REC
Resource & Environmental Consultants Ltd

National Consultancy, Locally Delivered

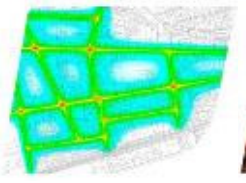
NOISE IMPACT ASSESSMENT
ANAEROBIC DIGESTION FACILITY – COURSERS FARM
EA PERMIT

REC REFERENCE: AC100899-1R3

REPORT PREPARED FOR: AGRIVERT

31ST MAY 2016





QUALITY ASSURANCE

Issue/revision	Revision 1	Revision 2	Revision 3
Remarks	Final	Final with Additional Receptors	Final following EA Comments
Date	15th February 2016	17th May 2016	31st May 2016
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Project number	AC100899-1r1	AC100899-1r2	AC100899-1r3

EXECUTIVE SUMMARY

Noise Survey

A full weekday and weekend Background Sound Survey had been completed in order to quantify the existing levels of background sound levels at the closest receptors to the Site. Given that the Site was under construction, a location away from the Site was chosen. This resulted in lower measured background sound levels that prevail at the receptors and so is considered worst case.

Noise Impact Assessment

The Noise Impact Assessment has shown that the predicted daytime and night-time rating levels at the closest receptors due to the operation of the AD Facility fall below the adopted criteria.

Therefore, noise should not give rise to an adverse impact at the closest receptors and is in accordance with the following advice given in NPPF:

> *"avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of development; and,*
>
> *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions."*

Additionally, the predicted specific sound pressure levels falls below the absolute criteria given in the EPR Guidelines.

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APPENDICES

1.0 INTRODUCTION

1.1 Background

Resource and Environmental Consultants (REC) Limited have been commissioned by Agrivert to complete a Noise Impact Assessment in order to support an Environment Agency Permit for a Anaerobic Digestion Facility *'the facility'* at Coursers Farm, Coursers Road, St Albans.

This Noise Impact Assessment has been completed in order to assess the noise impact of the proposed development upon the closest existing residential receptor.

All acronyms used within this report are defined in the Glossary presented in Appendix II.

1.2 Facility Location and Description

The facility is located on a parcel of agricultural land associated with Coursers Farm off Coursers Road in St Albans. The Site is located to the south west of the main building complex and is accessed off the entrance road to Coursers Farm. The Site is located in a predominately agricultural area with few residential dwellings located in the vicinity. The farm is commercial in nature and several commercial/industrial operations take place within the ownership of Coursers Farm.

The closest residential receptors to the Site are: Coursers Farm to the north east, 2 Coursers Road to the north and 3 Coursers Road to the north east. Additionally, Apton Plant to the east of the Site has been considered.

- 2 x 1500kW CHP and Gas Engine Unit;
- 1 x Flare Stack;
- 1 x Silage Feeder;
- 2 x Pumping and Heating Containers;
- 5 x Digester Tanks;
- 1 x Pump House;
- 1 x Biofilter;
- 1 x Wet Scrubber;
- 1 x Site Office and Meeting Room;
- 2 x Weighbridge;
- 1 x Reception Building; and,
- 1 x Silage Clamp.

REC has comprehensive knowledge of the processes and associated noise emissions from AD Facilities and the key sources of noise are from the CHP Gas Engines. The Flare Stack will operate only on an emergency basis for the purposes of burning excess biogas which cannot be handled by the CHP Gas Engine. The data used is based on a previous assessment, undertaken by REC, for the Coleshill AD Facility (90288r2 dated 18th June 2013) at the request of Agrivert.

This assessment has been undertaken with due regard to the supplied Site plan shown on the following planning drawings:

- Site Layout Plan (drawing number: 1000 C 001 Rev 6) dated 1st May 2015 and produced by Agrivert.

The Proposed Site Layout is shown in Figure I of Appendix III.

1.3 Limitations

The limitations of this report are presented in Appendix I.

1.4 Confidentiality

REC has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC; a charge may be levied against such approval.

2.0 ASSESSMENT CRITERIA

2.1 The Environment Agency for England and Wales

The Environment Agency for England and Wales has issued their own guidance on the management and control of noise at permitted Installations. Specifically Horizontal Guidance Note IPPC H3 (Parts 1 and 2) 'Horizontal Guidance for Noise' detail general issues relating to the regulation, assessment and control of noise relevant to all sectors.

The EPR horizontal guidance for noise indicates that the methodology contained in British Standard 4142: 1997 'Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas' should be used as the basis of the noise assessment. BS4142:1997 was superseded by BS4142:2014 in October 2014 and so this most current version of the guidance will be adopted in this assessment.

In addition to an assessment in accordance with BS4142:2014, Section 2.4 'Determination of BAT' offers the following absolute noise criteria levels for daytime and night-time periods:

- Daytime: 50dB free-field $L_{Aeq,16hr}$; and,
- Night-time: 45dB façade $L_{Aeq,8hr}$

2.1.1 BS4142: 2014 '*Methods for rating and assessing industrial and commercial sound*'

This standard describes methods for rating and assessing sound of an industrial or commercial nature which includes:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and / or commercial premises; and,
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from processes or premises, such as that from forklift trucks, or that from train or ship movements on or around an industrial or commercial Site.

The procedure detailed in the standard compares the measured or predicted noise level 'the specific noise level' from any of the above detailed noise sources with the background sound level at a residential dwelling. The measured background sound level at a receptor should be reliable and should not necessarily ascertain a lowest measured background sound level, but rather to quantify what is typical.'

The specific noise level also acknowledges the following reference time intervals depending upon whether the noise source operates during daytime or night-time periods:

- Daytime (07:00 – 23:00): 1 hr; and,
- Night-time (23:00 – 07:00): 15 minutes.

There are a number of 'penalties' which can be attributed to the specific sound level depending upon the 'acoustic features' of the sound level under investigation as follows. These penalties vary in their weighting depending upon the severity of the acoustic feature, as follows:

Tonality

- +2dB: where the tonality is just perceptible;
- +4dB: where the tonality is clearly perceptible; and,
- +6dB: where the tonality is highly perceptible.

Impulsivity

- +3dB: where the impulsivity is just perceptible;
- +6dB: where the impulsivity is clearly perceptible; and,
- +9dB: where the impulsivity is highly perceptible.

Intermittency

- +3dB: where the intermittency is readily distinctive against the acoustic environment.

In addition to the above acoustic features, there is a penalty for 'other sound characteristics' of +3dB where a sound exhibits characteristics that are neither tonal nor impulsive, though are readily distinctive against the acoustic environment.

BS4142 goes on to state that the rating level is equal to the specific sound level if there are no such features present or expected to be present.

Assessment of the rating level relative to the background noise level can yield the following commentary:

- Typically the greater this difference (between the rating level and the background sound level), the greater the magnitude of impact;
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and,
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

With the above in mind, it is common that a Local Planning Authority will specify their own criteria for the rating level relative to the background sound level and, where this is the case, this criteria usually takes precedence over a simple comparison of the rating level against the background sound level.

2.1.2 Absolute Criteria

Under the heading 'Indicative BAT Requirements', the EPR guidelines for noise indicate that justification should be given where the rating level exceeds the numerical value of the background noise level ($L_{A90,t}$) or 50dB $L_{Aeq,t}$ by day (free-field) or 45dB $L_{Aeq,t}$ by night (façade) when assessed at local noise-sensitive receptors.

3.0 NOISE SURVEYS

3.1 Background Sound Survey

REC has conducted a full weekday and weekend Background Sound Survey in order to quantify the existing levels of background noise at a location considered representative of the closest noise sensitive receptor to the Installation.

- 11:16 Friday 22nd – 13:16 Monday 25th January 2016.

The following noise measurement position was chosen for the Background Sound Survey:

- Noise Measurement Position 1 (NMP1): Located to the south east of the Site, approximately 1.1km to the south east of the centre of the Site. This separation distance was required due to construction activities on Site and the requirement for generators to run security lighting through the night-time and weekend periods. This position is considered representative of the receptors, albeit worst case given the increased distance from Coursers Road. The main source of noise was noted to be distant road traffic noise from the A1(M) and the M25.

The location of the meter was pinpointed to be X: 520932 Y:203652 or grid reference TL 20932 03652.

Table 3.1 details the Average measured background sound levels. The daytime average is based on the hourly data and the night-time levels are based on the 15 minute data in accordance with BS4142:2014. A full representation of the hourly data is shown in Table A1 of Appendix IV.

Table 3.1: Summary of Average Measured Background Sound Level

Date	Period	Average Measured Background Sound Level $L_{A90,T}$ (dB)
Friday 22nd January 2016	Daytime (11:16 – 23:00)	56.8
	Night-time (23:00 – 07:00)	53.7
Saturday 23rd January 2016	Daytime (07:00 – 23:00)	54.9
	Night-time (23:00 – 07:00)	49.3
Sunday 24th January 2016	Daytime (07:00 – 23:00)	54.0
	Night-time (23:00 – 07:00)	51.4
Monday 25th January 2016	Daytime (07:00 – 13:16)	55.6

3.2 Meteorological Conditions & Equipment

Tables 3.2 and 3.3 detail the recorded meteorological conditions at the start and end of the background sound survey.

Table 3.2: Record of Meteorological Conditions at Start of Survey

Measured Wind Speed (m/s)	Wind Direction	Precipitation Occurred?	Fog or Mist Evident?	Was the Ground Wet, Frozen or Snow Covered?	Measured Temperature (°C)	Cloud Cover (%)
4.6	South	No	No	Damp ground	6.0	100

Table 3.3: Record of Meteorological Conditions at Termination of Survey

Measured Wind Speed (m/s)	Wind Direction	Precipitation Occurred During Survey?	Fog or Mist Evident?	Was the Ground Wet, Frozen or Snow Covered?	Measured Temperature (°C)	Cloud Cover (%)
7.2	South	Occasional Light Rain	No	No	12.0	75

The light rain was found to occur on Saturday evening for approximately 2 hours. By consulting the noise level data, no change in noise levels was recorded due to this, therefore it is considered negligible. Weather data between installation and collection was taken from internet based historical weather data.

Table 3.4 details the equipment used for the survey.

Table 3.4: Noise Measurement Equipment

Measurement Position	Equipment Description	Manufacturer & Type No.	Serial No.	Calibration Due Date
NMP3	Sound Level Meter	01dB-Metravib Fusion	10819	26th May 2017
	Pre-amplifier	GRAS 40CE	10714	
	Microphone	01dB-Metravib	217637	
	Calibrator	01dB-Metravib CAL-21	34554787	4th June 2016

4.0 NOISE IMPACT ASSESSMENT

4.1 BS4142:2014 Assessment

The main sources of noise associated with operation of the AD Facility are the CHP units and Mobile Plant.

REC have been provided with details of the CHP Unit, JMC 420 GS- B.L 1500kW, that provides a sound pressure level of 65dB at 10m for the container within which the plant is housed.

REC has used previously supplied and measured data in relation to a previous AD Facility undertaken which includes for the following:

- Heating System Pump: 35dB(A) at 1m;
- Exhaust Stack: 70.5dB(A) at 1m;
- Digester Loading Pump: 71.8dB(A) at 1m;
- Hydraulic Pump: 74.3dB(A) at 0.5m;
- Mixing Pit Pump: 70.2dB(A) at 0.5m;
- HGV movement 75dB (A) at 4m;
- 360 Excavator within Reception Building: 107dB(A) L_W; and,
- Tipping of Material within Reception Building: 117dB(A) L_W.

Given the very low noise level from the Heating System Pump, this will not be considered in the assessment as it will not contribute to the overall noise level. With regards the reception building, internal to external calculations have been undertaken below. Therefore, the noise levels of the facades of the Reception Building have been calculated as follows assuming a 360 excavator and tipping of material within the building:

The direct sound pressure levels (Direct SPL) within the reception building as a result of the mobile plant have been calculated based on the following formula:

$$\text{Direct SPL} = L_W + (10 \times \text{Log} (1/ ((4*3.14) \times D^2)))$$

Where: *L_W is the sound power level of the source*
D is the distance of the source from the facade

Each Direct SPL of each item of plant on each façade have been logarithmically added together to provide the Direct SPL for each façade.

The reverberant sound pressure level (Reverb SPL) has been calculated as follows:

$$\text{Reverb SPL} = L_W + (10 \times \text{Log} (4 / R_C)$$

Where: *L_W is the sound power level of the source*
R_C is the room constant

These have again been logarithmically added together to provide the Reverb SPL for each façade for all sources. The Reverb SPL has then been logarithmically added to the Direct SPL for each façade.

Assuming a Sound Reduction Index of 24dB for a single steel skin for the reception building, the following equation has been used to determine the sound power level of each façade:

$$L_W = L_P + (10 \times \text{Log} (S))$$

Where: L_P *is the sound pressure level of the façade assuming -6 directivity*
S is the surface area of the facade

Table 4.1 details the calculated sound power levels of each façade. It is assumed that the door at the entrance to the tipping hall will be kept shut the majority of the time and when opened, for deliveries, etc, the machines inside will be switched off. The south façade has not been considered for the residential receptors as this is located with full line of sight removal from the receptors. The north façade has been taken for the Apton Plant receptor and is considered worst case.

Table 4.1: Calculated Sound Power Levels of Reception Building Facades

Façade	Assumed Surface Area (m^2)	Calculated Sound Power Level of Façade (dB)
North	573.3	89.7
East	444.6	88.5
West	444.6	88.5
Roof	1508.22	94.6

This assessment has used the different component parts associated with the Site. The calculated sound power levels from the reception building facades have been distance corrected in accordance with the following equation:

$$L_P = L_W - 20 \times \text{Log}(R) - 8$$

Where: L_W *is the sound power level; and,*
R is the distance to the receptor.

This has been completed for the combined facades at a nominal distance of 10m resulting in a sound pressure level of the reception building of 69.2dB at 10m.

The measured noise levels for the above plant have been calculated for the closest non-associated receptor using the following formulas:

Distance Attenuation: $L_{Aeq,T\,2} = L_{Aeq,T\,1} - 20 \times \log(D_2 / D_1)$

Where:
$L_{Aeq,T\,2}$ *= Noise level under investigation*
$L_{Aeq,T\,1}$ *= Known noise level*
D_2 *= Distance from source to receiver*
D_1 *= Measurement distance of source*

Soft Ground Attenuation: $\text{Correction} = 5.2\ I \times \log(6H - 1.5/(d+3.5))$

Where:
H = Height
d = Distance from source to receiver
I = Proportion of soft ground cover

The reference time intervals as detailed in BS4142:2014 are 1 hour for the daytime period and 15 minutes for the night-time period.

BS4142:2014 specifies applicable penalties in relation to tonal, impulsive and intermittent

characteristics. The penalties have been applied to each specific plant item that the penalties correspond to. Table 4.2 determines the applicable penalties for fixed and mobile plant respectively.

Table 4.2: Identification of Applicable Penalties – Fixed and Mobile Plant

Penalty	Applicable?	Attributable Penalty	Comment
Tonality	Yes	6dB	No 1/3 octave band data available for analysis however there is the potential of tonal noise from the CHP Unit and to a lesser extent with regards the pumps.
Impulsivity	No	-	From REC's experience of noise generated by CHPs, they produce steady-state noise continuously and impulsivity is not considered to be an issue.
Intermittency	Yes	3dB	From REC's experience of noise generated by CHPs, they produce steady-state noise continuously and intermittency is not considered to be an issue. However, the intermittent noise from the reception building and HGVs may be perceptible.
Other Sound Characteristic	No	-	Not applicable as other penalties have been assigned.

4.1.1 Daytime BS4142 Assessment

The receptor locations are shown on Figure 2 of Appendix III.

With regards HGV movements, it is assumed that 6 movements can take place in any given 1 hour period and that these movements will only take place during the daytime period. This is considered worst case. It is assumed that the movements of the HGVs on Site and not inside the reception building will account for 50% of the HGV process, i.e. 30 minutes.

For the application of line of sight removal, the following has been accounted for at each receptor.

Table 4.3 Determination of Attenuation Provided by Line of Sight Removal

Plant	R1 – Coursers Farm	R2 – 2 Coursers Road	R3 – 3 Coursers Road	R4 – Apton Plant	R5 – Horse Menage
2 x CHP	Full – Existing Buildings	None	None	Full – Reception Building and Barn	None
Exhaust Stack	None	None	None	None	None
Digester Loading Pump	Full – Existing Buildings	Full – Reception Building	Full – Reception Building	Partial – Proposed Tanks	Full – Barn and Reception Building
Hydraulic Pump	Full – Existing Buildings	Full – Proposed Tanks	Full – Proposed Tanks	Full – Proposed Tanks	Full – Proposed Tanks
Mixing Pit Pump	Full – Existing Buildings	Full – Proposed Tanks	Full – Proposed Tanks	Full – Proposed Tanks	Full – Proposed Tanks
HGV Movement	Full – Existing Buildings	None	None	Partial - Reception Building and Barn	None
Reception Building	Full – Existing Buildings	None	None	Partial – Barn and Proposed Tanks	Partial - Barn

Receptor 1 – Coursers Farm

Table 4.4 calculates the specific noise level at Receptor 1 (Coursers Farm) for the daytime period. Additionally, full (-10dB) or partial line of sight (-5dB) removal has been applied to certain plant items to account for on-site buildings, where applicable. The sound pressure level for the CHP has been increased by 3dB to account for 2 units.

Table 4.4: Calculation of Specific Noise Level at Receptor 1 - Daytime

Plant	Calculated L_W/ Measured Noise Level (dB)	Assumed Activity Duration (seconds)	Distance to Receptor (m)	Reference Time Period (seconds)	Soft Ground Attenuation and Line of Sight Removal (dB)	Calculated Specific Noise Level at Receptor (dB)
2 x CHP	68	3600	212	3600	-13.2	25.1
Exhaust Stack	70.5	3600	208	3600	-3.2	21.0
Digester Loading Pump	71.8	120	262	3600	-14.2	-5.5
Hydraulic Pump	74.3	3600	260	3600	-14.2	5.8
Mixing Pit Pump	70.2	3600	260	3600	-14.2	1.7
HGV Movement	75.0	1800	170	3600	-13.3	33.9
Reception Building	69.2	3600	206	3600	-13.8	29.1

Receptor 2 – 2 Coursers Road

Table 4.5 calculates the specific noise level at Receptor 2 (2 Coursers Road) for the daytime period. Additionally, full (-10dB) or partial line of sight (-5dB) removal has been applied to certain plant items to account for on-site buildings, where applicable.

Table 4.5: Calculation of Specific Noise Level at Receptor 2 - Daytime

Plant	Calculated L_W/ Measured Noise Level (dB)	Assumed Activity Duration (seconds)	Distance to Receptor (m)	Reference Time Period (seconds)	Soft Ground Attenuation and Line of Sight Removal (dB)	Calculated Specific Noise Level at Receptor (dB)
2 x CHP	68	3600	209	3600	-5.7	36.0
Exhaust Stack	70.5	3600	191	3600	-5.5	19.4
Digester Loading Pump	71.8	120	275	3600	-16.9	-8.7
Hydraulic Pump	74.3	3600	318	3600	-17.2	1.0
Mixing Pit Pump	70.2	3600	318	3600	-17.2	-3.1
HGV Movement	75.0	1800	90	3600	-4.7	48.0
Reception Building	69.2	3600	231	3600	-6.6	35.4

Receptor 3 – 3 Coursers Road

Table 4.6 calculates the specific noise level at Receptor 3 (3 Coursers Road) for the daytime period. Additionally, full (-10dB) or partial line of sight (-5dB) removal has been applied to certain plant items to account for on-site buildings, where applicable.

Table 4.6: Calculation of Specific Noise Level at Receptor 3 - Daytime

Plant	Calculated L_W/ Measured Noise Level (dB)	Assumed Activity Duration (seconds)	Distance to Receptor (m)	Reference Time Period (seconds)	Soft Ground Attenuation and Line of Sight Removal (dB)	Calculated Specific Noise Level at Receptor (dB)
2 x CHP	68.0	3600	405	3600	-7.7	28.2
Exhaust Stack	70.5	3600	405	3600	-7.7	10.7
Digester Loading Pump	71.8	120	474	3600	-18.0	-14.5
Hydraulic Pump	74.3	3600	486	3600	-18.1	-3.5
Mixing Pit Pump	70.2	3600	486	3600	-18.1	-7.6
HGV Movement	75.0	1800	140	3600	-4.9	43.9
Reception Building	69.2	3600	413	3600	-7.7	29.2

Receptor 4 – Apton Plant

It is worth noting that BS4142:2014 is not applicable for the assessment of commercial noise on non-residential receptors. However, in order to complete a robust and worst case assessment, Apton Plant has been considered as a residential receptor.

Table 4.7 calculates the specific noise level at Receptor 4 (Apton Plant) for the daytime period. Additionally, full (-10dB) or partial line of sight (-5dB) removal has been applied to certain plant items to account for on-site buildings, where applicable.

Table 4.7: Calculation of Specific Noise Level at Receptor 4 - Daytime

Plant	Calculated L_W/ Measured Noise Level (dB)	Assumed Activity Duration (seconds)	Distance to Receptor (m)	Reference Time Period (seconds)	Soft Ground Attenuation and Line of Sight Removal (dB)	Calculated Specific Noise Level at Receptor (dB)
2 x CHP	68.0	3600	84	3600	-11.0	38.5
Exhaust Stack	70.5	3600	215	3600	-5.7	18.1
Digester Loading Pump	71.8	120	65	3600	-8.6	12.2
Hydraulic Pump	74.3	3600	85	3600	-11.0	18.7
Mixing Pit Pump	70.2	3600	85	3600	-11.0	14.6
HGV Movement	75.0	1800	147	3600	-6.3	42.2

Reception Building	69.2	3600	120	3600	-8.1	42.4

Receptor 5 – Horse Menage and RS Machinery

It is worth noting that BS4142:2014 is not applicable for the assessment of commercial noise on non-residential receptors. However, in order to complete a robust and worst case assessment, the Horse Menage and RS Machinery have been considered as a residential receptors.

Table 4.8 calculates the specific noise level at Receptor 5 (Horse Menage and RS Machinery) for the daytime period. Additionally, full (-10dB) or partial line of sight (-5dB) removal has been applied to certain plant items to account for on-site buildings, where applicable.

Table 4.8: Calculation of Specific Noise Level at Receptor 5 - Daytime

Plant	Calculated L_W/ Measured Noise Level (dB)	Assumed Activity Duration (seconds)	Distance to Receptor (m)	Reference Time Period (seconds)	Soft Ground Attenuation and Line of Sight Removal (dB)	Calculated Specific Noise Level at Receptor (dB)
2 x CHP	68.0	3600	131	3600	-3.0	42.6
Exhaust Stack	70.5	3600	144	3600	-3.1	24.2
Digester Loading Pump	71.8	120	155	3600	-13.2	0.0
Hydraulic Pump	74.3	3600	147	3600	-13.1	11.8
Mixing Pit Pump	70.2	3600	147	3600	-13.1	7.7
HGV Movement	75.0	1800	125	3600	-3.0	46.9
Reception Building	69.2	3600	106	3600	-6.1	42.6

BS4142:2014 Daytime Assessment – All Receptors

Table 4.9 calculates the resulting rating level at all Receptors during the daytime period.

Table 4.9: Calculation of Rating Level at All Receptors for Daytime Period

Receptor	Calculated Combined Specific Noise Level at Receptor (dB)	Calculated Combined Rating Level, $L_{A,r}$ (dB)	Lowest Average Measured Background Sound Level, $L_{A90,1hr}$ (dB)	Criteria (dB)	Difference + / - (dB)
R1 – Coursers Farm	36	40	54	$L_{A,r} = L_{A90}$	-14
R2 – 2 Coursers Road	49	52	54		-2
R3 – 3 Coursers Road	44	47	54		-7
R4 – Apton Plant	46	49	54		-5
R5 – Horse Menage and RS Machinery	49	53	54		-1

Table 4.9 indicates that the rating level will fall below the criteria noise level for the daytime period, at all receptors, and as such no consideration of mitigation measures is required.

Under the heading 'Indicative BAT Requirements', the EPR guidelines for noise indicate that justification should be given where the rating level exceeds the numerical value of the background noise level ($L_{A90,t}$) or 50dB $L_{Aeq,t}$ by day (free-field) when assessed at local noise-sensitive receptors.

Table 4.10 compares the predicted specific sound pressure level for the daytime period at each receptor with the absolute criteria.

Table 4.10: Comparison of Specific Sound Pressure Level with EPR Absolute Criteria for Daytime Period

Receptor	Calculated Specific Sound Pressure Level at Receptor (dB)	Daytime Criteria (dB)	Difference +/- (dB)
R1 – Coursers Farm	36	50	-14
R2 – 2 Coursers Road	49	50	-1
R3 – 3 Coursers Road	44	50	-6
R4 – Apton Plant	46	50	-4
R5 – Horse Menage and RS Machinery	49	50	-1

Table 4.10 indicates that the EPR benchmark criteria will not be exceeded at all receptors during the daytime period.

4.1.2 Night-time BS4142 Assessment

For the night-time assessment, it is assumed that no deliveries or activity within the reception building will take place. Only the residential receptors have been assessed as non-residential receptors are not sensitive during the night-time period.

Receptor 1 – Coursers Farm

Table 4.11 calculates the specific noise level at R1 for the night-time period.

Table 4.11: Calculation of Specific Noise Level at Receptor 1 – Night-time

Plant	Calculated L_W/ Measured Noise Level (dB)	Assumed Activity Duration (seconds)	Distance to Receptor (m)	Reference Time Period (seconds)	Soft Ground Attenuation and Line of Sight Removal (dB)	Calculated Specific Noise Level at Receptor (dB)
2 x CHP	68	900	212	900	-13.2	28.3
Exhaust Stack	70.5	900	208	900	-13.2	11.0
Digester Loading Pump	71.8	120	262	900	-14.2	0.5
Hydraulic Pump	74.3	900	260	900	-14.2	5.8
Mixing Pit Pump	70.2	900	260	900	-14.2	1.7

Receptor 2 – 2 Coursers Road

Table 4.12 calculates the specific noise level at R2 for the night-time period.

Table 4.12: Calculation of Specific Noise Level at Receptor 2 – Night-time

Plant	Calculated L_W/ Measured Noise Level (dB)	Assumed Activity Duration (seconds)	Distance to Receptor (m)	Reference Time Period (seconds)	Soft Ground Attenuation and Line of Sight Removal (dB)	Calculated Specific Noise Level at Receptor (dB)
2 x CHP	68.0	900	209	900	-5.7	36.0
Exhaust Stack	70.5	900	191	900	-5.5	19.4
Digester Loading Pump	71.8	120	275	900	-16.9	-2.6
Hydraulic Pump	74.3	900	318	900	-17.2	1.0
Mixing Pit Pump	70.2	900	318	900	-17.2	-3.1

Receptor 3 – 3 Coursers Road

Table 4.13 calculates the specific noise level at R3 for the night-time period.

Table 4.13: Calculation of Specific Noise Level at Receptor 3 – Night-time

Plant	Calculated L_W/ Measured Noise Level (dB)	Assumed Activity Duration (seconds)	Distance to Receptor (m)	Reference Time Period (seconds)	Soft Ground Attenuation and Line of Sight Removal (dB)	Calculated Specific Noise Level at Receptor (dB)
2 x CHP	68.0	900	405	900	-7.7	28.2
Exhaust Stack	70.5	900	405	900	-7.7	10.7
Digester Loading Pump	71.8	120	474	900	-18.0	-8.5
Hydraulic Pump	74.3	900	486	900	-18.1	-3.5
Mixing Pit Pump	70.2	900	486	900	-18.1	-7.6

Table 4.14 calculates the resulting rating level at all Receptors during the night-time period.

Table 4.14: Calculation of Rating Level at All Receptors for Night-time Period

Receptor	Calculated Combined Specific Noise Level at Receptor (dB)	Calculated Combined Rating Level, $L_{A,r}$ (dB)	Lowest Average Measured Background Sound Level, $L_{A90,15mins}$ (dB)	Criteria (dB)	Difference + / - (dB)
R1 – Coursers Farm	28	34	49	$L_{A,r} = L_{A90}$	-15
R2 – 2 Coursers Road	36	42	49		-7

R3 – 3 Coursers Road	28	34	49		-15

Table 4.14 indicates that the rating level will fall below the criteria noise level for the night-time period, at all receptors, and as such no consideration of mitigation measures is required.

Under the heading 'Indicative BAT Requirements', the EPR guidelines for noise indicate that justification should be given where the rating level exceeds the numerical value of the background noise level ($L_{A90,t}$) or 45dB $L_{Aeq,t}$ by night (façade) when assessed at local noise-sensitive receptors.

Table 4.15 compares the predicted specific sound pressure level for the night-time period at each receptor with the absolute criteria.

Table 4.15: Comparison of Specific Sound Pressure Level with EPR Absolute Criteria for Night-time Period

Receptor	Calculated Specific Sound Pressure Level at Receptor (dB)	Night-time Criteria (dB)	Difference +/- (dB)
R1 – Coursers Farm	28	45	-17
R2 – 2 Coursers Road	36	45	-9
R3 – 3 Coursers Road	28	45	-17

Table 4.15 indicates that the EPR benchmark criteria will not be exceeded at all receptors during the night-time period.

5.0 CONCLUSION

Resource and Environmental Consultants Limited have been commissioned by Agrivert to complete a Noise Impact Assessment in order to determine the impact of an Anaerobic Digestion Facility at Coursers Farm, St Albans as part of the Environmental Permit.

This assessment has been undertaken to identify key noise sources associated with the AD Facility and to determine their potential impact upon the closest noise-sensitive residential receptors.

A noise survey has been completed in order to measure the background and ambient sound levels at a location which was considered representative of the closest residential receptors to the Site.

The Noise Impact Assessment has shown that the predicted daytime and night-time rating levels at the closest receptors due to the operation of the AD Facility should fall comfortably below the adopted criteria.

Therefore, noise should not give rise to an adverse impact at the closest receptors and is in accordance with the following advice given in NPPF:

> *"avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of development; and,*
>
> *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions."*

Additionally, the predicted specific sound pressure levels falls below the absolute criteria given in the EPR Guidelines.

APPENDIX I LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between REC Limited and the Client as indicated in Section 1.2.

2. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

3. REC cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by REC is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by REC in this connection without their explicit written agreement there to by REC.

APPENDIX II GLOSSARY OF ACOUSTICAL TERMINOLOGY

Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A1: Typical Sound Pressure Levels

Sound Pressure Level dB(A)	Location
0	Threshold of hearing
20 - 30	Quiet bedroom at night
30 - 40	Living room during the day
40 - 50	Typical office
50 - 60	Inside a car
60 - 70	Typical high street
70 - 90	Inside factory
100 - 110	Burglar alarm at 1m away
110 - 130	Jet aircraft on take off
140	Threshold of pain

Acoustic Terminology

Table A2: Terminology

Descriptor	Explanation
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall Leq noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} & L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Fast	A time weighting used in the root mean square section of a sound level meter with a 125millisecond time constant.
Slow	A time weighting used in the root mean square section of a sound level meter with a 1000millisecond time constant.

APPENDIX III FIGURES

Figure 1

Proposed Site Layout

Figure 2

Receptor Locations

APPENDIX IV MEASURED NOISE LEVEL DATA

Table A1: Measured Background Sound Levels at NMP1

Date and Time	Measured Sound Pressure Level	
	$L_{Aeq,1hr}$	$L_{A90,1hr}$
22/01/2016 11:16	59.5	56.3
22/01/2016 12:16	57.2	55.3
22/01/2016 13:16	57	55.6
22/01/2016 14:16	59.3	57.7
22/01/2016 15:16	59.2	57.2
22/01/2016 16:16	59	57.2
22/01/2016 17:16	58.2	56.3
22/01/2016 18:16	59.8	58.2
22/01/2016 19:16	59.9	58.7
22/01/2016 20:16	58.7	57.1
22/01/2016 21:16	58.1	56.4
22/01/2016 22:16	57.3	55.5
22/01/2016 23:16	56.2	54.6
23/01/2016 00:16	56	54.3
23/01/2016 01:16	54.6	52.3
23/01/2016 02:16	53.8	51.7
23/01/2016 03:16	55	52.9
23/01/2016 04:16	55.2	53.2
23/01/2016 05:16	55.9	54.2
23/01/2016 06:16	58.5	56.2
23/01/2016 07:16	60.1	59
23/01/2016 08:16	60.5	59.2
23/01/2016 09:16	58	56.6
23/01/2016 10:16	55.6	54.1
23/01/2016 11:16	56	54.1
23/01/2016 12:16	57.2	56.1
23/01/2016 13:16	56.4	54.1
23/01/2016 14:16	55.5	53.8
23/01/2016 15:16	59.6	55.1
23/01/2016 16:16	61	55.7
23/01/2016 17:16	56.3	55.1
23/01/2016 18:16	55.6	54.4
23/01/2016 19:16	55	53.6
23/01/2016 20:16	54.8	53.4
23/01/2016 21:16	54.3	52.2
23/01/2016 22:16	53.7	51.8
23/01/2016 23:16	54.9	52.5
24/01/2016 00:16	53.5	50.9
24/01/2016 01:16	51.3	48.7
24/01/2016 02:16	50.7	46.8
24/01/2016 03:16	49.2	46.2
24/01/2016 04:16	51.3	47.5
24/01/2016 05:16	51.5	49.1
24/01/2016 06:16	53.4	51.1
24/01/2016 07:16	54.1	52.1
24/01/2016 08:16	55.6	53.8
24/01/2016 09:16	56.8	55.1
24/01/2016 10:16	56.9	55.3
24/01/2016 11:16	57.1	55.5
24/01/2016 12:16	56.3	54.6
24/01/2016 13:16	55.6	53.9
24/01/2016 14:16	56	54.5
24/01/2016 15:16	56.1	54.1
24/01/2016 16:16	56	54.6
24/01/2016 17:16	56.3	55.1
24/01/2016 18:16	56.1	54.7
24/01/2016 19:16	56	54.5
24/01/2016 20:16	55.4	53.6
24/01/2016 21:16	53.9	52.4
24/01/2016 22:16	52.2	50.6

24/01/2016 23:16	52.5	50.8
25/01/2016 00:16	51.6	49.7
25/01/2016 01:16	51	49
25/01/2016 02:16	50.9	49.1
25/01/2016 03:16	51.7	50
25/01/2016 04:16	53.4	51.7
25/01/2016 05:16	56.4	54.2
25/01/2016 06:16	57.9	56.9
25/01/2016 07:16	60.5	56.4
25/01/2016 08:16	56.7	54.9
25/01/2016 09:16	57.7	55.5
25/01/2016 10:16	57.8	55.6
25/01/2016 11:16	57.5	55.8
25/01/2016 12:16	58.2	55.5