Response to Q5 Maple STC Request for Information – January 2023.

TWUL are committed to providing information about the characteristics of the wastewater streams at Maple and are undertaking a review of our commitment to BAT 3, 6 and 7 further details of which are set out below.

Our review includes, but is not limited to, requesting companies providing national laboratory services to provide information relating to their capacity to analyse return liquor matrix for the determinants listed in the guidance you refer to in question 5 a)..

Such information is essential in order for us to complete the review of our current Liquor monitoring proposal and delivery of BAT 3, 6, and 7. We plan to complete this at the earliest opportunity and at the point of writing these enquires remain open with each of the laboratories.

We will provide and updated proposal to the Environment Agency in line with a revised IED programme and in the meantime, we would like to assure you of our commitment to sample liquor returns at Maple, our commitment to BAT 3, 6, and 7 and the following:

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

Under the BREF guidance BAT conclusion 3 Thames Water should establish and maintain an inventory of wastewater and waste gas streams. Thames Water will carry out a sampling and analysis methodology of the effluent discharged at defined and recorded locations. All Thames Water staff involved in the sampling, analysis and reporting will be trained personnel, accredited to MCERTS standards or appropriate alternatives. Thames Water sampling procedures will include details such as:

- precise location of the discharge sampling point including a grid reference.
- sampling process.
- storage conditions and transport of samples.
- types of bottles or containers and their closures.

A management system will be used to ensure the results are recorded and subject to review to include, but not be limited to, the following procedures:

- sampling programme, including procedures for resampling.
- data review and reporting
- training and audit.

b) **A written statement with a commitment to undertake the sampling and analysis in line with BAT3.**

The purpose of BAT3 in relation to return liquors is to establish and maintain an inventory of wastewater streams, as part of the environmental management system, to facilitate the reduction of emissions to water. In accordance with BAT3 the following data will be provided:

a) Simplified process flow sheets that show the origin of the emissions. Flow calculation based on an assessment of throughput may be used.
b) Descriptions of process-integrated techniques and wastewater treatment at source including their performances. Chemicals used for thickening and dewatering should also be stated.
c) Thickening and dewatering liquors, which comprise the major component of the returns, will be subject to monitoring for: Ammonia; BOD; solids; flow and pH.
d) Data on bio-eliminability (e.g. BOD)

Thames Water is committed to providing information about the characteristics of the identified liquor return sampling points, namely average values and variability of calculated daily flows. In addition, Thames Water is committed to further undertake the sampling and analysis of ammonia, BOD, solids and pH.

c) **A written statement with a commitment that those undertaking the sampling and analysis will be by accredited to MCERTs or provide evidence of equivalent standards.**

Thames Water is committed to sampling and analysis in accordance with MCERTS or ISO/IEC 17025.

The chemical analysis of the effluent and liquor return samples will be analysed in a United Kingdom Accreditation Service (UKAS) accredited laboratory.

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

Thames Water has identified process/drainage lines at Maple STC which take return liquors and wastewater from the sludge treatment area back to the head of works. The primary wastewater streams identified are as follows:

- Primary Sludge Picket fence thickening liquors.
- Surplus Activated Sludge (SAS) Picket Fence Thickening (PFTs) liquors.
- Surplus Activated Sludge (SAS) belt thickening liquors.
- Primary sludge drum thickening liquors.
- Sludge dewatering centrifuge centrate.
- Biogas condensate.

Other streams identified are:

- Site surface rain run-off
- Washdown for maintenance and cleaning

Primary wastewater streams

1) Primary Sludge Picket Fence Thickening Liquors

The PFTs receive sludge from the primary sludge tank in parallel with the primary drum thickener. Each tank pumps thickened sludge into the sludge blending tank via a common sludge line. The Picket Fence Thickening (PFT) process relies solely on settlement and no polymer is added. Approximately 967 m^3/day of liquor is produced from the process, which weirs out of the tank and drains together with the SAS delt thickening liquors back to the works inlet. Solids captured from the thickening process equipment in operation is analysed as it is a key thickener performance measure and also has a significant effect on the cost of treatment. The solids are associated with a biological demand (measured as BOD) hence the objective is to keep them as low possible. The ammonia loading at this point is expected to be significantly low.

2) **SAS Picket Fence Thickening Liquors**

Surplus Activated Sludge is pre-thickened using a Picket Fence thickener prior to further thickening using thickening belts. Approximately 1211 m3/d of liquors are produced from the process. Only SAS is input into the PFTs as There is no polymer addition at this point. The supernatant from the SAS picket fence thickeners returns to the activated sludge plant.

3) SAS Belt Thickening Liquors

The sludge is dewatered using belt thickeners with addition of polymer used to aid coagulation. Polymer solution is input into the thickening process, as well as the biological surplus activated sludge from the final settlement tanks onsite. The solids levels coming off the thickening equipment in operation are monitored to ensure the equipment is performing as required. Approximately 1039 m3/d of liquors are produced from the process. The aim is to capture as many solids as possible and not return them to add un-necessary load back to the effluent stream. The ammonia loading at this point is also expected to be significantly low.

4) Primary Sludge Drum Thickening Liquors

The PDTs receive sludge from the primary sludge tank in parallel with the primary picket fence thickeners. A feedstock of primary biological sludge is combined with polymer solution to produce a thickened sludge and a liquor (design flow = approximately 439m^3/d). The solids levels coming off the thickening equipment in operation are monitored to ensure the equipment is performing as required. The aim is to capture as many solids as possible and not return them to add un-necessary load back to the effluent stream. The ammonia loading at this point is also expected to be significantly low.

5) Sludge Dewatering Centrifuge Centrate

Digested biological sludge is dewatered using centrifuges to produce a solid cake, with the separated liquors being returned to the head of works. Like in the thickening processes, a polymer solution . Approximately 1266m^3/d of post digestion dewatering liquors is produced. As with the thickening equipment, solids levels off the dewatering equipment in operation is monitored. The ammonia loading at this point is higher than the other liquor return streams.

6) Biogas Condensate

A very small volume, approximately 5m^3/d in total, of condensate is produced from gas condensate traps on biogas lines. The result of this is a liquid waste stream made up mostly

of condensed water vapour. The condensate trap systems are sealed, with no chemical addition. There is no solids, BOD or ammonia load in the condensate.

Due to the low volumes this will not be routinely monitored.

Other streams

Site Surface Rain Run-off

There are surface water drains in the sludge treatment area of Maple STW which are returned to the head of the works.

Washdown for Maintenance and Cleaning

There is maintenance and cleaning within the sludge treatment area onsite at Maple STW. These flows will only contain biological sludges produced onsite and final effluent from the wash water system. Flows will be adequately diluted.

Sampling Locations

We propose to sample each of the wastewater streams discussed above, except for rain run-off and irregular washdown flows. Washdown flows are produced irregularly and its final effluent from the urban wastewater effluent stream.

The Table below lists the locations identified as provisional sampling points, annotated in the Process Flow Diagram of Maple STC (Fig. 2) and labelled in the Maple site plan (Fig.1);

1: Primary Sludge Picket Fence Thickener.

2: SAS Picket Fence Thickener.

3: SAS Belt Thickener.

4: Primary Sludge Drum Thickener

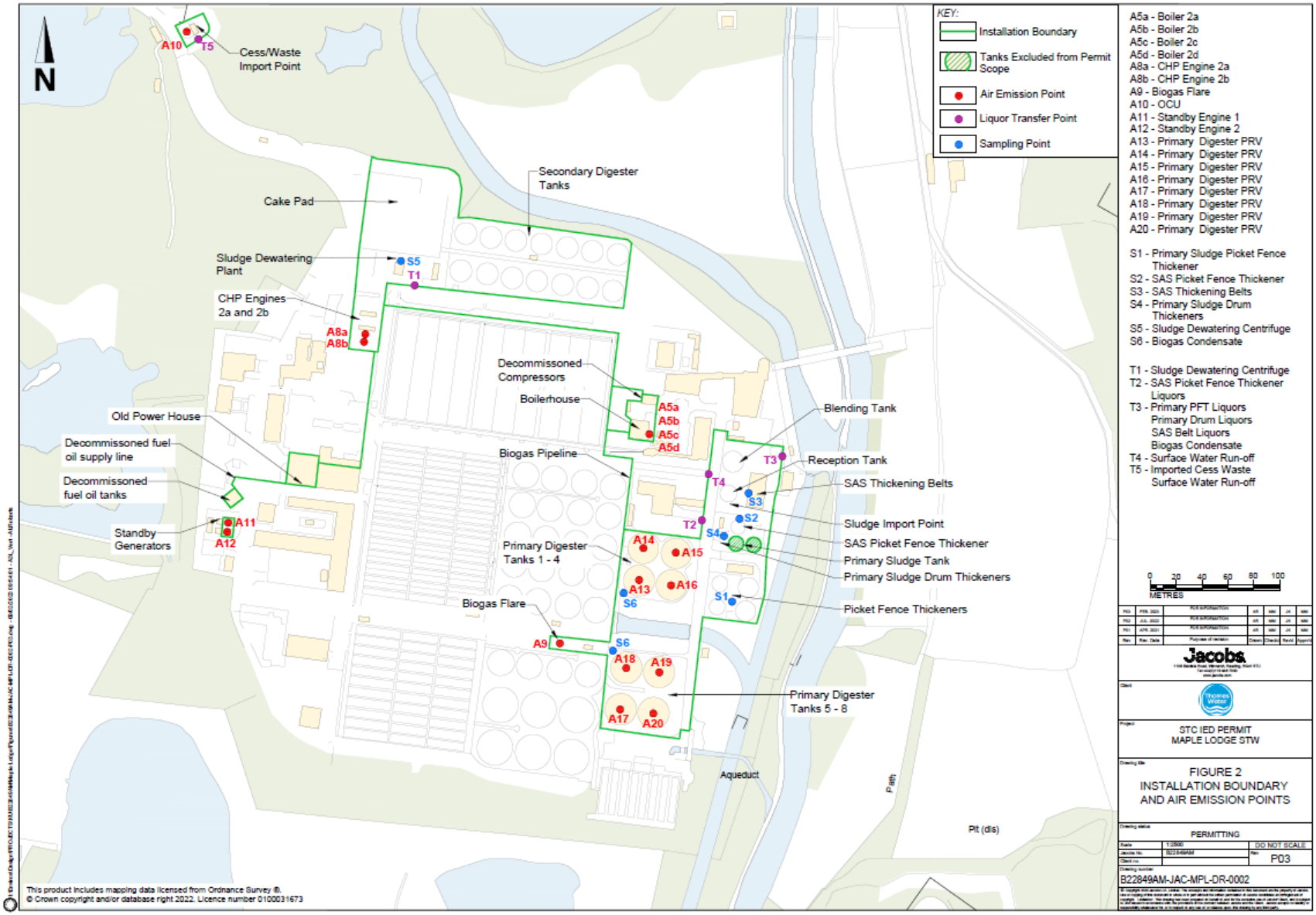
5: Sludge Dewatering - Centrifuge.

These provisional sample points are listed in Table 1, along with the grid references for each. There is one sample point for each of the returns from thickening/dewatering equipment.

Table 1: Sample points

Effluent	**Sample point Grid Reference**
1) Primary Sludge Picket Fence Thickener Liquors	TQ 04176 92114
2) SAS Picket Fence Thickening Liquors	TQ 04186 92168

3) SAS Thickening Belts Liquors	TQ 04191 92202
4) Primary Sludge Drum Thickener Liquors	TQ 04170 92156
5) Sludge Dewatering Centrifuge Centrate	TQ 03918 92369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KEY:
Installation Boundary
Tanks Excluded from Permit Scope
Air Emission Point
Liquor Transfer Point
Sampling Point
A5a - Boiler 2a
A5b - Boiler 2b
A5c - Boiler 2c
A5d - Boiler 2d
A8a - CHP Engine 2a
A8b - CHP Engine 2b
A9 - Biogas Flare
A10 - OCU
A11 - Standby Engine 1
A12 - Standby Engine 2
A13 - Primary Digester PRV
A14 - Primary Digester PRV
A15 - Primary Digester PRV
A16 - Primary Digester PRV
A17 - Primary Digester PRV
A18 - Primary Digester PRV
A19 - Primary Digester PRV
A20 - Primary Digester PRV
S1 - Primary Sludge Picket Fence Thickener
S2 - SAS Picket Fence Thickener
S3 - SAS Thickening Belts
S4 - Primary Sludge Drum Thickeners
S5 - Sludge Dewatering Centrifuge
S6 - Biogas Condensate
T1 - Sludge Dewatering Centrifuge
T2 - SAS Picket Fence Thickener Liquors
T3 - Primary PFT Liquors
Primary Drum Liquors
SAS Belt Liquors
Biogas Condensate
T4 - Surface Water Run-off
T5 - Imported Cess Waste
Surface Water Run-off
A10
T5
Cess/Waste Import Point
Secondary Digester Tanks
Cake Pad
Sludge Dewatering Plant
S5
T1
CHP Engines 2a and 2b
A8a
A8b
Decommissoned Compressors
Boilerhouse
A5a
A5b
A5c
A5d
Old Power House
Decommissoned fuel oil supply line
Decommissoned fuel oil tanks
Biogas Pipeline
Blending Tank
T3
Reception Tank
T4
SAS Thickening Belts
S3
S2
T2
S4
Sludge Import Point
SAS Picket Fence Thickener
Primary Sludge Tank
Primary Sludge Drum Thickeners
Standby Generators
A11
A12
Primary Digester Tanks 1 - 4
A14
A15
A13
A16
S6
S1
Picket Fence Thickeners
Biogas Flare
A9
S6
A18
A19
Primary Digester Tanks 5 - 8
A17
A20
Aqueduct
Path
Pit (dis)
0 20 40 60 80 100
METRES
Jacobs
Thames Water
STC IED PERMIT
MAPLE LODGE STW
FIGURE 2
INSTALLATION BOUNDARY
AND AIR EMISSION POINTS
PERMITTING
DO NOT SCALE
P03
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Figure 1: Maple STC Site Map with the return liquor streams.

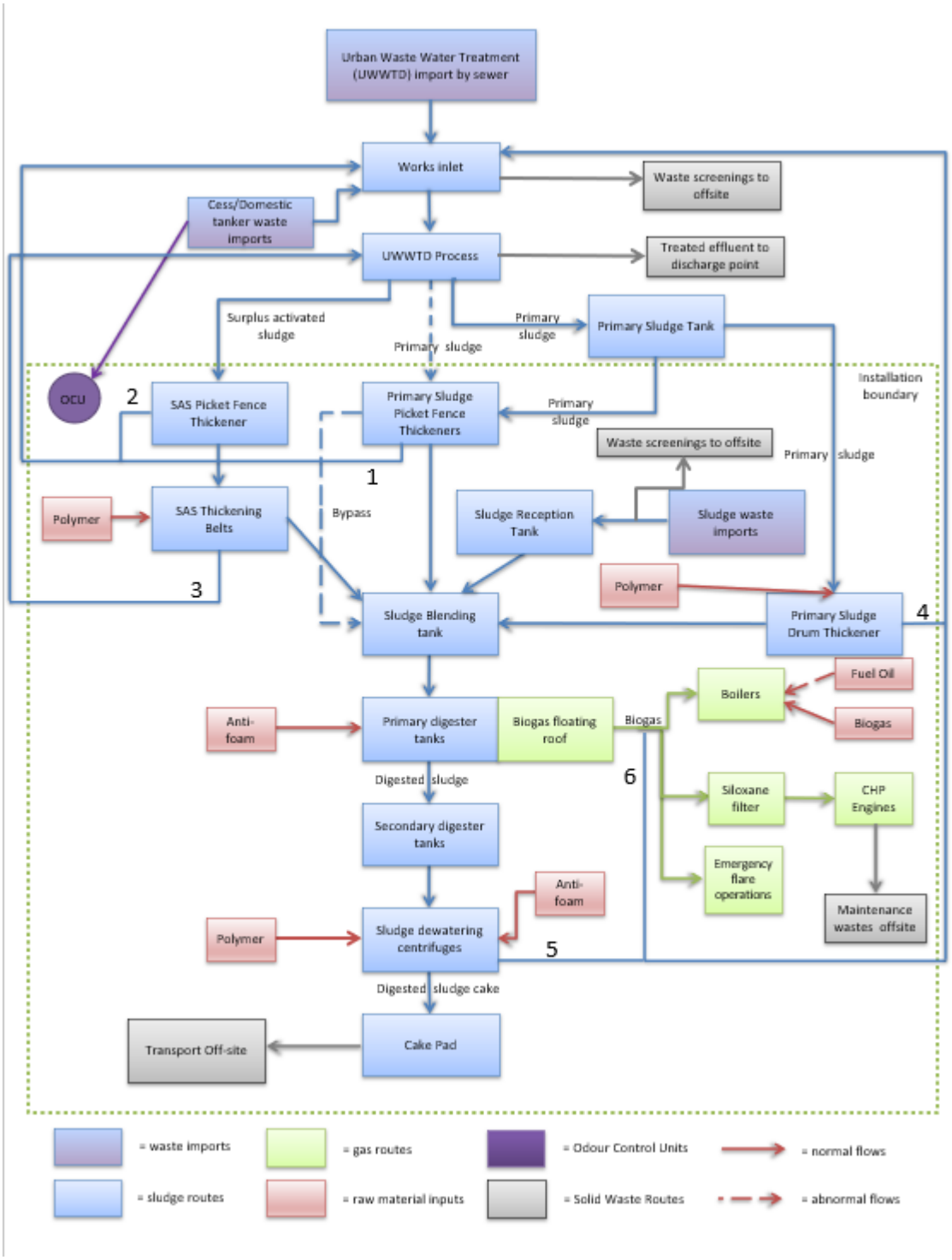

Figure 2: Maple STC Process Flow Diagram with return liquor streams