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Environmental Risk Assessment – EPR/JP3925SN/P001

Glentham Anaerobic Digestion Plant

Glentham Green Energy Limited

CRM.0166.001.PE.R.005

'Experience and expertise working in union'

enzygo.com

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Environmental Risk Assessment – CRM.0166.001.PE.R.005

Project:	Glentham Anaerobic Digestion Plant
For:	Glentham Green Energy Limited
Status:	FINAL
Date:	May 2024
Author:	Daniel Mills, Senior Permitting Consultant
Reviewer:	Peter Cumberlidge, Director

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1.0 Introduction

1.1 Introduction

1.1.1 This Environmental Risk Assessment (ERA) has been completed to support the Bespoke Environmental Permit Application for an Anaerobic Digestion (AD) Facility by Glentham Green Energy Limited ('the Operator'). This report has been prepared in response to Question 6 on the Environment Agency's Part B2 application form. The permit application reference is EPR/JP3925SN/P001.

1.2 Scope of Assessment

1.2.1 A number of assessments have been carried out to determine the environmental risks posed by the Facility and to identify whether the level of risk is considered acceptable. The assessment has been completed in accordance with the guidance provided on the Environment Agency's Website 'Risk assessments for your environmental permit', 21st November 2023.

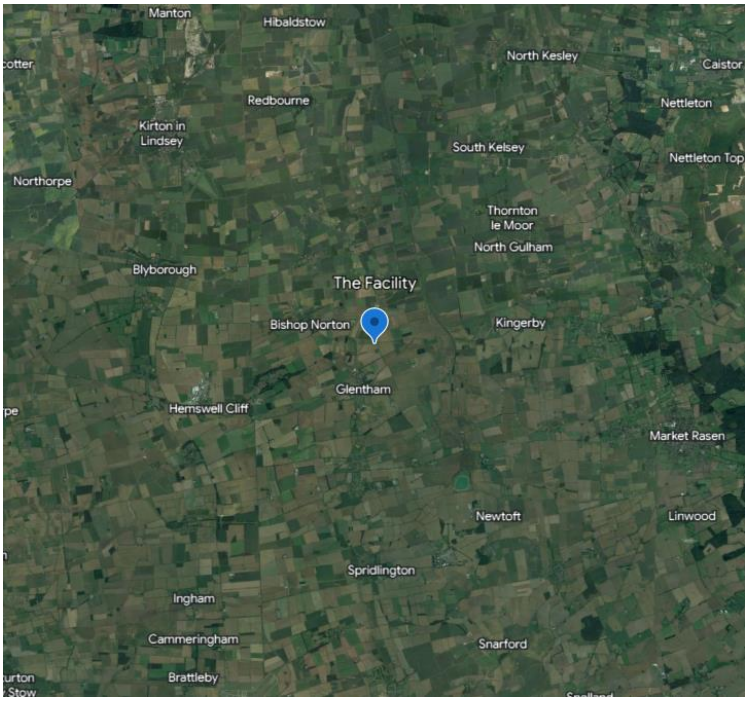
1.2.2 This report contains justification for all risk assessments completed or screened out from requiring further consideration and provides an overall assessment of the acceptability of the proposed activity.

1.3 Facility Location and Environmental Setting

1.3.1 The full address for the Facility will be:

Glentham Anaerobic Digestion Plant
Barff Lane
Glentham
Lincolnshire
LN8 2EY

Figure 1.3.1: Proposed Facility Location



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1.3.2 The proposed Facility's layout is shown on drawing 'Proposed Site Layout', referenced 28248/005 Rev X contained within the drawings section of the application.

1.3.3 The National Grid Reference (NGR) for the proposed Facility is TF 00584 91928. The proposed Facility covers an area of approximately 3.5 hectares. The village of Glentham is located approximately 800m to the southwest and the village of Bishop Norton is situated approximately 1,785m to the northwest.

1.3.4 The site currently comprises arable agricultural land. The site is bound to the north by a drainage ditch, running in a roughly east - west orientation, beyond which are agricultural fields. An access track bounds the site to the east, beyond which are agricultural fields. The site is bound to the south by an irrigation lagoon with further agricultural fields beyond and Barff Lane located south of the fields. The west of the site is bound by further agricultural fields.

1.3.5 The nearest residential property to the proposed Facility lies approximately 706m to the south southwest.

1.3.6 The nearest natural surface water feature is the drainage ditch adjacent to the northern site boundary. The drainage ditch is a tributary of a main river, Norton Beck. However, the nearest main river to the proposed Facility is Seggimoor Beck located approximately 592m to the southeast.

1.3.7 A review of the flood map for planning on the Gov.UK website, indicates that the proposed Facility is located within a Flood Zone 1. Land lying within Flood Zone 1 has a low probability of flooding.

1.3.8 The site is located over an undifferentiated secondary aquifer within the superficial geology and the northwestern corner of the site is located over a secondary A aquifer within the bedrock geology.

1.3.9 The site is located within a drinking water safeguard zone for surface water and a Nitrate Vulnerable Zone (NVZ).

1.3.10 The prevailing winds at the proposed Facility are from the southwest and west southwest, based on historic daily observation data sourced from the Humberside Airport weather station. The weather station is located approximately 20km north northeast of the proposed Facility (based on data provided by www.windfinder.com), see Appendix B for details.

1.4 Permitted Activities

1.4.1 The listed activities proposed within this permit application are in accordance with the Environmental Permitting (England and Wales) Regulations 2016 (as amended). Schedule 1 listed activities and Directly Associated Activities (DAAs) are summarised in Table 1.4.1 below.

Table 1.4.1: Regulated Activities

Activity	Description of Activity and WFD Annex I and Annex II operations	Limits of specified activity and waste types
Activity Listed in Schedule 1 of EPR		
Part A (1) Section 5.4 Part A()1) (b)(i) Anaerobic Digestion Plant – Recovery or a mix of recovery and disposal of non-	**R13:** Storage of wastes pending the operations numbered R1, R3 and D10. **R3:** Recycling or reclamation of organic substances that are not used as solvents.	From receipt of waste through to digestion and recovery of by-products (digestate). Total capacity of 41 070 tonnes per annum.

Activity	Description of Activity and WFD Annex I and Annex II operations	Limits of specified activity and waste types
hazardous waste with a capacity exceeding 75 tonnes per day (or 100 tonnes per day if the only waste treatment is anaerobic digestion) involving one or more of the following activities, and excluding activities covered by Council Directive 91/217/EEC- (i) biological treatment		Daily treatment capacity of 120 tonnes per day.
Directly Associated Activities		
DAA 1 Storage of waste pending recovery or disposal	**R13:** Storage of waste pending the operations numbered R1 and R3 (excluding the temporary storage, pending collection, on the site where it is produced).	From the receipt of waste to dispatch off site for recovery and/or disposal. Storage of waste in covered clamps on an impermeable surface with sealed drainage. Storage of liquid digestate. Storage of solid digestate. Storage of dirty water from the process in dirty water lagoon prior to use in the AD process.
DAA 2 Physical treatment for the purpose of recycling	**R3:** Recycling or reclamation of organic substances which are not used as solvents	From the receipt of waste to despatch for anaerobic digestion or despatch off site for recovery and/or disposal. Storage of waste in covered clamps on an impermeable surface with sealed drainage. Treatment of non-waste straw by crushing, wetting, chopping, maceration and extrusion prior to despatch into the anaerobic digestion process.
DAA 3 Natural gas combusted in 2no. combined heat and power (CHP) engine to produce heat and power	**R1:** Use Principally as a fuel to generate energy	Combustion of natural gas in 2no combined heat and power (CHP) engines each with an aggregated thermal input of 3.495 MWth, with the release of combustion gasses.

Activity	Description of Activity and WFD Annex I and Annex II operations	Limits of specified activity and waste types
DAA 5 Treating biogas and biomethane	**R13:** Storage of waste pending the operations numbered R3 (excluding temporary storage, pending collection, on the site where it is produced) **R3:** Recycling/reclamation of organic substances which are not used as solvents	From the receipt of biogas produced at the on-site anaerobic digestion process to upgrading and dispatch to the national gas grid
DAA 6 Emergency flare operation	**D10:** Incineration on land	From the receipt of biogas produced at the on-site anaerobic digestion process to incineration with the release of combustion gas. Use of one auxiliary flare required for periods of breakdown or maintenance of the biogas upgrading plant or in the case of an emergency only
DAA 7 Emergency Diesel Generator	Combustion of diesel within a emergency diesel generator	Combustion of diesel within one emergency generator with a thermal input of 0.432kWth. For use in an emergency <50 hours per annum.
DAA 7 Biogas Storage	R3: Recycling or reclamation of organic substances which are not used as solvents Storage of biogas produced by the on-site anaerobic digestion of permitted waste and non-waste maize, grass and rye silage**.**	From the receipt of biogas produced at the on-site anaerobic digestion process to despatch for use within the facility.
DAA 8 Biogas upgrading	R3: Recycling or reclamation of organic substances which are not used as solvents Cleaning, upgrading and compression of biogas using membrane separation technology and propane injection	From the receipt of biogas produced at the on-site to biomethane for compression and export to the grid. This includes return of off specification biogas for combustion to either the biogas holder or the emergency flare.
DAA 9 Raw material storage	Storage of raw materials including maize, and/or rye silage, straw lubrication oils, diesel, ferric chloride, ethyl glycol, propane, anti foaming agent	From the receipt of raw materials to despatch for use within the facility.
DAA 10 Digestate Storage	Storage of liquid digestate in the onsite lagoon and of solid digestate	From the receipt of digestate produced from the on-site anaerobic digestion process to dispatch for use off site. Sorag of processed liquid digestate in a digestate lagoon.
DAA 11 Surface water collection and storage	Collection and storage of uncontaminated site surface rainwater	From the collection of uncontaminated roof and site surface water from non-operational areas only to reuse within the facility or discharge to the drainage ditch.

Activity	Description of Activity and WFD Annex I and Annex II operations	Limits of specified activity and waste types
DAA 12	Collection and storage of process water in a dirty water lagoon	From the collection storage of effluent from the storage of feedstocks to re-use within the facility.

1.4.2 The proposed CHP units each have a net rated thermal input of >1MWth, (3.495MWTh) therefore fall under the requirements of Schedule 25a of the Environment Permitting (England and Wales) Regulations 2016 (as amended).

1.4.3 The CHPs will also provide electricity (and heat) to the facility, however there is not a capacity agreement or agreement to provide a balancing service in place and it is not part of a wider specified generator group therefore it will not fall under the requirements of Schedule 25b of the Environmental Permitting (England and Wales) Regulations 2016 (as amended).

1.4.4 It is also proposed that CO_2 from the upgraded biogas be recovered and stored within 2no. 52m³ tanks before removal off site for utilisation within the food and drink industry, after testing has been undertaken. The Operator is proposing to use Regulatory Position Statement 255 to allow this to occur.

1.5 Waste Types, Quantities and Operating Hours

1.5.1 Feedstock deliveries and waste collections will take place at the site during the following restricted operational hours:

- Monday to Sunday – 08:00 to 17:00
- No deliveries on bank holidays

1.5.2 The treatment of feedstock through the process, the combustion of biogas in the CHP engine and upgrading of Biogas and injection into the grid will operate continuously 24 hours a day. Following allowance for maintenance and downtime the total operating hours are estimated to be 8,322 per annum.

1.5.3 The feedstock to be processed at the Facility will be straw, chicken manure, maize, potato peelings, straw farmyard manure and rye. The Facility will accept a maximum of 41,070 tonnes of feedstock per year, consisting of a combination of the materials detailed in Table 1.5.1 below.

Table 1.5.1: Input Materials

Input Materials	Estimated annual quantity (tonnes)	EWC Code
Straw	10,970	N/a
Chicken manure	12,700	02 01 06
Maize	11,800	N/a
Potato peelings	3,000	02 03 04
Straw farmyard manure	2,600	02 01 06
Rye	0 (only to be used if there is insufficient maize)	N/a

1.6 Raw Materials

1.6.1 In addition to the feedstocks listed in section 1.5 above, a range of additional raw materials are used at the Facility as part of the Anaerobic Digestion Process.

1.6.2 Raw material deliveries will take place at the site during the following restricted operational hours:

- Monday to Sunday – 08:00 to 17:00
- No deliveries on bank holidays

1.6.3 The raw materials to be used at the Facility are detailed within Table 1.6.1 below.

Table 1.6.1: Raw Materials

Raw Material	Estimated Annual Throughput	Maximum Storage Quantity
Ethylene glycol	1l	3,000l
Activated carbon	10t	5.4t
Ferric chloride	1,000l	1,000l
Anti-foaming agent	1,000l	1,000l
Diesel	<5,000l	235l

1.6.4 Ethylene glycol is used within the Facility's three separate cooling systems which each contain 1,000l. Following initial filling of the cooling systems, they will only require small top ups annually to compensate for losses.

1.6.5 Activated carbon is contained within two tanks, each containing 2.7t of activated carbon, fitted to the biogas upgrading system. The activated carbon is used within the biogas upgrading process to remove H_2S with approximately 27.3kg of activated carbon used per day.

1.6.6 The ferric chloride is contained within a 1,000l bunded IBC which is located within the bunded area containing the digesters. The material is added to the digestate within the AD process to reduce the amount of H_2S contained within the biogas produced.

1.6.7 An anti-foaming agent is added to the digestate within the AD process to prevent foaming within the digesters. The anti-foaming agent is stored within a 1,000l bunded IBC which is located within the bunded area of the Facility.

1.6.8 Diesel is stored on site for use in the emergency backup generator with a maximum volume of 235l being kept on site. Diesel will only be used in the event that the emergency generator is required and during servicing checks on the generator. The diesel is contained within a double skinned fuel storage tank located inside the bunded area containing the digesters.

1.7 Nearby Sensitive Receptors

1.7.1 Nearby receptors within 2,000m of the Facility have been identified as part of the ERA. Key receptors that have the potential to be impacted by emissions from the Facility are summarised in Table 1.7.1 below.

1.7.2 There are no Local Nature Reserves (LNR), National Nature Reserves (NNR) or Sites of Special Scientific Interest (SSSI) sites within 3km of the proposed Facility. There are also no Special Protection Areas (SPA), Special Areas of Conservation (SAC) or Ramsar within 10km of the proposed Facility based on searches carried out using Defra's Magic website.

1.7.3 The EAs Nature and Heritage Conservation Screening assessment has identified no protected sites or species within the designated screening distance for an AD facility at this site.

1.7.4 The Nearest designated site is located approximately 3,000m from the Facility at Normanby Meadow SSSI.

Table 1.7.1: Sensitive Receptors

Receptor	Type	Distance (m)	Direction
Undifferentiated secondary aquifer (superficial geology)	Hydrogeological	-	Onsite
Secondary A aquifer (bedrock geology)	Hydrogeological	-	Onsite
Drinking water safeguard zone (surface water)	Hydrological	-	Onsite
Nitrate vulnerable zone	Hydrological	-	Onsite
Irrigation lagoon	Agricultural	0	S
Unnamed drainage ditch	Hydrological	0	N
Agricultural fields	Agricultural	0	N, E, S, W
Seggimoor Beck	Hydrological	592	SE
Pond	Hydrological	674	W
Pond	Hydrological	688	WNW
Mellow's Beck	Hydrological	689	WNW
Residential property off Prospect Lane	Residential	706	SSW
Glentham Farming Co	Residential and commercial	832	SW
Glentham village	Residential	836	SSW
Beck farm	Residential	938	NNW
The bungalow	Residential	942	E
Low place	Residential	948	NE
Glentham Sewage Treatment Plant	Commercial	1020	SSW
Norton Sandhayes Farmhouse	Residential	1270	N
The Chestnuts	Residential	1330	S
Glentham Grange Farmhouse	Residential	1350	SE
St Peters Church	Community	1360	SSW
Glentham Motors	Business	1500	S
Barff Farm PT Moore	Residential	1560	S
Glebe Farm House	Residential	1630	SSE
Allotments at Bishop Norton	Recreational	1800	NNW
Business Units at Barff Farm	Business	1830	S
White House Farm, Bishop Norton	Residential	1900	NNW
The Spinney	Residential	2001	NW

1.8 Emissions from the Site

1.8.1 There are 5 no. point source emissions to air at the Facility which arise from the CHP engines, biogas upgrading system, emergency flare and CO_2 recovery unit. There will also be pressure relief valves and vents for emergency use only.

1.8.2 There will be no point source emissions to sewer or surface water of process emissions. All liquid wastes are returned to the anaerobic digestion process.

1.8.3 Surface water collected within the bunded area on site will be harvested and used as process water within the anaerobic digestion operations. A surface water holding lagoon is included in the design of the facility to enable collection of rain and uncontaminated surface water.

1.8.4 The point source emissions described above are summarised in Table 1.8.1 below:

Table 1.8.1: Point Source Emissions from the Facility

Air Emission Point Reference	Source of Emission	Receiving Media	Emissions
A1	CHP Engine	Air	CO, NOx
A2	CHP Engine	Air	CO, NOx
A3	Emissions from the Emergency High Temperature Flare Stack	Air	CO, NOx, VOCs
A4	CO_2 Recovery Plant	Air	CO_2, N_2, O_2, H_2O, CH_4
A5	Emergency Diesel Generator	Air	NOx, SO_2, Particulates
PRV's	2no. CSTR tank PRV 2no. PFR tank PRV's	Air	CO2 (44.5%), CH4 (55%), H2S, NH4, VOCs
Vents	Biogas storage dome vent Buffer Tank Vent CO_2 dryer purge vent CO_2 storage tank vent CO_2 purge gas vent	Air	CO_2, H_2S, NH_4, N_2, VOCs including methane
SW1	Overflow from surface water holding lagoon	Release to watercourse	H_2O
SW2	Surface water from access road in the east of the site	Release to watercourse	H_2O

2.0 Environmental Risk Assessments

2.1 Scope of Assessments Completed

2.1.1 This ERA has been compiled to determine the environmental risks posed by the proposed Facility and to ensure there are no significant impacts on the environment or human health, in accordance with regulatory guidance. In accordance with Environment Agency guidance 'Risk assessments for your environmental permit', last updated 21st November 2023, the following potential risks to the environment were considered and either assessed qualitatively in this document or screened out.

2.1.2 This ERA identified the following potential risks to the environment for consideration and inclusion in the assessment, if they are likely to be present:

- point source releases to air;
- point source discharges to Surface waters;
- point source discharges to sewer;
- point source discharges to Ground or groundwater;
- odour impacts;
- noise and vibration impacts;
- impacts from accidents;
- pests and vermin;
- mud and litter;
- fugitive emissions to air including bioaerosols,
- fugitive emissions to land, surface waters and groundwater; and
- disposal or recovery of wastes produced on site.

2.1.3 Each assessment completed is summarised below with a qualitative assessment of the risks from the proposed Facility provided in Appendix A. Full details of control measures compared with techniques described in the sector guidance is presented in the OTMP referenced CRM 0166 001 PE R 006.

2.1.4 Mitigation measures have been proposed where necessary with consideration of Environment Agency Guidance 'Control and monitor emissions for your environmental permit', 24th November 2022 and industry best practise.

2.2 Point Source Emissions to Air

2.2.1 There are 5 no. of point source emissions to air from the proposed Facility, as detailed in Table 1.8.1 above.

2.2.2 The Air Quality Assessment (AQA) was undertaken in April 2024 using ADMS 6 (v6.0.0.1). Impacts at sensitive receptors were quantified and the results compared with the relevant

Environmental Quality Standards (EQS) and criteria provided by the Environment Agency (EA). The assessment is provided as Appendix E to this document.

2.2.3 The AQA concludes that impacts on human health were considered to be not significant at all modelled locations within the assessment extents. This conclusion was based on the predictions detailed within the assessment and the use of conservative assumptions, such as worse case emission limit values and meteorological conditions over a 5-year period. Therefore, the assessment states that the overall air quality impacts of the Facility would be insignificant.

2.3 Point Source Emissions to Land, Water or Sewer

2.3.1 The surface water collected within the bunded area and feedstock storage areas will be harvested into the dirty water / leachate lagoon and used as process water within the anaerobic digestion operations.

2.3.2 However, a limited amount of surface water may be discharged from the non-operational areas of the Facility. There are two point source emissions from the Facility to the unnamed drainage ditch, which runs adjacent to the Facility's northern boundary.

2.3.3 The first of these point source emissions is the overflow from the Facility's surface water holding lagoon. The surface water holding lagoon receives clean surface water from non-operational areas only. The water contained within the surface water holding lagoon will generally be used within the anaerobic digestion process and this discharge will only take place if there is excess surface water to prevent overtopping of the lagoon.

2.3.4 The second point source emission is clean surface water from the Facility access road, entrance and exit in the east of the site. The water passes through a separator to remove silt and oils prior to discharge. This discharge can be also shut off and rerouted to the surface water holding lagoon in the case of an emergency or if additional water is required for the anaerobic digestion process.

2.3.5 The residual risk from point source emissions to water is considered to be low.

2.3.6 There will be no point source emissions to land or sewer as part of the proposed activities at the Facility. Further risk assessments of point source emissions to land and sewer have therefore been screened out from further assessment.

2.4 Fugitive Emissions to Air

2.4.1 The key sensitive receptors at risk of exposure to potential fugitive emission to air from the Facility have been identified as site employees, ecological receptors and local residences. Environmental sensitive receptors are listed in Table 1.7.1.

2.4.2 The potential fugitive emissions to air from the proposed facility will be the generation and release of dust, including bioaerosols, and the release of VOCs. The primary sources of the emissions will be from the straw processing units, the digestate lagoon, the AD process units, gas upgrading units, CO_2 recovery unit, feedstock loading and storage and from plant and vehicle movements.

2.4.3 Activities on site are managed in accordance with the Operator's management systems, including regular inspections and maintenance of the CHPs, emergency flare, CO_2 recovery unit and biogas upgrading unit. The CHPs will be monitored annually using MCERTS methods to ensure compliance with permitted limits. SCADA monitoring systems will be used to ensure all equipment is operating at optimal levels.

2.4.4 The permit will limit waste types to be accepted at the facility, and will not include dusts, powders, or loose fibres. Waste acceptance and handling procedures minimise the likelihood of the generation of dust.

2.4.5 All waste feedstocks will be stored in separate piles within a storage clamp. The storage clamp is constructed of impermeable concrete hardstanding and is served by a sealed drainage system. The waste feedstocks will be kept covered at all times, with the exception of during the addition or removal of feedstock.

2.4.6 Straw feedstock will be received via conveyor and passes through the bale string removal system, bale breaker and subsequently to a straw mill in order to crush the straw. The crushed straw leaves the mill via an auger which is fitted with a water sprinkling mechanism to wet the straw, the wetted straw is deposited into a storage clamp. The storage clamp is constructed of impermeable concrete hardstanding and is served by a sealed drainage system. This initial processing and the storage of the wetted straw takes place in a covered straw processing area.

2.4.7 Following up to 24 hours of soaking, the wetted straw is collected by loading shovel and fed into the straw extruder. The extruded straw is then deposited as a separate pile within the waste feedstock storage clamp.

2.4.8 The digestate has a long residence time within the anaerobic digestion process, spending 25 days within the Continuous Stirred Tank Reactor (CSTR) followed by a 25 day residence time in a Plug Flow Reactor (PFR). This extended residence time reduces the risk of fugitive emissions from the digestate stored within the lagoon.

2.4.9 The digestate lagoon will be covered by 1mm flexible floating LLDPE cover with passive venting and anchored into the surrounding bund.

2.4.10 The CO_2 from the upgraded biogas be recovered and stored within 2no. 52m³ tanks before removal off site for utilisation within the food and drink industry. The SCADA monitoring system will be installed at these tanks to ensure optimal operation.

2.4.11 All vehicles movements will take place on areas of asphalt or concrete hardstanding. A strict site speed limit of 10mph will be maintained across the Facility and on the access track leading to the Facility. Regular cleaning of all internal haul routes will be carried out and all spillages will be cleaned immediately.

2.4.12 The residual risk from fugitive emissions to air is considered to be low.

2.5 Fugitive Emissions to Land and Water

2.5.1 All feedstock storage areas are covered by impermeable 175mm thick reinforced concrete hardstanding with sealed construction joints served by a sealed drainage system. All effluent captured within the feedstock area gullies is directed through the Facility's sealed drainage system to the dirty water/leachate storage lagoon.

2.5.2 All clean rainwater from the non-operational areas will be captured separately and directed to the surface water holding lagoon. The water captured within the surface water holding lagoon and the dirty water/leachate storage lagoon is then used as process water within the anaerobic digestion operations.

2.5.3 All waste feedstocks will be stored on impermeable concrete, within a storage clamp. All feedstocks are covered except during addition or removal of the feedstock, in order to prevent ingress of rainfall.

2.5.4 All tanks, including the anaerobic digestion tanks, are constructed to CIRIA 736 standard. The digestion tanks are stored within a bunded area capable of containing 125% of the largest tanks volume (the PFR).

2.5.5 The dirty water/leachate storage lagoon and the liquid digestate lagoons are constructed of an impermeable liner with leak detection installed below. The drainage system and lagoons are inspected and maintained on a regular basis with a freeboard of at least 750mm maintained at all times..

2.5.6 High level alarms and automatic shut off valves are fitted on all storage tanks and cooling systems, which are controlled by the SCADA system. The level of the digestate storage lagoon will be monitored on a daily basis.

2.5.7 Secondary containment is present within all anaerobic digestion tank filling and emptying areas and spill kits are on hand. Refuelling of equipment in dedicated areas with impermeable surfacing and spill kits are on hand. All staff undertake training on the use of the spill kits and report all incidents.

2.5.8 A programme of planned preventative maintenance is undertaken at the Facility. All primary and secondary containment systems and hardstanding areas are regularly inspected with any repairs carried out promptly and records kept.

2.5.9 The clean surface water drainage can be shut off on site, so in case of emergencies the surface water can be sealed to prevent any contamination entering the unnamed drainage ditch to the north.

2.5.10 Chemicals used within the process include ferric chloride and anti-foaming agent, which are stored in bunded IBCs which are contained within the bunded site area. The activated carbon and ethylene glycol used at the Facility are contained within sealed systems which are controlled by the SCADA system with alarms fitted.

2.5.11 The residual risk from fugitive emissions to water and land is considered to be low.

2.6 Odour

2.6.1 An Odour Risk Assessment was carried out by Enzygo Limited in April 2024 to assess the odour impacts from the proposed Facility. A copy of this assessment can be seen in Appendix E.

2.6.2 The Odour Risk Assessment was undertaken in accordance with the Institute of Air Quality Management (IAQM) Guidance on the Assessment of Odour for Planning and the EA H4 guidance. Based on the Risk Assessment outcomes, potential mitigation and control options were identified.

2.6.3 The Odour Risk Assessment indicates that the Facility operations are likely to have a negligible odour impact at all modelled receptor locations. The report concludes that the odour emissions associated with the operation of the Facility can be considered as acceptable and not significant.

2.6.4 An Odour Management Plan (OMP) has been prepared by Enzygo Limited to support this application. The OMP has been prepared to:

- Establish the likely sources of odour arising from the Facility;
- Set out the procedures followed at the plant in order to prevent or minimise odour emissions; and

- Formalise the procedures for dealing with any our complaints.

2.6.5 In accordance with Environment Agency Guidance H4: Odour Management, the OMP is designed to:

- Employ appropriate methods, including monitoring and contingencies, to control and minimise odour pollution;
- Prevent unacceptable odour pollution at all times; and
- Reduce the risk of odour releasing incidents or accidents by anticipating them and planning accordingly.

2.6.6 A copy of the Odour Management Plan is included in this permit application.

2.6.7 The control measures identified within the Odour Management Plan will be transposed into the Facility's Environmental Management System.

2.7 Noise and Vibration

2.7.1 A Noise Impact Assessment was conducted for the site by Enzygo Limited in May 2024. The BS4142:2014+A1:2019 assessment included a background sound survey and quantification of the noise from the AD facility upon the closest residential receptors. A copy of this assessment is contained within Appendix C of this report.

2.7.2 The Noise Impact Assessment states that '*The BS4142 assessment has shown that rating sound levels from the facility would have a low noise impact during both the daytime and night-time periods, with predicted levels being shown to not exceed the typical background noise levels.*'

2.7.3 The assessment concludes that the Facility would not result in adverse noise impacts on any of the receptors in the vicinity of the development.

2.7.4 A copy of the Noise Management Plan is included in this permit application.

2.7.5 The potential hazard from vibration is low based on the limited sources of vibration and the control measures to be put in place. The plant used at the Facility will be no different to that used in the daily agricultural activities currently carried out on site.

2.7.6 Vibration has therefore been discounted as a potential hazard and no further assessment has been undertaken.

2.8 Pests and Vermin

2.8.1 As biodegradable waste will be processed at the facility there is the potential for pests such as flies, vermin and mammals.

2.8.2 Wastes are delivered to a storage clamp and kept covered until required. Deliveries of energy crops are deposited straight into the silage clamps and remain covered apart from during delivery or removal of feedstock.

2.8.3 Cleaning procedures ensure any spills and litter around the site are cleared up immediately.

2.8.4 A vermin/pest control contract will be set up with a pest control contractor. Records of all vermin and pest control visits and incidents are maintained and available for inspection.

2.8.5 The residual risk of pests is therefore considered to be low.

2.9 Mud and Litter

2.9.1 It is unlikely that there will be any litter generated on site. All feedstocks will be delivered to site in road going wagons or trailers and tipped into the appropriate storage area, generating no litter.

2.9.2 General housekeeping measures detailed within the site's Environmental Management System will ensure any other litter generated on site is minimal and does not escape into the environment. Litter has therefore been screened out from further assessment.

2.9.3 There is limited potential for mud to be generated on site as the majority of the site area and access road comprises hardstanding. It is however possible that mud will be brought onto site by feedstock delivery vehicles.

2.9.4 Wheel washing facilities will be available on site to ensure vehicles leaving the site do not track mud onto the adjacent roads and housekeeping measures will reduce the build up of materials on site.

2.9.5 The residual risk from mud impacting identified receptors is considered to be low.

2.10 Wastes Generated and Waste Management

2.10.1 Minimal waste will be generated at the Facility. General waste will be collected under contract with a local waste disposal contractor.

2.10.2 The digestate generated by the Facility will be PAS 110 compliant and used on the surrounding agricultural land for irrigation and as a soil improver.

2.10.3 Contingency arrangements will be in place for any untreated or partially treated materials in the event of the Facility being unable to process the materials.

2.10.4 The waste hierarchy will be applied to all waste generated at the Facility.

2.11 Accidents

2.11.1 There is potential for exposure from accidents or incidents on site to all sensitive receptors identified.

2.11.2 Key potential hazards identified include the collision of vehicles on site, fires and spillages resulting from arson and vandalism, accidental explosion of biogas, failure of plant and equipment on site and accidental fires. Although these are recognised as potential risks, the likelihood of them occurring remains low.

2.11.3 The qualitative risk assessment provided within Appendix A of this report concludes that if appropriately managed, the residual risks posed would remain low. Proposed management and mitigation controls include the following:

- Activities will be managed and operated in accordance with a written management system (which will include the Accident Management Plan produced as part of this application, referenced CRM.0166.001.PE.R.010);
- The risk of explosion of biogas is considered to be an unlikely event if the site is effectively managed and Lightning protection is installed to BS EN 62305;
- All plant and equipment is monitored with a SCADA control system which identifies abnormal operation. If necessary, biogas can be directed to the emergency flare, or if this

fails can be released via emergency pressure valves;

- The anaerobic digestion tanks are located within a bunded area sized to contain 125% of the largest tank. Containment systems are designed, manufactured and installed in accordance with CIRIA 736 guidance; and
- All fuel and chemicals stored on site will be in sealed, leak resistant containers with appropriate secondary containment. Containers are regularly inspected for leaks, located on impermeable concrete hardstanding and incompatible chemicals are stored in separate locations.
- A Site Traffic Management Plan will be in place and all delivery and collection vehicle drivers briefed on the STMP before entering the Facility. The STMP will include details on speed limits, one way systems and vehicle and pedestrian routes; and
- Shutoff valves are fitted to the clean and dirty water drainage systems to prevent the migration of any contamination or firewater through these systems.

2.11.4 The residual risk from accidents on site, if all identified mitigation measures are implemented, is considered to be low.

2.12 Climate Change Risk Assessment

Overview

2.12.1 This section addresses the requirements of the 'a changing climate' section of the Environment Agency guidance 'Develop a management system: environmental permits', last updated 3rd April 2023.

2.12.2 The following Climate Change Risk Assessment (CCRA) and adaptation planning follows the six-stage approach detailed within the Environment Agency guidance 'Climate change: risk assessment and adaptation planning in your management system', last updated 3rd April 2023.

Scope

2.12.3 The CCRA will describe the main climate change risks specific to the site. Each risk scenario will be assessed using EA Risk Assessment guidance to determine whether each scenario presents a high, medium or low risk using the six-stage approach described in the guidance:

1. Preparation
2. Find potential impacts.
3. Complete your risk assessment.
4. Find control measures.
5. Write your adaptation plan.
6. Monitor, record and review your plan.

Regulatory Guidance

2.12.4 The risk assessments will be developed with reference to the EA's guidance 'Develop a Management System: Environmental Permits', last updated 3rd April 2023, and the following connected EA guidance notes:

- Climate change: risk assessment and adaptation planning in your management system, Plan for climate change impacts to and from your site. How to integrate climate change adaptation into your management system under an environmental permit, EA, last updated 3rd April 2023.

- Guidance - Biowaste: examples for your adapting to climate change risk assessment, EA, last updated 17th May 2023.

- Preparing for flooding: a guide for regulated sites. Flood planning guide to help businesses comply with their environmental permit and the COMAH regulations, EA, last updated 30th June 2015.

Step 1: Preparation

2.12.5 The Facility is newly constructed and has been designed with potential future impacts of climate change taken into consideration. The measures implemented at the site include the following:

- Emergency response plan in place which considers severe weather and natural disasters including flooding.

- Robust design of plant and equipment.

- Capture and storage of surface water for use within the process.

- Tanks are provisioned with bunds which meet the requirements of CIRIA C736.

- Oil tanks comply with Oil Storage Regulations requirements comprising a double skinned container.

- Impermeable concrete hardstanding is installed in operational areas to prevent spills reaching exposed ground or groundwater.

- EMS in place to identify and mitigate the impact from significant environmental risks.

- Accident Management Plan in place to identify accident scenarios, implement preventative measures and mitigate the risks should an accident occur.

- Contingency arrangements are in place to divert feedstocks and manage digestate in the event of an emergency, including scenarios relating to climate change, see appendix G.

Step 2: Identifying Potential Impacts

Increasing Summer Temperatures

2.12.6 This may be around 7°C higher compared to average summer temperatures now, with the potential to reach extreme temperatures as high as over 40°C with increasing frequency based on today's values.

2.12.7 The following potential impacts have been identified for the site and any potential risk created regarding Permit compliance.

- Overheating of vessels and pipework at anaerobic digestion plants, requiring increased insulation and cooling.

- Potential for increased fires involving combustible waste stockpiles.

- Increased changes in feedstock, low nitrogen waste (less grass) and slower processing times.
- There could be an increase in dust and bioaerosol emissions from the site.
- Increased pests and flies.
- Lower gas uptake from National Grid affecting grid demand.
- There could be an increase in odour from the site.

Winter Temperature Profile Changes

2.12.8 Winter temperatures could be 4°C more than the current average with the potential for more extreme temperatures, both warmer and colder than present.

2.12.9 The following potential impacts have been identified for the site and any potential risk created regarding Permit compliance.

- Longer growing seasons resulting in a change in the feedstocks.
- Poor crop yields and feedstock scarcity for anaerobic digestion could lead to reduced digester performance.
- In extreme cold weather, risk of freezing of feed water, resulting in blockages – particularly on long pipelines and storage in exposed areas.
- Frozen onsite roadways may restrict access for staff and emergency vehicles.
- There could be damage to site infrastructure from snow-loading over extended periods.

Daily extreme rainfall

2.12.10 Daily rainfall intensity could increase by up to 20% on today's values and average winter rainfall may increase by over 40% on today's averages.

2.12.11 The following potential impacts have been identified for the site and any potential risk created regarding Permit compliance:

- Unstable process conditions for AD sites causing temperature fluctuations and increased odours.
- Land bank availability for spreading digestate may experience extreme difficulty due to prolonged wet weather.
- Leachate storage risk of over-topping.
- Localised flood events.
- Potential for increased site surface water and flooding.
- Access or egress to/from site could be affected.

Sea level rise

2.12.12 Sea level rise which could be as much as 0.6m higher compared to today's level. The site is located approximately 15m above sea level and is located approximately 32km from the coast.

2.12.13 The rise in sea level has the potential to increase the flood risk at the site.

Drier summers

2.12.14 Summers could see potentially up to 40% less rain than now.

2.12.15 The following potential impacts have been identified for the site and any potential risk created regarding Permit compliance:

- Increased need for water for digesters.
- Poor crop harvest and reduced feedstock.

River flow

2.12.16 The flow in the watercourses could be 50% more than now at its peak and 80% less than now at its lowest.

2.12.17 Reduced river flows may mean that there is also a risk of reduced dilution available in receiving watercourse in the event of a spill, increasing potential for damage from pollution.

Storms

2.12.18 Storms could see a change in frequency and intensity. The unique combination of increased wind speeds, increased rainfall, and lightning during these events provides the potential for more extreme storm impacts.

2.12.19 Storms and high winds could damage building structures with increased potential for fugitive emissions is identified as an impact.

Steps 3 and 4: Risk assessment and Control Measures

2.12.20 Stages 3 and 4 of the six-stage approach are covered within the climate change risk assessment shown in Table 9 contained within Appendix F.

Step 5: Adaption Plan

2.12.21 The current control measures are suitable for the currently predicted climate change impacts for the site. The Facility is newly constructed and the anticipated climate change impacts at the site have been considered throughout the design and construction.

2.12.22 The climate change risk assessment and adaption plan is reviewed annually along with the Facility's EMS and will fulfil step 6 of the six-stage approach. The climate change risk assessment and adaption plan will also be reviewed following any changes to the predicted climate impacts, flood zone designations or climate change related incidents at or near to the site.

2.12.23 Regular reviews of the Facility's Environmental Risk Assessment, Flood Risk Assessment and emergency procedures will be carried out to reflect changes to the conditions on site. There will also be a review of these assessments and procedures should any climate incident occur at or near to the site e.g. flooding event.

2.13 Conclusions

2.13.1 The assessments undertaken consider the possible impacts on sensitive receptors from a range of potential emissions from the Facility. The risk assessments have considered both the intended design and operational practices at the Facility and conclude that:

- Air quality assessment concludes that overall air quality impacts of the Facility are determined to be insignificant.
- Noise assessment concludes that the facility would not result in adverse noise impacts on any of the receptors in the vicinity of the development.
- The overall risk to receptors from accidents, odour and fugitive emissions to air, land and water is considered low following implementation of management measures and controls.
- The overall risks from vibration, mud, litter and pests are considered very low due to the nature of the wastes and treatment processes carried out.

2.13.2 Full details of control measures to minimise the impact of accidents compared with requirements detailed in the relevant technical guidance notes is described in the Operations Techniques and Monitoring Plan.

Table 1: Point Source Emissions to Water

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
Releases of contaminated surface water including firewater	Contaminated surface water; firewater	Transportation through clean surface water drainage system	Underlying groundwater and land; watercourses; ecological receptors; surrounding agricultural land.	Low	Medium	Medium	The site is served by a separate sealed drainage networks for clean and dirty areas with surface waters captured for use within the process. Clean surface water is captured and discharged from non-operational areas only. All potentially polluting materials are contained within bunded areas and located in impermeable surfaces. All main liquid storage and treatment vessels are constructed to CIRIA 736 standard and located within a sealed bunded area sized to contain 125% of the largest tanks capacity. Emergency shutoff valves are fitted to clean surface water discharge outlets. A separator to remove silt and oils prior to discharge is fitted to one discharge point and the other feeds into the surface water holding lagoon initially. Visual inspections of the surface water holding lagoon and separator is part of the daily site checks. The surface water holding lagoon has a capacity of 415m^3 and the dirty water /	Low

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
							leachate lagoon has a capacity of 2,165m^3 to contain firewater in the case of an emergency. Spill clean-up procedure in place to minimise the impact from spills and leaks.	

Table 2: Fugitive Emissions to Air

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
Releases of gaseous emissions above permit limits	Point source emissions	Transportation through air then inhalation or deposition	Residential receptors; site employees; watercourses; ecological receptors; surrounding agricultural land.	Low	Medium	Medium	Activities on site are managed in accordance with the Operator's management systems, including regular inspections and maintenance of the CHPs, emergency flare, emergency generator, CO_2 recovery unit and biogas upgrading unit. The CHPs and biogas upgrading plant will be monitored annually using MCERTS methods to ensure compliance with permitted limits. SCADA monitoring systems will be used to ensure all equipment is operating at optimal levels.	Low
Releases of particulate matter (dust) and bioaerosols	Fugitive releases of dust and/or bio-aerosols	Transportation through air then inhalation or deposition	Residential receptors; site employees;	Low	Medium	Medium	Wastes and silage are covered to prevent release of dusts, odour and bioaerosols. Pretreatment of straw takes place largely within a covered area and include wetting of the material.	Low

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
	from the Facility; releases from feedstock delivery vehicles		watercourses; ecological receptors; surrounding agricultural land.				Activities on site are managed in accordance with the operator's management systems. Regular inspections and maintenance of equipment to ensure they continue to operate at optimum conditions. Good housekeeping practices are applied, such as: regular inspections and cleaning/sweeping of all paved areas on site and covered deliveries of feedstock. The site area and access road comprise concrete and asphalt hardstanding minimising the potential for dust to be generated by vehicles entering and exiting the site. Wheel washing facilities will be available on site should any vehicles bring in mud from off site. Site traffic management plan in place with strict speed limit of 10mph. Monitoring of bioaerosols in line with the Permit conditions. 50 day residence time within the AD process. Digestate lagoon is covered by flexible floating cover, which is anchored in the surrounding bund. Prevailing wind direction is away from the nearest residential receptor.	
Releases of VOC's	Fugitive releases of dust and/or	Transportation through air then	Residential receptors;	Low	Medium	Medium	The CHPs, biogas upgrading plant and emergency generator will be maintained to	Low

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
	bio-aerosols from the Facility; releases from feedstock delivery vehicles	inhalation or deposition	site employees; watercourses; ecological receptors; surrounding agricultural land.				ensure they are operating at optimal conditions, and not releasing VOC's above normal/permitted limits. Emissions of VOCs from the pressure release valves will only occur in emergency situations, where the emergency flare has failed. All records of their use will be maintained. SCADA monitoring systems will be used to ensure all equipment is operating at optimal levels. Solid digestate will be stored in a covered concrete bay before being transferred off-site. Digestate lagoon is covered by flexible floating cover, which is anchored in the surrounding bund.	

Table 3: Fugitive Emissions to Land and Water

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
Contaminated run-off from site surfaces	Loss of containment on site	Percolation through soils, direct run-off from site across the ground	Underlying groundwater and land; watercourses; local residences.	Medium	Medium	Medium	All potentially polluting materials are contained within bunded areas and located in impermeable surfaces. All main liquid storage and treatment vessels are constructed to CIRIA 736 standard and	Low

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
							located within a sealed bunded area sized to contain 125% of the largest tanks capacity. High level alarms and automatic shut off valves are fitted on all storage tanks and cooling systems which are controlled by the SCADA system. Secondary containment is present within all tank filling and emptying areas. The site is served by a separate sealed drainage networks for clean and dirty areas with surface waters captured for use within the process. Emergency shutoff valves are fitted to clean surface water discharge outlets. Spill clean-up procedure in place to minimise the impact from spills and leaks. Programme of planned preventative maintenance in place at the Facility. Chemicals and fuels stored at the Facility in line with COSHH requirements for the substance.	
Release from digestate lagoon or dirty water / leachate lagoon	Loss of Containment on site	Percolation through soils, direct run-off from site across the ground	Underlying groundwater and land; watercourses; local residences.	Medium	High	High	Lagoons are regularly inspected and periodically emptied to enable full inspection. A leak detection system is installed at the lagoons and a programme of planned preventative maintenance is undertaken at the Facility.	Low

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
							Spill clean-up procedure in place to minimise the impact from spills and leaks. The level of the lagoons is monitored on a daily basis with a freeboard of at least 750mm on the digestate lagoon and 500mm on the dirty water / leachate lagoon maintained at all times. Digestate lagoon is covered to prevent rainwater ingress.	
Release from storage tanks (fuels and waste)	Loss of Containment on site	Percolation through soils, direct run-off from site across the ground	Underlying groundwater and land; watercourses; local residences.	Medium	Medium	High	Regular inspection of the storage tanks to identify leaks. Spill clean-up procedure in place to minimise the impact from spills and leaks. Storage tanks are constructed to CIRIA 736 standard and located within a sealed bunded area sized to contain 110% of the largest tanks capacity or 25% of the maximum volume of all the material stored within the bund. High level alarms and automatic shut off valves are fitted on all storage tanks and cooling systems which are controlled by the SCADA system. Secondary containment is present within all tank filling and emptying areas and spill kits are on hand	Low

Table 4: Odour

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
Odour from feedstock while transported to the Facility	Vehicles	Transportation through air then inhalation or deposition	Site employees; Local residents.	Medium	Medium	Medium	Feedstock will be delivered to the site via road. OMP in place to prevent and minimise odorous releases.	Low
Release of odours from stored materials and AD plant operations	Fugitive releases of odours from feedstocks and processes	Transportation through air then inhalation or deposition	Site employees; Local residents.	High	High	High	Wastes and silage are stored in clamps and covered with protective sheeting. Waste feedstocks are stored for a maximum of 8 days before input into the process. The Facility operates a first in first out policy to prevent the build up of older feedstocks. The digestion process is sealed minimising the potential for odour releases. Activities on site are managed in accordance with the operator's management systems. This includes regular inspections and maintenance of equipment to ensure they continue to operate at optimum conditions. OMP in place to prevent and minimise odorous releases. Prevailing wind direction is away from the nearest residential receptor.	Low

Table 5: Noise and Vibration

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
Noise	Plant and equipment producing noise including vehicle movements	Transportation through air	Local residential receptors.	Low	Medium	Low	Noise management plan in place to prevent and minimise impacts. Noise assessment carried out for the site showing no sustained adverse impacts. Delivery times limited to: • Monday to Sunday – 08:00 to 17:00 • No deliveries on bank holidays Plant and equipment to be regularly inspected for abnormal operation with a programme of planned preventative maintenance.	Low
Vibration	Vibration from plant and equipment at the Facility including vehicle movements	Transportation through the ground	Local residential receptors.	Low	Medium	Low	Noise and vibration management plan in place to prevent and minimise impacts. Vibration will be minimal but any issues to be resolved during commissioning process. Delivery times limited to: • Monday to Sunday – 08:00 to 17:00 • No deliveries on bank holidays Plant and equipment to be regularly inspected for abnormal operation with a programme of planned preventative maintenance.	Low

Table 6: Pests and Vermin

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
Vermin and flies attracted to feedstocks	Pests	Travel across air and/or land	Local residential receptors; site employees.	Low	Medium	Low	The primary areas at most AD facilities that attract pests are the feedstock storage areas. The silage and manure are sheeted apart from during feedstock deliveries and removal. Digestate storage lagoon is covered. Cleaning procedures ensure any spills and litter around the site are cleared up immediately. A vermin/pest control contract will be set up with a pest control contractor should pests be found to be inhabiting the facility. Records of all vermin and pest control visits and incidents are maintained and available for inspection. The Facility operates a first in first out policy to prevent the build-up of older feedstocks.	Low

Table 7: Mud and Litter

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
Mud	Mud from vehicle movements	Transportation over land (roadways)	Local residential receptors;	Low	Medium	Low	Wheel washing facilities are present on site and can be used if required. Internal access and haul roads are swept, when required.	Low

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
			site employees.				All vehicle movements will take place on concrete or asphalt hardstanding.	
Litter	Litter from operations	Transportation through the air and over land	Local residential receptors.	Low	Medium	Low	A high standard of housekeeping will be maintained through regular checks for any litter and debris. Wastes generated will be stored securely in covered skips/bins. Any issues identified will be recorded, investigated and appropriate remedial action will be taken as soon as practicable.	Low

Table 8: Accidents

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
Vehicle Collision/ impact	All on-site hazards: wastes, machinery and vehicles	Direct Physical Contact	Drivers; site employees; local environmental receptors.	Low	High	Medium	Vehicle movements are scheduled and directed onto site by staff. Activities on-site are managed and operated in accordance with a management system (which includes site security measures to prevent unauthorised access). A speed limit of 10mph is enforced across the site and signage is clearly displayed at the entrance.	Low

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
							All delivery drivers must report to the site office and will receive instruction on site traffic management system.	
Explosion of biogas	Digester tanks, Post digester tank, Gas upgrading compound	Transportation through air	Site employees; local residential receptors; ecological receptors; watercourses; surrounding farmland.	Low	High	Medium	Activities are managed and operated in accordance with the Operator's management system and monitored with SCADA systems. If abnormal operation occurs, or an issue is perceived, gas will be directed to the Facility's emergency flare. Should the emergency flare fail, digesters and upgrading unit are fitted with emergency pressure release valves to avoid overpressure. All records of the use of PRVs will be kept on site and the reason for use documented. Should an explosion compromise the integrity of any tank, the tanks are located within an area of bunding sized to contain 110% of the largest tank and 25% of the combined tank volume. Containment systems are designed, manufactured and installed in accordance with CIRIA 736 guidance. Lightning protection is installed to BS EN 62305	Low
Arson and / or vandalism causing the release of polluting	Unauthorised Access	Transportation through air then inhalation/ deposition;	Site employees; local residential receptors;	Medium	High	High	The site is fenced to prevent unauthorised access and is under 24hr surveillance from a security contractor.	Low

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
materials to air (smoke or fumes), water or land.		Release of contaminants through surface water drainage system.	ecological receptors; watercourses; surrounding farmland.				Access gates are kept locked outside of delivery hours. All visitors must first report to the site office for an induction and be escorted across the site if required. Oils and fuels are stored in lockable tanks with bunding sized to contain 110% of the largest tank and 25% of the combined tank volume. Activities are managed and operated in accordance with a management system which includes fire and spillage procedures. Process areas where liquids are stored are constructed of concrete hardstanding. Surface waters are mostly captured and stored on site. Clean surface water discharge points are fitted with shutoff valve to prevent the release of contaminants.	
Contaminated run-off from site surfaces mobilising pollutants off site	Loss of containment on site, spillage or leakage of liquids, oils or fuels	Percolation through soils or direct run-off from site entering surface watercourses	Ecological receptors; watercourses; surrounding farmland.	Medium	Medium	Medium	Process areas where liquids are stored are constructed of concrete hardstanding. Potentially contaminated surface water is captured by the surface water drainage system and stored in the dirty water / leachate lagoon prior to use in the process. Uncontaminated surface water run-off is directed to the surface water holding lagoon or discharged offsite.	Low

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
							The clean surface water discharge points are fitted with shutoff valve to prevent the release of contaminants. Any spills on site will be cleaned up immediately with spill kits available for this purpose and staff trained in spill response procedures. Digestate and other liquids are contained within sealed tanks. The tanks are located within an area of bunding sized to contain 125% of the largest tank. Containment systems are designed, manufactured and installed in accordance with CIRIA 736 guidance. All maintenance fluids stored on site will be in sealed, leak-resistant containers with appropriate secondary containment. Containers are regularly inspected for leaks, located on impermeable concrete hardstanding and incompatible chemicals are stored in separate locations.	
Accidental fire causing the release of pollution to air, water or land	On site machinery. Combustion of feedstock.	Transportation through air. Surface water or percolation through soil	Residential receptors; site employees; watercourses; ecological receptors;	Medium	Medium	Medium	All plant and equipment on site are maintained to the manufacturer's specification, with details incorporated into the site's EMS. The main plant areas are provided with secondary containment. Drainage can be sealed to contain firewater on-site and can be directed to and stored in the on-site lagoons	Low

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
			surrounding farmland.				to ensure contaminated water will not be released to the local environment in the case of a fire. Firewater will be evaluated and disposed of by authorised waste contractor. Smoking is prohibited anywhere on site and is clearly signed. Any abnormal operation of the gas upgrading equipment will be detected by the SCADA system and if necessary, biogas can be directed to the emergency flare. If for any reason this fails, pressure release valves will be utilised to release excess gas. All records of their use will be maintained. Risk of self-combustion of waste is low, as the majority of material feedstock into the installation has a high-water content and is pumped directly into the plant for processing. Crops are unloaded into the clamps when they arrive on site and are covered using protective sheeting. Manure and fruit and vegetable waste is stored in the clamps and covered. Input materials will be processed on a first-in first-out basis. The risk of self-combustion is therefore considered to be low. Straw is wetted prior to storage on site.	

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
Plant and equipment breakdown and/or failure causing releases of potentially polluting substances	On site infrastructure (digestion tanks, biogas upgrading unit, CHP, auxiliary boiler, digestate lagoon, dirty water storage tanks and attenuation pond)	Transportation through air, Surface water drainage system, percolation through soil	Residential receptors; site employees; watercourses; ecological receptors; surrounding farmland.	High	High	High	All plant and equipment on site are maintained to manufacturer's specification and regularly integrity checked. All details are incorporated into the site's EMS. The SCADA system will identify any abnormal operations prior to any catastrophic failure and automatically notify the operator. The programme will shut off equipment if it reaches unsafe limit set points. If necessary, gas can be directed to the emergency flare. All operations will cease in the event of plant failure, with waste directed to an alternative site where necessary. Emergency diesel generator can provide power to critical plant in case of failure of the CHPs. Digestate and other liquids are contained within sealed tanks. The tanks are located within an area of bunding sized to contain 110% of the largest tank and 25% of the combined tank volume. Containment systems are designed, manufactured and installed in accordance with CIRIA 736 guidance. The digestate lagoon is double lined with an impermeable liner and leak detection system. Digestate lagoon is covered with a flexible floating cover.	Low

Hazard	Source	Pathway	Receptor	Probability of Exposure	Consequence	Magnitude of Risk	Risk Management	Residual Risk
Accidental release of potentially polluting substances through flooding	Loss of containment, contaminated flood water	Percolation through soils or direct run-off from site entering surface watercourses	Local residential receptors; ecological receptors; watercourses; surrounding farmland.	High	High	High	Site is located within a flood zone 1. Chemicals and oils are stored in impermeable containers and are provided with secondary containment. All site areas are constructed of impermeable concrete and asphalt surfacing. Drainage systems divert capture and store almost all surface water at the site. Clean surface water discharge points can be shutoff in case of flooding.	Low
Failure of digester tanks or digestate storage lagoon	Loss of containment	Direct physical contact; Percolation through soils, direct run-off from site across the ground	Local residential receptors; site employees; underlying ground and groundwater; watercourses.	Medium	High	High	All tanks and lagoons are inspected regularly in line with the Facility's EMS to identify any leaks. The tanks are connected to the Facility's SCADA system and telemetry systems which monitor levels, pressure and foam within the tank continuously. A spill clean-up procedure is in place which is designed to minimise the impact on the environment in the case of any spills. The tanks are located within their own bund which is sized to contain 125% of the largest tank. Containment systems are designed, manufactured and installed in accordance with CIRIA 736 guidance. Digestate lagoon is double lined with leak detection system installed.	Low

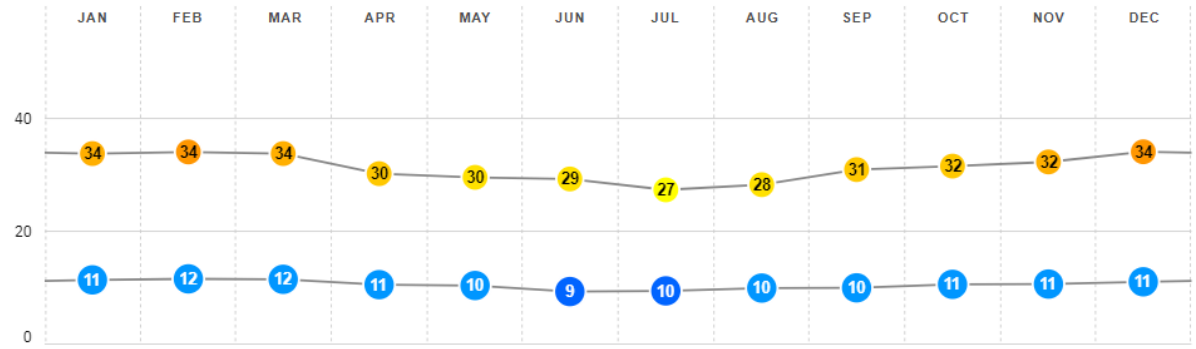
Statistics based on observations taken between 11/2000 - 03/2024.

Monthly wind speed statistics and directions for Humberside Airport

Dominant wind direction

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
SW	SW	SW	WSW	SW	SW	SW	WSW	SW	SW	SW	SW

Average wind speeds and gusts (kts)



Appendix D – Air Quality Assessment

Appendix E – Odour Risk Assessment

Appendix F – Climate Change Risk Assessment

The impact of each climate change scenario identified above has been assessed using the following criteria:

Likelihood of Impact		Severity of Impact	
Low	Unlikely	**Low**	Low impact with minor, temporary effects on the environment or human health.
Medium	Low to medium likelihood	**Medium**	Moderate impact with medium-term effects on the environment or human health.
High	Likely	**High**	Moderate to severe impact with potential for long-lasting damage to the environment or human health

The two figures are then multiplied to give the risk category. Each impact can then be prioritised as follows:

Likelihood Score	Severity	Risk Category
Low	Low	Low
Low	Medium	Medium
Low	High	Medium
Medium	Low	Low
Medium	Medium	Medium
Medium	High	High
High	Low	Medium
High	Medium	High
High	High	High

Table 9: Climate Change Risk Assessment

Impact	Likelihood	Severity	Risk	Control Measures	Residual Risk
Changing Temperatures					
Overheating of vessels and pipework at anaerobic digestion plants, requiring increased insulation and cooling.	Medium	Medium	Medium	Insulation of control and electrical systems. Critical plant and equipment are provisioned with monitoring and alarms by SCADA System. Planned Preventative maintenance is carried out and recorded in line with the EMS. PRVs are tested annually. Increased process monitoring during periods of extreme weather. Maintenance contract is in place with the equipment suppliers.	Low
Potential for increased fires involving combustible waste stockpiles.	Low	Medium	Medium	Fire risk assessments and emergency response procedures in place. Staff training with suitable fire marshals present 24hrs. Windrows will be kept to a maximum height of 3m to encourage heat loss. Moisture and temperature monitoring of feedstocks with moisture adjustment, if required. Soaking of straw feedstock prior to storage on site.	Low
Increased changes in feedstock, low nitrogen waste and slower processing times.	Medium	Low	Low	Management of change procedure to be followed for changes in feedstock. Monitoring of carbon to nitrogen mix and adjustment of input crops. Increased temperature and moisture monitoring and adjustment. Increased monitoring of feedstock to ensure the right organic mix to maintain digester stability.	Low
Increase in dust and bioaerosol emissions.	Medium	Medium	Medium	Damping down and sweeping operational areas daily during prolonged dry weather conditions. Monitoring bioaerosols as required by the permit. Dust monitoring during periods of prolonged dry weather. Harvesting clean water for use in operational areas and feedstock.	Low

Impact	Likelihood	Severity	Risk	Control Measures	Residual Risk
				Covering of feedstocks and digestate lagoon. Site inspections and sweeping of internal roads as required.	
Increased pests and flies.	Medium	Medium	Medium	Contractor available to provide pest control services. Site inspections and waste acceptance procedures in place. Materials are kept covered at all times, except for during feedstock addition and removal. Digestate lagoon is covered. Treatment processes carried out within enclosed tanks and vessels.	Low
Lower gas uptake from National Grid affecting grid demand.	Low	Medium	Medium	Contingency to slow feedstock rate to lower gas yield at times when grid off-take is reduced. Combustion contingency is available in the form of the flare.	Low
Increase in odour.	Medium	Medium	Medium	Odour sources are covered or enclosed within hoppers or tanks providing protection against elements. Odour Management Plan in place. Solid digestate removed regularly and sheeted when not being loaded. Digestate lagoon is covered.	Low
Longer growing seasons resulting in a change in the feedstocks.	Low	Medium	Medium	Management of change procedure to be followed for changes in feedstock.	Low
Poor crop yields and feedstock scarcity for anaerobic digestion could lead to reduced digester performance.	Medium	Medium	Medium	Management of change procedure to be followed for changes in feedstock.	Low
Freezing pipelines.	Low	Medium	Medium	All pipelines and tanks are suitably insulated. Daily site inspections and SCADA system in place to monitor changes in operating conditions.	Low
Frozen onsite roadways may restrict access for staff and emergency vehicles.	Low	Medium	Medium	Gritting and clearing contractors available to clear internal roads and external access roads, if required.	Low
Damage to site infrastructure from snow-loading.	Low	Medium	Medium	No history of significant snowfall. Robust structures built to withstand severe weather conditions.	Low

Impact	Likelihood	Severity	Risk	Control Measures	Residual Risk
				Tanks and bunds constructed to CIRIAC736 standards.	
Extreme rainfall					
Unstable process conditions causing temperature fluctuations and increased odours.	Medium	Medium	Medium	Process monitoring at increased frequency. CHPs can provide heat for the process when required.	Low
Land bank availability for spreading digestate may experience extreme difficulty due to prolonged wet weather.	Medium	Medium	Medium	Contingency plan in place. Up to 20m^3 of solid digestate and 10,000m^3 of liquid digestate storage available on site. Additional off-site storage for 30,000m^3 of liquid digestate.	Low
Leachate storage risk of over-topping.	Medium	Medium	Medium	750mm of free board on digestate lagoon which is covered to prevent rainwater ingress. 500mm of free board on dirty water / leachate lagoon. High level alarms on large tanks, attenuation pond and lagoon. Making sure lagoon levels are lowered before increased forecast rainfall. Harvesting of clean and dirty water for use in the process, with dirty water used preferentially. Clean surface water holding lagoon can discharge clean water to prevent overtopping.	Low
Localised flood events	Low	High	Medium	Routine tank and lagoon inspections. Site levels have been raised and a site perimeter bund and new flood alleviation area created. 750mm of free board on digestate lagoon which is covered to prevent rainwater ingress. All main liquid storage and treatment vessels are constructed to CIRIA 736 standard and located within a sealed bunded area sized to contain 125% of the largest tanks capacity. Contingency plan in place to divert feedstocks if site is overwhelmed, and if the landbank is not available for spreading of digestate.	Low

Impact	Likelihood	Severity	Risk	Control Measures	Residual Risk
Potential for drainage systems to be overwhelmed	Low	Medium	Medium	Routine preventative maintenance and inspection of drainage infrastructure. Waste/feedstock storage and handling areas are provisioned with separate drainage system. Dirty and clean water constantly being used within the process.	Low
Reduced access or egress due to site flooding	Low	Medium	Medium	Emergency plan in place including staffing contingency. Contingency arrangements in place to divert feedstocks.	Low
Sea level rise					
Risk of flooding and associated impacts.	Low	Low	Low	Site and roadways into site are located 15m above sea level and not in close proximity to the sea.	Low
Drier summers					
Increased need for water for digesters.	Low	Medium	Medium	Water captured from across the site for use within the process.	Low
Poor crop harvest and reduced feedstock.	Low	Medium	Medium	Management of change procedure to be followed for changes in feedstock. On site storage capacity for up to 9 months of crop feedstock.	Low
Changing river flow rates					
Reduced dilution available in receiving watercourse in the event of a spill, increasing potential for damage from pollution.	Low	Low	Low	Containment and secondary containment are in place to prevent spills. Accident Management Plan in place. Spill procedures.	Low
Increased flood risk due to discharge of waters during peak river flows.	Low	Low	Low	Very limited water is discharged from the site. Surface water discharge can be shut off if required.	Low
Storms					

Impact	Likelihood	Severity	Risk	Control Measures	Residual Risk
Damage to building structures and tanks resulting in increased potential for accidental and fugitive emissions.	Low	High	Medium	Robust structures built to withstand severe weather conditions. Tanks and bunds constructed to CIRIAC736 standards. Lightning protection in place and annually serviced.	Low

Appendix G – Summary of Environmental Management System

1 Overview

2. Site Documentation
- 2.1. Environmental Permit
- 2.2. Site Plans
- 2.3. Environmental Permit Application Documentation

3. Context of the Organisation
- 3.1. Context of the Organisation

4. Leadership
- 4.1. Leadership & Commitment
  - 4.1.1.Leadership & Commitment
- 4.2. Environmental Policy
  - 4.2.1. Environmental Policy
- 4.3. Organisational Roles, Responsibilities & Authorities
  - 4.3.1.Organisational Chart

5. Planning
- 5.1. Actions to Address Risks and Opportunities
  - 5.1.1. Environmental Aspects
  - 5.1.2. Aspects Register
  - 5.1.3. Legal Register
  - 5.1.4. Planning Action
- 5.2. Environmental Objectives & Planning to Achieve Them
  - 5.2.1.Environmental Objectives

6. Support
- 6.1. Competence
  - 6.1.1. WAMITAB Certification
- 6.2. Awareness
  - 6.2.1.Training & Awareness Procedure
- 6.3. Communication
  - 6.3.1.Internal Communication
  - 6.3.2. External Communication
- 6.4. Documented Information
  - 6.4.1.Document Change Register
  - 6.4.2.Document Control Procedure

7. Operation
- 7.1. Operational Planning & Control Procedure
  - 7.1.1.See ISO9001 documentation
- 7.2. Emergency Preparedness & Response
  - 7.2.1.Operational Planning and Control
  - 7.2.2.Emergency Preparedness & Response – Accident Management Plan

8. Performance Evaluation
- 8.1. Monitoring, Measurement & Analysis
  - 8.1.1.Monitoring, Measurement & Analysis
- 8.2. Internal Audit
  - 8.2.1.Internal Audit Report
- 8.3. Management Review

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