



SEVERN ROAD RESOURCE RECOVERY CENTRE

CHAPTER 8- NOISE AND VIBRATION

Viridor

September 2009

SLR REF 402.0036.00374



solutions for today's environment

CONTENTS

Introduction	1
Government Advice, Standards and Good Practice	1
British Standard 5228:2009	1
British Standard 4142:1997	2
Draft Guidelines for Noise Impact Assessment	2
ISO9613	3
Sources of Information	4
Approach to the Assessment	4
Baseline Conditions	4
Environmental Design Measures	6
Potential Impact	6
Construction Noise Assessment	6
Construction Vibration	8
Construction Traffic Noise	9
Operational Assessment	9
BS4142 Assessment	10
Heavy Goods Vehicle Movements	12
Cumulative Impacts	13
Mitigation Measures	14
Construction Noise	14
Construction Traffic Noise	15
Construction Vibration	15
Operational Noise	16
Conclusions	16



INTRODUCTION

- 8.1 An assessment of noise has been carried out with reference to British Standard and other government guidance. Noise issues relating to the operation of the proposed development have been considered to the nearest noise-sensitive properties surrounding the site. A plan of the noise monitoring locations is attached in Appendix 8/3.
- 8.2 Technical terms or references are occasionally used in this section. To assist the reader, a glossary of terminology, including a table of example noise levels that may be found in general life, are included in Appendix 8/1.

GOVERNMENT ADVICE, STANDARDS AND GOOD PRACTICE

British Standard 5228:2009

- 8.3 British Standard 5228:2009 *Noise and vibration control on construction and open sites*, Part 1: *Noise* and Part 2: *Vibration* sets out a methodology for predicting noise levels arising from a wide variety of construction and related activities. As such, it can be used to predict noise levels arising from the operations of proposed minerals extraction sites. BS5228 also sets out tables of sound power levels generated by a wide variety of mobile equipment.
- 8.4 Noise levels generated by the site operations and experienced at local receptors will depend upon a number of variables, the most significant of which are:
- the amount of noise generated by plant and equipment being used at the development site, generally expressed as a sound power level;
 - the periods of operation of the plant at the development site, known as the “on-time”;
 - the distance between the noise source and the receptor, known as the “stand-off”;
 - the attenuation due to ground absorption or barrier screening effects; and
 - reflections of noise due to the presence of hard vertical faces such as walls.
- 8.5 The noise predictions in this section have been undertaken using a proprietary software-based noise model, CADNA/A, which implements the full range of UK calculation methods.
- 8.6 BS5228:2009 gives several examples of acceptable limits for construction or demolition noise. The most simplistic being based upon the exceedance of fixed noise limits and states in paragraph E.2:
- “Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut.”*
- 8.7 Paragraph E.2 goes on to state:

“Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

- *70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise;*
- *75 decibels (dBA) in urban areas near main roads in heavy industrial areas.*

These limits are for daytime working outside living rooms and offices.”

British Standard 4142:1997

- 8.8 British Standard 4142:1997 *Method for rating industrial noise affecting mixed residential and industrial areas* is intended to be used to assess whether noise from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises is likely to give rise to complaints from people residing in nearby dwellings.
- 8.9 The procedure contained in BS4142 for assessing the likelihood of complaint is to compare the measured or predicted noise level from the source in question immediately outside the dwelling, the ‘specific noise level’, with the background noise level.
- 8.10 The specific noise level is measured in terms of a $L_{Aeq,T}$ value and the background noise level is measured in terms of a L_{A90} value.
- 8.11 Where the specific noise contains a ‘*distinguishable discrete continuous note (whine, hiss, screech, hum etc.) or if there are distinct impulses in the noise (bangs, clicks, clatters or thumps), or if the noise is irregular enough to attract attention*’ then a correction of +5dB is added to the specific noise level to obtain the ‘rating level’, or $L_{Ar,T}$.
- 8.12 The likelihood of noise provoking complaints is assessed by subtracting the background noise level from the rating noise level. BS4142 states:

“A difference of around 10dB or higher indicates that complaints are likely. A difference of around 5dB is of marginal significance. A difference of -10dB is a positive indication that complaints are unlikely.”
- 8.13 The standard is not suitable for the assessment of complaint when the background and rating noise levels are both very low; very low background noise levels are defined as those below 30dB L_{A90} and very low rating noise levels are defined as those below 35dB $L_{Ar,T}$.

Draft Guidelines for Noise Impact Assessment

- 8.14 The draft *Guidelines for Noise Impact Assessment* produced by the Institute of Acoustics/Institute of Environmental Management and Assessment Working Party have been referenced in relation to the potential changes in

road traffic noise levels as a result of the operational use of the proposed development.

- 8.15 The findings of the Working Party are draft at present although they are of some assistance in this assessment. The draft guidelines state that for any assessment, the noise level threshold and significance should be determined by the assessor, based upon the specific evidence and likely subjective response to noise.
- 8.16 The impact scale adopted in this assessment is shown in Table 8-1 below.

**Table 8-1
Impact Scale for Comparison of Future Noise against Existing Noise**

Noise Level Change dB(A)	Subjective Response	Significance
0	No change	No impact
0.1 – 2.9	Barely perceptible	Minor impact
3.0 – 4.9	Noticeable	Moderate impact
5.0 – 9.9	Up to a doubling or halving of loudness	Substantial impact
10.0 or more	More than a doubling or halving of loudness	Major impact

- 8.17 The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.
- 8.18 It is considered that the criteria specified in the above table provide a good indication as to the likely significance of changes on noise levels in this case and have been used to assess the impact of the operational noise.

ISO9613

- 8.19 The noise levels generated by the operation of fixed plant at the proposed development have been predicted in accordance with the noise prediction framework set out in ISO 9613-2 *Acoustics – Attenuation of sound during propagation outdoors – Part 2 General method of calculation*.
- 8.20 The model takes into account the distance between the sources and the receptors and the amount of attenuation due to atmospheric absorption.
- 8.21 The model also assumes downwind propagation, i.e. a wind direction that assists the propagation of noise from the source to all receptors.

SOURCES OF INFORMATION

- 8.22 Information regarding the proposed development, including plant utilisations associated with construction and operations, operational hours and proposed vehicles movements to and from the site has been supplied by the applicant and/or their sub-consultants.

APPROACH TO THE ASSESSMENT

- 8.23 This assessment considers the likely noise levels that would be generated by the proposed development at the nearby noise-sensitive receptors. The assessment has been undertaken on the basis as those undertaken for similar sites.
- 8.24 An assessment has been made of the baseline situation and the potential impact of the proposals. Environmental advantages and disadvantages have been identified and where appropriate, mitigation measures and/or scheme changes to offset potentially adverse environmental impacts have been identified.
- 8.25 Noise levels during the construction phase have been calculated using the methodology contained within British Standard 5228-1:2009 the predicted noise levels have been assessed against the guideline noise limits suggested in the *Significance based on fixed noise limits* detailed in paragraph E.2 of BS5228-1:2009 and the draft *Guidelines for Noise Impact Assessment* produced by the Institute of Acoustics and the Institute of Environmental Management and Assessment. Vibration during the construction phase has also been considered.
- 8.26 Noise levels during the operation of the facility have been calculated and assessed using the procedures of BS4142 for the fixed plant. The mobile on-site plant noise has been calculated using the procedures of BS5228-1:2009 and has been assessed against the existing ambient noise levels.

BASELINE CONDITIONS

- 8.27 Environmental noise surveys were carried out at the noise-sensitive receptors closest to the application site on 22nd, 23rd and 24th March 2009 to capture typical background noise levels. The survey methodology and results are set out below.
- 8.28 The noise monitoring equipment used during the surveys is detailed in Appendix 8/2. All noise monitoring equipment was calibrated before and after the measurements and no calibration drifts were found to have occurred. The equipment had been calibrated to a traceable standard by UKAS-accredited laboratories within the 24 months preceding the surveys.
- 8.29 The noise monitoring locations, shown in Appendix 8/3, are considered as being representative of the nearest noise-sensitive locations to the proposed development site. These are:

- Location 1 – Fencott, Severn Road, to the south-east of the proposed development;
 - Location 2 – Shadow Patch, Moorhouse Lane, to the south of the proposed development; and
 - Location 3 – Elmington Manor Farm, Berwick Lane, to the east of the proposed development.
- 8.30 Measurements were taken over a number of 15 minute non-consecutive periods to cover the proposed operational hours of the proposed development during a normal weekday period and on a Sunday.
- 8.31 Measurements were logged every 5 minutes during the night-time and every 15 minutes during the daytime.
- 8.32 At the measurement positions the following noise level indices were recorded:
- $L_{Aeq,T}$ The A-weighted equivalent continuous noise level over the measurement period.
- L_{A90} The A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe background noise.
- L_{A10} The A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe road traffic noise.
- L_{Amax} The maximum A-weighted noise level during the measurement period.
- 8.33 The weather conditions during the survey periods were acceptable for noise monitoring, being dry with little or no wind.
- 8.34 The microphone was placed 1.5m above the ground in free-field conditions, *i.e.* at least 3.5m from the nearest vertical, reflecting surface.
- 8.35 The results of the noise surveys are presented in full in Appendix 8/4 and are summarised in Tables 8-2 and 8-3 below.

Table 8-2
Summary of Measured Noise Levels - Midweek, free-field, dB

Location	Period	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{Amax}
1. Fencott	Night-time	59.3	43.4	51.5	89.0
	Daytime	67.2	52.5	69.5	91.2
2. Shadow Patch	Night-time	50.5	44.3	52.9	70.2
	Daytime	53.4	47.3	52.6	70.4
3. Elmington Manor Farm	Night-time*	50.5	44.3	52.9	70.2
	Daytime	52.7	46.5	54.0	73.2

Night-time noise levels measured at Location 2 have been used for this location as access could not be gained to Elmington Manor Farm during the night-time.

Table 8-3
Summary of Measured Noise Levels - Sunday, free-field, dB

Location	Period	L _{Aeq,T}	L _{A90}	L _{A10}	L _{Amax}
1. Fencott	Night-time	49.1	37.1	47.6	79.0
	Daytime	64.3	50.9	64.8	88.9
2. Shadow Patch	Night-time	46.1	39.0	42.6	65.9
	Daytime	52.6	48.2	53.1	70.0
3. Elmington Manor Farm	Night-time*	46.1	39.0	42.6	65.9
	Daytime	52.1	46.7	52.9	75.5

Night-time noise levels measured at Location 2 have been used for this location as access could not be gained to Elmington Manor Farm during the night-time

- 8.36 The night-time noise climate was similar at all locations comprising road traffic noise from the M49, some occasional local road traffic and wind nearby trees. During the midweek survey there was some industrial estate generated noise audible at Location 2.
- 8.37 The day-time noise climate was similar at all locations comprising road traffic noise from the M49, local road traffic, wind in nearby trees and birdsong. During the midweek survey there was some industrial estate generated noise and occasional rail traffic noise audible at Location 2.

ENVIRONMENTAL DESIGN MEASURES

- 8.38 The main operational processes take place within the building envelopes with heavy goods vehicles accessing the site, via the weighbridge, to the waste reception hall area at the northern side of the development.
- 8.39 The layout of the site has been designed in such a way that external activities are screened from the nearby noise-sensitive receptors by either the intervening landform or by proposed buildings within the development.

POTENTIAL IMPACT

Construction Noise Assessment

- 8.40 It is inevitable with any major development of this nature that some disturbance will be caused to those living and working nearby during the construction phase. However, disruption due to construction is a localised phenomenon and is temporary in nature. In general, only people living within 100 to 200m of the site boundary are likely to be seriously impacted by construction noise.
- 8.41 Although there are techniques available to predict the likely noise effects from construction works, such as those contained in BS5228:2009 Part 1: *Noise* are necessarily based on quite detailed information on the type and number of plant being used, their location within the site and the length of time they are in operation.
- 8.42 An estimate of the likely effects of noise from site clearance and preparation and construction of the buildings and surrounding service areas has been

made for those properties closest to the site. The predictions are based on the methodology contained within BS5228:2009 Part 1: *Noise* over the core working day and reflect the currently available construction information. The predictions assume that no mitigation measures have been implemented, such as those identified later in this report.

- 8.43 The predicted noise levels have been assessed against an external façade criterion of 75dB $L_{Aeq,1hr}$ and against the existing ambient noise levels in the area. The derivation of the 75dB criterion is contained earlier in this chapter.
- 8.44 For the purpose of predicting the likely noise impact, the construction works have been divided into the following phases. The full list of plant assumed for each phase or works is contained in Appendix 8/5, the on-times given are based on data supplied for a similar site:
- **Site preparation works** – to include earthmoving, site profiling and landscaping works. The total sound power level for these items is assumed to be 116dB L_{WA} ;
 - **Piling works** – the total sound power level for piling works is assumed to be 115dB L_{WA} ;
 - **Foundation works** – it is assumed that any concreting would require the use of a concrete pump and poker vibrators. The total sound power level for these items is assumed to be 113dB L_{WA} ; and
 - **Building works** – to include the use of a tracked crane. The total sound power level for these items of plant is assumed to be 115dB L_{WA} .
- 8.45 It is acknowledged that there are likely to be other sub-phases of the construction work. However, in the absence of detailed information pertaining to how these operations are likely to be carried out the four main phases assessed are considered to give a good indication of the likely impact during the construction works.
- 8.46 Predictions have been made for construction works being undertaken at the proposed development building nearest to the nearby noise-sensitive receptors. The predicted assume that all construction operations are being undertaken simultaneously to give a worst-case situation.
- 8.47 Predictions have been carried out of the noise levels likely to be generated by each of the above phases of work using the methodology outlined in BS5228:2009 Part 1: *Noise*.
- 8.48 Construction works are likely to take place between the following hours:
- Monday to Friday 08:00 to 18:00 hours; and
 - Saturday 08:00 to 13:00 hours.
- 8.49 In each instance, the façade that faces towards the site has been considered where the construction works are being undertaken at a location closest to each property. The predicted noise levels are set out Table 8-4. The acoustic screening of intervening landforms or built structures has been ignored for the purpose of this assessment.

Table 8-4
Predicted Construction Noise Levels, Façade L_{Aeq,1hr}, dB

Location	Site Prep	Piling	Foundation	Building
1. Fencott	32.4	30.9	29.2	33.1
2. Shadow Patch	31.6	30.2	28.3	32.4
3. Elmington Manor Farm	29.5	28.2	26.4	30.4

8.50 Table 8-4 indicates that the predicted noise levels from construction operations at the proposed development are below the 75dB criterion adopted for this assessment at all of the receptors.

8.51 The effect that the construction works will have on the ambient noise levels at the closest noise-sensitive receptors can be assessed by logarithmically adding the predicted construction noise levels to the measured L_{Aeq} noise levels during the daytime period. This has been done for the total construction noise, i.e. the cumulative impact of all construction operations being undertaken simultaneously. The proposed working methods are unknown at present therefore assessing the total construction noise, rather than the noisiest phase of construction alone, will present a worst-case assessment. The results are shown in Table 8-5.

8.52 Note that the predicted construction noise levels have been reduced by 3dB so that free-field values are obtained. These may be added directly to the free-field measured values.

Table 8-5
Predicted Construction Noise Levels, Façade L_{Aeq,1hr}, dB

Location	Ambient Noise Levels		Change	Impact
	Existing	Predicted		
1. Fencott	67.2	67.2	0	No Impact
2. Shadow Patch	53.4	53.5	+0.1	Minor
3. Elmington Manor Farm	52.7	52.8	+0.1	Minor

8.53 Table 8-5 indicates that the predicted worst-case noise levels from construction operations would have a minor, barely perceptible impact on the existing ambient noise climate at Shadow Patch and Elmington Manor Farm and no impact at Fencott.

8.54 Mitigation measures to reduce the construction noise impact are set out later in this chapter.

Construction Vibration

8.55 BS5228:2009: Part 2 *Vibration* gives recommendations for controlling vibration on construction and open sites. It is considered that the main source of vibration during construction works relates to piling operations

- 8.56 It is generally accepted that for the majority of people, vibration levels in excess of 0.15 and 0.30mms⁻¹ peak particle velocity are just perceptible. The table below details the distances at which certain activities give rise to a just perceptible level of vibration, these figures are based on historical field measurements.

Table 8-6
Distances at which Vibration may just be Perceptible

Construction Activity	Distance from activity when vibration may just be perceptible (metres)
Excavation	10 – 15
Heavy vehicles (e.g. dumper trucks)	5 – 10
Hydraulic breaker	15 – 20
Augered Piling	30 – 50

- 8.57 The closest vibration-sensitive residential property to the proposed development is at a distance of approximately 1200m from the closest area of construction. On the basis of the above figures it is probable that vibration from construction operations would be imperceptible and mitigation measures are considered unnecessary.

Construction Traffic Noise

- 8.58 The construction phase will not generate traffic movements over those considered in the operational phase of the development, where no significant impacts were identified.

OPERATIONAL ASSESSMENT

- 8.59 The operational noise effects associated with the development are anticipated to include the following:
- site plant; and
 - on-site traffic movements.
- 8.60 There are no assessment methods that apply to all aspects of the operation of the site. British Standard 4142 *Method for rating industrial noise affecting mixed residential and industrial areas* is applicable to the assessment of noise from fixed plant and there are no specific guidelines for the assessment of on-site vehicle movements. Mobile plant noise and site-related heavy goods vehicle movements have been calculated using the haul route methodology detailed in BS5228 and have been assessed against the existing ambient noise levels. In addition, the cumulative effect of both types of noise generating activities has been considered against the existing ambient noise levels.

BS4142 Assessment

- 8.61 An assessment has been carried out in accordance with the guidance contained in British Standard 4142 to determine whether noise emissions from the fixed plant associated with the proposed resource recovery centre are likely to give rise to complaints from occupants of the residential noise-sensitive receptors closest to the development site.
- 8.62 Predictions of the noise levels at the nearby noise-sensitive receptors have been undertaken using the proprietary software-based noise model, CADNA/A, which implements the full range of UK calculation methods. In this instance, the calculation algorithms set out in ISO9613 have been used.
- 8.63 It is assumed that the plant will have some intermittent noise sources or noise sources that will be variable in nature, therefore an acoustic feature correction of 5dB has been added to the noise level to give a noise rating level, $L_{Ar,T}$.
- 8.64 The predicted noise levels assume that the buildings provide a sound reduction index of 20dB.
- 8.65 The midweek BS4142 assessment is shown in Table 8-7 below.

Table 8-7
Midweek BS4142 Assessment, free-field, dB

Location	Period	Measured Background Noise Level L_{A90}	Predicted Rating Level $L_{Ar,T}$	Difference
1. Fencott	Night-time	43.4	33.8	-9.6
	Daytime	52.5	28.8	-23.7
2. Shadow Patch	Night-time	44.3	28.1	-16.2
	Daytime	47.3	28.1	-19.2
3. Elmington Manor Farm	Night-time	44.3	30.7	-13.6
	Daytime	46.5	26.2	-20.3

- 8.66 The Sunday BS4142 assessment is shown in Table 8-8 below.

**Table 8-8
Sunday BS4142 Assessment, free-field, dB**

Location	Period	Measured Background Noise Level L_{A90}	Predicted Rating Level $L_{Ar,T}$	Difference
1. Fencott	Night-time	37.1	33.8	-3.3
	Daytime	50.9	28.8	-17.1
2. Shadow Patch	Night-time	39.0	28.1	-10.9
	Daytime	48.2	28.1	-20.1
3. Elmington Manor Farm	Night-time	39.0	30.7	-8.3
	Daytime	46.7	26.2	-20.5

8.67 BS4142 states:

“A difference of around 10dB or higher indicates that complaints are likely. A difference of around 5dB is of marginal significance. A difference of -10dB is a positive indication that complaints are unlikely”.

8.68 Table 8-7 indicates that the noise rating levels generated by the proposed resource recovery centre would lead to a situation where complaints would be unlikely during the midweek daytime at all locations.

8.69 Table 8-7 also indicates that the noise rating levels generated by the proposed resource recovery centre would lead to a situation where complaints would be unlikely at Shadow Patch and Elmington Manor Farm and a situation between marginal significance and complaints unlikely at Fencott during the midweek night-time period.

8.70 Table 8-8 indicates that the noise rating levels generated by the proposed resource recovery centre would lead to a situation where complaints would be unlikely during the daytime on a Sunday at all locations.

8.71 Table 8-8 also indicates that the noise rating levels generated by the proposed resource recovery centre would lead to a situation where complaints would be unlikely at Shadow Patch during the night-time on a Sunday and a situation between marginal significance and complaints unlikely at Fencott and Elmington Manor Farm during the night-time on a Sunday.

8.72 It should be noted that the noise rating levels are below the background noise levels at all times.

8.73 Based on the above, mitigation measures to reduce the noise impacts at the nearby residential properties are considered unnecessary.

Heavy Goods Vehicle Movements

- 8.74 The predicted noise level produced by on-site heavy goods vehicle movements has been calculated using the methodology contained in BS5228. Calculations have been undertaken using the proprietary noise modelling software CADNA/A.
- 8.75 The traffic assessment has advised that, as a worst-case between 07:30 and 08:30 hours, there would be a total of 32 heavy goods vehicles and 40 light goods vehicles/passenger visiting the site.
- 8.76 The former Department of Transport document *Calculation of Road Traffic Noise* (CRTN, 1988) states that calculations of noise level for traffic flows below 50 vehicles per hour or 1000 vehicles per 18 hour day are unreliable and measurements should be taken when evaluating such cases. However, as the site is not yet operational, the noise generated by waste lorry movements has been predicted using the haul route method outlined in BS5228. The impact of noise from heavy goods vehicles has been assessed against the existing ambient noise levels for the daytime only.
- 8.77 Table 8-9 shows the predicted noise level produced by heavy goods vehicle movements at the site.

Table 8-9
Predicted Noise Levels from Traffic Movements, free-field, L_{Aeq} dB

Location	Predicted L _{Aeq}
1. Fencott	28.2
2. Shadow Patch	24.6
3. Elmington Manor Farm	22.0

- 8.78 The future ambient noise levels at the closest noise-sensitive receptors have been calculated by logarithmically adding the above total predicted noise levels to the existing ambient noise levels.
- 8.79 Table 8-10 compares the predicted future ambient noise levels with the impact scale adopted for this assessment.

Table 8-10
Predicted Ambient Noise Levels from On-site Traffic Movements – Midweek
free-field, $L_{Aeq,T}$ dB

Location	Period	Ambient Noise Level		Change	Impact
		Existing	Predicted Future		
1. Fencott	Daytime	67.2	67.2	0	No impact
2. Shadow Patch	Daytime	53.4	53.4	0	No impact
3. Elmington Manor Farm	Daytime	52.7	52.7	0	No impact

Table 8-11
Predicted Ambient Noise Levels from On-site Traffic Movements – Sunday
free-field, $L_{Aeq,T}$ dB

Location	Period	Ambient Noise Level		Change	Impact
		Existing	Predicted Future		
1. Fencott	Daytime	64.3	64.3	0	No impact
2. Shadow Patch	Daytime	52.6	52.6	0	No impact
3. Elmington Manor Farm	Daytime	52.1	52.1	0	No impact

8.80 Tables 8-10 and 8-11 indicate that there would be no change to the existing ambient noise levels due to heavy goods and light goods/passenger vehicle movements associated with the proposed development. On this basis, no mitigation measures are considered necessary.

CUMULATIVE IMPACTS

8.81 The noise levels from the operational processes have been assessed against standards appropriate for each type of source considered; BS4142 for the operation of the fixed plant associated with the proposed resource recovery centre and the existing ambient noise levels for the assessment of traffic movements. The scope of BS4142 specifically excludes the assessment of mobile noise sources and is not appropriate for the assessment of cumulative impacts.

8.82 Table 8-12 and 8-13 summaries the cumulative impact at each receptor during the daytime and night-time period for midweek and Sunday respectively. The cumulative noise levels have been assessed against the existing ambient noise levels and the potential change has been compared to the impact scale adopted for this assessment. The table assumes that all heavy goods vehicle movements are limited to the daytime period only.

Table 8-12
Cumulative Impact Assessment - Midweek, Free-field L_{Aeq,T} dB

Location	Period	Ambient Noise Level		Change	Impact
		Existing	Predicted Future		
1. Fencott	Night-time	59.3	59.3	0	No impact
	Daytime	67.2	67.2	0	No impact
2. Shadow Patch	Night-time	50.5	50.5	0	No impact
	Daytime	53.4	53.4	0	No impact
3. Elmington Manor Farm	Night-time	50.5	50.5	0	No impact
	Daytime	52.7	52.7	0	No impact

8.83 It can be seen from Table 8-12 that the cumulative impact of the operation of the proposed development and associated heavy goods, light goods and passenger vehicle movements would not have any impact on the ambient noise levels at any of the receptors assessed during a normal weekday.

Table 8-13
Cumulative Impact Assessment - Sunday, Free-field L_{Aeq,T} dB

Location	Period	Ambient Noise Level		Change	Impact
		Existing	Predicted Future		
1. Fencott	Night-time	49.1	49.1	0	No impact
	Daytime	64.3	64.3	0	No impact
2. Shadow Patch	Night-time	46.1	46.1	0	No impact
	Daytime	52.6	52.6	0	No impact
3. Elmington Manor Farm	Night-time	46.1	46.1	0	No impact
	Daytime	52.1	52.1	0	No impact

8.84 It can be seen from Table 8-13 that the cumulative impact of the operation of the proposed development and associated heavy goods, light goods and passenger vehicle movements would not have any impact on the ambient noise levels at any of the receptors assessed on a Sunday.

MITIGATION MEASURES

Construction Noise

8.85 The assessment of construction noise has shown that the adopted criterion is unlikely to be exceeded at the nearby noise-sensitive receptors. The predicted increase in the ambient noise climate would lead to a minor, barely perceptible, impact at Shadow Patch and Elmington Manor Farm and no impact at Fencott.

8.86 Several safeguards exist to minimise the effects of construction noise and these will apply during the construction of the proposed development infrastructure. The safeguards include:

- the various EC Directives and UK Statutory Instruments that limit noise emissions of a variety of construction plant;
- guidance set out in BS5228:Part 1:1997, that covers noise control on construction sites; and
- the powers that exist for local authorities under Sections 60 and 61 of the Control of Pollution Act 1974 to control environmental noise and pollution on construction sites.

8.87 The adoption of Best Practicable Means, as defined in the Control of Pollution Act 1974 is usually the most effective means of controlling noise from construction sites. In addition, the following measures could be considered, where appropriate:

- phasing the works to maximise the benefit from perimeter structures;
- any compressors brought on to site should be silenced or sound reduced models fitted with acoustic enclosures;
- all pneumatic tools should be fitted with silencers or mufflers;
- deliveries should be programmed to arrive during daytime hours only. Care should be taken when unloading vehicles to minimise disturbance to local residents. Delivery vehicles should be prohibited from waiting within the site with their engines running;
- all plant items should be properly maintained and operated according to the manufacturers' recommendations in such a manner as to avoid causing excessive noise. All plant should be sited so that the noise impact at nearby noise-sensitive properties is minimised;
- local hoarding, screens or barriers should be erected as necessary to shield particularly noisy activities; and
- problems concerning noise from construction works can sometimes be avoided by taking a considerate and neighbourly approach to relations with local residents. Works should not be undertaken outside the hours agreed with the local authority.

8.88 Experience from other sites has shown that by implementing these measures, typical noise levels from construction works can be reduced by 5dB(A) or more.

8.89 As construction works are temporary and noise levels have been calculated for a worst-case situation no further mitigation measures are considered necessary.

Construction Traffic Noise

8.90 Construction traffic noise will be no higher than operational traffic noise, which is considered to have no significant impacts.

Construction Vibration

8.91 Vibration during construction operations is unlikely to be perceptible at any of the nearby vibration-sensitive receptors due to their distance from the site. It is however recommended that construction vibration levels are subject to a watching brief with vibration measurements taken as necessary.

Operational Noise

- 8.92 An assessment undertaken in accordance with the guidance contained in British Standard 4142. The assessment has shown that noise rating levels generated by the operation of the proposed resource recovery centre would lead to a situation between marginal significance and complaints unlikely at Fencott and Elmington Manor Farm during the night-time on Sunday and at Fencott during the midweek night-time period and a situation where complaints are unlikely at all other times and locations assessed.
- 8.93 The change in ambient noise levels due to all operations associated with the proposed resource recovery centre would be a minor, barely perceptible, impact at worst.
- 8.94 On the basis that the predicted change in noise levels would be no worse than a minor, barely perceptible change, mitigation measures are considered unnecessary.

CONCLUSIONS

- 8.95 The assessment has considered both the potential for the construction and operational proposals to give rise to noise and vibration impacts at the closest noise-sensitive receptors.
- 8.96 The assessment has found that:
- construction noise levels are predicted to be well below the 75dB criterion adopted for this assessment at all receptors;
 - perceptible levels of vibration from the construction works is unlikely at the nearest vibration-sensitive properties,
 - operational noise rating levels are predicted to give rise to a situation between 'marginal significance and complaints unlikely' at Fencott and Elmington Manor Farm during the night-time periods on Sundays and at Fencott during the midweek night-time period. At all other times and locations complaints relating to noise are considered unlikely;
 - site-related heavy goods, light goods and passenger vehicle movements would have no impact on the existing measured ambient noise levels at any of the properties assessed; and
 - the cumulative impact of all operations and vehicles movements associated with the proposed development would have no impact on the existing measured ambient noise levels at any of the properties assessed.

