TROWBRIDGE BC (11799) IED PERMIT APPLICATION

EPR/BB3934AG/A00 (103333)

ADDITIONAL SUBMISSION INFORMATION

SEPTEMBER 2023

ENVIRONMENTAL PERMITTING (ENGLAND AND WALES) REGULATIONS 2016

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Introduction

The initial application for Trowbridge was made in July 2021 BC (Bioresources Centre). Wessex Water Services (WWSL) have subsequently received two schedule 5's for another site and the additional information requested has been used to inform this additional gap submission to support the original Trowbridge application. This document is to be read in conjunction with the original application paperwork. Any replacement diagrams and reports included with this submission are to be taken as the latest reference document and the original versions disregarded. We very much appreciate the opportunity to submit this information now.

This submission is laid out in key areas following sectioning in Poole's schedule 5 notices. References to attachments are made within each area along with an item number and are listed in the attachment list below.

The permitting snapshot is the original submission from July 2021 but with the additional dewatering centrifuges we've installed to support the existing dewatering activity being applied for. We've included a BAT assessment for this asset as an addition.

The WWSL sludge treatment installation boundary has changed to accommodate the proposed containment area and there is a small change to allow for the placement of the centrifuges. As part of this gaps document, we've included an updated process description, revised diagrams for boundary, the drainage plan, the emissions & sampling plans. There is also a revised Leak Detection and Repair plan, Odour Management Plans and secondary containment report. We have used the structure and content from the second Poole schedule 5 notice (April 2023) to inform the revisions. There are two Odour Management (OMP) plans: one for Bioresources Centre (BC) covering the sludge assets and some gas assets, the remaining gas assets and Gas to Grid is covered in the CHP/G2G OMP for Wessex Water Enterprises (WWEL). The bioaerosols monitoring report and Site Specific Bioaerosols Risk Assessment (SSBRA) are also included. Finally, a form C6 is attached as requested in the early part of 2022 for Tranche 2 sites and onwards. We have completed as much as possible and is to be read in conjunction with our commitment to complete the BAT 3 inventory analysis and risk assessments.

The air emission attachments have been updated in line with the most recent RFI received for Poole on 17 August 2023. The Air Emissions Risk Assessment has been updated with the additional pollutants Carbon Monoxide (CO), Particulates (PM10) and Total Volatile Organic Compounds (TVOCs) and will replace the previous AERA submitted on 13 January 2023.

The multi-operator aspect of this permit variation remains the same as the situation in July 2021, with the WWSL permit EPR/BB3934AG covering sludge assets and some gas assets and the WWEL permit EPR/ HB3602TR covering the remaining gas assets and the Gas to Grid process. As requested for Poole, we've included a WWSL / WWEL demarcation plan.

Attachments List

Attachment no.	Name / Area	File Name
1	Boundary Plan	Trowbridge BC Plans Pack
1	Asset Plan	Trowbridge BC Plans Pack
2	Trowbridge BC Process Flow Diagrams.pptx	Trowbridge BC Sludge Process Flow Diagram
1	Emissions Plan	Trowbridge BC Plans Pack
1	Sampling Plan	Trowbridge BC Plans Pack
3	Drainage plan	Trowbridge BC IED – Drainage Plan_v3
4	C6 form – vary a bespoke water discharge activity	Trowbridge BC C6 form.pdf
5	C6 form – additional responses	Trowbridge BC C6 Form – additional responses
6	Trowbridge Process Description	Trowbridge Process Description September 2023
7	AERA report	Trowbridge Air Emissions Risk Assessment_v4
8	Air Emission modelling	Trowbridge EA Files.zip
9	LDAR plan	TRTWP551 Trowbridge BC Fugitive emissions Leak Detection (LDAR plan) v 1 August 2023
10	TRTWF551 LDAR Trowbridge Appendices	TRTWF551 LDAR Trowbridge Appendices
11	Bioaerosol Monitoring Report	Trowbridge Bioaerosol Monitoring Report April 2023
12	Bioaerosol Site Specific Risk Assessment	SSBRA Trowbridge July 2023
13	Process Monitoring	Trowbridge BC Digestion Process Monitoring Description
14	Waste Pre-Acceptance, Acceptance and Rejection Procedure	TRTWP549 Waste Pre-Acceptance, Acceptance and Rejection Procedure
14a	WRC pre-acceptance record form	BIOF037 WRC pre-acceptance record form
15	Residues Management Plan Trowbridge	Residues Plan – Trowbridge Bioresource Centre (TRTWP550)
16	Best Tanker Practice for Trowbridge (TRTWG801)	Best Tanker Practice for Trowbridge (TRTWG801)
17	Avoiding driving off whilst connected (TBT058)	Avoiding driving off whilst connected (TBT058)
18	Containment report	Trowbridge BC CIRIA 736 IED Report-Secondary Containment Assessment-Issue 1.pdf
19	Odour Management Plan	TRTWP547 Trowbridge BC OMP version 1.docx
20	G2G Odour Management Plan	GENECO070 Trowbridge G2G OMP Version 1.docx
21	Sodium Bicarbonate Product Specification MSDS - A	Sodium Bicarbonate Product Specification
22	Sodium Bicarbonate Product Specification MSDS - B	MSBC010.Sodium Bicarbonate (V5.2)
23	Polymer Zetag Belt Presses and GBT	Polymer – ZETAG 8160 SSK
24	Polymer Flopam EM640 - centrifuges	Polymer - Flopamem-640 MSDS
25	Mabanaft Diesel - TDS	Mabanaft Ltd – Diesel TDS
26	Mabanaft Diesel - SDS	Mabanaft Ltd – Diesel SDS

27	Antifoam Burst 5400	Antifoam – Burst 5400 IBC
28	WWEL Carbon OCU MSDS A	WWEL Carbon MSDS SA70 06_2019
29	WWEL Carbon OCU MSDS B	WWEL CPL Filtracarb Rev7 Feb 2019
30	WWEL Antifreeze MSDS	WWEL Antifreeze Brenntag DOWCAL 100 16-6-2015
31	WWEL Antifoam MSDS	WWEL Momentive SAG 7133 Antifoam 10-9-2018
32	WWEL Odorant NB Robinson SDS	WWEL Odorant NB Robinson SDS

Wessex Commitment Statements

Schedule 5 no.2 Q3 and 5	**Regarding assets with the potential to produce biogas, biomethane and diffuse emissions, and in line with BAT 14d, provide the following information regarding the ALL open topped, floating roofed and stated enclosed assets**
	A written confirmation that you will fully enclose open tanks
	A written description that demonstrates the tank enclosure/cover will be designed and installed in line with guidance, Biological waste treatment: appropriate measures for permitted facilities.
	A written description outlining how combustible biogas produced from the primary and secondary digesters shall be utilised as a fuel or stored for utilisation off site and that there shall be no uncontrolled emissions of biogas to the environment from this asset (excluding the venting of biogas in an emergency as specified using pressure release valves) with a view to obtaining a written agreement from the Environment Agency.
	Wessex Water commit to fully enclosing all secondary digesters at Trowbridge BC. All capital schemes will be designed and in line with BATc 14d and Section 7 of the *Biological waste treatment: appropriate measures for permitted facilities*. .
	Non-BAT Summary There are assets at Trowbridge BC which are not BAT compliant, the section below lists these and provides a description of the proposed solution; for these assets the improvement dates are to be finalised. Our strategy for remedial works, including the larger and more complicated items such as tank covering and secondary containment are closely tied in with process safety, resilience, landbank pressure and net zero. This will involve shutting down sites in a planned and ordered way to complete the work in an appropriate and safe manner. This strategy was detailed in our Chief Executive response (23/06/2023) to your IED compliance letter and we also outlined this approach in a recent meeting with the Wessex Area Director and local EA on 08/08/2023 in Bridgwater. Belt press stacks The belt press stacks extract air from the belt press building. There are two stacks, one for each belt press. Monitoring of these channelled emissions (A6 and A7) has started for the prospective permit conditions of odour concentration, ammonia and hydrogen sulphide. They are due to be removed as part of the dewatering scheme (D9674) which is at the Statement of Need stage. This scheme is replacing the current dewatering assets with new belt presses. Siloxane removal The Siloxane removal plant PP Tek unit with a channelled emission was switched off in August 2022. The siloxane removal plant will be replaced with CC Jensen carbon unit as part of the longer term strategy and in the

	interim we take monthly biogas samples at six different locations from raw biogas to exported biomethane. Storm overflows There is a small potential for the release of wastewater liquors and drainage to the environment via the adjacent WRC (water recycling centre) storm overflow at the terminal inlet pumping station. In order for this to happen; a series of overflows have to operate in series (as detailed on the process flow diagram). As detailed, in the attached secondary containment plan (Item no.18) we propose installing a pumping station and all installation wastewater liquors, condensate will be diverted to this pumping station and pumped straight to the inlet of the WRC. Centrate Safety Vent The centrate safety vent is in place as part of process safety and DSEAR requirements as there is a potential risk of methane being present in the centrate. We are undertaking gas monitoring to obtain data and have started RBP (Residual Biogas Potential) monitoring on the centrate to ascertain any emissions. Monitoring for odour emissions is included in the OMP Section 12 odour improvement plan. Screening/Strainpress Skips Current odour monitoring does not pick up any odour from strainpress skips, however our sniff testing and operational procedures will continue to assess for any impact. The skips are removed from site promptly and are not stored full anywhere else on site. We are looking to retro fit a curtain arrangement around the strainpress in order to reduce diffuse emissions as required by BAT 14.

Schedule 5 no.2 Qu 3	**Provide a written confirmation that you will undertake (using a UKAS accredited laboratory) a chemical analysis of the waste water which tests for ALL pollutants which you expect to find in the discharge (not just the limited data set as specified in response to question 13 of the previous schedule 5 notice) and that you will use an appropriate 'minimum reporting value' (MRV) (usually 10% of the environmental quality standards (EQS)). You will be able to gain an understanding of the expected pollutants by examining the likely pollutants in the input wastes, trade effluents and other sludge inputs which are combined for treatment at the installation.**
	Provide written confirmation that the sampling and chemical analysis will be undertaken in line with guidance Surface water pollution risk assessment for your environmental permit - GOV.UK (www.gov.uk) and Monitoring discharges to water: guidance on selecting a monitoring approach - GOV.UK (www.gov.uk).
	Provide a written statement with a commitment that those undertaking the sampling and analysis will be accredited to MCERTS or provide evidence of an equivalent standards.
	Wessex Water are committed to providing information about the characteristics of the waste water streams being discharged at Trowbridge BC and will do so in line with BAT 3, 6 and 7. In addition, we will undertake sampling and analysis in line with *Surface water pollution risk assessment for your environmental permit* - GOV.UK (www.gov.uk) and *Monitoring discharges to water: guidance on selecting a monitoring approach* - GOV.UK (www.gov.uk) Wessex Water will achieve this by using UKAS accredited laboratory/laboratories to carry out chemical analysis of waste water streams which will test for the pollutants as outlined in *Surface water pollution risk assessment for your environmental permit* - GOV.UK (www.gov.uk). We will ensure these laboratories will be UKAS accredited laboratories to ISO17025 and use an appropriate 'minimum reporting value' (usually 10% of the environmental quality standard (EQS). The intention is that the analysis will be carried out between our Wessex Water UKAS accredited laboratory and an external UKAS accredited laboratory. We do still have a little uncertainty over whether suitable analytical methodologies are available at the external laboratories. Wessex Water will ensure staff undertaking the sampling and analysis will be accredited to MCERTS or equivalent standards, for which suitable evidence will be provided.

Process flow diagrams and Site Plans

Boundary Plan

A pdf copy of all plans is included in the attachment pack, Trowbridge BC Plans Pack (Item no 1).

Current WWSL Installation Boundary

Current WWEL Installation Boundary

Proposed Installation Boundary

Asset Plan

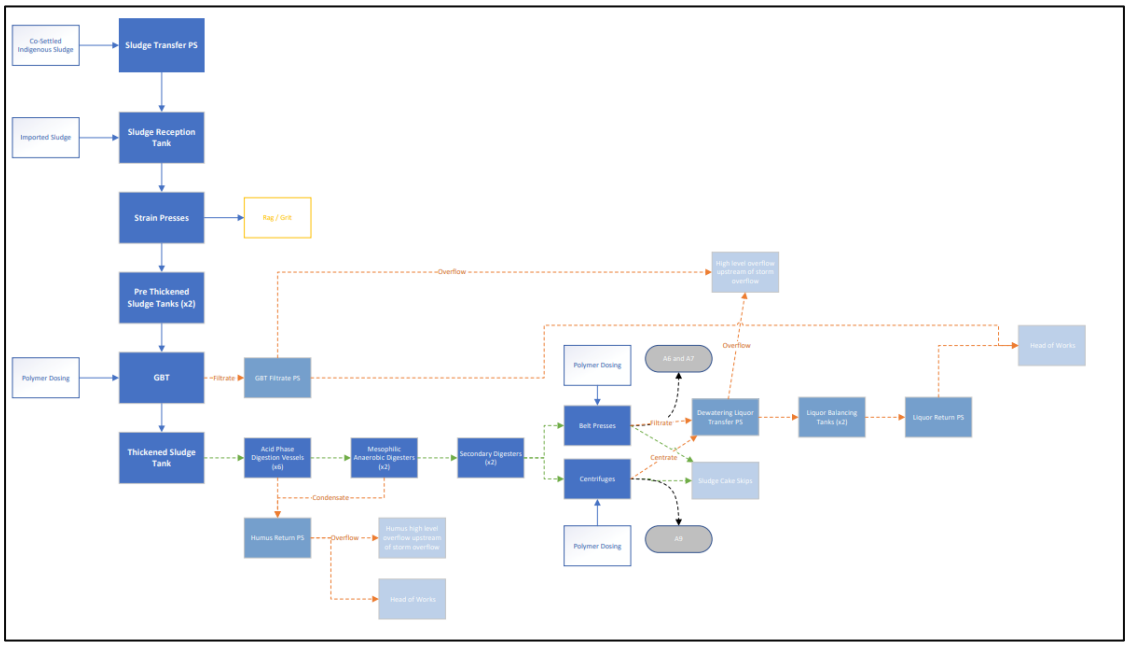
The Asset Plan has been updated to reflect the process description and is included here as a snapshot. A pdf copy is included in the attachment pack (Item no 1)

KEY FOR ASSET		
ITEM	DESCRIPTION	QTY.
	SLUDGE STORAGE AND TREATMENT	
A	SLUDGE RECEPTION TANK	1
B	SLUDGE STRAINPRESS3	2
C	PRE-THICKENED SLUDGE STORAGE TANK 1	1
D	PRE-THICKENED SLUDGE STORAGE TANK 2	2
E	GRAVITY BELT THICKENERS	2
F	GBT FILTRATE PUMPING STATION	1
G	THICKENED SLUDGE TANK	1
H1-6	ACID PHASE DIGESTION	6
I1 & I2	MESOPHILIC ANAEROBIC DIGESTERS	2
J1 & J2	SECONDARY DIGESTERS	2
K	DEWATERING BELT PRESS	2
K1	BELT PRESS STACK 1	1
K2	BELT PRESS STACK 2	1
L	DEWATERING CENTRIFUGE	2
L1	SKIP LOADING AREA 1	1
L2	SKIP LOADING AREA 2	1
M	DEWATERING LIQUOR TRANSFER PUMPING STATION	1
N1 & N2	LIQUOR BALANCING TANKS	2
O	RETURN LIQUOR PUMPING STATION	1
P	CENTRATE SAFETY VENT	1
Q	SKIP HOLDING AREA	1
	BIOGAS COLLECTION, STORAGE AND UTILISATION	
R	GAS HOLDER	1
S	DEHUMIDIFIER CHILLER	1
T	BOILERS	2
T2	BOILER STACK	2
U	CHP ENGINE	1
U1	CHP STACK	1
V	WASTE GAS BURNER (FLARE STACK)	1
W	GAS UPGRADING PLANT	1
W1	GRID ENTRY UNIT	1
X	BIOMETHANE FLARE	1
Y	PROPANE TANKS	3
	SITE ASSETS	
Z1	DIESEL TANK	1
Z2	SITE GENERATOR	1

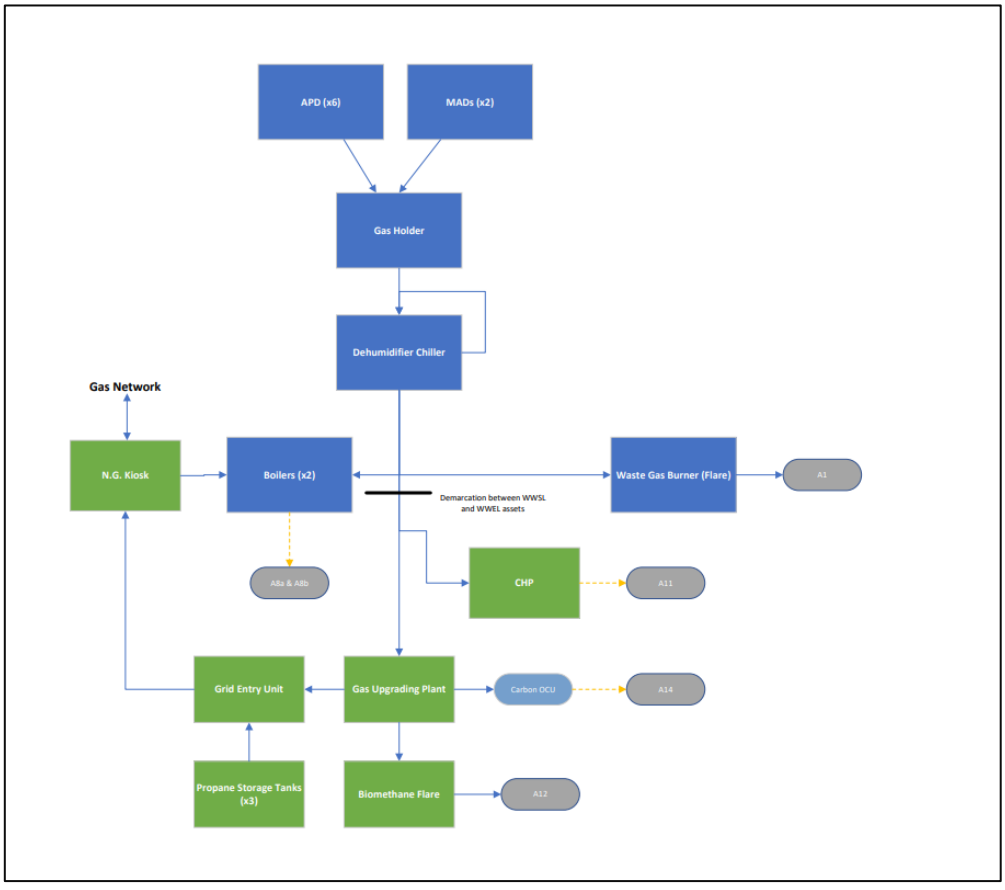
Process Flow Diagrams

A pdf copy of both diagrams is included in the attachment pack, Trowbridge BC Process Flow Diagrams, item number 2.

Trowbridge BC Process Flow Diagram



Trowbridge BC Biogas Process Flow Diagram

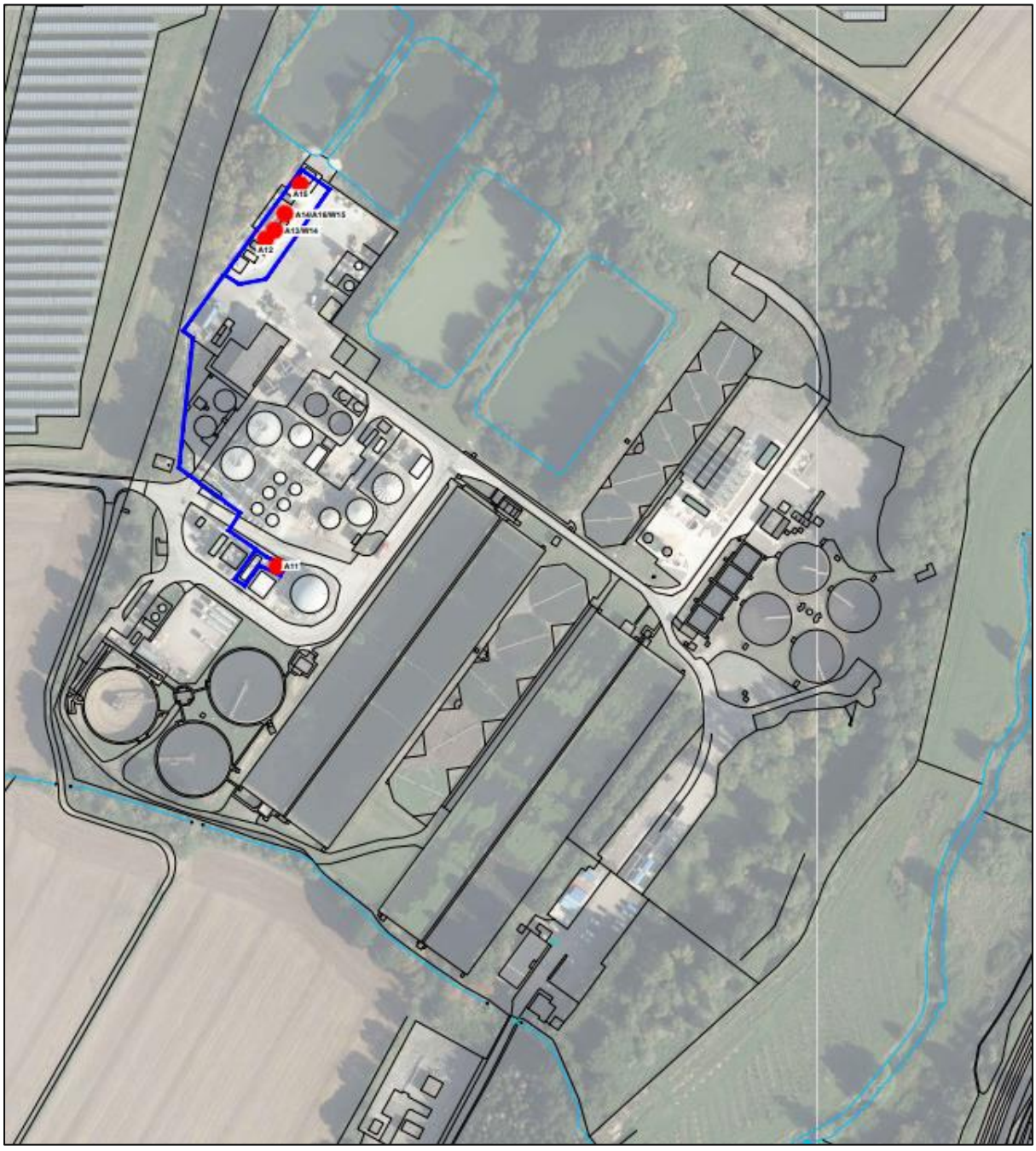


Emission plan

A pdf copy of both Emissions plans are included in the attachment pack (Item no 1)

Trowbridge Emissions Points Plan

WWEL Emission Plan



Sampling Plan

A pdf copy is included in the attachment pack (Item no 1)

Below is the snapshot of the sampling plan showing the two sampling points as detailed in the question below. The two sampling points are labelled as S1 and S2; this corresponds to W1 and W2.

Trowbridge Sampling Point Plan

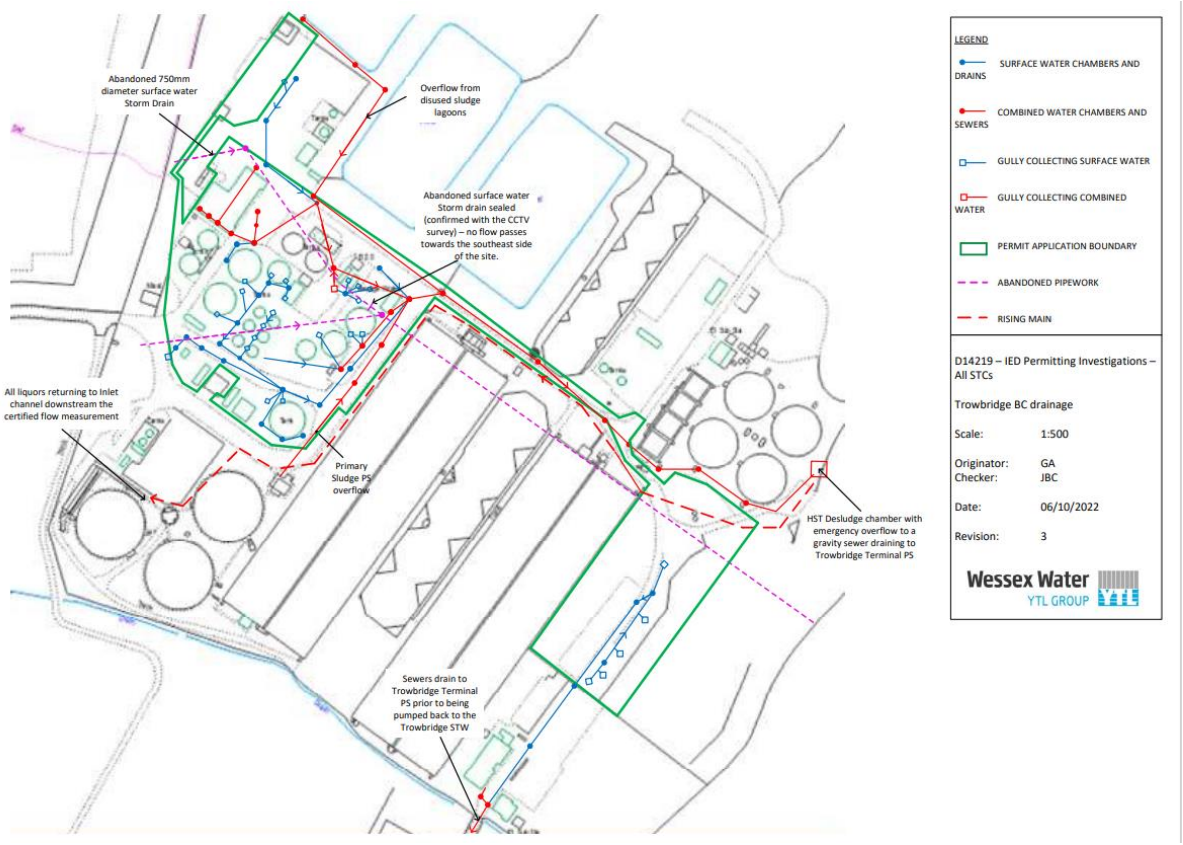
<table>
<tr><td>Schedule 5 no. 2 Qu3</td><td></td></tr>
<tr><td>Submit a revised emissions point plan that shows the location of the sampling points for the identified waste water effluent streams.</td><td>See attached sample point plan = Trowbridge BC Plans Pack (Item no. 1)</td></tr>
<tr><td>Provide the grid references for the chosen sampling points.</td><td>The plan referenced above shows the sampling points for the wastewater emissions to water; we have allocated two sampling points.

This is for the combined wastewater streams from the dewatering assets and the pre-digestion sludge thickening activities.

<table>
<tr><th>Name</th><th>Waste type</th><th>Flow diagram location</th><th>Sampling point NGR</th></tr>
<tr><td>Dewatering liquors</td><td>Centrate and Filtrate from the digestate dewatering assets</td><td>S1</td><td>ST 84749 58862</td></tr>
<tr><td>Thickening liquors</td><td>Gravity Belt Thickeners</td><td>S2</td><td>ST 84822 58810</td></tr>
<tr><td>Biogas Condensate and Process clean up water</td><td colspan="3">A very small volume of condensate is produced from gas condensate traps on biogas lines, in addition there are only small volumes of process clean up water produced. This liquid waste stream made is made up mostly of condensed water vapour and pH neutralised potable water. The condensate trap systems are sealed, with no chemical addition. There are no solids, BOD or ammonia load in the condensate. Due to the low volumes this will not be routinely monitored.</td></tr>
</table>
</td></tr>
</table>

Drainage Plan

Drainage plan – a PDF copy is included in the attachment pack, Trowbridge BC IED - Drainage Plan_v3, Item no 3.



Form C6 completion

Application for an environmental permit Part C6 – Variation to a bespoke water discharge activity or groundwater activity (point source discharge) or point source emission to water from an installation. We have included the form C6, plus an additional responses document (item no.'s 4 and 5).

Process Description & revised BAT assessment

A revised process description has been developed which expands on the one originally submitted in July 2021. We have focused on the dewatering assets and the gas to grid process which wasn't fully covered originally.

Different digestate dewatering assets have been put into operation since the original application; we've completed a revised BAT summary which is attached. The centrifuges are incorporated into the Odour Management Plan (OMP) and the centrate wastewater liquors are incorporated into the wastewater liquors assessment (BAT 3). There are no channelled emissions to air from the centrifuges. Please see process description, Process Flow Diagrams, plans, wastewater discharge sampling, and OMP for further details. Appendix 1 details a BAT summary completed solely for the additional centrifuges.

Process Description

A PDF copy of the Process Description (Trowbridge Process Description September 2023) is included in the attachment pack (item number 6).

PVRV

<table>
<tr><td>Schedule 5 no.2 Qu6</td><td>Provide a written a statement explaining that pressure vacuum release valves (PVRVs) are installed on all tanks (including the enclosed secondary digesters) and all assets containing volatile materials where there is a risk of over or under pressurisation in line with section 8.11 of the Biological waste treatment: appropriate measures for permitted facilities guidance, BATc 14d and 38 ensuring you address the following aspects:</td></tr>
<tr><td>Schedule5 no.1 Qu20</td><td>Provide details of all plant handling volatile materials and confirm whether they have PRVs installed.</td></tr>
<tr><td></td><td>
<table>
<tr><th>Asset Name</th><th>PVRV/ PRV fitted</th><th>Note</th></tr>
<tr><td>APD vessels</td><td>Yes</td><td>2 x Protego PVRVs.</td></tr>
<tr><td>MAD 1</td><td>Yes</td><td>Motherwell 10 inch</td></tr>
<tr><td>MAD 2</td><td>Yes</td><td>Motherwell 10 inch</td></tr>
<tr><td>MAD mixing compressor</td><td>Yes</td><td>Spring loaded PRV Utile. Enclosed and release to biogas system; these do not release to air.</td></tr>
<tr><td>APD compressors</td><td>Yes</td><td>PRV Leser. Enclosed and release to biogas system; these do not release to air.</td></tr>
<tr><td>Gas Bag</td><td>Yes</td><td>Hydraulic Kirk Environmental (25mbarg)</td></tr>
<tr><td>Siloxane plant</td><td>No</td><td>Not in use</td></tr>
<tr><td>Boilers</td><td>No</td><td></td></tr>
<tr><td>CHP</td><td>No</td><td></td></tr>
<tr><td>Waste Gas Burner (Flare)</td><td>No</td><td></td></tr>
<tr><td>Gas to Grid plant</td><td>Yes</td><td>Various types of devices fitted across the plant.</td></tr>
<tr><td>Biomethane Flare</td><td>No</td><td></td></tr>
</table>
</td></tr>
<tr><td>Schedule 5 no. 2 Qu 6 all remaining parts</td><td></td></tr>
<tr><td>ii) Explain how PRVs are designed by</td><td>Mass flow calculations have been carried out by a principal contractor, MWH, when the scheme was completed in 2015.</td></tr>
</table>

appropriately qualified engineers and can cope with the anticipated maximum gas production volumes.	
iii) Describe how you monitor gas production rates and organic loading to prevent excess pressure in tanks and vessels.	Operation of Trowbridge BC is governed by the mass flow calculation, design operating parameters and programmed setpoints to facilitate plant operation. All work on site is detailed in the operating procedures scheduled through the Work Asset Management System (WAM). These procedures contain information to inform appropriate action in the event of a problem with the digestion process. All instrumentation displays instantaneous values, and all parameters are visible on SCADA (Supervisory Control and Data Acquisition), with programmed status alerts for readings outside the accepted range and telemetry alarms, configured appropriately. Data is collated in archive trends to allow increased monitoring and identification of process issues. The SCADA system can be viewed from the control room, secure permitting room or remotely on site by all levels of Operational staff. Below are the activities and triggers that have been identified to reduce the risk. <u>Gas production rates</u> Biogas pressure is measured on the incoming pipework to the common gas holder and post gas booster skid. Biogas pressure data is also manually recorded daily. Pressure is also cross referenced to biogas production. In addition, the biogas holder has ultrasonic level measurement of gas levels. Gas volumes are measured by flowmeters by the consumers (CHP, G2G and Waste Gas Burner (Flare)). As the production of biogas increases above the rate of consumption, the volume in the gas holder will increase to a level such that the pressure in the system will not exceed the 25 mbarg PRV release point. When the gas holder reaches 90%, the Waste Gas Burner (Flare) will be called to operate. This will decrease the pressure within the system. Gas holder air blowers inflate the outer membrane of the gas holder to maintain the gas holder pressure between the membranes. The air blowers have a weighted mechanism that will prevent over pressurisation of the gas holder. <u>Organic Loading</u>

	The mesophilic anaerobic digesters share a common sludge flow meter from APD reactor vessel 6. This flow meter to measure sludge feed volume, the maximum volume is derived by the mass flow and additionally the site HACCP (Hazard Analysis and Critical Control plan). Additionally, there is flow measurement to record the volume delivered to APD reactor vessel 1 from the thickened sludge tank. Each flowmeter is calibrated annually. Site operational staff monitor %ds routinely as a key performance indicator (KPI); monitoring asset performance and carrying out onsite sampling to measure %ds. The maximum feed rate for each mesophilic anaerobic digester is 250m^3 per 24 hours = 10.42m^3 per hour. Additionally, the APD feed is limited to 500m^3 per 24 hour period. The maximum feed setpoint is locked within the control system (permitted +23m^3 accounted for) to manage the organic loading and prevent a non-conformance of the site HACCP plan. Once, the 24 hour target feed total has been achieved the digester will not introduce any further feedstock until the period resets. Weekly samples are submitted to Wessex Water's internal laboratory for analysis; in the event of a parameter exceedance, a daily exception report is generated from Wessex Water's lab sample system which is circulated to both the site scientist and site manager to prompt further investigation.
iv) Describe how you monitor pressure with appropriate technology such as pressure sensors fitted to your digestion tanks and gas storage vessels	Explained in answer to points ii) and iii)
v) Explain how PVRVs are correctly installed to withstand variance in pressure so that they do not routinely start to vent when gas production fluctuates.	PVRVs are installed, maintained and calibrated by a competent approved specialist contractor. The installation was carried out in accordance with the manufacturer's literature. All new installations will be tested for tightness and function and receive an inspection before becoming a live asset. Following installation, a conformance and function certificate will be provided. PVRVs are inspected annually by a competent person and calibrated to ensure the maximum set pressure remains correct and vacuum protection is maintained.

	The gas system has been designed to prevent pressure fluctuations that could cause a PVRV to release an emission to air in normal operation.
vi) Provide the maximum pressure for each digester above which there will be no further feed introduced.	Normal operating pressure is 21.4mbarg, but all PVRVs are calibrated to a lift pressure of 25mbarg. A telemetry alarm would also be generated for the operational team to investigate.
vii) Confirm that PVRVs are designed in accordance with BS EN ISO 28300:2008, or other recognised standards.	PVRVs have been designed in accordance with API2521, API2000, 2014/34 EU
viii) Describe how you detect leaks from your PVRVs under normal operating conditions.	Observational checks are conducted daily assessing if the PVRVs are seated correctly and are not leaking in normal operating conditions. Medium and high-rate releases in normal operation would be detected by lower than expected flow measurements on the biogas flow meters, where alarms are set up for high and low flow readings as mentioned in part ii).
ix) Explain how you restrict using PVRVs, so they activate in emergency situations only.	As a primary consumer of the biogas, the gas to grid plant will consume up to 600m^3 per hour of biogas to be treated and injected back into the National Grid. Alternatively, the combined heat and power engine (CHP) is sized to consume the gas production as per mass flow calculations. In the event of gas production exceeding the capabilities of the CHP; whether because of increased gas yield or due to asset performance, the flare stack will operate to regulate gas holder level and therefore system pressure, to ensure there is not a release from a PVRV. In the event of gas production exceeding capabilities of the CHP feed rate, the digestion process organic loading would be reduced by operational staff; either by adjusting the digester feed volume or %DS thickness. Planned maintenance activities that have the potential to cause an environmental impact from the PVRVs are controlled by a process risk assessment (PRA). PRAs are submitted 7 days in advance of any planned activity for review and approval by the site scientist and site manager and if needed other departments such as engineering or compliance are consulted. The competent person will assess whether the risk present from the planned

	activity is of a tolerable level and where required will implement additional controls, including informing the EA of any potential issues as per Schedule 5 notification. High PVRV pressures could be generated by asset failures. Asset failures generate telemetry alarms with set levels 1 – 7, in the event of a telemetry alarm being triggered this will first go to the Regional Operations Centre (ROC) and be scheduled through WAM to operational staff. Telemetry alarm levels response times are determined on a risk-based approach.
x) Describe how you will log and record release events from PVRVs.	Operation of PVRVs will occur in conjunction with associated pressure alarms within the gas system. This will be recorded in the archive data on the SCADA system, additionally this will recorded on the company health and safety management system as a 'Process Safety incident'. This will then trigger a root cause investigation.

AERA

In response to Poole RFI received on 17 August 2023; we have revised the air emission work for Trowbridge incorporating the requirement for inclusion of Carbon Monoxide (CO), Particulates (PM10) and Total Volatile Organic Compounds (TVOCs) into the modelling as well as revising the AERA report. We confirm we use low sulphur diesel throughout.

Both the AERA report (item no 7) and the Air Emission modelling (item no 8) are included in the attachment pack.

LDAR

Schedule 5 no.2 Qu7	**Taking into consideration the proposal submitted in response to the previous two questions, provide a revised version of your leak detection and repair (LDAR) programme and ensure the following points have been addressed:**
	We have attached the LDAR plan (item number 9) and have answered the questions within the text. For each sub-question below, the relevant section or appendix has been referenced.
i) Include a method for locating unknown fugitive emission sources.	See Section 9 of attached LDAR plan (TRTWP551)

ii) Estimates of the type and volume of release from each leak location.	See Section 7 and Appendix 1 Table 2 of attached LDAR plan (TRTWP551)
iii) Prioritised locations (from highest risk to lowest risk) based on potential quantity of release, environmental impact and your DSEAR.	See Appendix 1 Table 2 of attached LDAR plan (TRTWP551)
iv) Identification of monitoring methods and frequency of monitoring to quantify significant emissions where possible.	See Section 8 of attached LDAR plan (TRTWP551)
v) Specify the equipment used for leak detection.	See Section 8 of attached LDAR plan (TRTWP551)
vi) Deadline for the implementation of leak detection activities.	Annual surveys are already completed, and the further requirements of the LDAR will be rolled out before permit issue.
vii) A description of the mitigation measures you will implement in the event of diffuse emissions.	See Section 10 of attached LDAR plan (TRTWP551)
viii) A map of the site and inventory that identifies locations (point and area sources) for	See Appendix 2 of attached LDAR plan (TRTWP551)

potential emissions.	
ix) Identification of components deemed as high, medium or low risk.	See Appendix 2 of attached LDAR plan (TRTWP551)
xi) Inclusion of a written statement obtained from Wessex Water Enterprises Limited (WWEL) confirming that they will operate the CHP engine in line with the LDAR programme or provide an additional standalone LDAR programme for WWEL that addresses the CHP and associated assets they control (the provision of a standalone Schedule 5 Notice for WWEL to provide an LDAR programme can be undertaken on request).	Section 1 of the LDAR plan (TRTWP551) details this.

Bioaerosols

Bioaerosol monitoring took place on 14th February 2023 and the monitoring report and subsequent Site Specific Bioaerosol Risk Assessment was completed. These are included in the pack as Item numbers 11 and 12.

Digester Monitoring

Trowbridge BC Digestion Process Monitoring Description is included in the attachment pack (Item no 13)

Waste Pre-acceptance and Acceptance and Rejection Procedure

TRTWP549 Waste Pre-Acceptance, Acceptance and Rejection Procedure is included in the attachment pack (Item no 14)

Waste storage, Handling, Throughput and EWC acceptance

This section contains:

Residues plan plus tanker and best practice, throughput waste treatment capacity and EWC codes accepted by Trowbridge.

<table>
<tr><td>Schedule 5 no.2 Q10 i)</td><td>Ensure you include EWCs that are suitable for Sludge AD.</td></tr>
<tr><td></td><td>The table below lists the EWC codes that represents wastes imported into the sludge AD facility only now and in the future. These are the only EWC codes Trowbridge BC will accept. We have taken reference from Waste codes for sewage sludge materials: Regulatory Position Statement 231 and biological waste treatment: appropriate measures for permitted facilities for wastes that are appropriate for anaerobic digestion. The codes listed below, in addition to 19 08 05 and 20 03 04, are restricted in terms of their description to “sewage sludge only”.

Form C3 Question 1 (SI Table 4) – List of Waste Codes
<table>
<tr><td>Waste Code</td><td>Waste description</td></tr>
<tr><td>19 02 06</td><td>sludges from physico/chemical treatment other than those mentioned in 19 02 05</td></tr>
<tr><td>19 08 05</td><td>sludges from treatment of urban waste water</td></tr>
<tr><td>19 06 06</td><td>digestate from anaerobic treatment of animal and vegetable waste</td></tr>
<tr><td>19 12 12</td><td>wastes from mechanical treatment of wastes other than those mentioned in 19 12 11 (sewage sludge only)</td></tr>
</table></td></tr>
</table>

Schedule 5 no.1 – Qu 14	**Explain and provide calculations to show how you have provided adequate storage and treatment capacity for sludge.**

	For purposes of this response, we take the term tonnes to be equivalent to wet tonnes which is equivalent to m3. In our application we stated that there is 182,000 tonnes/year capacity in the digesters, this equates to 500 tonnes/day. The raw sewage sludge entering the digesters has been thickened via the GBTs and so the answer to points iii), v) and vi) and will be higher as sludge entering the permit boundary will be thinner.
i) The sludge storage maximum capacity in m3	11,340 m3
ii) How you will ensure that the sludge storage maximum capacity on site is not exceeded.	Tank levels are monitored with high level alarms. Import tank, as stipulated in waste management plan, has an inhibit on any tankers being accepted if volumes in import tanks are too high. Lights to indicate the level in the tank are visible to all staff, including drivers. They will change to red when the tank level is in inhibit and at 95%. Operational staff have the capability to inhibit the desludging of the UWWT stream to reduce the volume of sludge being passed into the permitted area, however the performance of the waste water treatment process is also key and consequently indigenous sludge takes precedence over tankered imports.
iii) The annual throughput of indigenous sludge in tonnes.	86,050 population equivalent (p.e.) (based on projected 2025 p.e. within process design review) generating 76g solids per day equals 6.54 tonnes DS/d and the addition of secondary and tertiary sludges generated through the WRC process equating to 3.5tonnes DS/d. And using a typical dry solid % of 2.5% this gives the figure of 401.6m3/d indigenous sludge, ((6.54+3.5)/2.5%) The annual throughput of indigenous sludge 146,583m3/year (401.6*365).
iv) The calculation for how the above storage capacity and retention time provide adequate storage and treatment for the annual throughput of sludge.	The blended indigenous sludge and imported sludge is typically ~2.8%DS (dry solids) and once thickened sludge is typically ~6% DS. The below tables show the average retention time throughput the various stages in the process. The process at Trowbridge includes Acid Phase Digestion (APD) which is an enzymic hydrolysis plant. This biological pre-treatment phase allows the digestion stage to be smaller and the retention time reduced. At the same time, this optimisation of the anaerobic digestion process allows more effective biological pathogen inactivation. Our commitment to sludge compliance is managed in accordance with a Hazard Analysis Critical Control Point plan (HACCP). This ensures the sludge treated at Trowbridge is in conformity with the applicable Biosolids Assurance Scheme (BAS) and is compliant with the conventional treated standard. A critical control point within the HACCP includes a maximum daily flow of 500m3/d (thickened sludge) which equates to an annual throughput of 182,500m3/year thickened sludge, this also equates to 1118m3/day pre-thickened sludge with an annual throughput of 407,941m3/year.

<table>
<tr><td></td><td>The processing of indigenous sludge takes priority over imported sludge and the daily operations of site will manage this accordingly.

<table>
<tr><th>Process retention times</th><th>HACCP Maximum limit (500m3/day thickened digestion feed 6% DS, 1200m3/day pre thickened 2.5%DS)</th><th>Average Sep22-Sep23 (370m3/day thickened digestion feed 6% DS, 886m3/day pre thickened 2.5%DS)</th></tr>
<tr><td>Sludge Reception Tanks 200m3</td><td><1 day</td><td><1 day</td></tr>
<tr><td>Pre thickened storage. 1520m3</td><td>1.26 days</td><td>1.71days</td></tr>
<tr><td>Thickened sludge tank

600m3</td><td>1.2 days</td><td>1.62 days</td></tr>
<tr><td>Acid Phase Digestion

1020m3</td><td>2.04 days</td><td>2.75days</td></tr>
<tr><td>Mesophilic Anaerobic Digestion

7000m3</td><td>14 days</td><td>18.91 days</td></tr>
<tr><td>Secondary Digestion 1000m3</td><td>2 days</td><td>2.70 days</td></tr>
</table></td></tr>
<tr><td>v) The total volume of imported sludge to be received at site each year.</td><td>The maximum imported sludge per annum is 250,000m3/year or 684m3/day derived from our existing permit limits, though annual totals are generally lower.</td></tr>
<tr><td>vi) The combined throughput of both imported sludge volumes and the annual throughput of indigenous sludge per annum.</td><td>Based on the calculations in answers iii, iv and v, the total combined throughput is 396,243 tonnes/year.

However, due to the variability of the %DS, the maximum total figure of unthickened sludge entering the IED permit boundary could be higher and consequently form C3 states that the maximum annual throughput is 450,000 tonnes/year.</td></tr>
<tr><td>vii) The cake skip maximum storage volumes and number of skips.</td><td>Each cake skip holds approximately 15 tonnes. There is no long term storage for full cake skips. Movements out are continuous throughout the week.

The maximum number of skips which are held on site is up to fifteen. Therefore, the maximum possible cake storage on site is 225 tonnes.</td></tr>
</table>

viii) How you will ensure that the cake skip storage maximum capacity is not exceeded on site.	Skip numbers are controlled by the Biosolids Controllers who oversee the movement of full cake skips from site and the return of the empty skips. The only locations for skips are by the presses (L), centrifuge (K) and skip holding area [Q].
ix) How non-conforming digested sludge cake will be stored on site to ensure it is segregated from conforming digested sludge cake.	All non-conforming digested sludge cake is held within labelled skips, to ensure segregation from conforming digested sludge cake. Each type of skip is labelled differently as an identification tool. These skips will be held in a different location to other conforming skips as well.
x) How long non-conforming digested sludge cake will be stored on site.	Non-conforming digested sludge cake is kept on site for a minimum length of time until it can be removed for retreatment, this will typically be 1 or 2 days. On occasions a non-conforming cake skip will be held for a longer period of up to 4 days whilst awaiting sample results.
xi) How non-confirming digested sludge cake will be removed off site or treated onsite.	The non-confirming skips are removed from site using our skip removal contractors under the direction of the Biosolids Controllers. The contractor holds a Waste Carrier Licence as detailed in the permit application. We do not carry out retreatment at Trowbridge BC.

Schedule 5 no.1 Qu4	
Provide a copy of your residue management plan.	Residues Plan - Trowbridge Bioresources Centre is included in the attachment pack (Item no 15)
Schedule 5 no.1 Qu15	
Explain how you will ensure that the transfer of waste into and from sealed tankers will be managed. This should include: **i) An explanation of procedures to ensure tanker drive off is not undertaken.** **ii) An explanation of**	i) We have two procedures, Best Tankering Practice for Trowbridge (TRTWG801) and, Avoiding driving off whilst connected (TBT058) (Items 16 and 17). Both are attached as separate documents. In addition to procedure all sludge discharge points are fitted with snap off connectors so in the event of drive off tank and pipework is not damaged and tank integrity is not compromised. ii) Tankers are fitted with endcaps and isolation valves for large spillage and emergency stop switches. Small spills and drips are collected via drip trays and buckets. iii) Wessex Water have a fleet of sludge tankers who only transport UWWT (LoW EWC code 19 08 05) sludge between smaller wastewater sludge works and the imports sites such as Trowbridge. This waste is not hazardous and not of an animal by-products origin.

how you will contain any leaks, (including worst-case leaks), spills and drips from the transfer of tankered waste at dedicated points. **iii) An explanation of how you will comply with 'wash out' certification for tankers.**	

Containment

Containment report item no 18 is attached entitled: CIRIA 736 IED Report Secondary Containment Assessment issue 1.

OMP

There are two OMPs for Trowbridge BC:

1) TRTWP547 – Trowbridge BC OMP covering WWSL assets

2) GENEC070 – Trowbridge G2G OMP covering WWEL assets

Both are included in the attachment pack item numbers 19 and 20

Multi-operator and demarcation

Schedule 5 no.2 Qu32	**To differentiate the assets and associated pipework between Wessex Water Service Limited (WWSL) and Wessex Water Enterprises Limited and to derive clear lines of responsibility for both operators, provide a detailed written description and site plan of all the permitted assets belonging to WWEL. This should include:**
A description of the plant, pipework and any associated areas for WWEL	WWEL have responsibility for the Gas to Grid plant, Biomethane Flare and propane storage tanks, plus the CHP, CHP stack and the biogas pipework up to the flange on the biogas tee-piece after the location of the unused siloxane plant. All other assets and pipework are the responsibility of WWSL.
A site plan clearly demonstrating the extent of plant/pipework	The site plan entitled: Trowbridge BC Plans, map no.9 in the attachment pack shows the demarcation between WWSL and WWEL. This has been physically marked on site.

under WWEL's control.	
Separated emission point plans for any air emissions associated with each operators' assets (i.e. the CHP, boilers, flare, etc). These plans should follow on from each other maintaining the sequential naming convention for air emission points.	See attached plan Trowbridge WWEL Emission Points, in Trowbridge BC Plans Pack, Item no. 1.

Maintenance / Corrosion

Schedule 5 no.2 Qu 4	**Provide a written description of how you ensure that equipment and pipework (including biogas and sludge/effluent carrying assets) are not subject to corrosion addressing the following aspects:**
Inspection and maintenance	See Appendix 2
Design standards	See Appendix 3

Storm overflows

Schedule 5 no.2 Qu9	**Provide the following information regarding releases of effluent/digestate in storm conditions:**
Provide written procedures which describes the site's contingency arrangements to prevent digestate and effluent being discharged to the WwTW while the WwTW are in storm conditions.	The current situation on site is that liquors are returned via a series of the pumping stations to the WRC inlet. These pumping stations have high level overflows which return any excess flows to the humus return pumping station. Condensate and clean up process water from the G2G enters the drainage system into the humus return pumping station. When this humus pumping station is in high level, there is an overflow present that does have ability to allow drainage and effluent to be discharged upstream of the storm separation weir at the Terminal Sewage Pumping Station. This is identified in the drainage plan. We are now providing written commitment that a solution will be developed as part of the containment report to ensure this flow does not occur. As detailed in the non-BAT summary above, drainage and wastewater flows will be captured by the proposed return pumping station being built within the tertiary containment area. This pumping station will return straight to the WRC inlet.
Provide a description of the buffer storage proposals to control or hold emissions in the event of storm overflow conditions at the WwTW.	There are no current proposals for additional buffer storage.
Should any contingency arrangements use storage	No storage contingency arrangements are in use other than the available liquor storage tanks.

tanks to act as a buffer, provide evidence that demonstrates the waste waters or digestates can be held in this storage during the period of storm overflows.	

Raw Material Data Safety Sheets

Schedule 5 no.1 Qu 18	**Provide the material safety data sheets (MSDS) for raw materials used on site**			
	We have revised the list of raw materials used by this installation and have include the list below as required by Form C3 Q3c Table 5			
	Raw Material Name	Quantities Annual Throughput /year	Total held in site	Description of use of raw material
WWSL	Polymer - Zetag 8160	Approximately 1500 kg / week 1 bag of 750kg for belt presses 1 bag of 750 kg for the GBTs	15,000 kg	Sludge thickening and sludge dewatering. To aid sludge thickening per digesters and in dewatering post digested sludge into digestate cake for recycling
	Polymer - Flopam EM640	1000 L / week for centrifuges	3 m3 in 3 IBC	Sludge dewatering to aid in dewatering post digested sludge into digestate cake for recycling
	Diesel (Mabanaft – low sulphur diesel)	Infrequent usage. Boilers only use diesel when there is a power failure	39,205 m3	Fuel – Used for standby power generation in the boilers
	Antifoam Burst 5400	Uncertain for actual quantities – there is automated background dosing on MADs as required. There is dosing set up for APDs but it's not normally used.	3000 m3	Used for preventing digesters from foaming
WWEL	CHP Oil	~1x tank capacity delivery each year	3000L	Engine lubricating oil for onsite CHP

				gas engine / onsite diesel generator.
	Antifoam	500 mg/day	100L	To the Process water foaming
	Sodium Bicarbonate	40kg	20kg bag	Neyitalise pH correction the process water
	Carbon used in OCU	n/a	6 tonnes in use in the OCU	Change over occurs every 18 months
	Odorant Natural Blend	33 Litres	50 Litres	To odorise the biomethane injected into the Grid
	Antifreeze	Top up if required	100 L	heating system antifreeze/inhibitor. Top-up is on an ad-hoc basis. No top-up has occurred in recent years.

Appendix 1 - Centrifuge BAT Summary

BAT Conclusion			Incorporation of two new dewatering centrifuges
	Overall environmental performance		
BAT 1	In order to improve the overall environmental performance - to implement and adhere to an environmental management system (EMS)		Their use has been incorporated into EMS documents and permit application documents. EMP (EPEMP004) has been produced for Trowbridge WRC. A range of other documents are part of the EMS like: - the Traffic Management Plan OPSP269 - the Odour Management Plan TRTWP256 - the HACCP Plan TRTWPL008
BAT 2	In order to improve the overall environmental performance - to use all of the techniques given below (see BAT conclusions doc for details)		New wastewater stream has been incorporated into the belt press stream for operational purposes.
BAT 3	In order to facilitate the reduction of emissions to water and air - to establish and to maintain an inventory of waste water and waste gas streams, as part of the environmental management system (see BAT 1)		Incorporated into BAT 3 sampling programme proposed sampling points.
BAT 4	In order to reduce the environmental risk associated with the storage of waste - to use all of the relevant techniques given in BAT 4.		n/a
BAT 5	In order to reduce the environmental risk associated with the handling and transfer of waste - to set up and implement handling and transfer procedures		Has been added to waste transfer procedures
	Monitoring		
BAT 6	For relevant emissions to water as identified by the inventory of waste water streams - to monitor key process parameters (e.g. waste water flow, pH, temperature, conductivity, BOD) at key locations (e.g. at the inlet and/or outlet of the pre-treatment, at the inlet to the final treatment, at the point where the emission leaves the installation).		currently under review in reference to BAT 3.
BAT 7	To monitor emissions to water with at least the frequency given below, and in accordance with EN standards. If EN standards are not available - to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality		currently under review in reference to BAT 3.
BAT 8	To monitor channelled emissions to air with at least the frequency given below, and in accordance with EN standards. If EN standards are not available		n/a
BAT 9	To monitor diffuse emissions of organic compounds to air from the regeneration of spent solvents, the decontamination of equipment		n/a

	containing POPs with solvents, and the physico-chemical treatment of solvents for the recovery of their calorific value,	
BAT 10	To periodically monitor odour emissions	Incorporated into the OMP
BAT 11	to monitor the annual consumption of water, energy and raw materials as well as the annual generation of residues and waste water - with a frequency of at least once per year	Incorporated in reviews of dewatering performance for water, energy and raw materials consumption
	Emissions to air	
BAT 12	In order to prevent or, where that is not practicable, to reduce odour emissions - to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1)	OMP has been updated to incorporate the centrifuges
BAT 13	In order to prevent or, where that is not practicable, to reduce odour emissions	measures to be implemented as required
BAT 14	In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour	measures to be implemented as required
BAT 15	To use flaring only for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns)	n/a
BAT 16	In order to reduce emissions to air from flares when flaring is unavoidable	n/a
	Noise and Vibrations	
BAT 17	In order to prevent or, where that is not practicable, to reduce noise and vibration emissions - to set up, implement and regularly review a noise and vibration management plan, as part of the environmental management system (see BAT 1)	n/a
BAT 18	In order to prevent or, where that is not practicable, to reduce noise and vibration emissions - to use one or a combination of the techhniques (see BAT conclusions doc for details).	n/a
	Emissions to water	
BAT 19	In order to optimise water consumption, to reduce the volume of waste water generated and to prevent or, where that is not practicable, to reduce emissions to soil and water - BAT is to use an appropriate combination of the techniques (see BAT conclusions doc for details).	Centrifuge dewatering activity takes place on an impermeable surface. Centrifuge monitoring and optimisation to reduce wastewater liquor production.
BAT 20	In order to reduce emissions to water - to treat waste water using an appropriate combination of the techniques (see BAT conclusions doc for details).	currently under review in reference to BAT 3.
	Emissions from accidents and incidents	
BAT 21	In order to prevent or limit the environmental consequences of accidents and incidents	Accident management plan (OPSP275) is available.
	Material efficiency	
BAT 22	In order to use materials efficiently - to substitute materials with waste	n/a
	Energy efficiency	

BAT 23	In order to use energy efficiently - to use both of the techniques given below (see BAT conclusions doc for details)	n/a
	Reuse of packaging	
BAT 24	In order to reduce the quantity of waste sent for disposal - to maximise the reuse of packaging, as part of the residues management plan (see BAT 1)	n/a
	BAT CONCLUSIONS FOR THE MECHANICAL TREATMENT OF WASTE	
	General BAT conclusions for the mechanical treatment of waste	
	Emissions to air	
BAT 25	In order to reduce emissions to air of dust, and of particulate-bound metals, PCDD/F and dioxin-like PCBs	n/a
	BAT conclusions for the mechanical treatment in shredders of metal waste	
	Overall environmental performance	
BAT 26	In order to improve the overall environmental performance, and to prevent emissions due to accidents and incidents	n/a
	Deflagrations	
BAT 27	In order to prevent deflagrations and to reduce emissions when deflagrations occur	n/a
	Energy efficiency	
BAT 28	In order to use energy efficiently	n/a
	BAT conclusions for the treatment of WEEE containing VFCs and/or VHCs	
	Emissions to air	
BAT 29	In order to prevent or, where that is not practicable, to reduce emissions of organic compounds to air	n/a
	Explosions	
BAT 30	In order to prevent emissions due to explosions when treating WEEE containing VFCs and/or VHCs	n/a
	BAT conclusions for the mechanical treatment of waste with calorific value	
	Emissions to air	
BAT 31	In order to reduce emissions to air of organic compounds	n/a
	BAT conclusions for the mechanical treatment of WEEE containing mercury	
	Emissions to air	
BAT 32	In order to reduce mercury emissions to air	n/a
	BAT CONCLUSIONS FOR THE BIOLOGICAL TREATMENT OF WASTE	
	General BAT conclusions for the biological treatment of waste	
	Overall environmental performance	
BAT 33	In order to reduce odour emissions and to improve the overall environmental performance - to select the waste input	Centrifuges dewater the same digestate as existing belt presses. This activity is incorporated into the OMP.
	Emissions to air	

BAT 34	In order to reduce channelled emissions to air of dust, organic compounds and odorous compounds, including H_2S and NH_3	n/a
	Emissions to water and water usage	
BAT 35	In order to reduce the generation of waste water and to reduce water usage	Liquors are treated on site, the ones from the dewaterers are balanced over 24hrs to manage the return rate to the Water Recycling Centre (WRC)
	BAT conclusions for the aerobic treatment of waste	
	Overall environmental performance	
BAT 36	In order to reduce emissions to air and to improve the overall environmental performance	n/a
	Odour and diffuse emissions to the air	
BAT 37	In order to reduce diffuse emissions to air of dust, odour and bioaerosols from open-air treatment steps	n/a
	BAT conclusions for the anaerobic treatment of waste	
	Emissions to air	
BAT 38	In order to reduce emissions to air and to improve the overall environmental performance - to monitor and/or control the key waste and process parameters	implementation existing systems/procedures and incorporation into the OMP
	BAT conclusions for the mechanical biological treatment (MBT) of waste	
	Emissions to air	
BAT 39	In order to reduce emissions to air	n/a
	BAT CONCLUSIONS FOR THE PHYSICO-CHEMICAL TREATMENT OF WASTE	
	General BAT conclusions for the physico-chemical treatment of solid and/or pasty waste	
	Overall environmental performance	
BAT 40	In order to improve the overall environmental performance	n/a
	Emissions to air	
BAT 41	In order to reduce emissions of dust, organic compounds and NH_3 to air	n/a
	BAT conclusions for the re-refining of waste oil	
	Overall environmental performance	
BAT 42	In order to improve the overall environmental performance	n/a
BAT 43	In order to reduce the quantity of waste sent for disposal	n/a
	Emissions to air	
BAT 44	In order to reduce emissions of organic compounds to air	n/a
	BAT conclusions for the physico-chemical treatment with calorific value	
	Emissions to air	
BAT 45	In order to reduce emissions of organic compounds to air	n/a

	BAT conclusions for the regeneration of spent solvents	
	Overall environmental performance	
BAT46	In order to improve the overall environmental performance of the regeneration of spent solvents	n/a
	Emissions to air	
BAT 47	In order to reduce emissions of organic compounds to air	n/a
	BAT-AEL for emissions of organic compounds to air from the re-refining of waste oil, the physico-chemical treatment of waste with calorific value and regeneration of spent solvents	
	BAT conclusions for the thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil	
	Overall environmental performance	
BAT 48	In order to improve the overall environmental performance of the thermal treatment of spent activated carbon, waste catalysts and excavated contaminated soil	n/a
	Emissions to air	
BAT 49	In order to reduce emissions of HCl, HF, dust and organic compounds to air	n/a
	BAT conclusions for the water washing of excavated contaminated soil	
	Emissions to air	
BAT 50	In order to reduce emissions of dust and organic compounds to air from the storage, handling, and washing steps	n/a
	BAT conclusions for the decontamination of equipment containing PCBs	
	Overall environmental performance	
BAT 51	In order to improve the overall environmental performance and to reduce channelled emissions of PCBs and organic compounds to air	n/a
	BAT CONCLUSIONS FOR THE TREATMENT OF WATER-BASED LIQUID WASTE	
	Overall environmental performance	
BAT 52	In order to improve the overall environmental performance	n/a
	Emissions to air	
BAT 53	In order to reduce emissions of HCl, NH_3 and organic compounds to air	n/a

Appendix 2 – Inspection and maintenance

Our Bioresources assets receive regular planned maintenance from our frontline operational teams including EMI (Electrical, Mechanical & Instrumentation). The maintenance activities range from intrusive tasks such as component replacement through to operational checks and visual inspections. Asset maintenance tasks and frequency are driven by an understanding of the consequence (or criticality) of the asset's failure in service and the optimal application of resource to mitigate against consequences of failure.

Some assets do have specific maintenance tasks to check for signs of corrosion, while others require inspection of pipework for leaks (which would also cover corrosion). The tables below show some of the maintenance activities on our assets at Trowbridge BC.

Examples of Corrosion related maintenance tasks at Trowbridge BC

Job Activity Description	Task Description
Forced Air Vent Fan - Centrifugal - 1Y	CHECK FOR SIGNS OF CORROSION / DAMAGE
Forced Air Vent Fan - High Rate Odour Control - 1Y	CHECK FOR SIGNS OF CORROSION / DAMAGE
Generator - CHP - 1 Weekly	INSPECT EXHAUST SYSTEM FOR LEAKS / CORROSION (G)
Generator - Load Management - 1M	INSPECT EXHAUST SYSTEM FOR LEAKS / CORROSION (G)
	INPSECT FUEL TANK AND ASSOCIATED PIPEWORK FOR SIGNS OF CORROSION OR VISIBLE LEAKS (G)
Generator-Load Management-3M	INSPECT EXHAUST SYSTEM FOR LEAKS / CORROSION (G)
	INPSECT FUEL TANK AND ASSOCIATED PIPEWORK FOR SIGNS OF CORROSION OR VISIBLE LEAKS (G)
Grit - Classifier	VISUAL CHECK OF CHANNEL CONDITION FOR CORROSION
Hv Batteries - 1Y	Examine all terminals and connections for corrosion/tightness where necessary clean and lightly trea
	Any spillage must be thoroughly cleaned up, particularly from the top of cells to avoid corrosion.
Pump - Submersible With Chain Inspection - 4Y	INSPECT CHAIN FOR SIGNS OF CRACKING / CORROSION / STRETCH
	PUMP HANDLE WEAR / CORROSION
	INSPECT ROPE FOR SIGNS OF CORROSION
Pump - Submersible With Chain Inspection 2 Man - 4Y	INSPECT CHAIN FOR SIGNS OF CRACKING / CORROSION / STRETCH
	PUMP HANDLE WEAR / CORROSION
	INSPECT ROPE FOR SIGNS OF CORROSION
Pump - Wash Water Pressure Set - 1Y	Surge vessel - look for signs of wear and corrosion particularly at the thread end of the cylinder
	INSPECT PRESSURE VESSEL FOR SIGNS OF CORROSION
Pump - Wash Water Pressure Set - 6M	Surge vessel - look for signs of wear and corrosion particularly at the thread end of the cylinder
WRM - Compressor Maintenance	PRESSURE VESSEL - LOOK FOR SIGNS OF WEAR AND CORROSION PARTICULARLY AT THE THREAD END OF THE CYLINDER

Job Activity Description	Task Description
Belt Press - 1Y	INSPECT ALL ASSOCIATED PIPEWORK
Belt Press - Gravity Belt Press - 1Y	INSPECT ALL ASSOCIATED PIPEWORK
Belt Press-Sludge Belt Press-2M	INSPECT ALL ASSOCIATED PIPEWORK (M)
Blower - Side Channel - 1Y	INSPECT ASSOCIATED PIPEWORK FOR LEAKS
Hydraulic Pack - 1Y	INSPECT ASSOCIATED PIPEWORK FOR LEAKS
Pump - Dry Well - 2Y	INSPECT ASSOCIATED PIPEWORK FOR LEAKS
Pump - Dry Well 2 Man - 2Y	INSPECT ASSOCIATED PIPEWORK FOR LEAKS
Pump - Spindle / Close Couple - 1Y	INSPECT ASSOCIATED PIPEWORK FOR LEAKS
Pump - Submersible - 2Y	INSPECT ASSOCIATED PIPEWORK FOR LEAKS
Pump - Vaughan Chopper Type - 1Y	INSPECT ASSOCIATED PIPEWORK FOR LEAKS
Pump - Wash Water Pressure Set - 1Y	Surge vessel - check safety valves and pipework for leakages or damage
Pump - Wash Water Pressure Set - 6M	Surge vessel - check safety valves and pipework for leakages or damage
	INSPECT ASSOCIATED PIPEWORK FOR LEAKS
Screen - Rotomat Microstrainer - 6M	INSPECT ASSOCIATED PIPEWORK FOR LEAKS
WRM - Compressor Maintenance	PRESSURE VESSEL - CHECK SAFETY VALVES AND PIPEWORK FOR LEAKAGES OR DAMAGE

In addition to the tasks shown above, our EMI technicians are required to assess and record the condition of the installed asset on completion of every planned maintenance job on to WAM (Work and Asset Management). The table below is taken from our Condition Grade Assessment Guide (AMG007). It shows that for condition grades 3-5, corrosion is a factor in the grading and is therefore considered in the overall assessment of asset condition.

Condition Grade Assessment

APPENDIX 4A: CONDITION GRADING ASSESSMENT – ELECTRICAL, MECHANICAL & INSTRUMENTATION

	CONDITION ASSESSMENT - ELECTRICAL, MECHANICAL AND INSTRUMENTATION EQUIPMENT				
	1	2	3	4	5
	Excellent	Good	Fair	Poor	Unacceptable
Structural integrity & function	As new appearance, operating reliably, meeting all statutory requirements and Company standards	As 1, but starting to show signs of minor wear & tear	Evidence of minor corrosion, distortion, wear, leakage, beginning to affect integrity but with little impact on performance or safe operation	Evidence of significant corrosion, distortion, vibration, wear, leakage, etc , having a noticeable affect on performance, integrity and safe operation of equipment. Meets all statutory requirements but is becoming obsolete in the short term	Evidence of severe corrosion, distortion, vibration, wear, leakage, operating temperature, affecting integrity, performance and safe operation of equipment. No longer meets all statutory or Company requirements, plant is obsolete and unsupportable
Action	normal operational maintenance	normal operational maintenance, some minor breakdown repairs	Increased failure rate and repairs required as necessary Monitor deterioration	Requiring significant maintenance to remain operational. Major refurbishment (to CG 2 min) or replacement required in 1-5 years	Unacceptable failure rate, incurring excessive maintenance costs. Major refurbishment (to CG 2 min) or replacement required in 1-2 years

We are currently reviewing both the maintenance strategy and our planned maintenance schedules to ensure we are able to clearly demonstrate compliance with all of our EPR permit requirements.

Appendix 3 – Design Standards

Provide a written description of how you ensure that equipment and pipework (including biogas and sludge/effluent carrying assets) are not subject to corrosion addressing the following aspects:

During the design and construction phase, WWSL and its delivery partners ensures that corrosion prevention is appropriately managed in the following ways:

Appointment of Design Resource

As part of WWS' quality management system, and in line with CDM 2015 regulations, designers will be allocated to projects based on the competency required to complete the task. This is formally documented at a scheme kick-off meeting. It is mandatory for all design calculations, specifications, drawings, and other outputs, to be checked and approved on WWS projects. Where specifying pipework or other assets that may be subject to corrosion, checks will be undertaken by a senior or principal mechanical engineer. The approver will normally be by the discipline lead, workstream lead or the named Principal Designer.

On every scheme, a technical manager (TM) is appointed to provide technical advice and governance as the project progresses. Any deviation from technical standards, including those with relevance to corrosion, must be approved by the TM. Deviations will also require acceptance from the Operator where it has the potential to impact inspection and maintenance of the relevant asset. Relaxation of standards relevant to corrosion would not be acceptable under any circumstance.

Design Reviews

WWS and its partners deliver projects in line with a mandatory project delivery process. This includes mandatory technical review meetings at key project milestones with project stakeholders, including the TM and the Operator. The reviews include:

Outline and Detailed Design Reviews

These meetings are used to confirm that the:

- project need is being addressed.
- design complies with WWS technical standards and specifications.
- design and enabling actions undertaken meet relevant regulatory requirements such as planning, ecological considerations, IED requirements.
- appropriate calculation, design, and drawing checks have been completed.
- design is adequate, practical, safe, and economic to construct, commission, and to operate and maintain with reasonable effort.

The deliverables reviewed typically include a detailed engineering model and associated engineering outline and construction drawings.

A key focus of these reviews is to give the operator a clear understanding of the spatial access, lifting and maintenance provisions included in the design. The use of digital approaches such as engineering 3D models allows operators to quickly understand the design intent and an opportunity to challenge aspects that they feel could be improved.

Hazard and Operability Analysis (HAZOP), Control Philosophy, and URS Review

The HAZOP is a systematic, in depth, review of the design solution, which ensures that appropriate safeguards are in place to avoid the proposed system failing and leading to a safety or pollution event. HAZOP guide words include composition, leakage and spillage, and operation and maintenance e.g. appropriate isolation.

The deliverables reviewed must include all pipeline and instrumentation diagrams, control philosophy, and user requirements specification.

Procurement:

The framework agreements with delivery partners, and their sub-contractors and designers, includes a clause stating that they must comply with WWSL and industry approved technical standards when delivering works on behalf of WWS. Deviation from these standards would be considered a defect requiring rectification unless a deviation is formally agreed with the Technical Manager and Operations prior to installation works.

Delivery partners must hold ISO 9001, 14001, 45001 accreditations and must demonstrate technical competence to be appointed. They are required to deliver projects to the WWSL delivery process.

Technical Standards

All designers must comply with WWS and industry approved technical standards, including the Water Industry Mechanical and Electrical specification (WIMES) standards. WWS standards are regularly reviewed and updated to ensure they reflect latest best practice and innovation. Examples of relevant specifications and what they broadly cover is referenced below.

WIMES

WIMES 8.03 MECHANICAL INSTALLATION – Issue 5 June 2021 Corrosion prevention	Section 4.6 - Corrosion prevention and/or Corrosion protection of Equipment after installation. Table 5 – Corrosivity Category Definitions and Associated Corrosion Prevention / Protection Measures
WIMES 8.03 MECHANICAL INSTALLATION – Issue 5 June 2021 Valve Installation	Section 6 – Valve Installation Install in accordance with the Purchaser's planned maintenance requirements, so all valve components that will require regular inspection, cleaning or maintenance are readily and safely accessible and where appropriate, easily replaceable. Designed to ensure safe isolation. The standard of isolation should be determined in an ALM in accordance with HSG 253 or the purchaser's ALM standard.
WIMES 8.08 Pipework (Non-Buried Applications) – Issue 1, June 2021 Section 6.2 Materials Selection	Defines requirements for the design, fabrication, installation, inspection, and testing of non-buried pipework in the water industry. Pipework material selection to ensure that the specified design life is achieved, considering all possible material

	degradation mechanisms associated with the specified external operating environment and process fluid. Includes provisions to avoid galvanic corrosion.
WIMES 8.08 Pipework (Non-Buried Applications) – Issue 1, June 2021 Section 6.3 Corrosion Prevention	Internal and external surfaces of ductile iron and carbon steel shall be protected in accordance with WIMES 4.01. The type of internal lining and /or external coating shall be as specified / stated in the SCHEDULE.
WIMES 8.08 Appendix C – Pipework specification tables Appendix D – Pipework selection tables.	Allows selection of suitable pipework for the required application.
WIMES 4.01 - Paints and Polymeric coatings for corrosion protection - Issue 5 August 2018	Defines the requirements for paints and polymeric coatings used for the protection of plant and equipment.
WIMES 8.09 – Valves – Issue 2 March 2021	Defines the requirements for the performance, design, construction and testing of valves for use in the water industry. Includes – external operating environment of the valve, special hazards associated with the operating environment, and references for further information relating to the operating environment to which the valve is being incorporated.

WWS Design Standards

DS224 SITE PLANNING – LAYOUT, PLANT, ROADS, LANDSCAPING - Issue 5b, February 2020	Sufficient space provided around all structures and plant, equipment, and instrumentation to facilitate all required access during … operation, inspection & repair.
DS 460 - SLUDGE THICKENING & DEWATERING - MECHANICAL - Issue 5, November 2018	Larger sites are subject to IED … which specify that pipework should preferably be installed above ground, or otherwise contained within a suitable inspection channel.
DS 250 – ABOVE GROUND VERTICAL CYLINDRICAL TANKS. Issue 2 March 2020	Sets out material selection for sludge storage tanks.