CONTENTS

INTRODUCTION

9.1 This chapter of the ES addresses the potential for the proposed changes to impact upon the noise climate in the vicinity of the application site. The approved ERF was not found to give rise to any significant effects upon the environment or amenity of local communities subject to the imposition of conditions and a s.106 legal agreement. The proposed changes to the scheme, which have been set out in Chapter 3 above, have been re-assessed and are reported in this chapter. Overall, it has been concluded that the proposed design changes to the ERF would not lead to any significant impacts and that the ERF could still operate within the terms of the relevant planning condition on the current consent.

9.2 The assessment has been carried out with reference to British Standards and other government guidance. Noise issues relating to the construction and operation of the proposed ERF, as amended by the current planning application have been considered to the nearest noise-sensitive properties surrounding the application site.

9.3 Technical terms or references are occasionally used in this Chapter. 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 9/1.

PREVIOUS APPLICATION

9.4 As noted in Chapter 1, the application site was the subject of a previous planning application for the same development (application reference 2009/2497/02), which was refused on 20th October 2010. The application was not found to be in conflict with any policies relating to noise.

9.5 The main consultation responses relating to noise was from the Charnwood Borough Council's Environmental Health Officer (EHO). In this respect, the EHO commented that "… *the assessment methodology is generally sound and the conclusions are reasonable based on the results submitted*".

9.6 Following a public inquiry (November 2011) into the Council's decision to refuse the planning application, the Secretary of State issued his decision on 28 June 2012 allowing the appeal. Condition 26 attached to the Secretary of State's decision provides that:

"The noise levels arising from the development when measured at any noise sensitive property shall not exceed 55dB(A)LAeq over any one hour (free field) during the hours of 07:00-23:00 and 42dB(A)LAeq 1 hour (free field) during the hours of 23:00-07:00".

9.7 Condition 27 adds that "*Measures shall be taken to ensure that the operations carried out on the site do not give rise to noise nuisance or disturbance in the locality*" and then provides examples of such measures (refer to the Executive Summary for further details).

METHODOLOGY

Approach to the Assessment

9.8 This assessment considers the likely noise levels that would be generated by the proposed development at the nearby noise-sensitive receptors.

9.9 An assessment has been made of the baseline situation and the potential impact of the proposals. The noise monitoring equipment used during the surveys is detailed in Appendix 9/2. 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.

9.10 The noise monitoring locations, shown on Drawing NH 9/1, are considered as being representative of the nearest noise-sensitive receptors to the proposed development. These are:

- Location 1 – Ingleberry House Farm, to the south-west of the site;
- Location 2 – Woodlands, to the west of the site;
- Location 3 – the residential property at Cowhill; and
- Location 4 – Hurst Farm, to the east of the site.

9.11 Measurements were taken over four non-consecutive 15 minute periods during the daytime period (07:00 to 19:00 hours) and two non-consecutive 15 minute periods during the night-time period (23:00 to 07:00) on a typical week day. 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.

9.12 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 if often used to describe road traffic noise.
- L_{Amax} – The maximum A-weighted noise level during the measurement period.

9.13 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.

9.14 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.

9.15 Operational noise levels generated by the ERF facility have been predicted using the guidance contained in ISO9613 and have been assessed against the guidance contained in BS4142.

9.16 Noise levels generated by heavy goods and refuse collection vehicle movements have been predicted using the guidance contained in BS5228:2009 and assessed against using the draft *Guidelines for Noise Impact Assessment.*

Sources of Information

9.17 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 client and/or their sub-consultants.

Scoping

9.18 Within the Council' scoping opinion (refer to Chapter 1 above) the EHO at Charnwood Borough Council has raised concerns regarding potential noise impacts arising from the development and it is considered that such impacts should be fully addressed. In particular, the EHO has concerns over the impact of the proposed additional cooling fans and any noise assessment needs to consider these.

GOVERNMENT ADVICE, STANDARDS AND GOOD PRACTICE

British Standard 5228:2009

9.19 British Standard 5228:2009 *Code of practice for 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.

9.20 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
- any reflections of noise due to the presence of hard vertical faces such as walls.

9.21 The noise predictions in this Chapter have been undertaken using a proprietary software-based noise model, CandaA[1], which implements the full range of UK calculation methods.

9.22 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.*"

9.23 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

9.24 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.

9.25 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.

9.26 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.

[1] CadnaA DataKustik GmbH. http://www.datakustik.com/en/navitop/home/

9.27 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 $L_{Ar,T}$.

9.28 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."

9.29 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

9.30 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.

9.31 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.

9.32 The impact scale adopted in this assessment is shown in Table 9-1 below.

Table 9-1
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

9.33 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.

9.34 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

9.35 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.*

9.36 The model takes into account the distance between the sources and the receptors and the amount of attenuation due to atmospheric absorption.

9.37 The model also assumes downwind propagation, i.e. a wind direction that assists the propagation of noise from the source to all receptors.

BASELINE CONDITIONS

9.38 Environmental noise surveys were carried out at the noise-sensitive receptors closest to the application site on 9th December and 10th December 2008 to capture typical background noise levels. The survey methodology has been set out in paragraph 9.10 to 9.12 above.

9.39 The weather conditions during the survey periods were acceptable for noise monitoring, being dry with little or no wind.

9.40 The results of the noise surveys are presented in full in Appendix 9/3 and are summarised in Tables 9-2 below.

Table 9-2
Summary of Measured Noise Levels, free-field, dB

Location	Period	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{Amax}
1. Ingleberry House Farm	Daytime	55.3	48.0	58.6	70.6
	Night-time	45.5	42.3	46.5	69.7
2. Woodlands	Daytime	58.5	53.9	60.9	74.7
	Night-time	48.8	45.3	50.8	60.2
3. Property at Cowhill	Daytime	67.9	59.1	71.0	84.8
	Night-time	57.3	45.8	57.3	77.0
4. Hurst Farm	Daytime	58.3	56.3	59.4	72.5
	Night-time	52.5	49.6	54.5	59.7

9.41 The daytime noise climate at Location 1 consisted of road traffic noise from Ingleberry Road and noise from aircraft passing overhead. Noise from traffic

using Ingleberry Road and Ashby Road Central dominated the noise climate at Location 2. Road traffic noise from Ashby Road Central once again dominating the noise climate at Location 3. At Location 4 the daytime noise climate was dominated by traffic using the M1 Motorway.

9.42 The night-time noise climate at Locations 1 and 4 was dominated by road traffic using the M1 Motorway. Road traffic noise from Ashby Road Central dominated the night-time noise climate at Locations 2 and 3. Noise from the adjacent industrial premises was also audible at Location 3.

9.43 Natural sounds such as birdsong, dogs barking and the noise of the breeze in the trees was also audible at all of the monitoring locations during both the day and night-time monitoring periods.

ASSESSMENT OF IMPACT

Construction Noise Assessment

9.44 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.

9.45 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 within the site and the length of time they are in operation.

9.46 An estimate of the likely effects of noise from site clearance, 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 Chapter.

9.47 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.

9.48 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 9/4, the on-times given are based on data supplied for a similar site:

- **Site preparation works** – to include site profiling and landscaping works. The total sound power level for these items is assumed to be 116dB L_{WA};

- **Piling works for the building foundations** - The total sound power for these items is assumed to be 115dB L_{WA};
- **Foundation works** – it is assumed that any concreting works would require the use of a concrete pump and poker vibrators. The total sound power level for these items of plant 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 113dB L_{WA}.

9.49 It is acknowledged that there are likely to be other sub-phases of the construction work; however the four main phases assessed are considered to give a good indication of the likely impact during the construction works.

9.50 Predictions have been made for construction works being undertaken at the proposed ERF 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.

9.51 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.*

9.52 Construction works would generally take place between the following hours[2]:

- Monday to Friday 07:00 to 19:00 hours; and
- Saturday 07:00 to 16:00 hours.

9.53 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 9-3. The acoustic screening of intervening landforms or built structures has been ignored for the purpose of this assessment.

Table 9-3
Predicted Construction Noise Levels, Façade $L_{Aeq,1hr}$, dB

Location	Site Prep	Piling	Foundation	Building	Total
1. Ingleberry House Farm	38.6	37.1	35.1	35.1	42.8
2. Woodlands	37.8	35.8	33.8	33.8	41.7
3. Property at Cowhill	53.5	45.2	43.2	43.2	54.8
4. Hurst Farm	40.4	38.8	36.8	36.8	44.5

9.54 Table 9-3 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.

[2] As noted from Chapter 3 above it may from time to time be necessary to carry out particular items of work for short periods outside of these hours; for example, in connection with the continuous pouring of concrete, e.g. slip forming operations.

9.55 The effect that the construction works would 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: assessing the total construction noise, rather than the noisiest phase of construction alone, would present a worst-case assessment. The results are shown in Table 9-4 below.

9.56 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 free-field measured values.

Table 9-4
Predicted Construction Noise Levels, Façade $L_{Aeq,1hr}$, dB

Location	Ambient Noise Levels		Change	Impact
	Existing	Predicted		
1. Ingleberry House Farm	55.3	55.5	+0.2	Minor
2. Woodlands	58.5	58.6	+0.1	Minor
3. Property at Cowhill	67.9	68.1	+0.2	Minor
4. Hurst Farm	58.3	58.4	+0.1	Minor

9.57 Table 9-4 indicates that the predicted worst-case noise levels during construction operations would, at worst have a minor, barely perceptible impact on the existing ambient noise climate at the nearest noise-sensitive receptors assessed. Mitigation measures to reduce the construction noise impact are set out later in this Chapter.

Construction Vibration

9.58 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 would relate to piling operations

9.59 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 9-5
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

9.60 The closest vibration-sensitive property to the proposed development is the property at Cowhill at a distance of approximately 200m 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. Notwithstanding this, it should be noted that under the extant planning permission for the IWMF, blasting operations would have been undertaken for a period of between 12 to 18 months to profile the quarry faces; such an operation would not be required under the current planning permission.

Operational Assessment

9.61 The operational noise effects associated with the proposed development are anticipated to include the following:

- site plant; and
- on-site traffic movements.

9.62 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 BS5228:2009 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 – BS4142 Assessment

9.63 The assessment is based on the internal reverberant noise levels for different areas of the facility which have either been provided by the applicant or have been taken from assessment undertaken for similar facilities. The levels used for the assessment are details in Appendix 9/5.

9.64 Predictions of the noise levels at the nearby noise-sensitive receptors have been undertaken using the proprietary software-based noise model, CadnaA

which implements the full range of UK calculation methods. In this instance, the calculation algorithms set out in ISO9613 have been used.

9.65 The predicted noise levels at the nearby noise-sensitive receptors include the attenuation provided by the building materials. The sound reduction index of these materials is given in Table 9-6.

Table 9-6
Construction Materials and Noise Attenuation, dB

Element	Construction Material	Noise Attenuation
Bottom Ash Wall	Gabion wall system	52
Wall Cladding	Europanel (composite insulated panel system,)	31
Translucent Wall Panels	Danpalon 16 microcell system	24
Roof	Kalzip aluminium roofing system	33
Louvers	Main Acoustic Louvre	15

9.66 The BS4142 assessment is shown in Table 9-7 below. It is assumed that the plant would have some intermittent noise sources or noise sources that would be variable in nature, therefore an acoustic feature correction of 5dB has been added to the noise level to give a noise rating level, $L_{Ar,T}$. It has also been assumed that all areas of the facility shown in Appendix 9/5 would be operational simultaneously thus giving a worst-case scenario.

9.67 Daytime noise levels at Locations 1, 2 and 4 have been predicted to a height of 1.5m above ground level and night-time noise levels to 4m, the approximate height of a ground floor living room and a first floor bedroom window respectively.

9.68 At Location 3 daytime and night-time noise levels have been predicted to 1.5m as the property has been identified as a bungalow.

Table 9-7
BS4142 Assessment - free-field, dB

Location	Period	Measured Background Noise Level L_{A90}	Predicted Rating Level $L_{Ar,T}$	Difference
1. Ingleberry House Farm	Daytime	48.0	30.4	-17.6
	Night-time	42.3	30.4	-11.9
2. Woodlands	Daytime	53.9	27.4	-26.5
	Night-time	45.3	27.8	-17.5
3. Property at Cowhill	Daytime	59.1	34.9	-24.2
	Night-time	45.8	34.9	-10.9
4. Hurst Farm	Daytime	56.3	28.7	-27.6
	Night-time	49.6	29.1	-20.5

9.69 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*".

9.70 It can been seen from Table 9-7 that noise rating levels from the operation of the proposed ERF would lead to a situation where there would be a positive indication that complaints would be unlikely at all of the nearest noise-sensitive receptors during the daytime and the night-time.

9.71 Table 9-7 also shows that the predicted rating levels are below the prevailing background noise levels at all the nearest noise-sensitive receptors during both the daytime and the night-time.

9.72 In view of the above mitigation measures to reduce the noise generated by the operation of the proposed ERF are considered unnecessary.

On-Site Heavy Goods Vehicle Movements

9.73 The predicted noise level produced by on-site heavy goods vehicle movements has been calculated using the methodology contained in BS5228. Again, calculations have been undertaken using the proprietary noise modelling software CadnaA.

9.74 The traffic assessment (refer to Chapter 8) has advised that during a worst-case peak hour there would be a total of 20 heavy goods vehicle movements to and from the site equating to a total of 40 movements. The applicant has advised that all goods vehicle movements would take place during the daytime; as a result a night-time noise assessment for these movements has not been carried out.

9.75 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.

9.76 Table 9-8 shows the predicted noise level produced by heavy goods vehicle movements at the site.

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

Location	Predicted L_{Aeq}
1. Ingleberry House Farm	10.3
2. Woodlands	9.8
3. Property at Cowhill	26.1
4. Hurst Farm	12.6

9.77 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.

9.78 Table 9-9 compares the predicted future ambient noise levels with the impact scale adopted for this assessment.

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

Location	Period	Ambient Noise Level		Change	Impact
		Existing	Predicted Future		
1. Ingleberry House Farm	Daytime	55.3	55.3	0	No Impact
2. Woodlands	Daytime	58.5	58.5	0	No Impact
3. Property at Cowhill	Daytime	67.9	67.9	0	No Impact
4. Hurst Farm	Daytime	58.3	58.3	0	No Impact

9.79 Table 9-9 indicates that there would be no change to the existing ambient noise levels due to goods vehicle movements associated with the proposed development. On this basis, no mitigation measures are considered necessary.

Cumulative Impacts

9.80 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 new building and the existing ambient noise levels for the assessment of on-site traffic movements. The scope of BS4142 specifically excludes the assessment of mobile noise sources and is not appropriate for the assessment of cumulative impacts.

9.81 Table 9-10 summarises the cumulative impact at each receptor during the daytime and night-time period. 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 9-10
Cumulative Impact Assessment, Free-field $L_{Aeq,T}$ dB

Location	Period	Ambient Noise Level		Change	Impact
		Existing Ambient	Predicted Future		
1. Ingleberry House Farm	Daytime	55.3	55.3	0	No Impact
	Night-time	45.5	45.5	0	No Impact
2. Woodlands	Daytime	58.5	58.5	0	No Impact
	Night-time	48.8	48.8	0	No Impact
3. Property at Cowhill	Daytime	67.9	67.9	0	No Impact
	Night-time	57.3	57.3	0	No Impact
4. Hurst Farm	Daytime	58.3	58.3	0	No Impact
	Night-time	52.5	52.5	0	No Impact

9.82 It can be seen from Table 9-10 that the cumulative impact of the operation of the amended ERF and associated heavy goods vehicle movements would have no impact on the existing ambient noise levels at the nearest noise-sensitive receptors assessed.

9.83 Though mitigation measures are therefore considered unnecessary, measures to further reduce the noise levels at the nearest noise-sensitive receptors are set out below.

Assessment against Condition 26

9.84 Planning Condition 26 of planning permission APP/M2460/A/11/2150748 for the ERF specifies daytime and night-time noise limits at the nearest noise-sensitive receptors. Table 9-11 below compares the predicted noise levels at the receptors with the specified limits.

9.85 It must be noted that the predicted noise levels shown in the table do not include the +5dB penalty for tonal content as this is a subjective penalty and it is considered the limits should be compared to the actual predicted levels.

Table 9-11
Assessment against Specified Limits, Free-field $L_{Aeq,T}$ dB

Location	Period	Predicted Noise Level	Specified Limit	Difference
1. Ingleberry House Farm	Daytime	25.4	55.0	-29.6
	Night-time	25.4	42.0	-16.6
2. Woodlands	Daytime	22.4	55.0	-32.6
	Night-time	22.8	42.0	-19.2
3. Property at Cowhill	Daytime	29.9	55.0	-25.1
	Night-time	29.9	42.0	-12.1
4. Hurst Farm	Daytime	23.7	55.0	-31.3

Location	Period	Predicted Noise Level	Specified Limit	Difference
	Night-time	24.1	42.0	-17.9

9.86 It can be seen from the above table that the predicted noise levels from the ERF are well within the limits specified in Condition 26 of the planning permission at all of the receptors assessed during both the daytime and the night-time.

9.87 It should also be noted that even if the +5dB penalty for tonal content was added to the predicted noise levels the resulting noise rating levels would still be well within the specified limits.

MITIGATION MEASURES

Construction Noise

9.88 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 all of the noise-sensitive receptors assessed.

9.89 Several safeguards exist to minimise the effects of construction noise and these would 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 BS5228:2009, 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.

9.90 The precise noise mitigation measures to control noise from the construction works may require the agreement of the local authority prior to the works starting. Generic measures below are given to illustrate the range of techniques available.

9.91 The adoption of Best Practicable Means, as originally 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 should be considered, where appropriate:

- phasing the works to maximise the benefit from perimeter structures;
- any compressors brought on to site would be silenced or sound reduced models fitted with acoustic enclosures;
- all pneumatic tools would be fitted with silencers or mufflers;

- deliveries would be programmed to arrive during daytime hours only. Care would be taken when unloading vehicles to minimise disturbance to local residents. Delivery vehicles would be prohibited from waiting within the site with their engines running;
- all plant items would be properly maintained and operated according the manufacturers' recommendations in such a manner as to avoid causing excessive noise. All plant would be sited to that the noise impact at nearby noise-sensitive properties is minimised;
- local hoarding, screens or barriers would 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 would not be undertaken outside if the hours agreed with the local authority.

9.92 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.

9.93 As construction works are temporary and noise levels have been calculated for a worst-case situation and have been assessed as having only minor impact, no further mitigation measures are considered necessary.

Construction Vibration

9.94 Vibration during construction operations is unlikely to be perceptible at any of the nearby vibration-sensitive receptors due to their distance from the site.

Operational Noise

Environmental Design Measures

9.95 The main operational processes take place within the building envelope, with heavy goods vehicles accessing the site, via the weighbridge, to the waste reception hall area on the western side of the development.

9.96 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. The design of the roadways also eliminates the need for HGVs to reverse outside of the building, thus reducing the occurrence of reversing bleepers.

Other Mitigation

9.97 In addition to the above the following generic noise mitigation measures would also be considered to reduce noise levels at the site as required:

- periods when access doors are open should be kept to a minimum or, preferably, avoided during the night-time period;

- increase the sound reduction performance of the building envelope by improving the specification of the walls;
- any louvers fitted to ventilation systems should be acoustically treated and where possible face away from nearby noise-sensitive receptors;
- ensure all plant is maintained appropriately to ensure noise emissions are minimised;
- use quiet plant options wherever possible;
- use localised screening and/or acoustic enclosures where possible.

CONCLUSIONS

9.98 The assessment has considered the potential for both the construction and operation of the proposed ERF to give rise to noise and vibration impacts at the closest noise-sensitive receptors.

9.99 The assessment has found that:

- the predicted construction noise levels are below the noise criterion adopted for the assessment;
- worst-case construction noise levels would, at-worst, have a minor, barely perceptible impact at the nearest noise-sensitive receptors;
- it is considered that construction vibration would not have an impact due to the relatively large distances between the construction site and the nearest receptors;
- the predicted noise rating levels produced by the operation of the proposed development would lead to a situation where there is a positive indication that complaints are unlikely at all of the nearest noise-sensitive receptors assessed during the daytime and the night-time;
- the predicted rating levels are below the prevailing background noise levels at all of the nearest noise-sensitive receptors assessed during both the daytime and the night-time;
- on-site heavy goods vehicle movements would have no impact on the existing measured ambient noise levels at any of the nearest noise-sensitive receptors assessed; and
- the cumulative impact of all operations would have no impact on the existing measured ambient noise levels at any of the nearest noise-sensitive receptors assessed.

9.100 Even though it is not expected that noise emissions would at any point exceed any of the limits, a number of mitigation measures and management actions have been identified that could further reduce noise emissions from the site.

9.101 In conclusion the assessment has determined that noise emissions from the operation of the development would be well within the noise limits specified in Planning Condition 26 of planning permission APP/M2460/A/11/2150748 at all the nearest noise-sensitive receptors during both the daytime and the night-time.

GLOSSARY OF TERMINOLOGY

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale, is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A9/1-1
Noise Levels Commonly Found In the Environment

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

Acoustic Terminology

dB (decibel) — The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$ Pa).

dB(A) — A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

L_{Aeq} — L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.

L_{10} & L_{90} — If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background

noise. It is common practice to use the L_{10} index to describe traffic noise.

L_{Amax} — L_{Amax} is the maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.

NOISE MONITORING EQUIPMENT

TableA9/2-1
Noise Monitoring Equipment

Location	Description	Serial No.
Locations 1, 2 and 3	Norsonic Nor-140 Type 1 sound level meter	1403010
	Norsonic Type 1251 acoustic calibrator	31821
Location 4	Cirrus CR:831 B Type 1 Sound Level Meter	C17175FF
	Cirrus CR:511E Acoustic Calibrator	36342

FULL SURVEY RESULTS

Table A9/3-1
Measured Noise Levels at Location 1 – Ingleberry House Farm, free-field, dB

Date	Start Time	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{Amax}
09/12/2008	10:40	55.1	49.0	58.5	70.6
	11:40	55.4	47.5	58.5	68.8
	12:38	54.9	46.5	58.5	69.3
	13:36	55.7	49.0	59.0	70.4
10/12/2008	23:55	46.1	42.5	46.5	69.7
	00:52	44.8	42.0	46.5	63.5

Notes: Time period T was 15 minutes

Table A9/3-2
Measured Noise Levels at Location 2 – Woodlands, free-field, dB

Date	Start Time	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{Amax}
09/12/2008	11:00	58.2	53.5	61.0	68.8
	11:58	57.9	53.0	60.5	71.4
	12:56	58.1	54.0	60.5	67.6
	13:54	59.3	55.0	61.5	74.7
10/12/2008	00:14	49.4	45.5	51.5	59.7
	01:10	48.2	45.0	50.0	60.2

Notes: Time period T was 15 minutes

Table A9/3-3
Measured Noise Levels at Location 3 – Property at Cowhill, free-field, dB

Date	Start Time	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{Amax}
09/12/2008	11:22	67.4	59.5	70.5	78.6
	12:19	68.2	58.0	71.0	84.8
	13:17	68.1	59.0	71.5	77.3
	14:13	68.0	60.0	71.0	77.2
10/12/2008	00:33	57.1	47.0	59.0	74.5
	01:29	57.4	44.5	55.5	77.0

Notes: Time period T was 15 minutes

Table A9/3-4
Measured Noise Levels at Location 4 – Hurst Farm, free-field, dB

Date	Start Time	$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{Amax}
09/12/2008	10:45	59.0	57.5	60.3	63.7
	11:15	59.0	57.2	60.3	70.4
	11:45	58.9	56.9	59.8	72.5
	12:15	55.5	53.6	57.0	63.5
10/12/2008	02:45	52.3	49.8	54.2	59.7
	03:15	52.6	49.3	54.7	59.1

Notes: Time period T was 15 minutes

LIST OF CONSTRUCTION PLANT

Table A9/4-1
Construction Plant Employed

Phase	Plant	No. of Plant	Plant L_{WA} dB	Estimated On-Time %	Equivalent Continuous L_{WA} dB
Site Preparation	Tracked Excavator	2	108	50	108
	Dozer	2	109	50	109
	Lorry	2	104	10	97
	Grader	1	104	50	101
	Articulated Dump Truck	2	110	50	110
	Road Roller	2	108	50	108
	Asphalt Spreader	1	110	50	107
Piling	Piling Equipment	2	115	50	115
Foundation	Tracked Excavator	2	108	50	108
	Concrete Pump	2	107	50	107
	Articulated Dump Truck	2	108	50	108
Building Erection	Tracked Excavator	2	108	50	108
	Concrete Pump	2	107	50	107
	Articulated Dump Truck	2	108	50	108
	Circular Saw	2	111	10	104
	Scaffolding	1	92	10	82
	Fork Lift Truck	1	97	30	92
	Compressor	2	92	100	95

OPERATIONAL NOISE LEVELS

Table A9/5-1
Operational Noise Levels

Site Area/Process	Internal Sound Pressure Level, dB	Number of Plant	Plant L_{WA} dB
Turbine Hall*	80.0	N/A	N/A
Boiler Hall*	80.0	N/A	N/A
Bunker*	80.0	N/A	N/A
Tipping Hall*	80.0	N/A	N/A
Bottom Ash Area*	80.0	N/A	N/A
Stack Outlet	N/A	1	95.0
Air Cooled Condensers	N/A	4	98.0

*** internal noise levels are designed to meet the lowest level to comply with Noise at Work Regulations**