

INTRODUCTION

- 8.1 An assessment of noise has been carried out with reference to EIA Good Practice Guide, the EIA Regulations and British Standard guidance. The specific noise issues listed below have been considered:
- the existing noise climate at noise-sensitive receptors around the site;
 - the process of site clearance, preparation and construction, and their impact on the surrounding noise-sensitive receptors; and
 - the impact of the operational use of the facility.
- 8.2 Technical terms or references are occasionally used in this section. To assist the reader a glossary of terminology and an introduction to the subject of noise and vibration, including a table of example noise levels that may be found in general life, is included in Appendix 8/A.

APPROACH TO THE ASSESSMENT

- 8.3 The development proposals include the construction of an Energy from Waste (EfW) facility at the existing Ardley landfill site. The noise generating activities on site will include the operation of the facility and the associated heavy goods vehicle movements.
- 8.4 This assessment considers the noise levels likely to be generated by the operation of the proposed EfW facility and a cumulative impact of the operation of the proposed EfW and continued landfill operations at the nearest noise-sensitive receptors. The assessment has been undertaken with reference to existing conditions, national planning guidance, and national and international guidance on noise impacts. Appendix 8/B provides more detail on the standards and criteria against which this assessment has been carried out.
- 8.5 The Planning Department of Oxford County Council and the Environmental Health Department of Cherwell District Council have been consulted during this assessment, details of which can be found in Appendix 8/B.
- 8.6 An assessment has been made of the baseline situation and the potential impacts of the proposals. Where appropriate, 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.
- 8.7 The properties and locations that could potentially be affected by noise have been considered and topographical information that could affect the propagation of sound has been obtained from site survey data.
- 8.8 Noise levels during the construction phase of the proposed development have been calculated using the methodology contained in British Standard

5228:2009 *Noise and vibration control on construction and open sites, Part 1 Noise*.

- 8.9 The assessment of noise and vibration from the construction works has been undertaken in accordance with British Standards and other available guidelines, including BS5228:2009 and the draft *Guidelines for Noise Impact Assessment*, produced by a joint working party of the Institute of Acoustics (IoA) and the Institute of Environmental Management and Assessment (IEMA).
- 8.10 The noise levels likely to be generated by the operation of the EfW facility have been assessed in accordance with British Standard 4142:1997 *Method for rating industrial noise sources affecting mixed residential and industrial areas*.
- 8.11 Noise levels likely to be generated by on-site heavy goods vehicle movements have been assessed in terms of the impact to the ambient noise level and the IoA/IEMA guidance.
- 8.12 All calculations have been undertaken using the proprietary noise modelling software Cadna/A which implements the common European methods of noise prediction, in this instance ISO 9613-2 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*.

DATA REQUIREMENTS

- 8.13 In undertaking the noise assessment the following information has been used:
- baseline noise levels obtained at a number of noise-sensitive receptors around the site;
 - traffic flow information relating to the number of heavy goods vehicles accessing the site; and
 - operational plant data supplied by the manufacturer.

BASELINE CONDITIONS

- 8.14 A background noise survey was carried out over a representative 24 hour period on 6th and 7th May 2008 to capture typical background noise levels at a number of noise-sensitive receptors close to the site.
- 8.15 The noise monitoring equipment used during the survey is detailed in Appendix 8/C. All noise monitoring equipment was calibrated before and after measurements and no calibration drifts were found to have occurred. All equipment had been calibrated by a UKAS-accredited calibration laboratory within the 12 months preceding the survey.
- 8.16 Noise-sensitive receptors are located to the north, east, south-west and north-west of the site. The area surrounding the site is a mix of residential properties and farmland. Measurements were taken at four locations around

the site that were considered representative of the closest noise-sensitive properties. The noise monitoring locations are shown in Figure 1 in Appendix 8/D and described below, namely:

- Position 1: Manor Farm Cottages to the south-west of the site;
- Position 2: Ashgrove Cottages to the west of the site;
- Position 3: Church House to the north of the site; and
- Position 4: Middleton Road, Buckley to the east of the site.

8.17 Measurements of non-consecutive 15 minute periods were undertaken during the daytime (07:00 to 23:00 hours) to total one hour at each receptor and at night-time (23:00 to 07:00 hours) to total 30 minutes at each receptor.

8.18 At each measurement position 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 period.

8.19 The full survey results are presented in Appendix 8/E and summarised in Table 8/1 below.

Table 8/1
Summary of Measured Noise Levels, free-field, dB

Location	Period	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{AFmax}
1. Manor Farm Cottages	Daytime	59.9	50.5	63.7	71.0
	Night-time	62.8	48.2	52.9	93.8
2. Ashgrove Cottages	Daytime	60.8	50.7	64.2	78.2
	Night-time	55.7	50.5	56.1	77.4
3. Church House	Daytime	57.2	51.7	58.4	76.2
	Night-time	57.5	50.6	57.9	77.2
4. Middleton Road	Daytime	50.6	44.5	51.6	75.8
	Night-time	42.7	38.5	43.0	77.1

8.20 Road traffic noise from local and distant roads and aircraft noise were audible at all positions to varying degrees. During the night-time survey, natural noise sources such as birdsong were also audible.

8.21 The weather during the surveys was suitable for noise measurement, it being dry with low wind speeds.

CONSTRUCTION EFFECTS

Construction Noise

- 8.22 It is inevitable with any major development of this nature that some disturbance would 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 100-200m of the proposed construction works are likely to be impacted by construction noise.
- 8.23 Although there are techniques available to predict the likely noise effects from construction works, such as those contained in BS5228:2009 Part 1: *Noise*, they are necessarily based on quite detailed information on the type and number of plant being used, their location and the length of time that they are in operation.
- 8.24 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.
- 8.25 The predicted noise levels have been assessed against an external façade criterion of 70dB $L_{Aeq,1 \text{ hour}}$ and against the existing ambient noise levels in the area. The derivation of the 70dB criterion is set out in Appendix 8/B.
- 8.26 For the purpose of predicting the potential noise impact, the construction works are considered to include a number of phases. The phases considered are:
- site preparation including earthmoving, site profiling and excavation. It is assumed that this phase of works would clear the location of the proposed EfW facility;
 - piling works for the building. For the purposes of this assessment, it is assumed that augered piling would be required;
 - foundation construction including the casting of concrete ground slabs. It is assumed that any concreting works would require the use of a concrete pump and poker vibrators; and
 - building erection, including the use of support plant such as a tracked crane, wheeled loader, compressor and generator.
- 8.27 The full list of plant assumed for each construction phase is contained in Appendix 8/F.
- 8.28 Predictions have been carried out of the noise levels likely to be generated by the above operations. These calculations include corrections for the

operating time of the assumed plant, the distance and the ground cover to the noise-sensitive receptors.

- 8.29 The predictions are undertaken for each of the noise-sensitive receptors listed in paragraph 8.16 above. In each instance, the façade that faces toward the application site has been considered.
- 8.30 The noise levels measured at Position 3 are considered representative of the noise climate at Upland Cottage, which is the closest receptor to the north of the site.
- 8.31 The predicted construction noise levels are shown below.

Table 8/2
Predicted Construction Noise Levels, façade $L_{Aeq, 1 \text{ hour}}$ dB

Location	Site Preparation	Piling	Foundation	Building Erection
1. Manor Farm Cottages	39.6	39.6	34.6	41.6
2. Ashgrove Cottages	44.3	44.3	39.3	46.3
3. Upland Cottage	37.9	37.9	32.9	39.9
4. Middleton Road	40.0	40.0	35.0	42.0

- 8.32 It can be seen from the above figures that the predicted construction noise levels are below the 70dB criterion adopted in this assessment at all sensitive receptors.
- 8.33 The above table shows that of the four construction phases the building erection phase will generate the highest noise level at each receptor.
- 8.34 The effect that the construction works would have on the ambient noise levels at the closest residential receptors can be assessed by logarithmically adding the predicted construction noise levels to the measured L_{Aeq} noise levels during the daytime period. The results are shown below for the noisiest phase of construction.
- 8.35 It should be noted 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 measured free-field values.

Table 8/3
Predicted Ambient Noise Levels during Building Erection, free-field $L_{Aeq, T}$ dB

Location	Ambient Noise Level		Change	Impact
	Existing	Predicted future		
1. Manor Farm Cottages	59.9	59.9	0	None
2. Ashgrove Cottages	60.8	60.9	+0.1	Minor
3. Upland Cottage	57.2	57.2	0	None
4. Middleton Road	50.6	50.9	+0.3	Minor

- 8.36 Table 8/3 indicates that the noise phase of construction operations, the building erection phase, would lead to a minor, barely perceptible, impact at Locations 2 and 4 and no impact at Locations 1 and 3 when compared to the impact scale adopted for the assessment.
- 8.37 Based on the above, mitigation measures are considered un-necessary.

Construction Vibration

- 8.38 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
- 8.39 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 8/4
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. dump trucks)	5-10
Hydraulic Breaker	15-20
Augered Piling	30-50

- 8.40 The closest residential property to the proposed works is Ashgrove Cottages at a distance of approximately 700 metres from the closest area of construction. On the basis of the above figures it is unlikely that vibration will be perceptible during piling.

Construction Traffic Noise

- 8.41 At this stage, there is no information on the likely levels of traffic during the construction works. However, it is considered that construction related traffic movements would be no greater than those associated with operation of the proposed development and therefore reference should be made to the assessment of site related traffic movements detailed later in this chapter.

OPERATIONAL EFFECTS

- 8.42 The operational noise sources are anticipated to include the following:
- fixed plant items; and
 - on-site traffic movements.

8.43 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.

Fixed Plant

8.44 The plant manufacturer has supplied data regarding the internal reverberant noise levels of each area of the building and the sound power levels of the air cooled condensers, turbine cooling fans and the stacks. This information is included in Appendix 8/F.

8.45 The plant manufacturer has also supplied data regarding the attenuation provided by the building fabric. This information is included in Appendix 8/G.

8.46 The information regarding the plant and building fabric has been input into the proprietary noise modelling software, Cadna/A, which utilises the full range of UK calculation methods. In this instance, the calculation algorithms set out in ISO9613 have been used.

8.47 The assessment of the fixed plant has been conducted in accordance with BS4142:1997. Table 8/5 below shows the BS4142:1997 assessment for each receptor during the daytime and night-time periods, i.e. 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively. The daytime assessment has been undertaken at a height of 1.5m above the ground to represent ground floor and the night-time assessment has been undertaken at a height of 4.0m above the ground to represent first floor level.

8.48 Noise levels have been predicted at each receptor with the façade that faces toward the site being considered. A +5dB penalty has been added to each source to account for any acoustic feature or distinctive characteristic of the noise source.

Table 8/5
BS4142 Assessment, free-field, dB

Location	Period	Background Noise Level L_{A90}	Predicted Rating Level $L_{Ar,T}$	Difference
1. Manor Farm Cottages	Daytime	50.5	18.5	-32.0
	Night-time	48.2	19.9	-28.3
2. Ashgrove Cottages	Daytime	50.7	27.2	-23.5
	Night-time	50.5	27.7	-22.8
3. Church House	Daytime	51.7	19.7	-32.0

	Night-time	50.6	20.1	-30.5
4. Middleton Road	Daytime	44.5	20.9	-23.6
	Night-time	38.5	22.1	-16.4

8.49 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."

8.50 The results of the BS4142 assessment shown in Table 8/5 shows that noise levels produced by operation of the proposed energy from waste facility would lead to a situation where there is a positive indication that complaints would be unlikely at all times and at all locations assessed.

On-Site Traffic Movements

8.51 The assessment of noise from on-site traffic movements is based on information from the transport assessment produced by SLR and an estimate of wheeled loading shovel movements in the bottom ash storage areas. Table 6/6 of the transport section shows that there will be nine heavy goods vehicle movements per hour associated with the EfW facility.

8.52 Table 8/6 below shows the predicted noise levels from heavy goods vehicle and wheeled loading shovel movements at the noise-sensitive receptors. For the purpose of this assessment it is assumed that heavy goods vehicles movements and wheeled loading shovel operations would continue over the full 24 hour period.

Table 8/6
Predicted Noise Levels from Heavy Goods Vehicle Movements – free-field
L_{Aeq,1hour} dB

Location	Period	Predicted Noise Level
1. Manor Farm Cottages	Daytime	31.3
	Night-time	32.2
2. Ashgrove Cottages	Daytime	31.6
	Night-time	31.6
3. Church House	Daytime	25.2
	Night-time	25.2
4. Middleton Road	Daytime	28.1
	Night-time	28.1

8.53 The future ambient noise levels at the closest noise-sensitive receptors have been calculated by adding the above predicted noise levels to the measured daytime ambient noise level.

Table 8/7
Predicted Change in Ambient Noise Levels during Heavy Goods Vehicle
Movements, free-field, dB

Location	Ambient Noise Level		Change	Impact
	Existing	Predicted future		
1. Manor Farm Cottages	59.9	59.9	0	None
	62.8	62.8	0	None
2. Ashgrove Cottages	60.8	60.8	0	None
	55.7	55.7	0	None
3. Church House	57.2	57.2	0	None
	57.5	57.5	0	None
4. Middleton Road	50.6	50.7	+0.1	Minor
	42.7	42.9	+0.2	Minor

8.54 It can be seen from Table 8/7 that on-site traffic movements, including heavy goods vehicle movements and wheeled loading shovel operations, would have no impact at Locations 1, 2 and 3 and a minor, barely perceptible, impact at Location 4.

8.55 Based on the above it is considered that mitigation measures are not necessary to reduce noise levels from on-site traffic movements.

CUMULATIVE IMPACT

8.56 The noise levels from the proposed EfW have been assessed against standards appropriate for each noise source; BS4142 for the fixed plant and an assessment against existing ambient noise levels for the heavy goods vehicle movements.

8.57 To provide an indication of the cumulative impact, the predicted operational noise levels have been added to the predicted worst-case levels from the landfill operations and assessed against the existing ambient noise levels at each receptor. The impact is assessed by logarithmically adding the predicted operational noise levels to the measured L_{Aeq} noise.

8.58 The landfill predictions are set out in Table 8/8 below and the assessment of cumulative impact is shown in Table 8/9 which excludes the +5dB penalty applied to fixed plant.

Table 8/8
Predicted Landfill Impact, free-field, L_{Aeq,T} dB

Location	Period	Nature of Operation			Cumulative
		Operations Non-Haz Cells	Operations Asbestos Cell	Validation Bay to Tip and Haul	
1. Manor Farm Cottages	Daytime	25.5	0	25.7	28.6
2. Ashgrove Cottages	Daytime	47.1	28.9	42.8	48.5
3. Church House	Daytime	30.4	22.1	29.2	32.2
4. Middleton Road	Daytime	25.3	17.0	25.7	28.8

8.59 These predictions consider the following plant operating within the landfill site:

- A Bomag 972 Waste Compactor and a CAT 963D Tracked Loading Shovel working the non-hazardous waste cell;
- A Volvo EC140 Hydraulic Excavator working the asbestos cell; and
- A JCB JS200 Hydraulic Excavator working the validation bay with a Bell B25 Articulated Dump Truck transporting waste from the validation bay to the appropriate landfill cell.

8.60 All operations have been assessed as worst-case for each receptor i.e. operating at the closest anticipated location to the receptor and on top of the fill at the most exposed position.

Table 8/9
Predicted Cumulative Impact, free-field, L_{Aeq,T} dB

Location	Period	Existing Ambient Noise Level	Future Ambient Noise Level	Change	Impact
1. Manor Farm Cottages	Daytime	59.9	59.9	0	None
	Night-time	62.8	62.8	0	None
2. Ashgrove Cottages	Daytime	60.8	61.1	+0.3	Minor
	Night-time	55.7	55.7	0	None
3. Church House	Daytime	57.2	57.2	0	None
	Night-time	57.5	57.5	0	None
4. Middleton Road	Daytime	50.6	50.7	+0.1	Minor
	Night-time	42.7	42.9	+0.2	Minor

8.61 It can be seen from Table 8/9 that the cumulative noise levels produced by all operations at the site would have a minor, barely perceptible, impact at Location 2 during the daytime and at Location 4 during the daytime and night-time and no impact at all other locations and times.

8.62 Based on the above, mitigation measures are considered un-necessary.

MITIGATION MEASURES

Construction Noise

8.63 The assessment of construction noise has shown that the adopted criterion is unlikely to be exceeded at the nearby noise-sensitive receptors assessed. The predicted increase in ambient noise climate would lead to a minor, barely perceptible, impact at Locations 2 (Ashgrove Cottages) and 4 (Middleton Road) therefore, no mitigation measures are considered necessary.

Operational Noise

8.64 The BS4142:1997 assessment of fixed plant noise has shown that the proposed development will lead to a situation where there is a positive indication that complaints are unlikely.

8.65 The assessment of on-site traffic movements, including heavy goods vehicles and wheeled loading shovel operations in the bottom ash storage area, has shown that there would be a minor, barely perceptible, impact at Location 4 (Middleton Road) during the daytime and night-time periods and no impact at any other time or location.

8.66 The cumulative impact assessment of landfill and EfW operations has shown that there would be a minor, barely perceptible, impact at Location 2 (Ashgrove Cottages) during the daytime and at Location 4 (Middleton Road) during the daytime and night-time periods. The cumulative assessment has shown that there would be no impact at any other time or location.

8.67 Based on the results of the assessment, mitigation measures are considered un-necessary.

CONCLUSION

8.68 The assessment has considered the potential for the proposals to give rise to noise impacts at the closest noise-sensitive receptors.

8.69 The assessment has found that:

- The predicted construction noise levels achieve the criterion adopted for this assessment;
- The operational noise levels from the fixed plant will result in a situation where there is a positive indication that complaints are unlikely at all receptors during the daytime and night-time periods;
- On-site traffic movements, including heavy goods vehicles and wheeled loading shovel operations in the bottom ash storage area, will have a minor, barely perceptible, impact on the ambient noise levels at Location 4 (Middleton Road) during the daytime and night-time periods and no impact on the ambient noise levels at any other time or location; and
- The cumulative impact of operation of the EfW and landfill operations would have a minor, barely perceptible, impact on the ambient noise levels at

Location 2 (Ashgrove Cottages) during the daytime and Location 4 (Middleton Road) during the daytime and night-time periods. There would be no impact on the ambient noise levels at any other time and location due to cumulative effect of EfW and landfill operations.

- 8.70 Based on the above, mitigation measures, beyond those designed into the proposed energy from waste facility are considered un-necessary.