	
A25 (PRV – Primary Digestion Tanks)	TQ 55398 76463	n/a	n/a	
A26 (PRV – Sequential Primary Digestion Tank)	TQ 55247 76474	n/a	n/a	
A27 (PRV – Main Dewatering Press Buffer Tank)	TQ 55267 76457	n/a	n/a	
A28 (Biogas PRV)	TQ 55324 76466	n/a	n/a	
A29 (Biogas PRV)	TQ 55340 76483	n/a	n/a	
S1 (Liquor sampling point) Liquor Return Pumping Station	TQ 55302 76423	n/a	MCERTS or equivalent, or ISO/IEC 17025	
S2 (Liquor sampling point) PFTs	Tbc	n/a	MCERTS or equivalent ISO/IEC 17025	
5.7 MWth Diesel Generator (Specified Generator)	TQ 55425 76742	Oxides of Nitrogen – Every three years	MCERTS or equivalent or BS EN 14792	
1.75 MWth Diesel Generator	TQ 55437 76706	Oxides of Nitrogen – Every three years		

Memorandum

(Specified Generator)				
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7. Q4b9 – BS EN 15259 - You have answered no to question in section 4, but not provided information on how the standards in BS EN 15259 will be met. Provide an assessment to how the standards in BS EN 15259 will be met.

a.

Answer 7)

As an existing operational site, sampling locations and sampling ports may not meet all of the requirements for BS EN 15259, but these are being checked onsite. The site has previously undertaken emissions monitoring in accordance with its permit, with no issues raised by the EA or the monitoring contractor. Due to the size of the existing boilers, 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.

8. Types of waste accepted. On review of Table C3-1b(i) Waste accepted for Anaerobic Digestion there are waste codes listed which would cause the digester outputs to fall outside of the Sludge Use in Agriculture Regulations.

a. Confirm that you will not be undertaking co-digestion, and identify the EWC codes that you will remove from your application, or.

b. Provide a non-technical summary and BAT assessment to demonstrate how you will operate the site for co-digestion.

Answer 8a)

No co-digestion will be undertaken at the site. Amended EWC tables are provided in **Annex 1** to this response.

Answer 8b)

Not applicable, there is no intention of operating the site as a co-digestion site.

9. On review of 'Table C3-1b(ii) Waste accepted at the head of the works import point', this activity comprises EWC codes already permitted for under EPR/BB3204GD. The following codes have been listed in Table C3-1b(ii) that are not listed within the current permit, these codes must be removed from the table (16 10 02, 19 02 06, 19 06 06, 19 06 99, 19 12 12 and 19 13 08). Confirm that these codes will be removed from this permit application. Should you still wish to accept the waste codes listed, you will need to apply for a separate variation application and revised risk assessments for the discharge to sewer.

Answer 9)

Please see the updated EWC list for this import activity presented in Annex 1 of this document.

EWC code 16 10 02 is retained to enable continued acceptance of waste from portable toilet coded 16 10 02 in accordance with WM3 and as stipulated and enabled by EA RPS 241 and RPS 277.

Thames Water include this code in response to feedback from the Environment Agency regarding the acceptance of this waste stream and the use of this code for portable toilet wastes; effluent from waste water treatment works; and dewatering liquors, 16 10 02 replacing the use of '99' codes and Chapter 20 EWC codes.

Thames Water request that an improvement condition is consider in respect to the inclusion of EWC's 19 09 02 and 19 13 08.

Head of works activity

The head of works operation to accept tankered waste and discharge these waste streams into the main waste water treatment works is classed as an indirect emission to water. We recognise that data on the waste water emissions to the works is not likely to be available at this point. The information below may allow us to set improvement conditions to inform the composition of these emissions and perform environmental risk assessments.

10. Provide a plan of the import area, including national grid reference for import point (emission point for the discharge to the waste water treatment works) and drawing showing import point/emission point, covered inlet channel and screen infrastructure described in your non-technical summary. This plan/drawing must include all infrastructure used solely for acceptance of tanker waste. All infrastructure relating to this will require a permit. The activity ceases to require a permit once it is mixed with incoming sewer network for process through WWTW under the UWWTD.

11. Provide a summary of the sampling and analysis methodology of the tankered waste and waste waters discharged to the import point and specify the likely pollutants in the effluent (guidance here Monitoring discharges to water: guidance on selecting a monitoring approach and Surface water pollution risk assessment for your environmental permit).

12. Provide a written statement with a commitment to undertake the sampling and analysis in line with the above guidance and requirements of BAT conclusion 3 of the Waste Treatment BREF (if it is determined the head of works activity is a Part A1 installation).

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

14. This activity is listed with disposal codes D09 and D15. D09 is for the physico-chemical treatment (screening) and D15 is for the storage pending disposal. The non-technical summary provided indicates there is no storage tank for tanker waste imported. The physical treatment process of screening the material prior to its discharge to the waste water treatment works is likely to be part of this waste operation and not UWWTD treatment. As a physical treatment for disposal, it is possible that the activity is an installation activity (S5.4 A(1)(a)(ii) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving physico-chemical treatment). Please note that this would have implications on application fee and the need to comply with BAT.

- a) *Please remove D15 unless there is storage within a tank of imported wastes before they meet the wastewater from catchment area and become part of UWWTD process.*
- b) *D13 must be added for this activity as D13 is for blending mixing, which occurs when the tanker waste meets with incoming waste water from the sewer catchment area. Update with the relevant disposal codes.*
- c) *Should you conclude that this activity is a Part A1 installation, submit a BAT assessment which explains how the Head of Works operations will meet all the relevant BAT conclusions.*

Answer 10) Please see the updated site emission point plan. The NGR for Transfer Point T3 is TQ 55176 76688

Please note the import point is located upstream of the screens and as such tankered imports have mixed with incoming sewer network effluent before being screen as part of the normal UWWTD operation. As such Thames Water understand these screens are outside the scope of this permit.

Answers 11 and 13.

Please see attached document Acceptance of Third Party Waste Imports EMS-EES-012' .

Answer 12. N/A as this activity does not form part of the Part A1 installation

Answer 14a and b This code D15 is removed and the use of the code D13 is agreed. A revised Table of Activities for the application has therefore been including as Annex 2. The revised tables also includes updated throughput figures revised in light of Environment Agency feedback on our applications.

Answer 14c) Not applicable.

Other additional waste operations

15. What waste operations are you applying to vary. You have included a waste table, 'Table C3-1b(iii): Waste accepted for temporary storage and transfer or treatment'. You have not provided the relevant application charge, given a non-technical summary, or provided information on how you will comply with the relevant appropriate measures for this waste activity.

a. Update your non-technical summary to include an explanation of the activity identified as 'Waste accepted for temporary storage and transfer or treatment'.

b. Provide a written report describing how the waste treatment operation will comply with the relevant appropriate measures Non-hazardous and inert waste: appropriate measures for permitted facilities - Guidance - GOV.UK (www.gov.uk).

c. Alternatively, confirm that you will not be applying for this waste activity as part of your permit application.

Answer 15a) Treated, digested, cake may be imported for temporary storage in the cake barn. Where cake is imported for temporary storage prior to transfer offsite for land application, it is stored separately in the barn from indigenous cake and is not mixed or blended with the indigenous cake. Imported cake is identified as such on site.

Answer 15b) This import is for the purposes of storage only on a temporary basis. It is similar in nature and composition to indigenous cake and as such does not require any operational changes or specialist infrastructure to manage it.

Please also find attached latest version of the document 'Acceptance of TWUL Inter-site Sludge, Cake and Sludge Liquors EMS-DOC.071'.

Answer 15c) Not applicable

Provide information in Application form Part C6 – General - varying a water discharge activity

16. Form C6 Liquor returns

The waste anaerobic digestion process produces effluent and is discharged off site to Long Reach Wastewater Treatment Works. Effluent discharged to the waste water treatment works is classed as a point source emission to sewer or indirect emission to water. BAT conclusion 3 requires operators to have an emissions inventory for the effluent. As stated in the question on the head of works activity, we acknowledge that applicants may not hold this information in order to inform a quantitative risk assessment for existing discharges. For the purpose of duly making, provide the following information:

- a) *Provide a summary of the sampling and analysis methodology of the effluent discharged and specify the likely pollutants in the effluent (guidance here Monitoring discharges to water: guidance on selecting a monitoring approach and Surface water pollution risk assessment for your environmental permit).*
- b) *Provide a written statement with a commitment to undertake the sampling and analysis in line with BAT conclusion 3 and the above guidance on discharges to water.*
- c) *Provide a written statement with a commitment that those undertaking the sampling and analysis will be by accredited to MCERTs or provide evidence of equivalent standards.*
- d) *Provide a revised drainage plan which identifies the effluent sampling point for the emission of effluent from the installation activities.*
- e) *Specify the national grid reference (NGR) of the effluent sampling point for T1 liquor transfer.*
- f) *Specify the NGR for T1 where the effluent emission leaves the installation, this might be the same as the sampling point above.*
- g) *Specify the emission point NRG of where the waste water enters waste water treatment works.*

Answer 16a) to 16 f)

Please find attached Thame Water Liquor Proposal 'TW_STC_EPR_08aLRG_APPM.pdf'

In addition, please note Thames Water commits to:

- a) undertaking (using a UKAS accredited laboratory where available) a chemical analysis of the waste water which tests for ALL pollutants which we expect to find in the

discharge (not just Ammonia, BOD, Solids, flow, pH and data on bio-eliminability) and that we will use an appropriate ‘minimum reporting value’ (MRV) (usually 10% of the environmental quality standards (EQS) where this is analytically achievable).

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

Please note that Effluent sample (‘S’ points) and transfer (‘T’ points) are identified on the site plan which is provided as B22849AM-JAC-LGR-DR-0002 referenced in the above proposal

NGRs for these locations are also provided in the following Table

Emission point reference and location	Source	NGR
S1 – Sample point	PFT Liquors , SAS Thickening Liquors, THP Centrifuge Thickening Liquors, Digested Sludge Dewatering Liquors, OCU Waste Waters, Biogas Condensate, Boiler Waste Water, Surface Water Runoff	TQ 55302 76423
S2 – Sample point	PFT Liquors	Tbc
T1 – Transfer point	PFT Liquors , SAS Thickening Liquors, THP Centrifuge Thickening Liquors, Digested Sludge Dewatering Liquors, OCU Waste Waters, Biogas Condensate, Boiler Waste Water, Surface Water Runoff	TQ 55202 76443
T2 – Transfer point	PFT Liquors	TQ 55238 76505

Additional Information:

Please see Annex 3 which provides updated information to Question 3 of Part C6 (on liquor).

END OF NOTE

Annex 1

Revised EWC tables for application

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]
19 09 02	sludges from water clarification
19 13 08	aqueous liquid wastes and aqueous concentrates from groundwater remediation
Note 1 – comprising but not limited to: Thickening and dewatering liquors, centrate and filtrate derived from TWUL processes	

Memorandum

Waste from a portable toilet
Chlorinated water from TWUL potable water network

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

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

Annex 2

Revised Table of Activities for application

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
Long Reach 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 nine Digestion 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).	1,781 wet tonnes per day	R3: Recycling reclamation of organic substances which are not used as solvents R13 Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage, pending collection, on the site where the waste is produced)	Maximum waste throughput 2,500,000 wet tonnes per annum including indigenous UWWTD derived sludge from within the wider Sewage Treatment Works. As per the volume calculations in Note 1 below.
Directly Associated Activities					
AR2	Imports of waste, including sludge from other sewage treatment works and imports of municipal liquid or sludges similar in composition to UWWTD derived materials				
AR3	Blending of indigenous sludges and imported wastes/waste sludges prior to treatment;				
AR4	Storage of digestate prior to dewatering;				
AR5	Pre-treatment of sewage sludge by THP;				

Memorandum

AR6	Dewatering of digested sewage sludge;				
AR7	Transfer of dewatering liquors back to the works inlet;				
AR8	Transfer of surface water runoff back to the works inlet;				
AR9	Storage of dewatered digested sludge cake prior to offsite recovery;				
AR10	Storage of biogas;				
AR11	Transfer of biogas condensate via site drainage back to the works inlet;				
AR12	Pressurisation of biogas in existing boosters;				
AR13	Removal of siloxanes;				
AR14	Combustion of biogas;				
AR15	Operation of emergency flares;				
AR16	Storage of raw materials;				
AR17	Storage of diesel; and				
AR18	Storage of waste, including waste oils.				
MCPD					
Specified Generator Activities					
	National Grid Reference and/or activity reference/emission point	Activity listed in the EP Regulations	Description of specified generator	Fuel	Operating hours limit per unit per annum
AR19	BHS1 Generator Blower House Generator 2 NGR: TQ 55425 76742	Schedule 25B – Specified generator	1 x 5.7 MWth engine	Diesel	50 hours per year for regular testing
	GSS1	Schedule 25B – Specified generator	1 x 1.75 MWth engine	Diesel	50 hours per year for regular testing

Memorandum

	GS1 Storm Generator 1 NGR: TQ 55437 76706				
Notes for Specified Generators:					
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	
AR20	Imports of wastes to the works inlet for treatment through the UWWTD route and screening of imports	D13: Blending or mixing prior to submission to any of the operations numbered D1 to D12	n/a	Maximum waste throughput 75,000 wet tonnes per annum	
	Digested sludge cake for temporary storage pending off-site removal	R13: Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where it is produced). R3: Recycling or reclamation of organic substances which are not used as solvents	n/a	Maximum waste throughput 1,000 tonnes per annum	
For all Waste Operations		Total capacity	36,981 wet tonnes	[a] + [b]	
		Total STC treatment capacity (tank volume)	32,181 wet tonnes	[a]	
		Total cake storage capacity	4,800 wet tonnes	[b]	
For waste imports to the head of the works		Annual throughput (tonnes each year)	Imports: 75,000 wet tonnes		
For waste imports of digested sludge cake for temporary storage		Annual throughput (tonnes each year)	Imports: 1,000 wet tonnes		
<p>Note 1: Treatment Calculation based on: Primary Sludge: 46.23 tds/day; worse case 1.50% dry solids = 3,082 m³/day = 1,124,933 m³/year SAS: 21.02 tds/day; worse case 0.70% dry solids = 3,002 m³/day = 1,095,714 m³/year</p>					

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Imports 16.81 tds/day; worse case 3.00% dry solids = 560 m³/day = 204,533 m³/year
Total Combined import calculation 2,425,181 m³/year; rounded to 2,500,000 m³/year

Annex 3

Revised Questions from Part C6 following updates to the Liquor Monitoring Proposal.

Q3 How much do you want to discharge?

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

8,534 Cubic metres

3c What is the maximum rate of discharge?

98.77 Litres / second

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

8,534 Cubic metres

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

Q3b –based on the maximum site input of 8,534 tonnes per day to the digesters, assuming 1 tonne = 1 cubic metre. The liquor arisings must come from the installation inputs as there is limited additional water inputs (primarily boiler feed water). Actual discharge will be slightly lower as no allowance has been made for water entrained in the produced sewage cake.

Q3c – this is based on 8,534,000 litres (8,534 x 1000) divided by 86,400 seconds (24 x60 x 60). Arisings from sources such as dewatering are constant as the plant runs continuously. This gives a value of 98.773148, rounded to 99.77 litres per second.

Q3d – based on the maximum site input of 8,534 tonnes per day to the digesters, assuming 1 tonne = 1 cubic metre. The liquor arisings must come from the installation inputs as there is limited additional water inputs (primarily boiler feed water). Actual discharge will be slightly lower as no allowance has been made for water entrained in the produced sewage cake.

Annex 4

A revised Technical Summary, including process description and aligned tank names is provided below.

2. Technical Description

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

Scope

This variation application covers the biological treatment of sewage sludge, both indigenous and imported from other waste water treatment sites, in a mixture with imported cess and septic tank derived wastes, by anaerobic digestion, with a capacity above the relevant thresholds. It also permits the acceptance of cess, septic tank, and similar sewage derived materials, along with portable toilet wastes to the works inlet for processing through the UWWTD treatment route. There are a number of DAAs, including the storage of biogas, which is supplied to another operator at the same Installation for the operation of biogas fuelled CHP engines for the generation of electricity and heat at the site. Finning (UK) Limited operate the CHP engines at the site as part of a multi-operator Environmental Permit. The CHP engines are classified as an 'existing' combustion source under the Medium Combustion Plant Directive (MCPD). There are also two currently permitted MCPD and specified generators at the site although these are not part of the installation as they do not meet the definition of a directly associated activity.

An additional waste activity, the import of treated sludge cake is also added to the permit by this variation.

Thames Water holds an existing bespoke Environmental Permit under number EPR/MP3838UP/V004 for storage of biogas, pressurisation of biogas, siloxane removal and use of a flares as a DAA to the combustion of biogas within CHP engines operated by Finning (UK) Ltd under permit EPR/WP3838UK. Environmental Permit EPR/MP3838UP/V004 also permits the operation of a MCPD compliant Tranche A Specified Generator. This permit is subject to a substantial variation to convert it to an installation permit with the biogas storage and associated operations becoming a DAA to the main listed activity, namely biological treatment of sewage sludge. The Finning (UK) Limited permit will also be subject to a parallel permit variation application (Environmental Permit Variation Application EPR/WP3838UH/V004) to become a DAA to this listed activity.

The site holds a second environmental permit, a waste operation standard rules permit, EPR/BB3204GD/A001, Long Reach Sewage Treatment Works Non-Hazardous Sludge Import Facility allowing the import of specified waste to the site for treatment and recovery or disposal. This permit will be subject to a variation to merge with the new installation permit.

An additional waste activity, the import of treated sludge cake is also added to the permit by this variation.

There is a further, separate bespoke waste facility environmental permit, EPR/DB3538RS/V003, for the import of specified wastes for treatment via a Fats, Oils and Greases (FOG) plant at Long Reach which remains as currently permitted and is not altered by this application.

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

- Proposed site throughput exceeding that allowed in the standard rules set;
- Requirement for additional EWC codes over those in the standard rules set;
- Standard rules sets exclude multi operator permits;
- The site being located within 10 m of a watercourse, namely an un-named watercourse adjacent to the Eastern boundary of the site and flows in a northerly direction outfalling into the River Thames approximately 450 m to the north.

Site Location

The Long Reach site is located immediately South of the River Thames, near the town of Dartford, Kent. The site is in a relatively rural location for the East of London, approximately 2.5 km North of Dartford, with a large housing estate approximately 50 m to the South of the site entrance. To the East is the former Littlebrook Power Station, which is currently being demolished with warehouses beyond. To the West of the site are the Dartford Marshes and the River Darent.

The whole of the STW and STC is within a Flood Zone 3 in an area that benefits from flood defences. This indicates that the land within this zone would have a high probability of flooding without the local flood defences. These protect the area against a river flood with a 1:100 annual probability of flooding as a result, or a flood from the sea with a 1:200 annual probability.

The site sits outside the boundary of a Source Protection Zone (SPZ) and sits outside the boundaries of an Air Quality Management Area (AQMA), with the closest AQMA located approximately 1.3 km from the site.

There are three designated habitat sites within the relevant distances of the site comprising the Purfleet Chalk Pits SSSI, the Inner Thames Marshes SSSI and the West Thurrock Lagoon and Marshes SSSI, which are located approximately 1.4 km to the North-East, approximately 1.5 km to the North-West and approximately 1.7 km to the East of the site respectively. There is one Marine Conservation Zone (MCZ), the Swanscombe MCZ, located approximately 3 km to the East of the site. There is one area of Ancient Woodland within 2 km of the site, namely Watts Wood Ancient and Semi-Natural Woodland habitat, located approximately 1.9 km to the north-east of the site. There are seven non-statutory designated Local Wildlife Site (LWS) within 2 km of the site, including the Dartford Marshes LWS, located approximately 185m to the West of the STC. There are no Special Areas of Conservation (SAC), Special Protection Areas (SPA) or Ramsar within 10 km of the site and there are no Local Nature Reserves (LNR) or National Nature Reserves (NNR) sites within 2 km of the site. There are also records for protected species and habitats within the screening distance of the site which includes protected fish, protected species (non-fish) and protected fish migratory routes on the River Thames and River Darent

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

Table 2.1 Site tank inventory

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Tank Purpose	Number	Operational Volume (m3)	Construction
Picket Fence Thickeners	4	884	Steel
Sludge Import Tank	1	251	Steel
High Energy Blending Tank	1	10	Steel
Pre-THP Storage Tank	2	59	Steel
THP Screened Sludge Holding Tank	2	59	Steel
THP Feed Silo	1	73	Steel
THP Pulper Tank	1	34	Steel
THP Reactor Tanks	3	13	Steel
THP Flash Tank	1	42	Steel
Digester Feed Tanks	2	254	Steel
Primary Digestion Tank	8	2,000	Steel
Sequential Primary Digestion Tank	1	3,739	Concrete
Emergency Storage Tank	1	3,739	Concrete
Main Dewatering Press Buffer Tank	1	3,739	Concrete/Steel
Local Press Buffer Tank	1	35	Steel

Tank Purpose	Number	Operational Volume (m3)	Construction
Liquor Buffer Tank	1	200	Concrete
Polymer Tank (for SAS dewatering)	1	25 tonnes	Steel
Polymer Silo (for THP)	1	25 tonnes	Steel
Polymer Silo (for digested sludge)	1	35 tonnes	Steel
Boiler Diesel Tank	1	79,704 litres	Steel
Boiler Diesel Day Tank	1	2,100 litres	Steel
Workshop tank (for site vehicles)	1	8,000 litres	Steel

Waste Activities

The STC comprises of imports of waste for biological treatment and two additional waste activities. Biological treatment processes at the installation are for indigenous sludges separated from the UWWTD areas of the site and for treatment processes for imported sludge that arrives at Long Reach STC by road, normally 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 portable toilet waste along with cess, septic tank and similar sewage derived materials to the head of the works for processing through the UWWTD treatment (an existing waste activity for the site) and waste imports of digested sludge to the cake barn (an additional waste activity for the site). Imports to the cake barn are for temporary storage, pending recovery offsite. These imports are a contingency option primarily and will not be routinely used.

One of the import points is found close to the inlet of the sewage treatment works for wastes that consists 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. These wastes are imported by road, including small vehicles up to and including articulated tanker vehicles. No wastes are imported packaged in other ways than tankers. Access to the offloading point is controlled by the issue of keys by Thames Water to approved contractors only, who have undergone appropriate waste pre-acceptance checks. These keys enable the delivery tankers to discharge waste into the works, through a data logger using the site supplied flexible hose pipes to prevent misconnection issues. This imported waste material is handled via the

UWWTD treatment route which is outside of the scope of this permit. Waste import of non-hazardous wastes to the works inlet is considered a secondary waste operation to the main listed activity.

Imported wastes to the inlet are subject to treatment with incoming sewer flows via the UWWTD treatment route. The waste import area is situated on made ground, with kerbing to prevent run-off to unmade ground, and drains to the site drainage system in the event of a spillage during transfer operations. Operations prior to the thickening of sludge are not included within this permit, other than the receipt of imported cess and septic tank wastes.

A second additional waste operation at the same site is for the import of treated sludge cake from other works. Imported treated sludge cake is imported from other works, for temporary storage on the site cake pad. All such imports are subject to appropriate waste pre-acceptance and acceptance checks, prior to import, including checking that the incoming cake complies with the requirements of SUIAR and BAS. Treated sludge cake will be offloaded and visually checked. The waste stream is the same as that arising from the treatment of sludge within the Long Reach 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 impermeably surface within the enclosed and odour abated cake barn, for the shortest time practicable, the duration depending on factors such as prevailing weather and availability of the landbank. Treated sludge cake is then subject to export from the site for recovery via application to land via an approved supplier.

Sludge Processes

The second waste import offloading point is for permitted imports of sludges into the anaerobic digestion process, to be mixed with indigenous sludges. Sludge is imported to the anaerobic digester plant from other waste water treatment works, via a data logger into the Sludge Import Tank. Incoming waste is subject to appropriate waste pre-acceptance and acceptance checks. Waste is transferred via a data logger, using the site supplied flexible hose pipes to prevent misconnection issues, in order to measure the transferred volume and record the originating site. The Sludge Import Tank is steel tank on a concrete base, enclosed and odour abated, with malodorous air extracted to an Odour Control Unit (OCU) that is shared with the Picket Fence Thickeners (PFTs). Sludge is screened, to remove rag and grit, which is discharged into skips for offsite disposal. Imported sludge is pumped from the Sludge Import Tank to the HEBT where it is mixed with indigenous primary sludge and SAS, prior to the THP process.

Sludge from the aerobic treatment processes is pumped from the primary settlement tanks via a subsurface pipe into one of the four PFTs on site, which under normal conditions operate three tanks thickening sludge and one tank being filled. Supernatant from the sludge weirs out of the tank and is returned to the works inlet via the site drainage for treatment via the aerobic process. These PFTs are all covered steel tanks on concrete bases and are odour abated. Once thickened, the sludge is pumped above ground from the PFT to the HEBT for processing via the THP or directly to the Digester Feed Tanks, via a THP bypass.

SAS from the Final Settlement Tanks (FSTs) is pumped to the SAS Buffer Tank, before it is pumped to and thickened within the SAS Thickening building, at which point the sludge falls under the scope of this Environmental Permit, which contains five belt thickeners. The SAS Buffer Tank is outside of the scope of this Environmental Permit. A bulk powder system is used with the SAS belt thickeners which automatically makes up a polymer coagulant with potable water / final effluent

water and doses it into the belt thickeners to aid coagulation. After thickening SAS is pumped above ground to the HEBT to be mixed with primary thickened indigenous sludges and imported sludge. Liquors are returned via the site drainage via the Liquor Buffer Tank and Return Liquor Pumping Station to the works for additional treatment via the aerobic process.

Thermal Hydrolysis Process

Prior to digestion, a proportion of the sludge is treated within the THP. The THP plant is located on made ground and is bunded, with drainage returning via the site drainage for additional treatment. The THP uses heat and pressure to make the sludge more readily available for digestion and increases the efficacy of the digestion process, generating more biogas as a result.

Thickened sludges combine within the HEBT and are blended in order to achieve a homogenous blend of SAS and mixed primary sludges for the centrifuges and other downstream processes. Blended sludge in the HEBT weirs equally into one of two pre-THP storage tanks at the beginning of the THP Process; a recirculation pump can return sludge to the HEBT preventing overflowing of this tank. The HEBT can be isolated for maintenance and bypassed and contains a high-level switch to prevent overtopping of the tank, that is monitored by Supervisory Control and Data Acquisition (SCADA) equipment.

The pre-THP storage tanks are both of steel construction. Levels within the storage tanks are monitored and controlled via SCADA, with tanks filling equally and high-level floats fitted to prevent overflowing. The mixed sludge is then pumped to screens, which remove further rag and inorganic material which is discharged into large skips for offsite transfer and disposal, with the screened sludge entering a THP Screened Sludge Holding Tank. The THP Screened Sludge Holding Tank are of steel construction, covered and feed sludge via dedicated pumps to three THP centrifuges, which dewater the sludge prior to the THP. These tanks have high level floats to prevent overflowing and are monitored via SCADA.

A polymer is added to each centrifuge feed line to aid coagulation, with the polymer being made up from a bulk powder system using potable water / final effluent water and stored in a day tank for use. The centrate from all centrifuges drains to site drainage and is returned to the works inlet for further treatment via the Liquor Buffer Tank and Return Liquor Pumping Station and the dewatered sludges fall into hoppers and is pumped, via dedicated pumps, to the top of the THP Feed Silo.

The THP Feed silo is monitored by high level alarms linked to SCADA and if the levels within the silos reach the high set point, all of the centrifuges are inhibited. The silo acts as buffer capacity for the THP and is of steel construction. Screw augers move the sludge into the inlets of the THP feed pumps, which pumps sludge to the THP Process (pulper, reactor and flash tanks).

There is one THP stream which operates a 24-7, batch process in parallel across the three reactor tanks. THP combines medium pressure boiling of sludge and is followed by a rapid decompression which also sterilises the sludge, destroying pathogens in the sludge so it exceeds the requirements for subsequent use in agriculture.

In the THP Pulper Tank, thickened sludge is preheated via recovered steam from the reactor and flash tanks. When a batch of sludge needed, the required volume is pumped from the pulper to one of the three reactor tanks for treatment and the cycle commences. Once filled with sludge, the reactor tank is filled with steam from the THP boiler, until the required pressure and temperature is reached in order to hydrolyse the sludge. The THP boiler is a HRB which uses

recovered heat from two of the CHP engines to produce steam for the THP. This HRB can also combust biogas to generate steam; or diesel as a back-up fuel source if biogas is not available. Once the hydrolysis has been completed, a valve is opened to gradually reduce the pressure with the steam released to the pulper tank for pre-heating of another batch of sludge. A second valve, at the bottom of the reactor tank is then opened and the sludge is discharged to the THP Flash Tank. The THP Flash Tank provides a thermal buffer to release excess energy from the sludge.

The THP process is carried out for a retention time of 20-30 minutes, at a pressure of approximately 6 bar and 165°C temperature. Each THP Pulper, Reactor and Flash Tank is fitted with a high-level switch to prevent overflowing and a bursting disc to prevent over-pressurisation, amongst other monitoring and safety features. As the warm, foul air from the THP is malodorous and saturated with water, a foul gas system is used to reduce temperature and moisture content prior to further treatment of this gas through the digestion process.

Digestion Processes

There are eight tanks adjacent to the THP in two banks of four parallel tanks, with tanks no. 2, no. 3 and no. 4 fed from one transfer pump, and tanks no. 6, no. 7 and no. 8 fed by another transfer pump, via aboveground sludge pipelines. These tanks are filled on a batch basis and empty by gravity, with digested sludge continuously transferred out of the tanks and into tank no. 1 which transfers into tank no. 5. The eight tanks are all of the same type and design, insulated steel tanks on a concrete base with a conical bottom that extends slightly below ground and each tank has a fixed concrete roof, with the exception of tank no. 3 which has a metal roof. Grit removal, drainage and compressed gas mixing all occur within the base of the conical bottom. The heating system recirculates sludge through a heat exchanger within the heating building, drawing sludge from near the bottom of each tank and feeding it back in near the top of the tank. Heating is supplied to this system either through transfer of heat from the CHP engines, or through use of the auxiliary boilers at the site (currently inoperable). All tanks are fitted with pressure relief valves (PRVs) on the fixed roof and teardrop alarms measuring levels within the tank. After a normal retention time of 18 days in total (the average retention in the Primary Digestion Tanks is 14 days and in the Sequential Primary Digestion Tanks is 4 days), sludge gravitates via aboveground pipes to the Sequential Primary Digestion Tanks. Biogas generated within the digestion process, largely methane, rises through the Primary and Sequential Primary Digestion Tanks and is captured within the biogas space at the top of each Primary and Sequential Primary Digestion Tanks, and transferred via aboveground pipes into the adjacent two Biogas Storage Holders for utilisation on site.

Sludge gravitates into the Sequential Primary Digestion Tanks on site via an above ground pipe, which then transfers into the Main Dewatering Press Buffer Tank. The Sequential Primary Digestion Tank is an above ground concrete tank with a fixed roof. The Main Dewatering Press Buffer Tank is of steel construction, sitting on top of an existing concrete tank that extends partially subsurface, and with a fixed roof. Both tanks have safety features, including PRVs, Elmat valves, teardrop sensors and high-level alarms. Each tank can be bypassed independently and taken out of service if required.

Fully digested sludge is then pumped above ground into the Local Press Buffer Tank, which is adjacent to the sludge dewatering presses located within the cake barn. There are five sludge

dewatering presses which are serviced by dedicated pumps. A powder polymer coagulant is automatically mixed with potable water / final effluent water, stored in a bulk silo, and dosed into each press feed line. Filtrate from the sludge dewatering presses returns via the Liquor Buffer Tank and Return Liquor Pumping Station to the works inlet for further treatment via the aerobic process. Digested sludge cake falls onto the floor of the cake barn into one of two bays, before shovel loaders move the digested sludge cake into the main barn. Digested sludge cake is subject to removal from site under the Sludge Use in Agriculture Regulations 1989 (SUiAR), and in accordance with the BAS. If the digested sludge cake is not suitable for application immediately, remedial actions are undertaken which includes isolation for an increased amount of time. The cake barn is an enclosed building with solid concrete floors and solid concrete internal walls. A large odour control unit is used to provide odour abatement to the enclosed cake barn and SAS thickening building. As the cake barn is totally enclosed and equipped with an abated air extraction system (the OCU) there is a low risk from bioaerosols from stored digested sludge cake.

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

Biogas

There are two double membrane biogas storage holders at Long Reach STC for storage of biogas generated on site and they are equipped with emergency PRVs, leak detection and slam shut valves to isolate the biogas storage holders. In the event of over pressurisation, pressure relief valves will activate. The area surrounding the two biogas storage holders is classified as a potentially explosive atmosphere, fenced off for security, provided with lightning protection and there are strict management provisions on the control of potential ignition sources.

The above ground biogas transfer pipeline is equipped with condensate pots that removes entrained moisture from the generated biogas and allow it to be drained to the site drainage system for treatment through the UWWTD system. This improves the quality of the biogas and reduces impurities that could reduce the efficiency of the CHP engines. Biogas passes through biogas boosters that increase the pressure of the biogas to the CHP engines, boilers (currently inoperable) or emergency flares. A slam shut valve is present on the main biogas line would also automatically isolate the biogas storage holders in the event of an emergency situation.

Two carbon-based siloxane filters are located upstream of the CHP engines on the biogas line and operate duty/standby to remove impurities from the biogas prior to combustion in the CHP engines. The use of siloxane filters reduces incidence of operational issues for CHP engines.

The wider site has three biogas CHP engines and the HRB which supplies steam to the THP process, that are located within a separate energy compound and receive biogas from the site operations for combustion, which generates electricity and recoverable heat, both of which are used on site. The three CHP engines and HRB are operated by Finning (UK) Limited as a multi-operator installation under a separate Environmental Permit (EPR/ WP3838UH/V003) and operation of the CHP engines and HRB falls outside of the scope of this permit variation application.

Biogas may also be combusted within the site's four boilers, which are dual fuelled with diesel. All boilers are currently inoperable. Heat generated by the boilers is used to regulate the Primary Digestion Tanks operational temperature. Diesel may be required to provide standby or top-up heating to the Primary Digestion Tanks in the event that the biogas is unavailable. All four of the

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boilers are Strebel models, two with a thermal input of 1.2 MWth each and two with a thermal input of 2.4 MWth each.

In the event of excess biogas due to CHP engines or boilers being unavailable or there being more biogas than the CHP engines or boilers can utilise, there are two ground mounted emergency flares which consume biogas. These are utilised under 10% of the year, less than 876 hours per year and their use is recorded.

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