Appendix 1

Noise Report

13 NOISE

13.1. INTRODUCTION

13.1.1 This chapter of the Environmental Statement assesses the noise impacts of the proposed Endless Energy Facility at Land East of Former Gas Works Airedale Road, Keighley.

13.2. ASSESSMENT METHODOLOGY

Consultation and Scope of Works

13.2.1 The following consultation was carried out in relation to application 13/04217/FUL which was submitted in October 2013. The application site remains the same as application 13/04217/FUL and the subsequent application 15/01381/FUL, as do the functions of the now two energy recovery plants that are proposed and the technologies to be employed. Therefore, the consultation undertaken with respect to the methodology and scope of assessment remains valid.

13.2.2 It was requested by Bradford Metropolitan District Council (BMDC) that a noise assessment be included within the EIA, so that the development proposals could be considered in the context of existing residential receptors' amenities.

13.2.3 A written methodology was provided by email to Mr. Brian Fairclough, Environmental Health Officer at BMDC, on 16th August 2013.

13.2.4 Comments regarding the methodology of the noise assessment were provided by Mr. Fairclough by email dated 20th August 2013. This correspondence included the following comments, in relation to the BS4142 assessment;

13.2.5 Bradford Environmental Health usually asks for a specific noise level of 5 dB(A) below existing background.

13.2.6 This assessment follows a similar methodology, with guidance documents updated where applicable.

13.2.7 The scope of the noise assessment includes consideration of noise at the existing sensitive receptors in the vicinity of the site, and the proposed offices as part of the facility, specifically in terms of the potential noise impact of the proposed Endless Energy Facility. This assessment considers current guidance including:

- National Planning Policy Framework, 2012;
- Noise Policy Statement for England, 2010;

- British Standard 5228:2009+A1:2014 (BS5228) Code of practice for noise and vibration control on construction and open sites – Part 1: Noise and Part 2: Vibration;
- British Standard BS4142:2014 Methods for rating and assessing industrial and commercial sound (BS4142);
- British Standard 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings (BS8233:2014); and,
- The World Health Organisation Guidelines for Community Noise 1999 (WHO 1999).

Noise Survey

13.2.8 As part of this assessment, Wardell Armstrong LLP has carried out an attended noise survey to assess the current ambient noise levels at the location of existing sensitive receptors. The noise survey is discussed in Section 13.3 of this report.

Assessment Methodology

13.2.9 The potential impacts of noise, on the existing noise sensitive areas, have been assessed with reference to the following guidance.

National Planning Policy Framework

13.2.10 In March 2012 the 'National Planning Policy Framework' (NPPF) was introduced as the current planning policy guidance within England. Paragraph 123 of the NPPF states:

'Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impact on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and

- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.'

13.2.11 With regard to 'adverse impacts' the NPPF refers to the 'Noise Policy Statement for England' (NPSE), which defines three categories, as follows:

'NOEL – No Observed Effect Level

- This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

- This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

- This is the level above which significant adverse effects on health and quality of life occur'.

13.2.12 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided. The second aim refers to the situation where the impact lies somewhere between LOAEL and SOAEL, and it requires that all reasonable steps are taken to mitigate and minimise the adverse effects of noise. However, this does not mean that such adverse effects cannot occur.

13.2.13 The Planning Practice Guidance (PPG) provides further detail about how the effect levels can be recognised. Above the NOEL noise becomes noticeable, however it has no adverse effect as it does not cause any change in behaviour or attitude. Once noise crosses the LOAEL threshold it begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. Increasing noise exposure further might cause the SOAEL threshold to be crossed. If the exposure is above this level the planning process should be used to avoid the effect occurring by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused. At the highest extreme the situation should be prevented from occurring regardless of the benefits which might arise. Table 13.1 summarises the noise exposure hierarchy.

Table 13.1: National Planning Practice Guidance noise exposure hierarchy			
Perception	**Examples of Outcomes**	**Increasing Effect Level**	**Action**
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Noise and Vibration from Earthworks and Construction Phase Activities

13.2.14 The activities associated with the earthworks and construction phase of the proposed development will have the potential to generate noise and vibration and create an impact on the surrounding area.

13.2.15 Guidance on the prediction and assessment of noise from development sites is given in British Standard 5228 -1:2009+A1:2014 “Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise” (BS5228-1).

13.2.16 Construction noise can have disturbing effects on the surrounding neighbourhood. The effects are varied and are complicated further by the nature of the site works, which will be characterised by noise sources which will change location throughout the construction period. The duration of site operations is also an important consideration. Higher noise levels may be acceptable if it is known that the levels will occur for a limited period.

13.2.17 Local authorities may also have their own procedures for control of construction activities that are proposed in their catchment area, which should be investigated before site working commence.

13.2.18 The Control of Pollution Act 1974 (COPA 1974) gives the local authority power to serve a notice under Section 60 imposing requirements as to the way in which works are to be carried out. This could specify times of operation, maximum levels of noise which may be emitted and the type of plant which should or should not be used.

13.2.19 However it may be preferable for the chosen contractor to obtain prior consent under Section 61 of COPA 1974. Section 61, enables anyone who intends to carry out works to apply to the local authority for consent. Under Section 61 the local authorities and those responsible for construction work, have an opportunity to settle any problems, relating to the potential noise, before work starts.

13.2.20 In addition to COPA 1974, BS5228-1 provides guidance on significance criteria for assessing the potential noise impacts associated with the construction phase of large projects. For the purposes of this noise assessment, the noise likely to be generated by the earthworks and construction phase, have been assessed against significance criteria established, using the BS5228-1 ABC Method.

13.2.21 The ABC method for determining significance criteria requires the ambient noise levels at existing sensitive receptors to be determined. The ambient noise levels at each existing receptor location are then rounded to the nearest 5dB(A) to determine the appropriate threshold value in accordance with the category value, A B or C, as detailed in Table 13.2.

Table 13.2: Thresholds of Significant Impact from Construction Noise at Residential Receptors in accordance with the ABC Method of BS5228-1			
Assessment Category and Threshold Value Period (LAeq)	**Threshold Value, in decibels (dB)**		
	Category A *1	**Category B *2**	**Category C *3**
Daytime (0700 to 1900 hours) and Saturdays (0700 to 1300 hours)	65	70	75
*1 Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than this value.			
*2 Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.			
*3 Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than Category B values.			

13.2.22 The noise level likely to be generated at the receptor during the construction phase, i.e. the ambient noise level plus construction noise, is then compared to the appropriate category value. If the noise level is greater than the appropriate category value, a significant noise impact may be registered.

13.2.23 An assessment of the construction noise at each existing sensitive receptor can be found in Section 13.5.

Vibration from Earthworks and Construction Phase Activities

13.2.24 Work involving heavy plant on an open site is likely to generate vibration, which may, in certain circumstances, propagate beyond the boundary of the site. In situations where particularly heavy plant, vibrating compaction equipment or piling rigs are being used close to the site boundary, nearby properties may experience ground-borne vibration.

13.2.25 Guidance on the assessment of vibration from development sites is given in British Standard 5228-2:2009+A1:2014 “Code of Practice for noise and vibration control on construction and open sites – Part 2: Vibration” (BS5228-2).

13.2.26 It is not possible to mitigate vibration emissions from an open site. It is important therefore to examine the proposed working method to ascertain what, if any, operations would be likely to cause unacceptable levels of vibration at nearby sensitive locations. It is possible that these operations could be modified to reduce their vibration impacts.

13.2.27 BS5228-2 2009 indicates that vibration can have disturbing effects on the surrounding neighbourhood; especially where particularly sensitive operations may be taking place. The significance of vibration levels which may be experienced adjacent to a site is dependent upon the nature of the source.

13.2.28 Human perception of vibration is extremely sensitive. People can detect and be annoyed by vibration before there is any risk of structural damage. Cases where damage to a building has been attributed to the effects of vibration alone are extremely rare; even when vibration has been considered to be intolerable by the occupants.

13.2.29 It is not possible to establish exact vibration damage thresholds that may be applied in all situations. The likelihood of vibration induced damage or nuisance will depend upon the nature of the source, the characteristics of the intervening solid and drift geology and the response pattern of the structures around the site. Most of these variables are too complex to quantify accurately and thresholds of damage, or nuisance, are therefore conservative estimates based on knowledge of engineering.

13.2.30 Where ground vibration is of a relatively continuous nature, there is a greater likelihood of structural damage occurring, compared to transient vibration; for example that caused by transiting vehicles.

13.2.31 BS5228-2 indicates that the threshold of perception is generally accepted to be between a peak particle velocity (PPV) of 0.14 and 0.3mm/sec. In an urban situation it is unlikely that such vibration levels would be noticed. The Highways Agency Research report No. 53 “Ground Vibration caused by Civil Engineering Works” 1986 suggests that, when vibration levels from an unusual source exceed the human threshold of perception, complaints may occur. The onset of complaints due to continuous vibration is probable when the PPV exceeds 3mm/sec.

13.2.32 British Standard BS6472: 2008 “Guide to Evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting” (BS6472-1) suggests that adverse comments or complaints due to continuous vibration are rare in residential situations below a PPV of 0.8mm/sec.

13.2.33 Continuous vibration is defined as “vibration which continues uninterrupted for either a daytime period of 16 hours or a night-time period of 8 hours”. The proposed earthworks and construction works at the site will not cause continuous vibration as defined in BS6472-1.

13.2.34 BS5228-2 2009 suggests that the onset of cosmetic damage is 15mm/sec (15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz for residential or light commercial type buildings).

13.2.35 The adverse residual impacts are assessed against the categories set out in Table 13.3.

Table 13.3: Construction Vibration Assessment Significance Criteria

Magnitude of Impact	Criteria for Assessing Construction Vibration impact
Major Adverse	> 10mm per sec. Vibration likely to be intolerable for more than brief exposure. Approaching the level at which cosmetic damage may occur in light structures.
Moderate Adverse	5mm - 10mm per second. Tolerance less likely even with prior warning and explanation.
Minor Adverse	1mm – 5mm per second. Complaints are likely, but can be tolerated if prior warning and explanation given.
Negligible	<1mm per second. Below level at which complaints are likely.

13.2.36 The vibration assessment for the construction phase outlines the main construction activities that could give rise to vibration impacts at receptors in the vicinity of the proposed development. It also sets out details of 'best practice' management and control measures to ensure that impacts are minimised as far as possible.

Noise from the Operational Phase of the Development

13.2.37 Noise from the operational phase of the development may impact upon existing sensitive receptors. Noise sources are likely to be;

- 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; and
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks on or around an industrial site.

13.2.38 A summary of the assessment guidance used to assess the impact of noise from the operational phase of the development is shown below;

British Standard 4142:2014, Methods for rating and assessing industrial and commercial sound (BS4142):

13.2.39 The standard is applicable to the determination of the following levels at outdoor locations:

- rating levels for sources of sound of an industrial and/or commercial nature; and
- ambient, background and residual sound levels, for the purposes of:

1) Investigating complaints;

2) Assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and

3) Assessing sound at proposed new dwellings or premises used for residential purposes.

13.2.40 The purpose of the BS4142 assessment procedure is to assess the significance of sound of an industrial and/or commercial nature.

13.2.41 BS4142 refers to noise from the industrial source as the 'specific noise' and this is the term used in this report to refer to noise which is predicted to occur due to activities associated with the proposed Endless Energy Facility. The 'specific noise' levels associated with the proposed facility have been predicted based upon a noise level limit for the facility and data from the technology provider as detailed in Section 5 of this report.

13.2.42 BS4142 assesses the significance of impacts by comparing the specific noise level to the background noise level (L_{A90}). Section 3 and 4 of this report provides details of the background noise survey undertaken.

13.2.43 Certain acoustic features can increase the significance of impacts over that expected from a simple comparison between the specific noise level and the background noise level. In particular BS4142 identifies that the absolute level of sound, the character, and the residual sound and the sensitivity of receptor should all be taken into consideration. BS4142 includes allowances for a rating penalty to be added if it is found that the specific noise source contains a tone, impulse and/or other characteristic, or is expected to be present. The specific noise level along with any applicable correction is referred to as the 'rating level'.

13.2.44 The greater the increase between the rating level over the background noise level, the greater the magnitude of the impact. The assessment criteria given by BS4142 are as follows:

- 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.
- 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 or a significant 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, depending on the context.

13.2.45 During the daytime, BS4142 requires that noise levels are assessed over 1-hour periods. However, during the night-time, noise levels are required to be assessed over 15-minute periods.

13.2.46 Where the initial estimate of the impact needs to be modified due to context, BS4142 states that all pertinent factors should be taken into consideration, including:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and,
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

13.2.47 BMDC have requested that noise from the proposed facility is 5dB(A) less than the measured background noise level.

British Standard 8233:2014 (BS8233) Guidance on sound insulation and noise reduction for buildings:

13.2.48 BS8233 provides recommendations for the control of noise in and around buildings and suggests appropriate criteria and internal design ranges to achieve good working conditions for offices, and other types of buildings.

13.2.49 The design range for offices is shown in Table 13.4.

Table 13.4: BS8233 Internal Noise Design Range For Offices	
Office Type	**Design Range ($L_{Aeq,T}$)**
Open Plan Offices	45-50
Executive Office	35-40

13.3. SITE LOCATION AND SITE DESCRIPTION

13.3.1 The site is vacant brownfield land located approximately 3km east of Keighley town centre and 12km north west of Bradford City Centre, at National Grid Reference SE 080 415. The site entrance is located off the A650 (Airevalley Road). The site was remediated in 2005 and currently comprises scrub land with a scattering of sapling and semi-mature trees.

Existing Sensitive Receptors

13.3.2 Three existing sensitive receptors (ESRs) have been identified in the vicinity of the proposed Energy facility and presented in Table 13.5 below. The sensitive receptors are in the same location as the monitoring locations, and share the same numbering.

13.3.3 Table 13.5 details the nearest representative sensitive receptors to the development.

Table 13.5: Existing Noise Sensitive Receptor Locations			
Receptor		**Bearing from Proposed Energy Facility**	**Distance to Sensitive Receptor**
ESR1	6 The Croft, Thwaites, Keigley. BD21 4ND	West	60m
ESR2	3 Marley Cottages, Aire Valley Road, Keighley. BD21 4LT	East	200m
ESR3	224 Bradford Road, Riddlesden, Keighley. BD20 5JT	North-east	630m

13.4. NOISE SURVEY

13.4.1 On the 20th & 21st August 2013 Wardell Armstrong LLP carried out a noise survey to assess the noise levels at the existing sensitive receptors.

13.4.2 Attended noise measurements were carried out at three monitoring locations; the locations are considered to be representative of the existing sensitive receptors. The monitoring locations are as follows, and are shown on Drawing 13.1, appended as Appendix 13.3.

- Monitoring Location 1: West of the site on The Croft close to ESR1 and other sensitive receptors near to the west of the site;
- Monitoring Location 2: East of the site, at ESR2, and nearby other existing sensitive receptors on the A650 Airevalley Road; and,
- Monitoring Location 3: North of the site, at the rear of ESR3 and nearby other existing sensitive receptors on Bradford Road.

13.4.3 Attended noise monitoring was carried out during the following periods:

- Between 1224 and 1629 hours on 20th August 2013; and,
- Between 0145 and 0344 hours on 21st August 2013.

13.4.4 It is generally accepted that noise monitoring data remains valid for up to 3 years. However, the assessment relies upon the measurement of the background noise level, and the lower the background noise level, the greater is the impact of a new source of noise. The main sources of background noise affecting the receptors are road and rail traffic. It is likely that the background noise at the receptors will have increased slightly from 2013 to the present day. Therefore, using 2013 measurement data has the effect of making the assessment more robust.

13.4.5 The noise measurements were made using a Type 1, integrating sound level meter. The microphone was mounted vertically on a tripod 1.2 m above the ground and more than 3.5 metres from any other reflecting surfaces.

13.4.6 All noise monitoring took place during dry and calm weather conditions. The sound level meter was calibrated to a reference level of 94dB at 1kHz both before, and on completion of, the noise survey. No drift in calibration was evident during the survey.

13.4.7 The attended noise measurements were carried out over approximately 30 minute periods at the locations described above. A-weighted[1] L_{eq}[2] and L_{90}[3] noise levels have been measured to comply with the requirements of BS4142, and BS8233. A-weighted L_{10}[4] noise levels, together with the maximum and minimum sound pressure levels, were also measured to provide additional information. The measured noise levels are set out in full in Appendix 13.1.

13.4.8 Attended noise monitoring allows observations and detailed notes to be made of the significant noise sources which contribute to each of the measured levels. The observations identified the following significant noise sources at the site:

Road Traffic Noise: Noise from road traffic on the A560, Airevalley Road, and the remainder of the local road network was audible at all locations during the daytime and night time;

Railway Noise: Noise from the Keighley to Bingley railway line was audible at monitoring locations 1 and 2 during the daytime and night time;

Industrial Premises: Noise from industrial premises, including noise from Worth Enterprise Park, and Marley Sewage Works was audible at monitoring locations 1 and 2 during the daytime, and to a lesser extent during the night time.

Birdsong: Birdsong was occasionally audible at all locations during the daytime; and,

Air Traffic: Noise from air traffic of various types was occasionally audible at all locations during the daytime and night time.

13.4.9 To reduce measurement uncertainty the following steps have been taken:

- The background noise measurement locations were selected to be representative of the background noise level at the closest point of the receptors to the proposed development. In accordance with guidance, the sound level meter was mounted vertically on a tripod 1.2m above the ground. Monitoring locations were also more than 3.5 metres from any other reflecting surfaces;
- The distances between the source and nearest receptors have been modelled using scale drawings showing the locations of each building;
- Noise measurements have been carried out over various time periods, throughout the daytime and evening.
- The background noise measurements were undertaken during dry weather and with wind speeds of less than 5m/s;
- The results of each measurement period were reported to the nearest 0.1dB; and,

- Noise measurements were made using a Class 1, integrating sound level meter.

13.5. NOISE IMPACT ASSESSMENT

Existing Noise Levels

13.5.1 The measured noise levels for each monitoring location have been divided into daytime (0700-2300 hours) and night-time (2300-0700 hours) categories. The individual levels have been arithmetically averaged and then rounded up to give a single daytime and night-time level for each location. The results for each of the monitoring locations are presented in Table 13.6. The measured noise levels are set out in full in Appendix 13.1.

Table 13.6: Average Daytime and Night-time Noise Levels (Figures in dB)

Time	Monitoring Location	Ambient Noise Level (L_{Aeq})	Background Noise Level (L_{A90})
0700-2300	1	50.7	44.8
2300-0700		49.0	38.1
0700-2300	2	62.4	57.8
2300-0700		53.3	55.6
0700-2300	3	50.3	46.6
2300-0700		47.0	44.5

13.5.2 To ensure the assessment is suitably robust, the noise monitoring carried out includes what is normally considered to be the quieter hours of the night time period (i.e. between 0100 and 0500 hours), and representative daytime noise levels outside of rush hour periods.

[1] A' Weighting — An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions

[2] L_{eqs} — Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.

[3] L_{90} — The noise level which is exceeded for 90% of the measurement period.

[4] L_{10} — The noise level which is exceeded for 10% of the measurement period.

Existing Sensitive Receptors Assessment – Noise and Vibration from Earthworks and Construction Phase Activities

13.5.3 The enabling and construction works will be restricted to daytime hours; typically, hours of work are restricted to between 0800 and 1800 hours Monday to Friday and 0800 to 1200 hours on a Saturday, with no work permitted on Sundays or Bank Holidays. Based on the ambient noise levels measured during the daytime period, the appropriate category value has been determined for each of the sensitive receptors, as detailed in Table 13.7. Details of the noise survey carried out at the sensitive receptors are set out in Section 13.4 of this report.

Table 13.7: Construction Noise Assessment Significance Criteria

Receptor	Average Measured Noise Levels (dB L_{Aeq})	Ambient Noise Level Rounded to the nearest 5dB(A) (dB L_{Aeq})	Appropriate Category Value A, B or C in accordance with BS5228-1	Noise Level above which activities of the Construction Phase may cause a significant impact at the Receptor (dB LAeq)
ESR1	50.7	50	A	65
ESR2	62.4	60	A	65
ESR3	50.3	50	A	65

13.5.4 The noise assessment for the construction phase details baseline daytime noise levels measured at similar locations to the sensitive receptor locations identified in Table 13.5. It also sets out details of 'best practice' management and control measures to ensure that impacts are minimised as far as possible.

13.5.5 A full assessment of construction noise has not been carried out as details of equipment, construction times, and phases have not been made available at this time.

Vibration from Earthworks and Construction

13.5.6 The earthworks and construction works have the potential to increase vibration levels at residential properties in the vicinity of construction phases of development during the proposed working hours.

13.5.7 Wardell Armstrong's archives contain field trial measurements of ground vibration associated with types of plant likely to be used at the proposed development. The representative, measured levels, made by Wardell Armstrong using a Vibrock B801 Digital Seismograph, are set out in Table 13.8.

Table 13.8: Measured Vibration Levels of Plant Under Normal Operating Conditions (Figures in ppv mm per second)			
Plant Type	**Distance from Source**		
	10m	**20m**	**30m**
25-30 tonne excavator	0.175	0.075	Background
25 tonnes dumptruck (Volvo A25) Loaded Empty	1.000 0.225	0.150 0.050	Background Background
Dozer	1.050	0.400	Background
Vibrating roller Drum Vibrator on Vibrator off	4.470 0.500	3.270 0.150	2.350 0.050
Loading shovel	1.025	0.150	Background

13.5.8 At the distances shown above, it is possible that vibration due to the operation of various construction plant, and in particular a vibratory roller, may be perceivable. However, the vibration levels are highly unlikely to be above the threshold of structural damage. It is possible that residential properties would therefore potentially experience a minor adverse impact. However, this would occur for only limited periods during the works, i.e. when activities take place close to the residential receptor boundaries.

13.5.9 In addition to the earthworks and construction works described, it is possible that piling will be required. At this time the type(s) of piling, which would be used at various locations across the site, is not known and it is likely that the contractor responsible for undertaking the works at the sites would decide the method of piling.

13.5.10 BS5228-2 recognises that the most common form of vibration associated with piling is the intermittent type derived from conventional driven piling. The intensity of vibration disturbance, which may be registered at a receptor, will be a function of many factors. These are set out in BS5228-2 and include:

- Energy per blow or cycle;
- Distance between source and receptor;
- Soil structure interaction i.e. nature of connection between soil and structure being monitored; and,
- Construction of structure and location of measuring points e.g. soil surface, building foundation and internal structural element.

13.5.11 At this stage detailed information regarding the above is not known and the type of piling has not been confirmed. It is not therefore possible to assess the potential impacts of vibration generated by piling activities in accordance with the significance criteria set out in Table 13.7. To minimise the potential for vibration to be generated by piling it is recommended that careful consideration is given to the type of piling to be used. For example, auger bored piles would be preferable to driven piles with regards to a reduced potential for noise and vibration to be generated. However, it is recognised that the piling process will need to be selected on the basis of the strata to be encountered, the loads to be supported and the economics of the system.

13.5.12 The receptors likely to be affected by piling will vary depending of the phase of the development under construction. Once the precise building locations, ground conditions for each location and type(s) of piling are confirmed, vibration levels could be estimated and recommendations for control made as appropriate.

BS4142 Assessment of the Proposed Endless Energy Facility

13.5.13 The drawings indicate that the Endless Energy Facility will be constructed on land adjacent to and east of Worth Enterprise Park, and south of the A560 Airevalley Road.

13.5.14 Operational activities associated with the proposed Endless Energy Facility have the potential to generate noise at existing sensitive receptors in the vicinity of the development. Activities that are likely to take place at the proposed facility which would have the potential to generate noise include:

- Vehicle movements within the proposed facility during the daytime;
- Noise breakout from industrial-type operations undertaken within the proposed facility; and,
- Ancillary noise sources associated with the proposed facility.

13.5.15 It is considered that without appropriate mitigation measures, noise from the proposed facility may impact upon the existing sensitive receptors. Therefore, a BS4142 assessment has been carried out.

Identification of the Specific Noise

13.5.16 Wardell Armstrong has not been provided with details of noise emissions from the proposed Endless Energy Facility. It has been assumed that the proposed facility will operate 24 hours-a-day, 7 days-a-week. However, HGV movements will only occur during the daytime.

13.5.17 Therefore, a limit value for the daytime and night-time will be calculated based upon the background noise level, and distance to the existing sensitive receptors identified in Table 13.5.

13.5.18 Wardell Armstrong and CNIM who are responsible for the specification and construction of the Energy from Waste Facility (EfwF) are currently in discussions with regard to the noise emission from the EfwF.

13.5.19 Maximum noise emission levels are based upon the likely noise emission for each part of the facility, allowing for the rating level to be up to 5dB below the lowest measured night time L_{A90} at each sensitive receptor as requested by the EHO of BMDC.

13.5.20 The calculated specific noise level at each ESR has been calculated using a logarithmic sum of the maximum noise emission for each element of the proposed facility, presented in Table 13.9.

13.5.21 With the exception of the RDF power plant, full details of the type of equipment located in each area have not been provided; therefore, the assessment is based upon experience of similar projects. The maximum noise levels have been calculated at each receptor as shown in Appendix 13.2.

13.5.22 The noise calculations include the attenuation provided by the proposed 3.5m high acoustic fence at the southern boundary to the site.

Table 13.9 Noise Emission Limits for Each Building Type / Noise Source

Figure	Description of Building Use	Estimated Sources of Noise	Noise Emission Limit Level (dB(A))
A	Offices	AC Condenser	60
		Customer Vehicles	60
B	Visitor Centre	AC Condenser	45
		Customer Vehicles	60
C	Tanker Loading	Miscellaneous Plant	60
		HGV	81
D	Tank Farm	Building	50
E	Waste Processing Plant	Building	50
J	RDF Power Plant (Maximum noise levels determined at the receptor)	ESR1	30
		ESR2	33
		ESR3	31
M	Workshops and compressors	Building	40
		HGV	81
O	Switch gear and transformers	Building	50

13.5.23 Mitigation measures may be required to the proposed energy from waste facility to reduce the noise from the facility to meet the noise level limits detailed in Table 13.9.

13.5.24 The BS4142 assessment considers the three nearest existing sensitive receptors, identified in Table 13.5.

13.5.25 The predicted specific noise level for the daytime and night-time at each ESR is presented in Table 13.10 below.

Table 13.10 Predicted Noise Level at Each Existing Sensitive Receptor

Receptor	Maximum Predicted Noise Level at the Receptor (Leq, Figures in dB(A))	
	Daytime	Night-time
ESR1	34	33
ESR2	36	34
ESR3	33	32

Application of any Tonal Weighting

13.5.26 BS4142 includes guidance on the application of an additional weighting which should be applied should the industrial noise be considered to be either tonal, impulsive, or intermittent at the existing sensitive receptor.

13.5.27 Any tonal, impulsive or intermittent noise audible at the existing sensitive receptors should be designed out at the latter stages of the design through the use of mitigation measures.

13.5.28 However, if it is not possible to mitigate the noise at the existing sensitive receptors, consideration of adding an appropriate weighting to the specific noise, shall be made in accordance with BS4142.

13.5.29 At this stage of the design, no weighting will be applied to the noise level limit. This is based on the assumption that mitigation measures will be used to reduce the effect of any tonal, impulsive, or intermittent noise at the existing receptors.

Identification of the Background Noise Level

13.5.30 Section 8 of BS4142 provides guidance on the selection of the background sound to be used in the assessment. BS4142 states that the background sound levels used for the assessment should be representative of the period being assessed (i.e daytime or night-time periods), and that there is no “single” background sound level.

13.5.31 Therefore some analysis of the measured noise levels is required to select the most appropriate and representative background sound levels for each ESR. An assessment has been carried out based upon the measured noise levels during the daytime and night-time. The mean average has been calculated to one decimal place and rounded to a whole number.

13.5.32 A summary of the daytime measured noise levels for use in the assessment is presented in the Table 13.11.

Table 13.11: Daytime Background L_{90} Noise Level – (Figures in dB(A))

Receptor	**ESR1**		**ESR2**		**ESR3**	
Monitoring Location	ML1		ML2		ML3	
	Time Period	**L_{90}**	**Time Period**	**L_{90}**	**Time Period**	**L_{90}**
Measured L_{90} – Period 1	1224-1254	44	1302-1338	57	1352-1425	47
Measured L_{90} – Period 2	1558-1629	45	1433-1507	58	1517-1550	46
Mean Average Value	**45**		**58**		**47**	
Lowest Measured Value	**44**		**57**		**46**	
Level to be used in the assessment	**45**		**58**		**47**	

13.5.33 Daytime noise monitoring has been carried out during what is regarded as the quieter periods of the daytime. The mean average noise level is considered to be representative of the noise level during the daytime. Therefore a robust assessment of noise during daytime can be carried out.

13.5.34 A summary of the night-time measured noise levels for use in the assessment is presented in the Table 13.12.

Table 13.12: Night-time Background Noise Level – (Figures in dB(A))						
Receptor	**ESR1**		**ESR2**		**ESR3**	
Monitoring Location	ML1		ML2		ML3	
	Time Period	**Level**	**Time Period**	**Level**	**Time Period**	**Level**
Measured L_{90} – Period 1	0226-0241	38	0145-0200	44	0309-0324	35
Measured L_{90} – Period 2	0241-0256	39	0200-0215	45	0324-0339	37
Measured L_{90} – Period 3		--*	0215-0230	48	0339-0354	38
Mean Average Value	**38**		**45**		**37**	
Lowest Measured Value	**38**		**44**		**35**	
Level to be used in the assessment	**38**		**45**		**37**	
* Only two measurements carried out during the night-time						

13.5.35 Night–time noise monitoring has been carried out during the quietest period of the night (i.e. 0100-0400 hours). The mean average noise level is considered to be representative of the noise level during the quietest part of the night-time. Therefore, a robust assessment of noise during night-time can be carried out.

BS4142: 2014 Assessment for the Proposed Endless Energy Facility

13.5.36 A BS4142 assessment has been carried out and has been provided in Tables 13.13 and 13.14 for the daytime and night-time using the background noise levels presented above. Distance attenuation relating to the proposed location of each building type, and corrections due to buildings being obscured, or partially obscured from view, have also been applied.

13.5.37 Details of the calculation method can be found in Appendix 13.2.

Table 13.13: Daytime BS4142 Assessment of the Proposed Energy Facility at Existing Sensitive Receptors – (Figures in dB(A))			
Sensitive Receptor	**ESR1**	**ESR2**	**ESR3**
Total Specific Noise (combination of noise levels detailed in Table 13.9) i.e. noise level of the Energy Facility (including distance attenuation)	34	36	33
Acoustic Feature Correction	0	0	0
Rating Level	34	36	33
Background Noise Level	45	58	47
Excess of rating over background level	-11	-22	-14

13.5.38 The results of the daytime BS4142 assessment in Table 13.13 indicate that, noise from the proposed energy facility will cause a low impact at existing sensitive receptors during the daytime.

13.5.39 The noise impact meets BMDC requirements for a noise impact of 5dB(A) less than the background noise level (L_{90}) during the daytime.

Table 13.14: Night time BS4142 Assessment of the Proposed Energy Facility at Existing Sensitive Receptors – (Figures in dB(A))			
Sensitive Receptor	**ESR1**	**ESR2**	**ESR3**
Total Specific Noise (combination of noise levels detailed in Table 13.9) i.e. noise level of the Energy Facility (including distance attenuation)	33	34	32
Acoustic Feature Correction	0	0	0
Rating Level	34	34	32
Background Noise Level	38	45	37
Excess of rating over background level	-5	-10	-5

13.5.40 The results of the daytime BS4142 assessment in Table 13.14 indicate that, noise from the proposed energy facility will cause a low impact at existing sensitive receptors during the night-time.

13.5.41 The noise impact meets BMDC requirements for a noise impact of 5dB(A) less than the background noise level (L_{90}) during the night-time.

BS4142 Context Assessment

13.5.42 BS4142:2014 States; *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs".*

13.5.43 The first requirement of this statement has been determined within the noise impact assessment section above. To determine the context in which the proposed industrial sound will resided three factors must be considered, these are;

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sound; and,
- The sensitivity of the receptor.

Absolute level of Sound

13.5.44 The impact of a given difference between rating level and background noise level will depend upon whether the residual sound level is low or high.

13.5.45 In order to assess the noise impact of the Endless Energy Facility in the context of its environment and that of each of the existing sensitive receptors, the predicted sound levels from the facility have been added to the measured, average ambient noise levels at each residential receptor. Before the facade noise levels can be calculated 2.5dB(A) must be added to the free field measured levels to allow for the reflection of sound from the existing sensitive receptor facades.

13.5.46 The results for each existing receptor location for day and night-time periods are detailed within Tables 13.15 and 13.16 respectively.

Table 13.15: Context Assessment at Existing Sensitive Receptors – Endless Energy Facility for Daytime Operations of the ERF, between 0700 and 2300 hours Figures in dB L_{Aeq}			
Receptor	**ESR1**	**ESR2**	**ESR3**
Average residual sound level over the noise monitoring period i.e. Existing sound level without the proposed ERF operations	51	62	50
Predicted Specific Noise i.e. Operational noise level of the proposed factory only	34	36	33
Total absolute level of sound i.e. Existing sound level plus Energy from Waste Facility sound level	51	62	50
Difference between existing ambient sound levels and predicted future sound levels	+0	+0	+0

Table 13.16: Context Assessment at Existing Sensitive Receptors – Endless Energy Facility for Night-time Operations of the ERF, between 2300 and 0700 hours Figures in dB L_{Aeq}			
Receptor	**ESR1**	**ESR2**	**ESR3**
Average residual sound level over the noise monitoring period i.e. Existing sound level without the proposed ERF operations	49	53	50
Predicted Specific Noise i.e. Operational noise level of the proposed factory only	33	34	32
Total absolute level of sound i.e. Existing sound level plus Energy from Waste Facility sound level	49	53	50
Difference between existing ambient sound levels and predicted future sound levels	+0	+0	+0

13.5.47 The noise likely to be generated by the proposed energy from waste facility during the daytime is at worst 15dB below the existing ambient noise levels at the nearby sensitive receptors. Therefore, there would not be a change in the absolute noise at each receptor location.

13.5.48 The noise likely to be generated by the proposed energy from waste facility during the night-time is at worst 14dB below the existing ambient noise levels at the nearby sensitive receptors. Therefore, there would not be a change in the absolute noise at either receptor location.

Character and Level of Residual Sound

13.5.49 The existing sensitive receptors in the vicinity of ESR1 currently experience levels of industrial noise from industrial premises on Gas Works Road, and Airedale Road. Receptors in the vicinity of ESR2 currently experience levels of industrial noise from the water treatment works to the north east. It is therefore considered that the character of the sound from the proposed facility will not be dissimilar to the present acoustic environment at ESR1, and ESR2.

13.5.50 The existing sensitive receptor ESR3 is away from any source of industrial noise. Any noise from the proposed energy from waste facility will not be in character with the existing environment. However, ESR3 is approximately 0.5km away from the proposed facility and the predicted noise from the facility is low.

Sensitivity of Receptor and Existing Acoustic Conditions

13.5.51 It was unclear from site observation what glazing and ventilation is installed at existing sensitive receptors. As a worst case scenario, the dwellings can be assumed be naturally ventilated with no specific mitigation measures to control noise ingress from the surrounding area.

Summary of the Site Context

13.5.52 When considering the site context, and in accordance with BS4142, noise from the proposed energy from waste facility will cause a **low impact** at existing sensitive receptors identified.

Proposed Offices

13.5.53 The daytime noise levels in the proposed offices have been assessed in accordance with the requirements of BS8233 for executive offices, and open plan offices. In accordance with BS8233 the acceptable daytime noise level within offices is:

- Between 35 and 40dB L_{Aeq} during the daytime in executive offices; and
- Between 45 and 50dB L_{Aeq} in open plan offices during the daytime.

13.5.54 The measured daytime noise levels have been used to determine the noise levels likely at the facades of the proposed offices in the vicinity of the proposed noise sensitive parts of the development, during the daytime period.

13.5.55 The noise levels measured at monitoring location 2 are considered to be representative of the noise levels from existing noise sources at the location of the proposed offices. The average measured daytime noise level at monitoring location 2 is 62.4 dB LAeq.

13.5.56 The noise level from the proposed energy facility should also be considered when assessing the internal noise level in the proposed offices. The calculated noise level at the location of the offices as a result of the noise from the energy facility, using the noise emission limits set in Table 13.9 is; 81dB L_{Aeq}. Details of the calculation method can be found in Appendix 13.2.

13.5.57 The total noise level as a result of existing and proposed noise sources at the proposed offices is equal to the logarithmic sum of the noise levels provided above. The noise level used for the assessment of the internal noise level in the proposed offices is 81dB L_{Aeq}.

13.5.58 Before internal noise levels can be calculated, 3dB(A) must be added to the free-field measured levels to allow for the reflection of noise from the proposed office facades when the buildings are in place.

13.5.59 The calculated noise levels at the façades of the dwellings, together with the level of attenuation required to achieve between 35 and 50dB L_{Aeq} in the proposed offices is summarised in Table 13.17.

Table 13.17: Façade Noise Level at Properties in the Vicinity of the Monitoring Locations and Level of Attenuation Required to Achieve the Internal Daytime Noise Limit (Figures in dB(A))

Property	Noise Level at the Façade of the Proposed Offices (L_{eq})	Level of Attenuation Needed To Achieve the Requirements of BS8233
Proposed offices in the eastern part of the site, near to the railway line, A650 Aire valley Road, and proposed Endless Energy Facility. (Monitoring Location 2)	84	34-49dB

13.5.60 The assessment demonstrates that mitigation needs to be incorporated into the building envelope design to reduce internal noise levels to acceptable levels. Further details of the required mitigation can be found in Section 13.6 of this chapter.

Car Park

13.5.61 In response to a query raised by the case officer on 21st April 2015, the noise impact of the proposed car park at the south western boundary of the application site has been assessed. It is understood that this car park has a capacity of 21 spaces, and will be used by employees on a staggered shift pattern. The proposed shift patterns are as follows;

- Shift 1 – 0700-1545hrs;
- Shift 2 – 1515-0000hrs; and,
- Shift 3 – 2330-0815hrs.

13.5.62 As a worst case, the staggering of the shifts would mean that there would be a maximum of 21 vehicles entering and leaving the car park during a 30 minute period, and this would occur only once during the night-time period.

13.5.63 To assess the potential impact for future activities within the car park, prediction calculations have been carried out (see Appendix 13.4), based upon library data of;

- A car door closing 97.1dB(A) L_{eq};
- A car starting 98.4dB(A) L_{eq}; and,
- The movement of a car 98.0 dB(A) L_{eq}.

13.5.64 The calculation considers;

- The on-time for each of the three events at the car park within a 30 minute period;
- The number of vehicles using the car park within a 30 minute period; and,
- The attenuation provided by:
  - Distance between the car park and the receptor; and,
  - The proposed 3.5m acoustic barrier at the southern and western site boundary.

13.5.65 The assessment of noise from the car-park has been carried out for the more sensitive night-time period. Using the assumptions and details above, the calculated noise level at ESR1, The Croft, is 45.7dB(A), which is 3.4dB(A) less than the measured ambient noise level of 49.1dB(A) at that location during the night-time. It must be noted that this assessment considers a single worst case 30 minute period during the night-time. There will be no other shift changes during the night.

13.5.66 Each of the other two shift changes occurs during the daytime, when the ambient noise level is higher, and therefore the noise impact of the car park will be less.

13.5.67 Therefore we would not consider that noise from the car park in the south western part of the site will cause a significant noise impact at existing sensitive receptors.

13.6. NOISE ATTENUATION SCHEME

Introduction

13.6.1 This section describes the measures which are required to mitigate any significant environmental impacts.

Construction Phase Assessment

13.6.2 To reduce the potential impact of noise levels generated by the construction phase of the development, at existing receptor locations in the immediate vicinity of the site, mitigation measures will be put in place. As the exact impact from construction noise is unknown due to lack of information regarding the programme and operations, generic mitigation measures to reduce the noise impact have been suggested.

13.6.3 The nearest noise sensitive receptors to the development, as detailed in Table 13.2, will vary depending on the phase of the development under construction. Given the potentially small distances between the construction activities and residential dwellings, noise levels at the receptors may occur above those detailed in Table 13.7. The noise generated by the earthworks and construction phases of the development may therefore have a short-term, minor to moderate adverse impact at the existing sensitive receptors located in the immediate vicinity of the construction phases of the development.

13.6.4 Best working practice will be implemented during each phase of the earthworks and construction works at the site. The construction works will follow the guidelines in BS5228-1 and the guidance in BRE Controlling particles, vapour and noise pollution from construction sites, Parts 1 to 5, 2003.

13.6.5 The following measures will be put in place to minimise noise emissions:

- When works are taking place within close proximity to those sensitive receptors identified, screening of noise sources by temporary screen may be employed;
- All plant and machinery should be regularly maintained to control noise emissions, with particular emphasis on lubrication of bearings and the integrity of silencers;

- Site staff should be aware that they are working adjacent to a residential area and avoid all unnecessary noise due to misuse of tools and equipment, unnecessary shouting and radios;
- A further measure to reduce noise levels at the sensitive receptors would include, as far as possible, the avoidance of two noisy operations occurring simultaneously in close proximity to the same sensitive receptor;
- Adherence to any time limits imposed on noisy works by the Local Authority;
- Implement set working hours during the week and at weekends;
- Ensure engines are turned off when possible; and
- Should earthworks/earthworks and construction activities need to be carried out during night-time hours, the local authority could include a planning condition which requests advance notice and details of any night working to provided.

13.6.6 Once the best working practices detailed in the mitigation section of this chapter are implemented the residual noise impacts associated with the earthworks and construction phase will be negligible, with only brief periods of minor adverse impacts likely in the short term at local level.

Operational Phase Assessment

Assessment of the Proposed Offices

13.6.7 When assessing daytime noise levels in offices the noise attenuation provided by the overall building facade should be considered. To mitigate noise levels, the composition of the building facade can be designed to provide the level of attenuation required. Glazing is generally the building element which attenuates noise the least, so the proportion of glazing in a building facade is an important consideration when assessing overall noise attenuation.

13.6.8 In the absence of design details for the building facades, it has been assumed that the glazing to the offices would comprise about 50% of the facade area. To calculate the overall attenuation provided by this percentage of glazing in a brick or block facade, a non-uniform partition calculation can be used. The attenuation provided by the building facade will decrease if the glazing of the proposed offices comprises a greater proportion of the facade area.

13.6.9 The calculation combines the different degrees of attenuation provided by the wall and the window elements. A facade comprising of solid brick or blockwork, will attenuate by 45-50dB (British Standard 8233: "Guidance on sound insulation and noise reduction for buildings" 2014) whereas standard double glazing will attenuate road traffic noise by 26-29dB(A) (BRE Digest 379" Double glazing for heat and sound insulation"). The overall noise attenuation provided by this combination is, therefore, between 28.9dB(A) and 31.9dB(A).

13.6.10 Therefore, for offices facing the major sources of noise, (i.e. on the western façade) enhanced glazing will be required. However, the noise on northern eastern and southern facades is likely to be less, and therefore, standard double glazing is likely to be sufficient on these facades.

13.6.11 Typically, offices would be mechanically cooled using air conditioning, or a similar system. Therefore, windows would not normally need to be opened for ventilation.

13.6.12 At this stage, a detailed site layout has not yet been confirmed. Glazing requirements will need to be confirmed once a detailed design layout is available.

13.7. CONCLUSIONS

Introduction

13.7.1 Wardell Armstrong has carried out a noise assessment in support of the EIA for the proposed Endless Energy Facility, located on land East of Former Gas Works, Airedale Road, Keighley.

13.7.2 To establish baseline noise levels, an attended noise survey has been carried out.

13.7.3 This report assesses the results of the noise survey carried out in accordance with current guidance and includes recommendations for noise mitigation as appropriate.

Construction Phase

13.7.4 The activities carried out during the earthworks and construction phase of the development will have the potential to generate short term increases in noise levels above the recommended noise limits, set in accordance with current guidance, at existing and proposed sensitive receptors surrounding the site.

13.7.5 Given the small distances between the construction activities and the nearest sensitive receptors, some sensitive receptors may experience minor adverse noise and vibration impacts in the short term. This would occur temporarily and only for short periods.

13.7.6 To minimise the potential impact of construction works, mitigation measures would be put in place. These will include restrictions on working hours, the implementation of temporary screening, and best working practice where possible.

13.7.7 In addition to earthworks and construction it is possible that piling will be required. At this stage detailed information regarding the type of piling has not been confirmed. To minimise the potential for vibration to be generated by piling it is recommended that careful consideration be given to the type of piling used.

13.7.8 With the implementation of best working practice and restriction on working hours, the noise and vibration impacts of earthworks and construction phases, are likely to be negligible, with only brief periods of minor adverse impacts likely in the short term at local level.

Noise Emission from the Proposed Energy Facility

13.7.9 The potential noise impacts associated with the operation of the proposed Endless Energy Facility have been assessed at existing sensitive receptors

13.7.10 Noise data for the RDF power plant has been provided by the technology provider, CNIM. However, for other noise sources, the noise emissions for other elements of the proposed energy facility should not exceed the noise levels stated in Table 13.9.

13.7.11 Mitigation measures will be incorporated into the site design of the proposed energy facility, to ensure the noise impacts of the facility are reduced to acceptable levels at existing sensitive receptors. It is considered that mitigation measures may include screening, building envelope design, and noise silencers, as appropriate.

13.7.12 The assessment includes the attenuation provided by a 3.5m high noise barrier to the southern and western site boundary.

13.7.13 Once operational, the proposed Endless Energy Facility will cause a **low impact** at existing sensitive receptors in accordance with BS4142 during the daytime and night-time.

13.7.14 In accordance with BS4142, the site context has been assessed. For this, the absolute level, the character, and the sensitivity of the receptors have been considered.

13.7.15 The noise impact from the proposed facility meets with BMDC criterion during the daytime and night-time.

Proposed Offices

13.7.16 The building envelope of the proposed offices should be designed to attenuate noise from the existing local transport network and proposed energy facility to achieve the criteria detailed in Table 13.17.

13.7.17 Enhanced glazing will be required to some parts of the western façade of the proposed office building. However, standard thermal double glazing will be sufficient in northern, eastern and southern façades, to attenuate noise levels to comply with the internal noise levels for offices in BS8233. Some form of acoustic ventilation or air conditioning system will need to be installed at the proposed offices.