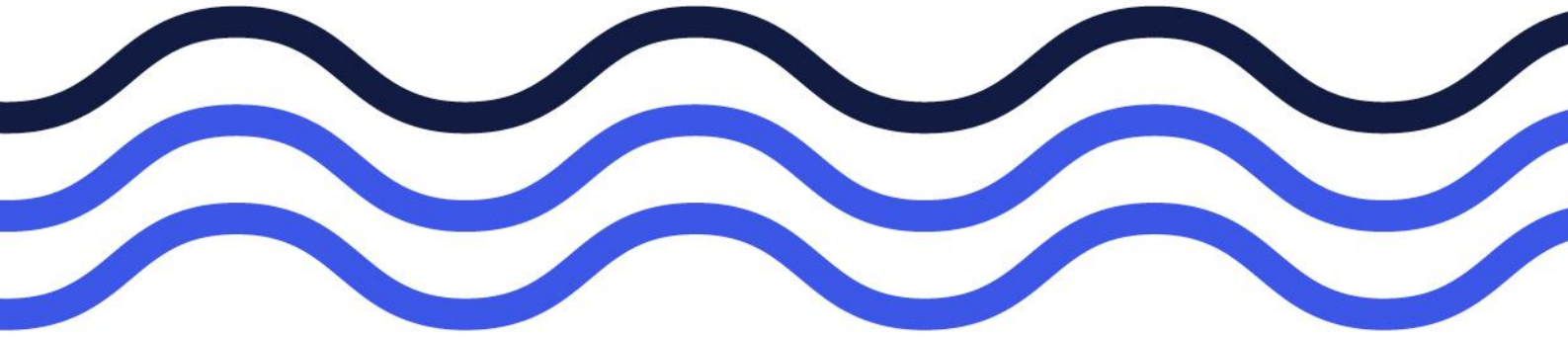
Esholt Sludge Treatment Facility: Accident Management Plan



YorkshireWater

Document Control

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Review Period:	Every 4 years or sooner in the event of changes that may impact this plan, including (but not limited to): • Changes to site activities, equipment or management / operational procedures. • An accident or incident on this site, or other similar sites (whether or not these are YW sites) that prompts a review of accident risks, preventive controls and emergency responses measures.

Document Approval

Name	**Name**
David Shaw Policy and Assurance	
Document Owner (Author)	**Document Approval Manager (Tier 3)**

Document Revision History

Version	Date	Revised By	Reviewed By	Amendment Details
1	21/10/2024	David Shaw	Hazel Morgan	New document

Business areas affected by this document

This applies to colleagues that are operating or managing Esholt STF.

1. Introduction

In accordance with the Environmental Permit for Esholt Sludge Treatment Facility (STF) (permit reference: EPR/DP3092ZJ), this document presents the Accident Management Plan for the permitted facility.

This plan is established to identify, evaluate, and prepare for potential incidents or events that could result in:

- Pollution; and / or
- not being able to comply with permit conditions.

This plan for accident prevention and management follows relevant Environment Agency guidance and includes the following sections:

- Overview of management controls (Section 2)
- Identification of relevant sensitive receptors (Section 3).
- Identification of potentially polluting substances held on site (Section 4).
- Identification potential accidents and incidents and assessment of the overall risk posed by these hazards (Section 5).
- The overall risk of each of the hazard is identified on the basis of the likelihood of the event occurring and the environmental consequence of that event, taking account of:
    - Preventive controls in place; and
    - Actions to be taken in the event of the accident / incident occurring.
- Summary of actions to be taken following an accident or incident occurring, including measures to record, investigate and respond to the incident (Section 6).
- List of emergency contacts (Section 7).

2. Overview of relevant management controls and procedures

YW has an established EMS, which is certified to the ISO 14001 standard. The EMS forms part of a wider corporate Integrated Management System (IMS) which also incorporates quality management, health and safety management, asset management, organisational resilience, and business continuity requirements. The management system follows an asset life cycle approach, from design through to decommissioning. Corporate level management system processes are in place, which are supplemented by site-specific documented procedures and processes.

YW has developed processes to identify, respond to and control emergency situations that may cause adverse environmental consequences. Spill kits are readily accessible at locations where there is a risk of spillage (e.g. delivery, storage, and areas of use). Spill control toolbox talks are provided to staff. This includes information about how to prevent and control pollution incidents from accidental spills of oils, fuels, sludge, and chemicals.

Contingency plans help minimise potential environmental impacts; this includes emergencies arising from breakdowns, enforced shutdowns, abnormal circumstances such as flooding as well as major fire and spill/loss of containment events.

The YW Business Continuity Plan is in place to define and prioritise critical business functions, details the immediate response requirements for a critical incident and details strategies and actions to be taken to ensure business continuity. All Bioresources sites, including Esholt STF, have the capability of remote monitoring and remote operation of key functions. A security guard is present on site 12 hours per day Monday to Friday and CCTV security cameras are located across the site with monitoring provided 24/7 by the YW Service Delivery Centre. All buildings are alarmed, and high-risk equipment is provided with secondary fencing for added security.

3. Sensitive receptors

A summary of sensitive receptors relevant to Esholt STF is provided in Table 1 below.

Table 1: Sensitive Receptors to site

Receptor type	Receptor description and distance
Human	
Residential housing – North	Digester area: Nearest residential properties located approximately 160m to the north (adjacent to Esholt Hall). Digested sludge area: Nearest residential property located approximately 450m to the north.
Residential housing – East	Digester area: Nearest residential property located approximately 315m to the northeast and 900m to the southeast. Digested sludge area: Nearest residential property located approximately 450m to the east.
Residential housing – South	Digester area: Nearest residential property located approximately 820m to the south. Digested sludge area: Nearest residential property located approximately 450m to the south.
Residential housing – West	Digester area: Nearest residential property located approximately 650m to the southwest. Digested sludge area: Nearest residential property located approximately 770m to the west.
Public amenity areas including public footpath / cycleway	National Cycle Network route crosses YW land directly to the West, but outside of, the installation boundary. The surrounding land use is generally wooded, with footpaths and is likely to provide local ecological and amenity interest.
Schools	There are 10 schools within approximately 2km of the site, and 2 sites within 1km. The nearest of these is 785m to the southeast of the digested sludge area.
Hospitals	There is one hospital located approximately 2km to the southwest of There are no hospitals within 2 km of the site. There is 1 hospital approximately 5 km from the site.
Industrial/commercial sites	YW-owned Esholt Hall is located approximately 140m to the northeast of the digester area.

	Home Farm Industrial Park (comprising a number of office units) is located approximately 315m to the northeast of the digester area.
Ecological	
Habitat sites – statutory designations	There is one internationally designated site within 10km of the installation (a SAC/SPA) and one nationally designated site within 2km; this is a SSSI designated for geological reasons.
Habitat sites – local sites and non-statutory designations	The surrounding land use is generally wooded, with footpaths and is likely to provide local ecological interest.
Protected species	Possible presence of protected species on or off sites.
Environment – Other	
Global atmosphere	Local, regional, and global atmosphere.
Local atmosphere	Local atmosphere. Site is not located within an AQMA.
Ground/groundwater	Underlying groundwater classed as a Secondary A aquifer; groundwater vulnerability classed as medium-high. Groundwater source protection zone located 1.2km to the northeast
Surface water	River Aire directly adjacent to installation boundary. Likely hydraulic continuity between underlying groundwater and river.

4. Inventory of potentially polluting materials

In assessing potential accidents and incidents consideration has been given to the potentially polluting substances held on site, including review of their properties, toxicity and the volume stored. 0 details the raw materials stored on site, 0 details the sludge, sludge cake and process liquors stored on site and 0 details the waste materials stored on site.

Table 2: Raw Materials Associated with the Facility and their Potential to Pollute (Main app pp.258)

Substance (Contaminants)	Use	State	Storage Arrangements	Toxicity/ Fate/ Mobility
Polymer (powder) and mixed polymer	Coagulant used for raw and digested sludge dewatering	Solid	Raw sludge dewatering: External storage silo (steel, 15 tonne capacity) located on hardstanding. Feeds adjacent mixing tank (GRP, 25 litre capacity). Digested sludge dewatering (sludge export facility): External storage silo (steel, 15 tonne capacity) located on hardstanding. Feeds adjacent mixing tank (GRP, 25 litre capacity). Digested sludge dewatering (conditioning area): 750kg bags stored internally.	Polluting if mobilised to watercourses in the event of a spillage/loss
Polymer (liquid)		Liquid	Use and storage in IBCs within GRP kiosk.	
Polymer (liquid)	Diluted coagulant used for thickening undigested surplus activated sludge (SAS).	Liquid	Liquid polymer is delivered to the SAS thickener building in either 1 m^3 IBCs or via bulk tanker deliveries. Bulk polymer deliveries are transferred into a 10 m^3 bunded GRP bulk storage tank located within the thickener building and from there are transferred to the 3 m^3 bunded GRP polymer prep tank. IBC deliveries directly feed the liquid polymer prep tank. Liquid polymer is diluted with potable water within the 3 m^3 bunded GRP polymer prep tank before being transferred to the adjacent 3 m^3 bunded GRP polymer make up tank. Both the make up and prep tanks are located within a common bund. The polymer solution is injected into the sludge stream before being transferred to thickener drums.	Polluting to soil and watercourses in the event of a spillage/loss

Substance (Contaminants)	Use	State	Storage Arrangements	Toxicity/ Fate/ Mobility
Antifoam	Digester antifoaming agent	Liquid	IBC (1 m^3) stored on bunded pallet with associated dosing pump and pipework within dosing cabinet.	Polluting to soil and watercourses in the event of a spillage/loss
Water treatment chemicals	Boiler treatment	Liquid and solid	Some storage of small quantities within locked containers in CHP compound. 3 No. 220litre drums stored within specified area in boiler house. Boiler water softener (bagged) stored on pallet within boiler house.	
Glycol	Antifreeze for use in CHP equipment	Liquid	2 No.IBC (1 m^3) stored on bunded pallet within locked containers in CHP compound.	
Biogas	Generated and stored within the AD	Gas	Transferred from AD to gas holder for use in the CHP	Volatile and unlikely to pollute watercourses or land in the event of escape
Gas oil	Stand-by boiler fuel	Liquid	Double bunded tank of 108,000litre capacity. Fill point is contained within bunding. Tertiary containment on surrounding hardstanding	Polluting to soil and watercourses in the event of a spillage/loss
Lubricating oil	For use in CHP and other equipment	Liquid	1m^3 IBC (internal). Small intermediary containers in use for compressor maintenance and stored locally (internal).	
Diesel	Fuel for mechanical loaders working on cake pad / barn	Liquid	2,500 litre integrally bunded tank	
Transformer oil	Transformer only	Liquid	No storage other than volume in use	
Propane	Gas oil preheat	Gas	Bottles stored within boiler house and designated storage cage adjacent to the stack	Volatile and unlikely to pollute water courses or land in the event of escape.

Table 3: Bulk Storage of Sludge, Sludge Cake and Process Liquors and their Potential to Pollute

Material	Nature of material	Storage Arrangements	Nominal capacity (m^3)
Raw sludge (un-thickened)	Liquid	Incoming underground pipes from Esholt WwTW	-
		Sludge screen feed tank, concrete. High level alarms, linked to SCADA	655

Screened sludge	Liquid	Consolidation tank 5, construction concrete	2,500
		Mixed sludge tanks x 2, concrete construction	1,200 and 1,130
SAS	Liquid	SAS storage tanks x 2, concrete construction	2,000 each
		SAS storage tanks x 2, concrete construction	400 each
Dewatered sludge	Liquid	THP feed silos x 2, steel construction	210 each
		THP feed hopper, steel construction	16.2
		THP vessels x 6, steel construction	22.7 each
		Buffer tank, steel construction	39.5
Sludge within digester	Liquid	Digester tanks x 4, concrete construction, aluminium clad	3,533 each
Digested sludge	Liquid	Degassing tanks x 2, GRP coated concrete	685 each
		Export dewatering feed tanks x 2, steel construction	1,604
		Conditioning dewatering feed tanks x 2, concrete construction	1,200 and 1,130
Sludge transfer	Liquid	Above ground and below ground sludge transfer pipework	-
Dewatering liquor	Liquid	Centrate pumping stations and associated underground pipework	-
		Liquor balance tank	800
Run-off / washwater from concrete pad	Liquid	Return pipework (underground, running from southern to northern installation area)	-
Cake	Solid	Imported, undigested cake reception unit	30
		Storage areas (barn and pad)	5,500 tonnes (estimated maximum)

Table 4: Process Wastes and Potential to Pollute (Main application pp.260)

Waste Type	Nature of material	Storage Arrangements	Storage and Disposal Method
Sludge screenings	Non-hazardous	Open skip on hardstanding	Collected by approved waste contractor for off-site disposal
Waste oil	Hazardous	Bunded container within bunded containment	Collected by approved waste contractor for off-site disposal
General waste	Non-hazardous	Dedicated skips on hardstanding and gravel areas	Collected by approved waste contractor for off-site disposal
Metals	Non-hazardous	Skip within designated area	Collected by approved waste contractor for off-site disposal
Mixed recycling	Non-hazardous	Skip within designated area	Collected by approved waste contractor for off-site disposal
Wood	Non-hazardous	Skip within designated area	Collected by approved waste contractor for off-site disposal (recycled or treated via EfW)
Empty IBCs	Hazardous	Dedicated area prior to collection	Collected by approved waste contractor for off-site disposal
Oil contaminated absorbents	Hazardous	Dedicated drum containers	Collected by approved waste contractor for off-site disposal
Oil filters	Hazardous	Dedicated drum containers	Collected by approved waste contractor for off-site disposal

5. Accident Management Plan

The potential for accidental releases resulting from the activities proposed in this variation application are identified and assessed in Table 5 below. This includes a summary of measures in place to manage/reduce accident risks. Refer to Appendix 1 for the scoring mechanism.

Table 5: Potential accidental releases and associated risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
Site Wide - general						
Flooding leading to damage to site processes and/or mobilisation of polluting materials	Ground / groundwater / surface waters	Floodwaters / Infiltration	**Preventative controls** • Flood risk review undertaken. Parts of the STF installation lie within Flood Zone 2 (land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding), and parts lie within Flood Zone 1 (Land having a 1 in 100 or greater annual probability of river flooding). • The site is built on a gradient. Major process tanks are constructed significantly above river level. • Materials are stored in appropriately sealed containers (preferably bulk or semi-bulk), or proprietary secondary containment cabinets, such that the risk of contents being mobilised, or containers being washed away in a flood event is low. • Vulnerable Asset Protection Plan specifically details flooding actions including how river	Likely	Medium	Moderate risk

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What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
			levels should be monitored and what actions are required. **In the event of an incident/accident** • Initiate site emergency plan. • Remove mobile fuel/ chemical sources away from flood risk, if appropriate and safe to do so.			
Flooding due to drain blockages and/or excessive rainfall causing localised on-site surface water flooding leading to damage to site processes and/or mobilisation of polluting materials	Ground / groundwater / surface waters	Floodwaters / Infiltration	**Preventative controls** • Drains are monitored for blockages and cleaned as required. • Materials are stored in appropriately sealed containers (preferably bulk or semi-bulk), or proprietary secondary containment cabinets, such that the risk of contents being mobilised, or containers being washed away in a flood event is low. • Vulnerable Asset Protection Plan specifically details flooding actions. • Planned maintenance / inspection of site drainage systems. **In the event of an incident/accident** • Initiate site emergency plan. • Remove mobile fuel/ chemical sources away from flood risk, if appropriate and safe to do so.	Unlikely	Mild	Low risk
Fire	Nearby human receptors	Air	**Preventative controls**	Highly unlikely	Severe	Low risk

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What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
	Local air quality and global climate impacts Ground / groundwater / surface waters	Overland runoff / infiltration / drainage systems	• Regular maintenance of equipment; LDAR programme in place. • Fire alarms are fitted in CHP/boiler rooms. • DSEAR assessment has been completed for site and only appropriate ATEX rated equipment may be used in high-risk areas. • Access controls in place for digester compound and portable gas monitor use required when inside compound. • Site does not treat combustible wastes. Sludge is wet. • Gas slam shut valves on biogas feeds to the CHP / boiler. • Gas and fire detection in the boiler/CHP rooms, and other key AD plant areas. • Lightning protection provided for biogas storage. **In the event of an incident/accident** • Follow site emergency procedure. • Hydrants connected to a final effluent supply can be used by the fire service. • Excess biogas created by the site will be burnt through the flare.			
Failure to contain firewater following fire / explosion event	Ground / groundwater / surface waters	Floodwaters / Infiltration	**Preventative controls** • Site drainage collects and returns surface/yard water to WwTW for treatment.	Highly unlikely	Medium	Low risk

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leading to localised on site surface water flooding leading to damage to site processes and/or mobilisation of polluting materials			(with the exception of roof water from two buildings). • Site drainage systems, hardstanding, sumps, storm tanks etc will minimise flow of firewater to receptors. **In the event of an incident/accident** • Initiate site emergency procedure.			
Excessively low temperatures leading to blockages or damage to pipework, valves or equipment and unplanned release of gas with fire / explosions risks and/or release of potentially polluting liquids	Nearby human receptors Local air quality and global climate impacts Ground / groundwater / surface waters	Air Overland runoff / infiltration / drainage systems	**Preventative controls** • 'Winterisation' procedures. • Bunding provided to environmentally critical plant and equipment. • Current YW technical standards include trace heating for vulnerable pipework. **In the event of an incident/accident** • Isolate systems as appropriate and initiate fire, spill and emergency response procedures, cleaning up spill and disposal of wastes appropriately. • Carry out repairs (as required).	Unlikely	Mild	Low risk
Generalised or localised power failure leading to failure of pumps /	Nearby human receptors	Air Overland runoff /	**Preventative controls** • Site has a dual power supply to minimise risk of power failure.	Unlikely	Mild	Low risk

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control systems and escape of sludge and/or biogas	Local air quality and global climate impacts Ground / groundwater / surface waters	infiltration / drainage systems	• Process for recovering from power failure has been planned and recorded. • In the event of power failure, sludge transfers will stop but this will not affect security of containment e.g., tanks will not overflow. **In the event of an incident/accident** • Halt sludge imports to site. • Confirm backup power supply is online. • Confirm that all systems are operating normally.			
Vandalism / site security failure leading to unplanned release of gas with fire / explosions risks and/or release of potentially polluting liquids (chemicals, oils, sludges)	Nearby human receptors Local air quality and global climate impacts Ground / groundwater / surface waters	Air Overland runoff / infiltration / drainage systems	**Preventative controls** • High level of security on site with 24 hr security monitoring, secure entry gate systems and locked cabs and control units. • In addition to perimeter fencing around site, key digestion equipment sits within a separate fenced area. • Storage containers bunded. **In the event of an incident/accident** • Isolate systems as appropriate and initiate fire, spill, and emergency response procedures, cleaning up spill and disposal of wastes appropriately. • Carry out repairs (as required). • Review security measures on site.	Highly unlikely	Mild	Negligible risk
Cyber security incident which	Nearby human receptors	Air	**Preventative controls**	Highly unlikely	Mild	Negligible risk

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What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
leads to unauthorised site access and unplanned release of gas with fire / explosions risks and/or release of potentially polluting liquids (chemicals, oils, sludges)	Local air quality and global climate impacts Ground / groundwater / surface waters	Overland runoff / infiltration / drainage systems	• YW operates an information security management system to provide cyber security protection and response. • High level of security on site with 24 hr security monitoring, secure entry gate systems and locked cabs and control units. • Storage containers bunded. **In the event of an incident/accident** • Isolate systems as appropriate and initiate fire, spill, and emergency response procedures, cleaning up spill and disposal of wastes appropriately. • Carry out repairs (as required). • Review cyber security measures.			
Failure of chemical or oil containment due to deterioration of storage containers, pipework or valves leading to spillage	Ground / groundwater / surface waters	Overland runoff / infiltration / drainage systems	**Preventative controls** • All oil storage and waste oil storage tanks are fully bunded (using either fixed or mobile bunds). • Joints external to containment minimised and fully welded. • Tank and pipework inspections undertaken as part of routine maintenance. • Operational procedures for refilling oil and chemical storage tanks. Spill kit to be available at tanks.	Unlikely	Mild	Low risk

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What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
			• Any oil spill around engines during maintenance will be cleaned up and disposed of appropriately. **In the event of an incident/accident** • Isolate systems as appropriate and initiate spill response procedure, cleaning up spill and disposal of wastes appropriately. • Carry out repairs (as required). • Review systems to prevent recurrence.			
Failure of chemical or oil containment during delivery	Ground / groundwater / surface waters	Overland runoff / infiltration / drainage systems	**Preventative controls** • Delivery procedures inc. supervision by site staff, check on space available in receiving tank. • Storage containers bunded. • Chemical/oil storage only in area surrounded by hardstanding with all drainage directed to WwTW. **In the event of an incident/accident** • Follow incident plan.	Unlikely	Mild	Low risk
Vehicle impact leading to loss of pressurised gas and explosion / fire risk or loss of liquid containment	Nearby human receptors Contribution to local air pollution and global warming	Air	**Preventative controls** • Site speed limits in place to reduce chance and consequence of collision. • Tanker discharge point and access to this area are controlled by manned security point at main site entrance. • Key areas including barriers to prevent collision with equipment.	Unlikely	Medium	Low risk

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(chemicals, oils, sludges)	Ground / groundwater / surface waters		• Key digestion assets including digestion tanks are set back from road and surrounded by a fence. • Site drainage will capture spills related to pipe failure. **In the event of an incident/accident** • Isolate systems as appropriate and initiate fire, spill and emergency response procedures, cleaning up spill and disposal of wastes appropriately. • Carry out repairs (as required)			
Excessive noise from plant or equipment e.g., due to equipment deterioration or failure	Nearby human receptors	Air	**Preventative controls** • Procurement controls mean plant are selected to comply with relevant noise limits. • Regular maintenance completed to ensure equipment operates within normal noise parameters. • Acoustic enclosures / controls on some noise generating plan (e.g. compressors). • Sensitive receptors not located within close proximity to the site. **In the event of an incident/accident** • Investigate cause and implement preventive measures, which may include system maintenance interventions.	Unlikely	Mild	Low risk
THP						

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What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
Excessive has pressure in vessels causing pipework/tank rupture	Nearby human receptors Ground / groundwater / surface waters	Air Overland runoff / infiltration / drainage systems	**Preventative controls** • Operators are trained to operate site within design parameters. • Process has automated process in place to prevent dangerous occurrences. • Alarms alert operators if a hazardous situation is developing. **In the event of an incident/accident** • Pressure relief valves are fitted to tanks to protect against damage from excess pressure.	Unlikely	Medium	Moderate/Low risk
Site wide - sludge pipework, tanks, valves						
Spillage of sludge during transfer / handling activities	Ground / groundwater / surface waters	Overland runoff / infiltration / drainage systems	**Preventative controls** • Staff training on system operation. • Hardstanding in key/high risk areas. • Site drainage returns surface runoff to WwTW **In the event of an incident/accident** • Isolate systems as appropriate and initiate spill response procedure, cleaning up spill and disposal of wastes appropriately.	Likely	Minor / negligible	Low risk
Failure (cracks, splitting) of underground pipework (e.g. fuel, chemicals,	Ground / groundwater / surface waters	Infiltration	**Preventative controls** • Existing underground pipework will be periodically surveyed using in-pipe crack detection technology. • Where new pipework at the site has to be underground, the containment provision will	Unlikely	Medium	Moderate / Low risk

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sludge, site drains)			be risk assessed and appropriate design specification implemented, which may include secondary containment and leak detection. **In the event of an incident/accident** • Damaged pipe will be isolated. • Spill management procedure will be followed. • Repairs to damaged pipework will be arranged.			
Minor failure of sludge storage tanks / digester tanks e.g., tank overtopping, pipework leaks	Ground / groundwater / surface waters	Overland runoff / infiltration / drainage systems	**Preventative controls** • High level probes to prevent overfilling of tanks, overflow pipework is in place as a failsafe. • Trace heating is provided to tank level gauges to prevent freezing and reduce the risk of false readings. • Site is monitored on a daily basis. • Infrastructure maintenance and inspections. • Protective measures as for sludge spillage. • Refer to Secondary Containment Report for details of risk assessment **In the event of an incident/accident** • Isolate systems as appropriate and initiate spill response procedure, cleaning up spill and disposal of wastes appropriately. • Arrange repairs.	Likely	Minor / negligible	Minor risk

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What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
Major failure of digester or other sludge storage tank or associated pipework leading to large scale sludge loss/spillage	Ground / groundwater / surface waters	Overland runoff / infiltration / drainage systems	**Preventative controls** • Design and construction of assets is governed by relevant YW technical standards to ensure it is fit for purpose. • Infrastructure maintenance and inspections. • Existing and planned bunding / secondary containment (Refer to Secondary Containment Report). • Site drainage returns to WwTW for safe processing. **In the event of an incident/accident** • Cancel all sludge deliveries to site. • Isolate systems as appropriate and initiate spill response procedure, cleaning up spill and disposal of wastes appropriately.	Highly unlikely	Severe	Moderate / Low risk
Biogas pipework, valves, vents						
Failure of biogas pipework, valves, and biogas holder (corrosion, cracks, material defects etc) leading to **minor** release of biogas and slight fire / explosion risk	Nearby human receptors Local air quality and global climate impacts	Air	**Preventative controls** • Design and construction of pipework is governed by relevant YW technical standards to ensure it is fit for purpose. • Most biogas pipework operates at low pressures. • Pipework/gas holders protected from excessive pressure by pressure relief valves. • Pipework is above ground where possible to facilitate inspection and maintenance.	Unlikely	Minor / negligible	Negligible risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
			• Maintenance schedule defined as part of LDAR strategy at site. • Requirements around use of ATEX rated equipment control risk of leak leading to fire/explosion. **In the event of an incident/accident** • Consider need to isolate pipework. • Consider need to initiate emergency response procedures. • Arrange repair to affected asset.			
Failure of biogas pipework, valves, and biogas holder (corrosion, cracks, material defects etc) leading to **major** release of biogas and fire/ explosion risk	Nearby human receptors Local air quality and global climate impacts	Air	**Preventative controls** • Design and construction of pipework is governed by relevant YW technical standards to ensure it is fit for purpose. • Most biogas pipework operates at low pressures. Pipework/gas holders protected from excessive pressure by pressure relief valves. • Pipework is above ground where possible to facilitate inspection and maintenance. • Maintenance schedule defined as part of LDAR strategy at site. • Standard operational H&S requires staff to wear personal gas monitors at all times, these will detect large scale leakage from pipes.	Highly Unlikely	Medium	Low risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
			• Requirements around use of ATEX rated equipment control risk of leak leading to fire/explosion. **In the event of an incident/accident** • Immediately follow safety control mechanisms in place to isolate pipework / equipment. • Consider need to initiate emergency response procedures.			
Breakdown or other damage to on-site gas consumers e.g. CHP/boiler leading to disposal of biogas without energy recovery	Nearby human receptors Local air quality and global climate impacts	Air	**Preventative controls** • Site is designed to minimise risk of uncontrolled release to air. • Operational and maintenance controls in place to ensure reliability of equipment and minimise requirement to send biogas to flare. • There are four CHP engines and two steam boilers with biogas firing capability, therefore flaring rarely occurs. **In the event of an incident/accident** • Any remaining capacity on on-site gas storage will fill. • Once gas storage is full flare will operate, ensuring proper combustion of biogas. • If flare fails, gas will vent through PRVs to prevent damage to site gas system.	Unlikely	Mild	Low risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
Failure of flare leading to release of unburnt biogas to atmosphere	Local air quality and global climate impacts	Air	**Preventative controls** • Flare burns biogas in a controlled way to reduce environmental harm. • Operational and maintenance controls in place to minimise requirement to send biogas to flare. • Flare has control system that ensures ignition e.g., flame detection. • Maintenance programme in place to ensure that flare is always in good operational condition. **In the event of an incident/accident** • Raise urgent maintenance request for repairs to flare. • If flare fails, valve will automatically shut down flow of gas to flare. • Once all site gas containment is full, pressure will release through PRVs to prevent damage to equipment and uncontrolled release of biogas.	Unlikely	Mild	Low risk
Incorrect setting or damage to emergency pressure relief valves leads to premature release of gas or	Local air quality and global climate impacts	Air	**Preventative controls** • Inspection and maintenance of PRVs carried out on a routine basis to ensure they are set and operate correctly. • Checks on PRVs part of normal operational routine.	Unlikely	Minor / negligible	Negligible risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
valve fails to reseat after release leading to uncontrolled release of biogas to atmosphere			• Over-pressure alarms in control system will alert site staff to incidents that could trigger PRV release. **In the event of an incident/accident** • Follow management procedures to ensure that the valves are re-seated/pressure setting adjusted rapidly and without putting staff at risk.			
Digester foaming blocks gas lines, leading to release of biogas and/or foam through PRVs	Local air quality and global climate impacts	Air	**Preventative controls** • Feed rate to digesters is controlled to prevent organic overloading. • Digester mixing is regularly assessed as part of operational checks to ensure that it is functioning effectively. • Feedstock assessment ensures that nature and quality of feedstock is understood. • Anti-foam system is fitted to digesters to control foaming. **In the event of an incident/accident** • Follow site procedures for dealing with foaming. • Investigate cause and implement preventive measures. • Ensure that PRVs are not blocked with foam and operating correctly to protect tanks. • Ensure PRVs reseat once pressure in headspace returns to normal levels.	Unlikely	Mild	Low risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
Spillage / loss of containment of liquids	Ground / groundwater / surface waters	Overland runoff / infiltration / drainage systems	**Preventative controls** • Checks on condensate traps and valves are part of regular operational routine. • Condensate runs to site drainage for treatment. • Digester operation is controlled to minimise risk of foaming, which could lead to blockages on condensate system. **In the event of an incident/accident** • Clear up any spills. • Ensure all valves are operating correctly.	Unlikely	Minor / negligible	Negligible risk
Sludge treatment processes						
Import of sludge which does not meet waste acceptance criteria leading to disruption to sludge treatment processes	Ground	Spread to land as part of disposal	**Preventative controls** • YW control all sites supplying sludge to the STF. Only YW sewage waste is imported to Esholt STF, this has a consistent composition and comes from carefully controlled treatment processes. • Prior to initial acceptance of sludge from a new YW site, a screening assessment will be completed to confirm it is safe and stable. • JRP – WaSP system records the dry solids, volume and origin of every import brought to site. • Site operators and tanker drivers are trained to identify problem sludges and divert them to alternative sites for treatment.	Unlikely	Minor / negligible	Negligible risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
			In the event of an incident/accident • Digester health will be investigated to understand cause of problem and best route to resolution. • Digestate being removed from digesters will be subject to enhanced monitoring to ensure that there is no environmental risk. Note this is also a HACCP requirement. • Where relevant the Environment Agency will be alerted that a problem has occurred. • The root cause of the problem will be investigated, and procedures updated so the incident cannot recur.			
Failure/blockage of sludge screening facility leading to spillage and excess odour emissions	Ground Air	Overland runoff / infiltration / drainage systems Odour to air	**Preventative controls** • Design and construction controls ensure equipment is correctly specified for task. • Maintenance to ensure reliable operation of equipment. • Imports are from YW sites which gives control over content. • Hardstanding around import facility prevents spills travelling to land. • Site drainage will collect spills and return to WwTW for treatment. **In the event of an incident/accident** • Stop imports. • Clean up spill.	Likely	Minor / negligible	Low risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
			• Unblock screens.			
Sludge contamination leading to inhibition of microbial activity / process disruption and insufficient digestion	Ground	Spread to land as part of disposal	**Preventative controls** • Management controls to identify potentially problematic sludges at source. • All sludge imports are from YW sites where sludge characteristics are considered stable. • Contamination levels would need to be very severe to significantly impact digestion processes due to the very large digester volume. **In the event of an incident/accident** • Assess digester content to decide best route to normal digester health. • Sample cake prior to export from site to confirm it is safe to spread to land. • Review acceptance procedures.	Highly Unlikely	Medium	Low risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
Excessive feeding of digester leads to reduced retention time and failure to meet pathogen kill requirements	Ground / groundwater / surface waters	Spread to land as part of disposal	**Preventative controls** • THP prior to digestion achieves high pathogen kill and improves sludge digestibility. • Staff training • Digesters have a maximum feed interlock ensuring that a set daily feed volume cannot be exceeded. This limit has been calculated to ensure digester stability and environmental safety. • HACCP monitoring. **In the event of an incident/accident** • Turn off digester feed. • Stop additional sludge imports until normal operational situation returns.	Highly Unlikely	Medium	Low risk
Failure of dewatering process leading to discharge to cake pad of cake with high water content	Ground / groundwater / surface waters	Overland runoff / infiltration / drainage systems	**Preventative controls** • Liquid runoff from sludge cake pad collected and directed to WwTW for treatment. System has large storage and handling capacity. **In the event of an incident/accident** • Switch off centrifuge and identify cause of problem.	Unlikely	Minor/negligible	Negligible risk
Temporary cessation of land spreading e.g. due to extreme weather	Local air quality and global climate impacts	Air	**Preventative controls** • Esholt cake storage is normally within a covered barn, which under normal circumstances, has spare capacity. If this	Likely	Minor/negligible	Low risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
conditions, leading to build up of digested sludge cake			becomes full, a cake storage pad is available to hold excess production. • Additional storage is available at nearby YW sites. **In the event of an incident/accident** • Monitor available storage on cake barn and reduce/stop sludge imports as required. • Divert sludge imports to alternative YW sites for storage.			
Very warm weather leading to increase in odour generation from sludge cake	Local air quality	Air	**Preventative controls** • Only likely to happen during a prolonged of extreme weather event. • Sludge cake secondary maturation or lime addition not required at this site due to THP. Cake is normally removed from site promptly. **In the event of an incident/accident** • Initial response would be to review operating times and avoid cake generation during problematic weather events, considering both temperature and wind. • If this was not sufficient, YW would look to remove cake from site and store elsewhere.	Likely	Minor/negligible	Low risk
Odour extraction and dispersal						
Failure of components	Nearby human receptors	Air	**Preventative controls**	Unlikely	Mild	Low risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
within odour extraction and dispersal systems leading to reduced dispersion of odorous emissions to air	Local air quality and global climate impacts		• Regular operational checks on systems (e.g. fan operation). • Inspection and maintenance schedule to ensure reliability of extraction and treatment system. **In the event of an incident/accident** • Follow operational procedures to minimise generation of emissions until system is repaired.			
CHPs, Boiler, and other gas consumers						
Excessive emissions to air from boilers and CHP e.g., due to equipment failure, poor performance or malfunction leading to incomplete or inefficient combustion	Nearby human receptors Local air quality and global climate impacts	Air	**Preventative controls** • Planned preventative maintenance in place for equipment to ensure assets continue to meet original specification on emissions. • Site operational knowledge supported through contracts with specialist providers. • Regular emissions monitoring timetable in operation to confirm required performance level is maintained. **In the event of an incident/accident** • Investigate cause and implement preventive measures, which may include system maintenance interventions.	Unlikely	Mild	Low risk
Pipe Bridge						
Rupture due to impact	Surface waters	Air	**Preventative controls**	Highly unlikely	Medium	Low risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
			• Pipes are attached to the downstream side of road bridge. This is of a substantial concrete construction. • The river is not navigable by boats, no risk of impact from river traffic. • Site flood protection plan dictates that process is stopped once river level reaches pre-determined level. Pumps will not be actively moving sludge across bridge in high water situations. **In the event of an incident/accident** • Pressure sensors will automatically stop pumps moving flow over pipe bridge.			
Rupture due to freezing	Surface waters	Air	**Preventative controls** • Insulation fitted to pipes. • Trace heating fitted to all pipes at risk of freezing including sludge, wash water, and potable water. **In the event of an incident/accident** • Pressure sensors will automatically stop pumps moving flow over pipe bridge.	Unlikely	Mild	Low risk
Rupture due to pressure	Surface waters	Air	**Preventative controls** • Air release valves fitted to pipework. • Pumps that have potential to generate high pressures e.g. progressive cavity pumps will be fitted with high pressure cut out sensors.	Highly Unlikely	Medium	Low risk

What harm can be caused and who can be harmed			Managing the risk	Assessing the risk (after preventative controls)		
Hazard	**Receptor**	**Pathway**	**Risk management**	**Probability of exposure**	**Environmental Consequence**	**What is the overall risk?**
What has the potential to cause harm?	**What is at risk? What do I wish to protect?**	**How can the hazard get to the receptor?**	**What measures will you take to reduce the risk? If it occurs – who is responsible for what?**	**How likely is this contact?**	**What is the harm that can be caused?**	**What is the risk that still remains?**
			• Maintenance and inspection regime to confirm integrity of pipes. **In the event of an incident/accident** • Pressure sensors will automatically stop pumps moving flow over pipe bridge.			

Risk Assessment Methodology

The risk assessment methodology employed for the accident management plan is summarised in Tables A to D below.

The overall risk rating for each of the identified risk scenarios is determined on the basis of the probability of the scenario occurring (the probability/likelihood score) and the environmental consequence(s) if the scenario were to occur (the consequence score). The probability and consequence categories used in this methodology are provided in Tables A and B below.

Table A: Classification of Consequences

Classification	Definition
Severe	• Acute risks to human health • Short-term risk of pollution of sensitive water resource (e.g. major spillage into controlled waters) • Impact on controlled waters e.g. large-scale pollution or very high levels of contamination • Catastrophic damage to buildings or property (e.g. explosion causing building collapse) • Ecological system effects – irreversible adverse changes to a protected location. Immediate risks
Medium	• Chronic risks to human health • Pollution of sensitive water resources (e.g. leaching of contaminants into controlled waters) • Ecological system effects – substantial adverse changes to a protected location • Significant damage to buildings, structures and services (e.g. damage rendering a building unsafe to occupy, such as foundation damage)
Mild	• Non-permanent health effects to human health • Pollution of non-sensitive water resources (e.g. pollution of non-classified groundwater) • Damage to buildings, structures and services (e.g. damage rendering a building unsafe to occupy, such as foundation damage) • Substantial damage to non-sensitive environments (unprotected ecosystems e.g. crops)
Minor/Negligible	• Non-permanent health effects to human health (easily prevented by appropriate use of PPE) • Minor pollution to non-sensitive water resources • Minor damage to non-sensitive environments (unprotected ecosystems e.g. crops) • Easily repairable effects of damage to buildings, structures, services or the environment (e.g. discoloration of concrete, loss of plants in a landscaping scene)

Table B: Classification of probability / Likelihood

Classification	Definition
High Likelihood	An event is very likely to occur in the short term, and is almost inevitable over the long term OR there is evidence at the receptor of harm or pollution
Likely	It is probable that an event will occur. It is not inevitable, but possible in the short term and likely over the long term
Unlikely	Circumstances are possible under which an event could occur. It is by no means certain that even over a longer period such an event would take place, and less likely in the short term
Highly Unlikely	Probability is so low that it is close to zero; It is improbable that an event would occur even in the very long term

Table C below provides the matrix used to identify the overall risk category using these consequence and probability categories.

Table C: Risk Matrix and Terminology Used for Risk Assessments

		Consequence			
		Severe	**Medium**	**Mild**	**Minor/Negligible**
Probability (Likelihood)	**High Likelihood**	Very high risk	High risk	Moderate risk	Moderate/Low risk
	Likely	High risk	Moderate risk	Moderate/Low risk	Low risk
	Unlikely	Moderate risk	Moderate/Low risk	Low risk	Negligible risk
	Highly Unlikely	Moderate/Low risk	Low risk	Negligible risk	Negligible risk

The overall risk categories are described in Table D below.

Table D: Description of Risk Categories

Term	Description
Very high risk	Severe harm to a receptor may already be occurring OR a high likelihood that severe harm will arise to a receptor, unless immediate remedial action works / mitigation measures are undertaken.
High risk	Harm is likely to arise to a receptor, and is likely to be severe, unless appropriate remedial actions / mitigation measures are undertaken.

	Remedial works may be required in the short term, but likely to be required over the long term.
Moderate risk	Possible that harm could arise to a receptor but low likelihood that such harm would be severe. Harm is likely to be medium. Some remedial works may be required in the long term.
Moderate / low risk	Possible that harm could arise to a receptor, but where a combination of likelihood and consequence results in a risk that is above low, but is not of sufficient concern to be classified as medium. It can be driven by cases where there is an acute risk which carries a severe consequence, but where the exposure is unlikely.
Low risk	Possible that harm could arise to a receptor. Such harm would at worse normally be mild.
Negligible risk	Low likelihood that harm could arise to a receptor. Such harm unlikely to be any worse than mild.

6. Accident and Incident Response

Accidents and incidents are managed in accordance with the Incident Management policy and procedures and Emergency Planning manual.

YW utilises the Nintex app to report, record, manage and assess incidents and accidents. This is available on phones and handheld devices of YW staff and provides an auditable record for every incident. Relevant forms used to record accidents are available electronically via this system.

In the event of a significant incident a root cause analysis is conducted. Actions are identified, reported, recorded, and communicated to prevent reoccurrence.

Complaints are typically received by YW central Customer Services team, where all complaints are logged on the ICE system. Complaints relevant to Esholt STF are passed on to the Site Manager for further investigation. The Site Manager is responsible for ensuring that any complaint is investigated and, if found to be justified, that work is undertaken to resolve the issue, including liaising with the relevant regulatory bodies where appropriate. The Customer Service Team ensure an appropriate response to the complainant in a timely manner including, if and as appropriate, detailing the reason behind the issue and the actions taken to resolve the matter.

All complaints information is recorded on the ICE system in order that this can be monitored, reviewed, and analysed.

If an incident with potentially significant environmental consequences occurs, YW will notify the Environment Agency without delay, and in accordance with the procedures and requirements specified in the site environmental permit.

7. Emergency contacts

Area	Contact
Esholt STF Contacts	Site Manager: Gavin Stowell Site Optimiser: Scott Jones
Bradford Council Environment Health	01274 432111
Environment Agency	03708 506 506

8. Definitions

Definitions of Terms Used:	
Yorkshire Water	Yorkshire Water is used in this document to refer to Yorkshire Water Services Limited and all other subsidiary companies within Kelda Holdings.
Anaerobic Digestion	AD is used to refer to anaerobic digestion. The process which imported waste is subject to at this sewage treatment facility.
CHP	Combined Heat and Power

9. Compliance with this document

Colleagues shall comply with the requirements of this document, in line with the company Conduct Policy.

10. Assurance

Regular monitoring of compliance with these requirements shall be undertaken by the assurance providers documented as part of the Assurance Framework.

Any sampling that is undertaken will be taken in accordance with sampling procedures as documented in the internal guidance document Operator Self-Monitoring, which can be found on the Integrated Management System. Samples must be tested at a UKAS accredited laboratory.

11. Related Documents

N/A