

# Noise and Vibration Management Plan

Issue 07

Produced for GWE Biogas Ltd

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Driffield Anaerobic Digestion Facility



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## QUALITY CONTROL

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7	31/10/2022	Reviewed in line with permit variation for new digesters, capacity increase, the construction of a silage clamp and the installation of a CCUS system.

Quality Control Sign Off		
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## 1.0 NOISE AND VIBRATION MANAGEMENT REQUIREMENTS

The preparation of this document has been undertaken using the guidance outlined in the Environment Agency Technical Guidance Note H3 (Part 2) – Horizontal Guidance for Noise (part2), Sector Guidance Note (SGN) IPPC 5.06, developing a management system and controlling and monitor your emissions for an environmental permit. The typical condition regarding noise and vibration on a permit is as follows:

*Emissions from the activities shall be free from noise and vibration at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved noise and vibration management plan to prevent or where that is not practicable, to minimise, the noise and vibration.*

## 2.0 NOISE AND VIBRATION

This Management Plan addresses the need to manage the potential for noise and vibration from the operations at site that may be considered as an environmental impact and a nuisance to neighbours, neighbouring businesses and operations.

Noise has been defined in various ways, but essentially it is *unwanted* sounds or sound that is not desired by the recipient. The degree of annoyance and stress that can result from exposure to noise is almost impossible to quantify, since responses may vary widely between individuals.

### 2.1 Noise and Sound

Sound is the sensation produced in the ear as a result of pressure variations set up in the air by a vibrating source. Such vibrations set up a series of alternate regions of increased and decreased pressure in the surrounding air or other medium. The longitudinal motion of these pressure fronts from source to receiver through a medium (air, ground, buildings, water) takes the form of sound waves.

Noise has been defined in various terms but is essentially sound of undesirable quality. Whilst the various physical attributes of sound can be quantified, the subjective aspects of noise - the degree of annoyance and stress which can result from exposure - is less easily measured. Annoyance and attitude towards noise varies widely between individuals, hence the apparent effectiveness of control measures may vary according to the individual exposed.

### 2.2 Vibration

Like sound, vibration is the oscillation of a body about a reference point and the number of oscillations or cycles per second gives the frequency of vibration (Hz). What differentiates the sound and vibratory forms of energy is in the way they are perceived - sound can be detected by hearing whilst vibration can be felt as it is transmitted through solid structures.

As with sound, vibration may occur at a single frequency (simple periodic vibration) or more usually there are a number of different frequency components imposed on top of each other and occurring simultaneously - often different parts of a machine will vibrate at different frequencies. A combination of superimposed frequencies can also form a repetitive periodic motion - for example motors and fans.

Random vibration occurs where there is a wide range of frequencies present which vary randomly with time. Vibration may also be transient and die away after a period of time such as occurs with the use of heavy presses or the passage of a heavily loaded vehicle. Vibration is quantified in terms of three parameters: acceleration, velocity or displacement. Displacement is the distance moved from the fixed reference position (amplitude) and may be positive or negative (mm or  $\mu\text{m}$ ). The velocity is the rate at which displacement varies with time (m/s or mm/s) and acceleration which is the rate of change of velocity over time ( $\text{m/s}^2$ ). The latter are generally used for the purpose of determining the various frequencies of

vibration and the severity. Displacement is often used to indicate the degree of unbalance in rotating machine parts.

## **2.3 Legislative Context**

### ***2.3.1 Environmental Protection Act 1990***

Local Authorities have a duty to inspect their area from time to time to identify any statutory nuisances and where a complaint of a statutory nuisance is made by a person living in the area, to take such steps as are reasonably practical to investigate the complaint.

Where a Local Authority is satisfied that a statutory nuisance exists or is likely to occur or recur in its area, legislation requires that the authority shall serve an abatement notice requiring any of the following:

- the abatement of the nuisance or prohibiting or restricting its occurrence or recurrence, and/or
- the execution of such works and the taking of such other steps as may be necessary for any of these purposes.

It is an offence not to comply with an abatement notice without reasonable excuse. A defence is to prove that the best practicable means were used to prevent or minimise the effects of the nuisance if the nuisance arose from industrial, trade or business premises.

### ***2.3.2 Control of Pollution Act 1974***

The main provisions of the Control of Pollution Act 1974 (COPA) with respect to noise are to control noise from construction sites and also to allow for the creation of noise abatement zones. Where it appears to a Local Authority that construction works are being, or are going to be carried out on any premises, the Local Authority may serve a Section 60 Notice imposing requirements as to the way the works are to be carried out. The Notice may specify the type of plant to be used or restrict the times that work can be undertaken or may impose noise level limits.

Sections 63-67 of COPA allow Local Authorities to designate Noise Abatement Zones. The Local Authority will maintain a register of acceptable noise levels permitted within the Noise Abatement Zones and monitoring is undertaken at specified monitoring points. Where a noise level is exceeded without consent the Local Authority may serve a noise reduction notice. Noise Abatement Zones have been criticised for their complexity and consequently few have been designated.

### ***2.3.3 Noise & Statutory Nuisance Act 1993***

The 1993 Act amends the Environmental Protection Act 1990 to control statutory nuisances arising from vehicles, machinery and equipment on roads. The Act makes provisions for control of audible intruder alarms which are dealt with by Statutory Nuisance proceedings.

### ***2.3.4 Noise at Work Regulations 1989***

The objectives of the permit issued is to achieve environmental protection and reduce harm to human health not secure worker protection from exposure to noise which is controlled by a separate regulatory regime. Full co-operation between the HSE, Local Authorities and EA is essential to ensure that noise controls placed on scheduled activities are effective and compatible.

Neither set of controls should adversely affect the protection of the environment, sensitive receptors or the workers. Where environmental protection demands tighter standards of control than are required to safeguard persons at work, these tighter standards should apply provided they have no adverse effects on the worker protection.

### ***2.3.5 Noise Act 1996***

The 1996 Act provides for the control of noise from dwellings at night and for the forfeiture and confiscation of equipment. The only provision relating to industry is section 10 which amends the Environmental Protection Act 1990 by allowing Local Authorities to seize and remove any equipment that appears to be used for the emission of the noise in question.

### ***2.3.6 Control of Noise at Work Regulations 2005***

These regulations are designed to protect employees from prolonged exposure to excessive noise. The regulations establish the responsibilities of an employer with regard to protecting their employees from the risks associated with exposure to noise.

## **2.4 Noise Control Principles**

Once noise has been generated, there are a number of physical factors involved in determining how the noise is propagated and how much reaches the receiver.










SOURCE		PATHWAY	RECEPTOR	
				
				
The amount of noise radiated depends upon: <ul style="list-style-type: none"> <li>• The sound power level of the source;</li> <li>• The nature of the building structure;</li> <li>• Gaps in the fabric of the building;</li> <li>• The number of sources.</li> </ul>		The noise received depends upon the degree of attenuation provided by: <ul style="list-style-type: none"> <li>• Distance from source;</li> <li>• Attenuation provided by type of ground;</li> <li>• Screening by walls, banks or buildings;</li> <li>• Wind direction;</li> <li>• Meteorological conditions;</li> <li>• Atmospheric absorption.</li> </ul>	The strength of any vibration received will depend upon: <ul style="list-style-type: none"> <li>• The strength of the source;</li> <li>• Ability of the source to transmit vibration to the ground;</li> <li>• The nature of the ground conditions;</li> <li>• Distance of the receiver from the source;</li> <li>• The continuity of the transmission route;</li> <li>• The ability of the receiver to receive the vibration.</li> </ul>	
<b>HAZARD</b>			Nuisance to local population.	

Figure 1 – Source-Pathway-Receptor Model for Noise Nuisance

**2.4.1 Noise Control Techniques**

Control of noise within waste management facilities can normally be affected at 2 points in this chain:

1. By reducing at source by design or management;
2. By blocking or impeding the transmission paths, control by distance, direction or some form of noise abatement equipment

In determining the degree of control required, it is usual to calculate or measure the sound pressure level close to the source and, knowing the desired end-point, to calculate:

- The attenuation provided by the environment at the sensitive location.
- The additional attenuation required.

A hierarchy of noise control measures determines the most appropriate solution to control where practicable under any one site specific scenario.

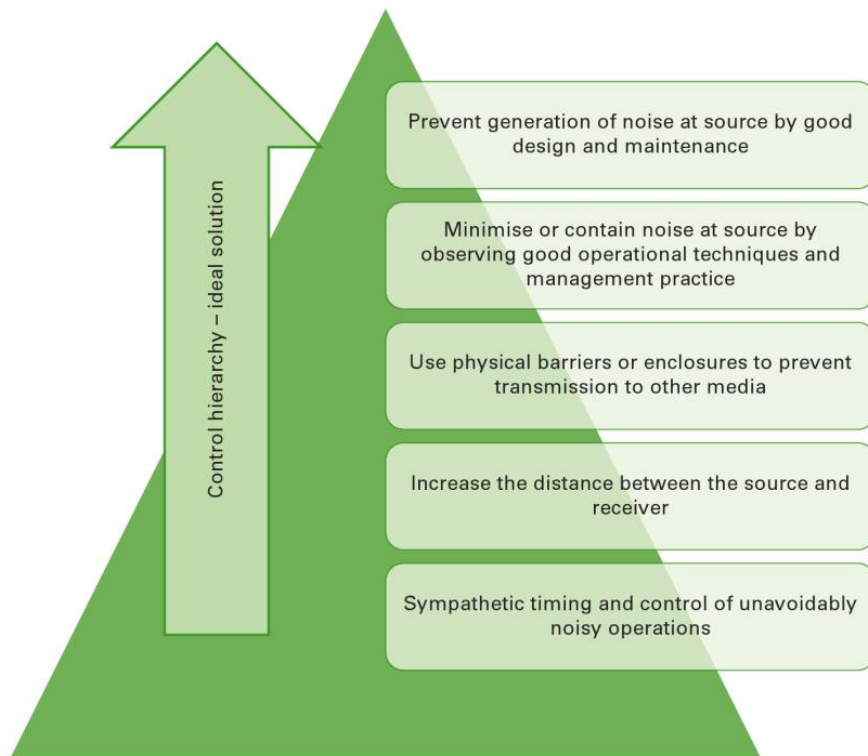


Figure 2 – Noise Control Hierarchy

### 2.4.2 Management Plan

The Noise and Vibration Management Plan shall identify sources and potential sources of noise and vibration, and shall consider the risk to sensitive receptors. The Noise and Vibration Management Plan has been produced with the intention to reduce as much as possible noise- and vibration-causing activities.

This Noise and Vibration Management Plan contains:

- An assessment of the risks of noise and vibration problems, from normal and abnormal situations, including worst case scenarios, for example of weather, temperature or breakdowns and accidents;
- The appropriate controls (both physical and management) needed to manage those risks;
- Suitable monitoring;
- Actions, contingencies and responsibilities when problems arise;
- Regular review of the effectiveness of noise and vibration control measures.

### 2.5 Management Responsibilities and Review

It will be the responsibility of the TCM (or designated responsible person) to ensure that the Noise and Vibration Management Plan is adhered to at the site. This includes ensuring the mitigation measures detailed in Section 3 are adhered to.

The TCM (or designated responsible person) will be supported by a company Director.

## **3.0 SOURCES**

The following section identifies potential noise sources at the anaerobic digestion facility and an assessment is made of noise impact, emergency conditions and action controls.

### **3.1 Source Assessment**

There are several sources of noise from the site due to the treatment activities of waste materials. However, the initial noise monitoring exercise concluded that noise associated with deliveries to, or activities within, the ADP is unlikely to result in any significant disturbance or annoyance at the nearest noise sensitive receptors. The individual sources are identified in the assessment below.

Table 1 – Noise and Vibration Source Mitigation Assessment

Source	Nature of Noise or Vibration	Location/Activity	Contribution to Emissions	Mitigation Measures
Vehicles delivering waste materials to the site.	<p>Diesel engine sounds and reverse alarms during manoeuvres to unload waste.</p> <p>Intermittent sound during deliveries of material only.</p> <p>Hours of reception are: Mon-Fri: 07:00-19:00 Sat: 07:00- 19:00 Sun: Closed</p>	<ul style="list-style-type: none"> <li>Access Road.</li> <li>Reception Area.</li> </ul>	Low – intermittent sound at low levels at receptor.	<ul style="list-style-type: none"> <li>Supervision of material unloading.</li> <li>Site access designed to minimise the need for reversing.</li> <li>Restriction of deliveries to between 07:00 to 19:00 hours.</li> </ul>
On site vehicles transporting material around the site.	<p>Diesel engine sounds and reverse alarms during manoeuvres to transport waste.</p> <p>Intermittent sound during material movements only.</p> <p>Hours of operation are: Mon-Fri: 07:00-19:00 Sat: 07:00- 19:00 Sun: Closed</p>	<ul style="list-style-type: none"> <li>At reception area.</li> <li>Inside reception hall.</li> <li>Transportation of final product to storage/customer.</li> </ul>	Low – intermittent sound at low levels at receptor.	<ul style="list-style-type: none"> <li>Site access designed to minimise the need for reversing.</li> <li>Restriction of deliveries to between 07:00 to 19:00 hours.</li> <li>Selection of inherently quiet plant.</li> <li>All vehicles, plant and machinery to be maintained in accordance with manufacturers specifications and fitted with effective silencers.</li> </ul>
Shredders	<p>Shredder.</p> <p>Intermittent noise during shredding activities only.</p> <p>Hours of operation are: Mon-Fri: 07:00-19:00 Sat: 07:00- 19:00 Sun: Closed</p>	<ul style="list-style-type: none"> <li>Inside reception hall.</li> </ul>	Low – Intermittent sound at low levels at receptor.	<ul style="list-style-type: none"> <li>Shredding activity does not take place close to the nearest sensitive receptor.</li> <li>All vehicles, plant and machinery to be maintained in accordance with manufacturers specifications.</li> <li>Enclosure of significant amounts of plant and activity in insulated building, with weaker elements oriented away from the noise sensitive receptors (i.e. roller shutter doors on the eastern façade).</li> </ul>

Source	Nature of Noise or Vibration	Location/Activity	Contribution to Emissions	Mitigation Measures
Anaerobic digestion process	24-hour anaerobic digestion process. Operation of digestion pumps. Operation of digestate tank mixers.	<ul style="list-style-type: none"> <li>Process building and external digestion tanks.</li> </ul>	Low – continuous sound at low levels at receptor.	<ul style="list-style-type: none"> <li>Selection of a site which is a significant distance from existing sensitive receptors.</li> <li>Enclosure of significant amounts of plant and activity in insulated building, with weaker elements oriented away from the noise sensitive receptors (i.e. roller shutter doors on the eastern façade).</li> <li>Material moving through the process is pumped in enclosed pipework and the pumps are contained within the main building.</li> </ul>
CHP units	Operation of four CHP units.	<ul style="list-style-type: none"> <li>To the west of the reception building.</li> </ul>	Low – continuous sound at low levels at receptor.	<ul style="list-style-type: none"> <li>Selection of a site which is a significant distance from existing sensitive receptors.</li> <li>All vehicles, plant and machinery to be maintained in accordance with manufacturers specifications.</li> <li>CHP units situated in acoustic enclosures.</li> </ul>
Gas Upgrading Unit	Operation of the compressor	<ul style="list-style-type: none"> <li>To the west of the reception building</li> </ul>	Low - continuous sound at low levels at receptor.	<ul style="list-style-type: none"> <li>Selection of a site which is a significant distance from existing sensitive receptors.</li> <li>All vehicles, plant and machinery to be maintained in accordance with manufacturers specifications.</li> <li>Gas upgrading unit situated in an acoustic container.</li> <li>Two of the four CHP engines will not run during upgrading operations.</li> </ul>

Source	Nature of Noise or Vibration	Location/Activity	Contribution to Emissions	Mitigation Measures
Carbon capture, utilisation and storage (CCUS) system.	Operation of the CCUS unit	<ul style="list-style-type: none"> <li>Situated alongside the Gas Upgrading Unit, to the north of the reception building</li> </ul>	Low - continuous sound at low levels at receptor.	<ul style="list-style-type: none"> <li>Selection of a site which is a significant distance from existing sensitive receptors.</li> <li>All vehicles, plant and machinery to be maintained in accordance with manufacturers specifications.</li> <li>CCUS unit situated in a prefabricated steel container, thus dampening the potential noise and vibrational impact.</li> </ul>
Vehicle Refuelling Station	Refuelling of on-site vehicles	<ul style="list-style-type: none"> <li>Situated adjacent to the CCUS infrastructure, to the north of the reception building</li> </ul>	Low – intermittent sound at low levels during refuelling at receptor.	<ul style="list-style-type: none"> <li>Selection of a site which is a significant distance from existing sensitive receptors.</li> <li>On-site vehicles will only be refuelled during operational hours.</li> </ul>

## 4.0 SENSITIVE RECEPTORS

### 4.1 Personnel and Visitors

Personnel/operatives working on site are the closest receptors to any noise and vibration produced on site, however due to consistent working conditions it may be unlikely that operatives would be particularly sensitive to noise and vibration. All operatives should be made aware of the issue of noise and vibration on site and should be fully conversant with the contents of the Site Management System and the Noise and Vibration Management Plan.

Personal Protective Equipment (PPE) shall be made available, where appropriate or requested.

It is unlikely that noise and vibration from the site will cause nuisance or distress to visitors to the site. However, all visitors shall be made aware that the site is a treatment facility.

### 4.2 Neighbours

Neighbouring sites and businesses are likely to be the most sensitive receptors to noise and vibration nuisances especially those not operating industrial facilities where noisy equipment is used. Good relationships with neighbouring land owners and businesses are essential in order to anticipate potential problems and avoid them, where possible, before official complaints are made. GWE Biogas shall ensure:

- that all the neighbours know how to contact the site if they consider noise and/or vibration to be a problem (Contact details will be clearly visible on the site sign along with the Environment Agency details); and
- that any complaints are recorded and that problems, where possible, are dealt with promptly.

### 4.3 Site Specific Sensitive Receptors

Noise-sensitive properties are located at:

Direction from site	Sensitive Receptors	Distance from site (m)
WNW	Eastburn Warren Farm	400m
SSW	High Battleburn	500m

There are no other fixed receptors within 1,300 m of the proposed development.

## 5.0 NOISE COMPLAINT RESPONSE

Elevated levels of noise may be identified by receipt of a noise complaint from a third party suggesting that there is an excessive noise from the treatment facility.

This section details the contingency measures in place to identify the source of elevated noise levels, bring noise levels back under control and minimise their impact, if elevated noise has been identified through receipt of a noise complaint from a third party.

Each required action will include a target timescale for rectification. The site manager will record any actions taken to rectify the issue, ensure that any necessary actions or reviews are recorded and ensure that the person reporting the incident is notified.

### 5.1 Noise Complaint Investigation

The complaint will be recorded in line with the complaints procedure stipulated within the Integrated Standard Operating Procedures, a general complaint form will be completed by the TCM (or designated responsible person) and a record kept at the site office. All complaints from third parties including external customers, potential customers, statutory authorities, statutory consultees, members of the general public and internal clients will be forwarded to the TCM (or designated responsible person) to action, and dealt with in line with the complaints procedure.

The complaints response procedure incorporates the following stages for noise:

- i. Investigation with regard to the cause of a complaint.
- ii. Determine if a complaint is justified.
- iii. Review attenuation measures and update site protocols to prevent a reoccurrence of a justified complaint.
- iv. Establish a regular communication with the local authority.
- v. Maintain a record of complaints and remedial action undertaken in the site office for inspection.



## **6.0 EMERGENCY RESPONSE**

This Section considers the potential for accidents (or incidents) which would result in the loss of control of noise emissions and could have an unacceptable short-term impact on the local community.

The measures in place to mitigate any emergency situations will generally be the same as the contingency measures identified in Section 7.1. If the situation is considered to be an emergency by the TCM (or designated responsible person) then the mitigation measures will be immediately implemented and the manager will consider limiting the hours of operation or immediately suspending the site operations creating the unacceptable levels of noise. These measures will be considered on a case by case basis.

### **6.1 Breakdown of Equipment and Plant**

Elevated levels of noise may escape from the site due to the breakdown of the waste treatment equipment or abatement equipment. Machines not operating to the manufacturer's specification may create unacceptable levels of noise and the failure of control equipment such as damage to acoustic cladding or acoustic barriers may allow unacceptable levels of noise to escape from the site.

In the event of equipment or abatement breakdown the mitigation measures to be undertaken are the same as the contingency mitigation measures detailed in Section 7.1.

### **6.2 Review of Noise Control Measures**

Noise control measures will be reviewed through an annual internal audit as part of the monitoring and reporting of the general site Management System.

With reference to noise, the internal audit will include but not limited to the following:

- Reviews on the higher risk sources of noise to check maintenance is being carried out in accordance with the manufacturer's specification.
- Checks to ensure that any issues/complaints reported have been resolved correctly.

## 7.0 MONITORING

It is acknowledged that there will be instances throughout the day where there will be some noise and/or vibration generated on site. These occurrences shall be minimised in accordance with the control measures outlined in Section 3 of this document. It shall be the responsibility of the site manager to monitor site operations and ensure that the proposed control measures are being implemented.

Any additional quantitative monitoring shall be undertaken on a required basis, as determined by the TCM. Triggers for quantitative monitoring could include:

- Receipt of a substantiated noise complaint;
- Following installation of a noise mitigation control e.g. noise attenuator or shield;
- After a change of noise risk posed by alteration or addition of a new operational process or technique;
- Upon request by the Environment Agency of Local Authority; or
- As part of on-going due diligence works to ensure compliance with the Environmental Permit.

### 7.1 Detection of Elevated Noise Levels

Any elevated levels of noise identified by monitoring undertaken will be mitigated as follows:

- The TCM (or designated responsible person) will investigate the source of the noise and carry out a range of checks at the identified source of the elevated levels if it is found to be originating from within the site. As part of these checks, the TCM (or designated responsible person) will consider the need for quantitative monitoring.
- Any noise monitoring will be completed in accordance with the relevant British Standards, including Method for rating industrial noise affecting mixed residential and industrial areas (BS4142).
- Monitoring locations will be agreed with the Environment Agency and/or the local Planning Authority prior to undertaking monitoring.
- The results of any noise monitoring will determine whether the site is causing an unacceptable impact at the receptor in question.
- The TCM (or designated responsible person) will then ensure the plant is being operated to the manufacturer's specification and ensure that any improvements required to minimise the noise levels are made.

To further mitigate the elevated noise levels, the following actions shall also be considered where practical and technologically viable.

- The replacement of equipment identified as generating excess noise.
- Once the improvements identified by the TCM (or designated responsible person) have been completed, the manager will commission a further set of monitoring to ensure that the improvements have met the required standard. If the noise levels are

still not being met then the manager will repeat the investigation into improvements and subsequent monitoring until the limits are met as far as is reasonably practicable.

If operational failings are identified, the retraining of employees will take place to ensure that all employees operate to the required standards. If the failings are identified as part of the operating techniques then the problem will be raised as part of the review of control measures.

The TCM (or designated responsible person) will ensure a close liaison with the Environment Agency throughout all stages of the process following an identified elevated noise level.

## **7.2 Noise and Vibration Records**

Records of site inspections, complaints or non-conformances shall be maintained and stored in line with the document control procedure in the Integrated Standard Operating Procedures, on the electronic filing structure.

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