





Environmental Risk Assessment

High Hedley Biogas



Report produced for W J Drennan Limited

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1.0 ASSESSMENT PROCESS

The Guidance *Risk assessments for your environmental permit* produced by the Environment Agency and DEFRA gives a five-step process for assessing the site activity and the risk to local amenity to successfully produce an Environmental Risk Assessment:

- 1) Identify and consider risks for your site, and the sources of the risks.
- 2) Identify the receptors (people, animals, property and anything else that could be affected by the hazard) at risk from your site.
- 3) Identify the possible pathways from the sources of the risks to the receptors.
- 4) Assess risks relevant to your specific activity and check they're acceptable and can be screened out.
- 5) State what you'll do to control risks if they're too high.

This risk assessment will identify people or parts of the environment that could be harmed by the activity and carry out risk assessments for:

- Odour;
- Flooding;
- Noise;
- Process Failure (e.g. pumps);
- Fugitive emissions (including dust and pests); and
- Releases to air, land, water.

Assessment of potential accidents at the facility and the consequential effects on sensitive receptors have been accounted for within this risk assessment.

1.1 Assessment Criteria

Each specific risk has been explored as part of the review with a risk rating being assigned based upon WRM's analysis. Risk has been considered in terms of likelihood of occurrence and also in terms of the impact it will have on the environment/receptor. Table 1 presents the risk scoring criteria used throughout this assessment with the identification of each score being based on the information provided by WRM in the 'justification of magnitude' column.

Table 1 - Risk Assessment Criteria

Likelihood of risk arising		Significance of a resulting risk	
1	Rare - Will only occur in exceptional circumstances.	1	Negligible - Minimal impact or no discernible impact at all.
2	Unlikely - Unlikely to occur but definite potential exists.	2	Minor - Impact of risk materialising is unlikely to have any permanent or significant effect on local area/sensitive receptors.
3	Possible - Reasonable chance of occurring - has happened before at an industry level on occasions.	3	Moderate - Impact of risk materialising will have a significant effect on local area/sensitive receptors in the short term.
4	Likely - Likely to occur - strong possibility.	4	Major - Impact of risk materialising will have a serious effect on local area/sensitive receptors in the medium term.

Likelihood of risk arising		Significance of a resulting risk	
5	Almost certain - The event will occur in most circumstances.	5	Catastrophic - Impact of risk materialising will have a serious effect on local area/sensitive receptors in the long term.

1.2 Resulting Risk Rating

The application of likelihood and significance scores enables an overall rating to be assigned to each risk. Each risk score has been calculated by multiplying the likelihood score by the significance score with the resulting value indicating the overall level of risk (Figure 1).

		Significance				
		1	2	3	4	5
Likelihood	1	1	2	3	4	5
	2	2	4	6	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20
	5	5	10	15	20	25

Figure 1 - Risk Grading Matrix

Risk ratings identified in the matrix include:

Low risk (1-5) – minor risks that are unlikely to have an impact on the local environment/sensitive receptors in any significant way. Aspects with this rating are considered to have adequate management systems or mitigation measures to address any identified risks.

Medium risk (6-14) – moderate risks that have potential to impact on the local environment/sensitive receptors. The proactive implementation of described mitigation measures will enable risk level to be reduced to an acceptable level.

High risk (15-25) – Major risks that have the potential to impact on the local environment/sensitive receptors.

1.3 Mitigation Measures and Residual Risk

Where appropriate, WRM has proposed mitigation measures that seek to reduce the risk level, improve best practice and operational performance of the operation. Where proposed, mitigation measures are justified with an indication of the intended outcome.

The assessment includes a residual risk column which provides an indication of the risk level that could be achieved if all mitigation measures are implemented comprehensively.

2.0 RISK ASSESSMENT

This section considers the risks associated with the operation of the High Hedley Anaerobic Digestion facility.

No.	Pollutant Model				Judgement				Action	
	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
1	Storage of raw material feedstock.	Nuisance, loss of amenity	Air transport then inhalation	Local human population	1	4	4	There is a potential for exposure to anyone working or living close to the site or at locations where members of the public may be exposed.	<ul style="list-style-type: none"> All potentially odorous materials are delivered to site in sealed vehicles. Liquid wastes are stored within sealed storage tanks. The solid wastes are stored within an enclosed reception building. The reception building has a sealed floor and doors to the building are kept closed except for vehicle access. Waste bays are subject to regular cleaning following deliveries and processing. All wastes are processed within 24hrs except in exceptional circumstances. Odour Management Strategy in place. 	2
2	Odour from waste activities.	Nuisance, loss of amenity	Air transport then inhalation	Local human population	3	4	12	Local residents are often sensitive to odour. The	<ul style="list-style-type: none"> Activities shall be managed and operated in accordance with the management system (will include 	2

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	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
								range of waste permitted at the site may cause odour issues at reception from waste storage and the release of biogas and digestate, hence control measures adopted.	<p>inspection and maintenance).</p> <ul style="list-style-type: none"> The site manages risk and controls through the implementation of an odour management strategy. Liquid waste is directly pumped into sealed tanks. Doors for the reception building will be kept closed at all times except when vehicles are entering /leaving. All processes downstream of waste reception will take place within enclosed buildings, sealed pipes, tanks etc. Liquid wastes are fed directly into the mixer tank from sealed tanks via closed pipework and mixed wastes are fed directly into the digesters via a closed system. The pasteurisation tank is within an enclosed building, with air from the pasteuriser piped out and 	

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									<p>into the lagoon for filtration through the digestate.</p> <ul style="list-style-type: none"> • Site has a complaints register that is to be maintained as part of the facility diary records. Odour complaints are investigated using the Odour Complaint form and remedial action is taken where necessary. • Olfactory monitoring is undertaken in line with Odour Management Strategy, and a report is produced summarising the outcome of the monitoring. 	
3	Odour generated from stored digestate.	Nuisance, loss of amenity	Air transport then inhalation	Local human population	1	4	4	There is a potential for exposure to anyone living or working close to the site or at locations where members of the public may be exposed.	<ul style="list-style-type: none"> • Following completion of pasteurisation, digestate is stored in a 12,000-15,000m³ on-site lagoon. The lagoon is lined and covered with welded plastic and vents installed within the lagoon cover. • The lagoon is fitted with four mixers to ensure homogenisation of the digestate. 	2

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									<ul style="list-style-type: none"> Odour Management Strategy 	
4	Releases of NOx (Oxides of Nitrogen) from CHPs.	Harm to human health – through respiratory irritation and illness.	Air transport then Inhalation.	Local human population.	3	3	9	There is a potential for exposure to anyone living or working close to the site or at locations where members of the public may be exposed.	<ul style="list-style-type: none"> Operation of the plant shall be managed and operated in accordance with the management system, including inspection and maintenance of plant equipment and engine management systems. CHPs designed to keep NOx emissions less than 500mg/Nm³. Plant is serviced in line with manufacturers guidelines to help minimise emission releases. Emissions shall be monitored by an MCERTS accredited organisation on an annual basis. 	3
5	Releases of CO (Carbon Monoxide) from CHPs.	Harm to human health – through respiratory	Air transport then Inhalation.	Local Human Population.	3	3	9	There is a potential for exposure to anyone living or working close to the	<ul style="list-style-type: none"> Operation of the plant shall be managed and operated in accordance with the site management system, including inspection and maintenance of equipment 	3

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	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
		irritation and illness.						site or at locations where members of the public may be exposed.	<ul style="list-style-type: none"> and engine management systems. • CHPs designed to keep CO emissions less than 1400 mg/Nm³. • Plant is serviced in line with manufacturers guidelines to help minimise emission releases. • Emissions shall be monitored by an MCERTS accredited organisation on an annual basis. 	
6	Onsite operations releasing VOCs into atmosphere.	Harm to human health – through respiratory irritation and illness.	Air transport then Inhalation.	Local human population.	2	3	6	Biogas and its combustion products have negligible amounts of particulates.	<ul style="list-style-type: none"> • Operation of the plant shall be managed and operated in accordance with the site management system, including inspection and maintenance of equipment and engine management systems. • CHPs designed to keep CO emissions less than 1400 mg/Nm³. • Plant is serviced in line with manufacturers guidelines to help minimise emission releases. • 	3

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	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
									<ul style="list-style-type: none"> Emissions shall be monitored by an MCERTS accredited organisation on an annual basis. Fugitive emissions are prevented by gas tight process and storage tanks. Oil tank on site is double bunded and located within the enclosed reception building so natural venting will be minimal. 	
7	Release of micro-organisms (bioaerosols)	Harm to human health – respiratory irritation and illness.	Air transportation, then inhalation.	Local Human Population.	2	4	8	There is the potential for release at waste reception/treatment areas.	<ul style="list-style-type: none"> Fully enclosed waste reception building fitted with roller-shutter doors to minimise the potential release of bioaerosols. Air handling plant extracts air from reception building – air extraction rate is variable up to 3 air changes per hour. All pre-processing of waste material is undertaken within the enclosed area or closed systems. All biological activity will take place in sealed digestion tanks. 	2

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	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
									<ul style="list-style-type: none"> Material moving through the process will be pumped via enclosed pipework. 	
8	Noise and vibration.	Nuisance, loss of amenity, loss of sleep	Noise through the air and vibration through the ground.	Local human population.	3	2	6	Local residents often sensitive to noise and vibration. However, the site is situated within rural setting surrounded by agricultural land.	<ul style="list-style-type: none"> All vehicles, plant and machinery will be maintained in accordance with manufacturers specifications. Significant amounts of plant and activity are situated inside a building. Material moving through the process will be pumped via enclosed pipework. 	2
9	All on-site hazards: machinery.	Bodily injury.	Direct physical contact	Local human population after gaining unauthorised access to the installation. Operatives.	2	5	10	Digestion activity carried out within enclosed digesters but pre-processing of materials is undertaken in a waste	<ul style="list-style-type: none"> Operation of the plant shall be managed and operated in accordance with the site management system. All operatives and visitors to the site have to wear PPE when going on to operational areas. Only suitably qualified personnel authorised to operate machinery. 	5

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	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
								reception hall where there is potential for operatives to come into contact with plant, such as telehandlers.		
10	Arson and / or Vandalism causing the release of polluting materials to air (smoke or fumes), water or land.	Respiratory irritation, illness and nuisance to local population. Injury to staff, fire fighters or arsonists/ vandals. Pollution of water or land.	Air transport of smoke. Spillages of digestate and contaminated firewater by direct run-off from site and via surface water drains and ditches.	Local human population and local environment.	2	5	10	Biogas is flammable and could cause significant harm in certain circumstances . Risk of direct contact is reduced by activity being carried out within enclosed systems and rural setting of the site.	<ul style="list-style-type: none"> Site implements full Accident Management Plan, which details how to deal with fire and spillages. Operation of the plant shall be managed and operated in accordance with the site management system which include site security measures to prevent unauthorised access. Facility includes site security measures to prevent unauthorised access, such as a fenced perimeter, CCTV and a lockable main gate to prevent unauthorised vehicular access. 	5

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	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
									<ul style="list-style-type: none"> Fire extinguishers are kept in appropriate locations on site. 	
11	Accidental explosion of biogas.	Respiratory irritation, illness and nuisance to local population. Injury to staff, fire fighters or arsonists/ vandals. Pollution of water or land.	Air transport of smoke. Spillages of digestate and contaminated firewater by direct run-off from site and via surface water drains and ditches.	Local human population and local environment.	1	5	5	Unlikely to happen, reduced by effective management system.	<ul style="list-style-type: none"> The site has a DSEAR assessment. Operation of the plant shall be managed and operated in accordance with the site management system. Digester tanks are located within a contained and bunded area. Fire drills are undertaken, and Toolbox Talks held with staff regarding fire safety. Site checks undertaken ensuring fire extinguishers are positioned in the correct location, fire exits are not blocked, and flammable material is not stored in inappropriate locations. Fire extinguishers are serviced annually. Fire Risk Assessment carried out on an annual basis by a suitably qualified 3rd party contractor. 	3

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	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
									<ul style="list-style-type: none"> Smoking is not permitted on site. The Accident Management Plan contains a procedure for operators to follow in the event of a fire. 	
12	Accidental fire causing the release of polluting materials to air (smoke or fumes), water or land.	Respiratory irritation, illness and nuisance to local population. Injury to staff or fire fighters. Pollution of water or land.	Air transport of smoke. Spillages of digestate and contaminated firewater by direct run-off from site and via surface water drains and ditches.	Local human population and local environment.	1	5	5	Risk of accidental combustion of waste is low due to quick processing time.	<ul style="list-style-type: none"> Operation of the plant shall be managed and operated in accordance with the site management system. Digester tanks are located within a contained and bunded area. Site checks undertaken ensuring fire extinguishers are positioned in the correct location, fire exits are not blocked, and flammable material is not stored in inappropriate locations. Fire extinguishers are serviced annually. Fire Risk Assessment carried out on an annual basis by a suitably qualified 3rd party contractor. Smoking is not permitted on site. 	3

No.	Pollutant Model				Judgement				Action	
	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
									<ul style="list-style-type: none"> The site has in place a full drainage system, so any release would be captured and appropriately contained. The Accident Management Plan contains a procedure for operators to follow in the event of a fire. 	
13	Spillage of liquids, including oil.	Acute effects: fish kill.	Direct run-off from site across ground surface, via surface water drains, ditches etc.	All surface waters close to and downstream of site.	2	2	4	<p>Potential for spillage from digestion tanks and storage vessels.</p> <p>No surface water features located close to site, with closest being a stream ~450m south that feeds the River Deerness ~850m southeast.</p>	<ul style="list-style-type: none"> No point source emissions to water. All Digester tanks and storage vessels are bunded. Oil tank is double bunded and located within the enclosed reception building with separate drainage system. Staff trained and equipment regularly maintained to ensure no spillages. Spill kits are available on site and will be able to contain any spillages and cover drains. The site has in place a full drainage system, so any release would be captured 	1

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	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
									and appropriately contained. <ul style="list-style-type: none"> Waste reception and storage areas are located on an impermeable surface. 	
14	Spillage of liquids, including oil.	Chronic effects: deterioration of water quality.	As above. Indirect run-off via the soil layer.	All surface waters close to and downstream of site.	2	2	4	Potential for spillage from digestions tanks and storage vessels. No surface water features located close to site, with closest being a stream ~450m south that feeds the River Deerness ~850m southeast.	<ul style="list-style-type: none"> No point source emissions to water. All Digester tanks and storage vessels are bunded. Oil tank is double bunded and located within the enclosed reception building with separate drainage system. Staff trained and equipment regularly maintained to ensure no spillages. Spill kits are available on site and will be able to contain any spillages and cover drains. Site has a dedicated Drainage and Spillage Procedure. The site has in place a full drainage system, so any release would be captured 	1

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	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
									<p>and appropriately contained.</p> <ul style="list-style-type: none"> Waste reception and storage areas are located on an impermeable surface. 	
15	Spillage of liquids, including oil.	Chronic effects: contamination of groundwater, requiring treatment of water or closure of borehole(s).	Transport through soil/groundwater then extraction at borehole(s).	Groundwater.	2	4	8	<p>Potential for spillage from digestion tanks and storage vessels.</p> <p>The site is built on an impermeable surface with appropriate containment.</p>	<ul style="list-style-type: none"> No point source emissions to water. All Digester tanks and storage vessels are bunded. Oil tank is double bunded and located within the enclosed reception building with separate drainage system. Staff trained and equipment regularly maintained to ensure no spillages. Spill kits are available on site and will be able to contain any spillages and cover drains. The site has in place a full drainage system, so any release would be captured and appropriately contained. 	3

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	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
									<ul style="list-style-type: none"> Waste reception and storage areas are located on an impermeable surface. 	
16	Any, but principally NOx.	Harm to protected site through toxic contamination, nutrient enrichment, disturbance etc.	Any.	Protected nature conservation sites - European sites and SSSIs.	2	3	6	<p>Emissions to air may cause harm to and deterioration of nature conservation sites.</p> <p>The nearest SSSI – Backstone Bank and Baal Hill Woods is 7.7km to the west of the site.</p>	<ul style="list-style-type: none"> Operation of the plant shall be managed and operated in accordance with the management system, including inspection and maintenance of plant equipment and engine management systems. CHPs designed to keep NOx emissions less than 500mg/Nm³. 	3
17	Material being transported to and from site.	Dust and mud.	Air: windblown.	Local atmosphere, amenity of local public.	3	1	3	<p>The nature of the waste delivered to site is not dusty and it is transported to site in enclosed vehicles.</p>	<ul style="list-style-type: none"> Roadways are maintained / kept clean to prevent dust or mud arising from vehicle movements. Vehicle wheels will be washed and the road dampened if required during very dry conditions. 	3

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18	Material being transported to and from site.	Litter.	Air: Windblown.	Local Amenity.	3	1	3	Waste deliveries will be in sealed or covered containers to prevent windblown material.	<ul style="list-style-type: none"> The majority of waste unloading, and handling will be undertaken within the enclosed waste reception building. Packaging is removed and stored in a sealed compactor container prior to dispatch off-site. The majority of waste is delivered into the site in enclosed vehicles. Nature of feedstocks minimises the risk of litter being present. 	3
19	Pests (e.g. flies)	Nuisance.	Air transport and over land.	Human population	3	3	9	Insect pests can multiply on permitted wastes, particularly in summer months.	<ul style="list-style-type: none"> Process operates in an enclosed system and doors of the waste reception building are closed after use. Bait Boxes installed within the site building and building exterior. These are checked by a pest control contractor 8 times per annum (or more frequently as required). 	2

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	Source	Harm / Outcome	Pathway	Receptor at Risk	Likelihood (1-5)	Significance (1-5)	Risk Rating	Justification	Risk Management	Residual Risk
20	Material escaping from on-site lagoon.	Chronic Effects: Contamination of groundwater, requiring treatment of water or closure of borehole.	Transport through soil/groundwater then extraction at borehole.	Groundwater.	2	5	10	If the material is managed incorrectly or the lagoon bunding is breached, then there is the potential for material to contaminate groundwater.	<ul style="list-style-type: none"> • Digestate is pumped to the lagoon via a sealed pipe network. • The lagoon has been constructed with a welded plastic lining and cover. • Integrity of the lagoon lining and cover is inspected on a daily basis 	5



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