

A large teal graphic element on the left side of the page, consisting of a triangle at the top and a trapezoid below it, forming a shape that resembles a stylized 'M' or a mountain peak.

# **Gravesend Sludge Treatment Centre Accident Management Plan**

February 2024

This page left intentionally blank for pagination.

Mott MacDonald  
4th Floor  
Mountbatten House  
Grosvenor Square  
Southampton SO15 2JU  
United Kingdom

T +44 (0)23 8062 8800  
mottmac.com

# Gravesend Sludge Treatment Centre Accident Management Plan

February 2024

# Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	February 2024	Amelia Luk	David Dray	Anita Manns	Draft (February 2024 Resubmission)
B	February 2024	Amelia Luk	Shannon Stone	Anita Manns	Submission

**Document reference:** 790101\_MSD\_AMP\_GRA\_February 2024

**Information class:** Standard

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

---

# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Scope	1
1.2	Roles and Responsibility	2
<b>2</b>	<b>Site information</b>	<b>3</b>
2.1	Site location	3
2.2	Summary of Site and sensitive receptors	3
<b>3</b>	<b>Accident Management Techniques</b>	<b>4</b>
3.1	Loss of Containment	7
3.1.1	Gas Escape	7
3.1.2	Liquid Escape	8
3.1.3	Material Storage	8
3.1.4	Odour	9
3.1.5	Vandalism and unauthorised access	9
3.1.6	Physical Protection Measures	10
3.1.7	Overfilling of tanks	10
3.1.8	Fire	11
3.1.9	Arson risks	12
3.1.10	Contingency for Sludge Treatment Issues	12
<b>4</b>	<b>Risk Assessment Methodology</b>	<b>16</b>
<b>5</b>	<b>Reporting and Recording</b>	<b>40</b>
5.1	Reporting	40
5.2	Recording	40
5.3	Post-incident Review	41
5.4	Competence and Training	41
<b>6</b>	<b>Emergency Response Procedures (ERP)</b>	<b>43</b>
6.1	Fire	43
6.2	Explosion	43
6.3	Pollution	44
6.4	Flooding	44
6.5	Road traffic accident impact or collision	44
6.6	Collapse of a structure or building	44
6.7	Spill transferring wastes	45
6.8	Spills transferring chemicals	45
6.9	Diesel spillage/leak	45

6.10	Overfilling vessels	46
6.11	Plant and equipment failures	46
6.12	Containment failure	46
6.13	Failure to contain firewater	46
6.14	Incorrect connection leading to releases to drains and other systems	47
6.15	Incompatible substances coming into contact	47
6.16	Emission of effluent or Biogas before composition checked	47
6.17	Theft & Vandalism	48

## A. Grab Pack 49

### Tables

Table 1.1: Key contacts and communication in the case of an emergency	2
Table 3.1: Supporting Emergency Procedures – IMP	4
Table 3.2: Raw Material and Process Chemical Storage	10
Table 3.3: Mitigation measures with sludge treatment incidents	12
Table 4.1: Severity Index	16
Table 4.2: Probability Index	16
Table 4.3: Magnitude of risk	16
Table 4.4: Accident risk assessment table	17

# 1 Introduction

This Accident Management Plan (AMP) describes the requirements, procedures and actions to be taken in the event of an environmental accident or incident at Gravesend Sludge Treatment Centre (STC), also referred to as the "Site". This plan will support the Gravesend STC Environmental Management System.

## 1.1 Scope

Environmental accidents and incidents shall cover emissions to air, land or water that can cause harm to the environment.

This plan is written in accordance with the IED Environmental Permit application requirements for Gravesend; BAT, specifically BAT1; and associated written management systems and procedures. Southern Water is required to review this plan annually, unless there are incidents, operational or managerial changes at the Site, which would require an earlier review.

The Site is staffed 7 days a week, from 7am to 6pm Monday to Friday and 7am to 3pm on Saturdays and Sundays.

The Site also operates under an Incident Management Plan (IMP), to be read in conjunction with this Accident Management Plan, which is incorporated into Southern Water's Environmental Management System to prevent and manage environmental related accidents. The IMP includes an inventory of substances stored at the Site, details on storage facilities, inventory of pollution prevention equipment (spill kits and fire extinguishers), inventory of waste and storage capacities, contact details of internal contacts (Site manager, Environmental Governance Manager and key HSE staff), national and regional (where appropriate) contact details of emergency services and environmental regulators. The IMP is distributed to key staff, to supervise the implementation of the Plan, and shared with external contacts (emergency services and the Environment Agency). The IMP is accompanied by a Site Plan that identifies the locations of designated storage areas (and their maximum storage capacity), location of spill kits and fire extinguisher and storage locations and hazards posed by chemical substances.

The IMP references procedures to comply with environmental legislation and protect the environment and human health in regard to potential accidents:

- Spill prevention and management, and operation of safety valves
- Procedures for recovering spilled product
- Procedures for the prevention of overflowing vessels, and the management of plant and equipment failures
- Fire prevention and responses to fires, including fire water containment procedures
- Security measures to prevent unauthorised access, arson and vandalism
- Competence, training and awareness requirements
- Monitoring and measurement requirements
- Record keeping procedures for the recording of incidents, accidents and near misses
- Emergency procedures to notify relevant authorities, emergency services and neighbours

There are several different document types referenced in the IMP. These have been listed below:

- EMS – Environmental Management System
- FEC – Field Event Co-ordinator's Manual

- IMP – Incident Management Plan
- BCP – Business Continuity Plan
- CCM – Control Centre Manual
- SIB – Safety Instruction Book
- CAT – Catastrophe Plans

Southern Water is committed to continual environmental improvements, including minimising the risk of accidents both on the Site and its operations and in the wider environmental setting. This commitment is delivered through efficient control of processes, capital investments, and environmental training.

## 1.2 Roles and Responsibility

The Site Manager has overall responsibility for reviewing the processes on the Site to minimise the risk of accidents and reduce the impact of any accidents should they occur. This document is reviewed annually, but the review process is ongoing as part of the regular performance monitoring for the Site. In the case of an emergency, key contacts and communication details are listed in Table 1.1.

**Table 1.1: Key contacts and communication in the case of an emergency**

Contact	Office Hours	Out of Hours
Southern Water	Duty Manager, Control Centre 01903 272095	Duty Manager, Control Centre 01903 272095
Environment Agency	0800 807060 (Emergency Hotline) 0370 8506506 (Routine enquiries)	0800 807060 (Emergency Hotline) 0370 8506506 (Routine enquiries)
Emergency Services	999	999
Local Police	999	999
Local Hospital	The Queen Mother hospital, St Peters Road, Margate, Kent. CT9 4AN	999
EA Incident Hotline	0800 80 70 60	0800 80 70 60
EA Local Contact	0800 80 70 60	0800 80 70 60
Local Authority Emergency Planning Department	Emergency Planning Duty Officer (24 hr) Kent Resilience Team / Kent County Council 03000 414 999	03000 414 999
Borough Council	Gravesend Borough Council	01474 337000
Water Company	Duty Manager, Control Centre 01903 272095	Duty Manager, Control Centre 01903 272095
Gas Company	0800 111 999	0800 111 999
Electricity Company	UK Power Networks 08433 102243	UK Power Networks 08433 102243
Framework Waste Contractor	MTS 01634 250326	MTS 01634 250326
Specialist Spill Clean Up Contractor	MTS 01634 250326 Cappagh Browne 0330 3031279	MTS 01634 250326 Cappagh Browne 0330 3031279



## 2 Site information

### 2.1 Site location

The Site is located to the east of the town of Gravesend, the sewage treatment works was constructed prior to 1932 and was redeveloped in 1982 in a new configuration. The Gravesend catchment serves the town of Gravesend, with a population equivalent of approximately 63,650.

Site address: Dering Way, Gravesend, Kent, DA12 2QF.

National grid reference: TQ 66711 73969

### 2.2 Summary of Site and sensitive receptors

Two residential properties are located at the site entrance in the south-west of the Site. To the north the Thames and Medway canal bounds the Site, with a freight yard and sand and gravel distribution beyond. To the east of the Site is agricultural fields are to the south and the west of the site industrial land uses are present.

There are a number of receptors around the Site, including an industrial estate located south of the Site, a Travellers site to the south east, a residential area south west to the south west, and an industrial estate to the north.

### 3 Accident Management Techniques

The IED Regulations require the identification of potential accidents associated with the operation of an Installation and implementation of measures to avoid or minimise the effects of an accident, should they occur. This section sets out the measures to be adopted at the Installation to minimise potential risks to the environment. See Section 6 for Emergency Response Procedures.

The Site has an IMP designed to give first response instruction and procedures to control any Incidents/Emergencies at the Site.

Table 3.1 below provides a list, along with a brief description of each, of the procedures which form part of the IMP.

**Table 3.1: Supporting Emergency Procedures – IMP**

Procedure Reference	Brief Summary
EMS 234 Chemical and Oil Storage	Specifies the standard for storage of chemicals and oils. Outlines the amounts of substances that can be stored on site without consent from the Local Authority, and details how these substances should be safely stored. Also includes Information on the auditing, training requirements and any associated documents.
EMS 260 Pollution Prevention (standard)	Specifies the standard for managing and reducing the risk of land contamination. Outlines the tasks a manager should complete i.e., ensuring spill kits are available, and who to contact in the event of an incident. The document also lists the measures that Southern Water should take to prevent pollution incidents. Also includes Information on the auditing, training requirements and any associated documents.
EMS 265 Discharges (Standard)	Sets the minimum standard of operation in managing effluent and potable water process discharges. Details definitions which relate to the procedure and outlines the standard. Also includes Information on the auditing, training requirements and any associated documents.
EMS 360 Pollution Prevention Procedure	Outlines the responsibilities of staff in relation to the procedure. The Procedure includes details on items such as site drainage, working on or near watercourses and excavations. As well as addressing different spill types; chemical, oil and sludge/sewage. Information on the auditing, training requirements, reporting forms and any associated documents.
EMS 361 Chemical Risk Assessment (Procedure)	Defines the procedure for assessing the environmental risk from bulk chemicals. Outlines the procedure for undertaking a risk assessment, and where required which EMS procedures need to be followed. Also addresses risk mitigation and employee awareness as well as the auditing, training requirements, reporting forms and any associated documents.
EMS 362 Environmental Fire Risk Assessment Procedure	Specifies the procedure for minimising the environmental consequence of a fire. Outlines the responsibilities of staff in relation to the procedure and provides a procedure for an Environmental Fire Risk Assessment. Information on the auditing, training requirements, reporting forms and any associated documents
EMS 363 Procedure for Managing oil spills on sites	Outlines the responsibilities of staff in relation to the procedure. The procedure details how to determine the severity of the spill for different scenarios; land, inland waters and coastal waters/beaches, and how to prevent, control and remediate the environmental damage caused by spillages from the site. Information on the auditing, training requirements, reporting forms and any associated documents.
EMS 364 Lime Spill Management Procedure	Outlines the procedure for managing lime chemical spills at STCs. Defines the responsibilities of staff, and the procedure for managing the spill including the spill assessment and notification and escalation. Information on

Procedure Reference	Brief Summary
EMS 365 Discharges Procedure	<p>the auditing, training requirements, reporting forms and any associated documents.</p> <p>Defines the procedure that must be adopted when managing intermittent discharges. Outlines the responsibilities of staff in relation to the procedure and outlines the procedure where an emergency discharge is foreseeable for both emergency and stormwater and potable water. Information on the auditing, training requirements, reporting forms and any associated documents.</p>
EMS 381 Operational Waste Procedures	<p>Specifies the procedure for managing wastes. The procedure addresses the definitions of different waste types and outlines a general procedure for managing waste. Identifies where further procedures should also be followed for specific waste types e.g., asbestos, WEEE and waste oils. Information on the auditing, training requirements, reporting forms and any associated documents.</p>
EMS 382 Hazardous Waste Procedures	<p>Specifies the procedure for moving hazardous waste between different sites. The procedure addresses identifying hazardous waste, storage of hazardous waste, consignment notes and record keeping. Information on the auditing, training requirements, reporting forms and any associated documents.</p>
EMS 461 Chemical Risk Assessment (Form)	<p>A template for a chemical risk assessment including the following:</p> <ul style="list-style-type: none"> <li>● Site details</li> <li>● Chemical details</li> <li>● Chemical classification</li> <li>● Risk activity</li> <li>● Risks for health, fire/DSEAR<sup>1</sup> and environment</li> <li>● Handling, usage and storage requirements</li> <li>● Management of spills</li> <li>● Disposal And the safety data sheet.</li> </ul>
EMS 480 Waste Descriptions	<p>Provides written descriptions of different waste types covering the following:</p> <ul style="list-style-type: none"> <li>● Process giving rise to the waste</li> <li>● Waste characteristics</li> <li>● Handling advice</li> <li>● Containment</li> <li>● Disposal</li> <li>● Name of waste</li> <li>● Waste classification</li> <li>● Producer and registered office details</li> <li>● EWC</li> <li>● Controlled Waste Regulations 2012 description</li> <li>● Waste type</li> <li>● Form</li> <li>● Temperature</li> <li>● SIC code</li> </ul> <p>Information on the auditing, training requirements, reporting forms and any associated documents.</p>
FEC 307 Reporting of Unauthorised Access, Including Loss, Theft and Vandalism	<p>Outlines the responsibilities of staff in relations to the reporting these incidents, and the procedure to be followed. Also includes Information on the auditing, training requirements and any associated documents.</p>
FEC 320 Process Related Incidents	<p>Specifies the procedures to follow in responding to process-related pollution incidents. Responsibilities of staff are outlined in the procedure, as well as contacting the FEC, FEC actions and reporting procedures. Information on the auditing, training requirements, reporting forms and any associated documents</p>

<sup>1</sup> Dangerous Substances and Explosive Atmosphere Regulations

Procedure Reference	Brief Summary
FEC 322 – Spillage Procedure	<p>Outlines the responsibilities of staff in relation to the procedure. The procedure outlines the process for handling spillages on site including:</p> <ul style="list-style-type: none"> <li>• Spillage assessment</li> <li>• Notifications and escalation</li> <li>• Containment</li> <li>• Awareness and training</li> </ul> <p>Information on the auditing, training requirements, reporting forms and any associated documents.</p>
IMPO_101 – Overview of the Incident Management Plan	This document sets out the overall structure of the Incident Management Plans and provides a short overview of each of the main plans
IMP 217 and IMP 218 Team Roles – Objectives and Responsibilities	Sets out the Objectives and Responsibilities for roles within the Incident Management Team and provides guidance for the ELT Representative. IMP 217 identifies when Southern Water should contact the Environment Agency, and IMP 218 identifies the process for contacting other authorities.
BCP 415 Guidance on Reporting Potential Media Interest	Sets out the types of incidents to be reported back by Field Operations Staff & Contract staff working on behalf of Southern Water that will potentially attract media interest, including contact numbers.
CCM 302 Procedure Following the Receipt of a Fire Alarm	Provides a consistent regional approach to dealing with any formal notification of a fire alarm within the Company. Outlines the responsibilities of staff, the procedure for when a fire alarm notification is received, inspections/audits, training and any associated documents.
SIB 603 Risk Assessment and Safety Instructions for Fire Awareness	<p>Covers the following:</p> <ul style="list-style-type: none"> <li>• Training needs of staff and fire wardens</li> <li>• What Managers must provide (i.e. fire safety meetings, plans)</li> <li>• Inspections</li> <li>• Safety instructions for occupied sites, unoccupied sites, and company vehicles</li> <li>• Firefighting procedure</li> <li>• Records to be completed</li> </ul>
CAT 303 Actions Following Severe Weather or Flood Warnings	<p>Outlines the plan of actions that should be undertaken following severe weather or flood warnings and the responsibilities of the staff under these circumstances. The procedure details checklists for the following scenarios:</p> <ul style="list-style-type: none"> <li>• impending severe weather,</li> <li>• flood watch,</li> <li>• flood warning,</li> <li>• severe flood warning, and</li> <li>• an all clear checklist.</li> </ul> <p>Also includes Information on the auditing, training requirements and any associated documents.</p>
Environmental Emergencies Poster (EMS)	A poster which should be displayed on all sites. The poster lists the type of emergency (fires, spills etc) and both the action which should be undertaken the contact phone number which should be called. The poster also highlights a list of things which should be checked prior to work starting such as the H&S notice boards, environmental notice boards and continuity plans.
Pollution 30 Minute Plan	Outlines a five-step plan for responding to a pollution incident in 30 minutes and outlines what should be done at each of the five stages.
Site Chemical Risk Register	Southern Water electronic database containing an inventory of hazardous substances used and stored by Southern Water and those relevant to individual sites, helping Southern Water to control substance use and comply with the COSHH regulations
Alternative Response Coordinators Booklet	These documents provide flowcharts and a step-by-step guide for completing the Alternative Response tasks. Section 5: Resilience Guidance identifies criteria on when to contact local authorities and other first responders

A site-specific Fire Prevention Plan is available for Gravesend to reduce the risk of fire and explosion. Please see the site-specific Fire Prevention Plan for full details of corrective measures.

### 3.1 Loss of Containment

#### 3.1.1 Gas Escape

Loss of containment of gaseous materials at the Site could result in the escape of biogas or other gases to the atmosphere around the site. In order to minimise the potential for accidental releases of gas from the Installation the following measures have been adopted:

- The gas holders are double-membrane inflatable bag type holders, constructed of a Type IV fabric<sup>2</sup>, which is resistant to UV and microbial degradation. The stored gas is contained within the inner membrane. The exterior dimension of the gasholder remains constant
- All pipework at the Site used for the transfer of gaseous products has been manufactured to the appropriate British Standard using appropriate grade materials and all pipe joints and seals are also designed to meet the required British Standard
- Regular monitoring of storage vessels, pipework and gas levels is undertaken to minimise release of fugitive emissions
- Storage vessels and pipework are subject to regular inspection, by the site operators to ensure the structural integrity of the system remains uncompromised
- All staff with responsibility for the handling or transfer of gaseous materials receive training for their role
- All staff on site will receive training in site emergency procedures and the actions to take in the event of discovering a gas leak as part of their mandatory site induction training
- The gas system has safety pressure release valves, which are designed to prevent over-pressurisation of the system. Gas emissions from this point are monitored on telemetry with immediate call-out of staff to remedy
- A waste gas burner is incorporated to deal with excess biogas and is the first point of relief for excess gas or pressure as an emergency measure

The Site is designed to meet the Dangerous Substances and Explosive Atmosphere Regulations (DSEAR). Consideration of the requirements of DSEAR is included in the Designers Risk Assessment including information on the operation and maintenance of the Installation to ensure DSEAR requirements are met.

An IMP is in place for the Gravesend site. The IMP includes actions to be followed in the event of a loss of containment of gaseous materials at the Installation.

Preventative measures incorporated into normal operations include a DSEAR operational risk assessment that will be periodically reviewed and updated against the latest DSEAR regulations and guidance to ensure best practice is adopted.

A Leak Detection and Repair (LDAR) plan is in place at the Gravesend STC.

---

<sup>2</sup> Type IV fabric is a biogas storage system that is constructed using a polyester fabric that has a PVC coating on both sides which makes it resistant to corrosive gas and heat.

### 3.1.2 Liquid Escape

Failure of the liquid containment systems at the STC could potentially lead to oil bearing fluids, reagents and process effluents discharging to surface waters and ground waters in proximity to the Installation. Potential risks associated with this have been reduced through the implementation of the following measures:

- The storage vessels for all boiler feed water treatment chemicals and fuel storage liquid materials located within the installation are double-skinned or banded to 110% capacity and have been manufactured to the required British Standard using appropriate grade materials
- Where applicable, on-site storage tanks are banded to 110% of their storage capacity in line with environmental good practice and bands are regularly inspected for liquid content and emptied if required
- Regular monitoring of storage vessels, pipework and fluid levels is undertaken to ensure no fugitive emissions are being released
- Storage vessels, bands and pipework are subject to regular inspection by the Site Manager or the nominated deputy to ensure the structural integrity of the system remains uncompromised
- All pipework at the site used for the transfer of liquids has been manufactured to the appropriate British Standard using appropriate grade materials and all pipe joints and seals are also designed to meet the required British Standard
- Spill kits comprising suitable materials for the containment of liquid spills have been placed throughout the site for the use of all staff
- Site surfaces surrounding liquid storage areas and transfer pipes are constructed of impermeable material and run off is diverted to appropriate drainage structures to prevent escape of fluids to surface waters or ground waters
- All staff with responsibility for the handling or transfer of liquid materials receive appropriate training for their role
- All staff on site must receive training in site emergency procedures and the actions to take in the event of discovering a liquid spillage and the use of spill containment measures as part of their mandatory site induction training

### 3.1.3 Material Storage

All chemical tanks and stores must be clearly labelled and marked with appropriate warning signs and all delivery points must be kept locked except when in the presence of an Operations team member.

The levels of raw materials are checked and recorded.

During deliveries of material to site, special care is taken to ensure that all storage tank levels and contents are checked in order to prevent the accidental overfilling of tanks or the inadvertent mixing of substances. Specific measures are in place for the discharging of sludge from delivery tankers to reduce the risk of overfilling of the tank and spillages during discharge.

The following are requirements for deliveries on site:

- Each direct delivery must be checked for the correct quality and strength and to ensure that no damage etc. has occurred in transit
- Supplier's Advice Notes must be checked, to ensure that the goods match the documentation, and then signed
- Retain copies of Supplier's Advice Notes

- All chemical deliveries must be supervised by nominated personnel as detailed on the current list
- Chemical deliveries must be recorded and must include a declaration that they conform to the required standard, either on the delivery note, or as a separate certificate of conformance
- Appropriate training is provided to personnel involved in receipt and handling of deliveries and specific procedures for the filling of tanks have been developed within the management systems

### 3.1.4 Odour

Biogas is a naturally odorous material; however, the high alkaline conditions present within the STC digesters, scrub most of the hydrogen sulphide (H<sub>2</sub>S) (an odorous constituent) from the biogas, resulting in relatively low concentrations. In addition, there will be no other odour emissions at the site from normal operations at the Installation.

Sewage, sewage sludges and returned liquors can all contribute to odour on a STC. A number of odour release points/areas have been identified in Gravesend STC, and a combination of good baseline site management and odour control measures have been implemented to manage these sources. Two odour control units are installed on the Site.

Regular inspection of site storage facilities and pipework will be undertaken to ensure that the structural integrity of the system remains intact in line with the Gravesend STC LDAR plan and Odour Management Plan (OMP). Regular site inspections and sniff checks are undertaken by the site team to ensure that no significant fugitive emissions of odour likely to cause pollution of the environment, adversely impact human health or significantly reduce the amenity of the local area are present. In the event of an accidental emission of odorous material from site storage facilities or pipework, the source of the emission will be isolated, investigated and, if required, operation suspended until the source of the emission has been sealed.

### 3.1.5 Vandalism and unauthorised access

Vandalism and unauthorised access to plant infrastructure and work areas has the potential to result in:

- Damage to plant infrastructure and equipment
- Increased risk of injury to personnel
- Uncontrolled release of fugitive emissions of gaseous, liquid or solid materials to the environment

Operations and Maintenance (O&M) activities at the STC occur on a continuous basis and high levels of site security are maintained to prevent unauthorised access to plant infrastructure and work areas in accordance with Field Event Coordinator's Manual (FEC) in relation to Reporting of Unauthorised Access, Including Loss, Theft and Vandalism (FEC 307). In light of this the potential for vandalism is considered to be effectively minimised.

The following measures have also been adopted as security measures:

- For visitors and unauthorised personnel, an intercom system at the Site entrance is used before entry is allowed
- On arrival at site, visitors must sign the visitor's book and also announce their arrival to staff in the control room
- The Site is staffed 7 days a week, from 7am to 6pm Monday to Friday and 7am to 3pm on Saturdays and Sundays
- CCTV cameras are positioned in key locations around the Site

- Access to Site and waste is restricted by 2.5m high steel palisade inner front gate, and palisade fencing (approximately 2.5m high) bordering the whole of the operational site except the area of the Site which is adjacent to the railway in the north, where there is chain link fencing with barbed wire (approximately 2m high) in place
- Regular inspections of the boundary fencing and buildings are undertaken to ensure that these have not been compromised and continue to prevent easy access to Site
- Out-of-hour intruder alarms are set for buildings
- CCTV cameras onsite as a deterrent to any unauthorised visitors

### 3.1.6 Physical Protection Measures

The Site has been designed to include protection of structures to minimise accident / incident issues. Potential risks associated with this have been reduced through the implementation of the following physical protection measures:

- All pipework at the site used for the transfer of gaseous products has been manufactured to the required British Standards using appropriate grade materials and all pipe joints and seals are also designed to meet the required British Standard
- Storage vessels and pipework are subject to regular inspection, by the site team to ensure the structural integrity of the system remains uncompromised.

### 3.1.7 Overfilling of tanks

Details of the raw materials and process chemicals held on site and their storage arrangements are provided in Table 3.1 below. During deliveries of material to site special care is taken to ensure that all storage tank levels and contents are checked in order to prevent the accidental overfilling of tanks or the inadvertent mixing of substances. Appropriate training is provided to personnel involved in receipt and handling of deliveries and specific procedures for the filling of tanks will be developed within the quality and environmental management system (QEMS) for the Site.

The volume of material in the receiving tanks will be measured and recorded manually prior to filling.

In the event of a spillage of polluting substances, absorbent material will be used to clear the spillage. The used materials will be removed and stored in suitable containers prior to authorised disposal. The Installation will incorporate impermeable paving with self-contained drainage.

**Table 3.2: Raw Material and Process Chemical Storage**

Raw Material / Process Chemical	Maximum amount stored (tonnes or m <sup>3</sup> )	Storage
Biogas	<3000m <sup>3</sup> max	Gas bag Digesters Pipelines Flare Stack CHP Engine.
Diesel / Oil	50m <sup>3</sup> (50,000 litres - 40,000 litres for generator tank, and 10,000 litres for boiler tank)	Tanks
Ferric chloride (40%)	<30,000 litres	Tanks
Highmark C-498 and C498HMW	3 tonnes (3 to 4 x 750kg bags)	Bags



Raw Material / Process Chemical	Maximum amount stored (tonnes or m <sup>3</sup> )	Storage
Kemira Superfloc C-496HMW	1.5 tonnes (2 x 750kg bags)	Bags
SAS SNF Flopam640	1.5 tonnes (2 x 750kg bags)	Bags
Burst 5400 or Flowfoam 681F	1m <sup>3</sup> (1,000 litre IBC)	IBC
Carbon filter tanks		Tanks
- Pulsorb GW	2 x 1 tonne filters	
- AddSorb VA4	1 x 1 tonne filter	
Hydrated lime, Calcium dihydroxide	Variable	Bags
Coolant – Fuchs Fricofin	~ 300 litres - engine. No further coolant stored on Site.	Engine
Lubrication Oils – Titan Ganymet Ultra	~ 200 litres – engine 1000 litres – clean tank 1000 litres – waste tank	Engine and tanks
Gas Cylinders	Welding / burning Equip.	Gas Bottles stored in a locked building overnight.
Aerosol Leaks of Biogas	Not Known as would be formed by leaks	Gas bag Digesters Pipelines Flare Stack CHP Engine
JCB Loader / MTS Tankers & Chemical Delivery tankers.	18m <sup>3</sup>	Vehicle stored in a locked building overnight.
Sludge	5,190m <sup>3</sup>	Tanks
Sludge cake	<6000m <sup>3</sup>	Bays

### 3.1.8 Fire

Operational activities at the STC are such that the potential for fire and explosion exists. However, the local Fire Service has not carried out any risk assessment investigations on site. Potential hazards arising from fire and explosion at the Site include:

- Uncontrolled release of pollutants from equipment, plant and infrastructure
- Uncontrolled release of pollutants from material stores
- Loss of containment of contaminated firewater

Fire detectors and fire alarms are fitted in all buildings. Fire extinguishers are located at strategic points throughout the STC. All fire extinguishers are clearly marked and tested to confirm their functionality. All personnel will be made aware of their location and trained in their use for escape purposes only, in order to minimise the risk to life posed by fire and explosion

However, the emergency policy is to evacuate the building in the event of a fire. Staff are informed during induction of the emergency procedures at the Site to be followed in the event of fire incidents at the Site.

To reduce the risk of fires from the Anaerobic Digestion process, it is managed by controlling KPI's on process control on a SCADA control system, DSEAR risk assessments are in place, with 12 monthly service agreements in place around the Biogas system. Six monthly inspections on the Boilers and CHP systems are also conducted.

Controls to reduce the risk of fires are good signage and EX zoned areas with fencing and locked gate policy around DSEAR areas. Lightning protection is also in place on Biogas storage bags. Operational and maintenance staff in both Biogas awareness and DSEAR training have also been trained.

The digestion process risks are managed by DSEAR risk assessments, Zonal areas & Biogas training for site operators and Maintenance staff along with Gas safe contractors carrying out programmed maintenance activities.

### 3.1.9 Arson risks

With flammable or combustible materials there is always a risk of arson on a site. This risk is controlled by secure perimeter fencing and an electric gate at the main entrance of the Gravesend site, plus adherence to a locked gate policy

### 3.1.10 Contingency for Sludge Treatment Issues

In the case of incidents with sludge treatment, the mitigation measures related to sludge treatment processes are listed in Table 3.3. A full list of mitigation measures covering different processes of the entire site can refer to the operational continuity plan of Gravesend.

**Table 3.3: Mitigation measures with sludge treatment incidents**

Incident	Mitigation measures
Import Reception Tank	<p>In the event of a failure of the import sludge tank:</p> <ul style="list-style-type: none"> <li>• If the tank should failure or generate a leak then a nurse tank can be installed to continue imports [Northfleet WTW discharges direct to the TSST so would be unaffected]</li> <li>• Tank size required – 30m<sup>3</sup></li> <li>• Previously hired through MTS</li> </ul>
Biogas	<p>In the event of an emergency with the CHP:</p> <ul style="list-style-type: none"> <li>• Locate and close ECV V66 or V08 located outside the CHP plant.</li> <li>• Activate any emergency stops for the CHP which are accessible</li> <li>• Inform site FPM (in hours) or Duty Manager (out of hours).</li> <li>• Inform Cogenco on [REDACTED] of the emergency so they can attend to investigate.</li> </ul> <p>In the event of a gas leak:</p> <ul style="list-style-type: none"> <li>• Locate and close associated ECV which will isolate the gas line to the affected area.</li> <li>• In the event of a fire locate and isolate associated ECV</li> <li>• Activate any emergency stops as applicable</li> <li>• Inform site FPM (in hours) or Duty Manager (out of hours).</li> <li>• Raise emergency P1 for gas service provider to attend and resolve the issue</li> </ul> <p>Failure of Flare Stack:</p> <ul style="list-style-type: none"> <li>• In the event of a flare stack failure along with the CHP failure will result in safety releases of biogas from the Whessoe Valves located on the</li> </ul>

Incident	Mitigation measures
	<p>roofs of the two digesters and the Whessoe valves located in the gas holder compound. This is to prevent over pressurisation of the digesters and gas systems.</p> <ul style="list-style-type: none"> <li>- Raise a P1 emergency job for our framework partner responsible for biogas work.</li> <li>- Restrict access completely to the gas holder compound and to the roofs of both digesters. Erect warning sign and consider replacing padlocks with single key padlocks to prevent unintentional access.</li> <li>- Escalate &amp; report to the pollutions team on [REDACTED]</li> <li>- Reduce or inhibit the digester feed to reduce the biogas generation and the volume being released.</li> </ul>
Digester	<p>Digester foaming:</p> <ul style="list-style-type: none"> <li>• The most likely causes of digester foaming could be failure of the antifoam dosing system (if a background dose is applied), high variability in flow and thickness of the feed sludge, and high septicity of the feed sludge.</li> <li>• If the probe alarm is indicating high foam or high level sludge it will inhibit digester feed as a precaution to prevent a foam or sludge release to ground. <ul style="list-style-type: none"> <li>- Check digester feed and compare against previous days.</li> <li>- Reduce digester feed by 10% from the previous day</li> <li>- If applicable check anti foam dosing pumps and system</li> <li>- Consider manual dose of antifoam to reduce the foam level</li> </ul> </li> <li>• If the foam or sludge level has reached the level where the gas lines are blocked (realised by failure of gas compressors and in catch pits for the gas condensate pots) following the below steps. <ul style="list-style-type: none"> <li>- Stop digester feed immediately</li> <li>- Mobile Biogas service provider as a P1 to clear gas lines /Whessoe Valves to prevent gas release via the Whessoe valves</li> <li>- Escalate &amp; report to the pollutions team on [REDACTED]</li> <li>- Depending upon the extent of the spillage mobilise suitable resources to instigate clean up.</li> <li>- If applicable check anti foam dosing pumps and system</li> <li>- Consider manual dose of antifoam to reduce the foam level</li> <li>- Once gas lines have been cleared then re-start digester feed much reduced digester feed – Please consult Process Scientist or on-call Process Scientist for exact feed rate.</li> </ul> </li> </ul> <p>Digester loss of heat</p> <ul style="list-style-type: none"> <li>• Digester feed will inhibit &lt;32 degrees with a normal range of 35-36 degrees. It usually takes around a day before it reaches inhibit levels. The most likely causes will be associated with failure of CHP and boilers (standby to CHP). <ul style="list-style-type: none"> <li>- Check CHP is operational and heat 3 way valve is operating correctly. If in doubt contact Cogenco on [REDACTED]</li> <li>- Check boilers are operational. If low gas then switch to gas oil.</li> <li>- Check recirculation pumps and three way valves are operating correctly.</li> <li>- Check heat exchanger is receiving the hot water – if not check the isolation valves and jet if required.</li> <li>- Check the sludge inlet and outlet temperatures – normally you would see a 2 degree rise across the heat exchanger. If not it could be scaled up so strip and jet.</li> </ul> </li> </ul> <p>Critical spares available:</p> <ul style="list-style-type: none"> <li>• Digester recirc - Hot water pump - Main Building</li> </ul>

Incident	Mitigation measures
	<ul style="list-style-type: none"> <li>● Digester Recirc - Recirculation Pump - Main Building</li> </ul> <p>Digester recirculation failure:</p> <ul style="list-style-type: none"> <li>● Recirculation is important to the health of the digester and retaining the temperature within the range. Unlikely to be any impact from immediate failure.</li> <li>● If the recirculation pumps both fail and are not immediate repairable onsite then overpumping can be installed.</li> <li>● Recirculation Pump details –Hydrostal DDMIX-M132 7.5kW</li> </ul>
Sludge Processing Pumps	<p>Failure of Sludge Processing Pumps:</p> <ul style="list-style-type: none"> <li>● All the sludge processing pumps will operate Duty/Standby so failure of a single unit should not cause an interruption to the sludge throughput. The exception to this is the centrifuge operation (please see above covering Centrifuge failure).</li> <li>● In the event of failure of both Duty and Standby pumps: <ul style="list-style-type: none"> <li>– Check the critical spare store as this holds a number of spare parts for various sludge pumps onsite. These include motors, gearboxes, rotors and stators. The most common failure items.</li> <li>– If no spares are available then check sludge tank levels throughout the process to determine the criticality of returning sludge throughput.</li> </ul> </li> <li>● If the levels are high then check other local STC's for compatible parts which may be available for these units.</li> </ul> <p>Critical Spares Available:</p> <ul style="list-style-type: none"> <li>● Import Sludge: Strain Press Feed Pump in Main Building</li> <li>● Primary Drum Thickeners: Primary Feed Pump in Main Building</li> <li>● SAS Drum Thickeners: SAS Feed Pump in Main Building</li> <li>● SAS Drum Thickeners: SAS Thickened in Main Building</li> <li>● Digester: Digester Feed Pump in Main Building</li> <li>● Centrifuge: Centrifuge Feed Pump in Main Building</li> </ul>
Drum Thickeners	<p>Failure of Thickener Drums:</p> <ul style="list-style-type: none"> <li>● Both SAS and Primary thickener drums operate as Duty/Standby</li> <li>● SAS Drums: <ul style="list-style-type: none"> <li>– The SAS drums are Important at Gravesend in maintaining the health of the aeration plant (ensuring MLSS is within operating range). If the MLSS goes high this causes high turbidity events as the sludge blanket turns over in the FST's.</li> </ul> </li> <li>● In the event that both drums have failed and are not repairable – even with the critical spare below and scavenging parts from the downed drums then a means to deal with the SAS from the aeration plant needs to be implemented. <ul style="list-style-type: none"> <li>– If the primary thickener drums are available then blend the SAS in with the primary sludge to be processed through the primary drums.</li> <li>– To provide enough storage room for this imports (excluding Northfleet which discharges direct to TSST) would need to be redirected.</li> <li>– Transfer would need to be manual to blend the sludge in the right amounts and to ensure it's not over-filled.</li> <li>– Monitor Drum performance and adjust the polymer dosing to achieve the correct %DS.</li> </ul> </li> </ul> <p>Primary Drums:</p> <ul style="list-style-type: none"> <li>● In the event that both drums have failed and are not repairable – even with the critical spare below and scavenging parts from the downed</li> </ul>

Incident	Mitigation measures
	<p>drums – then a means to deal with the primary sludge needs to be implemented.</p> <ul style="list-style-type: none"> <li>– Assess volume within the pre-thickened tanks to determine repair time frame.</li> <li>– To maximise the storage room the import sludge (excluding Northfleet which discharges direct to TSST) would need to be redirected.</li> <li>– Consolidate the sludge in the primary tank to achieve a higher %DS whilst still operating within the operating range.</li> <li>– Transfer un-thickened sludge to the TSST to maintain desludging</li> </ul> <p>Critical Spares Available:</p> <ul style="list-style-type: none"> <li>● Drum Thickeners: Drive chains in Main Building</li> </ul>
<p>Failure of Centrifuge</p>	<p>Failure of Centrifuge:</p> <ul style="list-style-type: none"> <li>● In the event of failure of the single centrifuge onsite                             <ul style="list-style-type: none"> <li>– Raise a P1 emergency job for our framework partner responsible for centrifuge work</li> <li>– Ascertain the levels within the PDST onsite to see if digester throughput will be affected. Tanks are ideally run at &lt;50% capacity so will normally have &gt;10 days capacity.</li> <li>– If outage is total and due to be ongoing for &gt;5 days consider mobilising a mobile centrifuge to ensure digester throughput is maintained.</li> <li>– If the mode of failure is associated with the conveyor utilise the critical spares to repair the conveyor. If a repair cannot be carried out then consider a hire conveyor.</li> </ul> </li> <li>● The centrifuge details are as follows:                             <ul style="list-style-type: none"> <li>– Andritz D5LC30CHP – throughput 25m<sup>3</sup>/hr</li> </ul> </li> <li>● Previous hire equipment needed:                             <ul style="list-style-type: none"> <li>– DP54 Mobile centrifuge – capable of 26m<sup>3</sup>/hr</li> <li>– Portable belt conveyor</li> <li>– Generator to power the unit and associated fuel cube</li> <li>– Armoured hose (75m) to feed digested sludge into the mobile unit</li> </ul> </li> <li>● Can be located within the existing sludge bay with cake being moved with the existing JCB onsite.</li> </ul> <p>Critical Spares Available:</p> <ul style="list-style-type: none"> <li>● Centrifuge: Conveyor, conveyor gearbox &amp; motor, washdown solenoid in Main Building</li> </ul>
<p>Power Failure</p>	<ul style="list-style-type: none"> <li>● Auto changeover to standby generator.</li> <li>● If onsite generators fail:                             <ul style="list-style-type: none"> <li>– The whole site will require a 1250 kVA trailer generator which can be connected direct to the Generator PLC panel utilising 50m of suitably rated cable.</li> <li>– HV trained Electrician Required to work alongside with Contractor installing the generator</li> </ul> </li> </ul>
<p>Contaminated Trade</p>	<ul style="list-style-type: none"> <li>● Would need to develop specific plan dependent on type of contamination.</li> </ul>
<p>Reduced Sludge Disposal</p>	<ul style="list-style-type: none"> <li>● 14 day storage in emergency storage tank, limited storage for unthickened sludge. Tanker sludge off site and close to imports.</li> </ul>
<p>Odour Control</p>	<ul style="list-style-type: none"> <li>● On Sludge Plant – This is on regular planned maintenance programme.</li> <li>● On Treatment Works – This is on regular planned maintenance programme</li> </ul>

## 4 Risk Assessment Methodology

The risk assessment has been undertaken by identifying hazards and source-pathway receptors and assigning a probability of exposure and a severity of consequence. These are assigned as described in Table 4.1 and Table 4.2 and are based on the generic risk assessments used for standard rules “SR2012 No11 and No12”, “SR2009 No 4” and “SR2008 No 19”, applicable to anaerobic digestion operations including use of the resultant biogas.

The probability and severity scores are then combined within a matrix to give an overall magnitude of the risk. This matrix is shown in Table 4.3 and is intended to illustrate the general approach to scoring.

Risks are categorised as either low, medium or high; this ranges from being a nuisance in some instances to potential health risks in others.

**Table 4.1: Severity Index**

Severity of harm	Severity index
Impact to people or designated receptor	High
Impact to non-designated receptor	Medium
All other impacts	Low

**Table 4.2: Probability Index**

Severity of harm	Severity index
Impact to people or designated receptor	High
Impact to non-designated receptor	Medium
All other impacts	Low

**Table 4.3: Magnitude of risk**

Severity index	Probability index		
	Low	Medium	High
Low	Low	Low	Medium
Medium	Low	Medium	High
High	Medium	High	High

**Table 4.4: Accident risk assessment table**

Data and information				Judgement			Action (by permitting)		
Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
All surface waters close to and downstream of the Site.	Tank failure, spillages of digestate and/or liquids including oil.	Aquatic or chronic effects to aquatic life, contamination, and water deterioration of water quality.	Direct run-off from the Site across ground surface, via surface water drains, ditches etc.	Low	High	Medium	Potential for leaks from digestions tanks, storage vessels/bays and drainage system which may cause contamination or deterioration of surface water quality.	The Site drainage plan is documented and all staff are trained in the event of emergency or accident.	Low
	Damage to drainage system.		Indirect run-off via the soil layer.				There is no bunding around the tanks on-site and the ground is mostly permeable gravel.	Drainage and cake bays are in good condition, there are drains running along the entrances to cake bays and at the end of the road through the centre of bays.	
	Spillage of raw materials of sludge/liquor during delivery/storage.		Transport through soil/groundwater then extraction/				Areas of pavement and hardstanding have kerbs to force water to drains, all water flows to the	Impermeable surface and secondary containment, in the form of constructed bunds or portable bunds, is in place around storage areas of all wastes and raw materials surrounding the STC and WTW.	
	Contaminated run off from cake storage e.g. containing suspended solids.		abstraction at borehole or intake.					Additional containment around digesters and other storage vessels is subject to a risk	

Data and information				Judgement				Action (by permitting)	
Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							<p>drainage network which diverts all water to the head of works.</p> <p>Quantities of liquids stored are generally low.</p> <p>There are five surface water ponds in the western part of the Site, however recent mapping indicates that these are overgrown and may only periodically host surface water.</p> <p>The Thames and Medway canal runs east to west, occurring approximately 30m north of the Site, and the River Thames is located 280m north.</p>	<p>assessment and will be undertaken as part of the BAT requirements and in accordance with the Construction Industry Research and Information Association (CIRIA) standard 736.</p> <p>Hardstanding is planned to be constructed (based on the recommendations of the CIRIA risk assessment) around the digester.</p> <p>All transfer of digestate and material takes place under supervision and with flow rate control.</p> <p>All tanks undergo a delegated inspection regime and the process parameters are monitored and understood by Site operatives.</p> <p>Digestion tanks are built to appropriate</p>	



Data and information				Judgement			Action (by permitting)		
Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							No pollution incidents have been substantiated or related to the STC.	standard and require appropriate bunding.  There are seven cake storage bays on-site, all of which are in good condition and with walls approximately 2.5m high.	
Abstraction from watercourse downstream of facility (for agricultural or potable use).	Spillage of liquids, contaminated rainwater run-off from waste e.g. containing suspended solids.	Acute effects, closure of abstraction intakes.	Direct run-off from site across ground surface, via surface water drains etc. then abstraction.	Low	Medium	Low	Watercourse must have medium / high flow for abstraction to be permitted, which will dilute contaminated run-off.  No substantiated pollution incident to water, air or land has been recorded within 250m of the Site in the past ten years.	The digester is currently back in operation. The current cake storage on-site will be sufficient to store the quantity of cake being produced.  Activities are managed and operated in accordance with the EMS. Spill procedures are in place under EMS363 and 364 as well as a pollution prevention procedure EMS360 All spillages are recorded in the site diary including actions taken.	Low
Groundwater, land and surface water	Spillages of liquids, contaminated rainwater run-off from waste e.g. containing suspended solids.  Sludge/liquid spillages as a result	Chronic effects: contamination of groundwater, requiring treatment of water or	Transport through soil/groundwater then extraction at borehole or intake.	Low	Medium	Low	Potential for leaks from digestion tanks and storage vessels.  There is one groundwater abstraction	Trucks removing cake from the Site and telehandler also pass through a wheel wash system before exiting the area of the cake	Low

Data and information				Judgement			Action (by permitting)		
Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
	of loss of tank/pipe integrity carelessness during transfer or overfilling	closure of borehole or closure of abstraction intakes.  Acute or chronic effects to aquatic life, contamination and deterioration of land and water quality.  Pollution of water or land.					present on-site, under a permit for the use of water for general washing/process washing. The abstracted groundwater is used for poly make-up only.  There another four groundwater abstraction licenses operated by J Clubb Ltd which permit the use of water for mineral washing, these are located 98m and 125m northeast of the Site.  Site infrastructure, hardstanding and drainage is generally in good condition	bays. The wheel wash is currently out of service but is due to be fixed made operational again. There are water hoses available on-site to use while the wheel wash is out of service.  A hosepipe is used to wash the road between bays when moving cake.  A road sweeper is used once per year.  Site Manager ensures the programme of Planned Preventative Maintenance (PPM) is implemented effectively to minimise the probability of equipment malfunction.  Control of substances hazardous to health (COSHH) assessment undertaken for all raw materials.  All drainage, surface and foul water is captured by the on-site drainage systems and	

Data and information				Judgement			Action (by permitting)		
Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							<p>with few cracks present.</p> <p>The ground surrounding tanks and the digester is mostly permeable gravel.</p> <p>Storage tanks are in good condition based on visual checks, the digester was in poor condition and was out of service during the Site visit.</p> <p>The digester has recently (in 2021) emptied and surveyed. In October 2021 the refilling of the digester begun, and the digester is back in use currently.</p> <p>Quantities of liquids stored are generally low.</p>	<p>rerouted to the head of the works.</p> <p>Regular inspections of the Site drainage systems and other equipment are undertaken, with any repairs and maintenance carried out if necessary. All complaints and other incidents are recorded in the site diary including actions taken.</p> <p>The condensate is clean, uncontaminated water and is small in quantity.</p>	

Data and information				Judgement			Action (by permitting)		
Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
Groundwater, land and surface water	Spillages of sludge/liquids during transfer of imported and indigenous/unknown sludge and liquids from tankers.	<p>Acute or chronic effects: contamination of groundwater, requiring treatment of water or closure of borehole or closure of abstraction intakes.</p> <p>Acute or chronic effects to aquatic life, contamination and deterioration of land and water quality.</p> <p>Pollution of water or land.</p>	Transport through soil/groundwater then extraction/abstraction at borehole or intake.	Low	Medium	Low	<p>Potential for spillage during transfer of liquid/sludge from tankers.</p> <p>Sludge is imported in tankers, and is unloaded via hoses into the reception tank</p> <p>Cake is stored on the ground and limited to be present around the conveyor and cake bays, a hosepipe is used to wash the road between the bays when moving the cake.</p> <p>There is one groundwater abstraction present on-site, under a permit for the use of water for general washing/process</p>	<p>Impermeable surface required for storage of all waste.</p> <p>Activities to be managed and operated in accordance with the EMS and management plans and procedures implemented to reduce spills when transferring liquids/sludges from tankers.</p> <p>Established procedures in place for the acceptance of tinkered trade waste (EMS387), waste duty of care (EMS380), operational waste procedures (EMS381) and waste rejection (EMS488).</p> <p>Compliance with the waste duty of care requirements to ensure waste accepted meets the permit conditions and relevant legislation.</p> <p>All liquid run off will be captured in the drainage network and</p>	Low

Data and information				Judgement			Action (by permitting)		
Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							<p>washing. The abstracted groundwater is used for poly make-up only.</p> <p>There another four groundwater abstraction licenses operated by J Clubb Ltd which permit the use of water for mineral washing, these are located 98m and 125m northeast of the Site.</p>	returned to head of works.	
Groundwater, land and surface water	Flooding of site	If waste is washed off-site it may contaminate natural habitats downstream.	Flood waters	Low	Medium	Low	<p>Permitted waste types are sludges/bio-solids, which may contain pathogens, so any waste washed off-site will add to the volume of the local post-flood clean up and may be</p>	<p>The drainage network sends water to the head of the works for treatment. There are no direct potentially contaminated discharges to controlled surface waters.</p> <p>Activities to be managed and operated in accordance with a management system and management plans</p>	Low

Data and information				Judgement			Action (by permitting)		
Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							<p>hazardous to human health.</p> <p>The entire Site area is located within Flood Zone 3 (less than 1 in 100 annual probability). The area is also registered as an area which is benefitting from flood defences, and flood defences are noted occurring on the banks of the River Thames, 280m north of the Site area.</p> <p>Area is not known to flood, and there have been no previous floods recorded on the Site.</p>	and procedures implemented, including the removal of spilled waste and other pollutants (such as use of spill kits and mobile bunds) before these could enter any flood waters if an event was to occur.	
Local human population, domestic	Spillages of odorous materials including	Nuisance, loss of amenity.	Air transport, then inhalation.	Low	Medium	Low	Local residents and staff often	Procedures for dealing with spillages are covered in the EMS under EMS363 and	Local human population, domestic

Data and information				Judgement			Action (by permitting)		
Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
properties, site offices.	<p>oils, fuels, chemicals.</p> <p>Failure to clean up spillages.</p> <p>Contaminated spill equipment not disposed of appropriately.</p>						<p>sensitive to odour.</p>	<p>364 for the Site. There is also a Field Event Co-ordinators (FEC) Manual which provides spillage procedures for EP sites (FEC322).</p> <p>The Site Manager shall ensure all relevant staff are appropriately trained to use the spill kits and that all spillages are cleaned up immediately.</p> <p>All areas of the Site are to be cleaned regularly; Site Manager to oversee regular cleaning schedule, all staff trained on importance of good housekeeping and site cleanliness.</p> <p>All spills are recorded in the site diary including actions taken.</p>	properties, site offices.

Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
Local human population and local environment.	Flooding of the site.	If waste is washed off-site it may contaminate buildings / gardens / natural habitats downstream.	Flood waters	Low	Medium	Low	<p>Permitted waste types are sludges/bio-solids, which may contain pathogens, so any waste washed off-site will add to the volume of the local post-flood clean up and may be hazardous to human health.</p> <p>The entire Site area is located within Flood Zone 3 (less than 1 in 100 annual probability). The area is also registered as an area which is benefitting from flood defences, and flood defences are noted occurring on the banks of the River Thames, 280m</p>	<p>All drainage is captured by the on-site drainage network sends, which sends all water to the head of the works for treatment.</p> <p>There are no direct potentially contaminated discharges to controlled surface waters.</p> <p>Activities to be managed and operated in accordance with a management system and management plans and procedures implemented, including the removal of spilled waste and other pollutants (such as use of spill kits and mobile bunds) before these could enter any flood waters if an event was to occur.</p>	Low



Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							north of the Site area.  There have not been any reported flooding issued from the Site previously.		
Local human population and / or livestock after gaining unauthorised access to the installation.	All on-site hazards: machinery, wastes and vehicles.	Bodily injury, death.	Direct physical contact.	Low	Medium	Low	<p>Potential injury to on-site personnel as a result of vehicle movements or equipment malfunction or misuse.</p> <p>Direct physical contact is minimised by activity being carried out within enclosed digesters so a low magnitude risk is estimated.</p> <p>Contact with waste is minimal with exception of leaks or spills from unloading of tanker and</p>	<p>Overall management of the site is overseen by an experienced member of staff holding an appropriate Certificate of Technical Competence (CoTC) awarded by the Waste Management Industry Training and Advisory Board. This competent person delegates responsibilities to appropriately experienced and trained site operatives throughout the operating hours.</p> <p>All operational staff are fully trained in the site operating procedures and Southern Water' safety and environmental management procedures and are kept up to date on changes.</p> <p>Training includes awareness raising of the potential on-site hazards and health and safety measures to adhere to.</p>	Low

Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							<p>transfer of filter cake.</p> <p>The eastern plot of land is owned by the Operator, but is not used for Site operations. There is a permanent Traveller's site to the south of this plot of land, and they often use this land for their horses.</p>	<p>Preventative measures will be under continuous review as part of the EMS procedures.</p> <p>Activities are managed and operated in accordance with the EMS – this includes site security measures to prevent unauthorised access. No maintenance work or contractor is permitted on-site without a suitable permission to work and qualification.</p> <p>The outer gate at the front of the Site is kept closed using a removable pin for residents to gain access. There is a second inner front gate which is steel palisade 2.5m high. The inner gate has an AMPR thermal and daytime camera facing it. Residents only have access through the outer gate to gain access to their properties, they cannot enter the inner site gate which is for Southern Water access only.</p> <p>Palisade fencing (~2.5m high) borders the whole of the operational site except the area of the Site which is adjacent to the railway in north, where there is chain link fencing with barbed wire (~2m high) in place. The back gate allows entry to the</p>	

Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								<p>eastern undeveloped plot of land.</p> <p>There are a total of nine cameras on-site at the inlet, bulk storage tanks and back gate. Lighting is provided around the site to give good visibility at all times of the day and night.</p> <p>The Site is staffed 7 days a week, from 7am to 6pm Monday to Friday and 7am to 3pm on Saturday and Sundays.</p> <p>Regular inspections of the boundary fencing and buildings are undertaken to ensure that these have not been compromised and continue to prevent easy access to site. Repairs are undertaken in accordance with the EMS requirements.</p> <p>Key sludge treatment and wastewater treatment activities undertaken within enclosed systems.</p> <p>On average the Site accepts four tankers per day of liquid sludge imports. .</p> <p>Vehicle movements around the Site vary depending on what activities are being undertaken. Cake is moved to cake bays once a trailer is full. A cake bay is emptied approximately every</p>	

Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								<p>two months, taking around two days to empty. Currently there is more sludge production at the Site due to the digester being out of service, raw cake is taken to Ashford STC to mature. The digester has recently (in 2021) emptied and surveyed. In October 2021 the refilling of the digester begun, and the digester is back in use currently. Waste is removed as required. Therefore, frequent vehicle movements are typically undertaken only by site staff and maintenance contractors.</p> <p>Operator has produced a hazard review and risk assessment documents relating to this and other types of potential incidents, within the EMS, H&amp;S and O&amp;M manuals.</p>	
Local human population and local environment.	Explosion of biogas causing release of polluting materials to air (smoke or fumes), water or land	Respiratory irritation, illness and nuisance to local population. Injury to staff, fire fighters or arsonists/vandals. Potential for uncontrolled release of fugitive emissions of gaseous, liquid or	Air transport  Direct run-off from site across ground surface, via surface water drains, ditches etc.	Low	High	Medium	<p>Emissions to air, land or water may cause harm to and deterioration of air, land or water.</p> <p>Smoke and fumes may cause irritation, illness or nuisance to</p>	<p>The key sludge treatment and WTW processes are undertaken within enclosed systems such as the AD and biogas systems. Sludge storage tanks are all enclosed.</p> <p>Activities are managed and operated in accordance with the EMS, H&amp;S and O&amp;M manuals – this includes site security measures to prevent unauthorised access. No maintenance work or contractor</p>	Low

Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
		<p>solid materials to air, water or land.</p> <p>Acute or chronic effects to aquatic life, contamination and deterioration of land and water quality.</p>	<p>Indirect run-off via the soil layer</p> <p>Transport through soil/groundwater then abstraction.</p>				<p>local residents and site staff.</p> <p>An explosion could cause injury to local residents and site staff from flying debris.</p> <p>Although biogas is flammable, risk of direct physical contact is minimised by activity being carried out within the sludge treatment works and in containerised units or locked buildings.</p> <p>Permitted waste types limited to sludges and liquids.</p>	<p>is permitted on-site without a suitable permission to work and qualification.</p> <p>Fire detection equipment is installed in the CHP containers and the boiler building which activate an alarm on detection of a fire. Slam shut valves on biogas lines will automatically close on detection of a fire to prevent any fuel being supplied to the CHP engines or boilers.</p> <p>Training and regular toolbox talks are given to operatives on-site and all operators and staff understand their role in an emergency.</p> <p>The EMS includes procedures relating to maintenance and inspection of bunding of tanks.</p> <p>Site Manager shall ensure the programme PPM is implemented effectively to minimise the probability of fire through faulty plant and equipment. All equipment is checked and calibrated as per the manufacturer's instructions.</p>	
Local human population and local environment.	Explosion of pressurised tanks due to	Respiratory irritation, illness and nuisance to local population.		Low	Medium	Low	<p>Emissions to air, land or water may cause harm to and</p>	<p>Emergency operating procedures are in place.</p> <p>Adequate firefighting measures are implemented on-site.</p>	Low

Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
	equipment and/ or process failure.	<p>Fatality/injury to staff, fire fighters.</p> <p>Potential for uncontrolled release of fugitive emissions of gaseous, liquid or solid materials to air, water or land.</p> <p>Acute or chronic effects to aquatic life, contamination and deterioration of land and water quality.</p>					<p>deterioration of air, land or water.</p> <p>Smoke, fumes and material released from tanks may cause irritation, illness or nuisance to local residents and site staff.</p> <p>Impact from the tank explosion may cause external damages to other equipment, buildings located close to the epicentre of the explosion.</p>	<p>The main site entrance is secured by two gates. The outer gate at the front of the Site is kept closed using a removable pin to allow access for residents. There is a second inner front gate which is steel palisade 2.5m high. Residents only have access through the outer gate to gain access to their properties, they cannot enter the inner site gate which is for Southern Water access only. The inner gate has an AMPR thermal and daytime camera facing it.</p> <p>Palisade fencing (~2.5m high) borders the whole of the operational site except the area of the Site which is adjacent to the railway in north, where there is chain link fencing with barbed wire (~2m high) in place.</p> <p>The back gate allows entry to the eastern undeveloped plot of land. Lighting is provided around the site to give good visibility at all times of the day and night.</p> <p>The Site is staffed 7 days a week, from 7am to 6pm Monday to Friday and 7am to 3pm on Saturday and Sundays.</p> <p>To prevent unauthorised access of pedestrians. The Site also benefits from a CCTV system. There are a total of nine cameras</p>	

Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								on-site at the inlet, bulk storage tanks and back gate.	
Local human population and local environment	Accidental fire causing the release of polluting materials to air (smoke or fumes), water or land.  Equipment failure.	Respiratory irritation, illness and nuisance to local population. Injury to staff or fire fighters.  Potential for uncontrolled release of fugitive emissions of gaseous, liquid or solid materials to air, water or land.  Acute or chronic effects to aquatic life, contamination and deterioration of land and water quality.	Air transport  Direct run-off from site across ground surface, via surface water drains, ditches etc.  Indirect run-off via the soil layer  Transport through soil/ groundwater then abstraction	Low	Medium	Low	Emissions to air, land or water may cause harm to and deterioration of air, land or water.  Smoke and fumes may cause irritation, illness or nuisance to local residents and site staff.  Although biogas is flammable, risk of direct physical contact is minimised by activity being carried out within the sludge treatment works and in containerised units or locked buildings.	The key sludge treatment and WTW processes are undertaken within enclosed systems Storage tanks are enclosed.  Activities are managed and operated in accordance with the EMS, H&S and O&M manuals including, fire and spill management.  Fire detection equipment is installed in the CHP containers and the boiler building which activate an alarm on detection of a fire. Slam shut valves on biogas lines will automatically close on detection of a fire to prevent any fuel being supplied to the CHP engines or boilers.  A Fire Prevention Plan is not required to be submitted for the permit application as the biowaste process on-site is wet anaerobic digestion. However, fire prevention and environmental fire risk assessment procedures are provided in the EMS, H&S manual and Safety Instruction Book (SIB) (EMS362, H&S204, H&S440, and SIB603). There is also Safety zoning of areas under DSEAR/ Plant and	Low

Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							<p>Risk of accidental combustion of waste is minimal.</p> <p>Permitted waste types limited to sludges and liquids.</p>	<p>Equipment for Atmospheres (PEXA) on-site and Smoking is only permitted in designated areas.</p> <p>Firewater is diverted through the drainage system to the head of the works allowing for contaminated fire water to be contained on-site and treated through the wastewater treatment system.</p> <p>Training and regular toolbox talks are given to operatives on-site and all operators and staff understand their role in an emergency. The EMS and Safety Instruction Book (SIB) includes procedures relating to maintenance and inspection of bunding of tanks, spills and environmental incidents.</p> <p>Site Manager shall ensure the programme of PPM is implemented effectively to minimise the probability of fire through faulty plant and equipment. All equipment is checked and calibrated as per the manufacturer's instructions.</p> <p>Emergency operating procedures are in place.</p> <p>Adequate firefighting measures are implemented on-site.</p>	



Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
Local human population and local environment.	Arson and/or vandalism causing the release of pollution materials to air (smoke and fumes), water or land.	Respiratory irritation, illness and nuisance to local population. Injury to staff, fire fighters or vandals/arsonists.  Potential for uncontrolled release of fugitive emissions of gaseous, liquid or solid materials to air, water or land.  Acute or chronic effects to aquatic life, contamination of land and water quality.	Air transport.  Spillages and contaminated firewater by direct run-off from site across ground surface, via surface water drains, ditches etc.  Indirect run-off via the soil layer.  Transport through soil/groundwater then abstraction.	Low	Medium	Low	Emissions to air, land or water may cause harm to and deterioration of air, land or water.  Smoke and fumes may cause irritation, illness or nuisance to local residents and site staff.  Although biogas is flammable, risk of direct physical contact is minimised by activity being carried out within the sludge treatment works and in containerised units or locked buildings.  Risk of accidental combustion of	The key sludge treatment and WTW processes are undertaken within enclosed systems such as AD and biogas systems. Storage tanks are enclosed.  Activities are managed and operated in accordance with the EMS, H&S and O&M manuals – this includes site security measures to prevent unauthorised access, fire explosions and spill management. No maintenance work or contractor is permitted on-site without a suitable permission to work and qualification.  Fire detection equipment is installed in the CHP containers and the boiler building which activate an alarm on detection of a fire. Slam shut valves on biogas lines will automatically close on detection of a fire to prevent any fuel being supplied to the CHP engines or boilers.  A Fire Prevention Plan is not required to be submitted for the permit application as the biowaste process on-site is wet anaerobic digestion. However, fire prevention and environmental fire risk assessment procedures are provided in the EMS and H&S	Low

Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
							<p>waste is minimal.</p> <p>Permitted waste types limited to sludges and liquids</p>	<p>manual (EMS362, H&amp;S204 and H&amp;S440). There is also Safety zoning of areas under DSEAR/PEXA on-site and Smoking is only permitted in designated areas.</p> <p>Training and regular toolbox talks are given to operatives on-site and all operators and staff understand their role in an emergency. The EMS includes procedures relating to maintenance and inspection of bunding of tanks, spills and environmental incidents.</p> <p>Site Manager shall ensure the programme of PPM is implemented effectively to minimise the probability of fire through faulty plant and equipment. All equipment is checked and calibrated as per the manufacturer's instructions.</p> <p>Emergency operating procedures are in place.</p> <p>Adequate firefighting measures are implemented on-site.</p> <p>The gate at the front of the Site is kept closed using a removable pin for residents to access. There is a second inner front gate which is steel palisade 2.5m high. The inner gate has an AMPR thermal and daytime</p>	

Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								<p>camera facing it. Residents only have access through the outer gate to gain access to their properties, they cannot enter the inner site gate which is for Southern Water access only</p> <p>Palisade fencing (~2.5m high) borders the whole of the operational site except the area of the Site which is adjacent to the railway in north, where there is chain link fencing with barbed wire (~2m high) in place.</p> <p>The back gate allows entry to the eastern undeveloped plot of land. There are a total of nine cameras on-site at the inlet, bulk storage tanks and back gate. Lighting is provided around the site to give good visibility at all times of the day and night.</p> <p>The Site is staffed 7 days a week, from 7am to 6pm Monday to Friday and 7am to 3pm on Saturday and Sundays.</p> <p>Regular inspections of the boundary fencing and buildings are undertaken to ensure that these have not been compromised and continue to prevent easy access to the Site. Repairs are undertaken in accordance with the EMS requirements.</p>	

Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
Local human population and local environment.	Operator Error.	Pollution to air, land, surface water and groundwater and human health	<p>Air transport, direct run-off from site across ground surface, via surface water drains, ditches etc.</p> <p>Indirect run-off via the soil layer.</p> <p>Transport through soil/groundwater then abstraction.</p>	Low	Medium	Low	<p>Possible contamination to air, land, groundwater and surface water.</p> <p>Given the level of operator controls which are in place and management plans, it is considered the probability and magnitude will be low.</p>	<p>Activities to be managed and operated in accordance with the EMS and management plans and procedures implemented.</p> <p>All equipment is checked under preventative maintenance plans and is checked and calibrated as per the manufacturer's instructions.</p> <p>Overall management of the Site is overseen by an experienced member of staff holding an appropriate Certificate of Technical Competence (CoTC) awarded by the Waste Management Industry Training and Advisory Board, or via the Competency Management System (CMS) once accredited.</p> <p>This competent person delegates responsibilities to appropriately experienced and trained site operatives throughout the operating hours.</p> <p>All operational staff are fully trained in the Site operating procedures and Southern Water's' safety and environmental management procedures and are kept up-to-date on changes.</p> <p>Training includes awareness raising of the potential implications of failure to control</p>	Low

Receptor	Source	Hazard	Pathway	Probability of exposure	Consequence	Magnitude of risk	Justification for magnitude	Risk management	Residual risk
								<p>operations and the potential impact on the environment.</p> <p>Preventative measures will be under continuous review as part of the EMS procedures.</p> <p>Emergency operating procedures are in place and detailed in the Site's Operational Contingency Plan</p> <p>Senior site-based management have direct responsibility for implementing risk management measures.</p>	

## 5 Reporting and Recording

### 5.1 Reporting

The procedure employed by Southern Water for reporting, recording, investigating and responding to incidents or breaches of the permit is the EPR notification procedure. Notifications must be made to the Environment Agency without delay and within 24 hours of the detection of an accident that has caused, is causing or may cause significant pollution or a breach of a limit specified in the Site's Environmental Permit.

If an incident with potentially significant environmental consequences occurs, Southern Water will notify the Environment Agency without delay. Southern Water will also inform the Environment Agency should any complaints be received directly to the Site due to the incident and will advise what remedial measures or actions have been taken to address the issue. Copies of complaints received will be made available to the Environment Agency for review on request.

Routine operation of the installation is subject to the conditions of the Site permit which details various requirements for actions and reporting for both routine and non-compliance.

The permit sections typically include:

- **Section 1 - Management of Installation** - General management of the Site, including handling and disposal of wastes
- **Section 2 Operation of Installation** - General operation of permitted activities and improvements
- **Section 3 Emissions and Monitoring** - Routine monitoring of all emissions (e.g. odour), including annual reporting of specified point emissions (e.g. various specified exhaust gases from CHPs)
- **Section 4 Records and Reporting** - An important section that includes the reporting of non-compliance with any permitted element. The major elements of concern would be:
  - Loss of containment of gaseous substance
  - Loss of containment of liquid substance
  - Equipment / plant failure causing loss of gas or liquid – inclusive of routine emissions monitoring.

Any losses or failures to comply with these areas require immediate notification to the Environment Agency, followed by "Schedule 6, Part A Notification" by email or paper means. The Part A must be submitted within 24hrs of detection of failure. "Part B" notification would then follow giving supporting information as soon as practicable.

Handling of the incidents on Site will be in line with relevant internal incident and accident procedures. These are all subject to audit via internal and external audit protocols.

### 5.2 Recording

In the event of an accident, a Schedule 6 notification is completed following an incident with potentially significant environmental consequences. Relevant information that must be recorded includes:

- Date, time and location of the event
- Substances involved, including estimated quantities

- Immediate measures taken to minimise environmental impacts

Part A must be completed within 24 hours of detection of the incident and Part B is completed as soon as practicable. Records will be made of all incidents with potentially significant environmental consequences that occur at the Site. The associated actions arising will be held in Corporate Documents.

All records of events with potentially significant environmental consequences and the associated actions arising will be retained as required by the Environmental Permit. Where an incident with potentially significant environmental effects occurs, and the nature of the incident supports further investigation, a post incident review may be required.

### 5.3 Post-incident Review

Following an incident where potentially significant environmental effects occur, and the nature of the incident warrants it, the incident will be logged and an investigation will take place to determine both the root cause of the incident and how to prevent the incident re-occurring.

This review will assess:

- The cause of the incident
- The effectiveness of the response measures
- The effectiveness of the emergency response management team
- Lessons learned
- Recommendations for improvement

The findings of the investigation will be reported to Southern Water's management and shared with all relevant employees to enable the incorporation of good practice into future works.

Any changes to processes or procedures required as a result of the formal review will be communicated to Southern Water management and employees. If, as a result of the incident, this Accident Management Plan is subject to revision, it should be updated as part of this post-incident review and communicated to relevant Southern Water management and employees.

All safety equipment used to respond to an incident should be checked and replenished as required.

### 5.4 Competence and Training

Staff at the Site have the competency to manage and operate activities without causing pollution. Competency is ensured through the appropriate training of all staff, covering:

- Awareness of the regulatory implications of the Environmental Permit and AMP for the activity and their work activities
- Awareness of all potential environmental effects from operation under normal and abnormal circumstances
- Awareness of the need to report any deviation from the Environmental Permit
- Prevention of accidental emissions and action to be taken if accidental emissions occur

All staff are aware of the implications of activities undertaken including the operation of the Site. Staff have clearly defined roles and responsibilities. Skills and competencies necessary for key posts are documented and records of training needs and training received for these posts maintained.

Training in the actions to be taken in the event of an accident or emergency is provided to all.

Operator and Contractor staff working on-site as part of their mandatory site induction procedure. All staff are required to demonstrate their understanding of the AMP, and the actions and procedures contained therein, prior to undertaking any activities on-site. It is the responsibility of the Works manager to ensure that all staff members have received this training.

Regular installation drills are undertaken to ensure that all staff are aware of the actions to be taken in the event of an accident or emergency and those staff with specific responsibilities are fully versed in their duties.

Copies of the AMP are available for the review of all staff.



## 6 Emergency Response Procedures (ERP)

The following Hazards are addressed in specific Emergency Response Procedures (ERP) which will be located at each Emergency Control Centre.

- Fire
- Explosion
- Pollution
- Flooding
- Road traffic accident impact or collision
- Collapse of a structure or building
- Spill transferring wastes
- Spills transferring chemicals
- Diesel spillage/leak
- Overfilling vessels
- Plant and equipment failures
- Containment failure
- Failure to contain firewater
- Incorrect connection leading to releases to drains and other systems
- Incompatible substances coming into contact

In the event of one or combination of the following incidents occurring, the actions listed in the relevant ERP must be followed

### 6.1 Fire

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	Action
		Use the Model Fire Emergency plan on the H&S notice Board and in the Grab Pack container. This Model Emergency plan outlines responsibilities for site staff and call out staff during events.
		Raise the Site Alarm - call 999 and raise the alarm with the DM / RCC.
		SW rules are that we only fight fire to evacuate area or building.
		Attend the muster point and check register for any missing persons.
		If it is safe to do so, isolate any fuel sources.
		Make sure the fire brigade first response team are handed the Site Grab Pack on arrival.
		Liaise with the fire brigade on the area, mention if anyone is missing and confirm what is stored on site (e.g. chemicals, combustible materials, BIOGAS systems etc)
		Refer to plan of Fire Hydrants / Final effluent / Potable water points for use if required.

### 6.2 Explosion

N/A	Done	The Incident controller will: -
		Raise the Site Alarm - call 999 and raise the Alarm with the DM / RCC.
		Attend the muster point and check register for any missing persons.
		Make sure the fire brigade first response team are handed the Grab pack on arrival.

N/A	Done	The Incident controller will: -
		Liaise with the fire brigade on the area, mention if anyone is missing and confirm what is stored on site (e.g. chemicals, combustible materials, biogas systems etc – as per Sections above)
		Refer to plan of Fire Hydrants / Final effluent / Potable water points for use if required.

### 6.3 Pollution

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	Action
		Use the Pollution 30 Minute Plan.
		Consider whether the pollution event can be mitigated or stopped - use the 10-minute checks. If it is safe to do so, isolate the equipment to stop the pollution, the consequence of isolating any equipment needs to be considered.
		If not raise the Alarm with the FEC / Process scientist in hours and DM / RCC/ FEC out of hours.
		Liaise with the FPM/ Process scientist in hours & DM / RCC/ FEC out of hours to reduce the impact.

### 6.4 Flooding

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Use the Pollution 30 Minute Plan.
		Raise the site alarm – call 999 as soon as the site starts to flood and notify the DM / RCC.
		Attend the muster point and check register for any missing persons.
		If it is safe to do so, try to understand why the site is flooding. This may be obvious like the river is overflowing – the river levels are controlled by the Environment Agency so it may be possible to be managed quickly.
		Make sure the Fire brigade/first response team are handed the KFB Grab pack on arrival.
		Liaise with the fire brigade on the area, mention if anyone is missing and confirm what is stored on site (e.g. chemicals, combustible materials, biogas systems etc)

### 6.5 Road traffic accident impact or collision

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Raise the Site alarm - call 999 and raise the alarm with the DM / RCC.
		Keep the area isolated, do not move vehicles other than for freeing people.
		Cordon off area if the impact or accident is serious.
		Await instruction from the fire brigade or police depending on the nature of the event.
		Please see plan of Fire Hydrants / Final effluent / Potable water points for use if required.
		For leaking tankers after the event (Fuel or Chemicals) put out spill containment if safe to do so.

### 6.6 Collapse of a structure or building

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Raise the alarm - call 999 and raise the alarm with the DM / RCC.
		Attend the muster point and check register for any missing persons.
		Keep the area isolated, do not move debris other than for freeing people.
		Cordon off area if the collapse is serious.
		Await instruction from the fire brigade or police depending on the nature of the event.
		Please see plan of Fire Hydrants / Final effluent / Potable water for use if required.

## 6.7 Spill transferring wastes

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Use the Pollution 30 Minute Plan.
		Stop the transfer if safe to do so and isolate if possible - complete Personnel Risk Assessment first.
		Contain the spill if safe to do so, using spill kits if small amounts, cover drains if possible
		Determine what has been spilt and where it has gone (i.e. to ground, to the site drains etc.)
		Report the incident to the FPM/DM/RCC.
		Discuss the impact of the spill with the FPM /Process Scientist/DM.

## 6.8 Spills transferring chemicals

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Use the Pollution 30 Minute Plan.
		Stop the transfer if safe to do so and isolate if possible - complete Personnel Risk Assessment first.
		Contain the spill, if safe to do so, using spill kits if small amounts, cover drains if possible
		Determine what has been spilt and where it has gone (i.e. to ground, to the site drains etc.)
		Report the incident to the FPM/DM/RCC.
		Discuss the impact of the spill with the FPM /Process Scientist/DM.

## 6.9 Diesel spillage/leak

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Identify source and look to isolate the affected tank/pipework to prevent further leaks.
		Escalate & report to the pollutions team on [REDACTED]
		Instigate mitigation or remedial work <ul style="list-style-type: none"> <li>• Contain the affected area – utilise spillage kits/pads to absorb the diesel.</li> <li>• If diesel has made its way to the site drains consider isolating dirty water run off pumping station and remove contents with 2 x 4k tankers (if at full capacity)</li> </ul>
		Collect evidence (photographs, samples & keep any parts of failed assets that will be needed as evidence)
		Assess the condition of the downstream processes to determine the level of contamination present. Instigate remedial action if necessary which could include skimming of tanks,

N/A	Done	The Incident controller will: -
		draining of tanks or re-seeding if the biological process has been severely affected. On site sampling to be undertaken and microscopy slides to be viewed

## 6.10 Overfilling vessels

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Stop the transfer if safe to do so and isolate if possible - complete Personnel Risk Assessment first.
		Use the Pollution 30 Minute Plan.
		Contain the spill, if safe to do so, using spill kits if small amounts, cover drains if possible
		Determine what has been spilt and where it has gone (i.e. to ground to the site drains etc.)
		Report the incident to the FPM/DM/RCC.
		Discuss the impact of the spill with the FPM /Process Scientist/DM.

## 6.11 Plant and equipment failures

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Stop the transfer or process if safe to do so and isolate if possible - complete Personnel Risk Assessment first.
		Use the Pollution 30 Minute Plan.
		Contain the spill, if safe to do so, using spill kits if small amounts, cover drains if possible
		Determine what has been spilt and where it has gone, including Biogas releases (i.e. release to ground, to the site drains or the atmosphere etc.)
		Report the incident to the FPM/DM/RCC.
		Discuss the impact of the spill with the FPM /Process Scientist/DM.

## 6.12 Containment failure

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Stop the transfer or process if safe to do so by isolation - complete a personal Risk Assessment first.
		Use the Pollution 30 Minute Plan.
		Contain the spill, if safe to do so, using spill kits if small amounts, cover drains if possible
		Determine what has been spilt and where it has gone, including Biogas releases (i.e. release to ground, to the site drains or the atmosphere etc.)
		Report the incident to the FPM/DM/RCC.
		Discuss the impact of the spill with the FPM /Process Scientist/DM.

## 6.13 Failure to contain firewater

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Use the Pollution 30 Minute Plan.
		Contain the firewater if it is possible to do so, use spill kits if small amounts, cover drains if possible

N/A	Done	The Incident controller will: -
		Determine what amount has been spilt and where it has gone (e.g. site return WPS, to ground, to the site drains). Consider whether it can be contained and disposed of offsite.
		Report the incident to the FPM/DM/RCC.
		Discuss the impact of the spill with the FPM /Process Scientist/DM. – Process Scientist to risk assess impact.

#### 6.14 Incorrect connection leading to releases to drains and other systems

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Use the Pollution 30 Minute Plan.
		Contain the spill, if safe to do so, using spill kits if small amounts, cover drains if possible
		Determine what amount has been spilt and where it has gone, is it in the site return WPS, has the release been to ground to the site drains. Consider whether it can be contained and disposed of offsite.
		Report the incident to the FPM/DM/RCC.
		Discuss the impact of the spill with the FPM /Process Scientist/DM. – PS to Risk Assessment & impact.

#### 6.15 Incompatible substances coming into contact

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Use the Pollution 30 Minute Plan.
		Keep upwind of any potential fumes.
		Raise the Site alarm - call 999 if any fire or fumes are being generated, raise the Alarm with the DM / RCC.
		Discuss the impact of the spill with the FPM /Process Scientist/DM.
		Contain the liquid solution, if safe to do so, using spill kits if small amounts, cover drains if possible
		Determine what amount has been spilt and where it has gone (e.g. released to site return WPS, to ground, to the site drains). Consider whether it can be contained and disposed of offsite.
		Check the site COSHH register for both or all the components for likely reactions.

#### 6.16 Emission of effluent or Biogas before composition checked

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Use the Pollution 30 Minute Plan.
		Remember this emission may be a release of biogas to atmosphere. (We are Not able to sample biogas).
		Sample the effluent if it is safe to do so and notify the FPM/ Process scientist of results.
		Discuss the impact of the spill with the FPM /Process Scientist/DM for next steps.
		Report the incident to the DM/RCC/ SW Pollution team for Info.
		Stop the transfer if safe to do so and isolate if possible - complete Personnel Risk Assessment first.
		Contain the release if safe to do so, if there are spare containment tanks utilise these via discussion with Incident team.

N/A	Done	The Incident controller will: -
		Stop the process, use site spill kits if small amounts have been spilt, cover drains if possible.
		Determine what has been released and where it has gone (e.g. to ground, to the site drains etc.)

### 6.17 Theft & Vandalism

The Duty Operator on receiving either an automatic or a personnel-raised alarm will:

N/A	Done	The Incident controller will: -
		Use the Pollution 30 Minute Plan if the vandalism has affected the process.
		Remember pollution emission may be a release of biogas to atmosphere or poor effluent quality or a release from a process or fuel storage vessel to land or a water course.
		Discuss the impact of the theft or vandalism with the FPM /Process Scientist/DM.
		Report the incident to the DM/RCC/ SW Pollution team for inclusion in the morning 24-hour report.
		Make a thorough inspection of the SCADA and a walk of the Site if we have had intruders or vandalism on the Site as changes may have been made to the process.
		Report any thefts or vandalism to the police and ask for a crime reference number.

## **A. Grab Pack**

Southern Water

Gravesend WTW/STC

Emergency Grab pack.

Nov 2023.

Final Draft

Author: [REDACTED]

Sponsor: [REDACTED]

Approved and signed off by: [REDACTED]

Version 2.0 Nov 2023



## Contents

<b>1. EMERGENCY CONTACT NUMBERS .....</b>	<b>3</b>
<b>2. SITE PLANS .....</b>	<b>4</b>
<b>3. MATERIALS &amp; CHEMICALS STORAGE ON SITE .....</b>	<b>7</b>
<b>4. LOCATION OF FIRE EXTINGUISHERS ON SITE.....</b>	<b>11</b>
<b>5. WASHATER MAINS &amp; FIRE HYDRANTS.....</b>	<b>12</b>
<b>6. DSEAR DRAWINGS .....</b>	<b>13</b>
<b>7. FIRE RISK ASSESSMENT.....</b>	<b>31</b>
<b>8. COSHH DATA SHEET.....</b>	<b>32</b>

## 1. EMERGENCY CONTACT NUMBERS

### Management

RCC – 0330 3030261

[REDACTED]

[REDACTED]

### SITE OPS

[REDACTED]

[REDACTED]

[REDACTED]

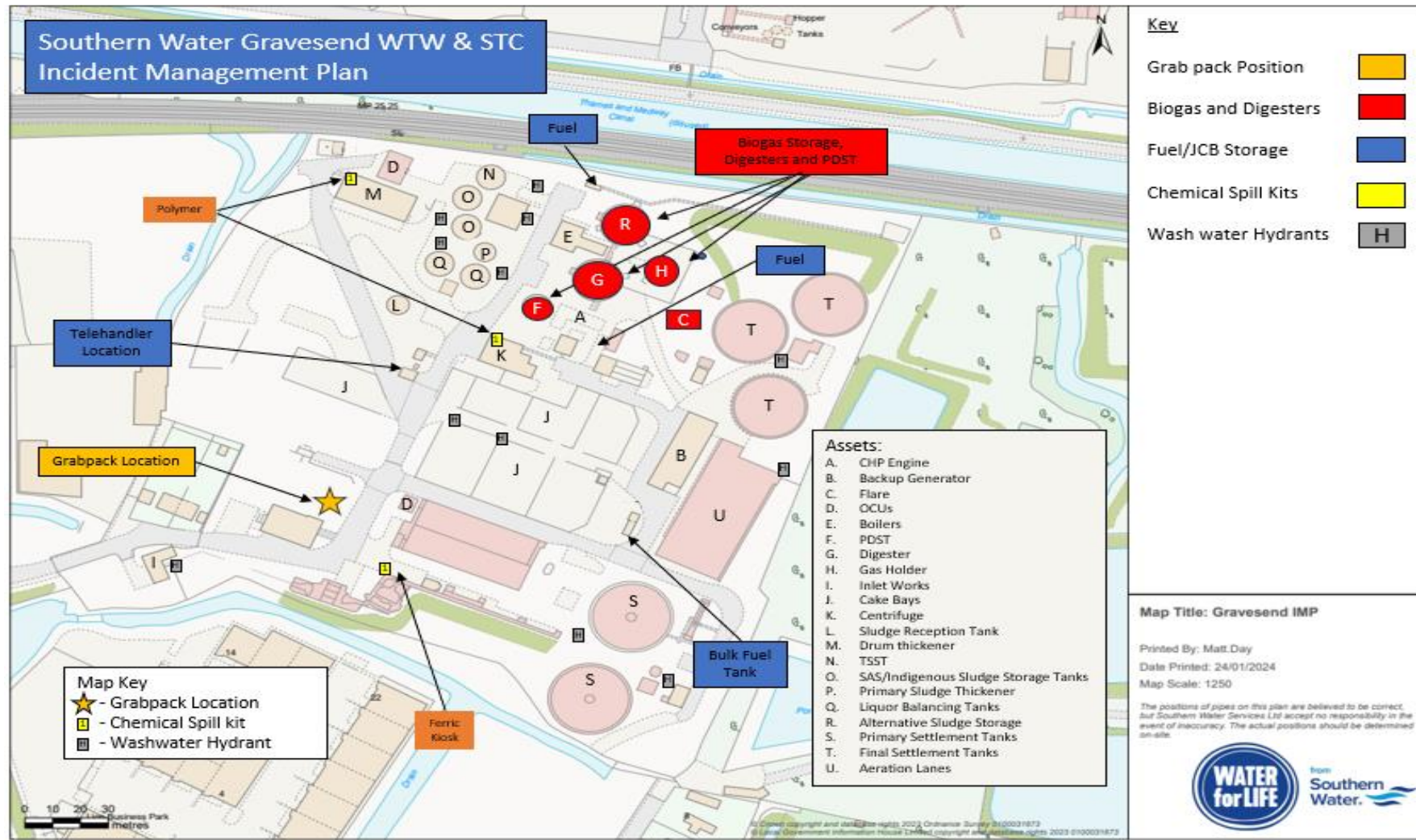
[REDACTED]

## 2. SITE PLANS

Map of Processes

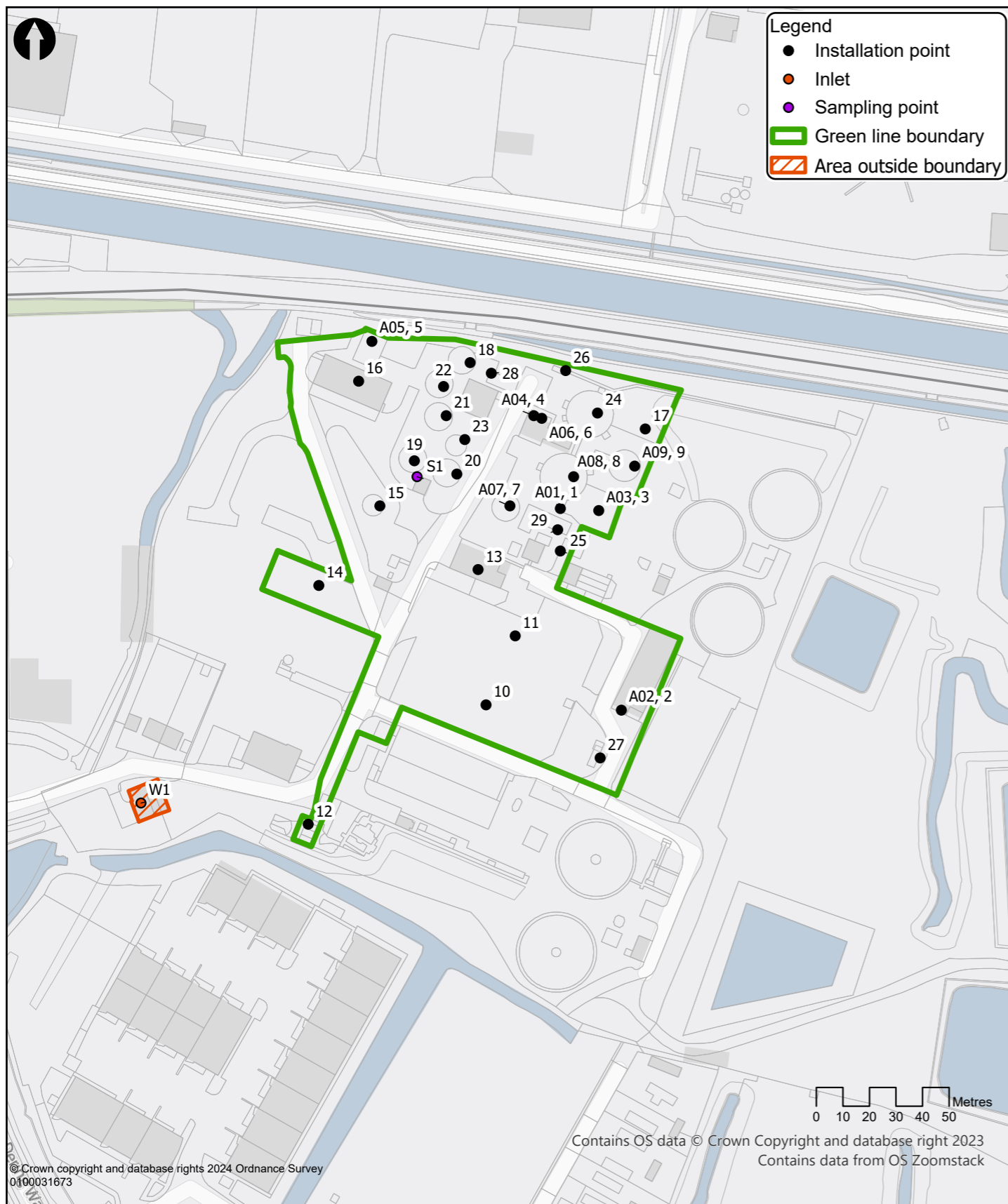


Map of flammable substances and fire hydrants.






# Map of biogas systems



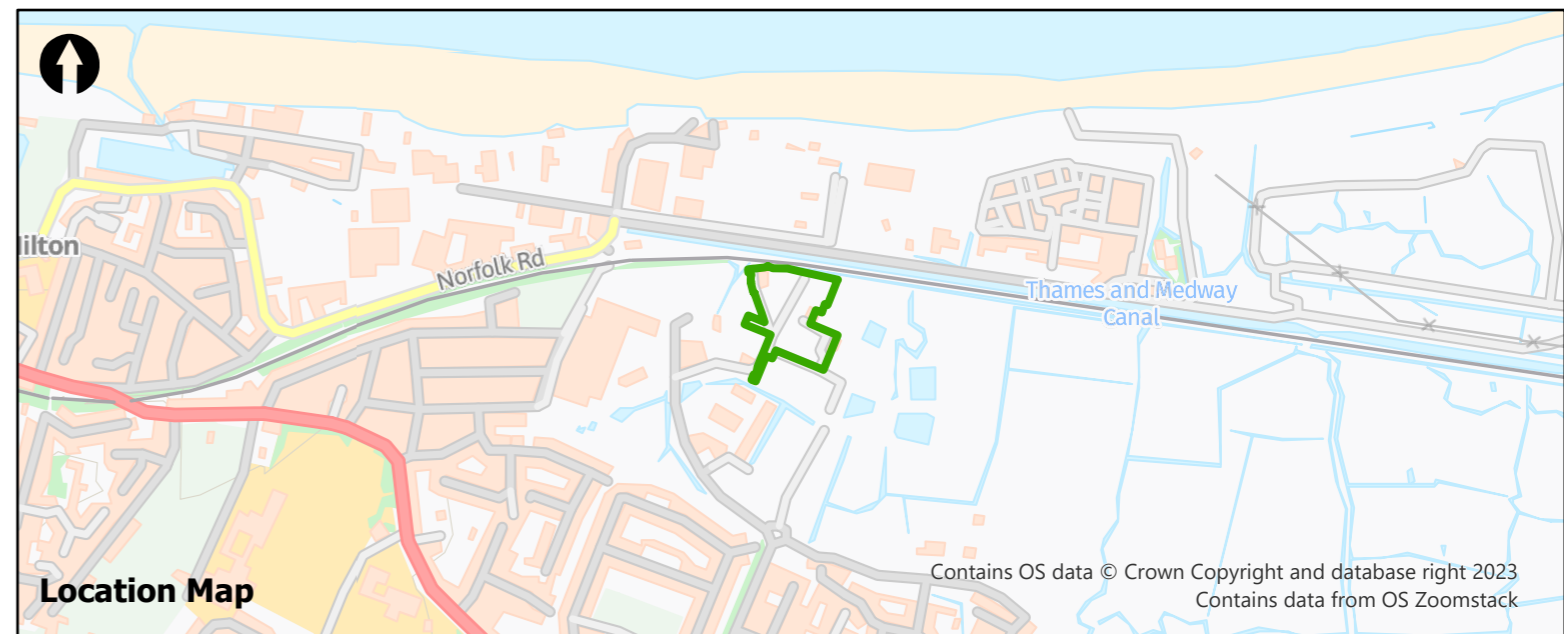
© Crown copyright and database rights 2024 Ordnance Survey 0100031673

© Mott MacDonald Ltd.  
This document is issued for the party which commissioned it and for specific purposes connected with the captioned project only. It should not be relied upon by any other party or used for any other purpose. We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

<b>Title</b> Gravesend STC Site Layout Plan		 MOTT MACDONALD		Mott MacDonald House 8-10 Sydenham Road Croydon T +44 (0)20 8774 2000 W mottmac.com			
---	--	---	--	---	--	--	--

Date	Drawn	Checked	Approved	Scale at A4	Drawing Number	Status	Rev
27/02/24	M Pinney	S Stone	A Manns	1:2,000	790101_MSD_SiteLayoutPlan_GRA	INF	03

Emissions Ref	Emissions Points	Assets Ref	Assets	X	Y
A01	CHP engine stack	1	CHP engine	566737	173998
A02	Back-up generator stack	2	Back-up generator	566760	173922
A03	Flare stack	3	Flare	566751	173997
A04	Boiler stack 2	4	Boiler 2	566727	174033
A05	OCU 2	5	OCU 2	566666	174061
A06	Boiler stack 1	6	Boiler 1	566730	174032
A07	Whessoe valve 1	7	Post digester	566718	173999
A08	Whessoe valve 2	8	Digester	566742	174010
A09	Whessoe valve 3	9	Gas holder	566765	174014
W1	Inlet works			566579	173887
S1	Liquor sampling point			566683	174010
		10	Cake bays	566709	173924
		11	Cake bays	566720	173950
		12	Screenings handling area	566642	173879
		13	Centrifuge	566706	173975
		14	Alternative Cake bay	566646	173969
		15	Sludge reception tank	566669	173999
		16	Drum thickener	566661	174046
		17	Condensate pot	566769	174028
		18	Thickened sludge storage tank	566703	174053
		19	Liquor balancing	566682	174016
		20	Liquor balancing	566698	174011
		21	SAS/indigenous sludge storage	566694	174033
		22	SAS/indigenous sludge storage	566693	174044
		23	Primary sludge thickener	566701	174024
		24	Alternative Sludge storage tank	566751	174034
		25	Fuel storage	566737	173982
		26	Fuel storage	566739	174050
		27	Bulk fuel tank	566752	173904
		28	Imported sludge tank	566711	174049
		29	Chemical storage	566736	173990



Contains OS data © Crown Copyright and database right 2023  
Contains data from OS Zoomstack

### 3. MATERIALS & CHEMICALS STORAGE ON SITE

List of combustible materials stored on site.

WASTE INVENTORY (See EMS 480)					
Trade Name/ Substance	Solid/liquid/ gas/powder	UN Number	Max Stored on Site	Location Marked on Site Plan	Type of Containment
Biogas	Biogas	UN1971	<3000m3 max	Biogas Holder Digester Headspace PDST Headspace	Gas bag Digesters Pipelines Flare Stack CHP Engine.
Diesel Oil	Liquid	UN1202	18m3	Opposite blower house	Tank
Sludge	Liquid	Non - Hazardous	523m3	Sludge Reception Tank	Tank
Sludge Cake	Dried Cake	Non - Hazardous	<6000m3	Cake Bays	Bays
Polymer	Powder	2923	6 X 1m3/750kg bags	Inside centrifuge building	Bags
Polymer	Liquid	2923	6 x 1050 kg as liquid in IBC	Inside garages next to offices	IBC
Lime (Dust).	Solid (granules)	UN1956	Variable this is an unusual activity	Cake Bays	In bags
Gas Cylinders	Gas	N/A	Welding / burning Equip.	Workshop on plan.	Gas Bottles stored in a locked building overnight.
Aerosol Leaks of Biogas	Gas	UN1971	Not Known as would be formed by leaks	Biogas Holder area Digester headspace	Gas bag Digesters Pipelines Flare Stack CHP Engine
JCB Loader / MTS Tankers & Chemical Delivery tankers.	Diesel Powered	N/A	Diesel Fuel tank on machine	Stored in workshop marked as building 4 on plan out of hours but may be anywhere on site.	Vehicle stored in a locked building overnight.

### Likely combustible waste management.

- Paper or cardboard – this is controlled by using sealed bins.
- Plastics – We do not store plastic waste other than in recycle Bins.
- Rags and textiles – rag is managed in skips by MTS for composting.
- Scrap metals contaminated or mixed with other waste such as oils or plastics – managed by Southern Water Scrap metal skips and Fly tipping requests to empty skips.
- De-polluted and un-depolluted ELVs – We do not break ELV's
- Refuse derived fuel (RDF) and solid recovered fuel (SRF) – N/A.
- Compost and plant material – Managed by MTS on SW behalf.
- Biomass – Managed In process control and via sludge cake.
- Mixed waste containing any combustible wastes – Via Sealed bins.
- Sludge cake Storage in cake bays.
- Lime used to treat Sludge cake could be stored on Cake Bays if in use.
- WEEE – Managed via Locked Wee containers.
- Wood – Pallets are stored on site.

## Non-Combustible.

CHEMICAL PRODUCT INVENTORY (See relevant COSHH sheets)					
Trade Name/ Substance	Solid/liquid/ gas/powder	UN Number	Max Stored on Site	Location Marked on Site Plan	Type of Containment
Antifoam	Liquid	N/A	1m3	Inside centrifuge building.	Intermediate Bulk Container (IBC)
Polymer	Liquid	N/A	6 x 1050 kg as liquid in IBC	Inside garages next to offices	IBC
Wastewater	Liquid	N/A	2100m3	Storm Tank	Tank
Wastewater	Liquid	N/A	4782m3	2 X Primary Settlement Tanks	Tanks
Wastewater	Liquid – Non- Buoyant	N/A	4743m3	Aeration Lanes	Lanes
Wastewater	Liquid	N/A	3828m3	3 X Final Settlement Tanks	Tanks
Sludge	Liquid sludge	N/A	2580m3	1 X Digesters	Tanks
Sludge	Liquid sludge	N/A	1500m3	Thickened Sludge Storage Tank	Tank
Sludge	Liquid	N/A	100m3	Tank 2 Sludge Storage Tank	Tank
Sludge	Liquid	N/A	290m3	Tank 1 Sludge storage Tank	Tank

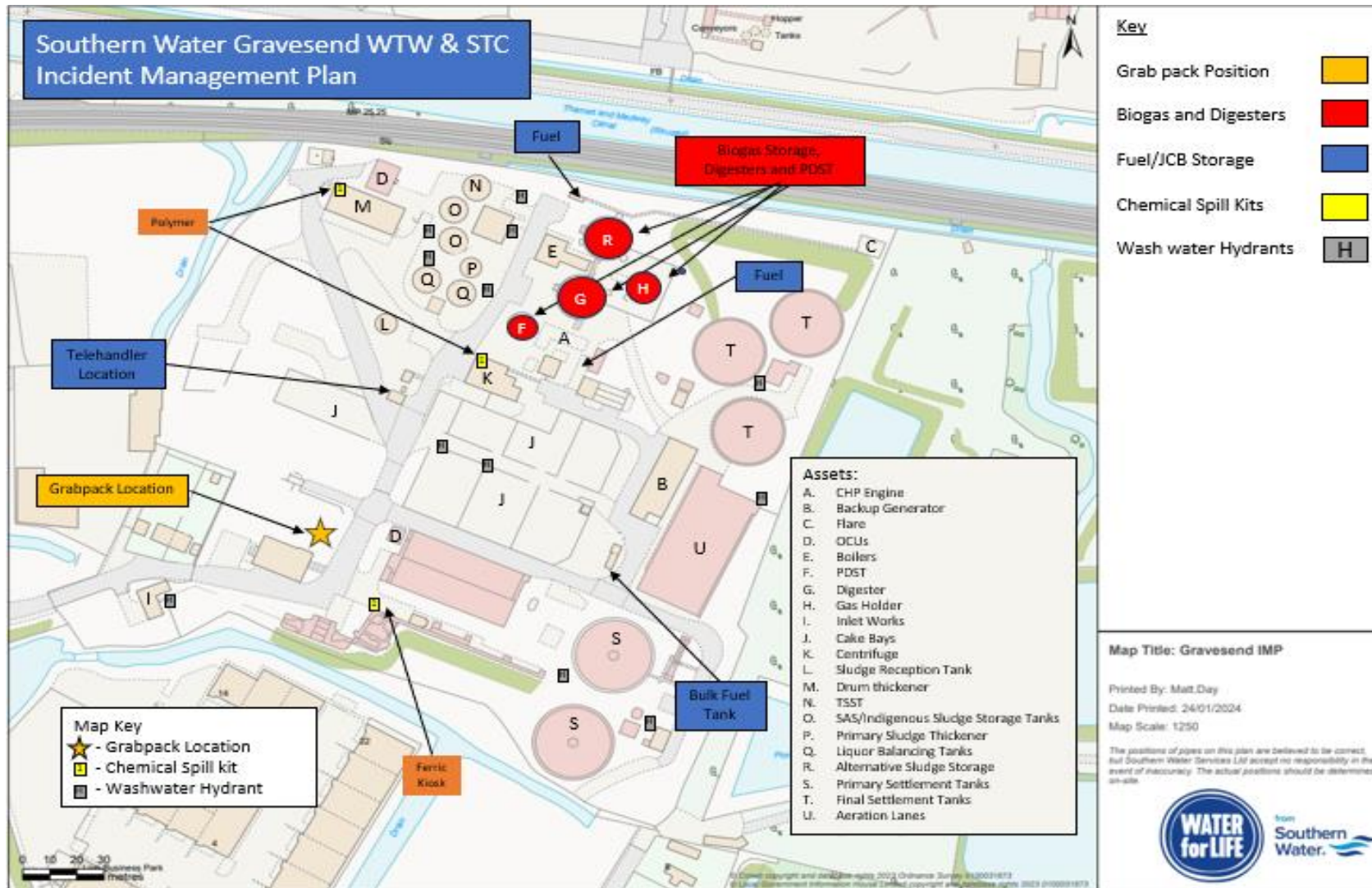


Sludge	Liquid	N/A	720m3	Sludge Reception Tank	Tank
Sludge Cake	Liquid	N/A	<6000m3	Cake Bays	Bays

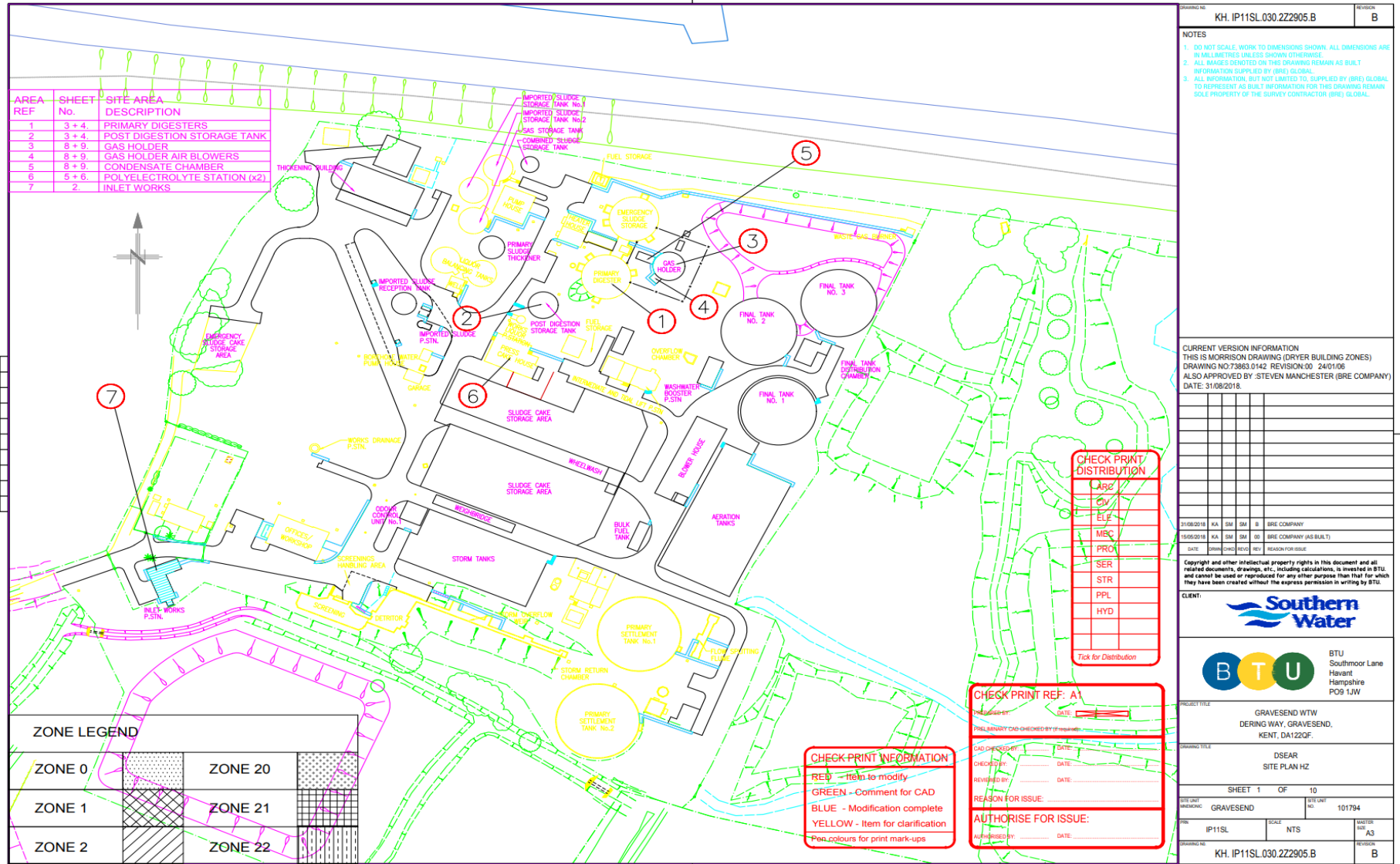
## 4. LOCATION OF FIRE EXTINGUISHERS ON SITE.

POLLUTION PREVENTION EQUIPMENT INVENTORY (ON AND OFF-SITE RESOURCES) ILLUSTRATED ON HAM HILL IMP MAP			
Type	Location	Amount	Staff Contact
Spill Kits	Inside Centrifuge building	1	[REDACTED]
Spill Kits	Inside Office building	1	[REDACTED]
Spill Kits	Inside Thickener building	1	[REDACTED]
Spill Kits	Inside Blower building	1	[REDACTED]
Fire Extinguishers	Inside centrifuge building	1	[REDACTED]
Fire Extinguishers	Inside Boiler house	1	[REDACTED]
Fire Extinguishers	Inside Office building	7	[REDACTED]
Fire Extinguishers	Inside Generator building	1	[REDACTED]
Fire Extinguishers	Inside Generator building	1	[REDACTED]
Fire Extinguishers	Inside Thickener building	2	[REDACTED]
Fire Extinguishers	Inside Inlet building	1	[REDACTED]
Fire Extinguishers	Inside PST Desludge Kiosk	1	[REDACTED]
Fire Extinguishers	Inside Blower Building	2	[REDACTED]
Fire Extinguishers	Inside Wash water Kiosk	1	[REDACTED]
Fire Extinguishers	Inside Digester Pump House	1	[REDACTED]

## 5. WASHATER MAINS & FIRE HYDRANTS (H).



# 6. DSEAR DRAWINGS



ENG-FM-210-01-00

DRAWING NO.	KH. IP11SL.030.222905.B	REVISION	B
-------------	-------------------------	----------	---

**NOTES**

- DO NOT SCALE. WORK TO DIMENSIONS SHOWN. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
- ALL IMAGES DERIVED ON THIS DRAWING REMAIN AS BUILT INFORMATION SUPPLIED BY (BRE) GLOBAL.
- ALL INFORMATION, BUT NOT LIMITED TO, SUPPLIED BY (BRE) GLOBAL TO REPRESENT AS BUILT INFORMATION FOR THIS DRAWING REMAINS SOLE PROPERTY OF THE SURVEY CONTRACTOR (BRE) GLOBAL.

**CURRENT VERSION INFORMATION**  
 THIS IS MORRISON DRAWING (DRIVER BUILDING ZONES)  
 DRAWING NO:73863.0142 REVISION:00 24/01/06  
 ALSO APPROVED BY :STEVEN MANCHESTER (BRE COMPANY)  
 DATE: 31/08/2018

DATE	BY	CHKD	REV	REASON FOR ISSUE	
31/08/2018	KA	SM	SM	B	BRE COMPANY
15/09/2018	KA	SM	SM	20	BRE COMPANY (AS BUILT)

Copyright and other intellectual property rights in this document and all related documents, drawings, etc., including calculations, is invested in BTU and cannot be used or reproduced for any other purpose than that for which they have been created without the express permission in writing by BTU.

**CLIENT:**  
 Southern Water

**BTU**  
 BTU Southmoor Lane  
 Havant Hampshire  
 PO9 1JW

**PROJECT TITLE:**  
 GRAVESEND WTW  
 DERING WAY, GRAVESEND,  
 KENT, DA122QF.

**DRAWING TITLE:**  
 DSEAR  
 SITE PLAN HZ

**SHEET 1 OF 10**

SITE UNIT	GRAVESEND	SITE UNIT NO.	101794
DRAWING NO.	IP11SL	SCALE	NTS
DRAWING NO.	KH. IP11SL.030.222905.B	REVISION	B



## 5 Risk assessment

For each hazardous area a risk assessment table has been compiled, giving a risk rating for the identified ignition hazards. The likelihood rating given to sparks generated by equipment is based on the number of non-ATEX equipment present. Equipment in each zoned area was catalogued. Where applicable any hazardous areas allocated are illustrated in hazardous zoning drawings of the site and relevant equipment.

### 5.1 Preliminary treatment

#### 5.1.1 Inlet works

The inlet works at Gravesend STC are located outside and the inlet pipe flows into a channel open to the atmosphere as can be seen in Figure 1.

According to Southern Water's MED 4004 2015<sup>(3)</sup>, the inlet works have been allocated a zone 2 classification within the channel area. Therefore, the pipe is zoned internally, however once the waste flows into the open channel, any flammable vapours that may be present will disperse.



Figure 1: Inlet works.



### Raw sewage inlet works

Hazards	Control measures	Likelihood	Severity	Risk rating
Naked flames	No smoking policy on site except in designated areas. Signs present.	1	2	2
Welding / cutting: sparks and hot surfaces	Permit to work required before maintenance works can be undertaken.	1	2	2
Sparks from mobile phones	Mobile phones are not allowed to be taken into zoned areas. Signs present	1	2	2
Lightning	Exposed zoned areas fitted with protection.	1	2	2
Electrostatic discharge	Earth bonding of equipment.	1	2	2
Sparks from equipment	Ex rated equipment must be used – see catalogued equipment.	1	2	2







## 5.5 Sludge treatment

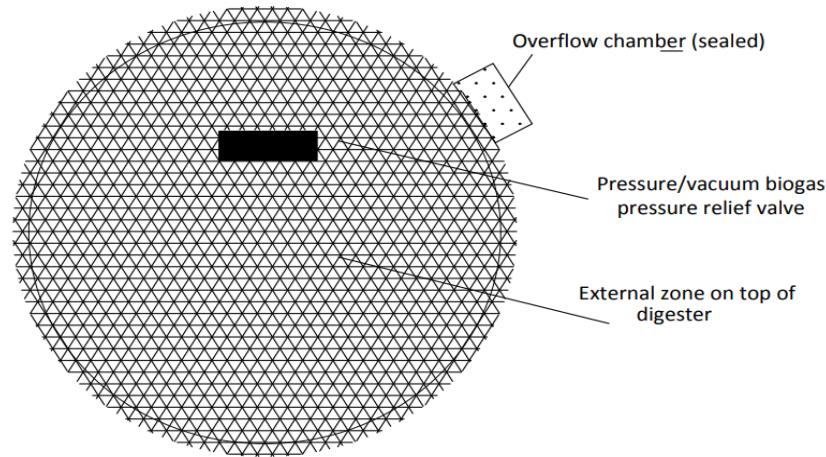
### 5.5.1 Digester 1

Zone 0 internally and zone 1 externally surrounding the top of the digester.

There is only one digester in use at Gravesend STC, the second tank is for emergency use.

Hazards	Control measures	Likelihood	Severity	Risk rating
Naked flames	No smoking policy on site except in designated areas. Signs present.	1	2	2
Welding / cutting; sparks & hot surfaces	Permit to work required before maintenance works can be undertaken.	1	2	2
Sparks from mobile phones	Mobile phones not allowed to be taken into zoned areas. Signs present.	1	2	2
Lightening	Exposed zoned areas fitted with protection.	1	2	2
Electrostatic discharge	Earth bonding of equipment.	1	2	2
Sparks from equipment	Ex rated equipment must be used – see catalogued equipment.	3	2	6

# DIGESTER & POST-DIGESTER PLAN



**CHECK PRINT INFORMATION**  
 RED - Item to modify  
 GREEN - Comment for CAD  
 BLUE - Modification complete  
 YELLOW - Item for clarification  
 Pen colours for print mark-ups

**CHECK PRINT REF: A1**  
 PREPARED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 PRELIMINARY CAD CHECKED BY (if required): \_\_\_\_\_  
 CAD CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 REASON FOR ISSUE: \_\_\_\_\_  
**AUTHORISE FOR ISSUE:**  
 AUTHORISED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

**CHECK PRINT DISTRIBUTION**

ARC	
CIV	
ELE	
MEC	
PRO	
SER	
STR	
PPL	
HYD	

Tick for Distribution

DRAWING NO. KH.IP11SL.030.2Z2901.A REVISION A

- DO NOT SCALE. WORK TO DIMENSIONS SHOWN. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
- ALL IMAGES DOTTED ON THIS DRAWING REMAIN AS BUILT INFORMATION SUPPLIED BY BRE GLOBAL.
- ALL INFORMATION, BUT NOT LIMITED TO, SUPPLIED BY (BRE) GLOBAL TO REPRESENT AS BUILT INFORMATION FOR THIS DRAWING REMAIN SOLE PROPERTY OF THE SURVEY CONTRACTOR (BRE) GLOBAL.

CURRENT VERSION INFORMATION  
 THIS IS (BRE COMPANY) DRAWING (NOT AS BUILT)  
 APPROVED BY: STEVEN MANCHESTER (BRE COMPANY)  
 DATE: 31/08/2018.

21/08/2018	KA	SM	SM	A	BRE COMPANY
19/08/2018	KA	SM	SM	00	BRE COMPANY
DATE	ISSUED	CHANGED	REVISED	REVISION	REASON FOR ISSUE

Copyright and other intellectual property rights in this document and all related documents, drawings, etc., including calculations, is vested in BTU, and cannot be used or reproduced for any other purpose than that for which they have been created without the express permission in writing by BTU.

CLIENT:




BTU  
 Southmoor Lane  
 Havant  
 Hampshire  
 PO9 1JW

PROJECT TITLE GRAVESEND STC  
 DERING WAY, GRAVESEND,  
 KENT, DA122QF.

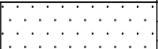


DRAWING TITLE DSEAR  
 DIGESTER PLAN

SHEET 3 OF 10

PROJECT LOCATION GRAVESEND SITE ID: 101794

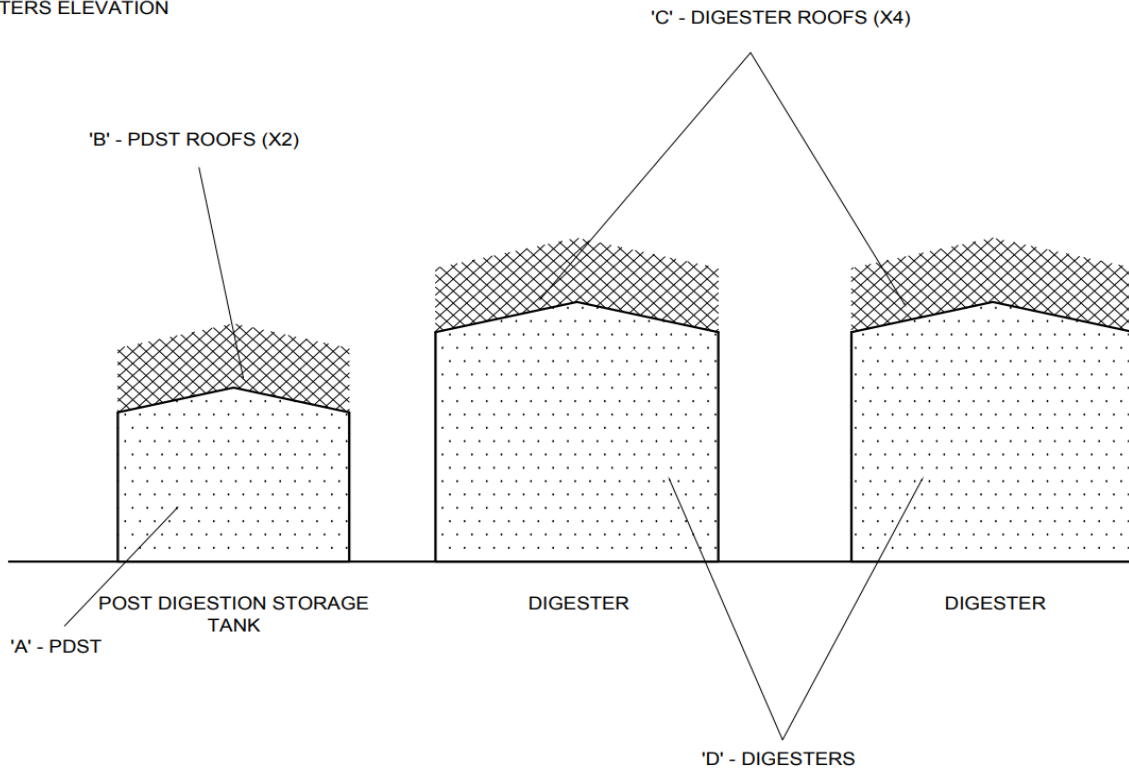
DWG NO. IP11SL SCALE NTS QUANTITY A3

DRAWING NO. KH.IP11SL.030.2Z2901.A REVISION A

ZONE LEGEND	REF	SITE AREA DESCRIPTION	ZONE	T CLASS	EXTENT OF ZONE (V-VERTICAL, H-HORIZONTAL) MEASURED FROM POINT OF POSSIBLE RELEASE
	A	OVERFLOW CHAMBER (SEALED)	0		INTERNALLY
	B	EXTERNAL ZONE ON TOP OF DIGESTER	1		EXTERNALLY
					EXTERNALLY 'V' + 'H' - 3m
					



DIGESTERS & POST-DIGESTERS ELEVATION



**CHECK PRINT INFORMATION**  
 RED - Item to modify  
 GREEN - Comment for CAD  
 BLUE - Modification complete  
 YELLOW - Item for clarification  
 Pen colours for print mark-ups

**CHECK PRINT REF: A1**  
 PREPARED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 PRELIMINARY CAD CHECKED BY (if required): \_\_\_\_\_  
 CAD CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 REASON FOR ISSUE: \_\_\_\_\_  
 AUTHORISE FOR ISSUE:  
 AUTHORISED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

CHECK PRINT DISTRIBUTION	
ARC	
CIV	
ELE	
MEC	
PRO	
SER	
STR	
PPL	
HYD	

Tick for Distribution

DRAWING NO. KH.IP11SL.030.222908.B

REVISION B

- DO NOT SCALE. WORK TO DIMENSIONS SHOWN. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
- ALL IMAGES DENOTED ON THIS DRAWING REMAIN AS BUILT INFORMATION SUPPLIED BY (BRE) GLOBAL.
- ALL INFORMATION, BUT NOT LIMITED TO, SUPPLIED BY (BRE) GLOBAL TO REPRESENT AS BUILT INFORMATION FOR THIS DRAWING REMAIN SOLE PROPERTY OF THE SURVEY CONTRACTOR (BRE) GLOBAL.

CURRENT VERSION INFORMATION  
 THIS IS MORRISON DRAWING (NOT AS BUILT)  
 DRAWING NO.73863.0115 / 0116 REVISION:00 DATE:19-22/07/05  
 ALSO APPROVED BY: STEVEN MANCHESTER (BRE COMPANY)  
 DATE: 31/08/2018.

11/08/2018	KA	SM	SM	B	BRE COMPANY
19/08/2018	KA	SM	SM	DD	BRE COMPANY
DATE	ISSUED	CHANGED	REVISED	REV	REASON FOR ISSUE

Copyright and other intellectual property rights in this document and all related documents, drawings, etc., including calculations, is invested in BTU, and cannot be used or reproduced for any other purpose than that for which they have been created without the express permission in writing by BTU.

CLIENT:



BTU  
 Southmoor Lane  
 Havant  
 Hampshire  
 PO9 1JW

ZONE LEGEND	REF	SITE AREA DESCRIPTION	ZONE	T CLASS	EXTENT OF ZONE (V-VERTICAL, H-HORIZONTAL) MEASURED FROM POINT OF POSSIBLE RELEASE
ZONE 0	A	POST DIGESTION STORAGE TANKS 1+2	0	2	INTERNALLY
	B	POST DIGESTION STORAGE TANKS 1+2 ROOFS	1	2	EXTERNALLY - 3m 'v' + 'h' TO EDGE OF ROOFS
ZONE 1	C	DIGESTERS NO. 1-4 ROOFS	1	2	EXTERNALLY - 3m 'v' + 'h' TO EDGE OF ROOFS
	D	DIGESTERS NO. 1-4	0	2	INTERNALLY
ZONE 2					

PROJECT TITLE: GRAVESEND STC  
 DERING WAY, GRAVESEND  
 KENT, DA122QF.

DRAWING TITLE: DSEAR  
 DIGESTER ELEVATION

SHEET 4 OF 10

FILE CODE: GRAVESEND DATE DWT: 101794

PK: IP11SL SCALE: NTS DRAWER: AS

DRAWING NO. KH.IP11SL.030.222908.B REVISION: B



### 5.5.2 Post digestion storage

Zone 0 internally and zone 1 externally surrounding the top of the post digestion

Hazards	Control measures	Likelihood	Severity	Risk rating
Naked flames	No smoking policy on site except in designated areas. Signs present.	1	2	2
Welding / cutting: sparks and hot surfaces	Permit to work required before maintenance works can be undertaken.	1	2	2
Sparks from mobile phones	Mobile phones are not allowed to be taken into zoned areas. Signs present	1	2	2
Lightning	Exposed zoned areas fitted with protection.	1	2	2
Electrostatic discharge	Earth bonding of equipment.	1	2	2
Sparks from equipment	Ex rated equipment must be used – see catalogued equipment.	3	2	6

The drawing illustrating the extent of the hazardous zoning around the digesters and post-digesters is included in section 5.5.1.



### 5.5.3 External mixing & heat-exchange

External digested sludge mixers and digested sludge heat-exchangers are located in a small room off the main boiler house.

According to Southern Water's MED 4004 April 2015<sup>[3]</sup>, any pipework containing digested sludge does not need to be zoned externally.

### 5.5.4 Polyelectrolyte

There is one polyelectrolyte dust hopper / dispenser unit on site.

Following Southern Water's MED 4004 April 2015<sup>[3]</sup>, the receiving vessel is allocated a zone 21 classification internally and the external area is allocated a zone 22 classification for 1m.



Figure 2: Polyelectrolyte hopper.

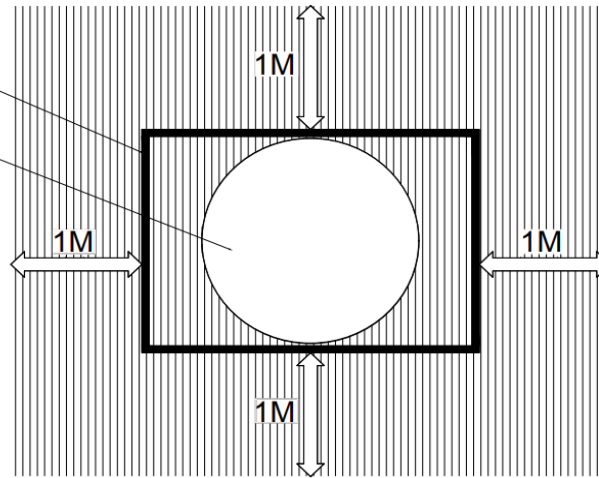


Hazards	Control measures	Likelihood	Severity	Risk rating
Naked flames	No smoking policy on site except in designated areas. Signs present.	1	2	2
Welding / cutting: sparks and hot surfaces	Permit to work required before maintenance works can be undertaken.	1	2	2
Sparks from mobile phones	Mobile phones are not allowed to be taken into zoned areas. Signs present	1	2	2
Lightning	Exposed zoned areas fitted with protection.	1	2	2
Electrostatic discharge	Earth bonding of equipment.	1	2	2
Sparks from equipment	Ex rated equipment or IP5x must be used as a minimum – see catalogued equipment.	2	2	4

# POLYELECTROLYTE STATION - PLAN

Support Frame

'A' - Polyelectrolyte Bag



### CHECK PRINT INFORMATION

RED - Item to modify  
 GREEN - Comment for CAD  
 BLUE - Modification complete  
 YELLOW - Item for clarification  
 Pen colours for print mark-ups

### CHECK PRINT REF: A1

PREPARED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

PRELIMINARY CAD CHECKED BY (if required): \_\_\_\_\_

CAD CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

REASON FOR ISSUE: \_\_\_\_\_

AUTHORISE FOR ISSUE:

AUTHORISED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

### CHECK PRINT DISTRIBUTION

ARC	
CIV	
ELE	
MEC	
PRO	
SER	
STR	
PPL	
HYD	
Tick for Distribution	

DRAWING NO: KH.IP11SL.030.2Z2902.A  
 REVISION: A

- DO NOT SCALE. WORK TO DIMENSIONS SHOWN. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
- ALL IMAGES DENOTED ON THIS DRAWING REMAIN AS BUILT INFORMATION SUPPLIED BY (BRE) GLOBAL.
- ALL INFORMATION, BUT NOT LIMITED TO, SUPPLIED BY (BRE) GLOBAL TO REPRESENT AS BUILT INFORMATION FOR THIS DRAWING REMAIN SOLE PROPERTY OF THE SURVEY CONTRACTOR (BRE) GLOBAL.

CURRENT VERSION INFORMATION  
 THIS IS MORRISON DRAWING (NOT AS BUILT)  
 DRAWING NO:73863.0115 / 0116 REVISION:00 DATE:18/22/07/05  
 ALSO APPROVED BY: STEVEN MANCHESTER (BRE COMPANY)  
 DATE: 31/08/2016.

31/08/2016	KA	SM	SM	A	BRE COMPANY
18/08/2016	KA	SM	SM	00	BRE COMPANY
DATE:	DRWN	CHKD	REVCD	REV	REASON FOR ISSUE

Copyright and other intellectual property rights in this document and all related documents, drawings, etc., including calculations, is invested in BTU and cannot be used or reproduced for any other purpose than that for which they have been created without the express permission in writing by BTU.

CLIENT:




BTU  
 Southmoor Lane  
 Havert  
 Hampshire  
 PO9 1JW

### ZONE LEGEND

ZONE 20	
ZONE 21	
ZONE 22	

REF	SITE AREA DESCRIPTION	ZONE	T CLASS	EXTENT OF ZONE (V-VERTICAL, H-HORIZONTAL) MEASURED FROM POINT OF POSSIBLE RELEASE
A	POLYELECTROLYTE STATION	22	4	EXTERNALLY - 1M 'H' AND 1M 'V' EXTENDING TO FLOOR

PROJECT TITLE: GRAVESEND STC  
 DERING WAY, GRAVESEND,  
 KENT, DA122QF

DRAWING TITLE: DSEAR  
 POLYELECTROLYTE STATION PLAN

SHEET 5 OF 10

DSE OFF: GRAVESEND  
 SITE: 101794

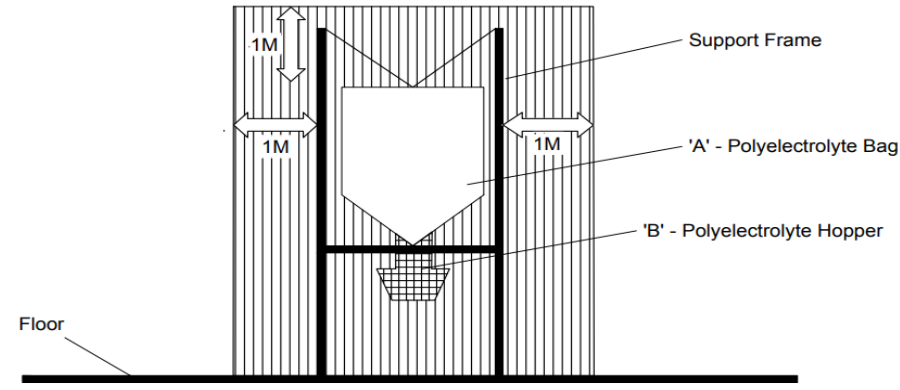
PRN: IP11SL  
 SCALE: NTS  
 SHEET: A3

DRAWING NO: KH.IP11SL.030.2Z2902.A  
 REVISION: A

# POLYELECTROLYTE STATION - ELEVATION

DRAWING NO: KH.IP11SL.030.2Z2903.A  
 REVISION: A

- DO NOT SCALE. WORK TO DIMENSIONS SHOWN. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
- ALL IMAGES DENOTED ON THIS DRAWING REMAIN AS BUILT INFORMATION SUPPLIED BY (BRE) GLOBAL.
- ALL INFORMATION, BUT NOT LIMITED TO, SUPPLIED BY (BRE) GLOBAL TO REPRESENT AS BUILT INFORMATION FOR THIS DRAWING REMAIN SOLE PROPERTY OF THE SURVEY CONTRACTOR (BRE) GLOBAL.



**CHECK PRINT INFORMATION**  
 RED - Item to modify  
 GREEN - Comment for CAD  
 BLUE - Modification complete  
 YELLOW - Item for clarification  
 Pen colours for print mark-ups

**CHECK PRINT REF: A1**

PREPARED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

PRELIMINARY CAD CHECKED BY (if required): \_\_\_\_\_

CAD CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

REASON FOR ISSUE: \_\_\_\_\_

**AUTHORISE FOR ISSUE:**

AUTHORISED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

**CHECK PRINT DISTRIBUTION**

ARC	
CIV	
ELE	
MEC	
PRO	
SER	
STR	
PPL	
HYD	

Tick for Distribution

**CURRENT VERSION INFORMATION**  
 THIS IS MORRISON DRAWING (NOT AS BUILT)  
 DRAWING NO: 73863.0115/0116 REVISION: 00 DATE: 18-22/07/05  
 ALSO APPROVED BY: STEVEN MANCHESTER (BRE COMPANY)  
 DATE: 31/08/2018.

31/08/2018	KA	DM	SM	A	BRE COMPANY
18/08/2018	KA	DM	SM	00	BRE COMPANY
DATE	DRWN	CHKD	REVSD	REV	REASON FOR ISSUE

Copyright and other intellectual property rights in this document and all related documents, drawings, etc, including calculations, is invested in BTU and cannot be used or reproduced for any other purpose than that for which they have been created without the express permission in writing by BTU.

CLIENT:

BTU  
 Southmoor Lane  
 Havant  
 Hampshire  
 PO9 1JW

ZONE LEGEND	REF	SITE AREA DESCRIPTION	ZONE	T CLASS	EXTENT OF ZONE (V-VERTICAL, H-HORIZONTAL) MEASURED FROM POINT OF POSSIBLE RELEASE
ZONE 20	A	POLYELECTROLYTE BAG	22	4	EXTERNALLY - 1M 'H' AND 1M 'V' EXTENDING TO FLOOR
	B	POLYELECTROLYTE HOPPER	21		INTERNALLY - WITHIN HOPPER
ZONE 21					
ZONE 22					

PROJECT TITLE: GRAVESEND STC  
 DERING WAY, GRAVESEND,  
 KENT, DA122QF.

DRAWING TITLE: DSEAR  
 POLYELECTROLYTE DRAWING ELEVATION

SHEET 6 OF 10

BRE GEN/ HAMBURG: GRAVESEND	BRE GEN/ NO: 101794
PRN: IP11SL	SCALE: NTS
DRAWING NO: KH.IP11SL.030.2Z2903.A	REVISION: A



## 5.6 Gas storage

### 5.6.1 Boiler house

There are two boilers at Gravesend STC. They are located in the boiler house alongside the digested sludge heat exchangers.

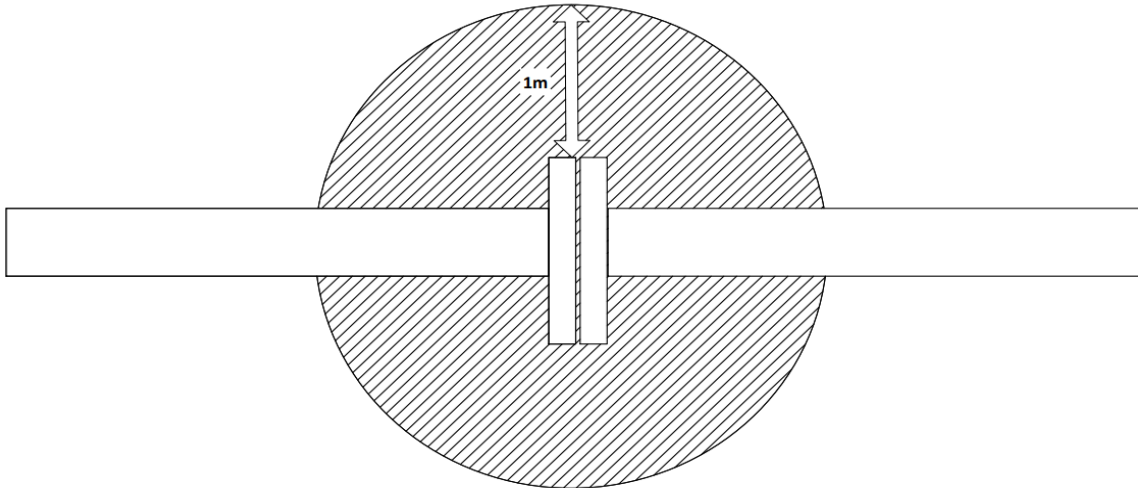
A zone 2 hazardous area is allocated extending 1m around all gas flanges and fittings on both natural and biogas pipelines.



Figure 3: Boilers.

Hazards	Control measures	Likelihood	Severity	Risk rating
Naked flames	No smoking policy on site except in designated areas. Signs present.	1	2	2
Welding / cutting: sparks and hot surfaces	Permit to work required before maintenance works can be undertaken.	1	2	2
Sparks from mobile phones	Mobile phones are not allowed to be taken into zoned areas. Signs present	1	2	2
Lightning	Exposed zoned areas fitted with protection.	1	2	2
Electrostatic discharge	Earth bonding of equipment.	1	2	2
Sparks from equipment	Ex rated equipment must be used – see catalogued equipment.	2	2	4

# BIOGAS AND NATURAL GAS PIPELINE - INTERNAL PIPEWORK ONLY



**CHECK PRINT INFORMATION**  
 RED - Item to modify  
 GREEN - Comment for CAD  
 BLUE - Modification complete  
 YELLOW - Item for clarification  
 Pen colours for print mark-ups

**CHECK PRINT REF: A1**  
 PREPARED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 PRELIMINARY CAD CHECKED BY (if required): \_\_\_\_\_  
 CAD CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 REASON FOR ISSUE: \_\_\_\_\_  
**AUTHORISE FOR ISSUE:**  
 AUTHORISED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

N.B - ZONE 2 AREA NOT RELEVANT FOR EXTERNAL PIPEWORK.  
 - ALL GAS PIPEWORK IS ALLOCATED A ZONE 0 INTERNALLY.

**CHECK PRINT DISTRIBUTION**

ARC	
CIV	
ELE	
MEC	
PRO	
SER	
STR	
PPL	
HYD	

*Tick for Distribution*

ZONE LEGEND	REF	SITE AREA DESCRIPTION	ZONE	T CLASS	EXTENT OF ZONE (V-VERTICAL, H-HORIZONTAL) MEASURED FROM POINT OF POSSIBLE RELEASE
ZONE 0	A	BIOGAS AND NATURAL GAS PIPEWORK	2		EXTERNALLY - 1M AROUND FLANGES AND FITTINGS
ZONE 1					
ZONE 2					

PROJECT NO:	KH.IP11SL.030.2Z2904.A			REVISION:	A
1. DO NOT SCALE. WORK TO DIMENSIONS SHOWN. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE. 2. ALL IMAGES DENOTED ON THIS DRAWING REMAIN AS BUILT INFORMATION SUPPLIED BY (BRE) GLOBAL. 3. ALL INFORMATION, BUT NOT LIMITED TO, SUPPLIED BY (BRE) GLOBAL TO REPRESENT AS BUILT INFORMATION FOR THIS DRAWING REMAINS SOLE PROPERTY OF THE SURVEY CONTRACTOR (BRE) GLOBAL.					
CURRENT VERSION INFORMATION THIS IS (BRE COMPANY) DRAWING (NOT AS BUILT) APPROVED BY: STEVEN MANCHESTER (BRE COMPANY) DATE: 31/08/2018.					
DATE	BY	CHKD	REV	REASON FOR ISSUE	
31/08/2018	KA	SM	SM	A	BRE COMPANY
07/03/2018	KA	SM	SM	00	BRE COMPANY (AS BUILT)
Copyright and other intellectual property rights in this document and all related documents, drawings, etc. including calculations, is invested in BTU and cannot be used or reproduced for any other purpose than that for which they have been created without the express permission in writing by BTU.					
CLIENT:  Southern Water					
BTU Southmoor Lane Havant Hampshire PO9 1JW					
PROJECT TITLE: GRAVESEND STC DERING WAY, GRAVESEND, KENT, DA122QF.					
DRAWING TITLE: DSEAR BIOGAS AND NATURAL GAS PIPE FLANGE (INTERNAL PIPEWORK ONLY)					
SHEET 7 OF 10					
DATE DWT	PROJECT NO	SCALE	DATE DWT	SCALE	DATE DWT
GRAVESEND	101794	NTS			
FIG	SCALE	SCALE	SCALE	SCALE	SCALE
IP11SL	NTS	NTS	NTS	NTS	NTS
DATE DWT	SCALE	SCALE	SCALE	SCALE	SCALE
PROJECT NO:	KH.IP11SL.030.2Z2904.A			REVISION:	A



### 5.6.1.1 Gas pipework in mixing / heat-exchanger side room

The gas pipework in the room with the digested sludge mixers and digested sludge heat-exchangers will have a zone 2 hazardous area extending 1m around all flanges and fittings.

Hazards	Control measures	Likelihood	Severity	Risk rating
Naked flames	No smoking policy on site except in designated areas. Signs present.	1	2	2
Welding / cutting: sparks and hot surfaces	Permit to work required before maintenance works can be undertaken.	1	2	2
Sparks from mobile phones	Mobile phones are not allowed to be taken into zoned areas. Signs present	1	2	2
Lightning	Exposed zoned areas fitted with protection.	1	2	2
Electrostatic discharge	Earth bonding of equipment.	1	2	2
Sparks from equipment	Ex rated equipment must be used – see catalogued equipment.	1	2	2

The drawing illustrating the extent of the hazardous zoning around the gas pipework is included in section 5.6.1.



### 5.6.2 Gas storage area

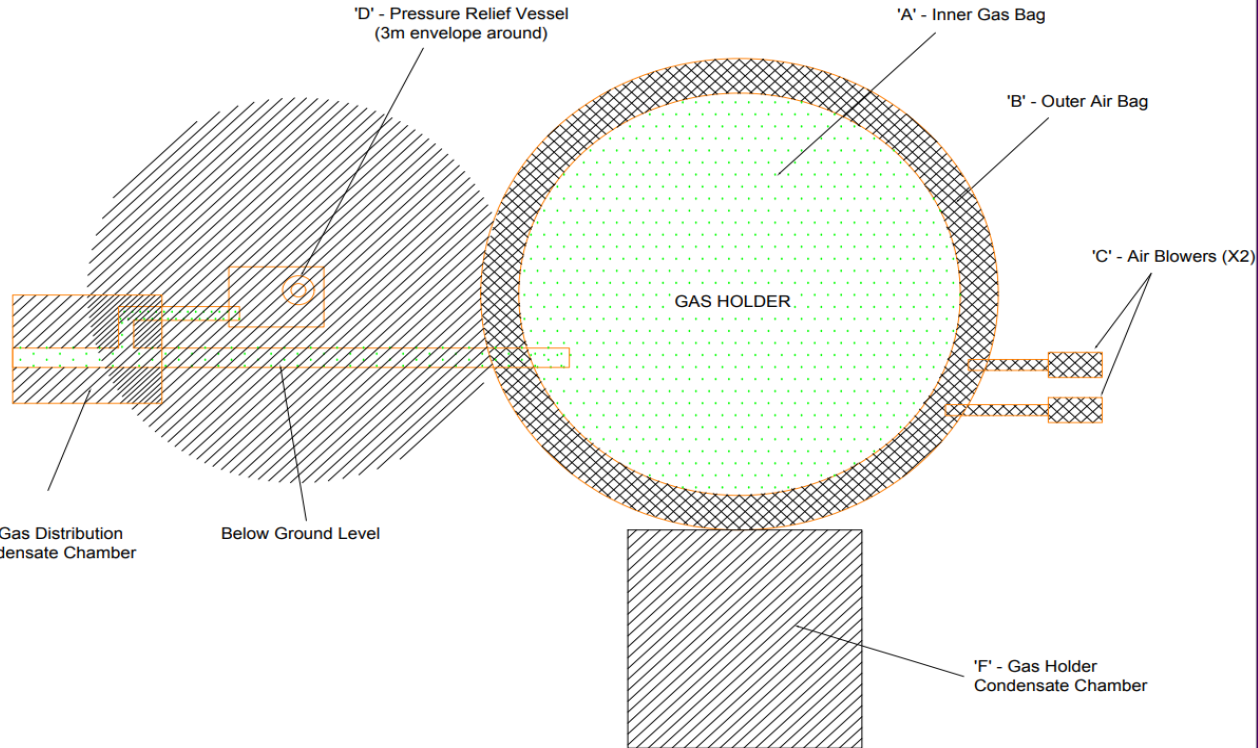
#### 5.6.2.1 Double membrane gas bag

A zone 0 was allocated inside inner membrane, zone 1 in outer membrane and zone 2 around PRVs extending 3m. This agrees with Southern Water's MED 4004 April 2015<sup>[3]</sup>.

Hazards	Control measures	Likelihood	Severity	Risk rating
Naked flames	No smoking policy on site except in designated areas. Signs present.	1	2	2
Welding / cutting: sparks and hot surfaces	Permit to work required before maintenance works can be undertaken.	1	2	2
Sparks from mobile phones	Mobile phones are not allowed to be taken into zoned areas. Signs present	1	2	2
Lightning	Exposed zoned areas fitted with protection.	1	2	2
Electrostatic discharge	Earth bonding of equipment.	1	2	2
Sparks from equipment	Ex rated equipment must be used – see catalogued equipment.	1	2	2



**GAS HOLDER COMPOUND**



CHECK PRINT DISTRIBUTION	
ARC	
CIV	
ELE	
MEC	
PRO	
SER	
STR	
PPL	
HYD	

Tick for Distribution

**CHECK PRINT INFORMATION**  
 RED - Item to modify  
 GREEN - Comment for CAD  
 BLUE - Modification complete  
 YELLOW - Item for clarification  
 Pen colours for print mark-ups

**CHECK PRINT REF: A1**

PREPARED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

PRELIMINARY CAD CHECKED BY (if require): \_\_\_\_\_

CAD CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

REASON FOR ISSUE: \_\_\_\_\_

**AUTHORISE FOR ISSUE:**

AUTHORISED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

DRAWING NO: KH.IP11SL.030.2Z2906.B REVISION: B

**NOTES**

- DO NOT SCALE. WORK TO DIMENSIONS SHOWN. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
- ALL IMAGES DENOTED ON THIS DRAWING REMAIN AS BUILT INFORMATION SUPPLIED BY (BRE) GLOBAL.
- ALL INFORMATION, BUT NOT LIMITED TO, SUPPLIED BY (BRE) GLOBAL TO REPRESENT AS BUILT INFORMATION FOR THIS DRAWING REMAIN SOLE PROPERTY OF THE SURVEY CONTRACTOR (BRE) GLOBAL.

**CURRENT VERSION INFORMATION**  
 THIS IS MORRISON DRAWING (DRYER BUILDING ZONES)  
 DRAWING NO:73863.0142 REVISION:00 - 24/01/06  
 ALSO APPROVED BY :STEVEN MANCHESTER (BRE COMPANY)  
 DATE: 31/08/2018.

DATE	ISSUE	CHKD	REV	REASON FOR ISSUE
31/08/2018	KA	SM	B	BRE COMPANY
15/05/2018	KA	SM	00	BRE COMPANY (AS BUILT)

Copyright and other intellectual property rights in this document and all related documents, drawings, etc., including calculations, is invested in BTU, and cannot be used or reproduced for any other purpose than that for which they have been created without the express permission in writing by BTU.



ZONE LEGEND		REF	SITE AREA DESCRIPTION	ZONE	T CLASS	EXTENT OF ZONE (V-VERTICAL, H-HORIZONTAL) MEASURED FROM POINT OF POSSIBLE RELEASE
ZONE 0		A	INNER GAS BAG	0	2	INTERNALLY
		B	OUTER AIR BAG	1	2	INTERNALLY
		C	AIR BLOWERS	1	2	INTERNALLY
ZONE 1		D	PRESSURE RELIEF VESSEL	2	2	EXTERNALLY - 3m 'V' AND 'H'
		E	GAS DISTRIBUTION CONDENSATE CHAMBER	2	2	INTERNALLY
ZONE 2		F	GAS HOLDER CONDENSATE CHAMBER	2	2	INTERNALLY

PROJECT TITLE: GRAVESEND WTW DERING WAY, GRAVESEND, KENT, DA122QF.

DRAWING TITLE: DSEAR GAS HOLDER PLAN

SHEET 8 OF 10

SCALE: NTS

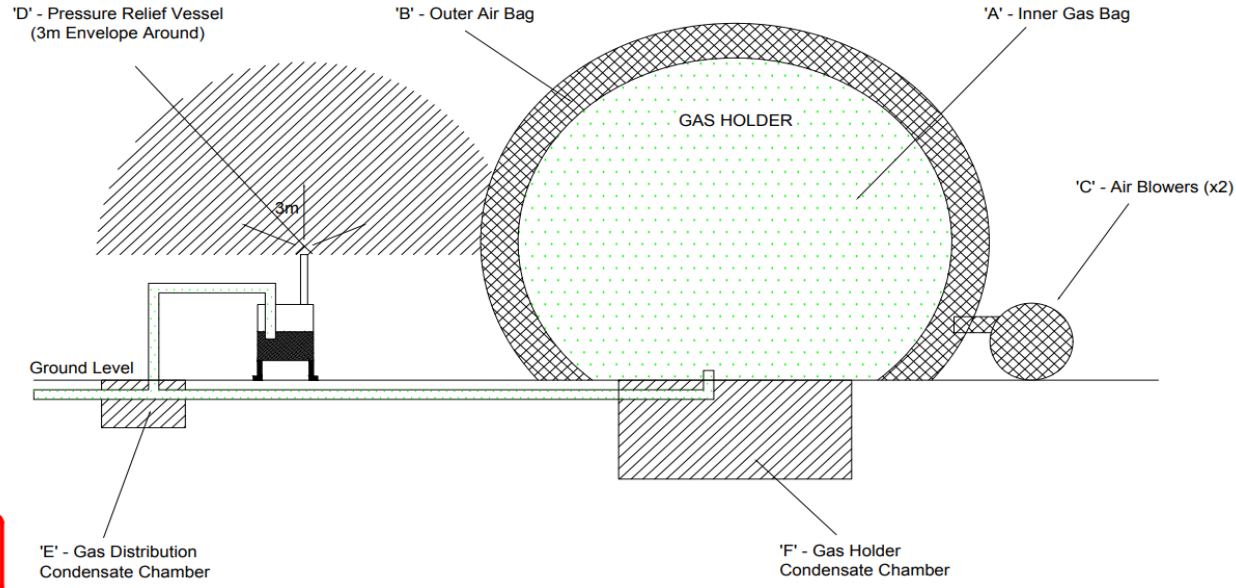
STATUS: MASTER PLAN A3

DRAWING NO: KH.IP11SL.030.2Z2906.B REVISION: B

**GAS HOLDER ELEVATION**

DRAWING NO: KH.IP11SL.030.222907.B REVISION: B

**NOTES**  
 1. DO NOT SCALE. WORK TO DIMENSIONS SHOWN. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.  
 2. ALL IMAGES DENOTED ON THIS DRAWING REMAIN AS BUILT INFORMATION SUPPLIED BY (BRE) GLOBAL.  
 3. ALL INFORMATION, BUT NOT LIMITED TO, SUPPLIED BY (BRE) GLOBAL TO REPRESENT AS BUILT INFORMATION FOR THIS DRAWING REMAIN SOLE PROPERTY OF THE SURVEY CONTRACTOR (BRE) GLOBAL.



**CHECK PRINT DISTRIBUTION**

ARC	
CIV	
ELE	
MEC	
PRO	
SER	
STR	
PPL	
HYD	

*Tick for Distribution*

**CHECK PRINT INFORMATION**  
 RED - Item to modify  
 GREEN - Comment for CAD  
 BLUE - Modification complete  
 YELLOW - Item for clarification  
 Pen colours for print mark-ups

**CHECK PRINT REF: A1**

PREPARED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

PRELIMINARY CAD CHECKED BY (if required): \_\_\_\_\_

CAD CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

REASON FOR ISSUE: \_\_\_\_\_

**AUTHORISE FOR ISSUE:**

AUTHORISED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

**CURRENT VERSION INFORMATION**  
 THIS IS MORRISON DRAWING (DRYER BUILDING ZONES)  
 DRAWING NO:73863.0142 REVISION:00 24/01/06  
 ALSO APPROVED BY :STEVEN MANCHESTER (BRE COMPANY)  
 DATE: 31/08/2018.

31/08/2018	KA	SM	SM	B	BRE COMPANY
15/05/2018	KA	SM	SM	00	BRE COMPANY (AS BUILT)
DATE:	DRWN	CHKD	REV	REV	REASON FOR ISSUE

Copyright and other intellectual property rights in this document and all related documents, drawings, etc., including calculations, is invested in BTU, and cannot be used or reproduced for any other purpose than that for which they have been created without the express permission in writing by BTU.



**BTU**  
 BTU  
 Southmoor Lane  
 Havant  
 Hampshire  
 PO9 1JW

**PROJECT TITLE**  
 GRAVESEND WTW  
 DERING WAY, GRAVESEND,  
 KENT, DA122QF.

**DRAWING TITLE**  
 DSEAR  
 GAS HOLDER ELEVATION

SHEET 9 OF 10

SITE UNIT: GRAVESEN SITE UNIT NO: 101794

PROJ: IP11SL SCALE: NTS DRAWER: A3

DRAWING NO: KH.IP11SL.030.222907.B REVISION: B

ZONE LEGEND	REF	SITE AREA DESCRIPTION	ZONE	T CLASS	EXTENT OF ZONE (V-VERTICAL, H-HORIZONTAL) MEASURED FROM POINT OF POSSIBLE RELEASE
ZONE 0	A	INNER GAS BAG	0	2	INTERNALLY
	B	OUTER AIR BAG	1	2	INTERNALLY
	C	AIR BLOWERS	1	2	INTERNALLY
ZONE 1	D	PRESSURE RELIEF VESSEL	2	2	EXTERNALLY - 3M 'V' AND 'H'
	E	GAS DISTRIBUTION CONDENSATE CHAMBER	2	2	INTERNALLY
ZONE 2	F	GAS HOLDER CONDENSATE CHAMBER	2	2	INTERNALLY



### 5.6.3 CHP

The existing CHP plant is not allocated a zoned area. The CHP plant appeared to be identical to those at Budds Farm, Millbrook and Ashford and therefore the air flow through the CHP plant is sufficient to ensure a flammable atmosphere is highly unlikely to develop. This zone is based on continual operation of the ventilation system.

The biogas area, near the CHP is not classified according to Southern Water's MED 4004 April 2015,<sup>[3]</sup> however, the equipment in the biogas area has been catalogued.



### 5.6.4 Flare stack area

According to Southern Water's MED 4004 April 2015,<sup>[3]</sup> the flare stack area is unclassified.

BRE concludes the area should be unclassified, however internally the pipework will be allocated a zone 0 classification.

The equipment in the flare stack area was catalogued to determine Ex certification.

### 5.6.5 Gas condensate traps

There are multiple gas condensate traps at the Gravesend STC. The type of condensate trap varies across the site.

There is a condensate trap, below ground in a pit in the gas bag compound. There are three condensate traps located in the biogas area next to the CHP plant and there is one final condensate trap in an isolate pit, off the pathway towards the flare stack.

The condensate pit in the gas bag compound is covered by a grid which allows good ventilation. The condensate pit towards the flare stack is covered, see Figure 4.

Based on Southern Water's MED 4004 April 2015,<sup>2</sup> condensate traps are either allocated a zone 2 internally or are allocated a zone 2 extending 3m (if not located in a pit).

Equipment in condensate traps was not catalogued as BRE aren't contracted to work in confined spaces.



Figure 4: Condensate trap, near flare stack.

Hazards	Control measures	Likelihood	Severity	Risk rating
Naked flames	No smoking policy on site except in designated areas. Signs present.	2	2	4
Welding / cutting: sparks and hot surfaces	Permit to work required before maintenance works can be undertaken.	1	2	2
Sparks from mobile phones	Mobile phones are not allowed to be taken into zoned areas. Signs present	1	2	2
Lightning	Exposed zoned areas fitted with protection.	1	2	2
Electrostatic discharge	Earth bonding of equipment.	1	2	2
Sparks from equipment <sup>2</sup>	Ex rated equipment must be used – see catalogued equipment.	n/a	n/a	n/a

<sup>2</sup> Equipment was not catalogued as BRE aren't contracted to work in confined spaces.

### 5.7 Diesel storage

There are two diesel storage tanks on site at Gravesend STC.

According to guidance given in the "Energy Institute: Model code of safe practice Part 15 – Area classification code for installation handling flammable fluids"[4] the diesel tanks were allocated a zone 1 internally above the liquid level.

Both tanks are double skinned and therefore no hazardous area classification exists outside the tanks.



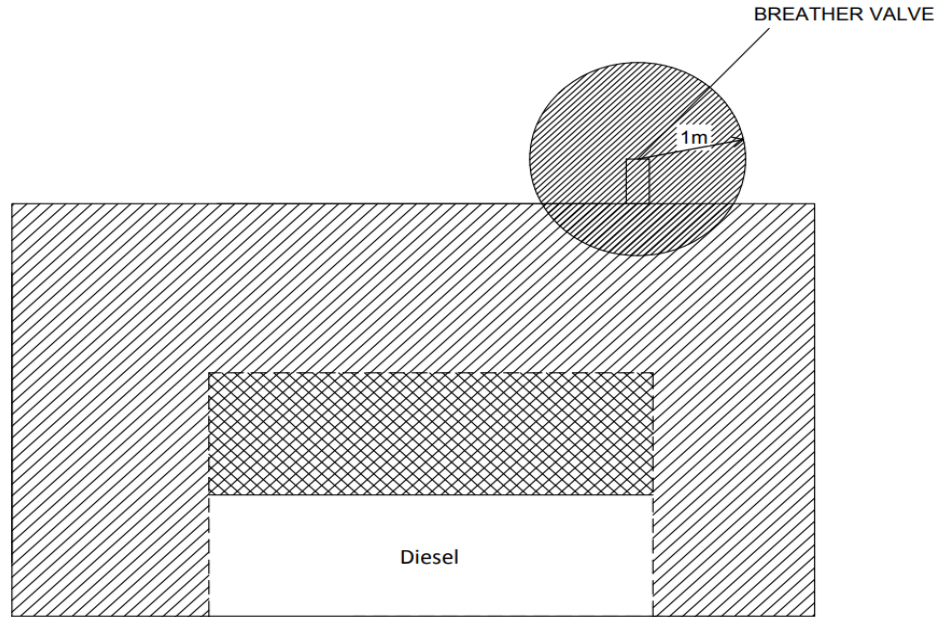
Figure 5: Diesel tank 1.



Figure 6: Diesel tank 2.

Hazards	Control measures	Likelihood	Severity	Risk rating
Naked flames	No smoking policy on site except in designated areas. Signs present.	1	2	2
Welding / cutting: sparks and hot surfaces	Permit to work required before maintenance works can be undertaken.	1	2	2
Sparks from mobile phones	Mobile phones are not allowed to be taken into zoned areas. Signs present	1	2	2
Lightning	Exposed zoned areas fitted with protection.	1	2	2
Electrostatic discharge	Earth bonding of equipment.	1	2	2
Sparks from equipment	Ex rated equipment must be used – see catalogued equipment.	n/a	n/a	n/a

DIESEL TANK - DOUBLE SKINNED



DRAWING NO: KH.IP11SL.030.2Z2910.A  
 REVISION: A

- DO NOT SCALE. WORK TO DIMENSIONS SHOWN. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
- ALL IMAGES DENOTED ON THIS DRAWING REMAIN AS BUILT INFORMATION SUPPLIED BY (BRE) GLOBAL.
- ALL INFORMATION, BUT NOT LIMITED TO, SUPPLIED BY (BRE) GLOBAL TO REPRESENT AS BUILT INFORMATION FOR THIS DRAWING REMAINS SOLE PROPERTY OF THE SURVEY CONTRACTOR (BRE) GLOBAL.

CURRENT VERSION INFORMATION  
 THIS IS (BRE COMPANY) DRAWING (NOT AS BUILT)  
 APPROVED BY :STEVEN MANCHESTER (BRE COMPANY)  
 DATE: 31/08/2018.

DATE	BY	CHKD	REV	REASON FOR ISSUE

DATE	BY	CHKD	REV	REASON FOR ISSUE
31/08/2018	KA	SM	SM	A BRE COMPANY
15/05/2018	KA	SM	SM	00 BRE COMPANY (NOT AS BUILT)

Copyright and other intellectual property rights in this document and all related documents, drawings, etc., including calculations, is invested in BTU, and cannot be used or reproduced for any other purpose than that for which they have been created without the express permission in writing by BTU.

CLIENT:

BTU  
 Southmoor Lane  
 Havant  
 Hampshire  
 PO9 1JW

PROJECT TITLE: GRAVESEND STC  
 DERING WAY, GRAVESEND,  
 KENT, DA1220F

DRAWING TITLE: DSEAR  
 DIESEL TANK HAZARDOUS

SHEET 10 OF 10  
 DRAWING NO: GRAVESEND  
 DATE ONLY: 101794

PROJ: IP11SL  
 SCALE: NTS  
 DRAWING NO: KH.IP11SL.030.2Z2910.A  
 REVISION: A

CHECK PRINT REF: A1

PREPARED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

PRELIMINARY CAD CHECKED BY (if required): \_\_\_\_\_

CAD CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

REVIEWED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

REASON FOR ISSUE: \_\_\_\_\_

AUTHORISE FOR ISSUE:

AUTHORISED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

CHECK PRINT INFORMATION

RED - Item to modify  
 GREEN - Comment for CAD  
 BLUE - Modification complete  
 YELLOW - Item for clarification

Pen colours for print mark-ups

CHECK PRINT DISTRIBUTION

ARC	
CIV	
ELE	
MEC	
PRO	
SER	
STR	
PPL	
HYD	

Tick for Distribution

ZONE LEGEND	REF	SITE AREA DESCRIPTION	ZONE	T CLASS	EXTENT OF ZONE (V-VERTICAL, H-HORIZONTAL) MEASURED FROM POINT OF POSSIBLE RELEASE
ZONE 0	A	OVERFLOW CHAMBER (SEALED)	0		INTERNALLY
	B	EXTERNAL ZONE ON TOP OF DIGESTER	1		EXTERNALLY
ZONE 1					EXTERNALLY 'V' + 'H' - 3m
ZONE 2					

## 7 FIRE RISK ASSESSMENT

Need to make sure the Site Fire risk assessment copy is stored with the Grab Pack.

Electronic link to copy of Fire Risk Assessment - [Gravesend WTW 2022 FRA.pdf](#)



## 8 COSHH DATA SHEET

COSHH data sheets for chemicals used on site should be Kept in a folder with the Grab Pack.

Electronic link to the Southern Water COSHH data sheets - [COSHH \(southernwater.co.uk\)](https://www.southernwater.co.uk/coshh)

