MOTT MACDONALD

Queenborough Sludge Treatment Centre Environmental Permit Application

Environmental Risk Assessment
790101_ERA_QUE

August 2024

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Contents

1 Introduction

1.1 Background and scope

This document has been prepared to support the application for the substantial variation of a bespoke waste operation Environmental Permit to a bespoke Waste Installation Environmental Permit (hereafter referred to as 'the Permit'), reference EPR/CP3798HU, for the Queenborough Sludge Treatment Centre (STC) ('the Site') on behalf of Southern Water Services Limited ('Southern Water' or 'the Operator').

As part of the application for an Environmental Permit, operators must assess the risk to the environment and potential harm to human health from the activities they propose to undertake. This document provides the environmental risk assessment (ERA) considered relevant to the Site in accordance with the Environment Agency's 'Risk assessments for your environmental permit'[1].

1.2 Assumptions and limitations

The assessment of effects has been based on information sourced from relevant and applicable legislation, guidance and websites. It is assumed that all guidance documents produced by the Environment Agency are up to date and correct at the time of writing.

[1] Environment Agency (2023) Risk assessments for your environmental permit .Available online at: https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit

2 Site setting

2.1 Location

Activity address: Argent Road, Queenborough, Kent, ME11 5DZ

National grid reference: TQ 90914 70575

A plan showing the boundary of the scheme is provided in 790101_MSD_SiteLayoutPlan_QUE August 2024.

2.2 Geology

The entire Site is underlain by superficial deposits comprising Alluvium (clay, silt, sand, and peat). There are no recorded artificial deposits beneath the Site or within 1km of the Site boundary, although artificial deposits may be present on-site as a result of site development.

The bedrock geology comprises the London Clay Formation, which is present beneath the entire Site. Two of the nearest BGS borehole records to the Site indicate the thickness of the London Clay Formation to be between 73m to 80m.

The London Clay Formation is described by BGS Lexicon as “bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay. It commonly contains thin courses of carbonate concretions and disseminated pyrite. It also includes a few thin beds of shells and fine sand partings or pockets of sand, which commonly increase towards the base and towards the top of the formation.”

2.3 Hydrogeology

The superficial deposits (Alluvium) beneath the Site is classed by the Environment Agency as a Secondary Undifferentiated aquifer. The bedrock geology (London Clay Formation) is classed by the Environment Agency as an Unproductive aquifer.

The Site is not located within 250m of a Source Protection Zone (SPZ).

No discharges to groundwater are known to occur within 250m of the Site.

2.4 Hydrology

The Site is bounded to the south (approximately 300m) by The Swale, a tidal channel of the Thames Estuary. Immediately surrounding the Site (north, west and south) is a smaller channel named Joan Fleet (approximately 20m north of the Site, at its closest), which is fed by a small drain that runs along the western boundary of the Site. There are further drains, streams and small surface water features surrounding the Site.

One environmental permit is recorded within 250m of the Site, operated by Southern Water Services Limited for the discharge of treated sewage and settled storm sewage to The Swale Estuary (saline estuary, 38m south of the Site) from Queenborough Wastewater Treatment Works.

2.5 Protected Areas

The European designated habitat sites located within 10km of the Site include:

- Medway Estuary and Marshes Special Area of Conservation (SAC), located within the Site boundary
- The Swale Ramsar site, located 670m from the Site
- The Swale SAC, located about 670m away from the Site
- Outer Thames Estuary SAC, situated 4.7km away
- Thames Estuary and Marshes, located 5.2km away
- Thames Estuary and Marshes, located 7km away

The national statutory designated sites located within 2km of the Site are as follows:

- Medway Estuary and Marshes Site of Special Scientific Interest (SSSI), located within the Site boundary
- The Swale Estuary Marine Conservation Zone (MCZ), located within the Site boundary
- The Swale SSSI, located 670m away
- Elmley Natural Nature Reserve (NNR), located 1.5km away
- Medway Estuary - Zone 1 MCZ, located 1.8km away
- Medway Estuary - Zone 2 MCZ, located 1.8km away

The only non-statutory designated site identified within 2km of the Site is the Diggs & Sheppey Court Marshes Site of Importance for Nature Conservation (SINC), located 1.7km away from the Site

The priority habitats within 2km of the Site are listed below along with their distance:

- Coastal and floodplain grazing marsh, located within the Site boundary
- Coastal saltmarsh, located within the Site boundary
- Maritime cliff and slope, located within the Site boundary
- Mudflats, located within the Site boundary
- Undefined priority habitat located within the Site boundary
- Good quality semi-improved grassland, located 340m away
- Coastal saltmarsh, located 590m away
- Undefined priority habitat located 590m away
- Lowland fens, located 670m away
- Reedbeds, located 680m away
- Deciduous woodland, located 700m away

Further discussion on impacts to natural habitats and ecology is provided in section 3.2.9 and Appendix B.

2.6 Other notable features

2.6.1 Properties

As shown in Figure A.4 in Appendix A, no sensitive human receptors lie within 250m of the Site. An industrial site/depot/works (Elmley Industrial Estate) lies within 400m north-east of the Site, with two car depots mapped 1km north and north-east of the site. A residential area lies within 400m north-west of the Site at the nearest point.

3 Environmental risks

3.1 Methodology

The ERA 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 3.1 and Table 3.2 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 3.3 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 3.1: 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 3.2: Probability index

Likelihood of harm occurring	Probability index
Harm is near certain or very likely to occur	High
Harm is likely to occur	Medium
Harm is unlikely	Low

Table 3.3: Magnitude of risk

Magnitude of risk	Probability index		
Severity index	**Low**	**Medium**	**High**
Low	Low	Low	Medium
Medium	Low	Medium	High
High	Medium	High	High

3.2 Risk assessment

3.2.1 Introduction

This section of the report identifies the potentially sensitive receptors within the vicinity of the Site and assesses the environmental risks within the following categories:

- Point source and fugitive emissions to air
- Point source and fugitive emissions to water and land
- Noise and vibration
- Odour
- Litter, mud and debris
- Vermin and insects (pests)
- Human health and environment safety (i.e. visual impacts, site security, flood risk)
- Natural habitats and ecology

The methodology used to assess and screen the environmental risks for each category is discussed in turn in the following subsections. The need for further detailed assessments and/or management plans, where applicable, is also elucidated upon.

An assessment of the overall and residual risk is provided in Appendix B. For each hazard there is the identification of the pathway and receptor and the mitigation proposed in order to reduce the residual risk.

3.2.2 Point source and fugitive emissions to air

3.2.2.1 Air quality

Air Dispersion Modelling has been undertaken to assess the impacts from point sources emissions at the site, 790101_AQRA_QUE August 2024

The flare is understood to operate during emergencies only, such as during CHP maintenance or downtime. Maintenance of the flare is undertaken annually.

The existing approaches and relevant procedures presented in the Environmental Management System (EMS) and operational procedures are considered to adequately address the emissions that may present a risk, and, therefore, an Emissions Management Plan (EMP) is not considered to be required.

3.2.2.2 Bioaerosols

According to the Environment Agency guidance ‘bioaerosol monitoring at regulated facilities (Jan 2018)’, a bioaerosol risk assessment is required if a facility is within 250m of a sensitive receptor.

The sensitive receptors in relation to the Site are shown in Appendix A. Since the Site does not lie within 250m of a sensitive human receptor, a bioaerosols risk assessment has not been undertaken.

For new permits there is a requirement to monitor in accordance with Technical Guidance Note (TGN) M9 ‘environmental monitoring of bioaerosols at regulated facilities’ if the site is within 250m of a sensitive receptor. The TGN lists sources of bioaerosols and refers to ambient and point sources of emissions. However, this is not applicable to the Site since no sensitive receptor lies within 250m of it.

Best practice methods will nonetheless be followed, during operation of the Site, to prevent the release of bioaerosols. These include methods and principles outlined in the Environment Agency's "Guidance on the evaluation of bioaerosol risk assessments for composting facilities"[2] and are described in Appendix B.

3.2.2.3 Abatement of other fugitive emissions to air

Environment Agency best practice guidance methods will be followed, during operation of the facility, to prevent the release of fugitive emissions. These are described in Appendix B.

3.2.3 Point source and fugitive emissions to water and land

An assessment of the risks from potential point source and fugitive emissions to water, sewers, land or groundwater is provided in Appendix B.

The Substantial Pollution Incident register in Landmark's Envirocheck report (Reference no: 270504808_1_1) has been used to provide details of pollution incidents within the past five years. According to the report, no substantiated pollution incidents are recorded within 250m of the Site in the last five years. 16 No. Category 4 incidents (little or no impact) were recorded in the last five years, according to the Operator's pollution incident register, six of which occurred in 2020 and related primarily to emissions to land. No Category 3 incidents (minor incident) were recorded in the register during the same period.

3.2.3.1 Emissions to water (other than sewers)

No pollution incidents to water were reported in Southern Water's Site incident report in the last five years.

The Site is not located within 250m of an SPZ. No discharges to groundwater are known to occur within 250m of the Site.

The drainage network sends water to the head of the works for treatment. There will be no point sources emissions from the Site. There are no direct potentially contaminated discharges to controlled surface waters.

There will be no direct discharge of wastewater to controlled waters from the STC.

There are no direct potentially contaminated discharges to groundwaters. The CHP exhaust condensate discharges to a container, which is emptied at least fortnightly to the drainage system of the adjacent Queenborough WTW. The condensate is clean, uncontaminated and discharges are small in volumes.

Accidental releases of materials to the environment are controlled through adequate containment measures and working procedures.

The existing approaches and relevant procedures presented in the EMS and operational procedures are considered to adequately address the emissions that may present a risk, and, therefore, an EMP is not considered be required.

3.2.3.2 Emissions to sewers, effluent treatment plants or other transfers off-site

There will be no point source emissions or direct discharges to controlled waters or public sewers, as part of the permit operation. Any liquid waste will either be reused or discharged to the drainage system of the adjacent Queenborough WTW and will undergo treatment through the works before being discharged under an existing water discharge permit. On-site WTW

[2] Drew, G.H., Deacon, L.J., Pankhurst, L., Pollard, S.J.T. and Tyrrel, S.F. (2009). Guidance on the evaluation of bioaerosol risk assessments for composting facilities. Environment Agency.

effluent will meet the requirements of the existing discharge permit. The water used at the Site will be contained in a closed circuit; all wastewater streams will either be recycled within the process or captured and rerouted to the adjacent WTW.

Discharges will be minimal, typically arising from periodic maintenance/cleaning operations. As such, there are no direct potentially contaminated discharges to controlled surface waters and no significant impacts. All drainage (surface water or foul water) will be captured by the on-site drainage system and returned to the WTW. A drainage plan of the Site is presented in document reference 790101_MSD_DrainagePlan_QUE.

The stormwater drainage of potentially contaminated areas from within the Site boundary will be routed into the sewage treatment process with no discharge outside of the Site. There will therefore be no risk of polluted runoff affecting off-site features.

Due to the anticipated low levels of contamination of the water and the volumes involved, no monitoring of its composition is proposed prior to discharge to the WTW.

Any areas of the Site, where there is a risk of contamination of surface water, groundwater or discharge of process waters are located on impermeable concrete surface. All surface water from these areas drain to the WTW internal drainage system and are returned to the head of the works for treatment prior to discharge as final effluent.

3.2.3.3 Emissions to land

There will be no point source emissions to land as part of the activities carried out on-site.

Discharges will be minimal, typically arising from periodic maintenance/cleaning operations, and is captured in spill trays. The CHP exhaust condensate is returned to the head of the works.

All raw materials are handled and stored within the confines of the buildings on-site, or in intermediate bulk containers (IBCs) in bunded areas, with the exception of biogas which is contained within the gas handling system. Releases of raw materials to land are considered to be negligible, therefore, due to adequate containment of the materials within suitable storage vessels, the provision of bunding and the presence of a contained drainage system.

3.2.4 Noise and vibration

There has been one noise complaint received by the Site in the last five years, in 2022.

Initial screening has been carried out for the Site. Since the Site is not undergoing changes to equipment and vehicle movements prior to application submission, a Noise Impact Assessment (NIA) is not considered to be required. Appropriate mitigation for noise and vibration impacts are provided in Appendix B. The sensitive receptors located within 2km of the Site are shown in Figure A.4 of Appendix A.

Since noise and vibration impacts are considered to be appropriately mitigated in the ERA, a Noise and Vibration Management Plan is also not considered to be required.

3.2.5 Odour

A review of the nearest human receptors has been undertaken to establish the level of odour risk to the receptors before and after mitigation. Sensitive receptors to odour are users of the adjacent land, which may vary in their sensitivity to odour. None are located within 250m as shown in Figure A.4 in Appendix A.

Current odour mitigation measures to prevent and reduce odours from receipt of waste, transfer across the Site, treatment and storage of waste have been assessed and are detailed in Appendix B.

No odour complaints have been received between 2018 to 2023.

There are no proposed works to be undertaken on the Site in respect of this permit application, therefore, the activities on-site are not anticipated to increase the off-site impact or result in adverse impact upon nearby sensitive receptors or the amenity of the area surrounding the Site.

The Site has an Odour Management Plan (OMP), produced in January 2024, which identifies potential odour sources from Site operations and procedures to manage, control and minimise odour impacts. It sets out the procedures for engaging with neighbours and how the Operator will manage complaints, and the actions to be taken in the case of pollution events. The OMP also describes the monitoring and maintenance procedures to maintain the control measures.

The OMP was written in accordance with the Environment Agency's H4 Odour Management guidance (2011). The level of odour risk from the Site is considered to be low, as shown in Appendix B and the OMP provides sufficient mitigation.

The Odour Management Plan can be found in document reference 790101_ERA_OdourMP_QUE August 2024.

3.2.6 Particulate matter, litter, mud and debris

Appendix B describes the aspects of the Site that generate litter, mud and debris within and outside the Site boundary and assesses their risk to the environment. Current waste management and Site cleaning procedures (EMS308) have been assessed in the ERA table in Appendix B to justify whether additional measures could be required. Measures to prevent debris and dust leaving the Site have also been addressed, in addition to the sensitivity of nearby receptors and the effectiveness of existing measures to reduce the escape of dust.

The need for a dust management plan is triggered if the keeping and/or treating of biowaste in the open, including the finished material, is located:

- In, or within 2km of, an air quality management area for PM10
- Within 500m of a sensitive receptor such as a home, school, hospital or nursing home, food preparation facility or similar
- Within 250m of a sensitive receptor when treating biowaste

The key sludge and wastewater treatment processes of the Site are enclosed. Sludge cake is stored in the open in minor quantities on the Site, but mitigation is in place to prevent dust emissions from presenting a risk (see Appendix B). Although the Site has been screened as being within 500 metres of sensitive receptors (see Appendix A), a Dust Management Plan is not considered to be required since operations and waste types used on-site cause minimal dust emissions and appropriate mitigation is in place.

3.2.7 Pests

Discussions with the Site operator during a site visit have addressed whether the Site activities are likely to attract pests, what measures are in place to deter pests and how effective these are. These are covered in Appendix B.

Pest control measures are implemented under EMS227. The site has monthly visits by a contractor, for pest control. Rat boxes are used around the Site, where appropriate.

Pests are not considered to be an issue since the waste types handled on-site do not attract them, contractors regularly check the Site for pests and appropriate mitigation is in place. Since the residual risk is considered to be low, a Pest Management Plan is not considered to be necessary.

3.2.8 Human health and environment safety

3.2.8.1 Visual impacts

The Site has been in the current location since the 1980s. It is located on the southern marshes below Queenborough (approximately 1.7km north-east of the Site), on the western side of the Isle of Sheppey, Kent. The Site is situated in a remote and windy location away from residential areas, with no sensitive receptor located within 300m of it.

Since no changes to the Site will occur prior to submission of this permit application, there will not be any changes in heights and configuration of the placement of equipment which could be noticed by nearby receptors. Visual impacts from the Site are, therefore, considered to be low.

3.2.8.2 Site security

Activities are managed and operated in accordance with the management system. Access to Site and waste is restricted by 2.5m high chain link security fence and a 40m wide watercourse which borders the Site. Electronically operated palisade gates secure the main access and are closed at all times when not in use and locked out of hours. The Site is staffed between 0700-1800 on Monday to Friday and between 0700-1500 on weekends. The electric gate is operated by a fob system, for visitors and unauthorised personnel an intercom system at the Site entrance is used. The Site also benefits from a CCTV system (normal and thermal), with cameras positioned in key locations around the Site, including one Automatic Number Plate Recognition (ANPR) camera on the main gate. 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.

Other risks relating to human health and the environment are presented in Appendix B.

3.2.8.3 Flood risk

Initial screening was undertaken to determine the flood risk for the Site. The data utilised for this study was published online by the Environment Agency and relates to the flood risk from surface water, rivers and the sea.

The Site is not located within an area with the potential for groundwater flooding to occur.

The Site is located within Flood Zone 3 for flooding from rivers or sea (deemed relatively high risk, 1% or greater probability of flooding in any given year) however flood defences are located east of the Site. The Site is considered to be a low risk for flooding from surface water, corresponding to a chance of flooding each year of between 1 in 1000 (0.1%) and 1 in 100 (1%).

The drainage network sends water to the head of the works for treatment. There are no direct potentially contaminated discharges to controlled surface waters. Activities are managed and operated in accordance with a management system and management plans and procedures implemented, including (but not limited to) the removal and clean-up of spilled waste material, including sludge, cake etc. and other pollutants (this may also include removal of used spill kits and mobile bunds) before these could enter any flood waters if an event was to occur.

There have not been any reported flooding issues from the Site in the last five years. The Site has one access route, which is at low risk of flooding.

Since no changes to the Site are planned prior to application submission, and no impacts to flood pathways or sensitive receptors are anticipated, a full flood risk assessment (defined here as a detailed assessment involving bespoke hydraulic modelling work) is unlikely to be required.

When proposed changes to the Site do occur these are understood to be either of a relatively minor nature or are unlikely to significantly alter existing development footprints.

3.2.9 Natural habitats and ecology

Ecological features that are situated within set distances of the Site boundary have been identified and screened. For the following ecological features, the Study Area was defined as the following:

- Statutory designated European sites: Special Areas of Conservation (SAC), candidate Special Areas of Conservation (cSAC), Special Protection Areas (SPA), potential Special Protection Areas (pSPA), Sites of Community Importance (SCI) and Ramsar sites within 10km of the Site boundary;
- Statutory designated national sites: Sites of Special Scientific Interest (SSSIs), Marine Conservation Zones (MCZs), National Nature Reserves (NNRs), Local Nature Reserve (LNRs), Areas of Outstanding Natural Beauty (AONB) within 2km of the Site boundary;
- Non-statutory designated sites: Local Wildlife Sites (LWS), Ancient Woodlands, Country Parks, Sites of Importance for Nature Conservation (SINC), Kent Wildlife Trust Reserves within 2km of the Site boundary;
- Priority habitats: within 2km of the Site boundary. Priority habitats are those listed under Section 41 of the Natural Environment and Rural Communities Act (2006) and include deciduous woodland, grassland, heathland, reedbed, vegetated shingle, wood-pasture and parkland, marshes, mudflats and fens; and
- Granted European Protected Species (EPS) within 2km of the Site boundary. Licences available on Multi-Agency Geographic Information for the Countryside (MAGIC), data from Kent Wildlife Trust (HIWWT), Kent & Medway Biological Records Centre (KMBR) or Sussex Biodiversity Record Centre (SBRC) depending on location of site. Accurate to within the nearest 100-200m depending on local council survey data accuracy.

No ecological field surveys have been completed to inform this screening. This screening identifies the likelihood of ecological features being present or further investigation being required.

Initial screening has been carried out for the Site, the high-level results of which are shown in Table 3.4. Where habitat sites are situated within the study area surrounding the Site, the relevant cells are highlighted in red and indicate the number of habitats sites located therein. Cells highlighted in green indicate that relevant habitat sites are not located within the specified study area. For cells highlighted in orange, there is potential for these protected species to be present within the study area.

Table 3.4: Results of initial screening of natural habitats and ecology for the Site

Natural habitats and ecology	Queenborough
Statutory designated European sites within 10km of the Site boundary	
Special Areas of Conservation (SAC)	
Special Protection Areas (SPA)	4
Sites of Community Importance (SCI)	
Ramsar sites	2
Statutory designated national sites within 2km of the Site boundary	
Sites of Special Scientific Interest (SSSIs)	2
Marine Conservation Zones (MCZs)	3
National Nature Reserves (NNRs)	1
Local Nature Reserve (LNRs)	

Natural habitats and ecology	Queenborough
Areas of Outstanding Natural Beauty (AONBs)	
Non-statutory designated sites within 2km of the Site boundary	
Local Wildlife Sites (LWS)	
Ancient Woodlands	
Country Parks	
Sites of Importance for Nature Conservation (SINC)	1
Kent Wildlife Trust Reserves	
Priority habitats within 2km of the Site boundary	
Priority habitats	11
Protected species	
Common nesting birds, common reptiles, terrestrial and aquatic invertebrates, common amphibians: within a 10m buffer of the Site boundary	
Wintering birds: within a buffer of up to 500m of the Site boundary	
Species of nesting birds within a 200m buffer of the Site boundary	
Bats: within a 50m buffer of the Site boundary	
Badgers: within a 30m buffer of the Site boundary	
Hazel dormice: within a 20m buffer of the Site boundary	
Great crested newts - ponds within a 500m buffer of the Site boundary and terrestrial habitat within 10m	

Four SPAs and two Ramsar sites are located within 10km of the Site. Medway Estuary and Marshes SPA in particular lies partly within the Site boundary. However, the variation does not include operational changes that would increase any existing effects to these European sites from the Site, and therefore, it is considered highly unlikely that a Habitats Regulations Assessment (HRA) would be required for the Site.

The Medway Estuary and Marshes SSSI and the Swale Estuary MCZ are located partly within the Site boundary. The Site is also located 670m from the Swale SSSI, 1.5km away from Elmley NNR and 1.8km away from Medway Estuary – Zones 1 and 2 MCZs.

Any potential impacts to statutory designated European and national habitat sites have been considered in the ERA following review of the following site-specific information:

- Discharges to water and groundwater, emissions to air and land, and from dust, noise and vibration, from all activities on-site, particularly from the anaerobic digestion processes;
- Pollution prevention and mitigation measures, including for emissions and spills; and
- Site plans detailing storage arrangements and drainage plans.

One SINC and 11 priority habitats are located within 2km of the Site. Coastal and floodplain grazing marsh, coastal saltmarsh, maritime cliff and slope and mudflats are located within the Site boundary. It is considered unlikely that Site activities will impact these habitat sites, however. This is covered in Appendix B along with appropriate mitigation.

The Site is mostly hardstanding and water treatment infrastructure and is bounded to the south (approximately 300m) by The Swale, a tidal channel of the Thames Estuary. Immediately surrounding the Site (north, west and south) is a smaller channel named Joan Fleet (approximately 20m north of the Site, at its closest), which is fed by a small drain that runs along the western boundary of the Site. To the east lie coastal marshes and some shrubbery.

There is the potential for bats (i.e. common bat, common pipistrelle, noctule bat), ear moths and great crested newts to be present within the Zones of Influence (ZoI).

It is considered unlikely that Site activities would lead to the disturbance or removal of terrestrial habitats, and therefore protected species surveys are not considered to be required for the Site.

The proposal for a varied permit does not involve the removal of vegetation, or structural modification to built structures therefore, a Preliminary Ecological Appraisal is not considered to be required for the Site.

The application is to permit anaerobic digestion activities in order to meet the Industrial Emissions Directive (IED). The site has been operating in its current capacity for a number of years and mitigation measures already in place directly or indirectly prevent or limit harm to existing habitats and species, as shown in Appendix B. No changes to operations are proposed and therefore the current risks posed to these habitats and species are likely to improve upon granting of the permit.

A. Environmental Constraints Maps

Figure A.1: Statutory designated habitat sites within 10km of the Site

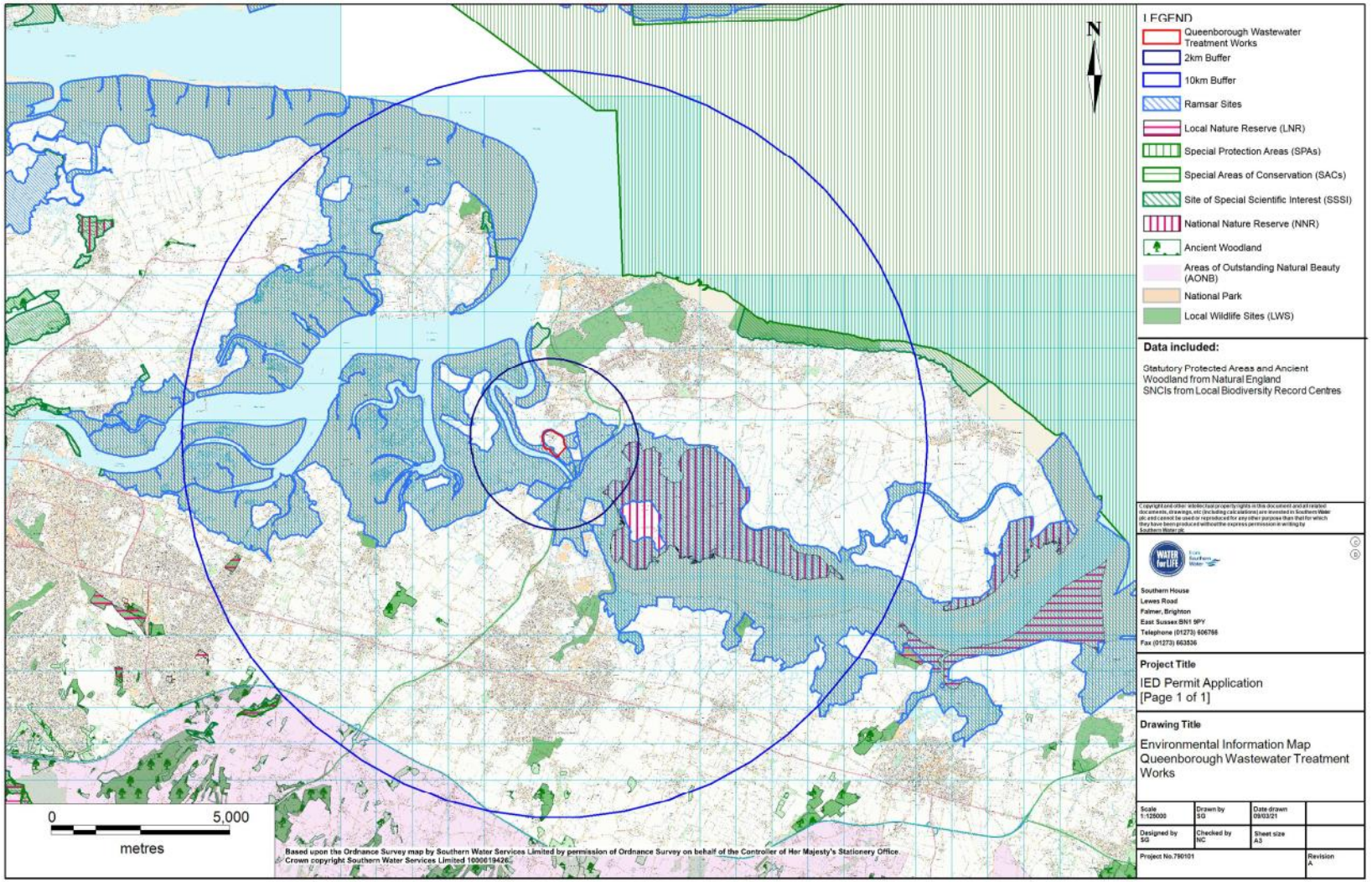


Figure A.2: Non-statutory designated habitat sites within 2km of the Site

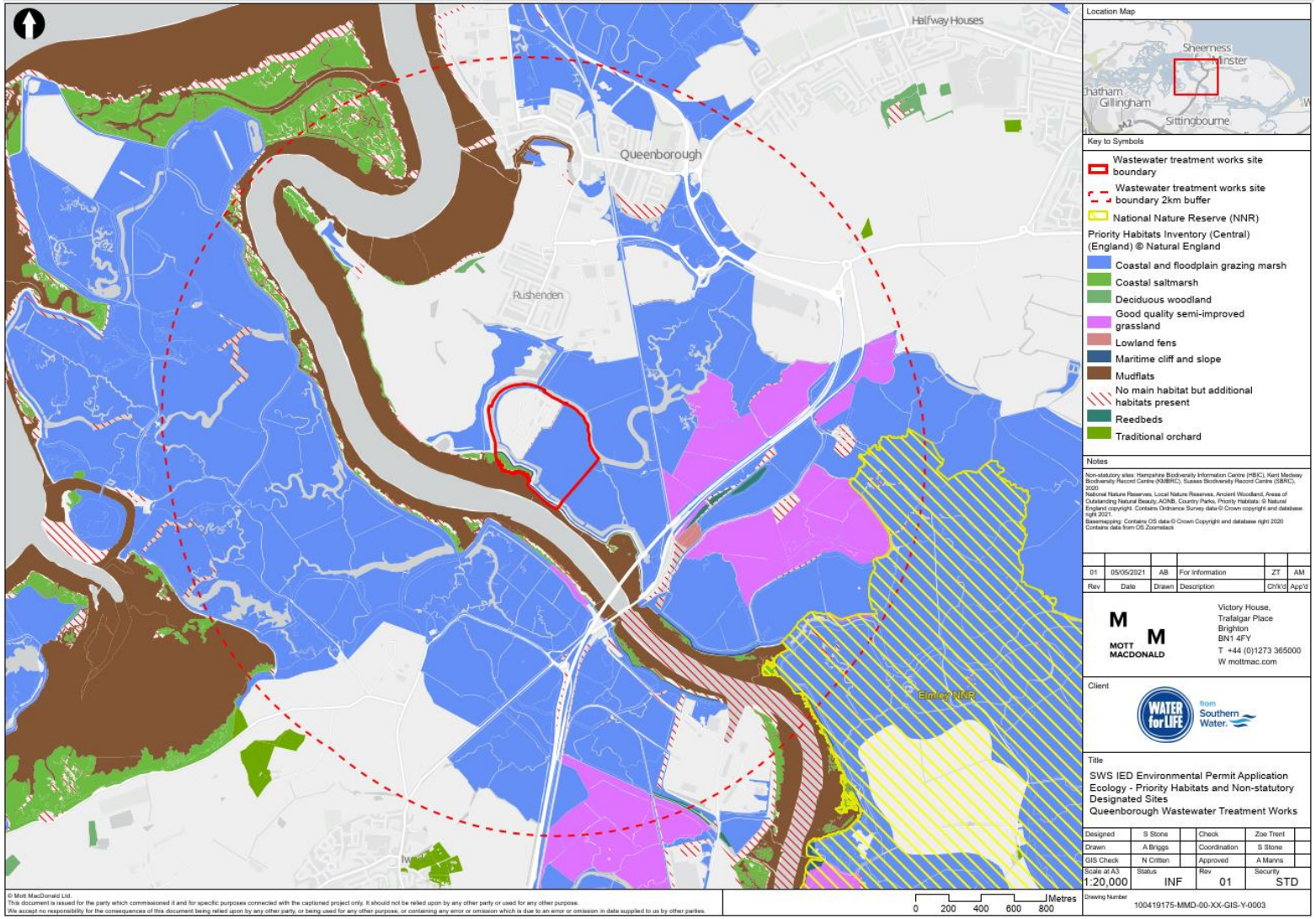


Figure A.3: Designated heritage sites within 1km of the Site

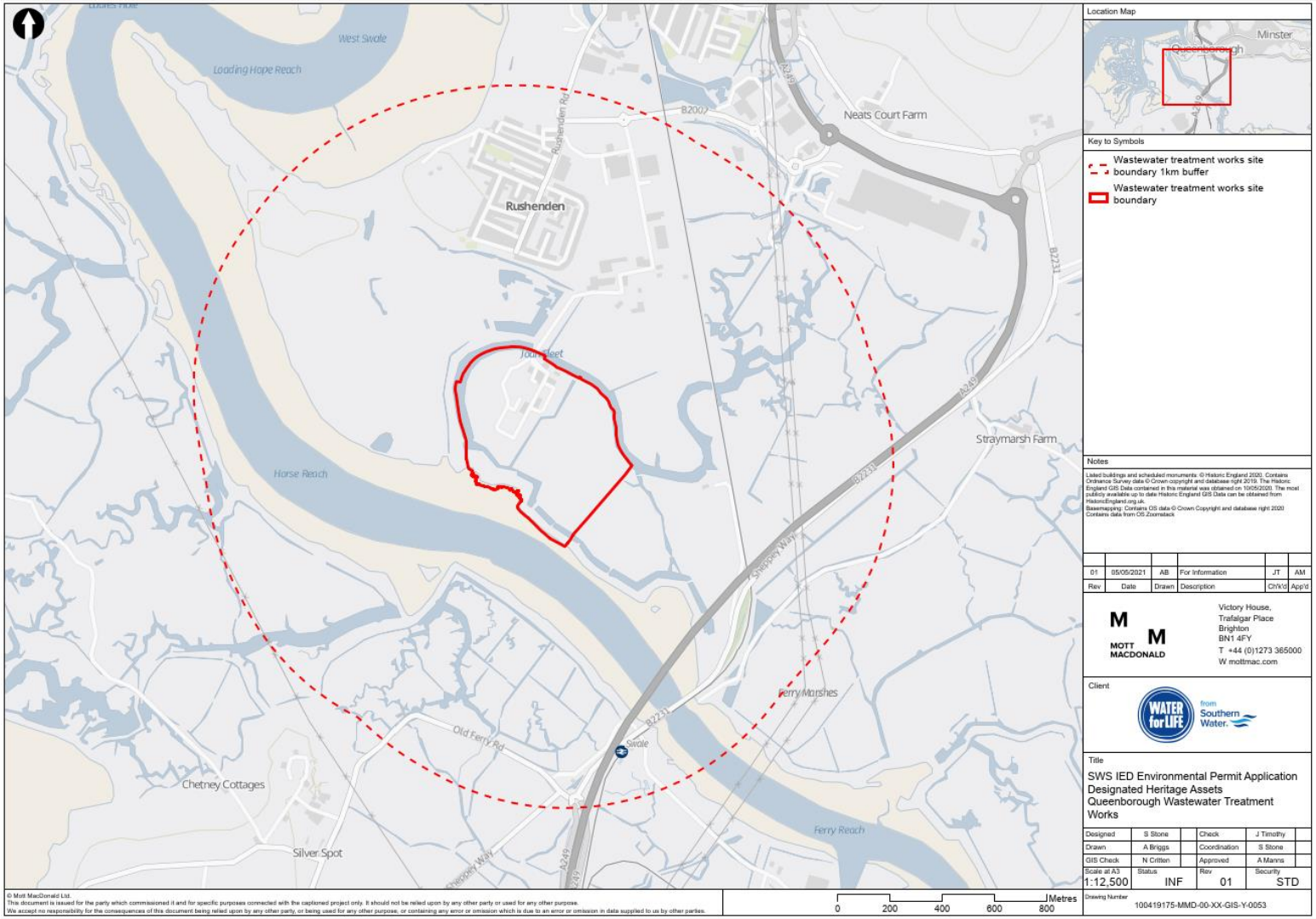
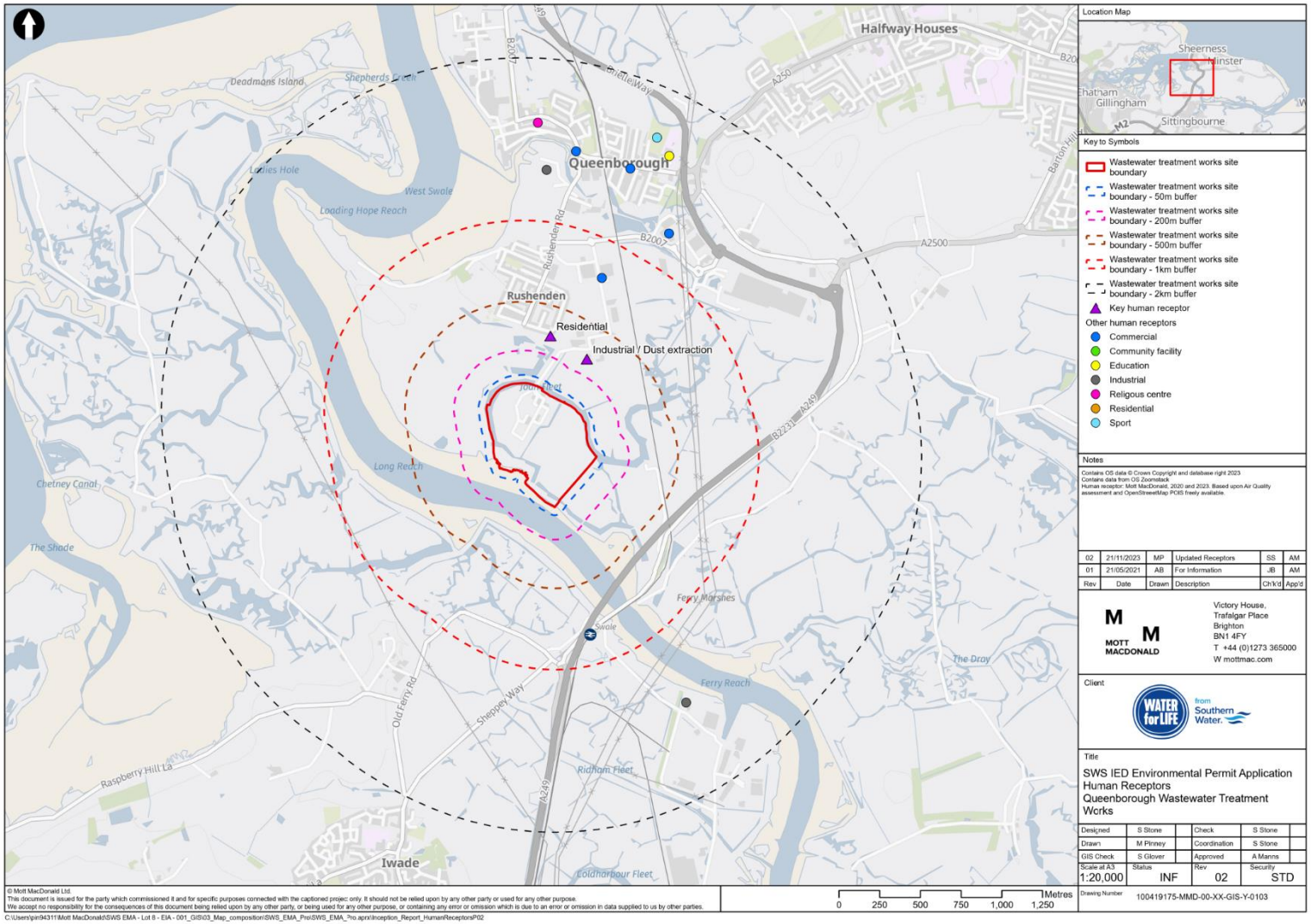


Figure A.4: Sensitive receptors within 2km of the Site



B. Environmental Risk Assessment Tables

Emissions to air									
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**
Local human population.	Releases of NO_2, SO_2, CO, NH_3 and other gases	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Low	Medium	Low	There is potential for exposure to anyone living close to the Site or at locations where members of the public might be regularly exposed.	Activities will be managed and operated in accordance with the EMS. This will include regular inspection and maintenance of associated equipment. Point source emissions to air will be monitored in line with the permit requirements and any relevant TGNs including M2 and will meet Monitoring Certification Scheme (MCERTS) standards, where suitable and available NOx and GHG emissions are controlled by emission limits. Storage of high ammonia bearing material will be covered at all times. Any emissions of substances harmful to human health not controlled by emission limits (excluding odour and noise) shall not cause pollution.	Low
Local human population	Release of unburnt biogas	Harm to human health - respiratory irritation and illness. Release of potent climate change gases.	Air transport	Low	High	Medium	There is potential for exposure to anyone living close to the Site or at locations where members of the public might be regularly exposed. There is one flare present on-site, which is understood to operate during emergencies only, such as during CHP maintenance or downtime.	Activities shall be managed and operated in accordance with the EMS and will include measures covering inspection and maintenance of equipment, including engine management systems. Point source emissions to air will be monitored to ensure emission limits for biogas are not exceeded, in accordance with permit requirements and any relevant TGNs including M2.	Low
Domestic properties, local human population, local amenity, site staff, visitors and offices. Haul roads, public highways.	Releases of particulate matter (dust) from cake storage bays and Transport off-site	Nuisance, loss of amenity.	Air transport then deposition	Low	Low	Low	Local residents and surrounding environment are often sensitive to dust. Dust may be produced from dirt deposits from vehicles or other users of the haul road and treatment and storage of cake. Cake bays are in reasonable condition with cake kept below wall limits. Road near cake bays is also in a good condition although there is some tracking of cake. The waste types used on-site are unlikely to cause dust emissions, however. Therefore, the magnitude of risk is considered to be low.	No wastes consisting solely of dusts are accepted. General operations at the Site do not create dusty materials. Cake is stored in open bays, but this material is not dusty by nature even when it is dry. Vehicles, equipment, impermeable surfaces and internal roads are swept and washed down, as required, to reduce the likelihood of any dust becoming airborne. There are no additional dust suppression techniques e.g. mist spray etc employed on-site as this is not considered necessary. Vehicles removing cake from Site are kept covered, whilst in transport to prevent the escape of waste. There are seven open cake storage bays on-site, six in the east of the Site and one back-up bay in the south. All of the cake bays are in good condition and their walls are approximately 1.2m to 1.5m high. The capacity of the cake storage bays is sufficient to contain the quantity of cake stored on-site and limit dust emissions therefrom. Cake is transferred by conveyor from the press house to the cake bays, located in the east of the Site. Cake is stored on-site and not handled until it is removed. Each bay takes approximately 4-6 weeks to fill.	Low
Local human population.	Release of microorganisms (bioaerosols).	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Low	Medium	Low	The permitted waste is non-hazardous sludge in liquid and cake form. The nature of waste and the 'wet' processes undertaken on-site are not likely to cause a release of bio-aerosols. The PSTs, aeration lanes, FSTs, storm tanks, final effluent and cake bays are not enclosed. Emergency situations such as a failure of the flare or CHP/boilers could result in uncontrolled emissions of bioaerosols.	Multiple control measures are in place at the Site which reduce and contain emissions of bioaerosols from the processes on-site by inhibiting the pathway between source and receptor. Most of the key operations take place within a closed system, including enclosed centrifuges, CHP and sludge reception, pipework and machinery. The anaerobic digestion vessels are sealed and biogas is extracted from the vessels. This minimises the risk of bioaerosols affecting operational staff. Several tanks (PSTs, FSTs, storm tanks) are uncovered, however these involve 'wet'	Low

Emissions to air									
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 sensitive receptor lies within 250m of the Site and, therefore, the magnitude of risk is considered to be low.	processes so the risk of resuspension of bioaerosols is minimised. Any emergency event would be temporary and infrequent due to the extensive monitoring and maintenance programmes undertaken at the Site as well as the emergency procedures and warning systems in place. Odour control unit is airtight and treats air released to remove bioaerosols. The process is monitored and regularly maintained. Gas holder is air-tight to prevent uncontrolled release of bioaerosols. SCADA system in place to detect leaks. Combustion of biogas occurs at very high temperatures in the CHP, boilers and flare, which would destroy bioaerosols. Stringent loading and unloading procedures are in place for receipt of sludge and liquor. Appropriate wash down facilities (hoses near cake bays) are also provided for drivers to clean the roads and vehicles after loading or unloading in sludge storage bays and loading points. Lorry and tanker drivers are required to hose down any spillage after each loading or unloading and clean contaminated wheels before leaving the Site.	

Emissions to water and land									
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 Damage to drainage system. Spillage of raw materials or sludge/liquor during delivery/storage Contaminated run off from cake storage e.g. containing suspended solids.	Acute or chronic effects to aquatic life, contamination and deterioration of water quality.	Direct run-off from the Site across ground surface, via surface water drains, ditches etc. Indirect run-off via the soil layer Transport through soil/groundwater then extraction/ abstraction at borehole or intake.	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. Hardstanding and cake storage bays are generally in a good condition across the Site. Appropriate bunding is provided for raw materials stored on-site and cake storage bays have sufficient capacity for the quantities stored therein. Permeable ground surfacing currently surrounds the digesters, but tanks and skips are located on hardstanding. Quantities of liquids stored are generally low. The Site is bounded to the south (approximately 300m) by The Swale, a tidal channel of the Thames Estuary. Immediately surrounding the Site (north, west and south) is a smaller channel named Joan Fleet (approximately 20m north of the Site, at its closest), which is fed by a small drain that runs along the western boundary of the Site. There are further drains, streams and small surface water features surrounding the Site. However, no substantiated pollution incidents to water have been recorded in the last five years.	The Site drainage plan is documented and all staff are trained in the event of emergency or accident. Impermeable surface and secondary containment, in the form of constructed bunds or portable bunds, is in place around storage areas of all wastes and surrounding the STC and WTW. Bunding will also be implemented for all raw material storage. Additional containment around digesters and other storage vessels is subject to a risk 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. Hardstanding is potentially planned to be constructed (in line with the recommendations of the CIRIA risk assessment) around the digesters. All transfer of digestate and material takes place under supervision and with flow rate control. All tanks undergo a delegated inspection regime and the process parameters are monitored and understood by Site operatives. Digestion tanks are built to appropriate standard and require appropriate bunding. There are seven open cake storage bays on-site, six in the east of the Site and one back-up bay in the south. All of the cake bays are in good condition and their walls are approximately 1.2m to 1.5m high. The capacity of the cake storage bays is sufficient to contain the quantity of cake stored on-site and limit dust emissions therefrom. Cake is stored on-site and not handled until it is removed. Each bay takes approximately 4-6 weeks to fill. 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. 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. Both clean and contaminated surface water is directed to a pumping station which recirculates it back into the system. The stormwater drainage of potentially contaminated areas from within the Site boundary is routed into the head of the works with no discharge outside of the Site boundary. 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. The condensate is clean, uncontaminated water and is small in quantity.	Low
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, ditches etc. then abstraction.	Low	Medium	Low	Watercourse must have medium / high flow for abstraction to be permitted, which will dilute contaminated run-off. No abstraction is undertaken from nearby watercourses.		Low
Groundwater, land and surface water	Spillage of liquids, contaminated rainwater run-off from waste e.g. containing suspended solids. Sludge/liquid spillages as a result of loss of tank/pipe integrity/ carelessness during transfer or overfilling	Chronic effects: contamination of groundwater, requiring treatment of water or 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.	Transport through soil/groundwater then extraction at borehole or intake.	Low	Medium	Low	Potential for leaks from digestion tanks and storage vessels. There is permeable gravel surfacing surrounding the digesters. Site infrastructure and hardstanding is generally in a good condition. Quantities of liquids stored are generally low.		Low
Groundwater, land and surface water	Spillage of sludge/liquids during transfer of imported and	Acute or chronic effects: contamination of groundwater, requiring	Transport through soil/groundwater then extraction/	Low	Medium	Low	Potential for spillage during transfer of liquid/sludge from tankers.	Impermeable surface required for storage of all waste. Activities to be managed and operated in accordance with the EMS and management plans and procedures	Low

	indigenous/unknown sludge and liquids from tankers	treatment of water or 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.	abstraction at borehole or intake.				The Site includes sludge treatment with liquid sludge reception facilities. Imported sludge makes up around 2/3 of the total dry solids treated. Reception area for sludge is generally in a good condition.	implemented to reduce spills when transferring liquids/sludges from tankers. Established procedures in place for the waste duty of care (EMS380), operational waste procedures (EMS381) and waste rejection (EMS488). Compliance with the waste duty of care requirements to ensure waste accepted meets the permit conditions and relevant legislation. All liquid run-off on-site is directed to a return pumping station before returning to the head of the works.	
Groundwater, land and surface water	Damage to drainage system	Acute or chronic effects to aquatic life, contamination and deterioration of land and water quality. Pollution of water or land.	Transport through soil/groundwater then extraction/ abstraction at borehole or intake.	Low	Medium	Low	Presence of Surplus Activated Sludge (SAS) pipework below ground. There is no leak detection of underground pipework on the Site.	Site Manager ensures the programme of PPM is implemented effectively and inspections are carried out frequently to minimise the probability of damage to the drainage system.	Low
Groundwater, land and surface water	Flooding of site.	If waste is washed off-site it may contaminate natural habitats downstream.	Flood waters	Medium	Medium	Medium	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. Area is within a Flood Zone 3 (for flooding from the river) but not known to flood, the Site benefits from flood defences located along Horse Reach/Long Reach (Main River) to the east.	The drainage network sends water to the head of the works for treatment. There are no direct potentially contaminated discharges to controlled surface waters. 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.	Low

Noise and Vibration									
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**
Local human population.	Noise and vibration from the following activities: Vehicles delivering/ removing wastes and materials Vehicles arriving/ leaving the Site.	Nuisance, loss of amenity, loss of sleep.	Noise through the air and vibration through the ground.	Low	Low	Low	Local residents and Site staff often sensitive to noise and vibration. There is low potential for exposure to sensitive receptors as none are located within 250m of the Site. 1 noise complaint has been received in the last five years (in 2022), however the magnitude of risk is considered low.	Site will only accept imports within existing operating hours established in current Environmental Permit (fully complying with the Site's planning conditions). Vehicles do not exceed the Site speed limit of 10mph and will not generate a great amount of noise. The main truck movements are away from residential housing and other sensitive receptors. Noise and vibration shall be minimised and not cause nuisance. Noise kept to a minimum during operating hours. Exceptional noisy operations e.g. construction – inform residents. Noise complaints to be investigated and actioned and remedial measures will be undertaken. All complaints are recorded in the site diary including actions taken.	Low
Local human population.	Noise and vibration from the following activities: Waste treatment, processing. Plant boilers and engines.	Nuisance, loss of amenity, loss of sleep.	Noise through the air and vibration through the ground.	Low	Low	Low	Local residents and Site staff often sensitive to noise and vibration. Majority of Site operations are fully enclosed. There is low potential for exposure to sensitive receptors as none are located within 250m of the Site. 1 noise complaint has been received in the last five years (in 2022), however the magnitude of risk is considered low	Limitation of operating hours established in current Environmental Permit (fully complying with the Site's planning conditions). Fans and condensate traps will be checked for water and fans and extraction systems checked. Flare usage is kept to a minimum to reduce noise impact. The design has been developed to minimise noise off-site. All equipment is maintained either in-house or by a sub-contractor such that noise and vibration are maintained within the required limits and to manufacturers recommendations. Where equipment is to be replaced, preference will be given to procuring quiet plant and silencing equipment. Proper maintenance of plant and equipment. There is no equipment on-site that can cause vibration nuisance at the local receptors. Nonetheless, equipment is turned off when not in use, where appropriate. Any complaints received are investigated and actioned in line with the complaint's procedure. All complaints are recorded in the site diary including actions taken.	Low

Odour									
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**
Local human population.	Odour from site activities	Nuisance, loss of amenity (e.g. disruption during outdoor activities)	Air transport then inhalation.	Low	Medium	Low	Local residents often sensitive to odour. Wide range of waste may cause odour issues at reception from wastes, release of biogas and from digestate hence control measures adopted. However, no odour complaints have been received between 2018 to 2023.	Odours are likely to be generated and released due to the nature of the wastes. Two odour control units (OCUs) are present. Odorous air is extracted by 2 No. duty, standby fans and dispersed via the stack. Odorous gases from tanks and treatment areas will be channelled to the odour control treatment units. Odour is monitored to ensure emissions are free of odorous compounds. The Site's Odour Management Plan, which was produced in January 2024, identifies potential odour emissions from site operations and procedures to manage, control and minimise odour impacts. Using appropriate measures, non-point source emissions of biogas shall be minimised. All available measures and Best Available Techniques will be implemented. All abatement systems are designed, monitored and maintained to treat specified emissions and off gases. Any emissions of substances not controlled by emission limits (excluding odour and noise) shall not cause pollution. Other odour mitigation measures implemented on-site include cleaning up of spills, placing covers on containers, keeping doors to buildings shut when not in use, limiting the height of rising sludge and use of ferric dosing. All sludge storage tanks are covered. Cake is stored in one of seven operational and open cake bays but is not handled until it is being removed from Site. Each bay takes approximately 4-6 weeks to fill. All waste is imported and exported in covered lorries or contained in tankers. Any complaints received are investigated and actioned in line with the complaint's procedure.	Low
Local human population, domestic properties, site offices.	Spillage of odorous materials including oils, fuels, chemicals. Failure to clean up spillages. Contaminated spill equipment not disposed of appropriately.	Nuisance, loss of amenity.	Air transport then inhalation.	Low	Medium	Low	Local residents and staff often sensitive to odour.	Procedures for dealing with spillages are covered in the EMS under EMS363 and 364 for the Site. There is also a Field Event Co-ordinators (FEC) Manual which provides spillage procedures for EP sites (FEC322). The Site Manager shall ensure all relevant staff are appropriately trained to use the spill kits and that all spillages are cleaned up immediately. 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. All spills are recorded in the site diary including actions taken.	Low
Local human population, domestic properties, site offices	Fugitive release of H_2S	Nuisance, loss of amenity	Air transport then inhalation.	Medium	Medium	Medium	Local residents and staff often sensitive to odour. Fugitive release, not expected to occur under normal operating conditions. Site suffers from high H_2S levels due to saline intrusion in the catchment.	Activities are managed and operated in accordance with the EMS (and include inspection and maintenance of equipment, including engine management systems). H_2S point source emissions to air are controlled in accordance with emission limits. Dosing with ferric chloride is undertaken to reduce H_2S formation. H_2S levels are monitored, and the CHP shuts down if the H_2S levels exceeds 500ppm to prevent corrosion of the CHP.	Low

Litter, mud and debris									
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**
Local human population, livestock and wildlife, domestic properties and local amenity.	Waste and litter on local and internal roads. Vehicles entering and leaving Site.	Nuisance, loss of amenity and road traffic accidents.	Air transport then deposition.	Low	Low	Low	Local residents, surrounding environment and animals sensitive to litter. There is some potential for litter to be generated from general Site activities but limited potential for it to leave the Site boundary. Sludge that is delivered to the Site is transported in tankers.	All vehicles leaving the Site which are transporting waste are to be covered to prevent waste/materials escaping from them. All waste produced from general Site activities is kept in enclosed containers, or inside a building, prior to removing from Site. Bins for general and recyclable waste, metal skips and a WEEE store are located outside the Site office. Grit and screenings are stored in appropriate skips. All waste is removed by an external contractor when required. Regular inspections for litter and debris are undertaken. Nuisance management measures are included in the EMS and the site-specific management plan. Details of the procedures Southern Water follows with regards to the control of mud and debris and potentially polluting leaks and spillages can be found in EMS 360 and EMS 381.	Low
Local human population.	Vehicles depositing mud and debris arriving/ leaving the Site.	Nuisance, loss of amenity, road traffic accidents.	Vehicles entering/ leaving the Site.	Low	Low	Low	Road safety issues - local residents often sensitive to mud on the road. Limited potential for mud and debris.	Activities shall be managed and operated in accordance with a site-specific management plan with overarching procedures set out in the EMS. Details of the procedures Southern Water follows with regards to the control of mud and debris and potentially polluting leaks and spillages can be found in EMS 360 and EMS 381. Any mud or sludge arising from activities on-site is cleared up promptly. There are no wheel wash facilities on the Site, but vehicles can be washed down with available hoses, and equipment and impermeable surfaces are swept and washed down, when necessary. Any emissions of substances not controlled by emission limits (excluding odour and noise) shall not cause pollution. Vehicle routes are to be inspected regularly and swept when necessary. All vehicles leaving the Site, transporting waste/ cake are to be covered to prevent waste/materials being blown from them.	Low

Pests									
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**
Local human population.	Vermin, birds and insects	Harm to human health from wastes carried off-site and faeces. Nuisance and loss of amenity.	Air transport and over land.	Low	Low	Low	Permitted wastes are unlikely to attract scavenging animals and birds but certain areas may become nesting / breeding sites. The waste types handled on-site do not attract pests, monthly pest control visits by contractors are performed at the Site. Therefore, the magnitude of risk is considered to be low.	Activities to be managed and operated in accordance with the EMS and management plans and procedures implemented. Pest control measures are implemented under EMS227. Rat boxes are used around the Site, where appropriate. All reports of pests are sent to the contractor who will investigate and report findings and outcomes and detail any actions required. Ensure waste cannot be accessed by scavengers. All waste produced from general Site activities are kept in enclosed containers, or inside a building, prior to removing from Site. Doors of buildings are to remain closed at all times when not in use. Regular inspection and maintenance of boundary fencing and buildings is carried out to prevent access to the Site. Well established and proven operational controls and procedures are in place, including regular inspection and monitoring of the Site for pests by contractors.	Low

Human health and environmental safety								
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**
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	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. The Site is not located within an area with the potential for groundwater flooding to occur. Area is within a Flood Zone 3 (for flooding from the river) but not known to flood, the Site benefits from flood defences located along Horse Reach/Long Reach (Main River) to the east. The Site is considered to be a low risk for flooding from surface water, corresponding to a chance of flooding each year of between 1 in 1000 (0.1%) and 1 in 100 (1%). There have not been any reported flooding issues from the Site.	Area is not known to flood and the drainage network sends water to the head of the works for treatment. There are no direct potentially contaminated discharges to controlled surface waters. 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.	Low
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	Potential injury to on-site personnel as a result of vehicle movements or equipment malfunction or misuse. Direct physical contact is minimised by activity being carried out within enclosed digesters so a low magnitude risk is estimated. Contact with waste is minimal with exception of leaks or spills from unloading of tanker and transfer of filter cake	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. 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. Training includes awareness raising of the potential on-site hazards and health and safety measures to adhere to. Preventative measures will be under continuous review as part of the EMS procedures. 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. Access to the Site and waste is restricted by 2.5m high chain link security fence and a 40m wide watercourse which borders the Site. Electronically operated palisade gates secure the main access and are closed at all times when not in use and locked out of hours. The Site also benefits from a CCTV system (normal and thermal), with cameras positioned in key locations around the Site, including one ANPR camera on the main gate. The Site is staffed between 0700-1800 on Mondays to Fridays and between 0700-1500 on weekends. The electric gate is operated by a fob system, for visitors and unauthorised personnel an intercom system at the Site entrance is used. Regular inspections of the boundary fencing and buildings are undertaken to ensure that these have not been compromised and	Low

Human health and environmental safety								
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**
								continue to prevent easy access to Site. Repairs are undertaken in accordance with the EMS requirements. Key sludge treatment and wastewater treatment activities undertaken within enclosed systems. Approximately 8 tankers per day (220m^3) deliver imported liquid sludge to the Site. Vehicle movements around the Site vary depending on what activities are being undertaken. Cake is moved to cake bays once a trailer is full. Cake is removed from the bays frequently during specific land spreading windows – typically throughout the summer months. Waste is removed as required. Therefore, frequent vehicle movements are typically undertaken only by Site staff and maintenance contractors. Operator has produced a hazard review and risk assessment documents relating to this and other types of potential incidents, within the EMS, H&S and O&M manuals.	
Local human population and local environment.	Explosion of biogas causing the 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 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	High	Medium	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. An explosion could cause injury to local residents and Site staff from flying debris. 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. Permitted waste types limited to sludges and liquids.	The key sludge treatment and WTW processes are undertaken within enclosed systems such as the anaerobic digestion (AD) and biogas systems. STC sludge storage tanks are covered and not considered a fire risk. 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. 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. 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. 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. Emergency operating procedures are in place. Adequate firefighting measures are implemented on-site. Access to the Site and waste is restricted by 2.5m high chain link security fence and a 40m wide watercourse which borders the Site. Electronically operated palisade gates secure the main access and are closed at all times when not in use and locked out of hours. The Site also benefits from a CCTV system (normal and thermal), with cameras positioned in key locations around the Site, including one ANPR camera on the main gate. The Site is staffed between 0700-1800 on Mondays to Fridays and between 0700-1500 on weekends. The electric gate is operated by a fob system, for visitors and unauthorised personnel an intercom system at the Site entrance is used. 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. 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 manual (EMS362, H&S204 and H&S440).	Low
Local human population and local environment	Explosion of pressurised tanks due to equipment and/or process failure.	Respiratory irritation, illness and nuisance to local population. Fatality/injury to staff, 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.		Low	Medium	Low	Emissions to air, land or water may cause harm to and deterioration of air, land or water. Smoke, fumes and material released from tanks may cause irritation, illness or nuisance to local residents and Site staff. Impact from the tank explosion may cause external damages to other equipment, buildings located close to the epicentre of the explosion.		Low

Human health and environmental safety								
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**
								Firewater within a newly bunded area will be contained by the bund and allow for appropriate disposal. There will be no gravity hydraulic connection from the bund to the drainage system/return to head of works. Manual intervention by an operator will be required to start the pumps and remains subject to the pre-acceptance (sample/test) procedure to ensure the water is appropriate for discharge to head of works. In the event of an incident, depending on the nature of the contamination (firewater in this context) the product will be held within the bund and be subject to alternative disposal methods. Depending on the scale and nature of the incident this may include temporary holding in road tankers to facilitate safe recovery activities. The detail regarding this procedure remains subject to further evaluation as solutions are designed and implemented. Firewater use on other process/equipment areas (which either have existing, or will be provided with new, impermeable surfaces) will drain to site drainage systems. A robust means of isolating the site drainage from returning to the head of works is required. Where sites have pumped return to head of works stopping the pump and ensuring no hydraulic link (syphoning) is required. Where return to head of works is (or could be) gravity returned, a new isolation valve is required which is to be shut in the event of an incident. Implementation of these measures will ensure no firewater returns to the WtW without appropriate controls including sampling/testing. Further design development is underway to determine the most appropriate solution to address this requirement and ensure compliance. There is also safety zoning of areas under the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR)/ Potentially Explosive Atmospheres (PEXA) on-site and smoking is only permitted in designated areas.	
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. Risk of accidental combustion of waste is minimal. Permitted waste types limited to sludges and liquids	The key sludge treatment and WTW processes are undertaken within enclosed systems such as the AD and biogas systems. STC sludge storage tanks are covered but and not considered a fire risk. 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/PEXA on-site and smoking is only permitted in designated areas. Firewater within a newly bunded area will be contained by the bund and allow for appropriate disposal. There will be no gravity hydraulic connection from the bund to the drainage system/return to head of works. Manual intervention by an operator will be required to start the pumps and remains subject to the pre-acceptance (sample/test) procedure to ensure the water is appropriate for discharge to head of works. In the event of an incident, depending on the nature of the contamination (firewater in this context) the product will be held within the bund and be subject to alternative disposal methods. Depending on the scale and nature of the incident this may include temporary holding in road tankers to facilitate safe recovery activities.	Low

Human health and environmental safety								
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**
								The detail regarding this procedure remains subject to further evaluation as solutions are designed and implemented. Firewater use on other process/equipment areas (which either have existing, or will be provided with new, impermeable surfaces) will drain to site drainage systems. A robust means of isolating the site drainage from returning to the head of works is required. Where sites have pumped return to head of works stopping the pump and ensuring no hydraulic link (syphoning) is required. Where return to head of works is (or could be) gravity returned, a new isolation valve is required which is to be shut in the event of an incident. Implementation of these measures will ensure no firewater returns to the WtW without appropriate controls including sampling/testing. Further design development is underway to determine the most appropriate solution to address this requirement and ensure compliance. Adequate firefighting measures are implemented on-site. 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. 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. Emergency operating procedures are in place. Adequate firefighting measures are implemented on-site.	
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 and deterioration 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 waste is minimal. Permitted waste types limited to sludges and liquids	The key sludge treatment and WTW processes are undertaken within enclosed systems such as the AD and biogas systems. STC sludge storage tanks are covered but and not considered a fire risk. 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 manual (EMS362, H&S204 and H&S440). There is also Safety zoning of areas under DSEAR/PEXA on-site and smoking is only permitted in designated areas. 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. 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. Emergency operating procedures are in place. Adequate firefighting measures are implemented on-site. Access to the Site and waste is restricted by 2.5m high chain link security fence and a 40m wide watercourse which borders the Site.	Low

Human health and environmental safety								
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**
								Electronically operated palisade gates secure the main access and are closed at all times when not in use and locked out of hours. The Site also benefits from a CCTV system (normal and thermal), with cameras positioned in key locations around the Site, including one ANPR camera on the main gate. The Site is staffed between 0700-1800 on Mondays to Fridays and between 0700-1500 on weekends. The electric gate is operated by a fob system, for visitors and unauthorised personnel an intercom system at the Site entrance is used. 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. Firewater within a newly bunded area will be contained by the bund and allow for appropriate disposal. There will be no gravity hydraulic connection from the bund to the drainage system/return to head of works. Manual intervention by an operator will be required to start the pumps and remains subject to the pre-acceptance (sample/test) procedure to ensure the water is appropriate for discharge to head of works. In the event of an incident, depending on the nature of the contamination (firewater in this context) the product will be held within the bund and be subject to alternative disposal methods. Depending on the scale and nature of the incident this may include temporary holding in road tankers to facilitate safe recovery activities. The detail regarding this procedure remains subject to further evaluation as solutions are designed and implemented. Firewater use on other process/equipment areas (which either have existing, or will be provided with new, impermeable surfaces) will drain to site drainage systems. A robust means of isolating the site drainage from returning to the head of works is required. Where sites have pumped return to head of works stopping the pump and ensuring no hydraulic link (syphoning) is required. Where return to head of works is (or could be) gravity returned, a new isolation valve is required which is to be shut in the event of an incident. Implementation of these measures will ensure no firewater returns to the WtW without appropriate controls including sampling/testing. Further design development is underway to determine the most appropriate solution to address this requirement and ensure compliance.	
Local human population and local environment.	Operator Error	Pollution to air, land, surface water and groundwater and human health	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	Possible contamination to air, land, groundwater and surface water.	Activities to be managed and operated in accordance with the EMS and management plans and procedures implemented. All equipment is checked under preventative maintenance plans and is checked and calibrated as per the manufacturer's instructions. 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. 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. Training includes awareness raising of the potential implications of failure to control operations and the potential impact on the environment. Preventative measures will be under continuous review as part of the EMS procedures.	Low

Human health and environmental safety									
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**
								Emergency operating procedures are in place and detailed in the Site's Operational Contingency Plan Senior site-based management have direct responsibility for implementing risk management measures.	

Natural habitats and ecology									
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**
Protected nature conservation sites - European and national designated sites	Any, but principally NOx.	Harm to protected site through toxic contamination, nutrient enrichment, disturbance etc.	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.	Medium	Medium	Medium	Physical disturbance and emissions to air, water or land may cause harm to and deterioration of nature conservation sites. Four SPAs and two Ramsar sites are located within 10km of the Site. Medway Estuary and Marshes SPA in particular lies partly within the Site boundary. The Medway Estuary and Marshes SSSI and the Swale Estuary MCZ are located partly within the Site boundary. The Site is also located 670m from the Swale SSSI, 1.5km away from Elmley NNR and 1.8km away from Medway Estuary – Zones 1 and two MCZs.	Activities to be managed and operated in accordance with the EMS and management plans and procedures implemented. Emissions of substances not controlled by emission limits (excluding odour and noise) shall not cause pollution. Storage of high ammonia bearing material will be covered at all times. Emission limits for stack gases are specified. BAT and appropriate additional mitigation measures set out in the EMS (EMS323, EMS223. EMS228 and EMS220), have been taken to prevent or where that is not practicable, to minimise, those emissions. As required by the Southern Water EMS various housekeeping and waste management practices are in place to monitor waste emissions. These include segregation of wastes according to their classification and nature, labelling waste and using designated storage containers.	Low
Protected species, including nesting birds, wintering birds, common reptiles, terrestrial and aquatic invertebrates, common amphibians, bats, badgers, hazel dormice and great crested newts	Any, but principally NOx.	Harm to protected species through the disturbance or removal of habitats		Medium	Medium	Medium	Physical disturbance and emissions to air may cause harm to protected species. The proposal for the Permit does not involve the removal of vegetation, or structural modification to built structures. It is considered unlikely, therefore, that Site activities would lead to the disturbance or removal of terrestrial habitats.		Low

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