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**ASSESSMENT OF THE POTENTIAL NOISE IMPACT
FROM
THE CONSTRUCTION AND OPERATION OF AN
IBA (INCINERATOR BOTTOM ASH)
AND
HBM (HYDRAULICALLY BOUND MATERIAL) FACILITY
AT
OGEE BUSINESS PARK
WELLINGBOROUGH
NORTHAMPTONSHIRE**



Assessment of the Potential Noise Impact
from the Construction and Operation of an
IBA (Incinerator Bottom Ash) and HBM (Hydraulically Bound Materials) Facility
at
Ogee Business Park
Wellingborough
Northamptonshire

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1. INTRODUCTION

- 1.1 Covanta is seeking planning permission for the construction and operation of a facility which comprises an IBA (Incinerator Bottom Ash) plant and an HBM (Hydraulically Bound Materials) plant on land at Ogee Business Park near Great Harrowden outside Wellingborough.
- 1.2 This report sets out the calculated noise levels arising from the operation of the proposed IBA and HBM facilities and associated activities on site, for use in a BS 4142:2014+A1:2019 assessment method for the nearest dwelling to the site.
- 1.3 The calculated noise levels are compared with representative background noise levels at the nearest dwelling to the site, namely Farm Cottage to the north north-west. These have been determined from a sound level meter installed at the property in October 2021.
- 1.4 This comparison of the calculated noise levels arising from the operation of the site with the background noise levels established from the installed sound level in October 2021 forms the basis for the BS 4142:2014+A1:2019 assessment method for the nearest dwelling to the site.
- 1.5 This report also includes an assessment of the noise impact of the construction of the site with regard to the '*ABC Method*' outlined in British Standard 5228-1:2009+A1:2014.
- 1.6 To aid comprehension, a glossary of acoustic terms is presented in Appendix A.
- 1.7 A site plan showing the permit area and the survey/assessment location used is presented in Appendix B.
- 1.8 The instrumentation and calibration details for the noise survey are included in Appendix C.



1.9 The full baseline noise survey results are presented in Appendix D.

1.10 Details of the noise calculation methods used and a noise calculation sheet are presented in Appendix E.



2. BRITISH STANDARD 4142: 2014+A1:2019

- 2.1 British Standard (BS) 4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*' describes methods for assessing the likely effects of sound of an industrial and/or commercial nature on residential properties. It includes the assessment of sound from industrial and manufacturing processes, M&E plant and equipment, loading and unloading of goods and materials, and mobile plant/vehicles on the site. It can be used to assess sound from proposed, new, modified or additional industrial / commercial sources, at existing or new premises used for residential purposes.
- 2.2 The standard describes methods to measure and determine ambient, background and residual sound levels, and the rating levels of industrial / commercial sound.
- 2.3 BS 4142:2014+A1:2019 is not intended to be used for the derivation or assessment of internal sound levels, or for the assessment of non-industrial / commercial sources such as recreational activities, motorsport, music and entertainment, shooting grounds, construction and demolition, domestic animals, people, and public address systems for speech.
- 2.4 This standard is not intended to be applied to the rating and assessment of sound from: ... '*h) other sources falling within the scopes of other standards or guidance.*'
- 2.5 Ambient sound is defined in BS 4142: 2014+A1:2019 as '*totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far*'. It comprises the residual sound and the specific sound when present.
- 2.6 Residual sound is defined in BS 4142: 2014+A1:2019 as '*ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound*'.



- 2.7 The background sound level is the $L_{A90, T}$ of the residual sound level, and is the underlying level of sound. Measurements of background sound level should be undertaken at the assessment location where possible or at a comparable location.
- 2.8 The measurement time interval should be sufficient to obtain a representative value (normally not less than 15 minutes) and the monitoring duration should reflect the range of background sound levels across the assessment period. The background sound level used for the assessment should be representative of the period being assessed.
- 2.9 The specific sound level is the L_{Aeq, T_r} of the sound source being assessed over the reference time interval, T_r . BS 4142:2014+A1:2019 advises that T_r should be 1 hour during the day and 15 minutes at night.
- 2.10 The rating level is the specific sound level plus any adjustment for the characteristics of the sound (tone, impulse, intermittent or other acoustic feature).
- 2.11 The standard describes subjective and objective methods to establish the appropriate adjustment. The adjustments for the different features and assessment methods are summarised in the table below:-



Acoustic Feature	Adjustment for Acoustic Feature		
	Subjective Methods	Objective Methods	
Tonality	+2 dB if just perceptible	Third Octave Analysis	Narrow Band Analysis
	+4 dB if clearly perceptible +6 dB if highly perceptible	+6 dB if tones identified	Sliding scale of 0 to +6 dB depending on audibility of tone
Impulsivity	+3 dB if just perceptible +6 dB if clearly perceptible +9 dB if highly perceptible	Sliding scale of 0 to +9 dB depending on prominence of impulsive sound	
Intermittency	+ 3 dB if intermittency is readily distinctive	n/a	
Other	+ 3 dB if neither tonal nor impulsive, but otherwise readily distinctive	n/a	

- 2.12 Where tonal and impulsive characters are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant, it might be appropriate to apply a single correction. The rating level is equal to the specific sound level if there are no features present.
- 2.13 The level of impact is assessed by comparing the rating level of the specific sound source with the background sound level. Other factors that may require consideration include the absolute level of sound, the character and level of the residual sound compared to the specific sound, and the sensitivity of the receptor and scope for mitigation.
- 2.14 When the rating level is above the background sound level, a difference of around +5 dB is likely to indicate an adverse impact and a difference of around +10 dB or more is likely to indicate a significant adverse impact, depending on the context.
- 2.15 The lower the rating level with respect to the background sound level, the less likely it is that the specific sound source will have an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.



3. DESCRIPTION OF SITE AND EXISTING NOISE CLIMATE

- 3.1 The site is located on the Ogee Business Park to the south-east of Great Harrowden in Northamptonshire, north of Wellingborough.
- 3.2 The site is on an industrial estate and is currently vacant.
- 3.3 The operator is applying for unrestricted operations on the site and therefore this assessment considers a worst case scenario of site operations taking place at night.
- 3.4 The location of the site and the primary baseline survey/assessment location (Farm Cottage) is shown on the plan in Appendix B which also shows the red line area for which the Planning is being sought. The permit application area may be slightly more contained.
- 3.5 A baseline noise survey was conducted by means of the installation of a sound level meter on the southern boundary of the garden of Farm Cottage for one week in October 2021.
- 3.6 Observations of the daytime noise environment were made during the visits for the installation and collection of the meter.
- 3.7 The nearest noise sensitive property to the site is located to the north north-west and is designated as Farm Cottage. This location is also representative of Great Harrowden Lodge on the opposite side of the road referred to as The Slips that runs east west to the north of the site.
- 3.8 The next nearest residential properties are Romadale to the north-west adjacent to Wellingborough Golf Club and Hillside Farm to the east of the site over the rail line. Both these properties are located at least 780 metres from the site.



- 3.9 Farm Cottage was selected as the primary location for site noise calculations in this assessment due to being the closest dwelling to the site.
- 3.10 Based on the observations made during the two visits to the site, the current noise climate is controlled by local and distant road and rail traffic and some farming activity plus ongoing operations on the other commercial premises within the industrial estate.
- 3.11 The operating times proposed for the facility are not restricted to within the daytime period and therefore assessments have been undertaken for both daytime and night-time periods. With regard to BS 4142, the assessment period is therefore 1 hour for daytime (07:00 hours to 23:00 hours) and 15 minutes for night-time (23:00 hours to 07:00 hours).



4. CALCULATED SITE NOISE LEVELS (OPERATIONAL)

- 4.1 For this assessment, one receiver location that is representative of the nearest residential property to the site where baseline noise data is available (Farm Cottage) has been used for site noise calculations. This property is also representative of the nearby Great Harrowden Lodge. An additional calculation for the next nearest property (Romadale by Wellingborough Golf Course) has been undertaken for checking purposes.
- 4.2 Other than these three dwellings, the next nearest residential property is approximately a kilometre away to the east of the site over the mainline railway line.
- 4.3 The noise calculation locations (and the other properties mentioned above) are shown on the plan in Appendix B.
- 4.4 The following assumptions have been made for the calculation of site noise levels for the operation of the proposed IBA/HBM facility at Ogee Business Park outside Wellingborough.
- 4.5 The fixed plant items will all operate for 100% of an hour, to represent a reasonable worst case scenario.
- 4.6 It has been assumed that there will be a maximum of forty-four 2-way HGV movements per hour (daytime) and the equivalent during the night over the 15 minute assessment period.
- 4.7 The plant items will achieve the dB L_{WA} values stated. The plant items used in the calculations (see Appendix E) are listed in the following table along with the Sound Power Levels dB L_{WA} used in the calculations.



Plant Item	dB L _{WA}
IBA Facility	
IBA Phase 1	110
IBA Phase 2	103
Crusher	104
Loading Shovel	106
Telescopic Handler	104
HBM Facility	
Loading Shovel	105
Mixers	91
Conveyor/Transfer Point	89
Generator	91
Vehicles	
HGVs within site	104

- 4.8 The calculations in this report are based on the methods contained in BS5228 1: 2009 ‘Code of practice for noise and vibration control on construction and open sites – Part 1: Noise’ as amended BS5228-1:2009+A1:2014.
- 4.9 The nearest operations on site will be at least 460 metres from the nearest dwelling (Farm Cottage) on The Slips to the east of Great Harrowden.
- 4.10 Attenuation due to the proposed storage building at a height of 15 metres above local ground height has been included in the calculations, where appropriate.
- 4.11 The calculated site noise levels in terms of dB L_{Aeq,1 hour, free field} are presented in the following table:-

Site Noise Calculation Location	Calculated Noise Level dB L _{Aeq, T free field}
Farm Cottage, The Slips	38
Romadale, The Slips	37

T=1 hour for daytime (07:00 hours - 23:00 hours) and 15 minutes for night-time (23:00 hours - 07:00 hours)



- 4.12 For the purposes of the assessment to accompany this application, the overall calculated noise level for all the site operations occurring simultaneously is used.
- 4.13 To represent a worst case scenario at night, the IBA and HBM processing operations have been included in the calculated site noise level for the period 23:00 hours to 7:00 hours, although this will only take place between 06:00 hours and 07:00 hours over the night-time period.



5. BASELINE NOISE LEVELS AND BACKGROUND SOUND LEVELS

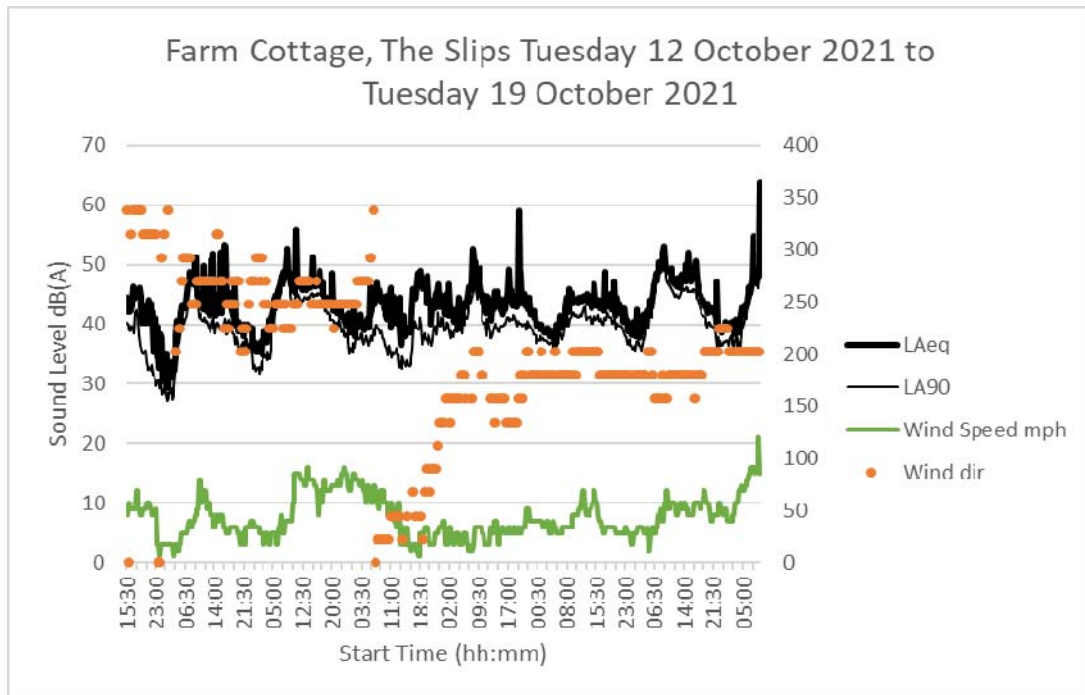
- 5.1 A baseline noise survey was undertaken in October 2021 by means of the installation of a data logging sound level meter in the rear garden of Farm Cottage between 12 and 19 October 2021.
- 5.2 The details of the noise measurement equipment and calibration are presented in Appendix C.
- 5.3 The data from the installed sound level meter at Farm Cottage is summarised in tabular and graphical form in Appendix D.
- 5.4 The following table is a summary of the measured ambient ($L_{Aeq,15 \text{ min}}$) and background ($L_{A90,15 \text{ min}}$) noise levels from the installed meter at Farm Cottage. The values shown are the average noise levels (mean, mode and median).

Location	Measured Noise Levels (dB)		
	Average Ambient Noise Level $L_{Aeq,T}$ (Mean/Mode/Median)	Average Background Noise Level $L_{A90,T}$ (Mean/Mode/Median)	Range of Samples of $L_{A90,T}$
Install: Farm Cottage	Daytime (07:00 hours - 23:00 hours)		
	45/43/44	41/40/41	30-50
	Night-time (23:00 hours - 07:00 hours)		
	40/39/40	37/37/37	27-46

- 5.5 The wind direction varied over the course of the installation. The observations made during the site visits noted that when the wind has a northerly component (i.e. potentially taking site noise away from the nearest residences) the ambient and background noise levels are noticeably lower.
- 5.6 It is considered that this is due to the location of the busier roads, the rail line and the existing commercial activities to the south of the dwellings.

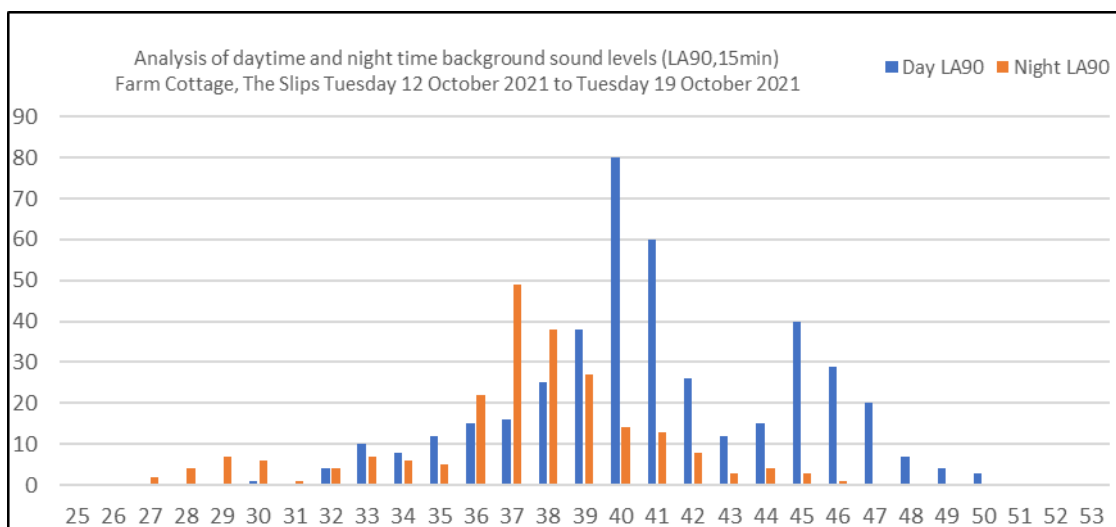


5.7 The chart below shows the variations in ambient and background noise levels during the course of the installation with an indication of the wind direction and speed.



5.8 As can be seen from the plot, when the wind has a northerly component, the ambient and background noise levels are lower than during periods in which the wind has a southerly component.

5.9 Data analysis of the background noise levels measured by the installed meter is shown in the following chart.





5.10 Based on the analysis of the data and considering that the lower ambient and background noise levels are when the wind would be taking site noise away from the residences, the following representative residual and background noise levels have been used in this assessment.

Location	Measured Noise Levels (dB)	
	Representative Residual Noise Level $L_{Aeq,T}$	Representative Background Noise Level $L_{A90,T}$
Farm Cottage	Daytime (07:00 hours - 23:00 hours)	
	43	40
	Night-time (23:00 hours -07:00 hours)	
	39	37



6. CALCULATED SITE NOISE LEVELS IN THE CONTEXT OF THE EXISTING NOISE ENVIRONMENT

6.1 A comparison of the calculated noise levels at the selected assessment location closest to the site (Farm Cottage) with the representative background and residual sound levels (based on the data obtained from the sound level meter installed at the property from 12 to 19 October 2021) is shown in the following table.

Receiver Location	Calculated Site Noise Level dB LAeq,T	Representative Background Sound Level dB LA90, 15 minutes	Representative Residual Sound Level dB LAeq, 15 minutes
(07:00 hours - 23:00 hours)			
Farm Cottage	38	40	43
Night-time (23:00 hours - 07:00 hours)			
Farm Cottage	38	37	39

T=1 hour for daytime (07:00-23:00) and 15 minutes for night-time (23:00 hours -07:00 hours)

6.2 The next nearest property to the site, Romadale to the north-west is over 200 metres further from the site than Farm Cottages and is also likely to be subject to higher residual and background noise levels due to being closer to the A509 main road. As such, Farm Cottages represents the worst case and for that reason, this assessment focuses on that location.

6.3 At the nearest dwelling to the site, Farm Cottage, the overall calculated site noise levels is below the representative daytime background sound levels by 2dB(A) and 1dB(A) above the representative night-time background sound levels.

6.4 The overall calculated site noise levels are below the representative daytime residual sound levels by 5dB(A) and below the night-time representative residual sound levels by 1dB(A).



- 6.5 The noise climate at the dwelling will continue to be controlled by distant and local road traffic on the public highway, occasional rail traffic and ongoing activity associated with the industrial estate.
- 6.6 An assessment has been undertaken in accordance with BS 4142:2014+A1:2019 '*Methods for Rating and assessing industrial and commercial sound*' for the nearest residential property to the site as examined above.



7. BS 4142: 2014+A1:2019 ASSESSMENT

The information to be reported, as specified in Section 12 of BS 4142:2014+A1:2019, is set out below where relevant.

(a) Statement of Qualifications

The authors of this chapter are Kevin Gough and Robert Storey.

Kevin worked on a number of environmental monitoring projects within local government before moving to the mineral extractive and associated industries in 1986. He founded Advance Environmental Consulting Limited and has managed environmental monitoring and assessment projects and contracts for clients throughout the UK and Europe.

Principal areas of expertise are the monitoring and assessment of environmental noise and ground borne vibration from blasting, which have been developed through over 40 year's practical experience in the field.

Served as a regional steering group member and chairman of the Institute of Environmental Management and served as a board member. Currently an Honorary Fellow of the Institute of Quarrying where most recently he served as a director and executive board member.

Robert holds a B.Eng(Hons), PhD and is a Member of the Institute of Acoustics. Robert has significant experience in carrying out Environmental Noise Impact Assessments for quarries and related development gained through over 15 years of working in consultancy.



(b) Source Being Assessed

1) Description of the main sound sources and of the specific sound

The source under investigation is the operation of an IBA and HBM facility and related infrastructure. The plant items associated with the operations are listed earlier in the report and would give rise to the specific sound levels at the off-site receiver locations.

2) Hours of operation

The permitted hours of operation are not restricted as the site would be operating throughout the day and night, but the periods in which the main site activities will be taking place are summarised in the following table:-

	Construction Phase Time Period	IBA and HBM Processing Time Period	Maintenance Time Period	Distribution and Storage
Monday to Friday	07:00 to 17:30	06:00 to 23:00	04:00 to 00:00	Continuous
Saturdays	08:00 to 13:00	06:00 to 23:00	04:00 to 00:00	Continuous
Sundays	None	06:00 to 23:00	04:00 to 00:00	Continuous
Bank Holidays	None	06:00 to 23:00	04:00 to 00:00	Continuous

As the period of operation of the IBA and HBM plants fall within the night-time period of 23:00 to 07:00 hours, they have been included in the night-time assessment to represent a worst case scenario.

3) Mode of operation (e.g. continuous, twice a day, only in hot weather)

The operation of the IBA and HBM facilities would be continuous with HGV movements in and out of the site taking place at any time at a rate of up to 44 vehicle movements per hour.



- 4) *Statement of operational rates of the main sound sources (e.g. maximum load setting, 50% max rate, low load setting)*

The measurements and assessment have been based on a ‘*maximum load setting*’ i.e. with all components of the site operations taking place simultaneously and for 100% of each 1 hour/15 minute assessment period.

- 5) *Description of premises in which the main sound sources are situated (if applicable).*

The IBA and HBM facilities will be situated on the proposed site to the south of a proposed storage building that will be constructed on the northern part of the site. A plan of the site showing the application area is provided in Appendix B.

(c) Subjective Impressions

- 1) *Dominance or audibility of the specific sound*

The specific source is not yet in place but it is expected that the specific sound may be audible at times but would not be expected to be dominant.

- 2) *Main sources contributing to the residual sound.*

The sound climate in the area in October 2021 was affected by distant and local road traffic noise, occasional rail movements and some activity on the industrial estate.

(d) The Existing Context and Sensitivity of Receptor

The sound climate during the daytime and night-time at the chosen assessment location is characterised by road traffic, occasional rail traffic and some industrial activity on the industrial estate. With regard to sensitivity, the receptor locations are residential properties and are therefore considered to be of High Sensitivity.



(e) Measurement Locations and Justification

Measurement locations, their distance from the specific sound source, the topography of the intervening ground and any reflecting surface other than the ground, including a photograph, or a dimensioned sketch with a north marker. A justification for the choice of measurement locations should also be included.

The baseline data used was obtained by means of a data logging sound level meter installed in the garden of Farm Cottage between Tuesday 12 and Tuesday 19 October 2021. Observations regarding the sound environment in the vicinity of the residences were made during the visits to install and collect the meter.

The data was used to determine the acoustic environment and to measure residual (ambient) and background sound levels in the vicinity of the nearest dwelling(s).

The receptor location selected for this assessment is the closest dwelling to the site (Farm Cottage).

(f) Sound Measuring Systems, Including Calibrator / Pistonphone

RION NL-52 Sound Level Meter (serial no. 420715)

RION NC-74 Calibrator (serial no. 34425556)

(g) Operational Test

The noise monitoring equipment was calibrated before and after the noise survey period.

The calibration levels were as follows:

Tuesday 12 October 2021: 94.0 dB(A)

Tuesday 19 October 2021: 94.0 dB(A)

(h) Weather Conditions

Weather conditions during the installation were as follows:



Mainly dry, variable wind directions 0.5 to 7 m/s, 6 to 17°C.

(i) Date(s) and Time(s) of Measurements

15:30 Tuesday 12 October 2021 to 09:30 Tuesday 19 October 2021

(j) Measurement Time Intervals

15 minutes

(k) Reference Time Interval(s)

The reference time interval is 1 hour for a daytime assessment between 07:00 to 23:00 hours. A period of 15 minutes is applicable between 23:00 and 07:00 hours.

As the site activities occur during both daytime and night-time hours, a 1 hour assessment period is used for daytime and a 15 minute assessment period is used for night-time.

(l) Specific Sound Level

1) Measured sound level(s)

The specific sound level could not be measured but has been determined from calculation.

2) Residual sound level(s) and method of determination

The range of residual sound levels from the data at the nearest residential property between Tuesday 12 October 2021 and Tuesday 19 October 2021 were:

Daytime: 35 to 64 dB $L_{Aeq,15 \text{ min, free field}}$

Night-time: 29 to 47 dB $L_{Aeq,15 \text{ min, free field}}$



3) *Ambient sound level(s) and method of determination*

The representative ambient sound levels based on the data at the nearest residential receptors during the period Tuesday 12 October 2021 to Tuesday 19 October 2021 were:

Daytime: 43 dB $L_{Aeq,1 \text{ hour, free field}}$

Night-time: 39 dB $L_{Aeq,15 \text{ min, free field}}$

4) *Specific sound level(s) and method of determination*

The specific sound levels for the assessment location for both daytime and night-time has been determined from calculation as:

37 dB $L_{Aeq,T, \text{ free field}}$ for Farm Cottage (including IBA and HBM processing)

5) *Justification of methods*

Calculation used as the operations are not yet taking place at the site.

6) *Details of any corrections applied*

See the Potential Impact of Uncertainty section.

(m) Background Sound Level(s)

Background sound level(s) and measurement time interval(s) and, in the case of measurements taken at an equivalent location, the reasons for presuming it to be equivalent.

The data from the sound level meter installed at Farm Cottage gave representative background sound levels of:

Daytime: 40 dB $L_{A90,15 \text{ min, free field}}$

Night-time: 37 dB $L_{A90,15 \text{ min, free field}}$



(n) Rating Level(s)

1) Specific sound level(s)

The specific sound level(s) stated in 8.12 are:

38 dB $L_{Aeq,T}$, free field for Farm Cottage

2) Any acoustic features of the specific sound

The potential adjustments for the different features and assessment methods are summarised in the table in Section 3 of this report.

At a separation distance of at least 460 m from the site to the receiver location and taking into account the noise attenuation to the intervening permanent structures proposed, no requirement for a penalty for tonality, impulsivity or intermittency is expected for the site operations at the three receiver locations.

3) Rating level(s)

The rating levels for daytime and night-time are therefore 1 dB above the specific noise levels stated above resulting in the following rating levels determined in accordance with BS 4142:2014+A1:2019:

38 dB $L_{Ar, Tr}$ for Farm Cottage

(o) Excess of the rating level(s) over background sound level(s)

Excess of the rating level(s) over the measured background sound level(s) and the initial estimate of the impacts

The rating levels, the background sound levels and the excess of the rating levels over the background sound levels for the daytime and night-time periods are presented in the following table:-



Receiver Location	Rating Level dB L _{Ar, Tr}	Representative Background Sound Level dB L _{A90, 15 minutes}	Excess of Rating Level over Background Sound Level
Daytime (07:00 hours - 23:00 hours)			
Farm Cottage	38	40	-2
Night-time (23:00 hours – 07:00 hours)			
Farm Cottage	38	37	+1

T=1 hour for daytime (07:00-23:00) and 15 minutes for night-time (23:00 hours - 07:00 hours)

When the rating level is above the background sound level, a difference of around +5 dB is likely to indicate an adverse impact and a difference of around +10 dB or more is likely to indicate a significant adverse impact, depending on the context.

(p) Conclusions of the assessment after taking context into account

Farm Cottage:

The calculations and assessment demonstrate a rating level of 38 dB L_{Ar, Tr} at Farm Cottage which is 2 dB below the representative background sound level during the daytime of 40 dB L_{A90, 1 hour} for that location.

Daytime residual levels at Farm Cottage ranged from 35 to 64 dB L_{Aeq,1 hour}.

The conclusion is that the assessment indicates no adverse impact for Farm Cottage during the daytime.

The calculations and assessment demonstrate a rating level of 38 dB L_{Ar, Tr} at Farm Cottage which is 1 dB above the representative background sound level at night of 37 dB L_{A90, 15 min} for that location.

The IBA and HBM processing operations is included in the night-time calculations although this will only take place between 06:00 hours and 07:00 hours during the period considered to be night-time.



This represents a worst case scenario with regard to site noise levels. With the IBA and HBM excluded from the calculations for the remainder of the night-time period (during which only distribution and storage operations will be taking place with the calculations including peak HGV movements of forty-four 2-way movements in the hour, two loading shovels and a telescopic handler), the rating level is 36 dB $L_{Ar, Tr}$ at Farm Cottage, which is 1 dB below the representative background sound level at night of 37 dB $L_{A90, 15 \text{ min}}$ for that location.

Night-time residual level at Farm Cottage ranged from 29 to 47 dB $L_{Aeq, 15 \text{ min}}$.

The lowest measured background sound level at Farm Cottage during the period 06:00 to 07:00 hours was 37 dB $L_{A90, 15 \text{ min}}$ with the average background sound level during that period being 41 dB $L_{A90, 15 \text{ min}}$.

The conclusion is that the assessment indicates no adverse impact for Farm Cottage during the night-time.

The soundscape for Farm Cottage during daytime and night-time will continue to be affected by local and distant road traffic noise, occasional rail movements and ongoing farm and industrial activity.

(q) The potential impact of uncertainty

Section 10 of BS 4142:2014+A1:2019 states: *‘Consider the level of uncertainty in the data and associated calculations. Where the level of uncertainty could affect the conclusion, take reasonably practicable steps to reduce the level of uncertainty. Report the level and potential effects of uncertainty.’*

The largest level of uncertainty is whether the proposed activity gives rise to the calculated noise level at the receiver location and whether the specific noise at that location attracts acoustic feature corrections.



The measurements and assessment have been based on all components of the site operation taking place simultaneously and for 100% of each assessment period during daytime and night-time periods. The site noise calculations do not include any allowance for air absorption.

The calculations include noise attenuation due to the proposed intervening permanent structures between the site and the assessment location.

The operation must also be considered in the context of the existing ambient noise levels at the assessment location with ongoing farming activity during the daytime and industrial activity on the rest of the industrial estate during both the daytime and the night-time.



8. CALCULATED SITE NOISE LEVELS (CONSTRUCTION)

- 8.1 The methodology used for the assessment of the construction phase is one that has calculated noise levels associated with construction activity, for comparison with baseline noise levels and applicable thresholds of significant effect (determined by reference to British Standard 5228-1:2009+A1:2014) for construction noise at dwellings.
- 8.2 For construction noise the threshold of a significant effect at dwellings is determined in accordance with Annex E (informative) of BS5228-1:2009+A1:2014 '*Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*'.
- 8.3 BS 5228-1:2009+A1:2014 gives recommendations for basic methods of noise control relating to construction sites, including sites where demolition, remediation, ground treatment or related civil engineering works are being carried out, and open sites. This part of BS 5228 provides guidance concerning methods of predicting and measuring noise and assessing its impact on those exposed to it.
- 8.4 On page 119 Section E.3.2 (Table E.1 reproduced below) an example is given of the threshold of potential significant effect at dwellings, when the site noise level exceeds the listed value for different time periods.



Assessment Category and threshold value period	Threshold value, in decibels (dB) ($L_{Aeq,T}$)		
	Category A A)	Category B B)	Category C C)
Night-time (23.00-07.00)	45	50	55
Evenings and Weekends D)	55	60	65
Daytime (07.00-19.00) and Saturdays (07.00-13.00)	65	70	75
<p>NOTE 1 A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.</p> <p>NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise.</p> <p>NOTE 3 Applied to residential receptors only.</p> <p>A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.</p> <p>B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.</p> <p>C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.</p> <p>D) 19.00-23.00 weekdays, 13.00-23.00 Saturdays and 07.00-23.00 Sundays.</p>			

8.5 The ‘ambient sound level’ is described in BS4142: 2014 as being the:

‘equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources, near and far, at the assessment location over a given time interval, T.’

8.6 If the construction site noise level is above the appropriate category value, then a potential significant effect is indicated.



- 8.7 For Daytime (07.00 hours - 19.00 hours) and Saturdays (07.00 hours - 13.00 hours) the Threshold Value, which if exceeded indicates a potential significant effect, for Assessment Category A is 65 dB $L_{Aeq, T}$. Assessment Category A is appropriate when existing measured ambient noise levels at the assessment location(s) are below 65 dB $L_{Aeq, T}$.
- 8.8 The Threshold Value for Assessment Category B is 70 dB $L_{Aeq, T}$. Assessment Category B is for when ambient noise levels equal 65 dB $L_{Aeq, T}$. The Threshold Value for Assessment Category C is 75 dB $L_{Aeq, T}$. Assessment Category C is for when ambient noise levels are higher than 65 dB $L_{Aeq, T}$.
- 8.9 Site preparation and construction working hours will be restricted to Monday to Friday 7am to 5:30pm and 8am to 1pm on Saturdays and therefore only daytime noise levels has been considered for this phase of the development.
- 8.10 From the data obtained from the sound level meter installed at Farm Cottage, the measured equivalent continuous sound pressure level (L_{Aeq}) is taken as being representative of the ‘*ambient noise level*’ at the residence.
- 8.11 The representative ambient noise level based on the measured equivalent continuous sound pressure levels (L_{Aeq}) over the periods when construction activity is expected to take place (i.e. daytime) is considered to represent the ‘*ambient noise level*’ for Farm Cottage in this context.
- 8.12 The average ambient noise level at Farm Cottage during the periods Monday to Friday 07:00 hours to 19:00 hours and Saturdays 07:00 to 13:00 hours was 57 dB $L_{Aeq, 15 \text{ min}}$, placing the development within the Category A, i.e. the Threshold Value would be 65 dB $L_{Aeq, T}$.
- 8.13 Calculations for construction site noise have been undertaken based on the methods contained in BS5228-1: 2009 ‘*Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*’ + A1: 2014, Annex F.



- 8.14 For the construction phase noise calculations, various separate plant items have been taken to operate simultaneously in the nearest area of the site to Farm Cottage, which is regarded as a worst case position for assessment purposes.
- 8.15 The calculated construction phase noise levels assume 90% soft ground between source and receiver and include no barrier attenuation due to existing or proposed structures and a 100% on time for all elements of the operation to represent a worst case scenario.
- 8.16 Plant items and the corresponding Sound Power Levels used in the calculation are presented in the following table:

Plant Item	Sound Power Level dB L_{WA}
Piling	126
RMX Lorry	107
Loading Shovel	105
Telescopic Handler/Forklift	107
Mobile elevating working platform (MEWP)	95
Mobile crane	110
Dump trucks	109
360° Excavator	108
Pump with diesel generator	102
Road going HGVs	104

- 8.17 The following table presents the calculated noise levels at the dwelling at Farm Cottage due to the construction phase in comparison with the appropriate Threshold Value.

Location	Calculated Construction Noise Level dB L_{Aeq, 1 hour}	BS5228 Threshold Value (Category A) dB L_{Aeq, T}
Farm Cottage	60	65



8.18 As can be seen from the table above, the calculated construction noise level from the site is below the Category A Threshold Value from BS5228:2009.



9. SITE NOISE MANAGEMENT

- 9.1 The following site noise management measures will be in place to minimise the noise impact of the operations on site and the movement of vehicles associated with the site.
- 9.2 The imposition of a speed limit on site will have the effect of minimizing noise from vehicle movements and is a key feature for the safety of all facility staff. Company vehicle drivers will be obliged to comply with the site speed limit as part of the terms of their employment and all facility staff will be instructed to report any observed speeding offence. Any non-company vehicle driver that repeats a speeding offence will be refused access to the site.
- 9.3 Upon entering the site, drivers will be supplied with a map clearly showing the vehicle routes which minimise the need for reversing alarms. The weighbridge operator and other facility staff will be instructed to report non-observance. Any non-company vehicle driver that does not follow the vehicle routes will be refused access to the site.
- 9.4. For mobile plant and all of the Permit Holder's road going vehicles on site white noise reversing alarms will be specified, rather than standard reversing beepers. Additionally white noise alarms will be requested on any hired plant or vehicles.
- 9.5 In summary, measures to minimise material handling, processing and vehicle noise include:
- Plant orientation designed such that as far as reasonably practicable vehicle movements and loading at the facility will be to the south of the storage building which will therefore provide noise mitigation for the nearest properties to the north of the site;
 - Utilisation of the latest mobile plant items operated by trained staff with maintenance functions performed by supplier engineers;



- Installation of white noise reversing indicators on trucks and loading shovels; and
- Training for operators with reference to revving of engines and generation of unnecessary noise, i.e. use of horns.

9.6 In order to ensure that the site noise management measures are effective and that the operations on site are not causing an adverse impact at the nearest noise sensitive receptors, monitoring of site noise levels is recommended.

9.7 It is suggested that attended sample noise monitoring takes place within three months of commissioning, then after six months from commissioning, during permitted daytime and night-time periods at the nearest residences to the site, namely Farm Cottage and Romadale.

9.8 It is expected that once the IBA/HBM Facility is commissioned and running fully that the overall noise output levels would not vary to any significant degree over time. The noise level due to operation of the facility would depend on a number of factors such as the particular assessment location, weather conditions for example wind direction, what activities are taking place.

9.9 Additionally site staff will note in the site diary abnormal noise from other nearby noise sources to assist in determination of source if complaints are received.



10. SUMMARY AND CONCLUSIONS

- 10.1 Covanta is seeking planning permission for the construction and operation of a facility which comprises an IBA (Incinerator Bottom Ash) facility and an HBM (Hydraulically Bound Materials) facility on land at Ogee Business Park near Great Harrowden outside Wellingborough. An Environmental Permit application will be made by the Day Group who will operate the facility.
- 10.2 This report sets out the calculated noise levels arising from the operation of the proposed IBA and HBM facilities and associated activities on site, for use in a BS 4142:2014+A1:2019 assessment method for the nearest dwelling to the site.
- 10.3 The calculated noise levels are compared with representative background noise levels at the nearest dwelling to the site, namely Farm Cottage to the north north-west. These have been determined from a sound level meter installed at the property in October 2021.
- 10.4 This comparison of the calculated noise levels arising from the operation of the site with the background noise levels established from the installed sound level in October 2021 forms the basis for the BS 4142:2014+A1:2019 assessment method for the nearest dwelling to the site.
- 10.5 The baseline noise data and assessment demonstrate a worst case rating level of 38 dB $L_{Ar, Tr}$ which is 2 dB below the representative background sound level of 40 dB $L_{A90, T}$ at Farm Cottage during the daytime (07:00 hours to 23:00 hours).
- 10.6 The baseline noise data and assessment demonstrate a worst case rating level of 38 dB $L_{Ar, Tr}$ which is 1 dB above the representative background sound level of 37 dB $L_{A90, T}$ at Farm Cottage at night (23:00 hours to 07:00 hours).



- 10.7 The conclusion is that the assessment indicates that there will not be an adverse impact during daytime and night-time periods at the nearest residential property considered in the assessment in the context of the existing noise environment in the vicinity of the nearest dwellings.
- 10.8 The assessment also demonstrates that construction activities associated with the development are within the threshold values based on the recommendations in BS 5228-1:2009+A1:2014.
- 10.9 The soundscape for the nearest residential property to the site considered in this assessment will continue to be affected by distant and local road traffic noise, occasional rail movements, birdsong and breeze in the trees, with some farming activity and ongoing operations on the industrial estate audible at times.



APPENDICES



Appendix A

Glossary of Acoustic Terms

The following section describes some of the parameters that are used to quantify noise.

Decibels dB

Noise levels are measured in decibels. The decibel is the logarithmic ratio of the sound pressure to a reference pressure (2×10^{-5} Pascals). The decibel scale gives a reasonable approximation to the human perception of relative loudness. In terms of human hearing, audible sounds range from the threshold of hearing (0 dB) to the threshold of pain (140 dB).

A-weighted Decibels dB(A)

The 'A'-weighting filter emulates human hearing response for low levels of sound. The filter network is incorporated electronically into sound level meters. Sound pressure levels measured using an 'A'-weighting filter have units of dB(A) which is a single figure value to represent the overall noise level for the entire frequency range.

A change of 3 dB(A) is the smallest change in noise level that is perceptible under normal listening conditions. A change of 10 dB(A) corresponds to a doubling or halving of loudness of the sound. The background noise level in a quiet bedroom may be around 20 –30 dB(A); normal speech conversation around 60 dB(A) at 1 m; noise from a very busy road around 70-80 dB(A) at 10m; the level near a pneumatic drill around 100 dB(A).

Façade Noise Level

Façade noise measurements are those undertaken near to reflective surfaces such as walls, usually at a distance of 1m from the surface. Façade noise levels at 1m from a reflective surface are normally around 3 dB greater than those obtained under freefield conditions.

Freefield Noise Level

Freefield noise measurements are those undertaken away from any reflective surfaces other than the ground.



Frequency Hz

The frequency of a noise is the number of pressure variations per second, and relates to the 'pitch' of the sound. Hertz (Hz) is the unit of frequency and is the same as cycles per second. Normal, healthy human hearing can detect sounds from around 20 Hz to 20 kHz.

Octave and Third-Octave Bands

Two frequencies are said to be an octave apart if the frequency of one is twice the frequency of the other. The octave bandwidth increases as the centre frequency increases. Each bandwidth is 70% of the band centre frequency.

Two frequencies are said to be a third-octave apart if the frequency of one is 1.26 times the other. The third octave bandwidth is 23% of the band centre frequency.

There are recognised octave band and third octave band centre frequencies. The octave or third-octave band sound pressure level is determined from the energy of the sound which falls within the boundaries of that particular octave or third octave band.

Equivalent Continuous Sound Pressure Level $L_{Aeq,T}$

The 'A'-weighted equivalent continuous sound pressure level $L_{Aeq,T}$, is a notional steady level which has the same acoustic energy as the actual fluctuating noise over the same time period T. The $L_{Aeq,T}$ unit is dominated by higher noise levels, for example, the $L_{Aeq,T}$ average of two equal time periods at, for example, 70 dB(A) and 50 dB(A) is not 60 dB(A) but 67 dB(A).

The $L_{Aeq,T}$ unit was commended by the Noise Advisory Council and is the chosen unit of BS5228 for Construction and Open site noise; MPS 2 for Noise from Minerals Extraction Sites; PPG 24 Planning and Noise and BS 7445 for the Description and Measurement of Environmental noise.

Maximum Sound Pressure Level L_{Amax}

The L_{Amax} value describes the overall maximum 'A'-weighted sound pressure level over the measurement interval. Maximum levels are measured with either a fast or slow time weighted, denoted as $L_{Amax,f}$ or $L_{Amax,s}$ respectively.



Sound Exposure Level L_{AE} or SEL

The sound exposure level is a notional level which contains the same acoustic energy in 1 second as a varying 'A'-weighted noise level over a given period of time. It is normally used to quantify short duration noise events such as aircraft flyover or train passes.

Statistical Parameters L_N

In order to cover the time variability aspects, noise can be analysed into various statistical parameters, i.e. the sound level which is exceeded for N% of the time. The most commonly used are the $L_{A01,T}$, $L_{A10,T}$ and the $L_{A90,T}$.

$L_{A01,T}$ is the 'A'-weighted level exceeded for 1% of the time interval T and is often used to give an indication of the upper maximum level of a fluctuating noise signal.

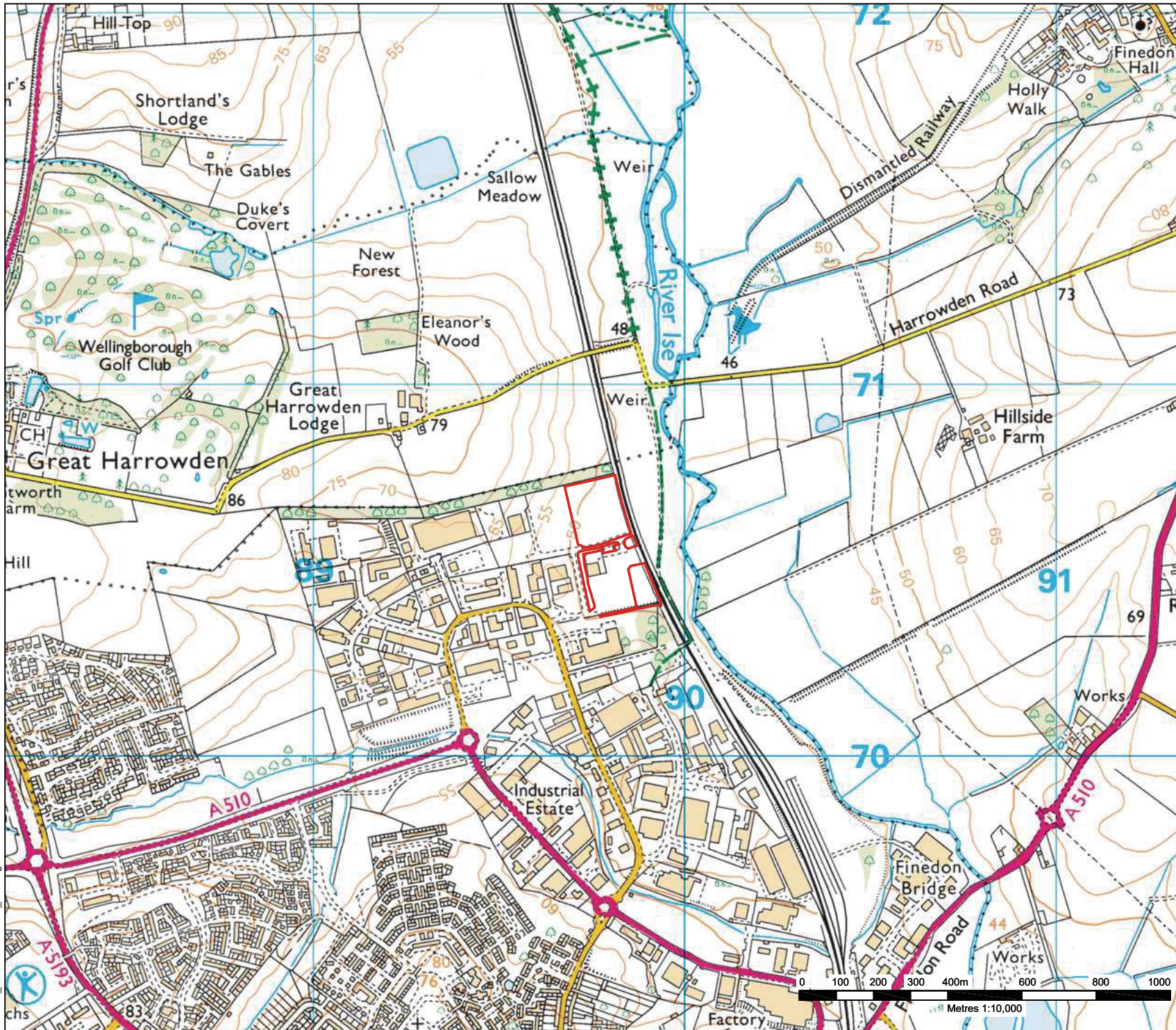
$L_{A10,T}$ is the 'A'-weighted level exceeded for 10% of the time interval T and is often used to describe road traffic noise. It gives an indication of the upper level of a fluctuating noise signal. For high volumes of continuous traffic, the $L_{A10,T}$ unit is typically 2–3 dB(A) above the $L_{Aeq,T}$ value over the same period.

$L_{A90,T}$ is the 'A'-weighted level exceeded for 90% of the time interval T, and is often used to describe the underlying background noise level. It is defined in British Standard 4142 as the background noise unit and is used for establishing the reference against which industrial noises are assessed.



Appendix B

Site Plan



LEGEND

 Application Boundary

COVANTA
Powering Today. Protecting Tomorrow.

Heatons
Planning Environment Design

SITE
Wellingborough
PROJECT
Proposed IBA Plant
DRAWING TITLE
Site Location Plan

DATE
March 2022
REFERENCE
COV-002-W-SLP

SCALE
1:10,000 @ A3
STATUS
FINAL



Heatons The Arc, 6 Mallard Way, Pride Park, Derby, DE24 8GX
www.heatonplanning.co.uk
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220304_COV-002-W-SLP_SH.dwg





Appendix C Noise Survey Details

Date and Locations of Installation

15:30 on Tuesday 12 October 2021 to 09:30 on Tuesday 19 October 2021

Installation/Collection carried out by

Dr Robert Storey

Weather Conditions

Tuesday 12 October 2021 – Overcast, NNW wind 0-1 m/s, ~14°C

Tuesday 19 October 2021 – Overcast, SSW wind 3-6 m/s, ~18°C

Instrumentation used (Serial Number)

Installed Meter

Rion NL-52 Sound Level Meter (420715)

Rion NC-74 Calibrator (34425556)

Calibration

The sensitivity of the meter was verified on site immediately before and after the installation. The measured calibration levels were as follows:

Survey Date / Meter	Start Calibration	End Calibration
12 to 19 October 2021	94.0 dB(A)	94.0 dB(A)

The meters and calibrators are tested monthly against Norsonic Calibrators, type 1253 (serial number 22906) and type 1256 (serial number 125626100) both with UKAS approved laboratory certificates of calibration.

In addition, the meter and calibrator undergo traceable calibration at an external laboratory every two years.

Survey Details

The meter installed at Farm Cottage was set to take repeat measurements of 15 minute duration. The microphone was at a height of between 1.2 and 1.5 metres above local ground, with a RION WS-15 weather protection fitted to the microphone.



Appendix D
Noise Survey Data

Date	Start Time	LAeq,15min	LAmx,f	LA10,15min	LA90,15min
12/10/2021	15:30	45	70	46	40
12/10/2021	15:45	42	52	45	40
12/10/2021	16:00	42	54	45	40
12/10/2021	16:15	42	59	45	39
12/10/2021	16:30	42	55	45	39
12/10/2021	16:45	43	54	46	40
12/10/2021	17:00	44	56	48	39
12/10/2021	17:15	46	75	48	38
12/10/2021	17:30	44	59	49	39
12/10/2021	17:45	45	61	48	42
12/10/2021	18:00	45	58	47	42
12/10/2021	18:15	45	59	47	42
12/10/2021	18:30	46	66	48	41
12/10/2021	18:45	46	59	50	38
12/10/2021	19:00	45	61	48	36
12/10/2021	19:15	43	57	47	36
12/10/2021	19:30	40	55	42	35
12/10/2021	19:45	43	57	47	35
12/10/2021	20:00	43	60	45	35
12/10/2021	20:15	40	58	41	36
12/10/2021	20:30	43	58	45	34
12/10/2021	20:45	40	56	41	33
12/10/2021	21:00	44	61	49	32
12/10/2021	21:15	43	59	45	33
12/10/2021	21:30	42	58	46	33
12/10/2021	21:45	43	62	46	32
12/10/2021	22:00	40	57	42	33
12/10/2021	22:15	35	51	36	32
12/10/2021	22:30	42	57	46	32
12/10/2021	22:45	35	50	39	30
12/10/2021	23:00	41	57	44	30
12/10/2021	23:15	35	51	33	30
12/10/2021	23:30	40	59	40	30
12/10/2021	23:45	35	53	35	31
13/10/2021	00:00	33	51	35	29
13/10/2021	00:15	38	55	41	30
13/10/2021	00:30	38	53	42	30
13/10/2021	00:45	30	42	33	28
13/10/2021	01:00	31	43	33	29



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
13/10/2021	01:15	33	43	36	30
13/10/2021	01:30	35	65	36	29
13/10/2021	01:45	29	41	30	28
13/10/2021	02:00	35	47	40	27
13/10/2021	02:15	29	39	31	28
13/10/2021	02:30	33	46	35	29
13/10/2021	02:45	32	41	36	29
13/10/2021	03:00	31	41	33	29
13/10/2021	03:15	34	53	32	27
13/10/2021	03:30	33	51	36	28
13/10/2021	03:45	32	50	34	29
13/10/2021	04:00	35	54	36	32
13/10/2021	04:15	38	56	39	34
13/10/2021	04:30	41	52	43	36
13/10/2021	04:45	40	50	42	38
13/10/2021	05:00	39	51	41	37
13/10/2021	05:15	42	54	44	38
13/10/2021	05:30	42	51	43	39
13/10/2021	05:45	43	52	45	41
13/10/2021	06:00	43	55	45	41
13/10/2021	06:15	43	55	44	40
13/10/2021	06:30	43	52	44	41
13/10/2021	06:45	44	55	45	41
13/10/2021	07:00	45	58	47	43
13/10/2021	07:15	47	57	49	46
13/10/2021	07:30	48	56	49	47
13/10/2021	07:45	49	55	50	48
13/10/2021	08:00	48	57	50	47
13/10/2021	08:15	48	56	49	47
13/10/2021	08:30	48	55	49	47
13/10/2021	08:45	48	53	49	46
13/10/2021	09:00	50	67	52	47
13/10/2021	09:15	51	67	55	45
13/10/2021	09:30	45	52	46	43
13/10/2021	09:45	45	57	46	43
13/10/2021	10:00	43	56	45	41
13/10/2021	10:15	45	58	47	42
13/10/2021	10:30	43	62	45	41
13/10/2021	10:45	43	58	44	41
13/10/2021	11:00	42	55	44	41
13/10/2021	11:15	50	68	54	41
13/10/2021	11:30	43	54	44	41



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
13/10/2021	11:45	43	57	45	40
13/10/2021	12:00	43	53	45	41
13/10/2021	12:15	42	52	44	40
13/10/2021	12:30	43	61	44	39
13/10/2021	12:45	41	56	43	39
13/10/2021	13:00	51	70	45	39
13/10/2021	13:15	42	56	44	40
13/10/2021	13:30	43	52	44	41
13/10/2021	13:45	52	71	48	42
13/10/2021	14:00	42	58	43	40
13/10/2021	14:15	41	58	43	39
13/10/2021	14:30	43	53	45	40
13/10/2021	14:45	43	53	44	40
13/10/2021	15:00	42	54	44	40
13/10/2021	15:15	45	65	45	40
13/10/2021	15:30	46	69	46	39
13/10/2021	15:45	52	74	50	39
13/10/2021	16:00	42	52	45	39
13/10/2021	16:15	50	71	49	40
13/10/2021	16:30	53	72	53	40
13/10/2021	16:45	53	74	50	41
13/10/2021	17:00	53	74	46	38
13/10/2021	17:15	43	54	46	38
13/10/2021	17:30	44	64	46	40
13/10/2021	17:45	45	65	47	41
13/10/2021	18:00	44	62	46	40
13/10/2021	18:15	44	64	46	40
13/10/2021	18:30	42	58	44	39
13/10/2021	18:45	42	53	44	39
13/10/2021	19:00	40	48	42	38
13/10/2021	19:15	47	62	46	37
13/10/2021	19:30	40	50	41	37
13/10/2021	19:45	40	50	42	38
13/10/2021	20:00	41	55	43	37
13/10/2021	20:15	39	49	41	36
13/10/2021	20:30	39	52	41	36
13/10/2021	20:45	39	47	41	37
13/10/2021	21:00	39	44	41	36
13/10/2021	21:15	40	53	43	37
13/10/2021	21:30	38	48	40	36
13/10/2021	21:45	40	54	41	37
13/10/2021	22:00	40	47	41	38



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
13/10/2021	22:15	40	59	41	37
13/10/2021	22:30	40	58	42	36
13/10/2021	22:45	39	51	41	37
13/10/2021	23:00	40	51	42	37
13/10/2021	23:15	39	50	41	37
13/10/2021	23:30	39	49	42	36
13/10/2021	23:45	36	46	38	33
14/10/2021	00:00	37	44	39	33
14/10/2021	00:15	37	50	39	33
14/10/2021	00:30	35	47	38	32
14/10/2021	00:45	36	53	38	33
14/10/2021	01:00	35	44	37	33
14/10/2021	01:15	36	50	38	33
14/10/2021	01:30	35	50	37	32
14/10/2021	01:45	36	50	38	33
14/10/2021	02:00	37	45	40	34
14/10/2021	02:15	35	44	37	32
14/10/2021	02:30	39	49	42	36
14/10/2021	02:45	37	46	39	35
14/10/2021	03:00	39	54	40	34
14/10/2021	03:15	38	51	40	35
14/10/2021	03:30	37	49	40	34
14/10/2021	03:45	39	48	42	35
14/10/2021	04:00	38	50	41	34
14/10/2021	04:15	41	52	45	34
14/10/2021	04:30	40	50	42	36
14/10/2021	04:45	42	50	43	39
14/10/2021	05:00	42	51	45	39
14/10/2021	05:15	43	54	46	39
14/10/2021	05:30	44	51	46	43
14/10/2021	05:45	45	54	47	43
14/10/2021	06:00	44	57	45	42
14/10/2021	06:15	46	51	47	44
14/10/2021	06:30	46	55	47	44
14/10/2021	06:45	46	56	48	45
14/10/2021	07:00	47	53	48	45
14/10/2021	07:15	48	59	50	46
14/10/2021	07:30	48	57	50	47
14/10/2021	07:45	49	61	50	47
14/10/2021	08:00	49	58	50	47
14/10/2021	08:15	49	66	51	48
14/10/2021	08:30	52	70	53	50



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
14/10/2021	08:45	53	68	56	48
14/10/2021	09:00	48	53	50	47
14/10/2021	09:15	49	58	50	46
14/10/2021	09:30	47	55	48	45
14/10/2021	09:45	46	57	48	44
14/10/2021	10:00	46	59	47	43
14/10/2021	10:15	46	60	48	43
14/10/2021	10:30	45	59	47	43
14/10/2021	10:45	56	76	54	45
14/10/2021	11:00	46	55	48	45
14/10/2021	11:15	47	56	48	45
14/10/2021	11:30	46	58	48	45
14/10/2021	11:45	47	65	48	44
14/10/2021	12:00	46	61	48	44
14/10/2021	12:15	47	60	49	44
14/10/2021	12:30	46	56	47	44
14/10/2021	12:45	46	59	48	44
14/10/2021	13:00	46	56	48	45
14/10/2021	13:15	47	63	48	45
14/10/2021	13:30	46	54	47	44
14/10/2021	13:45	46	59	48	44
14/10/2021	14:00	47	64	48	45
14/10/2021	14:15	46	61	48	45
14/10/2021	14:30	47	57	48	45
14/10/2021	14:45	47	56	48	45
14/10/2021	15:00	51	75	50	45
14/10/2021	15:15	47	57	48	45
14/10/2021	15:30	47	59	48	45
14/10/2021	15:45	46	54	48	45
14/10/2021	16:00	47	54	48	45
14/10/2021	16:15	47	56	49	45
14/10/2021	16:30	47	63	48	45
14/10/2021	16:45	47	54	48	45
14/10/2021	17:00	49	66	49	45
14/10/2021	17:15	46	56	48	45
14/10/2021	17:30	47	56	48	45
14/10/2021	17:45	47	58	49	45
14/10/2021	18:00	45	55	47	44
14/10/2021	18:15	45	54	46	43
14/10/2021	18:30	44	55	46	42
14/10/2021	18:45	45	53	47	42
14/10/2021	19:00	44	54	45	42



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
14/10/2021	19:15	43	52	45	42
14/10/2021	19:30	44	57	45	41
14/10/2021	19:45	44	57	45	41
14/10/2021	20:00	43	53	45	41
14/10/2021	20:15	49	72	45	41
14/10/2021	20:30	42	55	44	41
14/10/2021	20:45	42	50	44	40
14/10/2021	21:00	43	60	43	40
14/10/2021	21:15	42	49	44	40
14/10/2021	21:30	42	49	43	40
14/10/2021	21:45	42	51	43	40
14/10/2021	22:00	43	50	44	41
14/10/2021	22:15	43	63	43	40
14/10/2021	22:30	41	52	43	39
14/10/2021	22:45	41	52	43	39
14/10/2021	23:00	42	56	43	39
14/10/2021	23:15	40	54	42	38
14/10/2021	23:30	41	57	43	38
14/10/2021	23:45	40	46	41	39
15/10/2021	00:00	40	52	42	38
15/10/2021	00:15	42	56	44	37
15/10/2021	00:30	39	49	41	35
15/10/2021	00:45	40	54	42	36
15/10/2021	01:00	39	48	41	36
15/10/2021	01:15	40	50	43	36
15/10/2021	01:30	43	58	47	37
15/10/2021	01:45	38	46	40	36
15/10/2021	02:00	40	46	41	38
15/10/2021	02:15	40	53	41	38
15/10/2021	02:30	39	52	41	38
15/10/2021	02:45	41	54	43	38
15/10/2021	03:00	41	55	43	38
15/10/2021	03:15	42	58	43	38
15/10/2021	03:30	40	51	42	38
15/10/2021	03:45	39	47	41	38
15/10/2021	04:00	39	50	41	37
15/10/2021	04:15	40	49	42	37
15/10/2021	04:30	40	56	42	38
15/10/2021	04:45	41	58	42	38
15/10/2021	05:00	41	56	44	37
15/10/2021	05:15	39	55	41	37
15/10/2021	05:30	40	51	42	37



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
15/10/2021	05:45	46	64	48	38
15/10/2021	06:00	42	57	43	38
15/10/2021	06:15	42	57	45	37
15/10/2021	06:30	45	62	48	39
15/10/2021	06:45	45	60	49	38
15/10/2021	07:00	43	57	46	38
15/10/2021	07:15	46	57	50	39
15/10/2021	07:30	45	61	48	40
15/10/2021	07:45	47	63	51	39
15/10/2021	08:00	44	57	48	39
15/10/2021	08:15	46	59	50	39
15/10/2021	08:30	44	60	47	39
15/10/2021	08:45	45	59	48	39
15/10/2021	09:00	44	60	48	38
15/10/2021	09:15	44	61	48	37
15/10/2021	09:30	42	62	42	37
15/10/2021	09:45	45	66	48	37
15/10/2021	10:00	41	58	45	36
15/10/2021	10:15	41	61	45	35
15/10/2021	10:30	41	56	45	35
15/10/2021	10:45	45	58	49	36
15/10/2021	11:00	46	70	47	35
15/10/2021	11:15	39	53	42	34
15/10/2021	11:30	43	57	46	36
15/10/2021	11:45	45	64	46	35
15/10/2021	12:00	40	57	43	35
15/10/2021	12:15	41	55	44	35
15/10/2021	12:30	40	54	43	36
15/10/2021	12:45	40	55	43	35
15/10/2021	13:00	42	58	46	35
15/10/2021	13:15	45	65	41	33
15/10/2021	13:30	40	54	43	34
15/10/2021	13:45	37	50	41	33
15/10/2021	14:00	40	55	43	35
15/10/2021	14:15	42	58	45	34
15/10/2021	14:30	38	53	41	34
15/10/2021	14:45	38	53	42	33
15/10/2021	15:00	39	54	42	34
15/10/2021	15:15	39	51	43	34
15/10/2021	15:30	39	60	43	33
15/10/2021	15:45	39	54	43	33
15/10/2021	16:00	39	56	42	33



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
15/10/2021	16:15	42	60	45	34
15/10/2021	16:30	46	67	46	36
15/10/2021	16:45	45	57	48	40
15/10/2021	17:00	46	66	48	41
15/10/2021	17:15	44	60	47	40
15/10/2021	17:30	46	60	49	39
15/10/2021	17:45	49	68	50	39
15/10/2021	18:00	47	67	47	39
15/10/2021	18:15	49	68	52	40
15/10/2021	18:30	49	73	50	41
15/10/2021	18:45	47	63	51	40
15/10/2021	19:00	48	63	51	37
15/10/2021	19:15	46	58	49	38
15/10/2021	19:30	47	66	50	39
15/10/2021	19:45	47	63	52	38
15/10/2021	20:00	46	64	48	37
15/10/2021	20:15	43	61	43	37
15/10/2021	20:30	48	77	49	37
15/10/2021	20:45	44	57	48	38
15/10/2021	21:00	44	58	48	38
15/10/2021	21:15	42	60	42	37
15/10/2021	21:30	40	53	42	36
15/10/2021	21:45	43	61	45	38
15/10/2021	22:00	43	58	45	38
15/10/2021	22:15	44	56	47	39
15/10/2021	22:30	43	57	44	40
15/10/2021	22:45	45	61	47	38
15/10/2021	23:00	45	59	48	40
15/10/2021	23:15	47	67	48	42
15/10/2021	23:30	44	54	47	40
15/10/2021	23:45	43	56	45	40
16/10/2021	00:00	45	58	48	40
16/10/2021	00:15	45	59	46	41
16/10/2021	00:30	44	56	45	41
16/10/2021	00:45	45	57	47	39
16/10/2021	01:00	42	55	44	39
16/10/2021	01:15	43	57	46	40
16/10/2021	01:30	45	60	47	40
16/10/2021	01:45	42	52	43	40
16/10/2021	02:00	47	63	47	39
16/10/2021	02:15	42	56	45	38
16/10/2021	02:30	42	52	45	39



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
16/10/2021	02:45	43	55	45	39
16/10/2021	03:00	41	54	42	38
16/10/2021	03:15	42	56	44	39
16/10/2021	03:30	41	54	43	39
16/10/2021	03:45	42	54	44	40
16/10/2021	04:00	41	53	43	39
16/10/2021	04:15	42	51	44	39
16/10/2021	04:30	45	57	46	42
16/10/2021	04:45	42	49	44	39
16/10/2021	05:00	42	49	44	40
16/10/2021	05:15	41	50	42	39
16/10/2021	05:30	44	66	45	41
16/10/2021	05:45	43	53	44	40
16/10/2021	06:00	44	52	45	41
16/10/2021	06:15	44	54	45	41
16/10/2021	06:30	44	52	46	41
16/10/2021	06:45	45	55	47	42
16/10/2021	07:00	46	55	48	44
16/10/2021	07:15	46	55	48	43
16/10/2021	07:30	47	55	49	44
16/10/2021	07:45	47	56	49	45
16/10/2021	08:00	53	74	53	46
16/10/2021	08:15	51	65	52	48
16/10/2021	08:30	50	66	53	47
16/10/2021	08:45	48	68	50	46
16/10/2021	09:00	46	58	48	44
16/10/2021	09:15	47	53	48	45
16/10/2021	09:30	48	57	50	46
16/10/2021	09:45	50	66	50	46
16/10/2021	10:00	47	57	49	45
16/10/2021	10:15	45	59	47	43
16/10/2021	10:30	44	54	46	41
16/10/2021	10:45	45	65	44	40
16/10/2021	11:00	43	58	45	40
16/10/2021	11:15	43	53	45	40
16/10/2021	11:30	42	56	44	38
16/10/2021	11:45	45	66	47	41
16/10/2021	12:00	44	58	46	41
16/10/2021	12:15	43	60	45	39
16/10/2021	12:30	44	58	45	38
16/10/2021	12:45	41	49	43	38
16/10/2021	13:00	43	64	46	38



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
16/10/2021	13:15	43	56	45	39
16/10/2021	13:30	43	61	44	40
16/10/2021	13:45	46	66	47	40
16/10/2021	14:00	43	58	45	40
16/10/2021	14:15	46	68	45	40
16/10/2021	14:30	44	62	47	39
16/10/2021	14:45	43	56	45	39
16/10/2021	15:00	44	68	46	39
16/10/2021	15:15	42	55	44	40
16/10/2021	15:30	42	56	45	40
16/10/2021	15:45	42	54	44	40
16/10/2021	16:00	42	51	45	40
16/10/2021	16:15	43	63	44	40
16/10/2021	16:30	45	59	46	40
16/10/2021	16:45	44	61	46	41
16/10/2021	17:00	45	65	47	41
16/10/2021	17:15	49	72	50	41
16/10/2021	17:30	45	56	47	41
16/10/2021	17:45	46	65	47	41
16/10/2021	18:00	45	64	47	41
16/10/2021	18:15	43	54	44	41
16/10/2021	18:30	45	56	47	42
16/10/2021	18:45	44	55	46	41
16/10/2021	19:00	43	57	45	41
16/10/2021	19:15	43	53	45	40
16/10/2021	19:30	43	61	45	41
16/10/2021	19:45	59	85	60	40
16/10/2021	20:00	44	57	45	40
16/10/2021	20:15	49	66	49	40
16/10/2021	20:30	45	58	47	40
16/10/2021	20:45	44	58	48	40
16/10/2021	21:00	45	57	49	40
16/10/2021	21:15	44	59	46	40
16/10/2021	21:30	43	62	44	39
16/10/2021	21:45	44	59	45	39
16/10/2021	22:00	42	56	44	41
16/10/2021	22:15	45	59	46	40
16/10/2021	22:30	44	58	45	40
16/10/2021	22:45	42	55	43	39
16/10/2021	23:00	42	56	44	39
16/10/2021	23:15	42	56	44	39
16/10/2021	23:30	42	56	44	38



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
16/10/2021	23:45	41	55	43	38
17/10/2021	00:00	41	51	44	38
17/10/2021	00:15	40	48	42	37
17/10/2021	00:30	40	53	42	38
17/10/2021	00:45	40	56	42	37
17/10/2021	01:00	40	52	41	37
17/10/2021	01:15	39	47	41	37
17/10/2021	01:30	40	51	42	38
17/10/2021	01:45	39	47	41	37
17/10/2021	02:00	39	47	41	38
17/10/2021	02:15	39	47	40	37
17/10/2021	02:30	39	46	40	37
17/10/2021	02:45	39	46	41	37
17/10/2021	03:00	39	49	40	37
17/10/2021	03:15	39	56	41	37
17/10/2021	03:30	39	51	41	37
17/10/2021	03:45	38	46	39	37
17/10/2021	04:00	39	49	40	37
17/10/2021	04:15	38	47	40	37
17/10/2021	04:30	39	46	41	37
17/10/2021	04:45	38	45	39	36
17/10/2021	05:00	37	45	38	35
17/10/2021	05:15	39	48	41	37
17/10/2021	05:30	40	47	42	39
17/10/2021	05:45	39	48	41	37
17/10/2021	06:00	39	45	41	37
17/10/2021	06:15	41	51	44	39
17/10/2021	06:30	41	56	43	38
17/10/2021	06:45	39	47	41	38
17/10/2021	07:00	40	51	42	38
17/10/2021	07:15	41	49	43	38
17/10/2021	07:30	42	52	44	40
17/10/2021	07:45	43	58	44	40
17/10/2021	08:00	45	61	46	42
17/10/2021	08:15	43	58	45	40
17/10/2021	08:30	42	57	43	40
17/10/2021	08:45	46	61	47	41
17/10/2021	09:00	43	52	45	41
17/10/2021	09:15	45	60	46	42
17/10/2021	09:30	44	54	45	42
17/10/2021	09:45	44	54	46	42
17/10/2021	10:00	44	54	45	41



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
17/10/2021	10:15	44	57	46	42
17/10/2021	10:30	44	56	45	42
17/10/2021	10:45	43	56	45	41
17/10/2021	11:00	44	57	47	41
17/10/2021	11:15	45	60	47	42
17/10/2021	11:30	44	60	46	42
17/10/2021	11:45	44	56	46	41
17/10/2021	12:00	45	58	47	42
17/10/2021	12:15	45	55	46	43
17/10/2021	12:30	45	53	46	43
17/10/2021	12:45	44	56	46	42
17/10/2021	13:00	45	69	45	41
17/10/2021	13:15	44	54	46	41
17/10/2021	13:30	44	60	46	41
17/10/2021	13:45	44	57	45	41
17/10/2021	14:00	45	60	47	41
17/10/2021	14:15	43	55	44	40
17/10/2021	14:30	43	53	45	41
17/10/2021	14:45	44	67	45	40
17/10/2021	15:00	47	67	46	40
17/10/2021	15:15	44	57	46	41
17/10/2021	15:30	44	55	46	41
17/10/2021	15:45	43	55	45	41
17/10/2021	16:00	43	54	45	42
17/10/2021	16:15	44	58	46	41
17/10/2021	16:30	43	52	44	41
17/10/2021	16:45	43	54	45	41
17/10/2021	17:00	43	63	44	40
17/10/2021	17:15	43	62	44	40
17/10/2021	17:30	42	58	44	40
17/10/2021	17:45	49	67	49	41
17/10/2021	18:00	43	56	44	41
17/10/2021	18:15	45	58	48	42
17/10/2021	18:30	44	63	45	42
17/10/2021	18:45	44	55	45	41
17/10/2021	19:00	44	64	45	41
17/10/2021	19:15	45	63	46	41
17/10/2021	19:30	43	53	44	40
17/10/2021	19:45	45	59	45	40
17/10/2021	20:00	43	58	44	40
17/10/2021	20:15	47	61	50	41
17/10/2021	20:30	41	54	43	39



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
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17/10/2021	21:00	43	53	44	40
17/10/2021	21:15	44	58	45	40
17/10/2021	21:30	42	54	44	40
17/10/2021	21:45	43	58	43	40
17/10/2021	22:00	43	55	44	40
17/10/2021	22:15	41	52	43	39
17/10/2021	22:30	41	48	42	39
17/10/2021	22:45	43	54	45	38
17/10/2021	23:00	41	55	42	38
17/10/2021	23:15	41	55	42	38
17/10/2021	23:30	39	46	41	37
17/10/2021	23:45	39	47	40	37
18/10/2021	00:00	40	51	42	37
18/10/2021	00:15	39	48	41	36
18/10/2021	00:30	40	50	42	37
18/10/2021	00:45	38	49	41	36
18/10/2021	01:00	40	54	44	36
18/10/2021	01:15	38	48	40	36
18/10/2021	01:30	38	48	40	36
18/10/2021	01:45	42	58	43	37
18/10/2021	02:00	41	52	43	37
18/10/2021	02:15	39	47	40	37
18/10/2021	02:30	38	45	39	36
18/10/2021	02:45	39	48	40	37
18/10/2021	03:00	39	49	41	36
18/10/2021	03:15	39	48	40	37
18/10/2021	03:30	42	53	44	38
18/10/2021	03:45	40	52	42	38
18/10/2021	04:00	41	54	43	38
18/10/2021	04:15	41	49	43	39
18/10/2021	04:30	42	53	44	40
18/10/2021	04:45	43	51	45	40
18/10/2021	05:00	42	48	43	39
18/10/2021	05:15	44	57	46	42
18/10/2021	05:30	44	54	46	42
18/10/2021	05:45	43	51	44	41
18/10/2021	06:00	45	54	46	42
18/10/2021	06:15	46	55	48	44
18/10/2021	06:30	47	55	48	45
18/10/2021	06:45	47	56	49	46
18/10/2021	07:00	49	61	50	47



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
18/10/2021	07:15	49	57	50	47
18/10/2021	07:30	49	60	51	47
18/10/2021	07:45	50	64	52	49
18/10/2021	08:00	50	58	52	49
18/10/2021	08:15	50	58	52	49
18/10/2021	08:30	50	59	52	49
18/10/2021	08:45	52	66	54	50
18/10/2021	09:00	53	66	55	50
18/10/2021	09:15	50	67	52	48
18/10/2021	09:30	49	60	50	48
18/10/2021	09:45	49	59	51	47
18/10/2021	10:00	49	67	51	47
18/10/2021	10:15	49	67	50	47
18/10/2021	10:30	49	70	50	46
18/10/2021	10:45	49	78	49	46
18/10/2021	11:00	47	57	48	46
18/10/2021	11:15	48	70	49	45
18/10/2021	11:30	47	63	48	45
18/10/2021	11:45	47	60	49	45
18/10/2021	12:00	48	62	49	45
18/10/2021	12:15	46	58	48	45
18/10/2021	12:30	47	62	48	45
18/10/2021	12:45	46	57	48	45
18/10/2021	13:00	47	54	48	45
18/10/2021	13:15	48	59	50	45
18/10/2021	13:30	48	61	50	46
18/10/2021	13:45	48	61	50	46
18/10/2021	14:00	48	57	49	46
18/10/2021	14:15	47	55	49	46
18/10/2021	14:30	50	68	50	46
18/10/2021	14:45	48	55	49	46
18/10/2021	15:00	52	71	49	46
18/10/2021	15:15	48	63	50	46
18/10/2021	15:30	47	57	48	46
18/10/2021	15:45	48	59	50	46
18/10/2021	16:00	48	58	49	46
18/10/2021	16:15	49	66	52	46
18/10/2021	16:30	49	60	52	46
18/10/2021	16:45	49	65	50	46
18/10/2021	17:00	51	73	51	45
18/10/2021	17:15	48	63	51	44
18/10/2021	17:30	46	57	47	44



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
18/10/2021	17:45	46	61	49	44
18/10/2021	18:00	45	61	47	43
18/10/2021	18:15	45	58	47	42
18/10/2021	18:30	44	56	46	42
18/10/2021	18:45	44	54	46	42
18/10/2021	19:00	43	54	45	41
18/10/2021	19:15	44	54	46	41
18/10/2021	19:30	43	50	45	41
18/10/2021	19:45	43	53	45	40
18/10/2021	20:00	42	52	44	40
18/10/2021	20:15	44	55	45	40
18/10/2021	20:30	43	57	44	40
18/10/2021	20:45	43	53	45	40
18/10/2021	21:00	43	50	45	40
18/10/2021	21:15	43	53	45	40
18/10/2021	21:30	42	54	44	40
18/10/2021	21:45	42	52	44	39
18/10/2021	22:00	42	54	44	40
18/10/2021	22:15	40	49	43	38
18/10/2021	22:30	47	65	41	36
18/10/2021	22:45	40	52	42	38
18/10/2021	23:00	39	50	41	36
18/10/2021	23:15	39	47	41	37
18/10/2021	23:30	39	53	41	36
18/10/2021	23:45	39	46	40	37
19/10/2021	00:00	39	51	41	37
19/10/2021	00:15	39	49	41	37
19/10/2021	00:30	39	52	42	37
19/10/2021	00:45	40	61	42	37
19/10/2021	01:00	40	65	41	37
19/10/2021	01:15	40	53	42	37
19/10/2021	01:30	39	52	41	36
19/10/2021	01:45	40	51	42	38
19/10/2021	02:00	40	49	41	38
19/10/2021	02:15	41	50	43	38
19/10/2021	02:30	39	49	41	37
19/10/2021	02:45	38	47	40	36
19/10/2021	03:00	40	48	42	37
19/10/2021	03:15	41	57	43	38
19/10/2021	03:30	40	53	43	38
19/10/2021	03:45	39	47	41	36
19/10/2021	04:00	39	48	41	37



Date	Start Time	LAeq,15min	LAmax,f	LA10,15min	LA90,15min
19/10/2021	04:15	39	49	41	36
19/10/2021	04:30	42	56	44	39
19/10/2021	04:45	43	55	45	39
19/10/2021	05:00	42	52	43	39
19/10/2021	05:15	43	57	44	40
19/10/2021	05:30	43	60	45	41
19/10/2021	05:45	43	51	44	41
19/10/2021	06:00	44	55	45	42
19/10/2021	06:15	45	57	47	43
19/10/2021	06:30	46	56	48	44
19/10/2021	06:45	46	56	48	45
19/10/2021	07:00	46	57	48	45
19/10/2021	07:15	47	59	50	45
19/10/2021	07:30	55	73	53	46
19/10/2021	07:45	48	65	50	47
19/10/2021	08:00	48	60	50	47
19/10/2021	08:15	49	62	50	47
19/10/2021	08:30	48	58	50	46
19/10/2021	08:45	49	60	51	47
19/10/2021	09:00	48	58	49	46
19/10/2021	09:15	48	61	50	46
19/10/2021	09:30	64	82	69	48



Appendix E

Noise Calculation Methods

Specific noise levels are predicted or measured in terms of the Equivalent Continuous Noise Level, $L_{Aeq,T}$ over a given reference time interval, T. In BS4142:2014+A1:2019 the reference time interval is 1 hour for daytime and 15 minutes for night-time.

The calculation method for any plant which is relatively fixed in location is that set out in BS5228-1: 2009 + A1: 2014, Annex F, and is the 'Method for activity L_{Aeq} ' described in section F.2.2 or the 'Method for plant sound power level' described in section F.2.3.

The calculation method for site mobile plant such as lorries and dump trucks is that set out in BS5228-1: 2009 + A1: 2014, Annex F, and is the 'Method for mobile plant using a regular well defined route (e. g. haul roads)' described in section F. 2. 5.

Ground Absorption has been calculated using the technique set out in BS5228-1: 2009 + A1: 2014, Annex F, assuming 90% soft ground between the site and the receiver locations.

The method of assessing screening is that attributed to Maekawa as used in BS5228-1: 2009 + A1: 2014, Annex F and various other Government published documents. This method uses the calculated path difference and octave band noise data for each noise source over the frequency range stated in BS5228-1: 2009 + A1: 2014, Annex F.

The effects of ground absorption are not used in the calculations if screening has been assessed and offers a higher attenuation.

The nearest distances to the respective dwellings, from the various items of plant, have been used in an acoustic model for the site to calculate the reasonable worst case $L_{Aeq,T}$ site noise levels.

Noise calculation sheets are included in Appendix F.



Appendix F
Noise Calculation Sheets

**Covanta
Proposed IBA and HBM Facility
Ogee Business Park, Wellingborough
Construction**

03-Feb-22

RS/KG

Site Ground Height : 55 m AOD
Receiver Height : 1.5 m

Set Back
0

Ref	Plant Item	Comments on Plant	Activity LAeq @ 10 m	Power LWA or LWA / m	On-time %	Capacity Tonnes	Source Height	2 way flow Q per hour	Speed V kph	Plant Set back(m)	BS5228 method		
1	Piling		98	126	100		2			0	m back	1	Activity
2	RMX Lorry		79	107	100		2			0	m back	1	Activity
3	Loading Shovel	BS5228 Table C.9	77	105	100		2			0	m back	1	Activity
4	Telescopic Handler/Forklift	BS5228 Table C.4	79	107	100		2			0	m back	1	Activity
5	Crane	BS5228 Table C.4	82	110	100		4			0	m back	1	Activity
6	HGVs within site		76	104	100		2			0	m back	1	Activity
7	Dump Trucks	BS5228 Table C.5	81	109	100		2			0	m back	3	Defined Area
8	Mobile Elevated Working Platform (MEWP)	BS5228 Table C.4	67	95	100		3			0	m back	1	Activity
9	360° Excavator	BS5228 Table C.5	80	108	100		2			0	m back	1	Activity
10	Pump with Diesel Generator	BS5228 Table C.4	74	102	100		1			0	m back	1	Activity
11													Activity
12													Activity
13													Activity
14													Activity
15													Activity

Location No. 1 Farm Cottage
Receiver Height 80.5 m AOD
Site Noise Level for Items 1 to 10 **60 dB LAeq, 1 hour, free field**

Ref	Plant Item	Plan Distance	Working Distance	Ground Height	Working Height/depth	Source Height	Angle Degrees	Range Metres	Barrier -Receiver	Barrier Height	Path Diff.	Barrier Atten.	Soft Ground %	Ground Atten.	Resultant LAeq
1	Piling	460	460	55.0	0.0	57.0	0	0	0	0.0	-1.000	0.0	90.0	5.7	59.1
2	RMX Lorry	460	460	55.0	0.0	57.0	0	0	0	0.0	-1.000	0.0	90.0	5.7	40.1
3	Loading Shovel	460	460	55.0	0.0	57.0	0	0	0	0.0	-1.000	0.0	90.0	5.7	38.1
4	Telescopic Handler/Forklift	460	460	55.0	0.0	57.0	0	0	0	0.0	-1.000	0.0	90.0	5.7	40.1
5	Crane	460	460	55.0	0.0	59.0	0	0	0	0.0	-1.000	0.0	90.0	4.8	43.9
6	HGVs within site	460	460	55.0	0.0	57.0	0	0	0	0.0	-1.000	0.0	90.0	5.7	37.1
7	Dump Trucks	460	460	55.0	0.0	57.0	0	250	0	0.0	-1.000	0.0	90.0	5.7	42.1
8	Mobile Elevated Working Platform (MEWP)	460	460	55.0	0.0	58.0	0	0	0	0.0	-1.000	0.0	90.0	5.2	28.5
9	360° Excavator	460	460	55.0	0.0	57.0	0	0	0	0.0	-1.000	0.0	90.0	5.7	41.1
10	Pump with Diesel Generator	610	610	55.0	0.0	56.0	0	0	0	0.0	-1.000	0.0	90.0	6.2	32.1
11	0	610	610	55.0	0.0	58.0	0	0	0	0.0	-1.000	0.0	90.0	5.8	21.5
12	Conveyor/Transfer Point	610	610	55.0	0.0	70.0	0	0	0	0.0	-1.000	0.0	90.0	0.0	25.3
13	Generator	610	610	55.0	0.0	57.0	0	0	0	0.0	-1.000	0.0	90.0	6.2	21.1
14	0	10000	10000	0.0	0.0	0.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0
15	HGVs within site	650	650	55.0	0.0	57.0	20	0	0	0.0	-1.000	0.0	90.0	6.4	33.4



**Covanta
Proposed IBA and HBM Facility
Ogee Business Park, Wellingborough
Operation**

Site Ground Height : 55 m AOD
Receiver Height : 1.5 m

Set Back
0

Ref	Plant Item	Comments on Plant	Activity LAeq @ 10 m	Power LWA or LWA / m	Capacity On-time %	Source Tonnes Height	2 way flow Q per hour	Speed V kph	Plant Set back(m)	BS5228 method	
1											
2											
3		IBA Facility	-1027	-999	100	0			0	m back 1	Activity
4	IBA Phase 1	Measured noise output level	82	110	100	5			0	m back 1	Activity
5	IBA Phase 2	Measured noise output level	75	103	100	5			0	m back 1	Activity
6	Crusher	Measured noise output level	76	104	100	6			0	m back 1	Activity
7	Loading Shovel	AECL database	77	105	100	2			0	m back 1	Activity
8	Telescopic Handler	Product Data Sheet	76	104	100	2			0	m back 1	Activity
9		HBM Facility	-1027	-999	100	0			0	m back 1	Activity
10	Loading shovel	AECL database	77	105	100	2			0	m back 1	Activity
11	Mixers	Measured noise output level	63	91	100	3			0	m back 1	Activity
12	Conveyor/Transfer Point	Measured noise output level	61	89	100	15			0	m back 1	Activity
13	Generator	Measured noise output level	63	91	100	2			0	m back 1	Activity
14			-1027	-999	100	0			0	m back 1	Activity
15	HGVs within site	AECL database	76	104	100	2	44	15	0	m back 4	Haul Road

Location No. 1 Farm Cottage
Receiver Height 80.5 m AOD
Site Noise Level **38 dB LAeq, 1 hour, free field**

Ref	Plant Item	Plan Distance	Working Distance	Ground Height	Working Height/depth	Source Height	Angle Degrees	Range Metres	Barrier -Receiver	Barrier Height	Path Diff.	Barrier Atten.	Soft Ground %	Ground Atten.	Resultant LAeq
1	Rail Unloading (hydraulic excavator)	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-999.0
2	Rail Loading (reach stacker)	10000	10000	0.0	0.0	2.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-999.0
3	0	10000	10000	0.0	0.0	0.0	0	0	0	0.0	-1.000	0.0	0.0	0.0	-1087.0
4	IBA Phase 1	460	460	55.0	0.0	60.0	0	0	400	70.0	0.509	16.9	90.0	4.4	31.8
5	IBA Phase 2	460	460	55.0	0.0	60.0	0	0	400	70.0	0.509	16.4	90.0	4.4	25.3
6	Crusher	460	460	55.0	0.0	61.0	0	0	400	70.0	0.396	15.8	90.0	3.9	26.9
7	Loading Shovel	460	460	55.0	0.0	57.0	0	0	400	70.0	0.930	17.7	90.0	5.7	26.0
8	Telescopic Handler	460	460	55.0	0.0	57.0	0	0	400	70.0	0.930	17.7	90.0	5.7	25.0
9	0	10000	10000	0.0	0.0	0.0	0	0	400	70.0	-0.069	0.0	0.0	0.0	-1087.0
10	Loading shovel	610	610	55.0	0.0	57.0	0	0	400	70.0	0.087	9.9	90.0	6.2	31.4
11	Mixers	610	610	55.0	0.0	58.0	0	0	400	70.0	0.066	9.5	90.0	5.8	17.8
12	Conveyor/Transfer Point	610	610	55.0	0.0	70.0	0	0	400	70.0	-0.047	0.0	90.0	0.0	25.3
13	Generator	610	610	55.0	0.0	57.0	0	0	400	70.0	0.087	9.9	90.0	6.2	17.4
14	0	10000	10000	0.0	0.0	0.0	0	0	400	70.0	-0.069	0.0	0.0	0.0	-1087.0
15	HGVs within site	650	650	55.0	0.0	57.0	20	0	0	55.0	-1.000	0.0	90.0	6.4	31.6



