MURROW AD PLANT LTD
PERMIT VARIATION APPLICATION
MARCH 2023

Environmental Risk Assessment

Prepared for
Murrow AD Plant Ltd

CHAPMANBECK
ENVIRONMENTAL CONSULTANCY

REPORT SCHEDULE

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DATE OF REVISION	NEW VERSION	REASON FOR CHANGE	APPROVED
12.02.24	V2.0 FINAL	Update application at duly making due to change scope of variation	Murrow AD Plant Ltd. 16.02.24

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1. ENVIRONMENTAL RISK ASSESSMENT

1.1. Introduction

The following has been prepared to support a permit variation with respect to the permitted activities carried out at Murrow AD Plant Ltd, Somerset Farm Cants Drove, Murrow, Wisbech, Cambs, PE13 4HN, approx. central grid reference TF 37303 04635.

1.2. Summary of Key Assessment Parameters

Facility	Murrow AD Plant
Operator	Murrow AD Plant Limited
Location	Somerset Farm Cants Drove, Murrow, Wisbech, Cambs, PE13 4HN, approx. central grid reference TF 37303 04635.
Location of Key Environmentally Sensitive Sites	The site is located in an area that is agricultural in character, located within the wider Somerset Farm complex in an area of artificially drained fenland, with all fields having drainage ditches. There is a drain which runs to the south and west of the AD site just over 10 metres from the permitted site boundary. The Bishoplands Drain is 1.8 km to the west of the site, the Peakirk Drain 1.16 km to the south of the site. The River Nene is 2.5 km to the south and east of the site. There are a number of isolated dwelling and small hamlets within the vicinity of the site, and the village of Murrow is located 1.3-2.3km north of the site. The A47 highway is located 1.2km south of the site. The western corner of the site is situated upon an unproductive secondary aquifer and a principal bedrock aquifer (medium-low vulnerability), and the location of the remainder of the site is described as unproductive aquifer. The site is not within a Groundwater Source Protection Zone or within a Drinking Water Protected Area or Safeguard Zone. The nearest known abstraction licence is located 1671m west of the site and the activity is for the purpose of spray irrigation of crops. The site is situated in A Flood Zone 3 and shown on the ‘Groundsure report’ GS-9090856 to be at medium risk for flooding. There are no documented or known historical flooding events at the site. The site can remove groundwater rising by pumping the clean water into a nearby ditch. In the event of a flood

	alert being received locally a flood response procedure is in place for the site. The sites is not within a Nitrate Vulnerable Zone.
Risk Assessment Carried out by	Chapman Beck Limited
Date	31.10.22 revised 12.02.24

Risk Criteria Summary	
Parameter 1	The anaerobic digestion facility occupies an approximately 3-hectare site, located in a predominantly rural area of drained fenland, and is part of the wider Somerset Farm mixed agricultural setting. The AD operation is designed to process up to 125,000 tonnes of feedstocks per year received as either solid manures and vegetable-based materials, or pumpable liquid and animal slurries.
Parameter 2	Solid manures and vegetable based by product crop residues are received and stored on a short-term basis in a series of open concrete clamps prior to processing. Liquid animal slurries and wastes are received via tanker into the liquid feedstock reception tank. The reception tank is covered, with displaced air from filling venting to atmosphere. If more odorous animal manures such as chicken manure are received at the site, these are received on a 'just in time' basis and loaded straight into the process immediately on receipt. An odour impact modelling assessment has been carried out and concluded that predicted odour concentrations were below the relevant benchmark level at all sensitive residential locations in the vicinity of the site for all modelling years. As such, potential odour emissions from the facility are not considered to be significant.
Parameter 3	The biogas produced at the site is used within two 250 kW combined heat and power (CHP) engines (each with thermal inputs of 0.619MW). These CHPs provide both heat and power for site operations as do a further two 500 kW CHPs (each with thermal inputs of 1.193MW) which are run on imported liquified natural gas (LNG). All four engines were commissioned after December 2018. The remaining biogas produced at the site is upgraded to produce biomethane and injected directly to the high-pressure National Gas Transmission (NTS) system via 1km of pipework and a block valve connection. The biomethane does not need to be blended to a distribution specification, (with for instance the addition of propane or gas odorant). As no odorant is needed, no odorant chemicals are handled at the site. Dispersion modelling was undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the combustion plant. The results indicated that

	impacts on pollutant concentrations were not predicted to be significant at any human receptor location in the vicinity of the site. Impacts were also predicted at sensitive ecological habitats. The results indicated that emissions from the plant were not predicted to significantly affect existing conditions at any designation.
Parameter 4	The liquid storage and process tanks are contained within an impermeable concrete bund that has been sized to provide a volume of greater than 110% of the capacity of the largest single tank, and 25% of the combined capacity of all the tanks.
Parameter 5	Surface water accumulating in the concrete bunded area is collected in a series of sumps within the site and one sump that is located outside the site. All clean surface water and lightly contaminated run off from storage heaps is collected and either used within the process, or for contingency pumped to the digestate storage lagoons. There is no domestic sewage generated at the permitted facility. Clean surface water accumulating in specified areas is tested and released on a batch basis if testing results show that water quality is within acceptable benchmarks.
Parameter 6	All condensate is collected in a separate collection system and recirculated within the process.
Parameter 7	Hydrogen sulphide is controlled via a combination of bacterial control via sulphur mats and associated oxygen dosing, and chemical additions with ferric oxide and ferric hydroxide via the feeder units.
Parameter 8	The site is fitted with high level alarms on process tanks as a means of alerting operator to high level conditions and triggering automatic process controls to maintain levels within given set points.
Parameter 9	A noise modelling assessment has been carried out in assessment of the potential impacts of noise arising from the site. The assessment concludes that noise should not be a limiting factor in any permit variation if the noise emission of the proposed carbon capture equipment can be limited to 68 dB LAeq, T at 1 m.
Parameter 10	The operator despatches all final digestate to land as an agricultural fertiliser. Final whole digestate is passed through a separator to produce a solid and liquid fraction. The liquid fraction is pumped via a dedicated pipeline to one of the two storage lagoons which are located outside of the permitted area.

1.3 Appendices

Appendix 1	Air Quality Impact Assessment and Associated Data Input Files
Appendix 2	Odour Impact Assessment and Associated Data Input Files
Appendix 3	Noise Impact Assessment
Appendix 4	Bioaerosols Risk Assessment
Appendix 5	Environment Agency Conservation Screening Report

1.4 Summary List of Site Receptors

Groundwater Abstractors
There are no licenced groundwater abstraction points within the vicinity of the site. There are no known unlicenced abstraction points within the vicinity of the site.
Source Protection Zones
The site is not in a groundwater source protection zone.
Surface Water Abstractors
Nearest known abstractor is located 1671m west of the site. Abstraction point not used for potable water but for spray irrigation for agricultural purposes.
Nitrate Vulnerable Zones
The site is not in a nitrate vulnerable zone.
Surface Water
There are watercourses within proximity to the site as it is situated on artificially drained Fenland, with all fields having drainage ditches. There is a drain which runs to the south and west of the AD site just over 10 metres from the permitted site boundary. The Bishoplands Drain is 1.8 km to the west of the site, the Peakirk Drain 1.16 km to the south of the site. The River Nene is 2.5 km to the south and east of the site. Nene washes SSSI, SPA and RAMSAR Site is approximately 2.2km to the south of the site.

Flood Risk Zone
The site is situated in Flood Zone 3 and shown on the 'Groundsure report' GS-9090856 to be at medium risk for flooding. There are no documented or known historical flooding events at the site. The site can remove groundwater rising by pumping the clean water into a nearby ditch.
Air Quality Management Areas
The site is not located in an air quality management area.
Workplaces
There are a number of other farms and farm houses between 500m – 1000m of the site. The Somerset farms main office is located just over 200m from the nearest site boundary.
Highways and Transport
The A47 highway is located 1.2km south of the site. The B1187 road runs approx. 1.2km west of the site.
Other Amenity Sites
There are a number of other farm houses between 500m – 1000m of the site. Murrow Primary School is approx. 1.5m north of the site.

Site Name/Description		Location of Site/Grid Reference		Details
Designated Habitats and Wildlife Sites		**X**	**Y**	
E1	Nene Washes SAC, SPA and Ramsar	537531.1	301748.2	Designated habitats sites
E2	Nene Washes SAC, SPA and Ramsar	535750.1	301051.3	
E3	Nene Washes SAC, SPA and Ramsar	533672.3	300109.2	
E4	Nene Washes SAC, SPA and Ramsar	531896.0	299208.9	
E5	Nene Washes SAC, SPA and Ramsar	529211.6	299001.1	
E6	Nene Washes SAC, SPA and Ramsar	539595.9	302970.8	
E7	Nene Washes SAC, SPA and Ramsar	529211.6	299001.1	
E8	Nene Washes SPA and Ramsar	539595.9	302970.8	
E9	Nene Washes SPA and Ramsar	537371.7	302638.6	
E10	Nene Washes SPA and Ramsar	535572.0	301690.3	
E11	Nene Washes SPA and Ramsar	533406.3	301086.3	
E12	Nene Washes SPA and Ramsar	531473.6	300516.8	
E13	Nene Washes SPA and Ramsar	529049.1	299852.5	
E14	Nene Washes SPA and Ramsar	536767.7	306545.0	
E15	Coastal and Floodplain Grazing Marsh Protected Habitat	536929.0	306585.5	Priority habitats area
E16	Coastal and Floodplain Grazing Marsh Protected Habitat	537100.3	306625.4	
E17	Coastal and Floodplain Grazing Marsh Protected Habitat	533406.3	301086.3	
Residents				
R1	Residential - Willow Lodge	537272.8	304994.9	Residential receptors
R2	Residential - Poplar House	537342.8	304942.5	
R3	Residential - Coronation Cottage	537456.6	304927.1	
R4	Residential - Bank Farm Cottage	537964.2	305587.8	

R5	Residential - Two Bridges	538072.5	305461.4
R6	Residential - Sidmouth House	538256.7	304908.8
R7	Residential - Flagg House	538243.4	304832.8
R8	Residential - Tower Farm	537474.2	303673.4
R9	Residential - Fort Farm	537164.4	304330.0
R10	Residential - Hope Cottage	536762.4	304276.4
R11	Residential - Gull Drove Cottage	536540.9	304315.1
R12	Residential - Ivy Farm	536457.3	304328.0
R13	Residential - Hope Farm	536361.7	304383.6
R14	Residential - The Cottage	536846.0	305060.8
R15	Residential - Redfern House	536862.6	305017.7
R16	Residential - White Lion Farm	537028.7	305035.7
R17	Residential - Cant's Drove Cottage	537131.2	305004.1
R18	Residential - Ivy Home	537158.6	305003.5
R19	Residential - Homefield	537202.7	305005.9

1.5 Risk Criteria Rating

Risk ratings are based on the likelihood of an event occurring multiplied by the severity of potential impact. Ratings are made of residual risk following implementation of preventative measures on site. The following scale is applied to rate these parameters:

Severity	Likelihood
1 – No environmental harm arising 2 – Fleeting localised impacts 3 – Localised impacts medium term 4 – Wider scale impacts of a fleeting nature, or localised impacts of a more persistent nature 5 – Widespread/persistent impacts on high amenity/sensitive sites	1 – Very unlikely to happen 2 – Low probability – occasional 3 – Likely to occur 4 – Highly likely to occur 5 - Inevitable

Severity						
↑	**5**	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	66	8	10
	1	1	2	3	4	5
		1	**2**	**3**	**4**	**5**
	Likelihood →					

Final calculated risk band ratings are as follows

Insignificant	1 – 5
Low	6 – 10
Medium	11 – 15
High	16 – 20
Very High	20 - 25

1.5 Environmental Risk Assessment

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk Management**	**Probability of Exposure (Likelihood)**	**Consequence (Severity)**	**What is the overall risk?**
What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
Dust from movement of vehicles to and from the facility.	Local residents, users of nearby highway, local workplaces and local habitats.	Air Wind-blown dispersion in atmosphere.	Site Manager is responsible for checking wind strength and direction and taking corrective action if necessary. Road surfaces are concrete, so low likelihood of generation of materials. Wheel washing facilities are available on site. If the road surface becomes dry and more dust is being created therefore, the road surface will be dampened down to minimise dust. Surface will be kept swept clean.	1- Dust is unlikely to reach the adjacent highway even if a strong wind blew on a dry summer day. Low risk of dust generation and minimised by management actions, as necessary. Local residential properties too far away to be impacted.	2 – Nuisance, dust on cars, clothing, and inhalation of dusts.	2 – Insignificant. The nature of wastes received and stored on site and context of the site mean that there is a low risk of these releases from being generated from the site.
Dust from burning of biogas.	Local residents, users of nearby highway, local workplaces and local habitats.	Emission to air from engine stacks, and flare.	Release of dusts is not a significant risk factor associated with burning of biogas fuels in this type of plant. Annual emissions monitoring to be carried out in accordance with permit requirements. Ongoing maintenance schedule for engines, and flare.	1 - Unlikely not an associated risk with this type of fuel or plant.	1 - Nuisance, impact on amenity, and impact on local habitats.	1 – Insignificant.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
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What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
Release of particulate matter and microorganisms from wastes delivered to, stored, treated at the site and despatched from the site.	Local residents, users of nearby highway, local workplaces and local habitats.	Air. Windblown dispersion in atmosphere.	Feedstocks delivered to site via closed vehicles or tankers. FYM transported from cattle stalls immediately adjacent to the plant from the wider Sommerset Farms livestock operation. Chicken manures received in sheeted trailers on a 'just in time' basis for immediate use. Energy crops ensiled in a clamp within the permitted area. Final separated liquid digestate is pumped directly to and stored in a covered final storage lagoon outside the permitted area. Separated solid digestate falls into a trailer or temporary storage bay pending loading into a trailer and is carted offsite in sheeted trailers for medium/longer term storage in field heaps at the intended site of spreading for agricultural benefit. Liquid feedstocks are accepted via tanker delivery into a reception tank or pumped directly from the local drainage collection system. Gas upgrading process for removal of unwanted elements of biogas. Bioaerosols risk assessment has been undertaken to evaluate	2 – low probability – occasional exposure could occur.	2 – nuisance to local farms and potential health impacts.	4 – Insignificant.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
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What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
			potential impacts from this hazard. Risk found to be very low. As such, potential impacts as a result of bioaerosol emissions from the facility are not considered to be significant.			
Litter.	Local residents, users of nearby highway, local workplaces and local habitats.	Air, windblown, dispersion in atmosphere.	Feedstocks received are in bulk trailers/tankers and do not have associated packaging. No packaging removal facilities at the site.	1 – Very unlikely as feedstocks do not have associated packaging and are all farm-based materials received in bulk loads.	3 – litter generated could accumulate on adjacent farmland	4 – Insignificant due to low likelihood of generation of litter due to no packaging element
Mud on roads from movement of vehicles to and from the facility.	Local residents, users of nearby highway, local workplaces and local habitats.	Deposited on the ground by vehicles accessing and leaving the site.	Road surfaces on site are concrete, so low risk of mud being generated from roads within the site. Wheel washing facilities are available at the site if needed. Roads and concrete reception/yard areas will be swept and kept clean on a regular basis. An inspection will be made of all vehicles entering the site at the weigh bridge, and any concerns over mud on the wheels of incoming vehicles can be recorded and addressed with the supplier/haulier in question. Digestate tankers filling with liquid	2 – Mud is unlikely to get onto the local roads as a result of generation on the site, due to nature of road surfacing, road maintenance activities, wheel wash facilities on site, and context and location of the site. Potentially excessively contaminated vehicles entering	2 – Road safety and amenity for local residents and road uses on roads external to the site.	4 – Insignificant due to control measures available on site, and low risk of mud generation from the site itself.

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What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
			digestate from the lagoon do not need to enter the main AD facility. Site is located in a rural farming context.	the site will be checked, and wheel wash facilities made available if needed.		
Odour from delivered, stored and processed feedstocks.	Local residents, users of nearby highway, local workplaces and local habitats.	Air.	All deliveries of liquid and solid feedstocks to site take place in accordance with the incoming feedstock procedure. FYM is moved a short distance from outside cattle stalls at the wider Somerset Farms farming operation to concrete storage bays at the AD site for short term storage prior to processing. Solid vegetable-based/crop feedstocks are also stored in these bays pending use. All solid feedstocks stored in the open concrete bays are of an agricultural nature and the same/similar in characteristics to materials stored routinely on the immediately adjacent cattle farm units, and wider farming/agricultural context of the local area and region. Average residence time in the storage areas 2-3 days	2 - Odours unlikely to impact on local receptors,	2 - Nuisance and odour annoyance which may have more impact in hot summer months.	4 – Insignificant.

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What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
			depending on feedstock type. Chicken manure is received on a 'just in time' basis and fed straight into the plant on receipt. The site operates a full and comprehensive odour management plan that outlines measures for ongoing monitoring of impact of odours arising from the site, and incident reporting investigation procedures. There is no history of odour complaints relating to the AD permitted operations. Odour impact modelling assessment has been undertaken to support the risk assessment for the site. Modelling assessment report concludes that predicted odour concentrations were below the relevant EA odour benchmark level at all residential receptor locations for all modelling years. As such, potential odour emissions from the facility are not considered to be significant.			

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
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What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
Odour from fermentation of wastes in the digestion process.	Local residents, users of nearby highway, local workplaces and local habitats.	Air.	Wastes are moved from the waste reception tanks/feeder units to the primary and secondary digesters via closed pipe systems that have no facility to vent to air. The site operates a full and comprehensive odour management plan that outlines measures for ongoing monitoring of impact of odours arising from the site, and incident reporting investigation procedures. In the eventuality that gas consumers are not operational, biogas is to be burnt in the auxiliary flare. Pressure relief valves on digesters may vent in exceptional, emergency situations for short periods of time if for any reason gas consumers are not operational, and the flare was not available. A record of use of these valves is made in the site diary and on an incident report if they are ever in use. Odour modelling has been undertaken to support the risk assessment for the site. The odour modelling assessment report concludes that predicted odour	1 -Very unlikely as digestate is moved between tanks in a closed system.	2 - Nuisance and odour annoyance which may have more impact in hot summer months.	2 – Insignificant.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
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What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
			concentrations were below the relevant EA odour benchmark level at all residential receptor locations for all modelling years. As such, potential odour emissions from the facility are not considered to be significant.			
Odour from storage and movement of digestate on site.	Local residents, users of nearby highway, local workplaces and local habitats.	Air.	Liquid digestate is stored in covered lagoons which are outside the permitted boundary. Separated liquid digestate is piped directly to the lagoons by closed above/below ground pipeline. The site has the facility to store approx. 4-5 months digestate production in available offsite lagoons. Separated solid digestate is generated via separation of whole digestate. The separated solid digestate drops from the separator into a trailer or interim storage bay prior to loading into a trailer. The trailers are removed from site when full for medium/longer term storage of digestate close to the site of spreading. Digestate is not hauled long distances from the site of production. Digestate is derived from crop based/FYM/farming	2- Liquid digestate transferred in sealed pipework systems and stored in covered lagoons. Digestate tanker displaced air abated. No medium to long term storage of solid digestate at the site.	2 - Nuisance and odour annoyance which may have more impact in hot summer months.	4- Insignificant.

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What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
			feedstocks and located in a wider farming/agricultural context.			
Odour from spreading of digestate to land.	Local residents, users of nearby highway, local workplaces and local habitats.	Air.	Digestate to be spread in accordance with COGAP and 'Farming Rules for Water'. This reduces agitation and volatilisation of liquid, and hence minimises odours. Due note to be taken of weather conditions in specifically identified sensitive areas and spreading to take place where possible when impacts at lowest in line with site specific risk assessments or dynamic risk assessments. Digestate spread by competent landspreading contractor.	3 - Odours could impact on close residents near to spreading areas. Third party landspreading contractor to undertake risk assessment associated with this activity.	3 - Nuisance and odour annoyance which may have more impact in hot summer months.	9 – Low.
Flies in waste.	Local human population.	Air.	Liquid wastes received on site as pumpable slurries pumped to covered tank and so low risk of impacts from flies. Solid wastes to be received in as 'fresh' a state as possible as this will maximise gas production potential. Highly degraded or contaminated wastes to be quarantined and rejected from site in line with incoming feedstock procedure. Feedstocks to	2 - infrequently due to containment arrangements and turnaround times of feedstocks.	2 - Nuisance from flies will have more impact in hot summer months.	4 – Insignificant.

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What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
			be turned around according to maximum turnaround times outlined in management system. Pest control management plan to be established and use of external specialist contractor to manage pests in a preventative way and in response to evidence of infestation should it be found.			
Rodent infestation.	Local human and animal population.	Travelling between neighbouring properties.	Feedstocks received on site as pumpable slurries pumped to closed tanks or as solid manure/crops/crop residues. Feedstocks received in as 'fresh' a state as possible as this will maximise gas production potential. Highly degraded or contaminated material to be quarantined and rejected from site in line with incoming feedstock procedure. Feedstocks to be turned around according to maximum turnaround times outlined in management system. Pest control management plan to be established and use of external specialist contractor to manage pests in a preventative way and in response to evidence of	2 - Infrequently, due to containment arrangements, feedstock turnover times, and proactive monitoring for signs of infestation. External contractor to implement response if required.	2 - Nuisance from rodent, hygiene issues.	4 – Insignificant.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
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What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
			infestation should it be found on site or in the wider farming operation. Building infrastructure and ongoing management designed to reduce potential for ingress of rodents and to reduce areas where harbourage/shelter is available. Site does not accept ABP feedstocks that require approval to process, so lower risk feedstock types with respect to hygiene/potential to spread diseases.			
Scavenging animals and scavenging birds.	Local human and animal population.	Air and over land.	Liquid feedstocks received by closed pumping line to covered tank will not be accessible by scavengers. Solid feedstocks will be stored outdoors in concrete clamps. No Cat 3 food wastes accepted and stored at the site - solid feedstocks are FYM and crop residue vegetable-based materials and so lower risk materials for attraction of scavenging birds.	2 – Low probability, occasional access by birds.	2 - Nuisance and harm to human health from waste carried off site and faeces.	4 – Insignificant.
Noise from vehicle	Local residents, users of nearby highway,	Air.	Majority proportion of vehicle movements are internal to the wider farming site operation rather	2 - Daily responsibility of Site Manager,	2 -Nuisance from vehicle noise.	4 – Low.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk Management**	**Probability of Exposure (Likelihood)**	**Consequence (Severity)**	**What is the overall risk?**
What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
movements/ deliveries.	local workplaces and local habitats.		than external haulage entering the site. The Site Manager is responsible for ensuring vehicles are turned around efficiently, with least impact on the neighbouring properties and that vehicles are removed from the surrounding roads quickly. Estimates that only a single tanker a day is received at the site for delivery of liquid feedstocks/slurries. All potentially noise generating activities at the site will be carried out in accordance with the Noise Management Plan which in turn is based on detailed impact modelling of potential site impacts.	infrequent impact to neighbours to cause nuisance due to majority internal movements.		
Noise/vibration from equipment operating at the site.	Local residents, users of nearby highway, local workplaces and local habitats.	Air/land.	Noise management plan in place that outlines measures for management and monitoring and reporting procedures for noise arising from the site, and for managing and responding to incidents and complaints.	2 - Use of mitigation measures will reduce impact to insignificant.	2 - Nuisance from noise/vibration.	4 – Insignificant.
Noise from new CO_2 recovery unit at the site.	Residents, users of nearby highway, local workplaces and local habitats.	Air/land.	Plant to be designed in accordance with BAT selecting equipment with noise ratings as specified by the noise impact modelling	2 - Use of mitigation measures will	2 - Nuisance from noise/vibration.	4 – Insignificant.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk Management**	**Probability of Exposure (Likelihood)**	**Consequence (Severity)**	**What is the overall risk?**
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			assessment. This will be subject to reiteration once specific CO_2 recovery technology has been selected and can be assessed in the context of the wider site accumulative impacts. Noise management plan in place that outlines measures for management and monitoring and reporting procedures for noise arising from the site. This will be updated once the specific technology has been identified, impact assessments have been updated, and specific measures required to manage noise within acceptable limits have been identified for addition into the plan.	reduce impact to insignificant.		
Delivery of liquid feedstocks.	Ground/groundwater/ surface water.	Spillage through ground or drainage system.	All deliveries will be supervised and will take place during normal working hours. Deliveries will take place in a sealed, impermeable concrete area that drains to a sealed drainage system. Spill cleaning materials and wash facilities are situated in this area. State of repair of concrete is	1 -Low as supervised delivery procedure in place, and delivery area has impermeable surfacing and drains to sealed drainage system or bund.	3 - Pollution of watercourse/ groundwater/land	3 – Insignificant.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
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What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
			monitored on a regular basis, and proactive maintenance carried our if necessary. Any loss of waste from outdoor reception tanks will be contained in the concrete bund area that provides containment to the whole AD process part of the site.			
Chemical/oil delivery and storage.	Ground/groundwater/ surface water.	Spillage during delivery to drain/ground.	Diesel associated with emergency generator stored in integrally bunded tank. Work instruction established for delivery of diesel and engine oil to site based on site specific risk assessment. Ferric hydroxide/oxide delivered in plastic wrapped bags on pallets and stored in bunded area. Tailored spill kit to be kept on site in the locality of deliveries. All other raw material liquids delivered in drums or IBC's and stored on plastic bunded pallets inside the bunded AD process area of the site.	1 -Low.	3 - Pollution of watercourse/ groundwater/land	3 – Insignificant.
Storage of small volumes of chemicals.	Local environment.	Spillage.	All cleaning chemicals are stored with lids or caps secured. All cleaning chemicals are stored in a dedicated store to ensure substances are not exposed to	1 - Very low volumes are kept on site. Storage is contained and indoors.	2 - Harm to local environment and animal health.	2 – Insignificant.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
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What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
			conditions that could cause a reaction and spillages are contained. Small volumes of chemicals stored in the lab. Chemicals are segregated as appropriate and stored in secondary containers to catch any small spillages. Relatively small volumes of chemicals associated with CO_2 recovery unit are contained in sealed equipment infrastructure as for CHP engines.			
Failure of pipework and pumps.	Groundwater/surface water.	Breach of containment.	Majority of pipework to be installed above ground so that regular maintenance checks can be made. Pipeline from main AD site to permitted lagoon is above ground initially and then below ground beyond the permitted boundary. Digestate is measured by flow meter, monitoring of which would indicate any large losses from the pipeline.	2 - Low due to measures in place.	3 - Pollution of watercourse/ groundwater/land .	6 – Low.
Condensate from gas line and upgrading unit.	Groundwater/surface water.	Spillage/ release to ground/water on removal.	Condensate is collected in a purpose-built collection system and passed back through AD plant. Condensate not predicted to be produced in large quantities.	2 - Low due to relatively small volumes produced and purpose build	1 - Low due to relatively small volumes produced.	2 – Insignificant.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
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				containment system.		
Breach of digestion process tanks/pipework.	Groundwater/surface water.	Spillage/breach of tank.	All existing process tanks are situated inside a bunded area that is at least 110% volume of the largest tank, and 25% volume of the total volume of all the tanks contained within. Tanks are monitored constantly by computerised system, and a series of alarms are operable to alert staff of malfunction in different areas. Tanks are subject to daily visual checks for leaks. All liquid conveying pipework within the bund is above ground and so can be inspected/monitored for state of repair. Any breach of containment of these would be contained within the bund.	2 - Low due to alarms on tanks, and process control measures and maintenance programme in place.	2 - low due to presence of bund.	6 – Insignificant.
Breach of outdoor liquid feedstock reception tanks.	Groundwater/surface water.	Spillage or breach of tank.	Any major spillages resulting from tank failure will run to the bunded area and be contained.	2 - Low due to tank design, construction, and maintenance and bund.	2 - Unlikely to impact due to presence of bund.	4 – Insignificant.
Failure of CHP connection or	Air.	Release of methane to air	Site has an emergency flare fitted that has the capacity to burn gas	2 - Low, as unlikely that all of these	3 - Impact on localised air	6 – Low.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
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gas grid network connection.		and impact on air quality/ emissions of greenhouse gases.	produced by the digesters if the engines and/or gas upgrading grid connection were unavailable. Pressure relief valves will operate on digesters if flare is unavailable and CHP connection lost.	facilities will be unavailable at the same time but in any case, flare is sized to manage all gas arising from the site if needs be.	quality while pressure relief valves operational.	
Flare.	Air.	Air quality impacts for members of the public, and impact on ecology due to deposition.	Machinery fitted to comply with best available techniques relating to emissions limits. Machinery to be subject to regular maintenance programme to ensure optimum performance. Site to comply with emissions limits and reporting schedules set out in the permit. Flare to be used for short term emergency use only. Impact of emissions to be measured and assessed if flare use run hours exceed the limit stated in the site permit.	3 – Flare likely to be used for short term emergency periods.	2 - Impact on air quality standards will be short term and fleeting on emergency basis only.	6 – Low.
Heat from CHP engine.	Air	Air quality impacts for members of the public, and impact on	Machinery fitted to comply with best available techniques relating to emissions limits. Machinery to be subject to regular maintenance programme to ensure optimum performance. Site to comply with emissions limits and monitoring	1 - Low due to the nature of machinery fitted, maintenance schedules and monitoring applied,	1 - Impact on air quality standards	2 – Insignificant.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk Management**	**Probability of Exposure (Likelihood)**	**Consequence (Severity)**	**What is the overall risk?**
What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
		ecology due to deposition.	schedules set out in the permit. Heat is recovered from engine cooling waters to heat tanks on site.	and heat recovery on site.		
Stacks on engines burning biogas.	Air.	Air quality impacts for members of the public, and impact on ecology due to deposition.	Machinery fitted to comply with best available techniques relating to emissions limits. Machinery to be subject to regular maintenance programme to ensure optimum performance. Site to comply with emissions limits and monitoring schedules set out in the permit. Air dispersion modelling exercise has been undertaken to assess the likely impact of emissions to air from the site at nearby receptors. This modelling exercise is attached to this assessment as appendix 1. The results indicated that impacts on pollutant concentrations were not predicted to be significant at any human receptor location in the vicinity of the site. Impacts were also predicted at sensitive ecological habitats. The results indicated that emissions from the plant were not predicted to significantly affect existing conditions at any designation.	2 - Low due to the nature of machinery fitted and maintenance schedules and monitoring applied.	2 - Model predicts insignificant Impact on air quality standards at receptors.	4 – Insignificant.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk Management**	**Probability of Exposure (Likelihood)**	**Consequence (Severity)**	**What is the overall risk?**
What has the potential to cause harm?	What is at risk, what do I want to protect?	How can the hazard get to the receptor?	What measures will you take to reduce the risk – Who is responsible for what?	How likely is this contact? (1-5)	What is the harm that can be caused? (1-5)	What is the risk that still remains? The balance of probability and consequence (Likelihood x Severity) (1-25)
Stacks on engines burning LNG	Air.	Air quality impacts for members of the public, and impact on ecology due to deposition.	Machinery fitted to comply with best available techniques relating to emissions limits. Machinery to be subject to regular maintenance programme to ensure optimum performance. Site to comply with emissions limits and monitoring schedules set out in the permit. Air dispersion modelling exercise has been undertaken to assess the likely impact of emissions to air from the site at nearby receptors. This modelling exercise is attached to this assessment as appendix 1. The results indicated that impacts on pollutant concentrations were not predicted to be significant at any human receptor location in the vicinity of the site. Impacts were also predicted at sensitive ecological habitats. The results indicated that emissions from the plant were not predicted to significantly affect existing conditions at any designation.	2 - Low due to the nature of machinery fitted and maintenance schedules and monitoring applied.	2 - Model predicts insignificant Impact on air quality standards at receptors.	4 – Insignificant.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk Management**	**Probability of Exposure (Likelihood)**	**Consequence (Severity)**	**What is the overall risk?**
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CO_2 Vent Stack on Upgrading Unit.	Air.	Air quality impacts for members of the public, and impact on ecology due to deposition.	Machinery fitted to comply with best available techniques relating to emissions limits. Machinery to be subject to regular maintenance programme to ensure optimum performance. Site to comply with emissions limits and monitoring schedules set out in the permit. Air dispersion modelling exercise has been undertaken to assess the likely impact of emissions to air from the site at nearby receptors. This modelling exercise is attached to this assessment as Appendix 1. CO_2 to be recovered as a food grade product from vent stack and so while this is operational, no releases will be made to atmosphere of CO_2.	2 – Low potential for trace contaminants to be present in emissions.	2 – Small amounts of contaminants likely and air quality model predicts no significant impacts.	4 – Insignificant.
Pressure relief valves.	Air. Local human population and local environment.	Air quality impacts for members of the public, and impact on ecology due to deposition. Odour impacts.	Machinery fitted to comply with best available techniques relating to emissions limits. Machinery to be subject to regular maintenance programme to ensure optimum performance. Site to comply with emissions limits and monitoring schedules set out in the permit. Site has an emergency flare facility that will burn biogas in a controlled	2 – Low due to the nature of machinery fitted, maintenance schedules and monitoring applied.	2- Short term impact due to short term occasional usage.	4 - Insignificant

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
Hazard	**Receptor**	**Pathway**	**Risk Management**	**Probability of Exposure (Likelihood)**	**Consequence (Severity)**	**What is the overall risk?**
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			manner if it cannot be utilised by the gas users at the site. Pressure relief valves will only vent in emergency situations where the flare is not available or due to a blockage on the gas line. Odour and accident management in place and make facility for use of pressure relief valves.			
Flooding of site.	Local human population and local environment.	Contaminated Flood Waters.	Permitted waste types are non-hazardous. The main tanks and reception building for the plant are sealed and would therefore provide a level of containment in such an event. The site is bunded, so a degree of materials would be retained on site following a flooding incident. Site is in an identified flood risk zone and there is a flood response plan at the site but no known history of flooding. Flood risk assessment undertaken for planning consent for addition of new CO_2 recovery unit concludes; 'in summary, the proposed development area is thought to be generally at high risk from	3 - No known history of flooding in the area. Measures in place to manage flooding conditions should they arise via series of field drains pumps and sluices.	3 -Contamination of buildings / natural habitats downstream.	9 – Low.

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
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			fluvial and tidal sources, though due to the Less Vulnerable classification and nature of the development this flood risk is deemed acceptable. The risk of flooding from all other sources is considered low, based on an initial desk based study.'			
Unauthorised access to site.	Bodily injury to person or animal entering site.	Direct physical contact.	The site is located within the Somerset Farm wider farming complex and so access to the site is through the wider farm via the main access gate controls. The site is surrounded by a perimeter fence and CCTV facilities are installed. There is living accommodation at the site for on call staff and so personnel presence at the site out of normal working hours. The main farm entrance gate is closed and locked always when staff are not present on site and fitted with an intruder alarm. The permitted digestate storage lagoon is surrounded by security fencing. The AD plant is fitted with a remote alarm system, so staff are alerted to machine failure at a distance. All	1 - Low as site is locked and fenced when not manned, and access to the site is controlled during open hours. Site is in a remote location within a wider farm complex.	4 - Bodily injury/damage to plant.	4 - Insignificant

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
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			vehicles/people entering the site will be received by the weighbridge operator who will be present in this area while the site is open for deliveries. The main farm site benefits from external lighting.			
Arson and / or vandalism causing the release of polluting material to air (smoke or fumes), water or land.	Local human population, staff, firefighters, vandals, or local environment.	Air transport of smoke. Firewater run-off from site.	Permitted waste types are non-hazardous and liquid slurries or moist feedstocks, so only a low magnitude risk is estimated. Firewater run-off would be contained via integral bunding system and internal sealed drainage system within the bund. Site boundary is fenced and can only be accessed by the main farm entrance which is controlled by an electric gate which can only be opened when staff operated. On call staff available at all times and wider farm site staff present for extended working hours. The main site gate is locked out of normal working hours. Machinery fitted with remote alarm system to alert staff of failure. A series of procedures are in place to manage this eventuality: Accident and Emergency Management Plan.	1 - Site has a number of security mechanism in place to prevent access and is in a remote location within a wider farm complex.	4 - Respiratory irritation, illness and nuisance to local population. Injury to staff, firefighters or vandals. Pollution of water or land.	4 - Insignificant

What do you do that can harm and what could be harmed?			Managing the Risk	Assessing the Risk		
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			Facility to pump water from the retention area of the bund provides a location from which contaminated firewater can be removed from site in a controlled fashion to prevent overflowing. Fire risk assessment for the site has been undertaken. Site is fitted with lighting protection facilities. Fire water tank on site which holds 121,500 litres of water as a reserve for firefighting if needed. Fire alarm system installed which goes to a fire alarm monitoring centre. The monitoring centre then has 3 priority phone numbers to contact for escalation with final response as contact for the fire and rescue service.			
Disruption to operations due to unavailable onsite digestate storage.	Local sensitive residential and workplace receptors and ground/water receptors. Site operations.	Various depending on impacts arising from disruption to operations.	A contractual agreement is in place with a suitable digestate offtake operator. Site has 4-5 months storage available for liquid digestate across the facilities available in the two lagoons with are in the immediate locality of the site. Contractual arrangements can be made for other lagoons in the area to be used should contingency be needed. Separated solid	2 – Occasional short-term disruption could occur but unlikely due to robustness of offsite provision and contractual agreement in place.	3 – Localised medium-term impacts possible if disruption to operations should occur.	6 - Low

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			digestate is stored in field heaps at the intended site of spreading. The operator has a digestate management plan in the site EMS.			

1.7 Abbreviations

Abbreviation	Description
ABPR	Animal By-Products Regulations
AD	Anaerobic Digestion
ATEX	Abbreviation for the ATEX Directive and is short for "Atmospheres Explosibles"
BAT	Best Available Techniques
CCTV	Closed-Circuit Television
CHP	Combined Heat and Power (Engine)
COGAP	Code of Good Agricultural Practice
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations 2002
IBC	Intermediate Bulk Container
LNR	Local Nature Reserve
LWS	Local Wildlife Site
PAS110	Publicly Available Standard for the production of quality digestate
Ramsar	Ramsar Site (a wetland site designated to be of international importance under the Ramsar Convention 1971)
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
WHO	World Health Organisation

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