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SAXON WORKS,
PETERBOROUGH ROAD, WHITTLESEY

NOISE IMPACT ASSESSMENT

Report **16426-NIA-01 RevI**

Prepared on 11 February 2022

Issued For:

Johnsons Aggregates and Recycling
Crompton Road
Ilkeston
Derbyshire
DE7 4BG

Executive Summary

This noise impact assessment has been undertaken to assess proposed industrial operations including moving aggregate materials and aggregates screening operations at Saxon Works, Peterborough Road, Whittlesey.

General site operations comprise the processing of Incinerator Bottom Ash and Construction & Demolition waste, involving deliveries of waste, concrete and rubble, which are stored on site, before being processed and then collected back from the site.

A background noise survey has been undertaken as detailed in the report, in order to determine an appropriate noise emission criterion, in accordance with the requirements of British Standard 4142: 2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*' [BS 4142].

Calculations were undertaken in locations representative of the nearest identified receivers, identified as houses on Peterborough Road to the north and Snoots Road to the east. It should be noted that if there are closer receivers that Clement Acoustics is not aware of, a reassessment will be necessary, and this should therefore be confirmed by the Client.

Existing measurements and manufacturer provided noise levels of processes understood to take place on site have allowed for a 3D noise mapping model to be developed, which has been used to investigate the transmission of noise to identified receivers, and an investigation into the effectiveness of possible mitigation measures.

The assessment and report are dependent on the following material considerations:

- Different operations will be undertaken during the stated operating hours, for the assessed scenarios
- The provided noise levels for onsite processes and equipment are representative of the noise levels used in the noise mapping model.
- Source and receiver locations are as established in this report and marked on the site plan
- Mitigation to be applied as specified

If there is any deviation from the above, Clement Acoustics must be informed, in order to establish whether a reassessment is necessary.

With the adopted mitigation measures as proposed in this assessment, it has been demonstrated that when assessed according to the guidance of BS 4142, the findings for 3 established assessment periods are as follows:

- Period 1 (06:00 to 18:00)
    - No adverse impacts are predicted at any receiver during this period, based on the stated assumptions and with mitigation measures as proposed
- Period 2 (06:00 to 22:00)
    - No adverse impacts are predicted at any receiver during this period, based on the stated assumptions and with mitigation measures as proposed
- Period 3 (24-hour)
    - No adverse impacts are predicted at any receiver during this period, based on the stated assumptions and with mitigation measures as proposed

Clement Acoustics has used all reasonable skill and professional judgement when preparing this report. The report relies on the information as provided to us at the time of writing and the assumptions as made in our assessment.

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Document Revision	Date of Revision	Reasons for Revision	Revision By
0	15/01/2021	First Issue	Andy Thomas MIOA
RevA	23/03/2021	Separated operations out into early morning and daytime	Duncan Martin MIOA
RevB	17/05/2021	Addressing comments issued by the Local Authority and the Environmental Agency	Andy Thomas MIOA
RevC	23/06/2021	Corrected proposed operating hours	Duncan Martin MIOA
RevD	20/07/2021	Updated noise model assessment to align with proposed operations	Duncan Martin MIOA
RevE	23/07/2021	Added clarifications to findings	Duncan Martin MIOA
RevF	09/08/2021	Updating noise model to align with the alterations to the proposed scheme and address comments from the EA	Andy Thomas MIOA
RevG	14/10/2021	Updated assessment and findings following additional noise survey	Duncan Martin MIOA
RevH	07/02/2022	Updated to include latest proposed mitigation measures and consider comments from the Local Authority	Duncan Martin MIOA
RevI	11/02/2022	Response to Local Authority comments	Duncan Martin MIOA

1.0 INTRODUCTION

Clement Acoustics (CA) has been commissioned by Johnsons Aggregates and Recycling to measure background noise levels around the site at Saxon Works, Peterborough Road, Whittlesey PE7 1PD.

Based on existing noise levels of similar equipment and operations, a 3D noise mapping model has been developed.

This report presents the results of the environmental survey and predicted noise levels from proposed on site operations, followed by noise impact calculations and a discussion of possible mitigation measures.

An acoustic terminology glossary is provided in Appendix A.

2.0 SITE DESCRIPTION

The location is a historically industrial site in a mixed industrial and residential area, with existing industrial uses to the south of the site. Access to the site is via an access road from Peterborough Road. The access road has been observed to be currently used for other industrial activities including HGV movements.

The site is proposed to operate as a recycling facility for Incinerator Bottom Ash (IBA) and Construction and Demolition (C&D) Waste.

A kicker wall will be located on the eastern boundary of the site as indicated in Figure 2.1. The wall will be 5600 mm above ground level and comprise of 800 mm stackable concrete blocks.

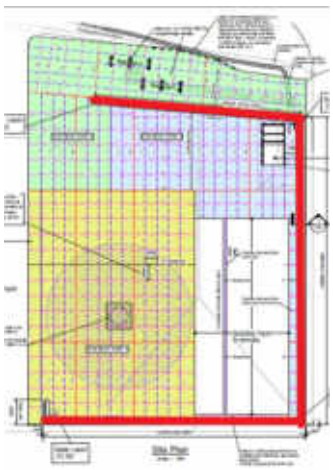


Figure 2.1 Kicker Wall Location

Three main periods of operations have been established. These are summarised below and discussed in more detail in subsequent sections.

- Period 1: 06:00 to 18:00
    - Includes all onsite processes
- Period 2: 06:00 to 22:00
    - Includes all internal processes
    - No external processing or acceptance of materials
- Period 3: 24-Hour Use
    - Internal operations in Building 2 and associated machinery only
    - No external processing, acceptance of materials or Building 1 operations

Figure 2.2 presents a Gantt chart of the different operating periods.

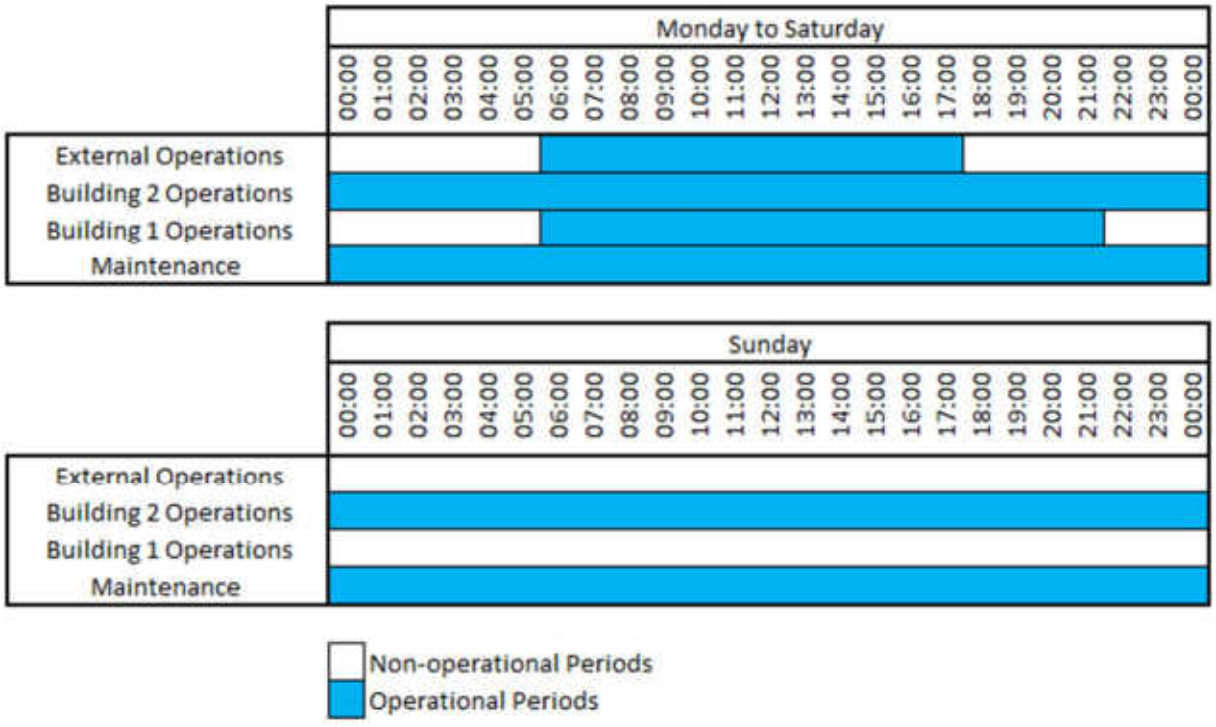


Figure 2.2 Operational periods

Note: Latest proposals are to vary hours and restrictions on Saturdays, to further protect the amenity of receptors during more sensitive periods. The varying times and additional measures for Saturday operations are discussed and summarised in Appendix L. The mitigation measures recommended for Saturday are included in Section 7.5 Proposed Mitigation and Appendix I Noise Management Plan.

The topography of the area is complex, the ground level of the site is approximately 25 to 30 m lower than the surrounding area. Residential dwellings partially overlook the site on Peterborough Road and Snoots Road.

Locations are shown in attached site plan 16426-SP1.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Unattended Noise Survey Procedure

Prior to the site being brought into use, a background environmental noise survey was undertaken on site.

Measurements were undertaken at two positions as shown on indicative site drawing 16426-SP1. The choice of these positions was based both on accessibility and on collecting representative noise data in relation to the nearest affected receivers. Survey position 1 will be used to represent the background noise profile for receivers on Peterborough Road, while survey position 2 will be used to represent the background noise profile for receivers on Snoots Road.

The surroundings and positions used for the monitoring locations are described in Table 3.1.

Position No.	Description
1	The microphone was mounted on a 2 m pole on the northern side of the site. The microphone was positioned away from any reflective surfaces. [1]
2	The microphone was mounted on a 3 m pole on the eastern side of the site. The microphone was positioned away from any reflective surfaces. [1]

Table 3.1: Description of unattended monitoring locations

Note [1]: The position was considered to be free-field according to guidance found in BS 4142: 2014, and a correction for reflections has therefore not been applied.

Continuous automated monitoring was undertaken for the duration of the survey between 15:00 on Friday 08 January 2021 and 12:00 on Tuesday 12 January 2021.

Background noise levels at the monitoring positions consisted mainly of traffic noise from surrounding roads and noise from plant / equipment associated with the existing industrial operations adjacent to the site, as shown in the site plan attached.

The existing operation comprised of excavators, front ended diggers and HGVs. These operations were ongoing during daytime hours over the period of the survey, excluding Sunday.

The measurement procedure generally complied with BS 7445: 1991: '*Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*'.

It is noted that the unattended noise surveys were undertaken during a national 'lockdown' associated with the COVID-19 pandemic. This is likely to have reduced traffic noise, which were determined to be a part of the acoustic environment. This will result in a lower typical background sound level and consequently a more onerous assessment.

Consideration was given in line with the joint guidance letter issued by the Association of Noise Consultants (ANC) and the Institute of Acoustics (IOA).

3.2 Resurvey of Environmental Noise

As stated in Section 3.1, initial surveys were undertaken during an enforced lockdown period, as part of the UK Government's response to the global Covid-19 Pandemic. As a result, traffic levels on surrounding roads could have been significantly reduced. The site was therefore revisited in September 2021, when lockdown restrictions had been eased.

Attended measurements and subjective observations close to Peterborough Road indicated that traffic flows had significantly increased and residual noise levels could therefore be higher.

Attended measurements and subjective observations close to Snoots Road indicated that residual noise levels close to Snoots Road indicated that residual noise levels were less dependent on road traffic noise, being located further from any one road, and noise levels therefore remained similar.

A summary of the analysis of attended measurements at each location, compared with the previously obtained data, is shown in Appendix D.

An additional survey was therefore undertaken close to the Peterborough Road boundary, which is particularly dependent on levels of road traffic.

Measurements were undertaken at the position shown on indicative site drawing 16426-SP1. The choice of this positions was based both on accessibility and on collecting representative noise data. This survey position will be used to represent the background noise profile for receivers on Peterborough Road.

The surroundings and position used for the monitoring location are described in Table 3.2.

Position No.	Description
3	The microphone was mounted on a 2 m pole on the northern side of the side. The microphone was positioned away from any reflective surfaces. [1]

Table 3.2: Description of unattended monitoring locations

Note [1]: The position was considered to be free-field according to guidance found in BS 4142: 2014, and a correction for reflections has therefore not been applied.

Continuous automated monitoring was undertaken for the duration of the survey between 14:00 on Wednesday 15 September 2021 and 13:30 on Monday 20 September 2021.

Background noise levels at the monitoring positions consisted mainly of traffic noise from surrounding roads and noise from plant / equipment associated with the existing industrial operations adjacent to the site, as shown in the site plan attached.

The existing operation comprised of excavators, front ended diggers and HGVs. These operations were ongoing during daytime hours over the period of the survey, excluding Sunday.

The measurement procedure generally complied with BS 7445: 1991: '*Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*'.

3.3 Weather Conditions

At the time of set-up and collection of the unattended survey equipment during the first survey, the weather conditions were cold, dry with light winds.

It is understood that no precipitation occurred during the survey, with wind speeds below 5 m/s on each day, with the exception of Sunday 10 January 2021 from 23:00 till 02:00 the following morning. This period has been excluded from the survey results when calculating representative background noise periods.

It is considered that due to the length of the survey, the weather conditions did not significantly adversely affect the measurements and are therefore considered suitable for the measurement of environmental noise.

At the time of set-up and collection of the unattended survey equipment during the second survey, the weather conditions were dry and partially cloudy, with light winds.

It is understood that no precipitation occurred during the survey, with wind speeds generally below 5 m/s.

It is considered that the weather conditions did not adversely affect the measurements and are therefore considered suitable for the measurement of environmental noise.

3.4 Equipment

The equipment calibration was verified, by means of a field verification check, before and after use and no abnormalities were observed as shown in Table 3.3.

Position No.	Make / Model	Type	Serial Number	Drift[1]
1	Svantek 957	Class 1 Sound Level Meter	15381	0.4 dB
2	Svantek 958A	Class 1 Sound Level Meter	59525	-0.1 dB
3	Svantek 958	Class 1 Sound Level Meter	15845	0.1 dB
All	Svantek SV33B	Class 1 Calibrator	83120	-

Table 3.3: Equipment and Calibration Drift

[1] The calibration drift is the difference between calibration factor measured before and after the survey. The drift should be less than +/- 0.5 dB.

Calibration certificates are available on request.

4.0 RESULTS

4.1 Unattended Noise Survey Results

The $L_{Aeq:\ 5min}$, $L_{Amax:\ 5min}$, $L_{A10:\ 5min}$ and $L_{A90:\ 5min}$ acoustic parameters were measured and are shown as time histories in figures 16426-TH1, 16426-TH2 and 16462-TH3.

Analysis of the measured background sound levels has been undertaken in accordance with the statistical analysis method example as shown in Figure 4 of BS 4142: 2014. It should be noted that the guidance of the standard is as follows:

"*The objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods*."

In order to ensure a representative assessment, the analysis was based on Survey Position 3 for receivers close to Peterborough Road, as this survey location is considered to be at a comparable

distance from the main source of noise influencing background noise levels, namely Peterborough Road.

The analysis will be based on Survey Position 2 for receivers close to Snoot Road.

The frequency distribution of background sound levels measured during the daytime, night-time and early morning periods are shown in Figures 4.1 to 4.3 for monitoring Position 3 and Figures 4.4 to 4.5 for monitoring Position 2.

These periods are defined as follows, chosen to ensure consistency with the Gantt charts shown in Figure 2.2:

- Period 1: 06:00 to 18:00
- Period 2: 06:00 to 22:00
- Period 3: 24-Hour Use[1]

[1] For Period 3, which includes the entire night-time period and also occurs on Sundays, the analysis has been based on weekend night-time hours only, in order to present a robust assessment for 24-hour weekend use.

A specific evening period (19:00 – 23:00) has not been included within this assessment in line with the defined daytime and night-time periods detailed in BS 4142: 2014.

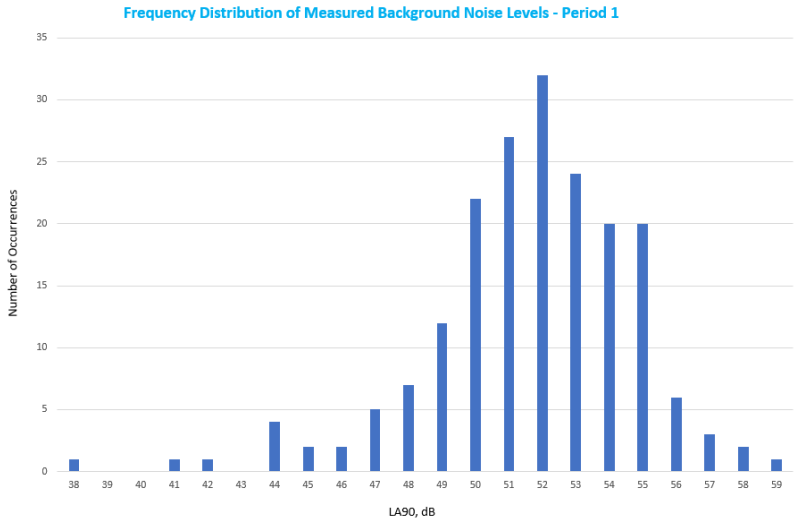


Figure 4.1: Statistical analysis of the background sound level at Position 3 (Peterborough Road) – Period 1

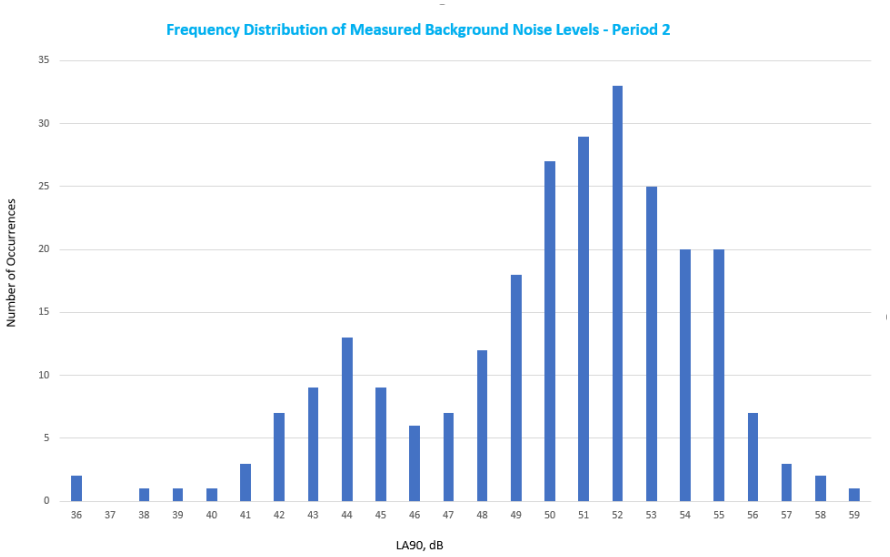


Figure 4.2: Statistical analysis of the background sound level at Position 3 (Peterborough Road) – Period 2

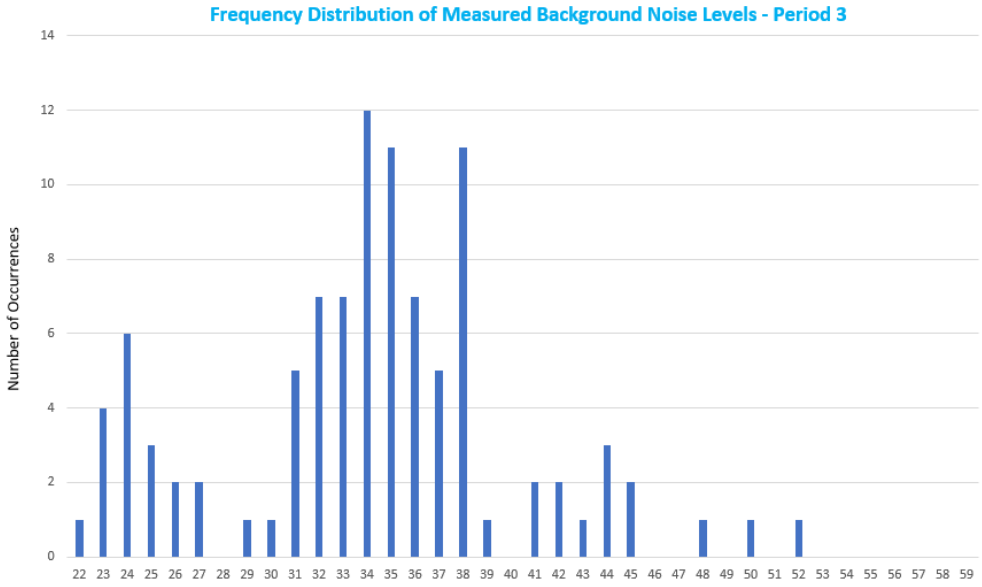


Figure 4.3: Statistical analysis of the background sound level at Position 3 (Peterborough Road) – Period 3

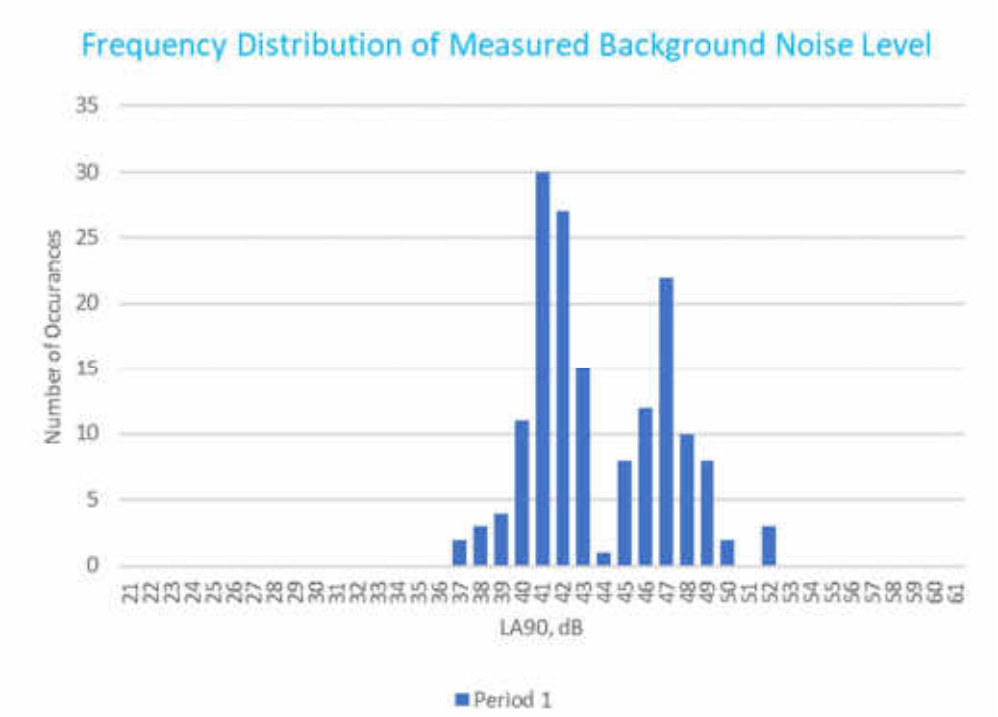


Figure 4.4: Statistical analysis of the background sound level at Position 2 (Snoots Road) – Period 1

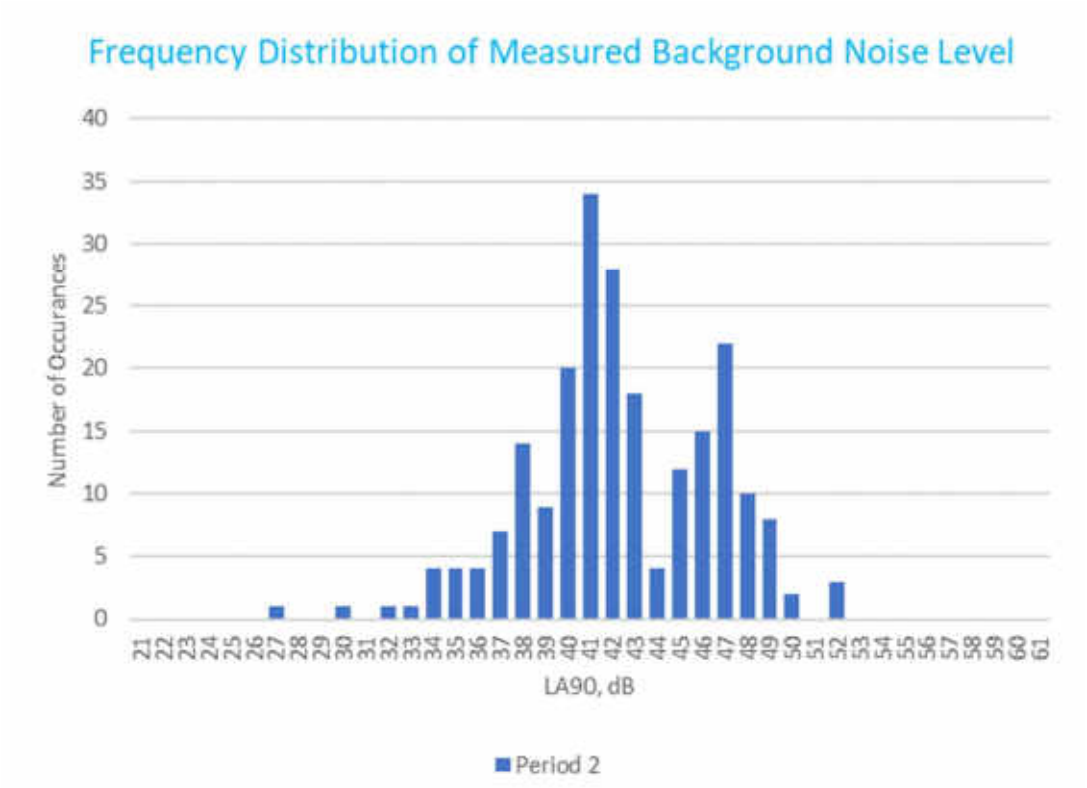


Figure 4.5: Statistical analysis of the background sound level at Position 2 (Snoots Road) – Period 2

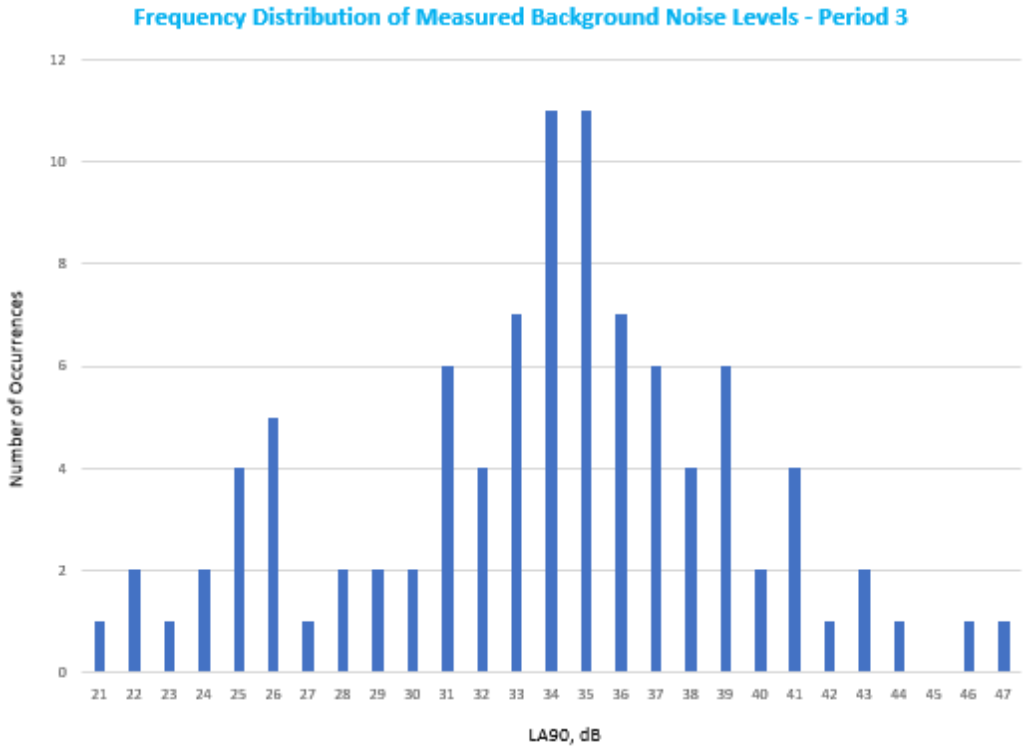


Figure 4.6: Statistical analysis of the background sound level at Position 2 (Snoots Road) – Period 3

Based on the analysis shown in Figures 4.1 to 4.4, the typical background noise level has been determined in Table 4.1 for the different time periods in each monitoring location. The calculated levels are considered to be in accordance with the conclusions drawn from the same methodology when used in the BS 4142:2014 example.

As stated in in BS 4142 there is no single background sound level due to the nature of a fluctuating parameter. Furthermore, it should not be considered to the minimum, mean or modal value. Therefore, the levels were chosen to represent a level that was not necessarily the most frequent but would be considered regular during the defined periods.

Measurement Position	Typical Background Noise Level, LA90		
	Period 1	Period 2	Period 3
Position 3	50	50	34
Position 2	42	42	34

Table 4.1: Typical Background Sound Level

5.0 ASSESSMENT CRITERIA

5.1 Proposed Industrial Operations

In a BS 4142 assessment, corrections are applied to noise levels in order to calculate a noise rating level for the effects of proposed activities on nearby noise sensitive receivers. This calculated receiver noise level is compared with the typical measured background noise level.

BS 4142 recommends penalties that can be applied to noise emissions to account for tonality, impulsivity and intermittency. Where a sound source is neither tonal nor impulsive, but is still distinctive against the residual acoustic environment, a penalty may still be applied.

The available penalties for different characteristics are summarised in Table 5.1.

Characteristic	Comments	Maximum Penalty
Tonality	Can be converted to 2 dB for a tone which is just perceptible, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible	6 dB
Impulsivity	Can be converted to 3 dB for impulsivity which is just perceptible, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible	9 dB
Distinctiveness	Intended for sources that are neither tonal nor impulsive, but distinctive against background noise sources	3 dB
Intermittency	When the sound has identifiable on/off conditions	3 dB

Table 5.1: Available penalties according to BS4142

BS 4142 states that a noise rating 5 dB above the background noise level is likely to be an indication of an adverse impact. If the difference is 10 dB or more, then this is stated as likely to be an indication of a significant adverse impact. Where the rating level does not exceed the background sound level, this is stated as an indication of the sound source having a low impact.

Calculated noise emissions will be assessed against the background sound levels shown in Table 4.1.

A one-hour reference period has been used for the daytime assessment as required by BS 4142, while a 15-minute reference period has been used for the early morning assessment.

6.0 DESCRIPTION OF NOISE SOURCES

The general proposed layout of the site is shown in Figure 6.1. The majority of processes will be undertaken internally within Buildings 1 and 2, marked on the figure, although some operations will also be undertaken externally around the site.

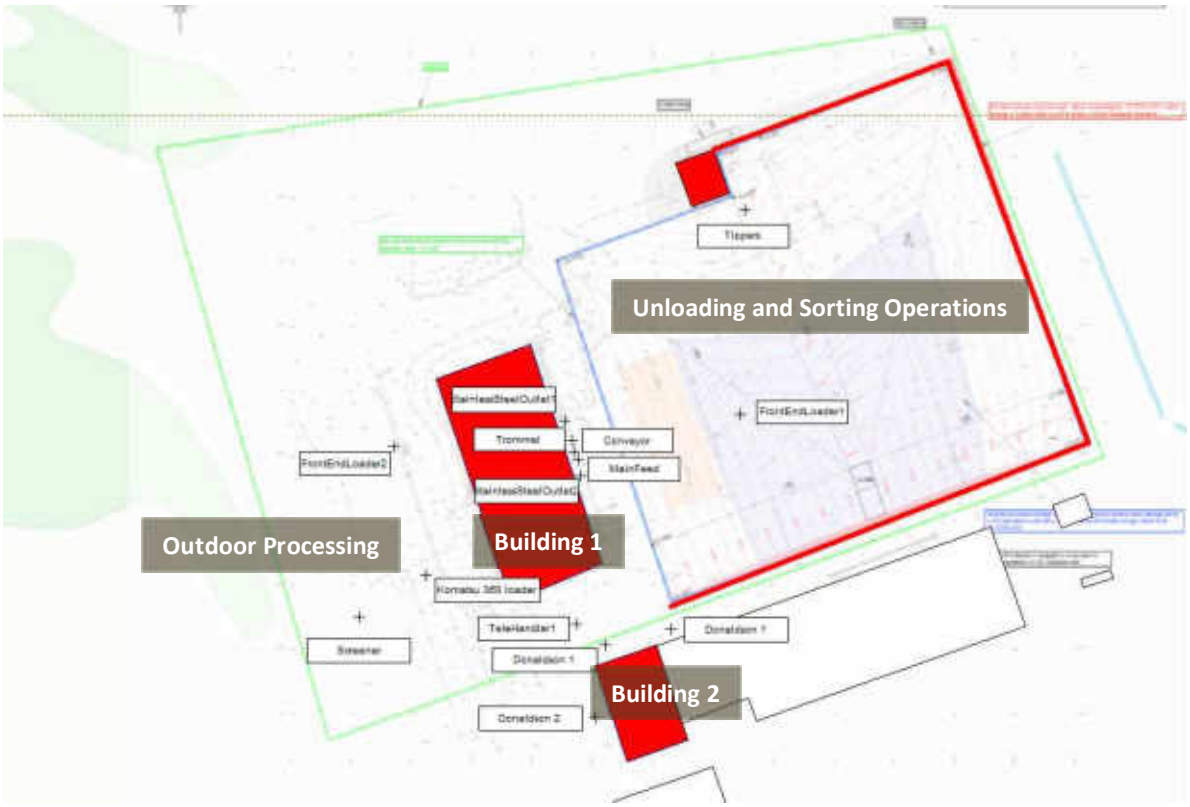


Figure 6.1: Plan view showing general layout of site

As the site is not currently in operation the associated noise levels will need to be assumed based on proposed operations.

The sources used to predict noise levels are manufacturer data or measured data at an existing Johnson Aggregates site in Ilkeston, or other similar operations found in library data where necessary. This provides the most accurate way to predict the noise levels from noise sources to a bespoke facility. This is particularly relevant to external screening operations and internal operations within Building 1. Further guidance on typical noise levels has been taken from available manufacturer data and Annexe C of British Standard *5228-1:2009 'Code of practice for noise and vibration control on construction and open sites. Noise'* [BS 5228-1].

Noise sources are generally distributed between 3 main groups, as follows:

- Operations associated with external processing and acceptance of materials
- Operations associated with Building 1 Processing
- Operations associated with Building 2 Processing

The groups also largely correlate with the operational hours. Noise sources used in the assessment and a description of assumptions made during the modelling are shown in the following Sections.

6.1 External Processing and Acceptance of Materials

Operations in this group are all undertaken externally and will only be undertaken during Period 1.

The noise sources associated with this group are summarised as follows:

- Site arrival and tipper truck operations
  - Materials arrive on site and are deposited, generally by tipping, in the northeast corner of the site, within the kicker wall area. HGV Movements and operations have been accounted for through the following noise sources:
    - HGV Movements and Unloading Operations modelled as a point source in the unloading area close to the site entrance, and as moving point sources along the main identified onsite HGV routes to loading areas
      - In order to predict the level of noise from this process, a measurement taken by CA on the Ilkeston site has been used, which was taken of vehicle and tipper movements. Details of this measurement are shown under 'Measurement 3' in Appendix C - CA Report, with a sound pressure level of **80 dB(A) at 5 m**[1].
    - HGVs being loaded (Loading Lorry) in two identified positions: within the kicker wall and to the west of Building 1, modelled as point sources.
      - The noise levels for this process have been taken from Source 33, Table C.6 in BS 5228-1 (Wheeled loader – loading lorry), with a sound pressure level of **82 dB(A) at 10 m**[1].
- Front End Loaders (5.9 m x 3.1 m x 6.0 m) & 360 Loader (9.1 m x 3.0 m x 3.5 m)
  - There are two front end loaders and a 360 loader in the assessment. One front end loader will operate close to the unloading operations to sort and store materials as they arrive. The other front end loader and the 360 loader will operate in the external processing area, close to the external screener.

- In order to predict the level of noise from this process, a measurement taken by CA on the Ilkeston site has been used, which was taken of a similar Komatsu Loader. Details of this measurement are shown under 'Measurement 10' in Appendix C – CA Report, with a sound pressure level of **74 dB(A) at 4 m**[1].

- Outdoor Screener (4.0 m x 12.6 m x 5.0 m)
  - A single outdoor screener will operate towards the southwest side of Building 1, although it will be mobile[2].
  - Manufacturer noise levels were provided as 95 dB(A) 'at operator position'. This position is likely to be within 1 m of the machine and therefore is not suitable to derive a sound power level in accordance with ISO 3746:2009. In order to predict the level of noise, noise levels from BS 5228-1:2009 (Table C.10) were used, resulting in a sound pressure level of **81 dB(A) at 10 m**[1].

[1] Spectral data taken from the stated source of the overall level, shown in Appendix E has been used in the assessment.

[2] Whilst the mobile nature of this piece of plant is noted, it is understood that its use will be restricted to the southwest corner of the site only.

Full spectral levels used in the assessment are summarised in Appendix E.

External noise sources have generally been modelled as point sources, which are typically used where the receiver distance is more than 3 times greater than the largest dimension of the source. However, the external screener has been modelled using a shoebox method, in order to account for its size.

The external noise sources in this plant group will be in use during Period 1 (06:00 to 18:00) only.

The routes of external plant are indicated in Figure 6.2.

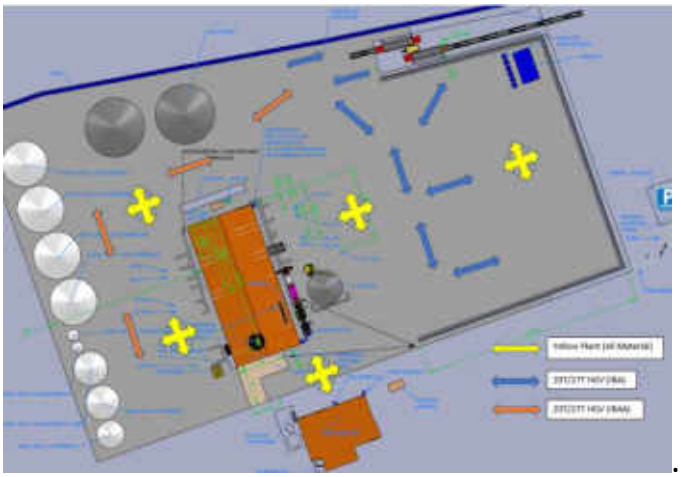


Figure 6.2 External plant routes

6.2 Building 1 Processes

Building 1 Processes comprise internal operations within the building, as well as some associated external operations. CAD drawings of Building 1 are shown in Appendix K indicating the layout of the building.

The external operations associated with Building 1 are summarised as follows:

- Main Feed / Hopper:
  - Materials are loaded into an external hopper, to be taken into the processing building. The main feed is located in the east side of Building 1, towards the southern end of the building.
  - In order to predict the level of noise from this process, a measurement taken by CA on the Ilkeston site has been used, which was taken of the main feed at that site. Details of this measurement are shown under 'Measurement 9' in Appendix C – CA Report, with a sound pressure level of **84 dB(A) at 5 m**[1].
- Outdoor Conveyor
  - An outdoor conveyor takes material from the main feed into Building 1. The conveyor is short in length, and is also in the east side of Building 1, towards the southern end of the building.
  - In order to predict the level of noise from this process, a measurement taken by CA on the Ilkeston site has been used, which was taken of the main feed at that site. Details of this measurement are shown under 'Measurement 8' in Appendix C – CA Report, with a sound pressure level of **78 dB(A) at 1 m**[1].
- Trommel
  - A trommel is used to separate materials before processing. The trommel is located in the east side of Building 1, close to the middle of the building.
  - Data for an existing trommel, or manufacturer data was not available. Data has therefore been taken from noise measurements taken at another existing site by Acute Acoustics. The levels are shown in Appendix C – Acute Acoustics 1567, with a sound pressure level of **73 dB(A) at 9 m**[1].
- Outlet Points
  - Processed materials are deposited from the building onto material piles. The main noise from these will be from stainless steel deposits, which are significantly louder than aggregate equivalents. It has therefore been assumed that the two stainless steel

outlets are in constant use. Both stainless steel outlets are located in the east façade of Building 1, one close to the north end of the building and one to the south.

- In order to predict the level of noise from this process, a measurement taken by CA on the Ilkeston site has been used, which was taken of the main feed at that site. Details of this measurement are shown under 'Measurement 5' in Appendix C – CA Report, with a sound pressure level of **82 dB(A) at 5 m**[1].

Processes inside Building 1 are summarised as follows:

- 2 No. TRS Spreaders: Stated sound power level (each) **70 dB(A)**[2]
- 9 No. Internal Conveyors: Stated sound power level (each) **80 dB(A)**
- Hein Lehman Vibration Sieve: Stated sound power level **90 dB(A)**[2]
- 3 No. Steinert Eddy Current: Stated sound power level (each) **95 dB(A)**[2]
- Spaleck Vibrating Feeder: Stated sound power level **85 dB(A)**[2]
- Steinert Vibrating Feeder: Stated sound power level **85 dB(A)**[2]
- Steinert Sensor Separator: Stated sound power level **110 dB(A)**[2]
- Forklift: Sound pressure level **67 dB(A) at 2 m** (Appendix C – CA Report, Measurement 11)[1]

[1] Spectral data from the measurements taken, shown in Appendix C has been used in the assessment.

[2] Spectral data for similar operations have been used, shifted to match the stated overall level.

External sources associated with Building 1 have generally been modelled as point sources, which are typically used where the receiver distance is more than 3 times greater than the largest dimension of the source. However, the external screener has been modelled using a shoebox method, in order to account for its size.

Building 1 itself has been modelled as a solid, noise emitting building. The reverberant level and external façade sound reduction have been calculated as described in Section 6.4.

Operations in this group will be undertaken during Period 2 (06:00 to 22:00), which means they are also undertaken during Period 1.

6.3 Building 2 Processes

Building 2 Processes comprise internal operations within the building, as well as some associated external operations. CAD drawings of Building 2 are shown in Appendix K indicating the layout of the building.

The external operations associated with Building 2 are summarised as follows:

- Telehandler (5.0 m x 2.3 m x 2.5 m)
  - The telehandler takes material between Buildings 1 & 2 and will be operational between the two buildings. The telehandler could be in use whenever Building 2 is operational.
  - In order to predict the level of noise from this process, a measurement taken by Acute Acoustics on the Ilkeston site has been used, which was taken of a JCB Telehandler at that site. Details of this measurement are shown in Appendix C – Acute Acoustics 1524, with a sound pressure level of **82 dB(A) at 4 m**[2].
- Trennso Extractors
  - Two extractors will be located to the north of Building 2. These will operate whenever Building 2 is operational.
  - The manufacturer stated sound pressure level is 86dB(A) at 1 m[2].
- Air Plant Extractor
  - An additional single extractor will be located to the west of Building 2. It will also need to be operational whenever Building 2 is operational.
  - The manufacturer stated sound pressure level is 83dB(A) at 1 m[2].

[1] Spectral data from the measurements taken, shown in Appendix C has been used in the assessment.

[2] Spectral data for similar operations have been used, shifted to match the stated overall level.

Processes inside Building 2 are summarised as follows:

- 1 No. Rotor Impact Mill: Stated sound power level **100 dB(A)**[1]
- 2 No. Dust Extractor: Stated sound pressure level **86 dB(A)** at 1 m (each) [1]
- 2 No. Trennso air separator: Stated sound pressure level **82 dB(A)** at 1 m (each) [1]

[1] Spectral data for similar operations have been used, shifted to match the stated overall level.

Spectral levels are also shown in Appendices C and E.

External sources associated with Building 2 have been modelled as point sources, which are typically used where the receiver distance is more than 3 times greater than the largest dimension of the source.

Building 1 itself has been modelled as a solid, noise emitting building. The reverberant level and external façade sound reduction have been calculated as described in Section 6.4.

Full spectral levels used in the assessment are summarised in Appendix E.

Operations in this group will be undertaken during Period 3 (24-hour use), which means they are also undertaken during Period 1 and Period 2.

6.4 Reverberant Noise Levels

For internal processes, the buildings have been modelled as a 3-dimensional noise source with noise emitting from the 4 walls and roof. In order to calculate the noise emissions, the indoor reverberant sound pressure level was calculated using the following formula:

$$Rev_{LP} = Lw + 10 * \log[(Q/S) + (4/Rc)]$$

Where:
Rev_{LP} = *Reverberant level within the plantroom*
L_w = *Cumulative sound power level of all the plant*
Q = *Directivity (radiating) factor*
$S = 4\pi r^2$
R_c = *Room Constant which is* $S_T\bar{\alpha}/1\text{-}\bar{\alpha}$ *in* m^2
$\bar{\alpha}$ = *Average absorption coefficient*
S_T = *Total absorption area*

Sound power levels were input as summarised in Appendix E

For the forklift in building 1, which is based on a sound pressure level, the directivity factor was set as hemispherical, based on the measurement conditions

Building 1 dimensions were as stated in the provided building description, which are: Footprint 31 m x 70 m, Building Height 10 m.

Building 2 dimensions were as stated in the provided building description, which are: Footprint 34 m x 24 m, Building Height 12 m.

The room finishes were assumed to be hard for all surfaces

The results of the internal reverberant noise levels are shown in Appendix J.

In order to calculate the reduction provided by the building facades and roof, the composite sound reduction of each façade was calculated. The spectral sound reductions for different elements are assumed to be as shown in Table 6.1.

Element	Octave band centre frequency SRI, dB					
	125	250	500	1k	2k	4k
0.7 mm Corrugated Steel Cladding	11	15	20	25	30	35
Gaps / Doorways / Open Shutters	0	0	0	0	0	0

Table 6.1: Assumed sound reduction performance from different building elements

The composite sound reductions indices have been calculated based on Client provided information regarding the open surface area on each façade. Details of the open areas on each façade are stated in Table 6.2.

Description	Building	Façade	No of	Size m²	Total m²
Conveyor Penetration	Building 1	East	5	1.4	7.0
Fire Doors	Building 1	North	1	2.0	2.0
roller shutter	Building 1	North	1	19.2	19.2
Fire Doors	Building 1	South	1	2.0	2.0
single roller shutter	Building 1	South	1	12.0	12.0
Conveyor Penetration	Building 1	West	5	1.4	7.0
Fire Doors	Building 1	West	2	2.0	4.0
roller shutter	Building 1	West	1	19.2	19.2
Conveyor Penetration	Building 2	North	1	1.4	1.4
Fire Door[1]	Building 2	North	1	2.0	2.0
Fire Door[1]	Building 2	West	1	2.0	2.0
Fire Door[1]	Building 2	South	1	2.0	2.0
North roller shutter[1]	Building 2	North	1	19.2	19.2

Table 6.2 Details of open areas on each façade

[1] As Building 2 operations include night-time periods, measures are proposed to ensure doors and shutters are closed as much as is practicable during night-time hours. These measures are summarised in Section 7.5.

Table 6.3 presents the percentage open areas, total façade areas and associated sound reduction index of each façade based on the information stated in Table 6.1 and Table 6.2. The calculated sound reduction indexes assume doors and shutters are constantly open.

Building	Façade	% open Area	Total Façade Area m²	Sound Reduction Index, dB							
				63	125	250	500	1000	2000	4000	8000
Building 1	North	8.4	252.8	7.0	8.1	9.5	10.3	10.6	10.7	10.8	10.8
Building 1	East	1.2	563.0	8.6	10.4	13.6	16.5	18.1	18.7	18.9	18.9
Building 1	South	5.5	252.8	7.6	8.8	10.7	11.9	12.3	12.5	12.5	12.5
Building 1	West	5.4	563.0	7.6	8.9	10.8	12.0	12.5	12.6	12.7	12.7
Building 1	Roof	0	2224.0	9.0	11.0	15.0	20.0	25.0	30.0	35.0	35.0
Building 2	North	11.9	189.6	6.4	7.2	8.3	8.9	9.1	9.2	9.2	9.2
Building 2	East	Adjoining Building									
Building 2	South	1	189.6	8.7	10.5	13.8	16.9	18.7	19.4	19.7	19.7
Building 2	West	0.7	268.6	8.8	10.6	14.1	17.6	19.8	20.8	21.1	21.1
Building 2	Roof	0	816.0	9.0	11.0	15.0	20.0	25.0	30.0	35.0	35.0

Table 6.3 Sound Reduction Indices

The input data for the facades has been calculated based on the calculated indoor reverberant level, calculated composite sound reduction for each façade, and an indoor to outdoor correction of -6 dB, the external sound power of the façade was then calculated. Modelling exercises were undertaken to confirm that this resulted in the expected level of breakout noise.

Full spectral levels used in the assessment are summarised in Appendix E.

7.0 NOISE IMPACT ASSESSMENT

7.1 3D Noise Map Model

In order to assess the noise impact of proposed operations, noise emissions have been assessed by developing a noise map.

The noise model was constructed using the proprietary noise modelling software package CadnaA. The noise model was constructed utilising the following assumptions and parameters:

- Locations of obstacles such as proposed building envelopes
- Presence of reflecting surfaces
- Hardness of the ground between the sources and receivers
- Attenuation due to atmospheric absorption
- Receiver height – Ground Floor 1.5 m, First Floor 4 m above ground

Calculations are performed over single octave band from 63 Hz to 8 kHz. The library of spectral noise levels used in the model itself are shown in Appendix F.

Figure 7.1 shows a 3-dimensional view of the constructed noise map.

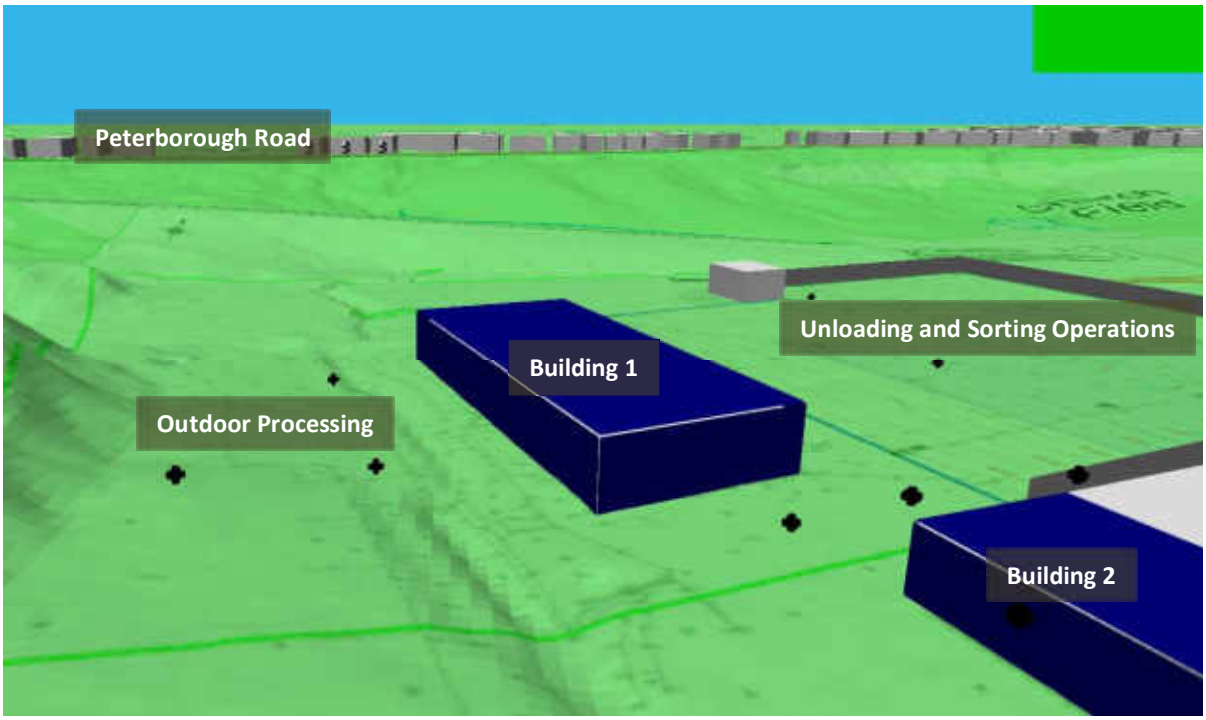


Figure 7.1: 3D noise mapping model

7.2 Noise Sensitive Receivers

The following residential dwellings have been assessed. The two noise survey positions were used to represent the noise profile of the area. Survey position 1 has been used to represent the noise profile for the noise sensitive receivers on Peterborough Road. Survey position 2 has been used to represent the noise profile on Snoots Road.

ID	Description	Receiver Floor Level
R1	97 Snoots Road	Ground[1]
R2	99 & 101 Snoots Road	Ground[1]
R3	103 & 105 Snoots Road	Ground[1]
R4	107 & 109 Snoots Road	Ground[1]
R5	111 Snoots Road	Ground[1]
R6	95 Snoots Road (south façade)	Ground
R7	95 Snoots Road (south façade)	First
R8	95 Snoots Road (west façade)	First
R9	144 Peterborough Road	Ground
R10	144 Peterborough Road	First
R11	142 Peterborough Road	Ground
R12	142 Peterborough Road	First
R13	140 Peterborough Road	Ground
R14	140 Peterborough Road	First
R15	203 Peterborough Road (south façade)	Ground
R16	203 Peterborough Road (south façade)	First
R17	203 Peterborough Road (west façade)	Ground
R18	203 Peterborough Road (west façade)	First
R19	130 Peterborough Road (west façade)	First

Table 7.1: Receiver Descriptions

[1] Single Storey Dwelling

7.3 BS 4142 Acoustic Features

The proposed plant operations have been considered against the available penalties that could be applied to the rating level. The penalties have been stated and discussed in Table 7.2.

Characteristic	Comments	Adopted Penalty
Tonality	Tones are most likely to occur from vehicle reversing signals. However, the noise management plan (Appendix I) states that atonal signals will be used. No other plant operation is expected to generate tones.	0 dB
Impulsivity	Impulsivity is the sudden on-set of a sound, the on-set is defined as 10 dB/s. Due to the nature of plant it is likely that a degree of impulsivity is experienced. However, due to the distance to the receiver, the targeted rating level and residual background any impulsivity is likely to be just perceptible for the majority of outdoor operations.	Outdoor Screener: 6 dB All Other Outdoor Sources: 3 dB
Distinctiveness	Intended for sources that are neither tonal nor impulsive, but distinctive against background noise sources. As a penalty for impulsivity has been adopted this penalty should not be used.	N/a
Intermittency	Due to the number of similar plant proposed, and the existing plant in use within the area, on/off conditions are unlikely to be noticeable within the 1 hour or 15 minute period.	0 dB

Table 7.2 Proposed BS 4142 Acoustic Features Correction

The specific noise level has been derived by the use of the 3D noise map model following the calculation method stated in ISO 9613. The rating level has been derived by adding relevant acoustic penalties to the specific noise level. In this instance a +6 dB correction for impulsivity to the outdoor screener and +3 dB for other outdoor noise sources has been deemed suitable. All BS 4142 acoustic features corrections have been added within the 3D noise map model, and therefore the model output is inherently the rating level.

7.4 Rating Levels without Mitigation

During Period 1, all plant could be in operation. Calculations assume the noise sources could be in constant use over a worst case 15-minute or one-hour period, with all Building 1 and 2 doors and shutters constantly open.

The resultant Period 1 rating level and rating level compared to the background sound level has been presented in Table 7.3. The rating level is the output of the constructed noise map for each receiver location, with detailed rating levels summarised in Appendix G.

Receiver ID	Background Sound Level (BSL), dB L_{A90}	Day time Rating Level, dB $L_{A,Tr}$	Excess Over BSL, dB
R1	42[1]	46	+4
R2		46	+4
R3		46	+4
R4		46	+4
R5		46	+4
R6		45	+3
R7		47	+5
R8		48	+6
R9	50[2]	52	+2
R10		55	+5
R11		52	+2
R12		55	+5
R13		52	+2
R14		56	+6
R15		46	-4
R16		49	-1
R17		35	-15
R18		36	-14
R19		54	+4

Table 7.3 Period 1 noise rating level and assessment for operations without mitigation

[1] Snoots Road Noise Survey – Position 2

[2] Peterborough Road Noise Survey – Position 3

As shown in Table 7.3, of the 8 assessed receptors on Snoots Road, 2 are expected to experience a level that reaches the threshold classed as likely to be an indication of an adverse impact, although no significant effects are expected. Of the 11 receptors assessed on Peterborough Road, 3 reach the threshold where an adverse impact is classed as likely, although no significant effects are expected.

During Period 2, external processing and acceptance of materials will not be permitted. Calculations assume the remaining Building 1 and 2 noise sources could be in constant use over a worst case 15-minute or one-hour period, with all Building 1 and 2 doors and shutters constantly open.

The resultant Period 2 rating level and rating level compared to the background sound level has been presented in Table 7.4. The rating level is the output of the constructed noise map for each receiver location, with detailed rating levels summarised in Appendix G.

Receiver ID	Background Sound Level (BSL), dB L_{A90}	Early Morning Rating Level, dB $L_{A,Tr}$	Excess Over BSL, dB
R1	42[1]	43	+1
R2		43	+1
R3		43	+1
R4		43	+1
R5		43	+1
R6		42	0
R7		44	+2
R8		44	+2
R9	50[2]	48	-2
R10		52	+2
R11		48	-2
R12		52	+2
R13		50	0
R14		54	+4
R15		42	-8
R16		43	-7
R17		30	-20
R18		30	-20
R19		50	0

Table 7.4 Period 2 noise rating level and assessment for operations

[1] Snoots Road Noise Survey – Position 2

[2] Peterborough Road Noise Survey – Position 3

As shown in Table 7.4, of the 19 assessed receptors, none are expected to experience a level that reaches the threshold classed as likely to be an indication of an adverse impact, and no significant effects are expected.

It is noted that Period 2 does not occur on Sundays, when sensitivity is expected to be at its highest and residual levels of noise at their lowest.

During Period 3, external processing, acceptance of materials and Building 1 operations will not be permitted. Calculations assume the remaining Building 2 noise sources could be in constant use over a worst case 15-minute period, with all doors and shutters to Building 2 constantly open.

The resultant Period 3 rating level and rating level compared to the background sound level has been presented in Table 7.5. The rating level is the output of the constructed noise map for each receiver location, with detailed rating levels summarised in Appendix G.

Receiver ID	Background Sound Level (BSL), dB L_{A90}	Early Morning Rating Level, dB $L_{A,Tr}$	Excess Over BSL, dB
R1	34[1]	34	0
R2		34	0
R3		34	0
R4		34	0
R5		35	+1
R6		34	0
R7		36	+2
R8		36	+2
R9	34[2]	37	+3
R10		39	+5
R11		37	+3
R12		39	+5
R13		36	+2
R14		40	+6
R15		37	+3
R16		38	+4
R17		23	-11
R18		24	-10
R19		41	+7

Table 7.5 Period 3 noise rating level and assessment for operations

[1] Snoots Road Noise Survey – Position 2

[2] Peterborough Road Noise Survey – Position 3

As shown in Table 7.5, of the 8 assessed receptors on Snoots Road, none are expected to experience a level that reaches the threshold classed as likely to be an indication of an adverse impact, and no significant effects are expected. Of the 11 receptors assessed on Peterborough Road, 4 reach the threshold where an adverse impact is classed as likely, although no significant effects are expected.

7.5 Proposed Mitigation

Based on the rating levels calculated during Periods 1 and 3, which indicate that an adverse impact is likely, mitigation has been proposed with the aim to reduce the excess over background sound level as far as is practicable.

It should be noted that a previously explored screen along and adjacent to Peterborough Road has been found to not be feasible, as the land in this area is not owned by the Client and as such permission cannot be obtained.

Local mitigation measures for identified sources of noise are therefore proposed as described in the following sections.

Note: It is understood commissioning measurements will be undertaken prior to full operation of the site. The effectiveness of the implemented mitigation measures shall be assessed at this stage. If the result of this assessment does not confirm mitigated rating levels are at least as predicted, additional options for mitigation shall be investigated and implemented accordingly - to ensure, as far as reasonably practicable, an adverse noise impact is not experienced at the receptors identified.

Hopper and Trommel Infeed Linings

The noise emissions from hoppers and infeed are generated by material being dropped and causing the thin metal panels to vibrate and consequently radiate as noise.

To mitigate this, the metal panels can be internally or externally lined with a sandwich material comprising a damping layer, such as rubber, and a further thin steel layer. As a minimum this layer should cover at least 80% of the surface area of the hopper or infeed and be between 40% to 100% of the thickness of the panel to be treated.

According to guidance found in document 'Top 10 Noise Control Techniques' prepared by Engineering Industry Noise Task Group and hosted on the Health and Safety Executive section of the UK Government website, such a treatment applied to a hopper is expected to reduce noise emissions by 5-25 dB.

In order to assess the effects on noise levels in a reasonably onerous way, it has been assumed that a 10 dB reduction in noise levels could be achieved. This is at the lower end of the stated range, and is considered appropriate based on the nature of material being deposited into the hoppers and infeed.

Openings to Building 2

Period 3 includes indoor processes within Building 2, and calculations have assumed that doors and shutters could be constantly open. In order to limit the breakout of noise from Building 2, the following measures are proposed for the main shutter door, which provides access to vehicles:

- The vehicle access door will not be opened more than twice over an entire night-time period, and on each occasion, will remain open for no longer than 5 minutes - to allow vehicle access / exit,
- The vehicle access door should not be opened more than once in a single 15-minute period during night-time Period 3 hours,
- If either of the above restrictions will be exceeded, Building 2 operations must be halted when the vehicle access door is opened.

Fire doors should be opened only when providing access during emergencies.

Saturday Restrictions

In order to minimise the impact of noise during early morning and evening periods, Saturday activities will be restricted to the following:

- Saturday 06:00 to 08:00 – Building 2 Operations Only (Period 3)
- Saturday 08:00 to 18:00 – All activities (Period 1), with the noted exceptions below[1]
- Saturday 18:00 to 22:00 – Building 2 Operations Only (Period 3)

[1] Outdoor screener will not be used on Saturdays

Maintenance

In order to limit the effects of maintenance, which as shown in Figure 2.2 could occur at any time, we would recommend that noisy or non-urgent maintenance work is undertaken during Period 1 days and hours only.

The recommended mitigation measures are reflected in the noise management plan, shown in Appendix I.

7.6 Assessment with Proposed Mitigation

During Period 1, all plant could be in operation. Calculations assume the noise sources could be in constant use over a worst case 15-minute or one-hour period, with all Building 1 and 2 doors and shutters constantly open.

The resultant Period 1 rating level, and rating level compared to the background sound level has been presented in Table 7.7. The rating level is the output of the constructed noise map for each receiver location, with detailed rating levels summarised in Appendix G, and a noise contour map for this scenario shown in Appendix H.

The calculations of the rating levels stated in Table 7.7 include the proposed mitigation stated in Section 7.5.

Receiver ID	Background Sound Level, dB (BSL), L_{A90}	Day time Rating Level, dB $L_{A,Tr}$	Excess Over BSL, dB
R1	42[1]	45	+3
R2		45	+3
R3		44	+2
R4		45	+3
R5		45	+3
R6		43	+1
R7		46	+4
R8		46	+4
R9	50[2]	50	0
R10		54	+4
R11		50	0
R12		54	+4
R13		51	+1
R14		54	+4
R15		46	-4
R16		48	-2
R17		34	-16
R18		35	-15
R19		52	+2

Table 7.7 Period 1 noise rating level and assessment for operations with proposed mitigation

[1] Snoots Road Noise Survey

[2] Peterborough Road Noise Survey

As shown in Table 7.7, the rating levels are reduced such that there are no adverse impacts expected at any receptor.

During Period 2, external processing and acceptance of materials will not be permitted. Calculations assume the remaining Building 1 and 2 noise sources could be in constant use over a worst case 15-minute or one-hour period, with all Building 1 and 2 doors and shutters constantly open.

The resultant Period 2 rating level, and rating level compared to the background sound level has been presented in Table 7.8. The rating level is the output of the constructed noise map for each receiver location, with detailed rating levels summarised in Appendix G, and a noise contour map for this scenario shown in Appendix H.

The calculations of the rating levels stated in Table 7.8 include the proposed mitigation stated in Section 7.5.

Receiver ID	Background Sound Level, dB (BSL), L_{A90}	Day time Rating Level, dB $L_{A,Tr}$	Excess Over BSL, dB
R1	42[1]	40	-2
R2		40	-2
R3		40	-2
R4		40	-3
R5		40	-2
R6		39	-3
R7		41	-1
R8		42	-1
R9	50[2]	45	-6
R10		48	-2
R11		44	-6
R12		48	-2
R13		46	-4
R14		50	0
R15		41	-9
R16		41	-9
R17		28	-22
R18		29	-21
R19		47	-3

Table 7.8 Period 2 noise rating level and assessment for operations with proposed mitigation

[1] Snoots Road Noise Survey

[2] Peterborough Road Noise Survey

As shown in Table 7.8, the rating levels at all receptors remain at a level where no adverse impact is expected during Period 2.

For Period 3, a 15-minute night-time period has been assessed with the vehicle access door and fire doors open for 5 minutes and closed for 10 minutes.

The calculated sound reduction index of Building 2 facades during the 10 minute 'doors closed' period are shown in Table 7.9. The sound reduction indices during the 5 minute 'doors open' period remain as shown in Table 6.3.

Building	Façade	% open Area	Total Façade Area m²	Sound Reduction Index, dB							
				63	125	250	500	1000	2000	4000	8000
Building 2	North	0.7[1]	189.6	8.8	10.6	14.1	17.6	19.8	20.8	21.1	21.1
Building 2	East	Adjoining Building									
Building 2	South	0	189.6	9.0	11.0	15.0	20.0	25.0	30.0	35.0	35.0
Building 2	West	0	268.6	9.0	11.0	15.0	20.0	25.0	30.0	35.0	35.0
Building 2	Roof	0	816.0	9.0	11.0	15.0	20.0	25.0	30.0	35.0	35.0

Table 7.9 Sound Reduction Indices with mitigation applied

[1] Conveyor penetrations will remain open at all times

The resultant Period 3 rating level, and rating level compared to the background sound level has been presented in Table 7.10. The rating level is the output of the constructed noise map for each receiver location, with detailed rating levels summarised in Appendix G, and a noise contour map for this scenario shown in Appendix H.

The calculations of the rating levels stated in Table 7.10 include the proposed mitigation stated in Section 7.5.

Receiver ID	Background Sound Level, dB (BSL), L_{A90}	Day time Rating Level, dB $L_{A,Tr}$	Excess Over BSL, dB
R1	34[1]	34	0
R2		34	0
R3		34	0
R4		34	0
R5		35	+1
R6		34	0
R7		36	+2
R8		35	+1
R9	34[2]	36	+2
R10		38	+4
R11		36	+2
R12		38	+4
R13		36	+2
R14		38	+4
R15		37	+3
R16		38	+4
R17		23	-11
R18		24	-10
R19		37	+3

Table 7.10 Period 3 noise rating level and assessment for operations with proposed mitigation

[1] Snoots Road Noise Survey

[2] Peterborough Road Noise Survey

As shown in Table 7.10, the rating levels are reduced such that there are no adverse impacts expected at any receptor.

7.7 Summary of Effects with Mitigation

As shown in Tables 7.7, 7.8 and 7.10, no adverse effects are expected at any receptor during any period of operations.

The majority of receptor effects are expected to be comparable to or lower than that classed as likely to be an indication of a low impact.

As summarised in Appendix L, mitigation measures applied to Saturday operations are expected to result in no adverse impact on Saturdays.

As stated in BS 4142, the context of the site is also considered important, with the site historically in use for industrial operations, with a number of existing industrial units also currently operating on nearby sites.

8.0 ASSESSMENT OF ACCESS ROAD

The assessment of increases to the flow of traffic on the access road will focus on Heavy Goods Vehicle (HGV) passbys, based on the nature of proposals.

Assessment has been undertaken according to Design Manual for Roads and Bridges [DMRB] LA111 Noise and Vibration - Revision 2.

A Transport Assessment has been undertaken for the proposed development by HSP Consulting, ref C3432. In this assessment, anticipated traffic flows over the 18 hour period between 06:00 and 00:00 associated with the development (although traffic is only proposed between 06:00 and 23:00) are compared with:

- Traffic flows associated with a previous use of the site as Saxon Brickworks
- Traffic flows associated with the current use of the site:
    - Plastic Recovery Facility (PRF)
    - Adjacent landfill site

For all comparisons, the impacts of both HGV movements and total vehicular movements are established.

In order to calculate the change in road traffic noise compared with the existing scenario, the following formula is used, informed by the observed existing and anticipated projected traffic flow:

$$Change\ in\ Noise\ Level = 10 \log_{10} \frac{Projected\ \ Traffic\ Flow}{Reference\ Traffic\ Flow}$$

The traffic flows used are as follows:

- Projected Traffic Flow:
    - PRF + Landfill + Proposed Development
- Reference Traffic Flow:
    - PRF + Landfill

The calculated change in HGV traffic noise levels for the access road is summarised in Table 8.1.

Road	Reference Traffic Flow	Projected Traffic Flows	Calculated Change in Noise Level LA10(18hour)
Access Road	PRF: 36 movements Landfill: 144 movements **Total 180 movements**	PRF: 36 movements Landfill: 144 movements Proposed: 92 movements **Total 272 movements**	1.8 dB[1]

Table 8.1: Calculated changes to access road traffic flow (HGVs Only)

[1] Results are given to one decimal place to match the resolution of the DMRB criteria.

By comparing the calculated change with the thresholds summarised in Table 3.54b of the DMRB document, it is shown that the anticipated change in HGV traffic flow equates to a negligible impact.

The calculated change in total traffic noise levels for the access road is summarised in Table 8.2.

Road	Reference Traffic Flow	Projected Traffic Flows	Calculated Change in Noise Level LA10(18hour)
Access Road	PRF: 96 movements Landfill: 159 movements **Total 255 movements**	PRF: 96 movements Landfill: 159 movements Proposed: 152 movements **Total 407 movements**	2.0 dB[1]

Table 8.2: Calculated changes to access road traffic flow (All Traffic)

[1] Results are given to one decimal place to match the resolution of the DMRB criteria.

By comparing the calculated change with the thresholds summarised in Table 3.54b of the DMRB document, it is shown the anticipated change in total traffic flow again equates to a negligible impact.

It is further noted that the proposed development represents a reduction in both HGV and total traffic movements when compared with the previous use of the site as Saxon Brickworks.

Based on the previous and existing use of the access road, the traffic levels associated with the proposed development would be considered acceptable.

It should be noted that any use of the access road outside the stated period would only occur in emergencies or in extreme circumstances.

9.0 DISCUSSION OF UNCERTAINTY

In this type of assessment, a degree of uncertainty is inherent in the measured and calculated noise levels presented. Measures have been taken to limit the level of uncertainty as discussed in the sections below.

9.1 Uncertainty in Measured Noise Levels

Measured noise levels in this assessment comprise the background noise levels, measured around the proposed site and machinery source measurements undertaken at an existing Johnsons Aggregates site in Ilkeston.

All background noise measurements were undertaken according to the guidance of BS 7445: 1991: '*Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*', and BS 4142: 2014. These are the recognised methodologies to ensure background noise data is reliable and repeatable. The microphone was located on a tripod, away from reflective surfaces, in order to minimise any assumptions or data manipulation required.

The timing and duration of the survey was chosen to ensure a suitably representative period was assessed during the measurements. Several different measurement periods have been used, in order to minimise uncertainty due to extraneous events and weather.

Measurements were undertaken using a Class 1 Sound Level Meter, which has been factory calibrated within the last 2 years, to minimise any instrumentation uncertainty.

Measurements were, however, undertaken during a 'lockdown' associated with the COVID-19 pandemic. Therefore, the typical background noise level may be higher during more typical conditions.

During onsite measurements undertaken at an existing Johnsons Aggregate site in Ilkeston, it was ensured that machinery was operated in a way representative of operational noise. Multiple measurement locations were used, to ensure the most robust data could be used in the assessment.

9.2 Uncertainty in Calculated Sound Levels

All noise propagation calculations have been undertaken using Cadna A, with noise propagation calculated according to ISO 9613-2: 1996 '*Acoustics – Attenuation of sound during propagation outdoors*'. This is the recommended calculation methodology as specified to reduce uncertainty in BS 4142:2014.

Calculations were undertaken assuming typical meteorological conditions, 10C with a humidity of 50%. These factors will affect the propagation, specifically the air absorption. Should the meteorological conditions significantly shift a +/- 2 dB change could occur.

Temperature or wind gradients could also cause the sound to refract whilst propagating, again altering the predicted rating levels.

10.0 CONCLUSION

An environmental noise survey has been undertaken at Saxon Works, Peterborough Road, Whittlesey.

Predicted noise emissions based on the proposed operations have allowed an assessment of noise breakout from the proposed site in terms of its impact on residential receivers, in accordance with the guidance of BS 4142:2014.

Based on the findings of the assessment, mitigation has been proposed, which is expected to significantly reduce the level of noise at the assessed receptors. Due to proposed noise levels from onsite operations with mitigation applied, a low impact is expected at the majority of receptors. No adverse impacts are expected for any receptors due to onsite operations when mitigation measures are applied.

Revisions 0, B and F:

Author	**Andrew Thomas** Principal Consultant BSc (Hons) MIOA		
Checked and Approved By	**Duncan Martin** Director BSc (Hons) MIOA		

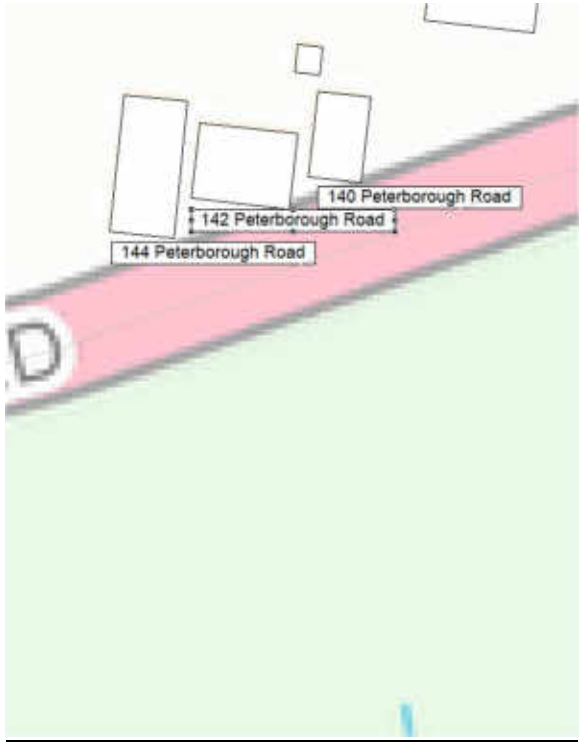
Revisions A, C, D, E, G, H and I:

Author	**Duncan Martin** Director BSc (Hons) MIOA		11 February 2022
Checked and Approved By	**Andrew Thomas** Principal Consultant BSc (Hons) MIOA		11 February 2022

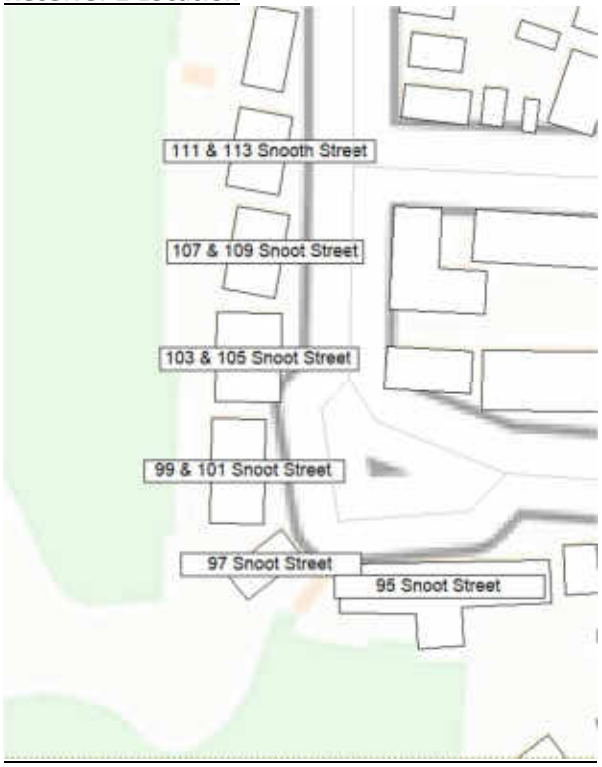
16426-SP1 RevI Indicative site plan indicating monitoring and receiver locations **Date:** 11 February 2022

N

Receiver 1 Location



Receiver 2 Location



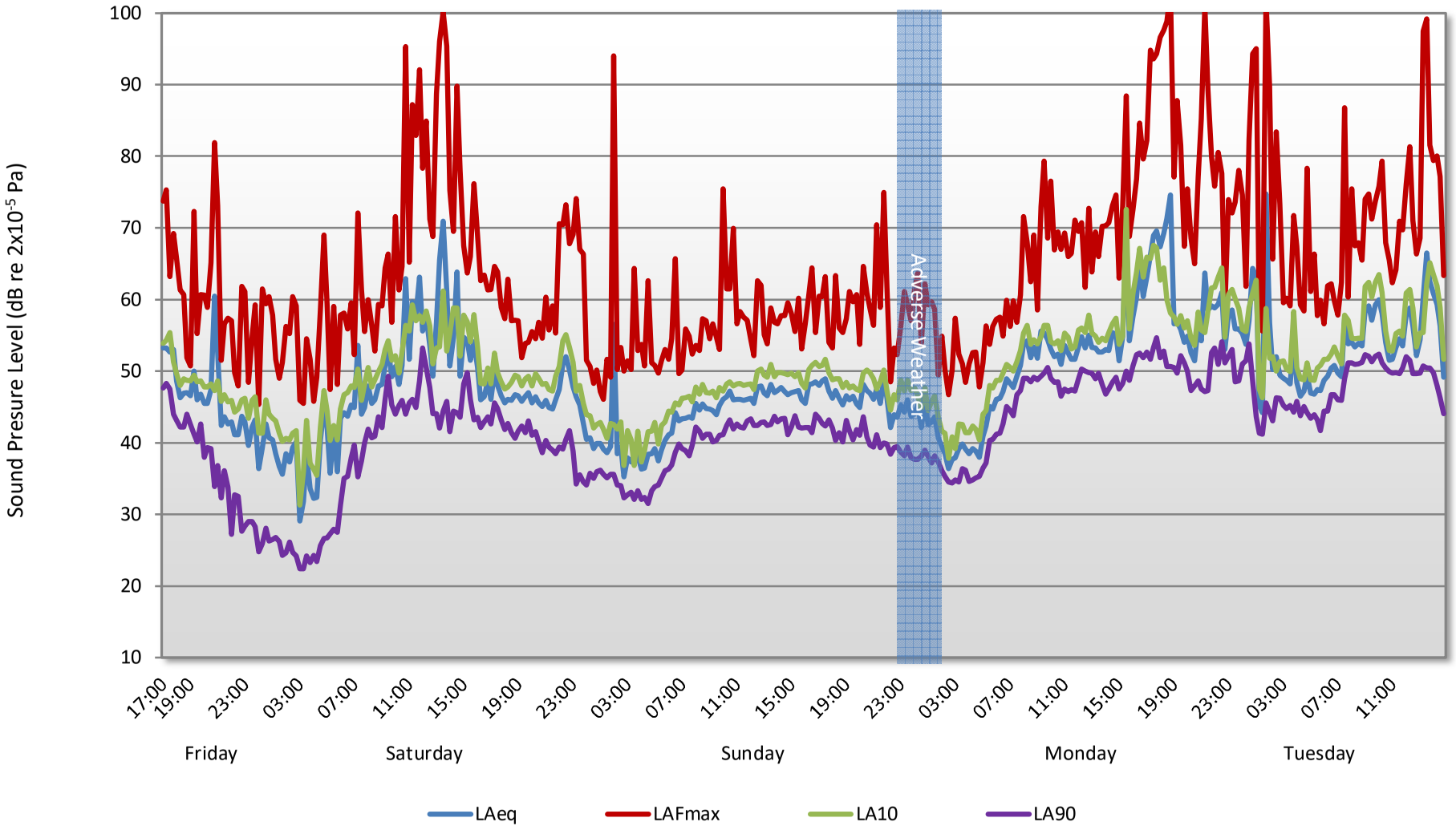
Access Road Entrance

16426-SP2 Zoom-in of Identified Receivers

Date: 11 February 2022

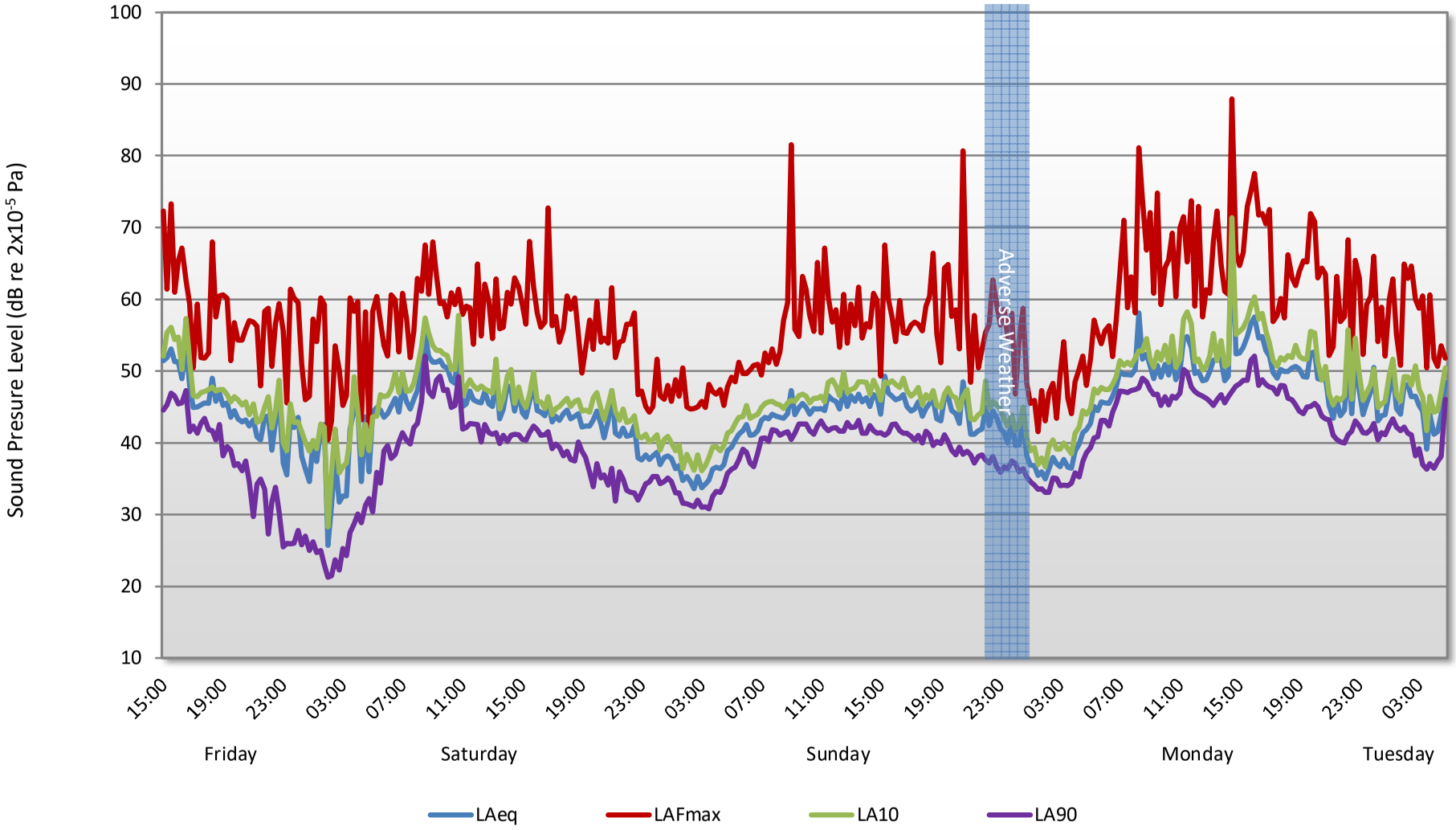
Saxon Works, Peterborough Road - Position 1

Environmental Noise Time History
08 January 2021 to 12 January 2021



Saxon Works, Peterborough Road - Position 2

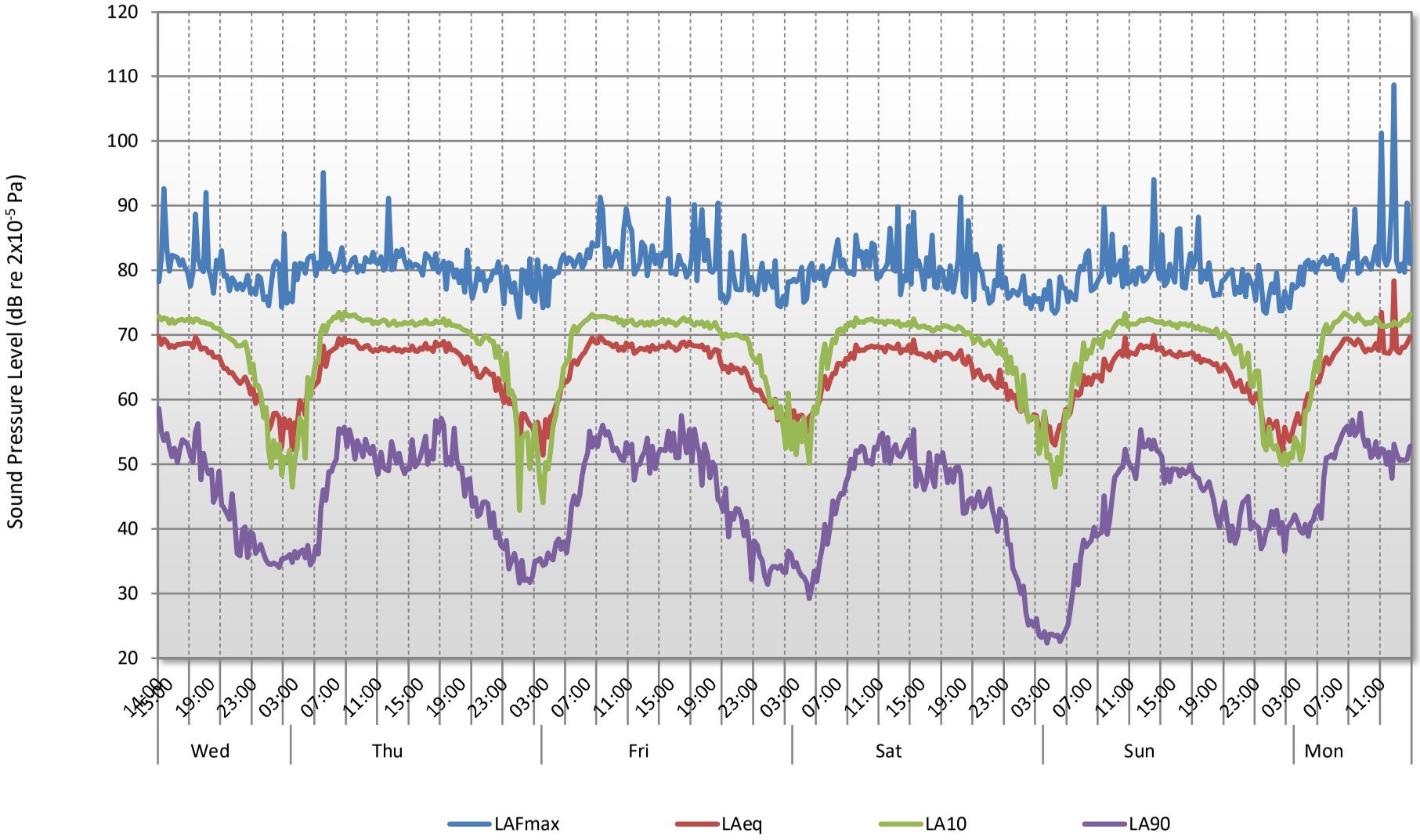
Environmental Noise Time History
08 January 2021 to 12 January 2021



Saxon Works, Peterborough Road - Position 3

Environmental Noise Time History

15/09/2021 to 20/09/2021



APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10 dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3 dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

APPENDIX B

16426

Saxon Works, Peterborough Road, Whittlesey

Survey Position 1

Date & time	LAFmax	LAeq	LA10	LA90
08/01/2021 16:52	73.7	53.2	53.9	47.6
08/01/2021 17:07	75.3	53.2	54.3	48.3
08/01/2021 17:22	63.2	52.7	55.4	47.5
08/01/2021 17:37	69.2	53	51.3	44
08/01/2021 17:52	65.7	48.6	49.6	43.1
08/01/2021 18:07	61.3	46.3	48	42.2
08/01/2021 18:22	60.7	46.9	48.9	42.2
08/01/2021 18:37	51.9	47	48.7	44
08/01/2021 18:52	50.7	46.6	48.6	42.5
08/01/2021 19:07	72.3	50	49.4	41.2
08/01/2021 19:22	55.2	46	48.5	40.1
08/01/2021 19:37	60.7	46.8	48.6	42.6
08/01/2021 19:52	60.6	45.5	47.8	38
08/01/2021 20:07	58.9	45.5	47.8	39.3
08/01/2021 20:22	65.1	47.4	48.2	39.2
08/01/2021 20:37	81.9	60.5	47.3	33.9
08/01/2021 20:52	73.1	52.6	48.6	36.8
08/01/2021 21:07	51.5	42.4	45.8	32.3
08/01/2021 21:22	56.6	43.6	46.7	36.1
08/01/2021 21:37	57.4	42.6	45.7	33.8
08/01/2021 21:52	57	42.9	45.9	27.2
08/01/2021 22:07	49.8	41.1	44.3	32.7
08/01/2021 22:22	47.9	41.1	44.7	32.5
08/01/2021 22:37	61.8	43.7	46	27.6
08/01/2021 22:52	61.1	42.9	46.2	28.4
08/01/2021 23:07	48.4	39.6	43.4	29
08/01/2021 23:22	54.7	42.2	45.9	29
08/01/2021 23:37	59.2	43.2	46.4	28.3
08/01/2021 23:52	45.4	36.4	41.3	24.8
09/01/2021 00:07	61.5	39.3	41.3	25.9
09/01/2021 00:22	59.4	42.6	46	28.1
09/01/2021 00:37	60.4	40.7	44	26.3

09/01/2021 00:52	57.8	40.4	43.4	26.5
09/01/2021 01:07	51.6	38.5	43	26.8
09/01/2021 01:22	49	36.7	41.3	26.2
09/01/2021 01:37	51.2	35.6	40.2	24.3
09/01/2021 01:52	56.2	38.5	40.6	24.6
09/01/2021 02:07	55.2	37.3	40.4	26.1
09/01/2021 02:22	60.4	39.3	41.3	24.7
09/01/2021 02:37	59.1	40.1	41.7	24.2
09/01/2021 02:52	45.9	29.1	31.3	22.4
09/01/2021 03:07	45.5	31.8	36	22.4
09/01/2021 03:22	54.5	38.5	43.1	24.2
09/01/2021 03:37	51.6	33.6	37.1	23.3
09/01/2021 03:52	45.8	32.2	36.3	24.3
09/01/2021 04:07	49.1	32.4	35.4	23.4
09/01/2021 04:22	58.5	40.3	42.2	25.6
09/01/2021 04:37	69	45	47.3	26.6
09/01/2021 04:52	59.4	42.2	44.5	26.7
09/01/2021 05:07	47.4	35.7	40.3	27.3
09/01/2021 05:22	59	41.8	42.4	27.9
09/01/2021 05:37	48.1	36	40.4	27.5
09/01/2021 05:52	57.8	43.4	44.7	31.2
09/01/2021 06:07	58.1	44.2	46.7	35
09/01/2021 06:22	55.9	43.7	47	35.3
09/01/2021 06:37	59.5	45.3	47.9	37.9
09/01/2021 06:52	52.3	44.9	47.7	39.7
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09/01/2021 07:37	55.5	44.9	48.1	40
09/01/2021 07:52	60	47.9	50.5	41.9
09/01/2021 08:07	56.4	45.5	47.8	40.7
09/01/2021 08:22	52.8	46	48.8	40.9
09/01/2021 08:37	59.3	47.9	49.9	43.6
09/01/2021 08:52	59.1	48.1	50.9	42.1
09/01/2021 09:07	64.4	50.8	53	46.1
09/01/2021 09:22	66.3	53	54.2	49.3
09/01/2021 09:37	56.8	49.2	51.5	45.3
09/01/2021 09:52	71.6	50.6	52.2	44
09/01/2021 10:07	61.3	48.1	49.7	45.2
09/01/2021 10:22	64.6	50.8	52.7	45.9
09/01/2021 10:37	95.3	62.9	56.4	44
09/01/2021 10:52	65.2	51.6	55.6	45.6
09/01/2021 11:07	87.2	59.7	59.2	46.1
09/01/2021 11:22	82.9	57.8	57	44.9
09/01/2021 11:37	92.1	63.1	57.7	48.6
09/01/2021 11:52	78.3	55.6	56.8	53.2
09/01/2021 12:07	84.9	57.6	58.4	50.5
09/01/2021 12:22	71.2	53.6	56.3	47.7
09/01/2021 12:37	68.8	49.3	51	44.1
09/01/2021 12:52	88.7	56.8	53.2	44.1
09/01/2021 13:07	96	65.5	53.4	42

09/01/2021 13:22	100.2	70.9	61.2	44.4
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09/01/2021 16:07	62.6	46	48.3	42.1
09/01/2021 16:22	63.4	46.4	48.2	42.9
09/01/2021 16:37	61.3	48.6	50.4	43.6
09/01/2021 16:52	61.4	46.1	48.2	42.6
09/01/2021 17:07	64.6	50	52.5	45.6
09/01/2021 17:22	63.8	48	49.8	44.8
09/01/2021 17:37	58.9	46.6	48.5	43.2
09/01/2021 17:52	57.3	45.6	47.5	41.8
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09/01/2021 18:37	57.1	46.7	49.4	40.6
09/01/2021 18:52	57	46.6	49.2	41.6
09/01/2021 19:07	51.9	45.8	47.9	42.3
09/01/2021 19:22	53.9	46.5	48.9	41.4
09/01/2021 19:37	54	47	49.3	43
09/01/2021 19:52	55.5	45.6	47.9	41
09/01/2021 20:07	54.5	46.4	49.6	41.5
09/01/2021 20:22	56.8	45.6	49	40.1
09/01/2021 20:37	54.6	45.1	48.1	38.6
09/01/2021 20:52	60.3	45.9	48.3	40.3
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09/01/2021 22:37	67.8	50.1	53.3	41.7
09/01/2021 22:52	69.1	47.8	51.2	38.8
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09/01/2021 23:37	66.3	42.7	45.5	34.5
09/01/2021 23:52	51.5	40.5	43.9	34.1
10/01/2021 00:07	50.6	40.7	43.8	35.7
10/01/2021 00:22	48.3	39.2	42	35
10/01/2021 00:37	50.1	39.9	42.5	36
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10/01/2021 03:22	64.3	38.3	36.8	32.1
10/01/2021 03:37	52.9	38.2	41.6	33.3
10/01/2021 03:52	53.7	36.3	37.3	32.1
10/01/2021 04:07	50.7	36.5	38.9	32.4
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10/01/2021 04:37	51.1	38.5	41.6	33.3
10/01/2021 04:52	50.8	39.2	42.8	33.9
10/01/2021 05:07	49.7	37.5	39.8	34.1
10/01/2021 05:22	51.4	39	42.4	35
10/01/2021 05:37	53	40.3	42.9	36.1
10/01/2021 05:52	51.6	41.1	44.4	36.3
10/01/2021 06:07	54.5	41.3	44.3	36.9
10/01/2021 06:22	65.7	44.2	45.6	38.7
10/01/2021 06:37	49.6	43	45.3	39.8
10/01/2021 06:52	50.1	43.3	46.2	39.2
10/01/2021 07:07	55.9	43.4	46.3	38.9
10/01/2021 07:22	54.9	43.6	46.5	38.2
10/01/2021 07:37	52.4	43.4	45.7	39.7
10/01/2021 07:52	53.6	45.5	47.8	42.2
10/01/2021 08:07	52.9	44.6	46.8	41.6
10/01/2021 08:22	57.3	45.4	48.1	40.6
10/01/2021 08:37	57	44.8	47	41.2
10/01/2021 08:52	54.5	44.7	46.9	41.2
10/01/2021 09:07	56.6	44.5	47.2	40.1
10/01/2021 09:22	54.7	43.9	46.3	40.3
10/01/2021 09:37	53	45.2	47.7	41
10/01/2021 09:52	75.4	46.1	47.2	41.1
10/01/2021 10:07	61.5	46.4	48.2	42.4
10/01/2021 10:22	61.5	47.2	48.5	43.2
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10/01/2021 10:52	56.6	46.1	48.2	42.6
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10/01/2021 11:37	57.1	46.1	48.1	43
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10/01/2021 12:22	62.6	47.8	50	42.4
10/01/2021 12:37	62	47.9	50.3	42.8
10/01/2021 12:52	55.1	46.9	49.4	42.9
10/01/2021 13:07	53.8	46.6	49.1	42.4
10/01/2021 13:22	58.8	48.1	50.9	42.5
10/01/2021 13:37	56.8	47	49.2	43.7
10/01/2021 13:52	56.6	47.3	49.8	42.9
10/01/2021 14:07	57.7	47.7	49.8	43.3

10/01/2021 14:22	57.7	47.1	49.6	43.4
10/01/2021 14:37	59.5	46.7	49.5	41.1
10/01/2021 14:52	58	47	49.7	42.2
10/01/2021 15:07	55.5	47.1	49.2	43.8
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10/01/2021 15:37	53.1	46	48.3	42
10/01/2021 15:52	56.6	45.5	47.6	42.1
10/01/2021 16:07	60.7	48.1	50.2	42.1
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10/01/2021 16:37	55.4	48.5	51.2	44
10/01/2021 16:52	60.5	48	50.6	43.4
10/01/2021 17:07	60.4	48.6	50.8	42.7
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10/01/2021 17:52	53.2	46.2	48.8	42
10/01/2021 18:07	63.3	47.3	48.9	40.3
10/01/2021 18:22	56	46.2	48.9	41.4
10/01/2021 18:37	55.4	45.3	47.7	40.1
10/01/2021 18:52	57.3	46.6	48.4	43.1
10/01/2021 19:07	61.1	46	47.6	41.7
10/01/2021 19:22	59.7	46.5	47.9	40.4
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10/01/2021 19:52	53.7	44.9	47.3	41
10/01/2021 20:07	64.6	48.1	49.7	43.6
10/01/2021 20:22	60.9	47.3	50.1	40.8
10/01/2021 20:37	58.7	46.9	49.8	39.7
10/01/2021 20:52	56.4	46.1	48.9	39.4
10/01/2021 21:07	70.4	47.5	47.5	41.1
10/01/2021 21:22	58.9	45.5	48.5	39.3
10/01/2021 21:37	74.9	48.8	50.1	40
10/01/2021 21:52	61.8	46.3	47.3	39.8
10/01/2021 22:07	48.5	42.1	44.6	38.4
10/01/2021 22:22	53.2	43.9	46.7	39.3
10/01/2021 22:37	52.3	43.5	46	39.5
10/01/2021 22:52	56.2	45.3	48.8	38.7
10/01/2021 23:07	61.1	44.3	47.2	38.2
10/01/2021 23:22	59.3	46	48.8	39.4
10/01/2021 23:37	57	43.7	47.3	37.9
10/01/2021 23:52	61.5	44.1	47.6	37.7
11/01/2021 00:07	63.7	45.3	46.6	37.7
11/01/2021 00:22	53.9	42.1	44.8	38.1
11/01/2021 00:37	62.2	45.8	47.7	39
11/01/2021 00:52	59.2	42.5	44.5	38.1
11/01/2021 01:07	59.7	42.9	45.8	37.2
11/01/2021 01:22	58.6	43.6	46.6	38.2
11/01/2021 01:37	49.4	40.7	43.5	37.3
11/01/2021 01:52	54.9	39.5	41.6	36.1
11/01/2021 02:07	50.2	38.5	41.3	35.3
11/01/2021 02:22	46.7	36.4	37.8	34.5
11/01/2021 02:37	50.1	37.7	40.8	34.4

11/01/2021 02:52	57.4	37.9	39.2	34.8
11/01/2021 03:07	52.4	39.2	42.6	34.5
11/01/2021 03:22	51	39.8	42.5	36.4
11/01/2021 03:37	48.4	39.1	41.4	36.2
11/01/2021 03:52	51	38.5	41.4	34.6
11/01/2021 04:07	52.6	39.2	42.3	34.8
11/01/2021 04:22	52.7	38.8	41.9	35.1
11/01/2021 04:37	47.8	38	40.4	35.3
11/01/2021 04:52	51.1	40.9	44	36.5
11/01/2021 05:07	56.3	42.3	44.5	37.2
11/01/2021 05:22	53.7	45.1	48	40.3
11/01/2021 05:37	56.2	44.7	47.6	40.5
11/01/2021 05:52	57.2	46.1	48.7	41.2
11/01/2021 06:07	57.5	46.2	48.7	41.3
11/01/2021 06:22	54.9	47.1	49.7	42.6
11/01/2021 06:37	59.9	48.9	50.9	45.1
11/01/2021 06:52	56.2	48.3	50.5	44.5
11/01/2021 07:07	59.8	47.7	50	43.8
11/01/2021 07:22	56.8	49.3	51.3	46.7
11/01/2021 07:37	60.6	50.8	52.9	47.3
11/01/2021 07:52	71.6	53.8	55.3	49
11/01/2021 08:07	68	54.2	56.4	49
11/01/2021 08:22	62.5	51.9	53.7	48.5
11/01/2021 08:37	69	53.4	54.4	49.1
11/01/2021 08:52	58.5	51.8	53.8	48.8
11/01/2021 09:07	72.9	55.6	54.8	49.3
11/01/2021 09:22	79.3	55.4	56.4	49.7
11/01/2021 09:37	68.6	54.4	56.4	50.5
11/01/2021 09:52	76.5	53.1	54.1	49
11/01/2021 10:07	66.9	52	53.8	48.4
11/01/2021 10:22	69.4	52.4	54.2	48.5
11/01/2021 10:37	67	50.9	52.9	46.5
11/01/2021 10:52	69.3	53.6	55.3	47.5
11/01/2021 11:07	66	52.5	54.7	47.1
11/01/2021 11:22	66.4	51.6	53.1	47.4
11/01/2021 11:37	71.1	51.7	53.4	47.2
11/01/2021 11:52	69.5	53.4	55.7	48.9
11/01/2021 12:07	70.7	54.8	56	50.3
11/01/2021 12:22	61.7	53.2	55.4	50
11/01/2021 12:37	72.7	55	57.8	49.8
11/01/2021 12:52	63.8	53.3	55.3	49.7
11/01/2021 13:07	69.4	53.2	54.9	48.9
11/01/2021 13:22	66	52.7	54	49.7
11/01/2021 13:37	70.2	52.7	54.6	48.1
11/01/2021 13:52	70.3	53	54.2	46.8
11/01/2021 14:07	70.7	52.9	55.4	47.5
11/01/2021 14:22	73.1	55.4	56.6	48.4
11/01/2021 14:37	74.6	55.1	57.4	49.1
11/01/2021 14:52	63	51.4	53.7	47.5
11/01/2021 15:07	73	54.8	54.9	48.3

11/01/2021 15:22	88.4	69.3	72.6	50
11/01/2021 15:37	68.8	54.2	55.9	48.7
11/01/2021 15:52	72.5	57.6	60.8	50.7
11/01/2021 16:07	76.8	60.3	63.8	52.3
11/01/2021 16:22	84.6	64.9	67.1	52.5
11/01/2021 16:37	79.6	60.4	63.1	51.9
11/01/2021 16:52	82.2	63.1	65.9	52.7
11/01/2021 17:07	94.8	66.2	65.7	51.7
11/01/2021 17:22	93.6	68.9	67.6	53.3
11/01/2021 17:37	94.3	69.6	67.2	54.7
11/01/2021 17:52	96.6	67.3	62.7	51.9
11/01/2021 18:07	97.6	69.2	64.4	52.8
11/01/2021 18:22	98.8	71.3	60	50.6
11/01/2021 18:37	102.9	74.6	58.1	50.6
11/01/2021 18:52	77.1	56.6	57.5	50.5
11/01/2021 19:07	87.8	56.9	56.5	49.7
11/01/2021 19:22	81.5	55.8	57.7	52.2
11/01/2021 19:37	67.4	54	56	51.1
11/01/2021 19:52	75.4	54.9	57	50
11/01/2021 20:07	68.6	52.6	54.6	47.3
11/01/2021 20:22	65	51.4	53.6	47.9
11/01/2021 20:37	77.1	56.4	58.2	48.6
11/01/2021 20:52	85.2	54.2	55.7	47.5
11/01/2021 21:07	100.9	63.7	55.4	47.1
11/01/2021 21:22	89.3	58.5	58.3	47.3
11/01/2021 21:37	79.9	59.1	61.6	52.6
11/01/2021 21:52	75.8	58.8	61.7	53.2
11/01/2021 22:07	80.5	59.3	63.1	50.9
11/01/2021 22:22	77.6	61	64.4	54.1
11/01/2021 22:37	58.6	53	54.7	51.1
11/01/2021 22:52	73.9	57.9	60.7	52.1
11/01/2021 23:07	72.1	58.5	61.4	53
11/01/2021 23:22	73.6	55.9	60.1	48.5
11/01/2021 23:37	78	55.9	58.7	48.6
11/01/2021 23:52	74.6	55.2	55.8	51
12/01/2021 00:07	61.8	53.7	55.5	51.4
12/01/2021 00:22	82.3	57	58.9	53.8
12/01/2021 00:37	94.3	64.3	60.9	48.6
12/01/2021 00:52	95	63.1	62.7	43.6
12/01/2021 01:07	56.5	45.2	47.5	41.3
12/01/2021 01:22	55.6	44.2	46.3	41.2
12/01/2021 01:37	102	74.7	58.7	45.6
12/01/2021 01:52	89.8	56.8	51.8	44.3
12/01/2021 02:07	65.6	50.2	52	43
12/01/2021 02:22	83.4	52	50	46.3
12/01/2021 02:37	73.3	49.4	51.3	46.2
12/01/2021 02:52	59.5	49	51.4	45.2
12/01/2021 03:07	60.2	48.7	50.3	44.8
12/01/2021 03:22	59.1	48.2	49.9	45.2
12/01/2021 03:37	71.7	54.2	58.3	44.3

12/01/2021 03:52	67.4	48.4	50.5	45.8
12/01/2021 04:07	59.2	46.5	48.9	43.8
12/01/2021 04:22	58.4	47.2	48.8	45.1
12/01/2021 04:37	78.3	49.4	51.1	44.2
12/01/2021 04:52	61.1	46.9	48.8	43.4
12/01/2021 05:07	66.3	46.8	48.7	43.9
12/01/2021 05:22	57.7	47.4	50.4	43.2
12/01/2021 05:37	59.9	47.3	50.8	41.7
12/01/2021 05:52	56.6	48.7	51.6	44.4
12/01/2021 06:07	61.9	49.3	51.7	44.4
12/01/2021 06:22	62.2	50.4	52.4	46.7
12/01/2021 06:37	59.8	50.8	53.4	46.7
12/01/2021 06:52	57.8	49.7	52.1	46
12/01/2021 07:07	62.4	49.2	51	45.9
12/01/2021 07:22	86.8	57.3	57.8	48.9
12/01/2021 07:37	60.3	53.8	57.1	51.1
12/01/2021 07:52	75.4	54	54.6	51.1
12/01/2021 08:07	67.5	53.4	54.5	50.9
12/01/2021 08:22	67.9	53.9	54.6	51
12/01/2021 08:37	65.5	53.5	54.6	51.2
12/01/2021 08:52	74	58.5	61.8	52.3
12/01/2021 09:07	74.7	59.1	62.4	52.1
12/01/2021 09:22	71.2	57.1	60.3	51.3
12/01/2021 09:37	73.7	59.2	62.4	52.1
12/01/2021 09:52	75.8	60	63.5	52.4
12/01/2021 10:07	79.3	58	61	51.1
12/01/2021 10:22	67.9	54	55.6	50.4
12/01/2021 10:37	65.5	51.5	52.9	49.9
12/01/2021 10:52	62.3	51.6	52.8	49.7
12/01/2021 11:07	64.1	53.3	55.2	49.8
12/01/2021 11:22	70.9	54.5	55.6	49.6
12/01/2021 11:37	69.7	53.5	54.9	50.4
12/01/2021 11:52	76.1	57.9	60.9	52
12/01/2021 12:07	81.3	58.8	61.4	51.5
12/01/2021 12:22	71	56.3	58.8	49.6
12/01/2021 12:37	66.3	52.2	53.4	49.6
12/01/2021 12:52	68.6	54.4	55.3	49.7
12/01/2021 13:07	97.4	60.2	55.4	50.7
12/01/2021 13:22	99.2	66.5	62.2	50.4
12/01/2021 13:37	81.5	62.5	65.1	50.4
12/01/2021 13:52	79.4	60.8	63.5	49.8
12/01/2021 14:07	80	59.3	61.9	48
12/01/2021 14:22	77.2	56.3	58.9	46.3
12/01/2021 14:37	63.3	49.1	51.6	44.1

Survey Position 2

Date & time	LAFmax	LAeq	LA10	LA90
08/01/2021 15:21	72.3	51.4	52.1	44.6
08/01/2021 15:36	61.4	51.9	55.4	45.3
08/01/2021 15:51	73.3	53.1	56.1	46.9
08/01/2021 16:06	61	51.3	54.4	46.5
08/01/2021 16:07	65.3	51.3	54.7	45.4
08/01/2021 16:09	67.1	48.9	50.2	45.6
08/01/2021 16:24	62.6	53.9	57.3	47.3
08/01/2021 16:39	59.4	47.9	51.4	41.5
08/01/2021 16:54	50.4	44.9	46.6	42.3
08/01/2021 17:09	59.3	45	46.4	41.3
08/01/2021 17:24	51.9	45.3	47	42.7
08/01/2021 17:39	51.8	45.6	47.1	43.4
08/01/2021 17:54	52.5	45.5	47.4	41.8
08/01/2021 18:09	68	49	47.8	41.7
08/01/2021 18:24	57.5	45.8	47.2	40.4
08/01/2021 18:39	60.5	46.9	47.4	42.5
08/01/2021 18:54	60.6	45.2	47.4	38.2
08/01/2021 19:09	60.1	45.6	46.7	39.5
08/01/2021 19:24	51.4	43.5	45.7	39
08/01/2021 19:39	56.7	44.5	46.4	36.8
08/01/2021 19:54	54.3	43.3	46	37.1
08/01/2021 20:09	54.3	42.9	45.3	36.1
08/01/2021 20:24	55.8	43.2	45.7	37.5
08/01/2021 20:39	57	42.3	43.9	34.6
08/01/2021 20:54	56.8	43.2	45.4	29.7
08/01/2021 21:09	56.2	40.8	42.8	34.2
08/01/2021 21:24	47.9	40.4	43.1	34.9
08/01/2021 21:39	58.3	43.5	45	33.5
08/01/2021 21:54	58.7	43.8	46.4	27.3
08/01/2021 22:09	50.6	39	42	31.8
08/01/2021 22:24	56.6	42.9	44.4	33.8
08/01/2021 22:39	59.4	46.1	48.7	30.4
08/01/2021 22:54	55.6	37.2	40	25.5
08/01/2021 23:09	45.6	35.5	38.9	26
08/01/2021 23:24	61.4	43.8	45.4	25.9
08/01/2021 23:39	60.2	42.1	42.8	26
08/01/2021 23:54	59.5	43.5	42.9	27.8
09/01/2021 00:09	50.9	38.1	41.5	25.8
09/01/2021 00:24	46	36.4	40.1	27
09/01/2021 00:39	46.5	34.6	38.8	25
09/01/2021 00:54	57.2	39.9	40.3	26.2
09/01/2021 01:09	54.1	37.4	39.2	24.7
09/01/2021 01:24	60.2	41.7	42.6	25
09/01/2021 01:39	59.2	42.5	42.2	23
09/01/2021 01:54	40.4	25.7	28.3	21.3

09/01/2021 02:09	43	31.3	36	21.5
09/01/2021 02:24	53.5	37.8	41.9	23.7
09/01/2021 02:39	50.1	31.7	35.8	22.3
09/01/2021 02:54	45.2	32.6	36.7	25.3
09/01/2021 03:09	46.6	32.6	37.2	24.3
09/01/2021 03:24	60.2	41.9	40.6	27.5
09/01/2021 03:39	58.3	44.6	49.2	28.7
09/01/2021 03:54	59.7	44.9	44.6	30.1
09/01/2021 04:09	43.2	34.6	38.3	28.9
09/01/2021 04:24	58.2	43.6	42.5	31.3
09/01/2021 04:39	42.1	36	38.9	32.2
09/01/2021 04:54	58.3	44.3	43.6	30.4
09/01/2021 05:09	60.4	44.9	43.7	35.9
09/01/2021 05:24	56.9	44.6	46.7	34.4
09/01/2021 05:39	53.5	43.5	46.4	38.9
09/01/2021 05:54	52.1	44.1	46.6	39.6
09/01/2021 06:09	60.6	45.1	47.4	37.8
09/01/2021 06:24	59.9	46.2	49.8	38.4
09/01/2021 06:39	52.7	44.3	47	40.1
09/01/2021 06:54	60.8	47.8	49.8	41.4
09/01/2021 07:09	57.2	45.7	47.1	40.3
09/01/2021 07:24	51.9	44.7	47.3	39.8
09/01/2021 07:39	55.5	46.1	48.3	42.1
09/01/2021 07:54	62.9	47.3	50.4	42.7
09/01/2021 08:09	61.1	50.1	53.4	45.7
09/01/2021 08:24	67.6	55.2	57.4	52.1
09/01/2021 08:39	60.7	52	55.2	47.1
09/01/2021 08:54	68	51.2	53.5	46.4
09/01/2021 09:09	63.3	51.2	52.9	48.7
09/01/2021 09:24	59.4	51.5	52.9	49.3
09/01/2021 09:39	59.6	50.6	52.4	47.3
09/01/2021 09:54	57.5	50.4	52.2	47.4
09/01/2021 10:09	60.9	48.6	50.2	44.9
09/01/2021 10:24	59.2	48.3	50.2	45.2
09/01/2021 10:39	61.4	54.5	57.7	49.2
09/01/2021 10:54	57.9	45.1	46.5	41.9
09/01/2021 11:09	59	45.4	47.8	42.1
09/01/2021 11:24	58.8	47.2	48.8	42.7
09/01/2021 11:39	53.7	46	47.9	42.6
09/01/2021 11:54	64.9	45.7	47.4	42.5
09/01/2021 12:09	54.9	45.6	47.9	40.1
09/01/2021 12:24	62.1	47.1	47.5	42.5
09/01/2021 12:39	59.7	45.4	47.2	41.4
09/01/2021 12:54	54.5	45.1	46.9	41.2
09/01/2021 13:09	62.8	49.7	51.7	41.4
09/01/2021 13:24	55.9	43.3	44.7	39.9
09/01/2021 13:39	56.1	44.7	46.2	41
09/01/2021 13:54	61	48	49.3	40.2
09/01/2021 14:09	59.3	47.4	50.2	41
09/01/2021 14:24	63	44.4	45.5	41.2

09/01/2021 14:39	61.7	47.1	47.8	41.1
09/01/2021 14:54	59.2	44.2	45.8	40.5
09/01/2021 15:09	56.5	43.5	44.9	40.3
09/01/2021 15:24	68.1	45.7	46.7	41.4
09/01/2021 15:39	61.7	48.1	49.8	42.3
09/01/2021 15:54	58.1	44.5	45.8	41.8
09/01/2021 16:09	56.1	44.3	45.7	41
09/01/2021 16:24	56.8	43.8	44.8	41.1
09/01/2021 16:39	72.7	46.1	46.4	41.5
09/01/2021 16:54	56.3	42.9	43.9	39.2
09/01/2021 17:09	57.6	43.7	44.8	39.8
09/01/2021 17:24	54	43.1	45.1	39.4
09/01/2021 17:39	55.9	44.1	45.7	38.2
09/01/2021 17:54	60.5	44.6	46.2	38.8
09/01/2021 18:09	58.6	43.3	45.1	37.7
09/01/2021 18:24	60.2	43.7	45.8	37.5
09/01/2021 18:39	55.1	44.1	46	40.1
09/01/2021 18:54	49.7	42.2	44.4	38.8
09/01/2021 19:09	53.1	42.3	44.6	38
09/01/2021 19:24	57.1	42.3	44.3	35.9
09/01/2021 19:39	53	43.2	46.3	33.9
09/01/2021 19:54	59.7	44.4	47	37.1
09/01/2021 20:09	54	42.6	44.7	35.1
09/01/2021 20:24	54.6	40.7	43.2	35.5
09/01/2021 20:39	53.9	43	45.3	34.1
09/01/2021 20:54	61.6	47.3	47.3	36.5
09/01/2021 21:09	51.9	41.3	44.4	31.9
09/01/2021 21:24	54	40.9	43.1	36
09/01/2021 21:39	54.2	42	44.7	34.9
09/01/2021 21:54	56.5	40.9	42.8	33.4
09/01/2021 22:09	56.5	41	43	33.1
09/01/2021 22:24	58.1	42.4	43.8	33
09/01/2021 22:39	46.7	37.9	40.9	32
09/01/2021 22:54	47.2	37.6	40.7	33
09/01/2021 23:09	45.1	38.3	41.2	34.3
09/01/2021 23:24	44.3	37.7	40.1	34.5
09/01/2021 23:39	45.1	38.2	40.5	35.3
09/01/2021 23:54	51.7	38.7	41.1	35.3
10/01/2021 00:09	46.6	37	39	34.3
10/01/2021 00:24	46.1	38	40.5	34.6
10/01/2021 00:39	48	38.2	40.9	35.1
10/01/2021 00:54	45.8	37.8	40	34.6
10/01/2021 01:09	48.8	36.4	38.9	33
10/01/2021 01:24	46.5	36.8	39.7	33
10/01/2021 01:39	50.4	34.7	36.4	31.6
10/01/2021 01:54	45	35.3	38.4	31.5
10/01/2021 02:09	44.7	34.6	37.3	31.3
10/01/2021 02:24	44.8	33.6	36.2	31.1
10/01/2021 02:39	45	35.3	38.3	32
10/01/2021 02:54	45.8	33.7	36.1	31

10/01/2021 03:09	44.9	34.2	36.8	31.1
10/01/2021 03:24	48.1	34.8	38	30.8
10/01/2021 03:39	47.1	36.3	39.4	32.5
10/01/2021 03:54	46.8	36.6	39.5	33.2
10/01/2021 04:09	47.4	36.4	38.9	33.1
10/01/2021 04:24	45.2	37	39.6	34.1
10/01/2021 04:39	47.8	38.9	41.3	35.7
10/01/2021 04:54	49.1	39.4	41.7	36.3
10/01/2021 05:09	48.5	40.3	42.7	36.6
10/01/2021 05:24	51.2	41.2	43.5	37.6
10/01/2021 05:39	49.6	41.7	43.6	39.1
10/01/2021 05:54	49.6	42.5	45.2	38.7
10/01/2021 06:09	50.1	41	43.4	37.2
10/01/2021 06:24	50.8	41.1	43.7	36.7
10/01/2021 06:39	50.9	41.7	44	38.6
10/01/2021 06:54	49.4	43.1	44.9	40.6
10/01/2021 07:09	52.5	43.5	45.5	40.7
10/01/2021 07:24	51.1	43.3	45.7	40.2
10/01/2021 07:39	53.1	44	45.8	41.8
10/01/2021 07:54	50.9	43.7	45.4	41.7
10/01/2021 08:09	52.7	43.5	45.3	41
10/01/2021 08:24	57	43.4	44.8	41.3
10/01/2021 08:39	59.5	44.1	45.6	41.5
10/01/2021 08:54	81.5	47.3	45.9	40.5
10/01/2021 09:09	55.8	43.9	45.8	41.3
10/01/2021 09:24	54.8	44.9	46.6	42.6
10/01/2021 09:39	63.2	45.5	46.8	42.6
10/01/2021 09:54	61.3	44.9	46.5	42.6
10/01/2021 10:09	57.7	44	45.6	41.7
10/01/2021 10:24	55.5	44.8	46.2	41.2
10/01/2021 10:39	65.1	44.7	46.2	42.3
10/01/2021 10:54	55.3	44.8	46.5	43
10/01/2021 11:09	67.1	44.5	45.7	42.2
10/01/2021 11:24	60.3	46.6	48.4	41.7
10/01/2021 11:39	56.8	46	48.8	42
10/01/2021 11:54	58.5	45.8	47.9	42.1
10/01/2021 12:09	53.3	44.7	46.6	41.6
10/01/2021 12:24	60.7	47.1	49.8	41.6
10/01/2021 12:39	53.9	45.1	46.9	42.8
10/01/2021 12:54	59.3	46.6	47.4	42.1
10/01/2021 13:09	56.3	45.8	47.6	42.2
10/01/2021 13:24	61.7	46.8	48.5	43.1
10/01/2021 13:39	54.6	45.7	48.5	41.3
10/01/2021 13:54	56.6	46.3	48.4	41.3
10/01/2021 14:09	56.1	45.1	46.8	42.4
10/01/2021 14:24	60.8	46.7	48.7	41.7
10/01/2021 14:39	59.8	46.3	47.6	41.3
10/01/2021 14:54	49.3	44	45.9	41.4
10/01/2021 15:09	67.6	49.3	48.5	41
10/01/2021 15:24	60	46.9	48.3	41.4

10/01/2021 15:39	57.5	46.5	48.6	42.5
10/01/2021 15:54	54.1	46	48.1	42.6
10/01/2021 16:09	59.8	46.2	47.7	41.7
10/01/2021 16:24	55.4	46.7	49	41.3
10/01/2021 16:39	55.2	45.1	47.3	41.3
10/01/2021 16:54	56.4	44.4	46.5	40.9
10/01/2021 17:09	56.8	44.7	46.9	40.3
10/01/2021 17:24	56.5	45.7	47.7	41
10/01/2021 17:39	55.6	43.7	45.3	40
10/01/2021 17:54	59	44.8	46.7	41.6
10/01/2021 18:09	60.4	45.5	46.1	41.1
10/01/2021 18:24	66.4	46.1	47.3	39.6
10/01/2021 18:39	55.2	43.3	45.2	40.2
10/01/2021 18:54	51.1	43	44.9	39.9
10/01/2021 19:09	64.3	46.3	46.8	41.1
10/01/2021 19:24	64.8	46.5	47.6	40.2
10/01/2021 19:39	57.6	44.5	46.6	39
10/01/2021 19:54	58.5	44.1	46.3	38.3
10/01/2021 20:09	53.1	42.7	44.6	39.4
10/01/2021 20:24	80.7	48.5	46.4	38.4
10/01/2021 20:39	57.4	45	47.4	38.8
10/01/2021 20:54	48.4	41.2	43.3	38.3
10/01/2021 21:09	57.7	41.2	43.2	37.2
10/01/2021 21:24	50.4	41.7	43.9	38.1
10/01/2021 21:39	53	41.9	44.3	38.3
10/01/2021 21:54	55.4	44.9	48.6	37.6
10/01/2021 22:09	56.5	42.4	44.8	37.2
10/01/2021 22:24	62.7	44.4	45.8	38.1
10/01/2021 22:39	59	43.4	45.3	36.6
10/01/2021 22:54	56.4	41.9	44.8	35.9
10/01/2021 23:09	58.6	41.4	43.4	36.7
10/01/2021 23:24	54.7	40	42.3	36.4
10/01/2021 23:39	58	43	43.9	37.5
10/01/2021 23:54	46.8	39.6	41.7	37.1
11/01/2021 00:09	54.3	39.7	42.3	36
11/01/2021 00:24	58.7	43	45	36.4
11/01/2021 00:39	48.3	38.2	40.7	35.2
11/01/2021 00:54	45.5	36.9	38.9	34.6
11/01/2021 01:09	45.9	36.8	39.3	34.1
11/01/2021 01:24	41.5	35.4	37	33.5
11/01/2021 01:39	47.3	36	37.9	33.6
11/01/2021 01:54	43	34.9	36.7	33.1
11/01/2021 02:09	46.9	36.3	39.4	33.1
11/01/2021 02:24	48.3	38	40.4	35.1
11/01/2021 02:39	43.4	37.1	39.1	35
11/01/2021 02:54	49.5	36.7	39.1	34
11/01/2021 03:09	54.1	37.7	40	34.1
11/01/2021 03:24	46.2	36.6	39.2	34
11/01/2021 03:39	44.1	36.5	38.5	34.4
11/01/2021 03:54	48.5	38.8	41.3	35.8

11/01/2021 04:09	50.3	39.8	42.2	35.2
11/01/2021 04:24	52.1	41.4	44.5	37.4
11/01/2021 04:39	48	41.8	44	38.6
11/01/2021 04:54	51.7	42.7	44.8	39.3
11/01/2021 05:09	57.1	45.1	47.5	40.7
11/01/2021 05:24	55.2	44.5	46.9	40.8
11/01/2021 05:39	53.8	45.7	47.7	43.1
11/01/2021 05:54	55.6	45.6	47.4	43.1
11/01/2021 06:09	56.3	45.5	47.4	42.3
11/01/2021 06:24	52	46.5	48.1	44.3
11/01/2021 06:39	57	47.8	49.2	45.5
11/01/2021 06:54	63.5	49.9	51.4	47.2
11/01/2021 07:09	71	49.5	50.8	47.1
11/01/2021 07:24	58.8	49.5	51.2	47
11/01/2021 07:39	63.1	49.4	50.8	47.3
11/01/2021 07:54	58.1	50.2	51.8	47.4
11/01/2021 08:09	81.1	58.1	52.8	47.6
11/01/2021 08:24	73.9	51.7	52.8	49
11/01/2021 08:39	66.8	52.4	54.5	48.5
11/01/2021 08:54	72.1	50.7	51.7	47.4
11/01/2021 09:09	60.8	48.9	50.5	46.7
11/01/2021 09:24	74.8	50.8	52.7	46.8
11/01/2021 09:39	59.2	49.1	51.5	45.2
11/01/2021 09:54	64.4	50.9	53.6	46.4
11/01/2021 10:09	65.5	49.4	51.2	45.3
11/01/2021 10:24	69.2	51.6	54.9	46.5
11/01/2021 10:39	60.3	48.8	50.5	46.2
11/01/2021 10:54	69.9	50	51.6	46.9
11/01/2021 11:09	71.5	54.5	57.2	50.2
11/01/2021 11:24	65.2	54.8	58.2	49.8
11/01/2021 11:39	73.7	53.3	56.6	47.8
11/01/2021 11:54	59	49.6	51.3	47.1
11/01/2021 12:09	72.9	49.9	51.7	46.8
11/01/2021 12:24	57.5	48.6	50.1	46.5
11/01/2021 12:39	61.3	48.8	50.6	46.2
11/01/2021 12:54	60.8	49.9	52.2	45.8
11/01/2021 13:09	68.1	51.5	55.2	45.2
11/01/2021 13:24	72.3	51.6	51.4	46
11/01/2021 13:39	64.8	51.6	54.2	46.7
11/01/2021 13:54	61.1	48.6	50.6	45.6
11/01/2021 14:09	60.7	49.3	50.9	46.4
11/01/2021 14:24	87.9	69.2	71.4	47.1
11/01/2021 14:39	66.4	52.4	55.1	47.9
11/01/2021 14:54	64.7	52.5	55.5	48.2
11/01/2021 15:09	66.5	53.3	56	48.7
11/01/2021 15:24	72.9	54.8	57.2	48.7
11/01/2021 15:39	75.1	56.6	59.1	51.5
11/01/2021 15:54	77.5	57.5	60.3	52.1
11/01/2021 16:09	71.7	54.6	57.2	48
11/01/2021 16:24	71.9	54.8	58	48.8

11/01/2021 16:39	70.5	52.9	55.6	48.1
11/01/2021 16:54	72.5	52.1	53.9	47.8
11/01/2021 17:09	56.9	49.8	51.5	47.6
11/01/2021 17:24	57.7	49	50.6	46.8
11/01/2021 17:39	60.1	50.2	51.9	48
11/01/2021 17:54	57.4	49.9	51.5	47.9
11/01/2021 18:09	66.2	49.9	52.2	46.2
11/01/2021 18:24	63	50.4	51.9	46
11/01/2021 18:39	61.9	50.6	53.6	45.3
11/01/2021 18:54	63.8	50.3	52.1	44.4
11/01/2021 19:09	65.3	49.2	51.7	44.1
11/01/2021 19:24	65.2	49.1	51.7	45
11/01/2021 19:39	71.9	52.5	55.5	45.1
11/01/2021 19:54	70.8	52.7	55.3	45.5
11/01/2021 20:09	63	48.9	51.2	45.1
11/01/2021 20:24	64.3	48.8	48.7	43.7
11/01/2021 20:39	63.5	49.1	50.6	43.3
11/01/2021 20:54	52.2	45.2	46.8	43.2
11/01/2021 21:09	53.4	43.4	45.3	41
11/01/2021 21:24	63.2	46	46.3	40.5
11/01/2021 21:39	56.9	43.8	45.9	40.1
11/01/2021 21:54	57.6	44.6	46.6	40
11/01/2021 22:09	68.3	51.2	55.7	41.1
11/01/2021 22:24	51.2	44.1	46.1	41.6
11/01/2021 22:39	65.4	51.4	54.6	43
11/01/2021 22:54	62.9	47.1	49.4	42.3
11/01/2021 23:09	52.3	43.9	45.9	41.4
11/01/2021 23:24	59.2	45.5	46.9	41.3
11/01/2021 23:39	60.4	47.1	48.1	41.8
11/01/2021 23:54	66	50.5	50.3	42.7
12/01/2021 00:09	54.1	43	44.9	40.4
12/01/2021 00:24	58.9	43.8	45.4	41.4
12/01/2021 00:39	52.1	43.9	45.8	41.1
12/01/2021 00:54	59.9	47.2	49.4	42.4
12/01/2021 01:09	62.8	50	51.7	43.3
12/01/2021 01:24	55.1	44.8	46.7	42.2
12/01/2021 01:39	50.8	44	45.8	41.7
12/01/2021 01:54	64.9	47.9	49.2	42.2
12/01/2021 02:09	62.9	48.1	49.2	41.3
12/01/2021 02:24	64.6	46.4	48	41.1
12/01/2021 02:39	60	46.5	50.7	38.2
12/01/2021 02:54	58.7	45.2	47.5	39.2
12/01/2021 03:09	60.5	44.4	46.4	37
12/01/2021 03:24	50.4	39.1	41.7	36.3
12/01/2021 03:39	60.6	43.9	46.5	37.1
12/01/2021 03:54	51.8	41.2	44.3	36.5
12/01/2021 04:09	50.6	41.5	44.5	37.4
12/01/2021 04:24	53.5	43.9	47.1	38.1
12/01/2021 13:19	51.8	48.4	50.4	46.1

Survey Position 3

Date & time	LAFmax	LAeq	LA10	LA90
15/09/2021 14:03:42	78.26	69.74	72.9	58.6
15/09/2021 14:18:45	81.77	68.53	72.3	55
15/09/2021 14:33:45	92.65	69.42	72.6	53.6
15/09/2021 14:48:45	83.21	68.94	72.5	54.7
15/09/2021 15:03:45	79.86	68.11	71.8	52.6
15/09/2021 15:18:45	82.29	68.39	72.4	51.2
15/09/2021 15:33:45	82.17	68.1	71.8	52.5
15/09/2021 15:48:45	81.96	68.54	72.2	50.2
15/09/2021 16:03:45	80.81	68.55	72.3	52.3
15/09/2021 16:18:45	81.61	68.59	72.4	53.8
15/09/2021 16:33:45	80.48	68.68	72.2	53.5
15/09/2021 16:48:45	79.74	68.67	72.4	53
15/09/2021 17:03:45	77.56	68.7	72.5	51.4
15/09/2021 17:18:45	79.6	68.05	71.9	50.3
15/09/2021 17:33:45	88.69	69.72	72.5	55
15/09/2021 17:48:45	81.88	68.97	72.4	56.3
15/09/2021 18:03:45	80.21	67.77	71.9	47.6
15/09/2021 18:18:45	79.79	68.02	72	51.7
15/09/2021 18:33:45	92.04	67.9	71.8	49.6
15/09/2021 18:48:45	80.35	67.21	71.7	48.5
15/09/2021 19:03:45	78.56	67.33	71.6	49.1
15/09/2021 19:18:45	76.45	66.6	71.2	44.1
15/09/2021 19:33:45	81.56	66.53	71	45.5
15/09/2021 19:48:45	80.41	66.64	71	48.9
15/09/2021 20:03:45	82.98	65.61	70.5	43.8
15/09/2021 20:18:45	79.09	64.77	69.9	43.2
15/09/2021 20:33:45	79.21	64.79	69.9	42.5
15/09/2021 20:48:45	76.87	64.11	69.5	41.4
15/09/2021 21:03:45	78.85	64.18	69.2	45.4
15/09/2021 21:18:45	78.21	63.57	68.9	41.6
15/09/2021 21:33:45	77.09	63.01	68.3	36.2
15/09/2021 21:48:45	77.93	62.51	68.3	35.8
15/09/2021 22:03:45	77	62.95	68.5	39.9
15/09/2021 22:18:45	77.88	63.49	68.9	40.3
15/09/2021 22:33:45	79.23	62.64	67.4	35.6
15/09/2021 22:48:45	76.49	60.86	64.2	39.5
15/09/2021 23:03:45	77.18	61.67	65.5	39.1
15/09/2021 23:18:45	76.28	59.41	62.1	36.2
15/09/2021 23:33:45	79.16	60.7	62.2	36.8
15/09/2021 23:48:45	78.78	60.06	61	37.6
16/09/2021 00:03:45	75.41	57.86	57.2	36.1
16/09/2021 00:18:45	75.85	57.72	58.7	35.1
16/09/2021 00:33:45	74.45	55.24	52.2	34.6

16/09/2021 00:48:45	77.73	56.14	49.5	34.5
16/09/2021 01:03:45	80.73	57.82	53.6	34.7
16/09/2021 01:18:45	81.43	57.89	51.1	34.5
16/09/2021 01:33:45	80.89	57.17	53.1	34
16/09/2021 01:48:45	74.25	52.71	48.3	35.3
16/09/2021 02:03:45	85.72	57.05	51.1	35.4
16/09/2021 02:18:45	74.91	55.68	50.4	35.6
16/09/2021 02:33:45	76.37	56.82	52.2	36
16/09/2021 02:48:45	75.09	52.23	46.4	34.8
16/09/2021 03:03:45	81.01	56.39	50.7	36.5
16/09/2021 03:18:45	78.56	56.18	52.6	35.5
16/09/2021 03:33:45	81.06	59.86	57.1	36.4
16/09/2021 03:48:45	80.92	59.07	56.2	36.7
16/09/2021 04:03:45	79.54	57.61	50.9	35.5
16/09/2021 04:18:45	81.75	62.2	63.4	37.4
16/09/2021 04:33:45	82.15	61.44	60.4	34.4
16/09/2021 04:48:45	82.21	61.91	63.6	35.2
16/09/2021 05:03:45	79.13	62.43	65.8	37.3
16/09/2021 05:18:45	81.13	62.77	65.7	36.1
16/09/2021 05:33:45	80.29	65.39	70.5	43.1
16/09/2021 05:48:45	95.11	68.31	71.5	46
16/09/2021 06:03:45	80.42	65.14	70.5	44.4
16/09/2021 06:18:45	82.59	67.25	71.9	48.8
16/09/2021 06:33:45	81.05	67.53	72.2	48.8
16/09/2021 06:48:45	79.74	67.87	72.8	50
16/09/2021 07:03:45	80.28	68.11	72.6	50.8
16/09/2021 07:18:45	81.29	69.43	73.5	55.5
16/09/2021 07:33:45	83.47	68.46	72.3	54.8
16/09/2021 07:48:45	80.04	69.57	73.5	55.7
16/09/2021 08:03:45	80.02	68.93	73.1	52.7
16/09/2021 08:18:45	80.51	69.19	72.9	55.3
16/09/2021 08:33:45	81.69	68.83	73	53.5
16/09/2021 08:48:45	82.02	69.09	73.1	50.8
16/09/2021 09:03:45	79.66	68.47	72.6	53.6
16/09/2021 09:18:45	80.68	67.94	72.5	52.7
16/09/2021 09:33:45	79.86	67.93	72.2	51.2
16/09/2021 09:48:45	81.95	68.34	72.3	53.9
16/09/2021 10:03:45	81.37	68.38	72.3	52.4
16/09/2021 10:18:45	81.22	67.8	72.3	51.6
16/09/2021 10:33:45	82.76	67.39	71.7	52.8
16/09/2021 10:48:45	81.23	67.76	72	50.3
16/09/2021 11:03:45	81.02	67.51	71.8	48.4
16/09/2021 11:18:45	82.11	68.06	72.1	51.9
16/09/2021 11:33:45	80.03	67.78	72.3	49.5
16/09/2021 11:48:45	80.54	67.93	72.2	49.1
16/09/2021 12:03:45	91.2	67.53	71.5	49
16/09/2021 12:18:45	80.12	67.76	71.8	53.5
16/09/2021 12:33:45	80.22	68.1	72.2	51.8
16/09/2021 12:48:45	82.98	67.47	71.5	50.1
16/09/2021 13:03:45	82.07	67.75	71.7	51.7

16/09/2021 13:18:45	83.26	67.31	71.6	49.6
16/09/2021 13:33:45	81.5	67.76	71.9	48.5
16/09/2021 13:48:45	80.36	67.64	71.8	49.4
16/09/2021 14:03:45	81.29	67.61	71.8	49.3
16/09/2021 14:18:45	80.45	68.3	72.1	53.8
16/09/2021 14:33:45	80.92	67.46	71.5	49.6
16/09/2021 14:48:45	80.75	67.43	71.6	50.1
16/09/2021 15:03:45	80.21	67.97	71.9	51
16/09/2021 15:18:45	79.26	67.76	71.8	52.5
16/09/2021 15:33:45	82.55	68.7	72.3	54.3
16/09/2021 15:48:45	82.22	67.83	71.8	50
16/09/2021 16:03:45	81.64	68.02	71.7	52
16/09/2021 16:18:45	80.3	67.42	71.7	50.8
16/09/2021 16:33:45	82.54	68.94	72.2	56.7
16/09/2021 16:48:45	79.7	68.29	71.9	54.9
16/09/2021 17:03:45	80.44	68.51	71.9	57.1
16/09/2021 17:18:45	81.41	69.02	72.5	56
16/09/2021 17:33:45	77.04	67.39	71.5	49.9
16/09/2021 17:48:45	81.13	68.73	72.2	51.1
16/09/2021 18:03:45	81.02	67.62	71.5	49.9
16/09/2021 18:18:45	78.94	67.71	71.5	55.6
16/09/2021 18:33:45	80.07	67.35	71.3	50.7
16/09/2021 18:48:45	78.11	67.06	71.3	49.3
16/09/2021 19:03:45	79.96	66.6	70.9	49.4
16/09/2021 19:18:45	76.6	65.5	70.7	45
16/09/2021 19:33:45	83.1	66.55	70.6	47.6
16/09/2021 19:48:45	78.53	65.9	70.3	47.7
16/09/2021 20:03:45	75.66	64.71	69.8	43.5
16/09/2021 20:18:45	77.42	64.86	69.7	44.8
16/09/2021 20:33:45	80.24	63.59	68.7	41.9
16/09/2021 20:48:45	78.51	63.4	68.6	42.3
16/09/2021 21:03:45	79.64	63.91	69.3	44.1
16/09/2021 21:18:45	76.85	64.73	69.9	44.2
16/09/2021 21:33:45	78.36	64.32	69.7	43.9
16/09/2021 21:48:45	78.48	63.9	69.1	40.3
16/09/2021 22:03:45	79.95	63.98	69	42.5
16/09/2021 22:18:45	79.59	61.4	66.5	38.6
16/09/2021 22:33:45	81.32	63.22	68.2	39.7
16/09/2021 22:48:45	79.35	61.21	66	37.4
16/09/2021 23:03:45	74.76	59.54	63	36.9
16/09/2021 23:18:45	80.51	62.54	67.1	38.2
16/09/2021 23:33:45	78.56	59.42	60.8	33.8
16/09/2021 23:48:45	76.64	59.38	61.4	35
17/09/2021 00:03:45	78.11	59.16	60.3	36.2
17/09/2021 00:18:45	74.58	56.9	55.1	34.6
17/09/2021 00:33:45	72.69	50.54	42.9	31.6
17/09/2021 00:48:45	80.06	57.78	54	35.1
17/09/2021 01:03:45	79.89	57.71	54.6	32
17/09/2021 01:18:45	76.49	56.7	54.9	32.2
17/09/2021 01:33:45	81.76	56.02	49.3	31.7

17/09/2021 01:48:45	75.86	55.76	52.5	32.6
17/09/2021 02:03:45	75.2	54.48	56.3	35
17/09/2021 02:18:45	81.61	56.53	51.5	35
17/09/2021 02:33:45	78.04	54.91	47.3	35.4
17/09/2021 02:48:45	74.19	51.38	44	34.3
17/09/2021 03:03:45	80.61	56.85	50.2	34.6
17/09/2021 03:18:45	74.48	54.2	49.2	36.3
17/09/2021 03:33:45	80.31	57.38	52	35.5
17/09/2021 03:48:45	79.07	57.66	55.8	35.2
17/09/2021 04:03:45	79.68	59.14	57.7	37.8
17/09/2021 04:18:45	79.59	59.9	61	38.4
17/09/2021 04:33:45	81.49	61.74	61.7	36.8
17/09/2021 04:48:45	82.42	62.82	64.9	38
17/09/2021 05:03:45	80.99	62.73	65.8	36.3
17/09/2021 05:18:45	81.95	63.18	66.2	39.1
17/09/2021 05:33:45	81.62	65.43	70.3	43.4
17/09/2021 05:48:45	80.54	66.06	71.3	45.1
17/09/2021 06:03:45	81.56	65.43	70.5	43.7
17/09/2021 06:18:45	82.4	66.25	71.3	45.1
17/09/2021 06:33:45	80.28	66.9	71.7	48.2
17/09/2021 06:48:45	81.09	67.29	72.1	50.2
17/09/2021 07:03:45	83.21	68.22	72.4	51.7
17/09/2021 07:18:45	81.94	68.8	72.7	55.1
17/09/2021 07:33:45	84.27	69.53	73.2	52.6
17/09/2021 07:48:45	83.73	68.88	72.6	54.1
17/09/2021 08:03:45	83.78	68.81	72.8	52.7
17/09/2021 08:18:45	91.31	69.78	72.9	54.7
17/09/2021 08:33:45	89.28	69.31	72.9	56
17/09/2021 08:48:45	80.56	68.81	72.9	54.5
17/09/2021 09:03:45	83.41	68.79	72.6	55
17/09/2021 09:18:45	80.72	68.56	72.6	53.9
17/09/2021 09:33:45	81.82	68.14	72.4	52.1
17/09/2021 09:48:45	82.94	68.6	72.7	52.5
17/09/2021 10:03:45	82.12	67.54	71.9	51.7
17/09/2021 10:18:45	80.3	68.05	72.3	50.8
17/09/2021 10:33:45	86.4	67.57	71.5	50.5
17/09/2021 10:48:45	89.53	68.76	72.2	53.3
17/09/2021 11:03:45	86.97	68.16	72.1	51.7
17/09/2021 11:18:45	86.11	68.64	72.3	53.1
17/09/2021 11:33:45	79.42	67.14	71.6	47.5
17/09/2021 11:48:45	80.17	67.45	71.5	49.8
17/09/2021 12:03:45	81.14	67.89	71.9	50
17/09/2021 12:18:45	84.31	67.92	72	51.1
17/09/2021 12:33:45	83.66	67.66	71.5	52
17/09/2021 12:48:45	79.13	68.1	71.9	54
17/09/2021 13:03:45	81.5	67.42	71.5	48.6
17/09/2021 13:18:45	83.79	68.42	72.1	52.8
17/09/2021 13:33:45	80.98	67.76	71.6	49.3
17/09/2021 13:48:45	82.32	67.95	71.9	51.5
17/09/2021 14:03:45	80.52	68.23	72	52.3

17/09/2021 14:18:45	82.69	68.31	72.4	52.2
17/09/2021 14:33:45	82.14	68.05	71.7	52.1
17/09/2021 14:48:45	91.1	68.84	72.3	55.1
17/09/2021 15:03:45	79.51	68.12	71.9	52.1
17/09/2021 15:18:45	79.77	68.16	71.9	54.8
17/09/2021 15:33:45	79.31	67.61	71.5	51
17/09/2021 15:48:45	82.31	67.95	71.9	51
17/09/2021 16:03:45	80.95	68.8	72.3	57.5
17/09/2021 16:18:45	80.74	68.93	72.6	54.3
17/09/2021 16:33:45	78.95	68.22	72.1	51.8
17/09/2021 16:48:45	79.62	68.93	72.4	55.3
17/09/2021 17:03:45	82.4	68.42	71.8	50.3
17/09/2021 17:18:45	90.14	68.34	71.5	55.4
17/09/2021 17:33:45	78.36	68.3	71.9	53.1
17/09/2021 17:48:45	84.78	68.18	71.7	51.6
17/09/2021 18:03:45	89.39	68.47	72	46.7
17/09/2021 18:18:45	81.47	67.69	71.3	53.1
17/09/2021 18:33:45	84.63	68.06	71.9	51.4
17/09/2021 18:48:45	79.93	66.5	71	47.9
17/09/2021 19:03:45	79.71	67.16	71.4	50.3
17/09/2021 19:18:45	80.27	67.78	71.9	49.7
17/09/2021 19:33:45	90.4	67.56	70.9	44.5
17/09/2021 19:48:45	75.64	65.72	70.5	44.1
17/09/2021 20:03:45	76.19	64.75	69.5	42.7
17/09/2021 20:18:45	74.97	65.11	70.2	46.3
17/09/2021 20:33:45	75.87	64.19	69.8	38.7
17/09/2021 20:48:45	82.75	65.35	70	42.4
17/09/2021 21:03:45	79.33	64.65	69.9	41.4
17/09/2021 21:18:45	77.05	64.84	70.1	43.2
17/09/2021 21:33:45	77.01	64.69	69.9	43
17/09/2021 21:48:45	77.02	64.09	69.6	41.6
17/09/2021 22:03:45	85.38	64.89	69.5	38.9
17/09/2021 22:18:45	80.75	64.17	69.6	41.1
17/09/2021 22:33:45	76.93	63.1	68.8	38
17/09/2021 22:48:45	78.96	61.92	66.9	32.1
17/09/2021 23:03:45	76.98	61.53	66.3	38.1
17/09/2021 23:18:45	76.2	61.37	65.7	37.5
17/09/2021 23:33:45	79.32	61.51	66.8	35.8
17/09/2021 23:48:45	81.09	60.65	63.6	35.1
18/09/2021 00:03:45	76.98	59.78	63.5	32.7
18/09/2021 00:18:45	79.77	59.72	61.6	31.4
18/09/2021 00:33:45	78.63	58.76	59.1	33.5
18/09/2021 00:48:45	77.37	58.83	59.9	34.2
18/09/2021 01:03:45	81.46	60.06	59.9	34.2
18/09/2021 01:18:45	74.64	56.78	57.1	33.9
18/09/2021 01:33:45	74.35	57.91	58.9	34.3
18/09/2021 01:48:45	75.95	56.93	55.7	33.3
18/09/2021 02:03:45	74.63	55.98	52.5	33.2
18/09/2021 02:18:45	78.22	59.24	61	36.6
18/09/2021 02:33:45	78.21	56.98	52.3	36

18/09/2021 02:48:45	78.64	58.26	56.6	34.1
18/09/2021 03:03:45	78.23	56.3	51.5	34.8
18/09/2021 03:18:45	78.71	57.41	56.3	33.6
18/09/2021 03:33:45	80.45	57.6	53.5	32.7
18/09/2021 03:48:45	75.05	57.22	57.2	32.5
18/09/2021 04:03:45	75.57	54.95	53.3	31.6
18/09/2021 04:18:45	80.35	57.28	50.1	29.2
18/09/2021 04:33:45	81.12	57.67	56.8	31
18/09/2021 04:48:45	78.43	58.53	58.9	33.5
18/09/2021 05:03:45	79.55	58.73	57.9	31.8
18/09/2021 05:18:45	78.69	59.96	61.7	35.1
18/09/2021 05:33:45	80.71	62.29	66.5	37.1
18/09/2021 05:48:45	77.6	63.58	68.6	40.7
18/09/2021 06:03:45	79.28	61.64	64.8	37.6
18/09/2021 06:18:45	80.22	63.11	67.7	40.5
18/09/2021 06:33:45	80.31	64.04	69.3	44.3
18/09/2021 06:48:45	82.8	64.05	68.8	42.3
18/09/2021 07:03:45	84.7	65.57	70.7	44.3
18/09/2021 07:18:45	80.52	65.55	70.9	45.5
18/09/2021 07:33:45	81.61	65.18	70.4	45.3
18/09/2021 07:48:45	80.23	66.35	71.5	47.1
18/09/2021 08:03:45	79.51	66.19	71.4	48.2
18/09/2021 08:18:45	79.73	67.14	71.9	50.8
18/09/2021 08:33:45	79.31	66.35	71.3	49.3
18/09/2021 08:48:45	85.42	68.43	72.6	52.1
18/09/2021 09:03:45	82.16	67.5	71.9	51.9
18/09/2021 09:18:45	82.85	67.71	72	52.8
18/09/2021 09:33:45	80.42	67.55	71.9	52.5
18/09/2021 09:48:45	82.93	68.02	72.3	50.2
18/09/2021 10:03:45	80.52	68.18	72.3	50.5
18/09/2021 10:18:45	84.15	68.32	72.5	50
18/09/2021 10:33:45	83.83	68.1	72.1	52.6
18/09/2021 10:48:45	78.69	68.2	72.2	52.3
18/09/2021 11:03:45	78.97	68.08	72	54.1
18/09/2021 11:18:45	79.85	68.08	72.1	54.8
18/09/2021 11:33:45	80.23	67.34	71.6	50.4
18/09/2021 11:48:45	81.12	68.4	72.2	54.1
18/09/2021 12:03:45	86.53	68.19	72	50.1
18/09/2021 12:18:45	80.11	67.94	72.1	52.2
18/09/2021 12:33:45	79.88	67.96	71.7	53
18/09/2021 12:48:45	89.84	68.62	72.1	51.4
18/09/2021 13:03:45	76.19	67.2	71.3	51.2
18/09/2021 13:18:45	79.18	67.76	71.6	52.2
18/09/2021 13:33:45	78.41	67.56	71.5	53.1
18/09/2021 13:48:45	86.82	68.41	71.9	53.8
18/09/2021 14:03:45	77.82	67.17	71.3	50.9
18/09/2021 14:18:45	88.99	69.26	72.5	55.3
18/09/2021 14:33:45	80.52	67.21	71.5	46.6
18/09/2021 14:48:45	81.5	67	71.2	49.3
18/09/2021 15:03:45	79.55	67.04	71.3	47.7

18/09/2021 15:18:45	77.11	66.8	71.4	46
18/09/2021 15:33:45	81.96	66.47	71.1	47.3
18/09/2021 15:48:45	79.09	67.15	71.2	51.8
18/09/2021 16:03:45	85.48	66.37	70.6	47.9
18/09/2021 16:18:45	77.42	66.02	70.7	46.5
18/09/2021 16:33:45	77.34	67.31	71.2	51.3
18/09/2021 16:48:45	80.47	66.54	70.9	50.3
18/09/2021 17:03:45	79.89	67.04	71.4	51.8
18/09/2021 17:18:45	77.41	67.2	71.4	49.6
18/09/2021 17:33:45	77.04	67.09	71.3	47.1
18/09/2021 17:48:45	80.71	66.95	71.1	49.2
18/09/2021 18:03:45	76.62	66.28	70.9	47.2
18/09/2021 18:18:45	78.86	66.35	70.8	49.4
18/09/2021 18:33:45	81.75	66.98	71.3	49.7
18/09/2021 18:48:45	91.29	67.54	71.1	48.4
18/09/2021 19:03:45	76.61	65.7	70.7	42.4
18/09/2021 19:18:45	75.87	65.39	70.1	42.5
18/09/2021 19:33:45	87.68	66.67	70.4	44.3
18/09/2021 19:48:45	81.82	65.46	70	44.7
18/09/2021 20:03:45	75.44	63.49	68.8	43.2
18/09/2021 20:18:45	82.48	64.36	69.3	44.6
18/09/2021 20:33:45	80.39	64.56	69.6	45.7
18/09/2021 20:48:45	79.69	63.3	68.7	43.4
18/09/2021 21:03:45	77.24	63.02	68.4	43.7
18/09/2021 21:18:45	77.19	63.56	68.8	45.1
18/09/2021 21:33:45	74.91	63.65	69.1	46.2
18/09/2021 21:48:45	75.31	62.82	68.3	43
18/09/2021 22:03:45	78.45	62.24	67.8	41.6
18/09/2021 22:18:45	77.59	61.89	67.1	39.6
18/09/2021 22:33:45	83.71	64.55	69.1	43.1
18/09/2021 22:48:45	77.29	62.01	66.9	42.2
18/09/2021 23:03:45	78.83	62.37	67.8	41.6
18/09/2021 23:18:45	75.64	60.04	64.1	37.6
18/09/2021 23:33:45	76.06	61.31	66.6	37.6
18/09/2021 23:48:45	76.95	60.49	64	33.9
19/09/2021 00:03:45	76.52	60.73	64.9	32.7
19/09/2021 00:18:45	76.09	58.72	61.7	32
19/09/2021 00:33:45	77.27	58.09	58.2	30
19/09/2021 00:48:45	79.13	60.75	63.8	31.1
19/09/2021 01:03:45	74.82	58.34	59.3	27
19/09/2021 01:18:45	75.74	56.96	56.6	25.1
19/09/2021 01:33:45	74.11	56.87	57.3	25.7
19/09/2021 01:48:45	76.09	57.65	57.3	24.8
19/09/2021 02:03:45	75.19	57.53	57.2	26.1
19/09/2021 02:18:45	75.61	55.21	51.6	23.5
19/09/2021 02:33:45	73.94	54.71	53.1	23.1
19/09/2021 02:48:45	76.98	58.07	58.1	24.1
19/09/2021 03:03:45	75.52	55.28	51	22.3
19/09/2021 03:18:45	78.39	55.78	51.5	23.7
19/09/2021 03:33:45	73.96	53.47	49.4	23.7

19/09/2021 03:48:45	73.34	52.94	46.4	23.4
19/09/2021 04:03:45	73.91	54.83	51.1	23.5
19/09/2021 04:18:45	79.03	56.06	48.4	22.5
19/09/2021 04:33:45	77.39	55.92	52.8	23.4
19/09/2021 04:48:45	77.13	58.43	58.2	24.2
19/09/2021 05:03:45	75.11	57.39	57.3	25.2
19/09/2021 05:18:45	76.65	57.8	58.7	27.2
19/09/2021 05:33:45	75.82	60.39	63.9	30.6
19/09/2021 05:48:45	75.39	61.27	65.5	34.4
19/09/2021 06:03:45	79.29	60.63	62.3	31.3
19/09/2021 06:18:45	80.62	60.9	64.5	35.5
19/09/2021 06:33:45	80.09	63.68	68.8	38.3
19/09/2021 06:48:45	82.48	62.3	66.3	37.2
19/09/2021 07:03:45	83	63.39	67.6	37.7
19/09/2021 07:18:45	76.84	62.36	67.2	38.1
19/09/2021 07:33:45	77.17	63.83	69.2	40.2
19/09/2021 07:48:45	77.95	63.58	69	38.8
19/09/2021 08:03:45	78.79	63.69	69.3	39.2
19/09/2021 08:18:45	79.27	62.84	68.1	39.4
19/09/2021 08:33:45	89.68	66.28	70.2	45.1
19/09/2021 08:48:45	80.55	65.03	70.5	39.1
19/09/2021 09:03:45	78.19	64.57	69.7	41.3
19/09/2021 09:18:45	85.64	65.76	70.5	44.8
19/09/2021 09:33:45	79.24	66.42	71.3	48
19/09/2021 09:48:45	80.28	67.05	71.9	48.6
19/09/2021 10:03:45	81.47	67.39	72.2	49.3
19/09/2021 10:18:45	77.42	66.74	71.6	49.5
19/09/2021 10:33:45	83.53	69.61	73.3	52.3
19/09/2021 10:48:45	77.95	66.62	71.3	50.7
19/09/2021 11:03:45	78.23	67.29	71.6	49.7
19/09/2021 11:18:45	79.95	67.1	71.7	49.2
19/09/2021 11:33:45	77.87	66.98	71.6	47.7
19/09/2021 11:48:45	80.33	67.89	71.9	51.4
19/09/2021 12:03:45	80.37	68.43	72.3	55.3
19/09/2021 12:18:45	78.28	67.99	72.2	52.6
19/09/2021 12:33:45	78.7	68.34	72.4	52.8
19/09/2021 12:48:45	79.36	68.18	72.5	53.8
19/09/2021 13:03:45	80.05	67.97	72.3	52.3
19/09/2021 13:18:45	94.03	69.96	72.2	53.7
19/09/2021 13:33:45	80.76	67.66	71.9	52.1
19/09/2021 13:48:45	78.73	67.91	72	51.9
19/09/2021 14:03:45	85.52	68	72.1	51.2
19/09/2021 14:18:45	77.64	66.97	71.6	47
19/09/2021 14:33:45	78.24	67.18	71.8	49.2
19/09/2021 14:48:45	80.9	67.45	71.9	47.3
19/09/2021 15:03:45	79.19	66.93	71.5	49.3
19/09/2021 15:18:45	78.16	66.78	71.6	49.2
19/09/2021 15:33:45	86.29	66.57	71.1	49.2
19/09/2021 15:48:45	86.44	67.34	71.8	48.1
19/09/2021 16:03:45	77.45	66.82	71.6	49.2

19/09/2021 16:18:45	77.19	66.94	71.7	48.5
19/09/2021 16:33:45	80.4	66.99	71.4	48.9
19/09/2021 16:48:45	82.59	67.22	71.6	49.9
19/09/2021 17:03:45	80.47	67.16	71.4	48.6
19/09/2021 17:18:45	82.01	66.15	70.9	48
19/09/2021 17:33:45	88.25	66.76	71.3	47.8
19/09/2021 17:48:45	78.17	65.75	70.8	46.4
19/09/2021 18:03:45	79.94	66.2	71	45.9
19/09/2021 18:18:45	78.59	65.95	70.8	46.5
19/09/2021 18:33:45	81.17	65.96	70.7	47.3
19/09/2021 18:48:45	77.98	65.61	70.5	45.8
19/09/2021 19:03:45	76.05	65.3	70.5	44.2
19/09/2021 19:18:45	76.28	65.6	70.9	41.8
19/09/2021 19:33:45	76.19	64.33	69.6	40.2
19/09/2021 19:48:45	78.27	64.66	69.9	42.6
19/09/2021 20:03:45	78.59	65.39	70.5	44.2
19/09/2021 20:18:45	79.22	64.76	70	41.2
19/09/2021 20:33:45	79.75	64.09	69.3	38.1
19/09/2021 20:48:45	80.05	63.27	68.4	40.4
19/09/2021 21:03:45	76.28	62.01	67	37.7
19/09/2021 21:18:45	77.38	62.51	68	38.9
19/09/2021 21:33:45	76.52	62.98	68.4	42
19/09/2021 21:48:45	80.18	61.28	65	44
19/09/2021 22:03:45	75.88	61.23	65.9	44.5
19/09/2021 22:18:45	79.31	62.51	67.2	45
19/09/2021 22:33:45	78.28	59.97	62.2	40
19/09/2021 22:48:45	77.65	59.5	62	41
19/09/2021 23:03:45	75.3	60.71	64.4	40.5
19/09/2021 23:18:45	80.78	61.05	64.4	40.1
19/09/2021 23:33:45	78.33	58.24	58.3	36.9
19/09/2021 23:48:45	73.73	55.56	53.1	37.7
20/09/2021 00:03:45	73.36	53.88	52.2	39.6
20/09/2021 00:18:45	76.07	56.87	55.7	40.2
20/09/2021 00:33:45	77.93	55.46	52.9	42.7
20/09/2021 00:48:45	76.55	56.08	52.3	40.6
20/09/2021 01:03:45	79.62	56.66	52.9	42.9
20/09/2021 01:18:45	73.72	53.56	51.1	39.3
20/09/2021 01:33:45	73.73	51.53	49.9	41
20/09/2021 01:48:45	76.76	55.69	51.7	36.5
20/09/2021 02:03:45	74.97	54.33	49.9	40.1
20/09/2021 02:18:45	74.14	53.53	51.6	40.6
20/09/2021 02:33:45	77.82	54.91	51	41.2
20/09/2021 02:48:45	77.22	56.28	54.1	42.2
20/09/2021 03:03:45	77.62	57.79	53.2	41
20/09/2021 03:18:45	80.52	56.23	50.7	39.7
20/09/2021 03:33:45	77.75	56.59	52.2	39.3
20/09/2021 03:48:45	81.07	59.33	58.1	40.7
20/09/2021 04:03:45	81.54	60.89	58.4	38.8
20/09/2021 04:18:45	80.18	60.65	60.2	40.9
20/09/2021 04:33:45	81.28	62.4	63.7	41.3

20/09/2021 04:48:45	79.7	62.7	65.9	42.8
20/09/2021 05:03:45	81.03	62.68	64.4	43.6
20/09/2021 05:18:45	81.51	63.99	68.2	41.6
20/09/2021 05:33:45	82.02	65.63	70.7	47.9
20/09/2021 05:48:45	80.92	66.52	71.6	51
20/09/2021 06:03:45	81.01	65.52	70.4	51.1
20/09/2021 06:18:45	82.32	66.37	71.2	51.5
20/09/2021 06:33:45	80.16	67.09	71.9	50.9
20/09/2021 06:48:45	81.68	67.54	72	52.6
20/09/2021 07:03:45	78.9	68.05	72.4	53.4
20/09/2021 07:18:45	78.5	68.69	72.9	54.5
20/09/2021 07:33:45	80.63	69.42	73.4	55.3
20/09/2021 07:48:45	80.13	69.38	73.1	55.9
20/09/2021 08:03:45	82.59	69.21	72.8	54.6
20/09/2021 08:18:45	81.89	68.82	72.5	56.8
20/09/2021 08:33:45	89.43	68.45	72.1	54.4
20/09/2021 08:48:45	79.53	69.32	73.2	55.2
20/09/2021 09:03:45	79.83	68.89	72.5	57.9
20/09/2021 09:18:45	81.37	67.99	72.2	54.3
20/09/2021 09:33:45	81.89	67.37	71.6	52.8
20/09/2021 09:48:45	80.82	67.88	71.9	53.7
20/09/2021 10:03:45	80.17	67.58	71.8	51
20/09/2021 10:18:45	81.82	67.94	72.1	51.5
20/09/2021 10:33:45	83.63	68.67	72.6	53.5
20/09/2021 10:48:45	80.86	67.61	72	51.1
20/09/2021 11:03:45	101.21	73.52	71.3	52.4
20/09/2021 11:18:45	81.78	67.23	71.4	52.2
20/09/2021 11:33:45	80.78	67.22	71.3	50
20/09/2021 11:48:45	81.83	67.12	71.5	51.9
20/09/2021 12:03:45	91.34	68.09	71.5	47.8
20/09/2021 12:18:45	108.69	78.38	72	53.1
20/09/2021 12:33:45	81.46	67.54	71.7	51.6
20/09/2021 12:48:45	79.82	67.19	71.5	50.5
20/09/2021 13:03:45	81.02	68.11	72	50.7
20/09/2021 13:18:45	79.68	68.09	72.3	50.5
20/09/2021 13:33:45	90.41	68.68	72.2	50.8
20/09/2021 13:36:02	81.02	69.69	73.2	52.8

APPENDIX C –

Noise Source Data Used in Assessments

APPENDIX C – CA Report

Clement Acoustics Measurements from Ilkeston Site

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JOHNSONS AGGREGATES AND RECYCLING LTD,
CROMPTON ROAD, ILKESTON

NOISE IMPACT ASSESSMENT

Report **15101-NIA-01**

Prepared on 30 July 2019

Issued For:

Johnsons Aggregates and Recycling Ltd

Contents

List of Attachments

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Johnsons Aggregates and Recycling Ltd to undertake an assessment of ongoing operations at the aggregate and metal recycling plant at Crompton Road, Ilkeston DE7 4BG.

Measured onsite noise levels will be compared with previously anticipated noise levels, which were predicted in a Noise Impact Assessment before the site came into use, as part of the Planning Application.

A previously undertaken background noise survey was used to set noise emissions criteria in agreement with the planning requirements of the Local Authority.

This report presents recent source noise measurements undertaken on the operational site followed by a subsequent noise impact assessment.

2.0 SITE DESCRIPTION

Johnsons Aggregates and Recycling Ltd operates a site at Crompton Road, Ilkeston as an aggregate and metal recycling facility.

A noise impact assessment was prepared as part of the Planning Application, which predicted the noise impact of proposed operations, based on assumed operations and measured noise levels at similar pre-existing sites.

During a recent visit to site, attended measurements were taken of onsite noise emissions levels, now the site is operational. Noise impact calculations and assessment will be undertaken in order to ensure the actual levels of noise emitted do not exceed relevant guidance and criteria.

3.0 NOISE EMISSIONS CRITERIA

3.1 Background Noise Surveys

Two previous environmental noise surveys have been undertaken by Acute Acoustics Ltd. The surveys were undertaken in April 2013 and January 2017, during different phases of the site coming into operation.

Surveys were undertaken as described in Acute Acoustics Ltd report '*1524 Johnsons – Ilkeston NIA [RevB]*', issued in June 2017.

It is understood measured background noise levels were analysed based on the following guidance found in Section 8.1 of British Standard 4142:2014 '*Methods for rating and assessing industrial and commercial sound*':

"*The objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.*"

The findings of the surveys detailed in the report are summarised as follows:

- April 2013: Daytime background noise levels range from L_{A90} 42-46 dB, with L_{A90} 43 dB considered representative.
- January 2017: Daytime background noise levels range from L_{A90} 40-48 dB, with L_{A90} 44 dB considered representative.

Based on the above, and in the interests of providing a robust assessment, L_{A90} 43 dB was selected as a suitable typical background noise level for the assessment.

3.2 Assessment Criteria

In a BS 4142 assessment, corrections are applied to noise levels in order to calculate a noise rating level for the effects of proposed activities on nearby noise sensitive receivers. This calculated receiver noise level is compared with the typical measured background noise level.

BS 4142 recommends penalties that can be applied to noise emissions to account for tonality, intermittency and other factors. Where a sound source is neither tonal nor impulsive, but is still distinctive against the residual acoustic environment, a penalty may still be applied.

The available penalties for different characteristics are summarised in Table 3.1.

Characteristic	Comments	Maximum Penalty
Tonality	Can be converted to 2 dB for a tone which is just perceptible, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible	6 dB
Impulsivity	Can be converted to 3 dB for impulsivity which is just perceptible, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible	9 dB
Distinctiveness	Intended for sources that are neither tonal nor impulsive	3 dB
Intermittency	When the sound has identifiable on/off conditions	3 dB

Table 3.1: Available penalties according to BS4142

BS 4142 states that a noise rating 5 dB above the background noise level is likely to be an indication of an adverse impact. If the difference is 10 dB or more, then this is stated as likely to be an indication of a significant adverse impact. Where the rating level does not exceed the background noise level, this is stated as an indication of the sound source having a low impact.

Calculated noise emissions will be assessed against the background noise levels shown in Section 3.1.

It should be noted that daytime noise emissions are assessed over a one-hour reference period

4.0 NOISE SOURCE MEASUREMENT PROCEDURE

A visit to site was undertaken on Tuesday 23 July 2019, in order to measure source noise levels due to ongoing operations. Measurements were taken in one third octave bands between 50 Hz and 10 kHz using a calibrated, Class 1 sound level meter.

Operations and machinery were observed to be in use, and the ongoing processes were deemed to be typical in nature by representative onsite.

For each measurement, the location is marked on the attached indicative site plan. Comments on the operations and descriptions including the measurement distance were noted, and are summarised in the results table below.

It should be noted that meaningful measurements could not be obtained closer to the receiver location due to residual noise, including ongoing works at other operational industrial sites, dominating the noise profile.

The receiver noise level for identified piece of machinery was then calculated by applying a distance correction to the closest window, with screening corrections and appropriate penalties applied as per previous assessment, in order to present a direct comparison.

5.0 DISCUSSION

5.1 Measurement Results

Measurement 1: Donaldson Extract Unit 1

Measurement 1 is of a Donaldson Extract Unit, located externally in the position identified as Position 1 on the attached site plan.

The measurement was taken at a distance of 2 m, with the measurement duration chosen to ensure a number of air 'blasts', which occur regularly, were captured.

The measured noise emission level was **86 dB(A) at 2 m**.

In terms of percentage on times, it is assumed that during a typical worst-case one-hour period, this item of machinery could be in constant use.

Measurement 2: Donaldson Extract Unit 2

Measurement 2 is of another Donaldson Extract Unit and an adjacent unit, located externally in the position identified as Position 2 on the attached site plan.

The measurement was taken at a distance of 4 m, with the measurement duration chosen to ensure a number of air 'blasts', which occur regularly, were captured.

The measured noise emission level was **84 dB(A) at 4 m**.

In terms of percentage on times, it is assumed that during a typical worst-case one-hour period, these items of machinery could be in constant use.

Measurement 3: Numerous Vehicular Movements

Measurement 3 was taken close to a number of operational vehicles, encapsulating loading and unloading operations, a tractor-pulled water sprayer, and heavy goods vehicles departing site. The measurement was located externally in the position identified as Position 3 on the attached site plan.

The measurement was taken at a distance of approximately 5 m from identified noisy processes, with the measurement duration chosen to ensure a number of operations were captured.

The measured noise emission level was **80 dB(A) at 5 m**.

In terms of percentage on times, it is understood that loading/unloading, spraying and vehicular movements are ongoing for approximately 70% of the time, including inbound and outbound trips.

Measurement 4: Stainless Steel Remover – Vibrating Plate

Measurement 4 was taken close to the operational Stainless Steel Remover, below an identified vibrating plate. The measurement was located externally in the position identified as Position 4 on the attached site plan.

The measurement was taken at a distance of approximately 4 m from the identified vibrating plate. The process was noted to be continuous, with the measurement duration selected accordingly.

The measured noise emission level was **83 dB(A) at 4 m**.

In terms of percentage on times, it is assumed that during a typical worst-case one-hour period, this item of machinery could be in constant use.

Measurement 5: Stainless Steel Remover – Outlet Point

Measurement 5 was taken close to the operational Stainless Steel Remover, at an identified outlet point, where processed material is dropped to the floor. The measurement was located externally in the position identified as Position 5 on the attached site plan.

The measurement was taken at a distance of approximately 5 m from the identified outlet point. The process was noted to be continuous, with the measurement duration selected accordingly.

The measured noise emission level was **82 dB(A) at 5 m**.

In terms of percentage on times, it is assumed that during a typical worst-case one-hour period, this item of machinery could be in constant use.

Measurement 6: Shredder Building Louvre

Measurement 6 was taken close to ventilation louvre to the shredder building, identified as the main breakout point for noise emissions from the building. The measurement was located externally in the position identified as Position 6 on the attached site plan.

The measurement was taken at a distance of approximately 4 m from the identified louvre. The noise was noted to be continuous, with the measurement duration selected accordingly.

The measured noise emission level was **84 dB(A) at 4 m**.

In terms of percentage on times, it is assumed that during a typical worst-case one-hour period, this process could be in constant use.

Measurement 7: Dryer

Measurement 7 was taken close to the operational Dryer unit. Subjectively, this was observed to be a significant contributor to apparent noise levels on the site. The measurement was located externally in the position identified as Position 7 on the attached site plan.

The measurement was taken at a distance of approximately 5 m from the identified noisy parts of the machinery. The process was noted to be continuous, with the measurement duration selected accordingly.

The measured noise emission level was **94 dB(A) at 5 m**.

In terms of percentage on times, it is assumed that during a typical worst-case one-hour period, this item of machinery could be in constant use.

Measurement 8: Conveyor Belt

Measurement 8 was taken close to the operational conveyer, carrying materials from the main feed. The measurement was located externally in the position identified as Position 8 on the attached site plan.

The measurement was taken at a distance of approximately 1 m from the identified noisy parts of the conveyer. The process was noted to be continuous, with the measurement duration selected accordingly.

The measured noise emission level was **78 dB(A) at 1 m**.

In terms of percentage on times, it is assumed that during a typical worst-case one-hour period, this item of machinery could be in constant use.

Measurement 9: Main Feed

Measurement 9 was taken close to the main feed, with a grab loading material into a hopper. The measurement was located externally in the position identified as Position 9 on the attached site plan.

The measurement was taken at a distance of approximately 5 m from the main feed point. The measurement duration was selected to ensure a number of grabs and drops were covered.

The measured noise emission level was **84 dB(A) at 5 m**.

In terms of percentage on times, it is assumed that during a typical worst-case one-hour period, this item of machinery could be in constant use.

Measurement 10: Komatsu WA500 Wheel Loader

Measurement 10 was taken close to an operating Wheel Loader, moving material towards the main feed. The measurement was located externally in the position identified as Position 10 on the attached site plan.

The measurement was taken at a distance of approximately 4 m from the Wheel Loader at the closest point during numerous passbys.

The measured noise emission level was **73 dB(A) at 4 m**.

In terms of percentage on times, it is assumed that during a typical worst-case one-hour period, this item of machinery could be in use for 50% of the time.

Measurement 11: Forklift Truck

Measurement 11 was taken close to an operating forklift, moving material around a storage area. The measurement was located externally in the position identified as Position 11 on the attached site plan.

The measurement was taken at a distance of approximately 2 m from the operational forklift moving material around the storage area.

The measured noise emission level was **67 dB(A) at 2 m**.

In terms of percentage on times, it is assumed that during a typical worst-case one-hour period, this item of machinery could be in use for 50% of the time.

5.2 Noise Impact Assessment

Noise impact calculations have been undertaken based on the measured noise levels and standard acoustic corrections according to the guidance of ISO 9613-2: 1996 '*Acoustics – Attenuation of sound during propagation outdoors*'.

The closest identified receiver to the existing site is a group of residential houses to the north of the site, on Hallam Fields Road. The closest residential house is approximately 440 m from the closest point of the Johnson Aggregates and Recycling site boundary.

The main considerations when undertaking noise impact assessment calculations are as follows:

- The distance correction has been calculated for each identified for each process or item of machinery, as shown in calculations in Appendix B,
- Percentage on-times for each process are as stated in Section 5.1 above,
- Screening reductions from intermediate buildings and topography has been set at -10 dB, in accordance with the calculations presented in earlier assessments,
- Penalties according to the guidance of BS 4142:2014 have been set at 3 dB for all sources, which are deemed to be distinctive noise sources. Additionally, a further +2 dB is applied to vehicular movements, which could have tonal reversing alarms. This is in line with the earlier assessment. It should be noted that analysis of the measured one third octave band data confirms that additional tonal penalties would not be applicable.

Full single octave band spectral calculations are shown in Appendix B, with the results summarised in Table 5.1.

Calculated Noise Rating Level at Receiver $L_{Aeq,1hour}$	Typical Measured Background Noise [Daytime Hours] L_{A90}	Difference	Indication
49 dB(A)	43 dB(A)	+6 dB	Likely to be an indication of an adverse impact

Table 5.1: Noise rating level and assessment for receiver during daytime hours

As shown in Table 5.1, the calculated cumulative noise level at the receiver is classed as a likely indication of an adverse impact according to the relevant standard.

This is comparable with the conclusions for this receptor as per the 2017 assessment completed by Acute Acoustics Ltd, which predicted a noise rating level 3 dB above background noise.

It is noted that the calculated noise rating level based on measured noise levels is significantly dominated by the noise emissions of the Dryer (Measurement 7).

We would therefore recommend that any future noise mitigation measures should focus on this noise source where possible.

6.0 MITIGATION MEASURES

6.1 Noise Management Plan

A noise management plan has been prepared by Golder Associates, in February 2015. The plan includes provision for ongoing monitoring during operation of the site, as well as Best Available Techniques for minimising noise emissions.

Having reviewed the noise management plan, we would recommend that it is suitable for use to manage and minimise noise reduction as far as is practicable.

6.2 Possible Noise Reduction Measures

As discussed above, the Dryer is noted to be significantly dominant in the calculated receptor levels. Further to discussions with representatives on site, it is understood investigations are to be undertaken into enclosing or screening the Dryer.

We would recommend that any proposals should be reviewed by Clement Acoustics prior to implementation, in order to ensure the noise reduction benefit to noise emissions from the Dryer is maximised.

7.0 DISCUSSION OF UNCERTAINTY

In this type of assessment, a degree of uncertainty is inherent in the measured and calculated noise levels presented. Measures have been taken to limit the level of uncertainty as discussed in the sections below.

7.1 Uncertainty in Measured Noise Levels

Measured noise levels in this assessment comprise the background noise levels, measured previously by Acute Acoustics Ltd.

Both surveys were undertaken close to identified residential receptors, which reduces the need for assumptions or corrections.

Further, the background noise levels measured during two surveys showed a close correlation. The calculated typical background noise levels in each assessment are comparable, within a tolerance of +/- 1 dB. This would indicate that representative, suitably repeatable background noise levels have been established.

7.2 Uncertainty in Calculated Sound Levels

Noise emission levels have been measured on site for the purposes of this assessment, which minimises the need for assumptions and consequently reduces uncertainty.

All noise propagation calculations have been undertaken according to ISO 9613-2: 1996 '*Acoustics – Attenuation of sound during propagation outdoors*'. This is the recommended calculation methodology as specified to reduce uncertainty in BS 4142:2014.

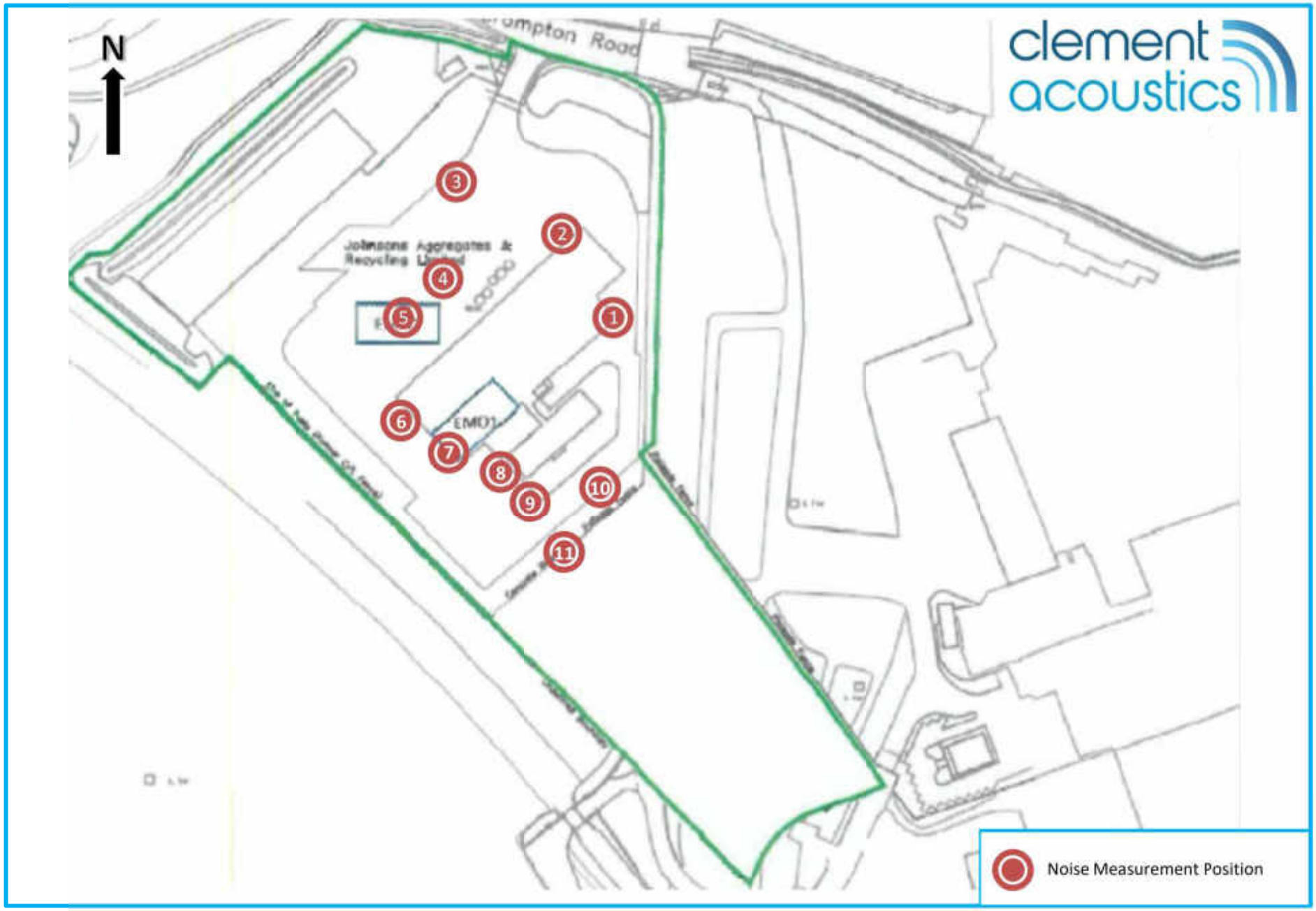
8.0 CONCLUSION

A noise impact assessment has been undertaken for ongoing processes and operations at Johnsons Aggregates and Recycling Ltd, Crompton Road, Ilkeston DE7 4BG. A previously undertaken noise survey was used to set criteria for noise emissions in accordance with the requirements of the relevant standard.

Manual measurements were then undertaken of the installed machinery and ongoing processes in order to calculate noise levels at residential receptors due to the site.

Measurements and calculations show that noise emissions from the site are comparable with those predicted in earlier noise impact assessments. The dominant source of noise has been identified, with proposals to reduce noise from this source to be investigated.

Report by	Checked by
Duncan Martin MIOA	**Florian Clement MIOA**



15101-NIA-01-SP1 Indicative site plan indicating noise measurement positions around site

Date: 30 July 2019

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

APPENDIX B

15101

Johnsons Aggregates and Recycling Ltd, Ilkeston

APPENDIX B: Calculation of Receiver Noise Levels

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Measurement 1: Donaldson Extract Unit 1									
Measured Noise Level at 2 m	87	78	82	79	81	79	77	72	86
BS4142 Penalties	3	3	3	3	3	3	3	3	
Correction for usage in a one hour period (constant)	0	0	0	0	0	0	0	0	
Correction for distance (total 510 m)	-48	-48	-48	-48	-48	-48	-48	-48	
Reduction from intermediate screening	-10	-10	-10	-10	-10	-10	-10	-10	
Noise Rating Level at Receiver	**33**	**23**	**27**	**25**	**26**	**24**	**22**	**18**	**31**
Measurement 2: Donaldson Extract Unit 2									
Measured Noise Level at 2 m	89	86	84	82	79	75	70	64	84
BS4142 Penalties	3	3	3	3	3	3	3	3	
Correction for usage in a one hour period (constant)	0	0	0	0	0	0	0	0	
Correction for distance (total 490 m)	-42	-42	-42	-42	-42	-42	-42	-42	
Reduction from intermediate screening	-10	-10	-10	-10	-10	-10	-10	-10	
Noise Rating Level at Receiver	**41**	**37**	**36**	**34**	**30**	**27**	**22**	**15**	**36**
Measurement 3: Vehicular Movements									
Measured Noise Level at 5 m	82	80	78	77	74	72	69	63	80
BS4142 Penalties	5	5	5	5	5	5	5	5	
Correction for usage in a one hour period (70%)	-2	-2	-2	-2	-2	-2	-2	-2	
Correction for distance (total 450 m)	-39	-39	-39	-39	-39	-39	-39	-39	
Reduction from intermediate screening	-10	-10	-10	-10	-10	-10	-10	-10	
Noise Rating Level at Receiver	**36**	**35**	**32**	**31**	**29**	**27**	**23**	**18**	**34**
Measurement 4: Stainless Steel Remover - Vibrating Plate									
Measured Noise Level at 4 m	79	73	74	77	75	76	77	74	83
BS4142 Penalties	3	3	3	3	3	3	3	3	
Correction for usage in a one hour period (constant)	0	0	0	0	0	0	0	0	
Correction for distance (total 490 m)	-42	-42	-42	-42	-42	-42	-42	-42	
Reduction from intermediate screening	-10	-10	-10	-10	-10	-10	-10	-10	
Noise Rating Level at Receiver	**31**	**25**	**25**	**29**	**27**	**27**	**28**	**25**	**34**
Measurement 5: Stainless Steel Remover - Oulet Point									
Measured Noise Level at 5 m	79	74	73	73	73	74	76	78	82
BS4142 Penalties	3	3	3	3	3	3	3	3	
Correction for usage in a one hour period (constant)	0	0	0	0	0	0	0	0	
Correction for distance (total 500 m)	-40	-40	-40	-40	-40	-40	-40	-40	
Reduction from intermediate screening	-10	-10	-10	-10	-10	-10	-10	-10	
Noise Rating Level at Receiver	**33**	**28**	**27**	**27**	**26**	**28**	**30**	**31**	**36**
Measurement 6: Shredder Building Louvre									
Measured Noise Level at 4 m	78	82	83	80	79	76	72	65	84
BS4142 Penalties	3	3	3	3	3	3	3	3	
Correction for usage in a one hour period (constant)	0	0	0	0	0	0	0	0	
Correction for distance (total 525 m)	-42	-42	-42	-42	-42	-42	-42	-42	
Reduction from intermediate screening	-10	-10	-10	-10	-10	-10	-10	-10	
Noise Rating Level at Receiver	**29**	**33**	**35**	**32**	**30**	**27**	**23**	**17**	**35**

continued over

	Frequency, Hz								
	63	*125*	*250*	*500*	*1k*	*2k*	*4k*	*8k*	*dB(A)*
Measurement 7: Dryer									
Measured Noise Level at 5 m	87	102	101	90	83	78	73	68	95
BS4142 Penalties	3	3	3	3	3	3	3	3	
Correction for usage in a one hour period (constant)	0	0	0	0	0	0	0	0	
Correction for distance (total 525 m)	-40	-40	-40	-40	-40	-40	-40	-40	
Reduction from intermediate screening	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	
Noise Rating Level at Receiver	**41**	**55**	**55**	**43**	**37**	**31**	**27**	**22**	**48**
Measurement 8: Conveyor Belt									
Measured Noise Level at 1 m	82	82	81	74	70	68	66	64	78
BS4142 Penalties	3	3	3	3	3	3	3	3	
Correction for usage in a one hour period (constant)	0	0	0	0	0	0	0	0	
Correction for distance (total 540 m)	-55	-55	-55	-55	-55	-55	-55	-55	
Reduction from intermediate screening	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	
Noise Rating Level at Receiver	**21**	**20**	**20**	**13**	**9**	**6**	**4**	**3**	**16**
Measurement 9: Main Feed									
Measured Noise Level at 5 m	80	76	75	71	81	73	78	67	84
BS4142 Penalties	3	3	3	3	3	3	3	3	
Correction for usage in a one hour period (constant)	0	0	0	0	0	0	0	0	
Correction for distance (total 550 m)	-41	-41	-41	-41	-41	-41	-41	-41	
Reduction from intermediate screening	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	
Noise Rating Level at Receiver	**32**	**29**	**28**	**24**	**34**	**26**	**30**	**19**	**36**
Measurement 10: Wheel Loader									
Measured Noise Level at 4 m	71	73	71	71	68	66	62	55	74
BS4142 Penalties	5	5	5	5	5	5	5	5	
Correction for usage in a one hour period (50%)	-3	-3	-3	-3	-3	-3	-3	-3	
Correction for distance (total 550 m)	-43	-43	-43	-43	-43	-43	-43	-43	
Reduction from intermediate screening	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	
Noise Rating Level at Receiver	**20**	**22**	**20**	**21**	**18**	**16**	**11**	**4**	**23**
Measurement 11: Forklift									
Measured Noise Level at 2 m	71	66	61	62	64	60	54	45	67
BS4142 Penalties	5	5	5	5	5	5	5	5	
Correction for usage in a one hour period (50%)	-3	-3	-3	-3	-3	-3	-3	-3	
Correction for distance (total 550 m)	-49	-49	-49	-49	-49	-49	-49	-49	
Reduction from intermediate screening	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	*-10*	
Noise Rating Level at Receiver	**15**	**9**	**5**	**5**	**7**	**4**	**-3**	**-11**	**11**
Calculated Cumulative Noise Level at Receiver	**45**	**56**	**55**	**44**	**41**	**37**	**36**	**33**	**49**

APPENDIX C – Kimpton

Kimpton Measurements from Ilkeston Site

KIMPTON
ENERGY SOLUTIONS

Unit 5, Greenfields Technology Park
Wirral, CH62 3RJ
Tel: 0151 343 1963
www.kimpton.co.uk

Table 1: Summary of Measured Sound Pressure Levels from Noise Generative Plant and Processes Across the Site

Source Ref No.	Source	Measurement Distance (m)	Start Time	Period (hh:mm:ss)	dB $L_{Aeq,T}$	dB SEL	Sound Pressure Level (dB $L_{eq,T}$) per Octave Band							
							63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
1	Liebherr 576 Passby	13	11:12:09	00:02:17	73	94	82	80	74	71	67	62	56	48
2	Liebherr 576 Pushing Up	13	11:26:52	00:00:59	72	90	76	71	75	69	66	62	59	55
3	Loading Ken Mill	10	11:28:41	00:00:12	81	92	77	74	77	79	76	74	69	56
4	Drier, Off Axis (Burner On)	10.6	11:31:51	00:01:03	88	106	87	87	90	87	79	74	70	74
5	Drier Fan (Burner Off)	5.6	11:33:43	00:01:44	83	104	87	89	81	78	77	73	74	77
6	Drier Fan (burner Off)	0.8	11:36:29	00:00:49	98	115	97	101	94	91	93	88	89	89
7	Conveyor Belt (Drier fan off, Burner off)	8.0	11:38:59	00:00:38	79	95	84	75	73	74	71	63	65	77
8	Z408 Fan (drier off) Casing Radiated Noise	1.2	11:40:23	00:01:29	98	117	98	95	96	94	96	88	82	76
9	Drier Burner (on platform)	4.1	11:44:34	00:01:31	96	115	93	100	103	93	86	80	75	71
10	Drier Burner (1/2 way down platform)	4.8	11:46:35	00:01:20	94	113	92	95	99	93	86	80	76	71
11	Shredder Output	4.1	11:48:59	00:01:04	76	94	76	75	73	70	69	69	69	66
12	Ferrous Metals Output	5.0	11:51:06	00:01:08	83	101	75	71	71	70	71	77	78	76
13	Stainless Filter Output	4.0	11:53:12	00:01:01	81	99	78	71	71	70	71	74	77	76
14	Bag House Fan, Casing Radiated Noise	1.2	11:55:14	00:01:06	90	108	85	85	86	84	82	84	83	80
15	Multiple Sources (Measured from the Weigh Brdge)	40	12:00:47	00:00:30	76	91	76	77	80	72	71	67	63	56
16	Z407 Fan, Casing Radiated Noise	1.2	12:06:31	00:01:01	91	109	92	90	95	88	85	79	74	68
17	Z406 Fan, Casing Radiated Noise	1.0	12:07:45	00:01:01	92	110	95	93	94	92	87	81	76	70
18	Z405 Fan, Casing Radiated Noise	1.0	12:09:18	00:01:12	101	120	104	101	98	101	97	90	85	77
19	Above Fan Z406 Exhaust Outlet	4.8	12:12:53	00:01:08	92	110	90	91	96	90	85	80	76	70
20	Above Fan Z407 Exhaust Outlet	2.5	12:14:26	00:01:05	93	111	94	90	93	92	87	82	79	73
21	Trenso 2 Casing Radiated Noise	1.0	12:22:39	00:00:51	88	105	90	84	87	86	84	80	75	66
22	Mill Extract Fan, Casing Rodiated Noise	1.0	12:23:56	00:00:44	85	101	85	85	87	83	79	75	70	61
23	Trenso 1 Casing Radiated Noise	1.4	12:26:27	00:02:36	91	113	95	85	88	86	88	83	78	71
24	Noise Break-Out from Mill Building	7.8	13:40:41	00:01:02	75	93	93	79	74	70	68	67	64	57
25	Inside mill building (on pedestrian walkway)	-	13:42:12	00:01:29	87	106	95	86	83	80	80	80	80	75
26	Inside mill building (1 m from shaker)	-	13:44:34	00:01:01	94	112	94	88	85	84	86	89	88	83

APPENDIX C – Acute Acoustics

Acute Acoustics Measurements from Ilkeston and Other Site

APPENDIX C

NOISE SOURCES

Acute Acoustics - Report Reference: 1524 Johnsons - Ilkeston NIA [RevB]

APPENDIX 5

Detailed Main Results of Source Noise Measurements – April 2013

Description/Operation	Duration,T	LAeq,T	LA1	LA10	LA90	LAmax[S]
Ambient Noise Level within Processing Building	00:03:08	87.8	94.9	90.6	84	94.7
Reverberent Level close to wall of building	00:01:40	89.3	95.2	90.9	87.2	94.9
Volvo 8 wheeler Tipper Lorry reversing @6m	00:01:16	75.3	82.4	77.9	68.5	80.5
DAF 12 Wheeler Up & Past @2m	00:00:26	74.2	80.9	78.5	67	79.5
Komatsu WA470 Front End Loading Shovel @7m	00:02:02	76.6	84.3	80	67	86.5
Komatsu WA320 P2 Front End Loading Shovel @7m	00:02:02	76.5	83.4	79.6	72	82.3
Ambient Level in yard, 2 x front end loaders & 8 wheeler lorries moving	00:01:16	76.9	88.7	76.9	69	90.4
8 Wheeler being loaded by WA470 @5m	00:01:38	77.3	90.2	75.5	69.1	91.2
12 Wheeler Walking Floor Unloading @4m	00:06:36	82.8	88.8	85.9	73.9	87.6
Komatsu PC290 LC 360 loader moving aggregate and IBA waste @7m	00:01:36	77.4	85.3	78.8	74.6	83.3
JCB531 Telehandler @4m moving scrap metal @4m	00:02:17	81.7	92	85.5	72.1	91.2

Acute Acoustics - Report Reference: 1567 R M Wright NIA

Noise Source	Measured SPL	Measure Dist/m	Dist to Recep/m	Dist Att	Barrier Att	Soft Gd	Rec SPL
Wood Dryer	77.9	11	340	29.8	12	7	29.1
Shredder/Conveyor	86	7	340	33.7	11	7	34.3
Doppstadt	81	10	340	30.6	9	7	34.4
Trommel	72.9	9	340	31.5	11	7	23.4
Silo	68	1	340	50.6	12	7	0.0
				Total			38.1

Figure 1: Predicted Receptor Noise Levels/dB

Description	Start Time	Duration,T	LAeq,T	LA1	LA10	LA90	LAmax[S]
HLT Position	11:30:00	00:10:00	72.9	79.6	75.2	68.8	79

Figure 2: Main Results of Trommel Noise/dB

	Frequency/Hz							
Description	63	125	250	500	1000	2000	4000	8000
HLT Position	69.9	66.5	67.5	68.9	68.9	66.4	60.6	52.8

Figure 2: Main Results of Trommel Noise/dB

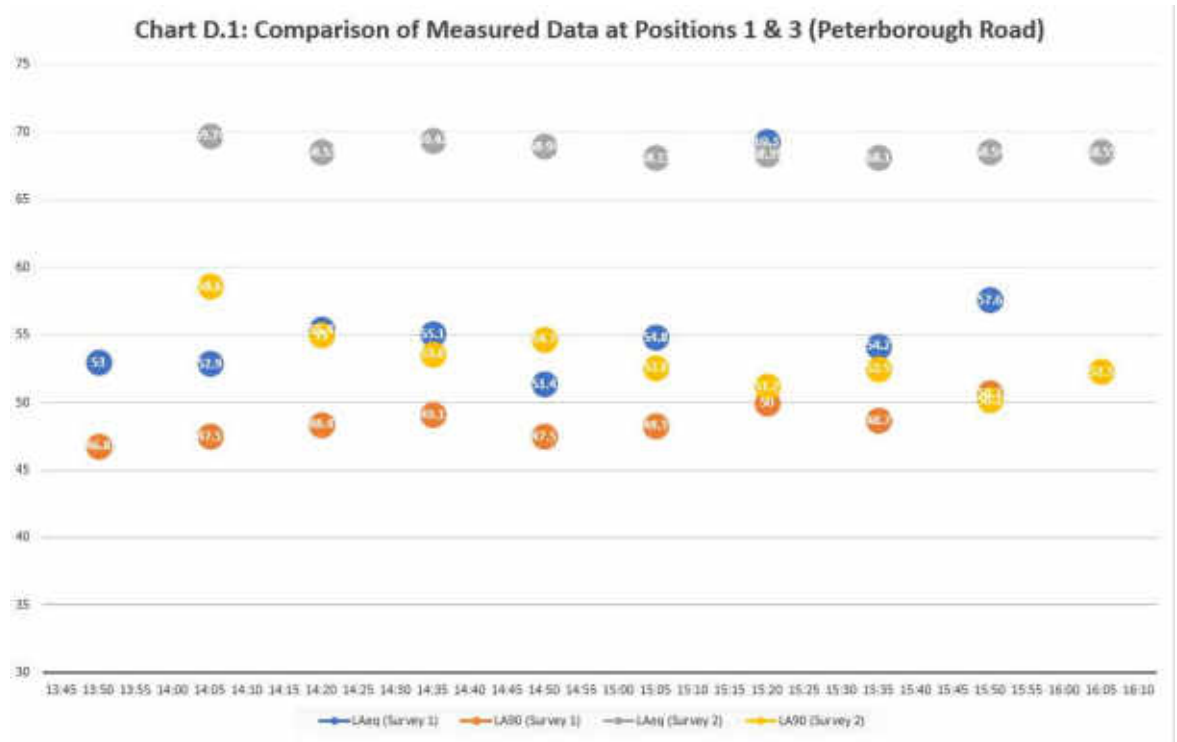
Appendix D: Attended Survey Analysis

Peterborough Road Analysis

The survey data for comparative periods were assessed as follows:

- Survey 1 (Position 1): Measurements between 13:45 and 16:10 on Monday 11 January 2021
- Survey 2 (Position 3): Measurements between 13:45 and 16:10 on Thursday 15 September 2021

The corresponding $L_{Aeq,15mins}$ and $L_{A90,15mins}$ measurements during these periods are plotted on Chart D.1, with a summary of the data shown in Table D.1.



Survey	Average ambient noise level $L_{eq:\,T}$	Minimum background noise level $L_{90:\,15min}$
Survey 1, Position 1 (11 January 2021)	60.8 dB(A)	46.8 dB(A)
Survey 2, Position 3 (15 September 2021)	68.7 dB(A)	50.2 dB(A)

Table D.1: Summary of comparative survey data

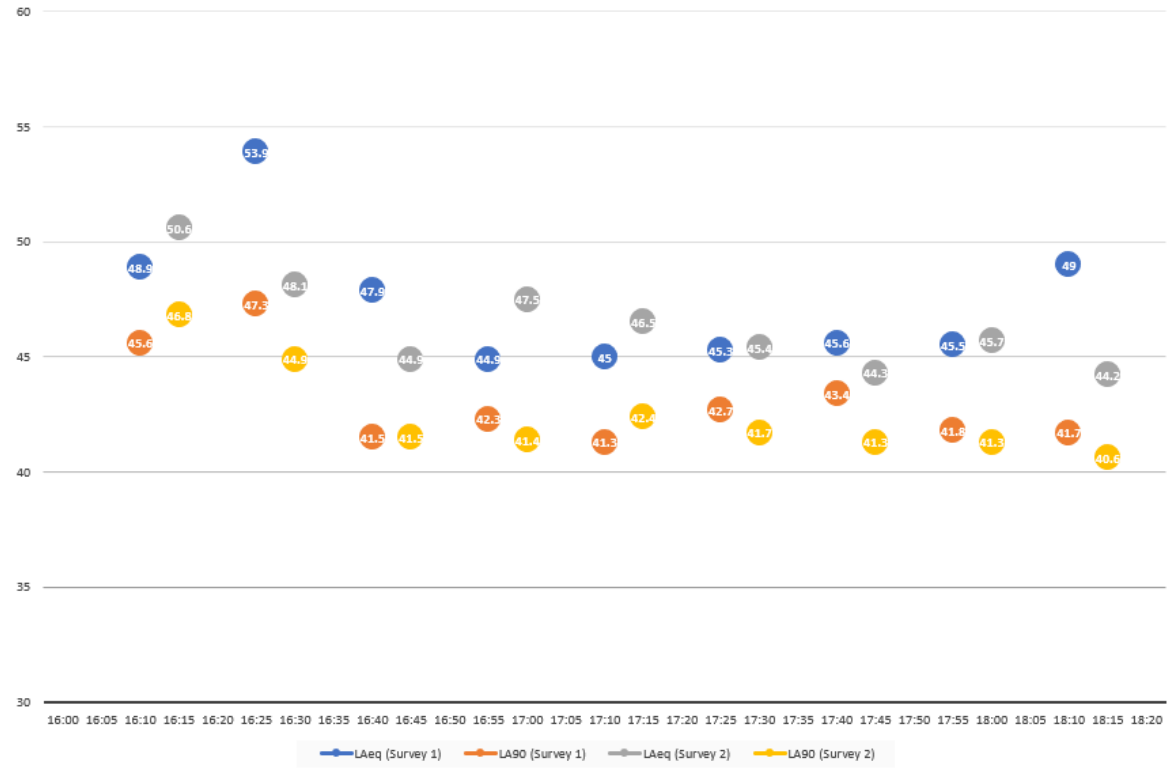
Snoots Road Analysis

The survey data for comparative periods were assessed as follows:

- Survey 1 (Position 2): Measurements between 16:00 and 18:20 on Friday 8 January 2021
- Survey 2 (Position 2): Measurements between 16:00 and 18:20 on Thursday 15 September 2021

The corresponding $L_{Aeq,15mins}$ and $L_{A90,15mins}$ measurements during these periods are plotted on Chart D.2, with a summary of the data shown in Table D.2.

Chart D.2: Comparison of Measured Data at Position 2 (Snoots Road)



Survey	Average ambient noise level $L_{eq:\,T}$	Minimum background noise level $L_{90:\,15min}$
Survey 1 (8 January 2021)	48.5 dB(A)	41.3 dB(A)
Survey 2 (15 September 2021)	46.9 dB(A)	40.6 dB(A)

Table D.2: Summary of comparative survey data

APPENDIX E - Summary of Spectral Data used in Assessment

External Processing and Acceptance of Materials

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Site arrival and tipper operations									
Measured Noise Level at 5 m	82	80	78	77	74	72	69	63	80
Front End Loaders & 360 Loader									
Measured Noise Level at 4 m	71	73	71	71	68	66	62	55	74
Outdoor Screener (Not used - see end of Appendix E)									
Manufacturer's overall SPL at 1m, spectral content assumed	96	96	93	92	90	88	83	73	95

Building 1 Processes - Outdoor

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Main Feed / Hopper									
Measured Noise Level at 5 m	80	76	75	71	81	73	78	67	84
Outdoor Conveyor Belt									
Measured Noise Level at 1 m	82	82	81	74	70	68	66	64	78
Trommel and Infeed									
Measured Noise Level at 9 m (Acute Acoustics)	70	67	68	69	69	66	61	53	73
Stainless-Steel Oulet Points									
Measured Noise Level at 5 m	79	74	73	73	73	74	76	78	82

Building 1 Processes - Indoor

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
TRS Spreaders									
Manufacturer's overall SWL, spectral content assumed	71	71	68	67	65	63	58	48	70
Conveyors									
Manufacturer's overall SWL, spectral content assumed	84	84	83	76	72	70	68	66	80
Hein Lehman Vibration Sieve									
Manufacturer's overall SWL, spectral content assumed	91	91	88	87	85	83	78	68	90
Eddy Current									
Manufacturer's overall SWL, spectral content assumed	96	96	93	92	90	88	83	73	95
Spaleck Vibrating Feeder									
Manufacturer's overall SWL, spectral content assumed	86	86	83	82	80	78	73	63	85
Steinert Vibrating Feeder									
Manufacturer's overall SWL, spectral content assumed	86	86	83	82	80	78	73	63	85
Steinert Sensor Separator									
Manufacturer's overall SWL, spectral content assumed	111	111	108	107	105	103	98	88	110
Forklift									
Measured Noise Level at 2 m	71	66	61	62	64	60	54	45	67

Building 2 Processes - Outdoor

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Telehandler									
Measured Noise Level at 4 m (Acute), spectral levels assumed	83	77	70	69	82	70	58	51	82
Trennso Extractors									
Measured Noise Level at 1 m	87	78	82	79	81	79	77	72	86
Air Plant Extractor									
Measured Noise Level at 1 m	84	75	79	76	78	76	74	69	83

Building 2 Processes - Indoor

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Inside Mill House									
BHS Rotor Impact Mill									
Manufacturer provideded Sound Power Level, Spectral levels Assumed)	102	102	101	98	95	92	86	76	100
Trennso Screener / Air Table									
Manufacturer Provided Sound Pressure Level at 1m	83	83	80	79	77	75	70	60	82
Trennso Dust Extractor									
Manufacturer Provided Sound Pressure Level at 1m	87	87	84	83	81	79	74	64	86

Screener

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Outdoor Screener									
BS 5228 Stated Noise Level (Screener) Table C.10, at 10 m	84	82	79	79	74	74	71	64	81

Appendix F: Noise Model Source Library

Name	ID	Type	1/1 Oktave Spectrum (dB)									
			63	125	250	500	1000	2000	4000	8000	A	lin
Vehicle Movements	_Source1	Lw	103.9	102.2	99.9	98.5	96	94.2	90.9	85.4	101.6	108.2
Conveyor Belt	_Source2	Lw	90	90	89	82	78	76	74	72	85.7	94.9
Main Feed	_Source3	Lw	102	98	97	93	103	95	100	89	105.9	108
Forklift	_Source4	Lw	85.4	79.5	75.4	75.5	77.8	74.1	68	59.2	81	87.8
Wheel Loader	_Source5	Lw	90.5	92.5	90.6	91.1	88.3	86.2	81.7	74.8	93.6	98.2
Rigid HGV	_Source6	Lw	99	97	99	96	92	89	85	80	97.9	104.4
Tripper and HGV Movements	_Source7	Lw	104	102	100	99	96	94	91	85	101.7	108.2
Artic HGV vehicle	_Source8	Lw	105	103	105	102	98	95	91	86	104	110.5
Komatsu 360 loader	_Source9	Lw	97.7	106.7	104.7	97.7	95.7	93.7	92.7	85.7	102.4	109.8
Komatsu front end loader	_Source10	Lw	113.7	102.7	100.7	99.7	95.7	94.7	87.7	79.7	101.9	114.5
JCB 531 telehandler/fork lift	_Source11	Lw	102.5	96.5	89.5	88.5	101.5	89.5	77.5	70.5	102	105.9
Trommel and Infeed	_Source13	Lw	97.1	94.1	95.1	96.1	96.1	93.1	88.1	80.1	100	103.4
KomatsuLoaderCA	_Source14	Lw	91	93	91	91	88	86	82	75	93.5	98.5
Stainless Steel Outlet	_Source15	Lw	101	96	95	95	95	96	98	100	104.1	106.6
Donaldson2Extract	_Source16	Lw	103	100	98	96	93	89	84	78	98.1	106.4
Donaldson1Extract	_Source17	Lw	101	92	96	93	95	93	91	86	99.7	104.3
Building 2 North Facade	_Source18	Lw	103.2	102.3	96.8	94.6	92.2	89	83.8	73.8	97.4	106.8
Building 2 West	_Source19	Lw	102.1	100.2	92.4	87.3	82.9	78.7	73.3	63.3	90.5	104.7
Building 2 South	_Source19.1	Lw	100.9	99	91.3	86.6	82.7	78.8	73.4	63.4	89.8	103.5
Building 2 Roof	_Source19.2	Lw	106.9	104.9	96.5	89.9	82.7	74.5	64.4	54.4	93.4	109.3
Building1 South	_Source20	Lw	102.9	101.7	94.8	92.5	90.2	87	82	72.3	95.6	106.1
Building1 East	_Source21	Lw	105.4	103.6	95.4	91.4	87.9	84.3	79.1	69.4	94.6	108
Building 1 West Facade	_Source21.1	Lw	106.4	105.1	98.2	95.9	93.5	90.4	85.3	75.6	98.9	109.6

Building 1 Roof	_Source22	Lw	111	109	100	93.9	87	79	69	59.3	97.3	113.4
Building 1 North	_Source21.2	Lw	103.5	102.5	96	94.1	91.9	88.8	83.8	74.1	97.1	106.9
Terex Screener	_Source23	Lw	112	110	107	107	102	102	99	92	109.1	116
Building 2 Roof	_Source24	Lw	86	75	65	58	53	49	43	38	64.5	86.4
HGVonAccessRoad	_Source25	Lw	111	108	98	100	96	94	88	84	102	113.3
Wheeled Loader (Loading lorry)	_Source26	Lw	115	112	110	105	104	102	98	93	109.5	118.1
Trennso Extractor	_Source27	Lw	87.2	77.8	81.6	79.2	80.7	78.9	76.6	72.3	85.5	90.3
Airplant Extractor	_Source28	Lw	95.2	85.8	89.6	87.2	88.7	86.9	84.6	80.3	93.5	98.3
HGV in site	_Source29	Lw	124	110	102	101	105	100	99	92	108.6	124.3
Screener	_Source30.1	Lw	107.6	105.6	102.6	102.6	97.6	97.6	94.6	87.6	104.7	111.6

Appendix G: Summary of Rating Level at Receiver Location

Receiver Rating Levels Without Mitigation

Period 1

Name	ID	Level Lr		Typical Background Level		Height		Coordinates		
		Day[1] (dBA)	Night (dBA)	Day (dBA)	Night (dBA)	(m)		X (m)	Y (m)	Z (m)
R01 97SnootStreet	97SnootStreet	46.1		42		1.5	r	525929.2	297285.8	6.3
R02 99&101SnootStreet	99&101SnootStreet	46.1		42		1.5	r	525924.2	297316.5	6.46
R03 103&105SnootStreet	103&105SnootStreet	46.2		42		1.5	r	525925.2	297334.1	6.53
R04 107&109SnootStreet	107&109SnootStreet	46.4		42		1.5	r	525928.2	297357.5	6.8
R05 111SnootStreet	111SnootStreet	46.4		42		1.5	r	525928.8	297378.6	7.12
R06 95SnootStreet EG	95SnootStreet	45.1		42		1.5	r	525955.1	297279.7	6.25
R07 95SnootStreet 1.OG	95SnootStreet	47.3		42		4	r	525955.1	297279.7	8.75
R08 95SnootStreet 1.OG (west)	95SnootStreet (west)	47.5		42		4	r	525951.3	297282.3	8.74
R09 144PeterboroughRoad EG	144PeterboroughRoad	51.6		50		1.5	r	525331.9	297424.7	9.17
R10 144PeterboroughRoad 1.OG	144PeterboroughRoad	55.1		50		4	r	525331.9	297424.7	11.67
R11 142PeterboroughRoad EG	142PeterboroughRoad	51.5		50		1.5	r	525348.3	297430.3	9.1
R12 142PeterboroughRoad 1.OG	142PeterboroughRoad	55.1		50		4	r	525348.3	297430.3	11.6
R13 140PeterboroughRoad EG	140PeterboroughRoad	52.2		50		1.5	r	525365.1	297435.6	9.22
R14 140PeterboroughRoad 1.OG	140PeterboroughRoad	56.1		50		4	r	525365.1	297435.6	11.72
R15 203PeterboroughRoad EG	203PeterboroughRoad	46.4		50		1.5	r	525065.1	297315.8	9.12
R16 203PeterboroughRoad 1.OG	203PeterboroughRoad	48.7		50		4	r	525065.1	297315.8	11.62
R17 203PeterboroughRoad EG	203PeterboroughRoad	34.6		50		1.5	r	525060.5	297322.6	9.03
R18 203PeterboroughRoad 1.OG	203PeterboroughRoad	35.5		50		4	r	525060.4	297322.6	11.53
R19 130PeterboroughRoad 1.OG	130PeterboroughRoad	53.5		50		4	r	525494.3	297480.3	11.41

[1] 'Day' refers to the level for the assessment period, i.e. Period 1

Period 2

Name	ID	Level Lr		Typical Background Level		Height		Coordinates		
		Day[1] (dBA)	Night (dBA)	Day (dBA)	Night (dBA)	(m)		X (m)	Y (m)	Z (m)
R01 97SnootStreet	97SnootStreet	43.4		42		1.5	r	525929.2	297285.8	6.3
R02 99&101SnootStreet	99&101SnootStreet	43.4		42		1.5	r	525924.2	297316.5	6.46
R03 103&105SnootStreet	103&105SnootStreet	43.3		42		1.5	r	525925.2	297334.1	6.53
R04 107&109SnootStreet	107&109SnootStreet	43.2		42		1.5	r	525928.2	297357.5	6.8
R05 111SnootStreet	111SnootStreet	43.2		42		1.5	r	525928.8	297378.6	7.12
R06 95SnootStreet EG	95SnootStreet	42.4		42		1.5	r	525955.1	297279.7	6.25
R07 95SnootStreet 1.OG	95SnootStreet	44		42		4	r	525955.1	297279.7	8.75
R08 95SnootStreet 1.OG (west)	95SnootStreet (west)	44.3		42		4	r	525951.3	297282.3	8.74
R09 144PeterboroughRoad EG	144PeterboroughRoad	48.1		50		1.5	r	525331.9	297424.7	9.17
R10 144PeterboroughRoad 1.OG	144PeterboroughRoad	51.9		50		4	r	525331.9	297424.7	11.67
R11 142PeterboroughRoad EG	142PeterboroughRoad	48		50		1.5	r	525348.3	297430.3	9.1
R12 142PeterboroughRoad 1.OG	142PeterboroughRoad	52		50		4	r	525348.3	297430.3	11.6
R13 140PeterboroughRoad EG	140PeterboroughRoad	49.5		50		1.5	r	525365.1	297435.6	9.22
R14 140PeterboroughRoad 1.OG	140PeterboroughRoad	53.7		50		4	r	525365.1	297435.6	11.72
R15 203PeterboroughRoad EG	203PeterboroughRoad	41.8		50		1.5	r	525065.1	297315.8	9.12
R16 203PeterboroughRoad 1.OG	203PeterboroughRoad	42.8		50		4	r	525065.1	297315.8	11.62
R17 203PeterboroughRoad EG	203PeterboroughRoad	29.6		50		1.5	r	525060.5	297322.6	9.03
R18 203PeterboroughRoad 1.OG	203PeterboroughRoad	30.4		50		4	r	525060.4	297322.6	11.53
R19 130PeterboroughRoad 1.OG	130PeterboroughRoad	49.9		50		4	r	525494.3	297480.3	11.41

[1] 'Day' refers to the level for the assessment period, i.e. Period 2

Period 3

Name	ID	Level Lr		Typical Background Level		Height		Coordinates		
		Day[1] (dBA)	Night (dBA)	Day (dBA)	Night (dBA)	(m)		X (m)	Y (m)	Z (m)
R01 97SnootStreet	97SnootStreet	34.3		34		1.5	r	525929.2	297285.8	6.3
R02 99&101SnootStreet	99&101SnootStreet	34.4		34		1.5	r	525924.2	297316.5	6.46
R03 103&105SnootStreet	103&105SnootStreet	34.3		34		1.5	r	525925.2	297334.1	6.53
R04 107&109SnootStreet	107&109SnootStreet	34.3		34		1.5	r	525928.2	297357.5	6.8
R05 111SnootStreet	111SnootStreet	34.5		34		1.5	r	525928.8	297378.6	7.12
R06 95SnootStreet EG	95SnootStreet	33.7		34		1.5	r	525955.1	297279.7	6.25
R07 95SnootStreet 1.OG	95SnootStreet	35.6		34		4	r	525955.1	297279.7	8.75
R08 95SnootStreet 1.OG (west)	95SnootStreet (west)	36.2		34		4	r	525951.3	297282.3	8.74
R09 144PeterboroughRoad EG	144PeterboroughRoad	36.5		34		1.5	r	525331.9	297424.7	9.17
R10 144PeterboroughRoad 1.OG	144PeterboroughRoad	38.8		34		4	r	525331.9	297424.7	11.67
R11 142PeterboroughRoad EG	142PeterboroughRoad	36.5		34		1.5	r	525348.3	297430.3	9.1
R12 142PeterboroughRoad 1.OG	142PeterboroughRoad	39.2		34		4	r	525348.3	297430.3	11.6
R13 140PeterboroughRoad EG	140PeterboroughRoad	36.1		34		1.5	r	525365.1	297435.6	9.22
R14 140PeterboroughRoad 1.OG	140PeterboroughRoad	39.5		34		4	r	525365.1	297435.6	11.72
R15 203PeterboroughRoad EG	203PeterboroughRoad	37.3		34		1.5	r	525065.1	297315.8	9.12
R16 203PeterboroughRoad 1.OG	203PeterboroughRoad	38		34		4	r	525065.1	297315.8	11.62
R17 203PeterboroughRoad EG	203PeterboroughRoad	23.4		34		1.5	r	525060.5	297322.6	9.03
R18 203PeterboroughRoad 1.OG	203PeterboroughRoad	24.2		34		4	r	525060.4	297322.6	11.53
R19 130PeterboroughRoad 1.OG	130PeterboroughRoad	40.9		34		4	r	525494.3	297480.3	11.41

[1] 'Day' refers to the level for the assessment period, i.e. Period 3

Receiver Rating Levels With Mitigation

Period 1

Name	ID	Level Lr		Typical Background Level		Height		Coordinates		
		Day[1] (dBA)	Night (dBA)	Day (dBA)	Night (dBA)	(m)		X (m)	Y (m)	Z (m)
R01 97SnootStreet	97SnootStreet	44.5		42		1.5	r	525929.2	297285.8	6.3
R02 99&101SnootStreet	99&101SnootStreet	44.5		42		1.5	r	525924.2	297316.5	6.46
R03 103&105SnootStreet	103&105SnootStreet	44.3		42		1.5	r	525925.2	297334.1	6.53
R04 107&109SnootStreet	107&109SnootStreet	44.7		42		1.5	r	525928.2	297357.5	6.8
R05 111SnootStreet	111SnootStreet	44.7		42		1.5	r	525928.8	297378.6	7.12
R06 95SnootStreet EG	95SnootStreet	43.4		42		1.5	r	525955.1	297279.7	6.25
R07 95SnootStreet 1.OG	95SnootStreet	46		42		4	r	525955.1	297279.7	8.75
R08 95SnootStreet 1.OG (west)	95SnootStreet (west)	46.2		42		4	r	525951.3	297282.3	8.74
R09 144PeterboroughRoad EG	144PeterboroughRoad	50.1		50		1.5	r	525331.9	297424.7	9.17
R10 144PeterboroughRoad 1.OG	144PeterboroughRoad	53.7		50		4	r	525331.9	297424.7	11.67
R11 142PeterboroughRoad EG	142PeterboroughRoad	50		50		1.5	r	525348.3	297430.3	9.1
R12 142PeterboroughRoad 1.OG	142PeterboroughRoad	53.7		50		4	r	525348.3	297430.3	11.6
R13 140PeterboroughRoad EG	140PeterboroughRoad	50.5		50		1.5	r	525365.1	297435.6	9.22
R14 140PeterboroughRoad 1.OG	140PeterboroughRoad	54.2		50		4	r	525365.1	297435.6	11.72
R15 203PeterboroughRoad EG	203PeterboroughRoad	46.2		50		1.5	r	525065.1	297315.8	9.12
R16 203PeterboroughRoad 1.OG	203PeterboroughRoad	48.4		50		4	r	525065.1	297315.8	11.62
R17 203PeterboroughRoad EG	203PeterboroughRoad	34.3		50		1.5	r	525060.5	297322.6	9.03
R18 203PeterboroughRoad 1.OG	203PeterboroughRoad	35.2		50		4	r	525060.4	297322.6	11.53
R19 130PeterboroughRoad 1.OG	130PeterboroughRoad	51.8		50		4	r	525494.3	297480.3	11.41

[1] 'Day' refers to the level for the assessment period, i.e. Period 1

Period 2

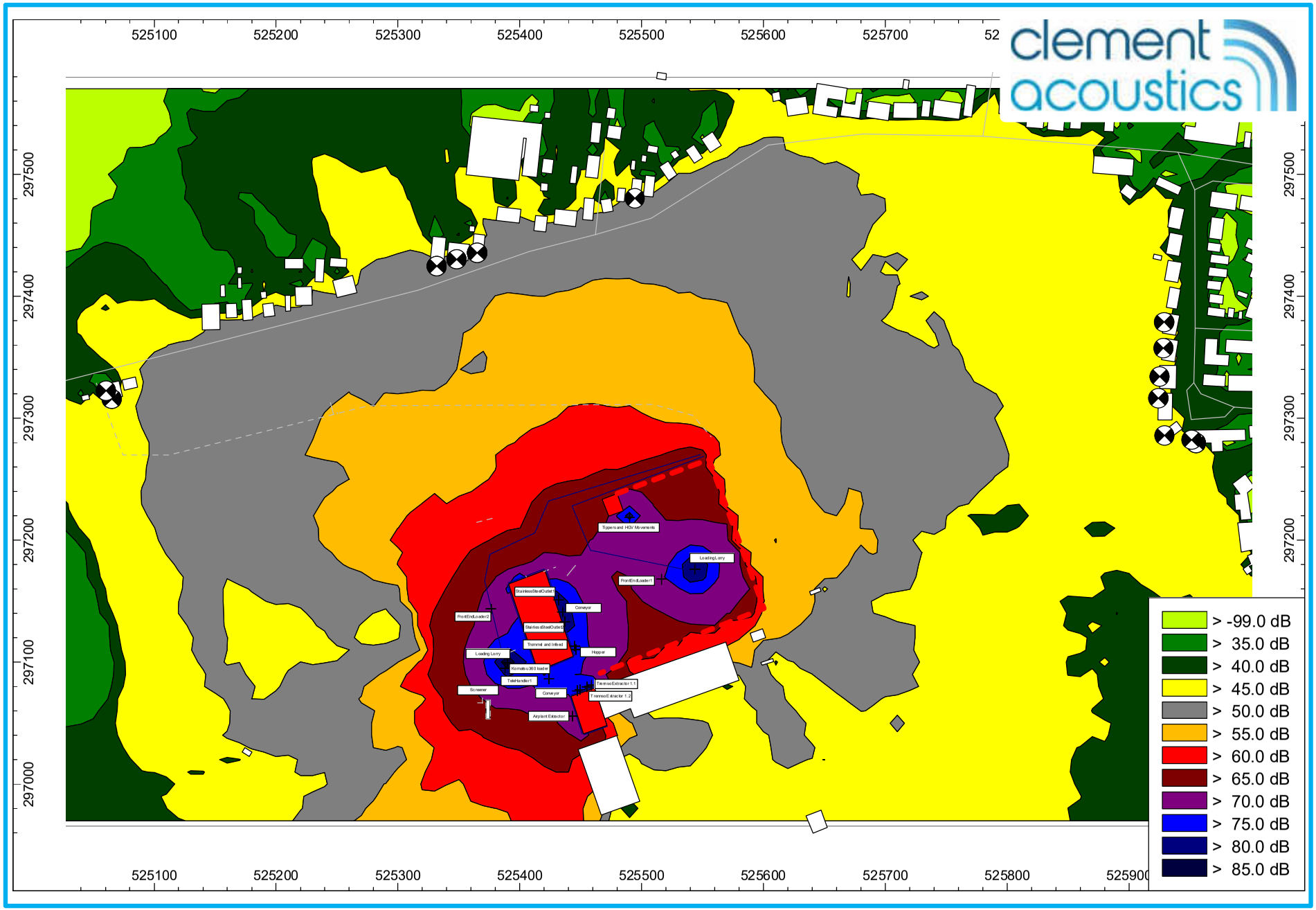
Name	ID	Level Lr		Typical Background Level		Height		Coordinates		
		Day[1] (dBA)	Night (dBA)	Day (dBA)	Night (dBA)	(m)		X (m)	Y (m)	Z (m)
R01 97SnootStreet	97SnootStreet	39.7		42		1.5	r	525929.2	297285.8	6.3
R02 99&101SnootStreet	99&101SnootStreet	39.7		42		1.5	r	525924.2	297316.5	6.46
R03 103&105SnootStreet	103&105SnootStreet	39.6		42		1.5	r	525925.2	297334.1	6.53
R04 107&109SnootStreet	107&109SnootStreet	39.5		42		1.5	r	525928.2	297357.5	6.8
R05 111SnootStreet	111SnootStreet	39.6		42		1.5	r	525928.8	297378.6	7.12
R06 95SnootStreet EG	95SnootStreet	39		42		1.5	r	525955.1	297279.7	6.25
R07 95SnootStreet 1.OG	95SnootStreet	41.1		42		4	r	525955.1	297279.7	8.75
R08 95SnootStreet 1.OG (west)	95SnootStreet (west)	41.5		42		4	r	525951.3	297282.3	8.74
R09 144PeterboroughRoad EG	144PeterboroughRoad	44.5		50		1.5	r	525331.9	297424.7	9.17
R10 144PeterboroughRoad 1.OG	144PeterboroughRoad	48.3		50		4	r	525331.9	297424.7	11.67
R11 142PeterboroughRoad EG	142PeterboroughRoad	44.3		50		1.5	r	525348.3	297430.3	9.1
R12 142PeterboroughRoad 1.OG	142PeterboroughRoad	48.3		50		4	r	525348.3	297430.3	11.6
R13 140PeterboroughRoad EG	140PeterboroughRoad	45.7		50		1.5	r	525365.1	297435.6	9.22
R14 140PeterboroughRoad 1.OG	140PeterboroughRoad	49.9		50		4	r	525365.1	297435.6	11.72
R15 203PeterboroughRoad EG	203PeterboroughRoad	40.6		50		1.5	r	525065.1	297315.8	9.12
R16 203PeterboroughRoad 1.OG	203PeterboroughRoad	41.3		50		4	r	525065.1	297315.8	11.62
R17 203PeterboroughRoad EG	203PeterboroughRoad	27.9		50		1.5	r	525060.5	297322.6	9.03
R18 203PeterboroughRoad 1.OG	203PeterboroughRoad	28.7		50		4	r	525060.4	297322.6	11.53
R19 130PeterboroughRoad 1.OG	130PeterboroughRoad	46.7		50		4	r	525494.3	297480.3	11.41

[1] 'Day' refers to the level for the assessment period, i.e. Period 2

Period 3

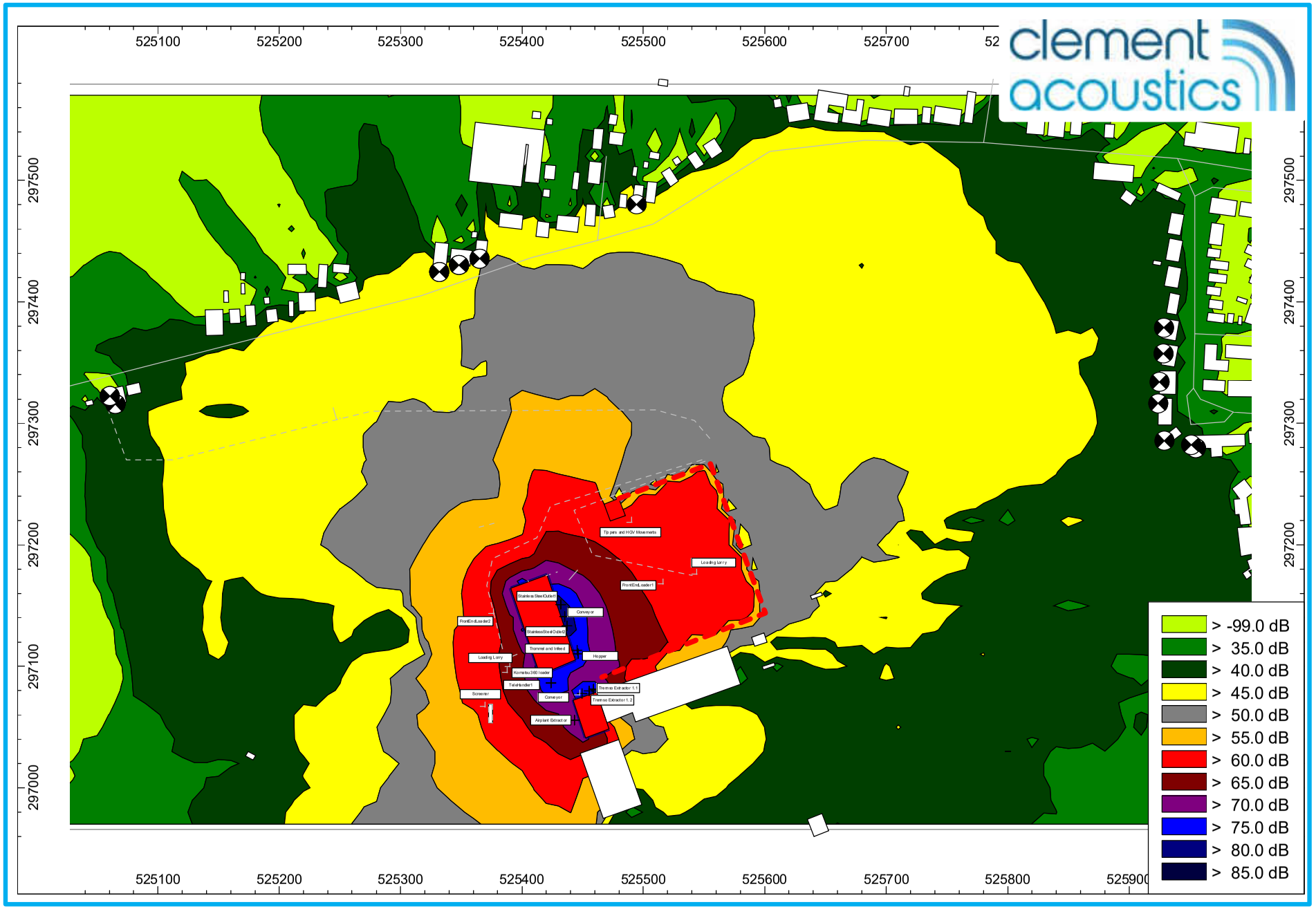
Name	ID	Level Lr		Typical Background Level		Height		Coordinates		
		Day[1] (dBA)	Night (dBA)	Day (dBA)	Night (dBA)	(m)		X (m)	Y (m)	Z (m)
R01 97SnootStreet	97SnootStreet	34.2		34		1.5	r	525929.2	297285.8	6.3
R02 99&101SnootStreet	99&101SnootStreet	34.1		34		1.5	r	525924.2	297316.5	6.46
R03 103&105SnootStreet	103&105SnootStreet	34.3		34		1.5	r	525925.2	297334.1	6.53
R04 107&109SnootStreet	107&109SnootStreet	34.4		34		1.5	r	525928.2	297357.5	6.8
R05 111SnootStreet	111SnootStreet	34.5		34		1.5	r	525928.8	297378.6	7.12
R06 95SnootStreet EG	95SnootStreet	33.6		34		1.5	r	525955.1	297279.7	6.25
R07 95SnootStreet 1.OG	95SnootStreet	35.6		34		4	r	525955.1	297279.7	8.75
R08 95SnootStreet 1.OG (west)	95SnootStreet (west)	35.2		34		4	r	525951.3	297282.3	8.74
R09 144PeterboroughRoad EG	144PeterboroughRoad	36.3		34		1.5	r	525331.9	297424.7	9.17
R10 144PeterboroughRoad 1.OG	144PeterboroughRoad	38.1		34		4	r	525331.9	297424.7	11.67
R11 142PeterboroughRoad EG	142PeterboroughRoad	36.3		34		1.5	r	525348.3	297430.3	9.1
R12 142PeterboroughRoad 1.OG	142PeterboroughRoad	38.2		34		4	r	525348.3	297430.3	11.6
R13 140PeterboroughRoad EG	140PeterboroughRoad	35.6		34		1.5	r	525365.1	297435.6	9.22
R14 140PeterboroughRoad 1.OG	140PeterboroughRoad	38.4		34		4	r	525365.1	297435.6	11.72
R15 203PeterboroughRoad EG	203PeterboroughRoad	36.9		34		1.5	r	525065.1	297315.8	9.12
R16 203PeterboroughRoad 1.OG	203PeterboroughRoad	37.7		34		4	r	525065.1	297315.8	11.62
R17 203PeterboroughRoad EG	203PeterboroughRoad	23.3		34		1.5	r	525060.5	297322.6	9.03
R18 203PeterboroughRoad 1.OG	203PeterboroughRoad	24.1		34		4	r	525060.4	297322.6	11.53
R19 130PeterboroughRoad 1.OG	130PeterboroughRoad	37.4		34		4	r	525494.3	297480.3	11.41

[1] 'Day' refers to the level for the assessment period, i.e. Period 3



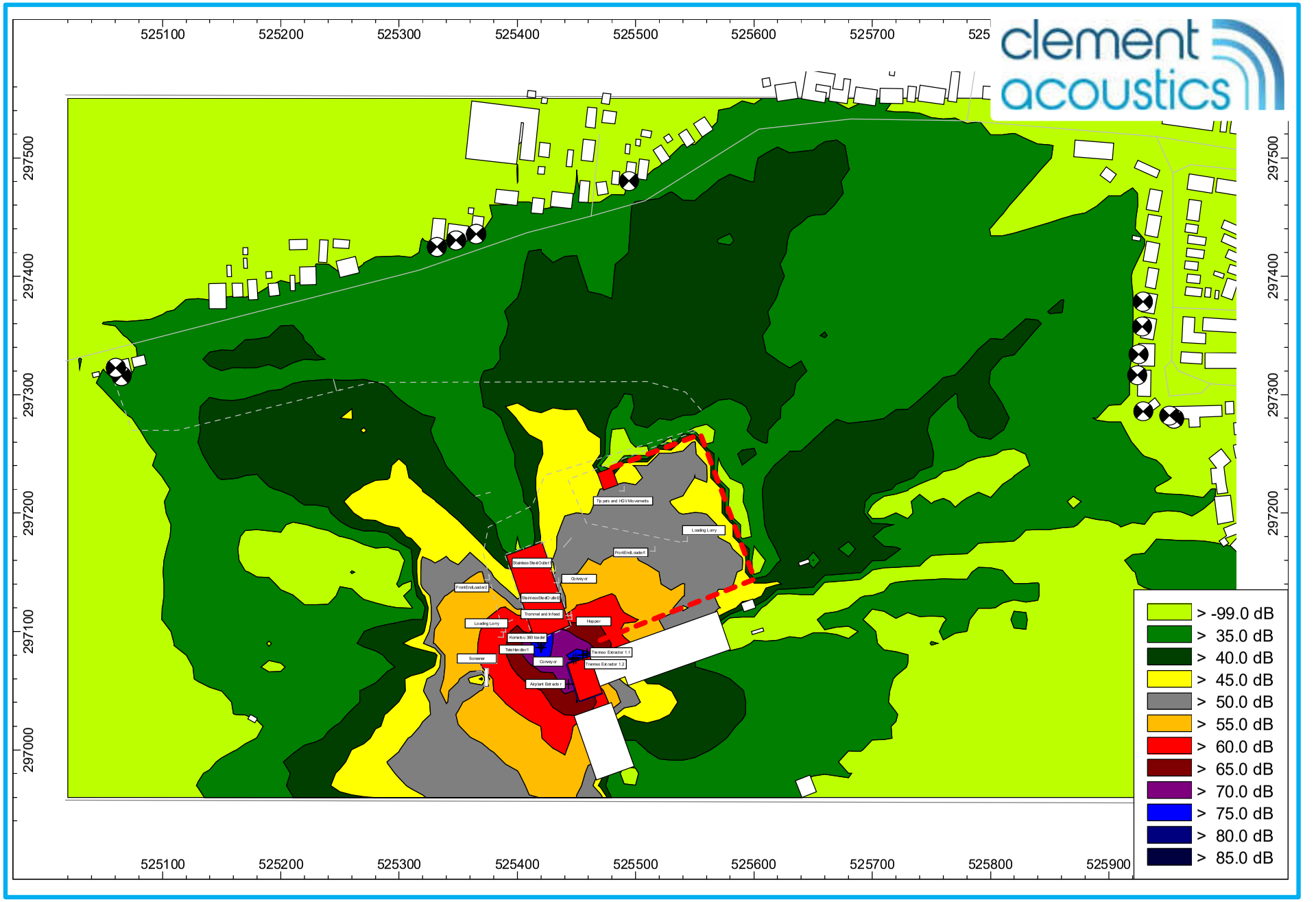
Appendix H CadnaA Noise Contours – Period 1 (With Mitigation)

Date: 11 February 2022



Appendix H CadnaA Noise Contours – Period 2 (With Mitigation)

Date: 11 February 2022


525100
525200
525300
525400
525500
525600
525700
525800
525900
297500
297400
297300
297200
297100
297000
Tip pins and HGV Movements
Loading Lorry
FrontEndLoader1
Stainless Steel Outlet 1
Conveyor
FrontEndLoader2
Stainless Steel Outlet 2
Trommel and Infeed
Hopper
Loading Lorry
Komatsu 360 loader
TeleHandler1
Screener
Conveyor
Trenmo Extractor 1.1
Trenmo Extractor 1.2
Amplent Extractor
> -99.0 dB
> 35.0 dB
> 40.0 dB
> 45.0 dB
> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB

Introduction

Clement Acoustics has been commissioned by Johnsons Aggregates and Recycling Limited (JARL) to produce a noise management plan for the proposed development site at Saxon Works, Peterborough Road, Whittlesey, Cambridgeshire.

The purpose of this document is to put in place best available techniques (BAT) to reduce noise emissions from the proposed development.

Site Description

The proposed site is located within a quarry and therefore benefits from a degree of natural screening from the topography of the site.

The processes undertaken by JARL are as follows:

- Unprocessed IBA will be imported to the Site and stored outside before undergoing a cooling and 'ageing' process; and
- The IBA will then go through vibrating screens and magnetic metal separation removing ferrous and non-ferrous metals and producing different sized fractions of Incinerator Bottom Ash Aggregate (IBAA).
- Construction and demolition and other waste materials will be crushed and screened dependent on the customer's requirements.
- All finished IBA will be used as aggregate; ferrous and non-ferrous metals will be sent for recycling at an appropriate facility.
- Any additional material unsuitable for recovery will be sent to an appropriately authorised facility.

The equipment on site comprises a combination of fixed and mobile plant. Specific detail of plant is stated within the body of this report.

Outline Mitigation Strategy

The *Horizontal Guidance Note IPPC H3 (Part 2)* issued by the Environmental Agency outlines consideration for what level of mitigation constitutes BAT:

- Costs and benefits
- The technical characteristics of the installation concerned
- Geographical location
- Local environmental conditions

Therefore, pragmatic and practicable mitigation measures should be considered. The document further goes on to state the general principles of mitigation.

- Reduction at source
- Ensuring adequate distance between the source and receiver
- The use of barriers between the source and receiver

In this instance the site is approximately 200 m from the nearest receiver. Due to the logarithmic nature of attenuation offered from sound propagation, a beneficial degree of attenuation is not expected to be achieved by further increasing the distance of the proposed processes from the receiver. Therefore, this document will focus on reducing the noise at source and the use of barriers.

The Hierarchy for Noise Control

1. **Prevent** generation of noise at source by good design and maintenance.
2. **Minimise or contain noise at source** by observing good operational techniques and management practice.
3. **Use physical barriers or enclosures** to prevent transmission to other media.
4. **Increase the distance** between the source and receiver.
5. **Sympathetic timing and control** of unavoidably noisy operations.

Noise Management

Mitigation Measures

The first-floor noise sensitive receivers located on Peterborough Road overlook the proposed works. In order to reduce the likelihood of causing a significant adverse impact during particularly sensitive periods it has been recommended that the following mitigation measures are implemented:

Hopper and Infeed Linings

The noise emissions from hoppers and the trommel infeed are generated by material being dropped and causing the thin metal panels to vibrate and consequently radiate as noise.

To mitigate this, the metal panels can be internally or externally lined with a sandwich material comprising a damping layer, such as rubber, and a further thin steel layer. As a minimum this layer should cover at least 80% of the surface area of the hopper and be between 40% to 100% of the thickness of the panel to be treated.

According to guidance found in document 'Top 10 Noise Control Techniques' prepared by Engineering Industry Noise Task Group and hosted on the Health and Safety Executive section of the UK Government website, such a treatment applied to a hopper is expected to reduce noise emissions by 5-25 dB.

In order to assess the effects on noise levels in a reasonably onerous way, it has been assumed that a 10 dB reduction in noise levels could be achieved. This is at the lower end of the stated range, and is considered appropriate based on the nature of material being deposited into the hopper.

Openings to Building 2

Period 3 includes indoor processes within Building 2, and calculations have assumed that doors and shutters could be constantly open. In order to limit the breakout of noise from Building 2, the following measures are proposed for the main shutter door, which provides access to vehicles:

- The vehicle access door will not be opened more than twice over an entire night-time period, and on each occasion, will remain open for no longer than 5 minutes - to allow vehicle access / exit,
- The vehicle access door should not be opened more than once in a single 15-minute period during night-time Period 3 hours,
- If either of the above restrictions will be exceeded, Building 2 operations must be halted when the vehicle access door is opened.

Fire doors should be opened only when providing access during emergencies.

Saturday Restrictions

In order to minimise the impact of noise during early morning and evening periods, Saturday activities will be restricted to the following:

- Saturday 06:00 to 08:00 – Building 2 Operations Only (Period 3)
- Saturday 08:00 to 18:00 – All activities (Period 1), with the noted exceptions below[1]
- Saturday 18:00 to 22:00 – Building 2 Operations Only (Period 3)

[1] Outdoor screener will not be used on Saturdays

Maintenance

In order to limit the effects of maintenance, which as shown in Figure 2.2 of the report could occur at any time, we would recommend that noisy or non-urgent maintenance work is undertaken during Period 1 days and hours only.

The recommended mitigation measures are reflected in the noise management plan, shown in Appendix E.

Note: It is understood commissioning measurements will be undertaken prior to full operation of the site. The effectiveness of the implemented mitigation measures shall be assessed at this stage. If the result of this assessment does not confirm mitigated rating levels are at least as predicted, additional options for mitigation shall be investigated and implemented accordingly - to ensure, as far as reasonably practicable, an adverse noise impact is not experienced at the receptors identified.

<u>HGV and other Vehicles</u>

- Where possible, the arrival of delivery vehicles should be properly co-ordinated so no more than one delivery is scheduled in a 30-minute period, and there will be no holding areas permitted.
- A notice instructing vehicle drivers entering and leaving the Site to minimise engine revving to limit unnecessary noise will be placed at the site entrance. The notice will also include a statement to the effect that a site speed limit of 10 mph will be enforced throughout the site
- Site vehicles are to be fitted with broadband white noise reversing signals
- HGVs must not arrive or depart the site outside the hours 06:00 to 18:00, unless in emergencies or genuinely extreme circumstances

<u>Plant machinery and equipment</u>

- Plant and machinery to be used on site must be selected carefully in order to minimise noise emission levels. Where there are multiple options for the same operations, the quieter unit shall be selected.
- Equipment is to be hired/purchased from reputable companies who can supply well maintained plant.

- Plant and equipment in frequent use should be serviced regularly to ensure that noise levels are minimised by using well maintained machinery.
- Any manufacturer recommended noise and vibration attenuation measures should also be used.
- Noise and vibration generating equipment should only be operational when necessary and switched off when not in use so as to minimise the accumulation of various noise sources on site.
- Unnecessary revving of engines and motor driven tools is to be avoided.
- The use of two-way radios for communication should be used where necessary to avoid shouting on site.
- Drop heights are to be minimised.
- Mobile plant are to be fitted with broadband white noise reversing signals
- All movement of plant and vehicles onto and around the site is to take place within their own permitted working hours.

Material

- The aggregate material should be located as to provide acoustic screening between noise sources and receivers.

Community Liaison

- JARL should make neighbours aware of noisy on-site activities.
- JARL is to communicate with neighbours to ensure that they are well informed about the proposed operating hours.

Ongoing Management of Noise

- Noise monitoring and audits – noise monitoring as part of the daily site inspection any abnormal findings are recorded in the site log and reported to the site supervisor. Rattles, hums, squeaks, relief valves, irregular sounds etc
- Daily operational checks - external doors are closed when not in use, hatchways or access doors left open, acoustic hoods not attached/fixed correctly, engines idling when not in use, suitable PPE being used as required.
- Records – site logs record operational and maintenance issues/findings.
- Communication – open 2-way communication, listen to concerns raised, investigate as required and feedback to group or individual.
- Procurement – equipment selection, noise rating, inclusive attenuation, replacement policy, life cycle of product.
- Signage – Appropriate signage denoting noise control areas and quite zones.
- The site rules are “policed” by the site personnel. All site personnel will be trained in the application of site rules and good practise and empowered to take ownership and responsibility for the implementation and application of such rules. There will be a “near miss” system for reporting near misses and breaches of site rules. This will be sent to the site management who will carry out the required actions as to prevent re-occurrence of the

incident. Near miss reports will be logged and analysed. Outcomes and actions will be reported and discussed at both site level and at Senior Management and Board level.

- Regular inspection and monitoring should be undertaken following Table 1.

Equipment	Inspection Period	Repair/Replace/clean period
Conveyor Belts	Daily, Monthly	6 hrs
Motor	Daily, Monthly	1 – 2hrs
Gear Box	Daily, Monthly	1 – 2hrs
Screens	Daily shift inspection	Blockage 6 hrs
Electrical	Daily – systems monitored in control room.	On call electrical service – dependent on system
	Statutory annual inspections	
Air compressors	Daily, Monthly	Portable compressor to be supplied by approved supplier
Bag collection silo	Differential pressure	Bag change 4hrs
Magnets	Daily, effectiveness continually monitored in control room	6 hrs
General cleaning	Daily at end of the day	1 hr set aside
General - lubrication	M/C specific – weekly/ monthly	-
Vehicles	Daily at the star of the day	15 minutes
Building	Daily checks – walk round	
Hard standing	Daily checks – walk round	

Table 1 Routine Inspection

Noise Monitoring and Repeat Assessment

Following 6 to 12 months of operation, a repeat noise impact assessment of the site operating will be undertaken to validate the predicted assessment. Where the site is operating louder than anticipated the noise emissions and mitigation measures will be revaluated. The procedure will be repeated until suitable mitigation is in place to achieve the predicted rating levels.

A repeat noise impact assessment could also be triggered for the following reasons:

- Change in Operation (e.g. Operating Times or Equipment)
- Periodic Assessments
- Concern from JARL personnel
- Complaint
- Legislative change

Noise monitoring will be conducted at regular intervals or following a noise complaint. The equipment would comprise a Class 1 Sound Level Meter and associated Acoustic Field-Calibrator. The Acoustic Field-Calibrator should be traceably calibrated every year, whilst the Sound Level Meter should be traceably calibrated every 2 years. The calibration should be undertaken by a UKAS accredited laboratory following nationally traceable standards. The noise monitoring should be undertaken for

the relevant reference periods (1 hour between 07:00 and 23:00, and 15 minutes between 23:00 and 07:00). The following descriptor should be captured:

- LAeq – Broadband and Third Octave
- LAFmax – Broadband
- LA90 – Broadband
- LCpeak – Broadband

The noise monitoring should primarily consider the noise sensitive receivers on Peterborough Road and Snoots Road, identified in the main body of this report.

The noise monitoring equipment should be placed in a representative location to the identified receivers. Where this is not possible the noise measurements can be supplemented by calculations as per Section 7.3.5 of BS 4142+A1:2019.

Noise monitoring should be undertaken following BS 7445-2:1991. Ensuring the monitoring location is 3.5 m from any hard, reflective surfaces and 1.5 m above ground level. The measurements should not be undertaken during any adverse weather conditions.

Noise at Work Regulations

The noise management plan should extend to the health and safety of operations on site. Hearing protection should be made available to all on site personnel. Where necessary an assessment should be undertaken to review the noise exposure of each employee and determine if hearing protection should be enforced.

Complaints Procedure

JARL's complaints procedure is as follows:

In the event of a complaint being received the following will be implemented:

- Information will be provided to the local neighbours (via the Environment Agency) regarding the point and method of contact for the site in the event noise has been detected or they want to discuss any activities etc… at the site;
- The neighbours can be advised that any complaints / concerns will be addressed immediately following identification / notification and contingency action implemented; and
- The neighbours can be advised of any corrective action and a follow up call carried out if required.

The Operator will continue to maintain a routine liaison with the Environment Agency regarding noise, and other potential, nuisance. In the event of a noise complaint being received by the EA the complaint is passed to the Operator for the investigation. Every complaint is recorded as detailed below:

- The complaint is forwarded to the Site Manager to undertake further investigation;
- Depending on the severity, the complaint can be escalated to senior management for investigation if necessary; and

- All complaints, together with actions taken will be recorded on the Complaints Form and/or the SharePoint complaints register.

The noise investigation procedure will also include the following elements:

- Site walk-over coupled an assessment of the site operations which took place prior to and at the time of the complaint in relation to their potential to create and noise and other potential on-site sources of noise;
- Assessment of the weather conditions prior to and at the time of the complaint; and
- A suitably trained person who is familiar with the site conditions will carry out an investigation into a noise related complaint. In the event of a substantiated complaint being received, then mitigation measures will be used for the areas/activities which were cause of the particular noise event.

A follow up report on the investigation will be issued to the EA if the complaint is found to be substantiated and if requested, to the Local Authority. The report will identify improvements proposed to reduce the potential for future complaints. Any new recommendations will then be incorporated in the Noise Management Plan and the operating procedures.

Appendix J
Reverberant Lp Calculation

$$Rev_{LP} = Lw + 10 * \log[(Q/S) + (4/Rc)]$$

Where:
Rev_{LP} = *Reverberant level within the plantroom*
L_w = *Cumulative sound power level of all the plant*
Q = *Directivity (radiating) factor*
$S = 4\pi r^2$
R_c = *Room Constant which is* $S_T\bar{\alpha}/1\text{-}\bar{\alpha}$ *in* m^2
$\bar{\alpha}$ = *Average absorption coefficient*
S_T = *Total surface area*

Building 1 (Without Mitigation)

Description	Qty	Lw / Lp	63	125	250	500	1k	2k	4k	8k	A
Screener (sieve and vibrating feeder)	1	Lw	91	91	88	87	85	83	78	68	90.1
Conveyors	9	Lw	84	84	83	76	72	70	68	66	79.8
Forklift	1	Lp @ 2m	71	66	61	62	64	60	54	45	67.1
Eddy Current	3	Lw	96	96	93	92	90	88	83	73	95.1
Vibrating Feeder	2	Lw	86	86	83	82	80	78	73	63	85.1
Spreader	2	Lw	71	71	68	67	65	63	58	48	70.1
Sensor Separator	1	Lw	111	111	108	107	105	103	98	88	110

Correction to Sound Power Levels and Correction for Quantity

Description	Qty	Lw / Lp	63	125	250	500	1k	2k	4k	8k	A
Screener (sieve and vibrating feeder)	1	Lw	91	91	88	87	85	83	78	68	90.1
Conveyors	10	Lw	94	93	93	86	82	79	77	76	89.3
Forklift	1	Lw	96	90	86	86	88	84	78	69	91.2
Eddy Current	3	Lw	101	101	98	97	95	93	88	78	99.9
Vibrating Feeder	2	Lw	89	89	86	85	83	81	76	66	88.1
Spreader	2	Lw	74	74	71	70	68	66	61	51	73.1
Sensor Separator	1	Lw	111	111	108	107	105	103	98	88	110

Description	Qty	Lw / Lp	63	125	250	500	1k	2k	4k	8k	A
Cumulative Sound Power Level		Lw	112	112	109	108	106	104	99	89	111

Average Absorption coefficient - Hard Room Finish (6600m²)			0.05	0.05	0.08	0.08	0.08	0.10	0.10	0.10	

Q	2
S (10 m)	1256.6

Description	63	125	250	500	1k	2k	4k	8k	A
Total Reverb + Direct SPL	93	93	88	87	85	82	77	67	90

Appendix J
Reverberant Lp Calculation

$$Rev_{LP} = Lw + 10 * \log[(Q/S) + (4/Rc)]$$

Where:
Rev_{LP} = *Reverberant level within the plantroom*
L_w = *Cumulative sound power level of all the plant*
Q = *Directivity (radiating) factor*
$S = 4\pi r^2$
R_c = *Room Constant which is* $S_T\bar{\alpha}/1\text{-}\bar{\alpha}$ *in* m^2
$\bar{\alpha}$ = *Average absorption coefficient*
S_T = *Total surface area*

Building 2

Description	Qty	Lw / Lp	63	125	250	500	1k	2k	4k	8k	A
Screener / Air Table	2	SPL	83	83	80	79	77	75	70	60	82.1
Mill	1	Lw	102	102	101	98	95	92	86	76	100
Dust Extractor	2	SPL	87	87	84	83	81	79	74	64	86.1

Correction to Sound Power Levels and Correction for Quantity

Description	Qty	Lw / Lp	63	125	250	500	1k	2k	4k	8k	A
Screener / Air Table	2	Lw	105	105	102	101	99	97	92	82	104
Mill	1	Lw	102	102	101	98	95	92	86	76	100
Dust Extractor	2	Lw	103	103	100	99	97	95	90	80	102

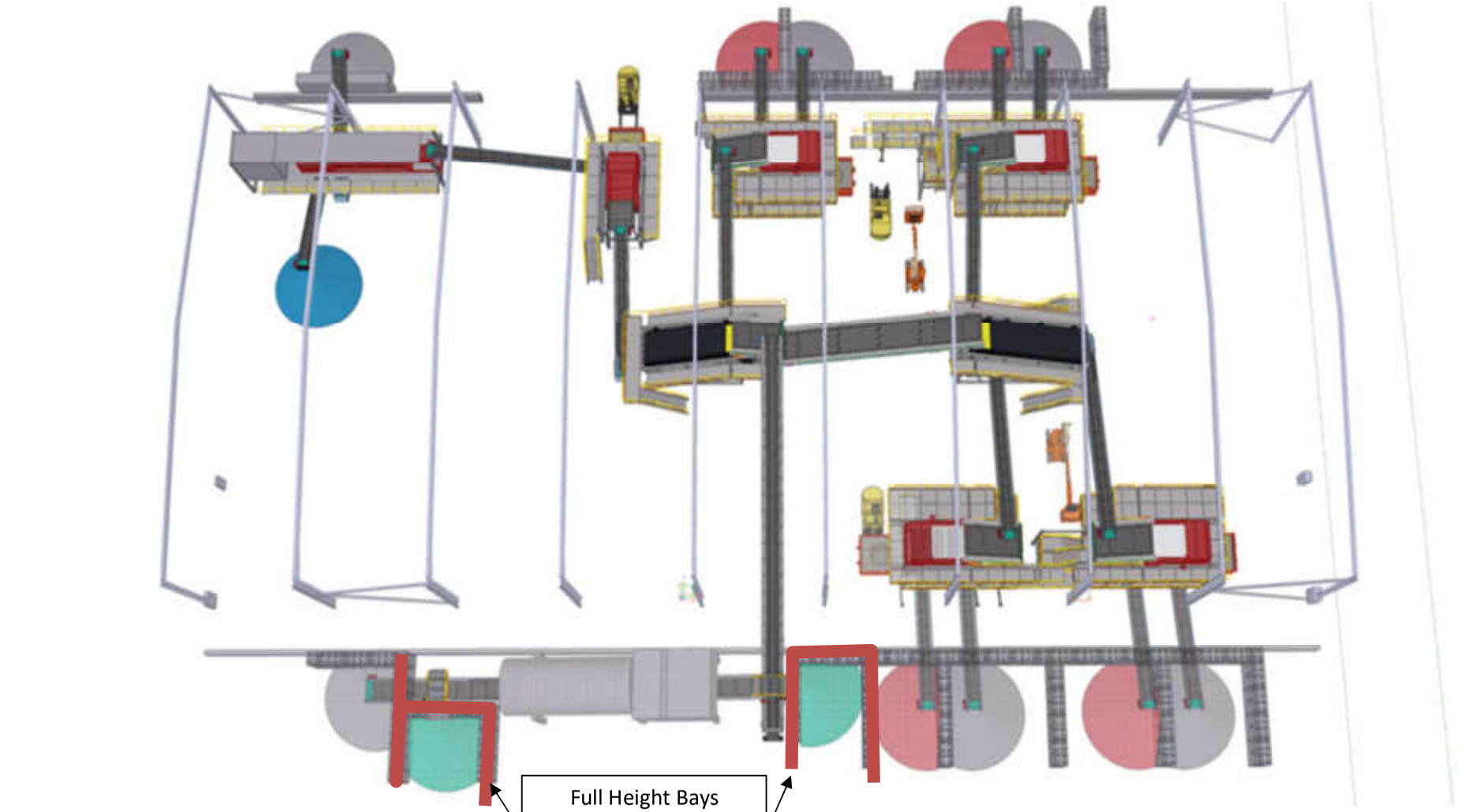
Description	Qty	Lw / Lp	63	125	250	500	1k	2k	4k	8k	A
Cumulative Sound Power Level		Lw	109	109	106	105	102	100	95	85	108

Average Absorption coefficient - Hard Room Finish (3024m²)			0.05	0.05	0.08	0.08	0.08	0.10	0.10	0.10	

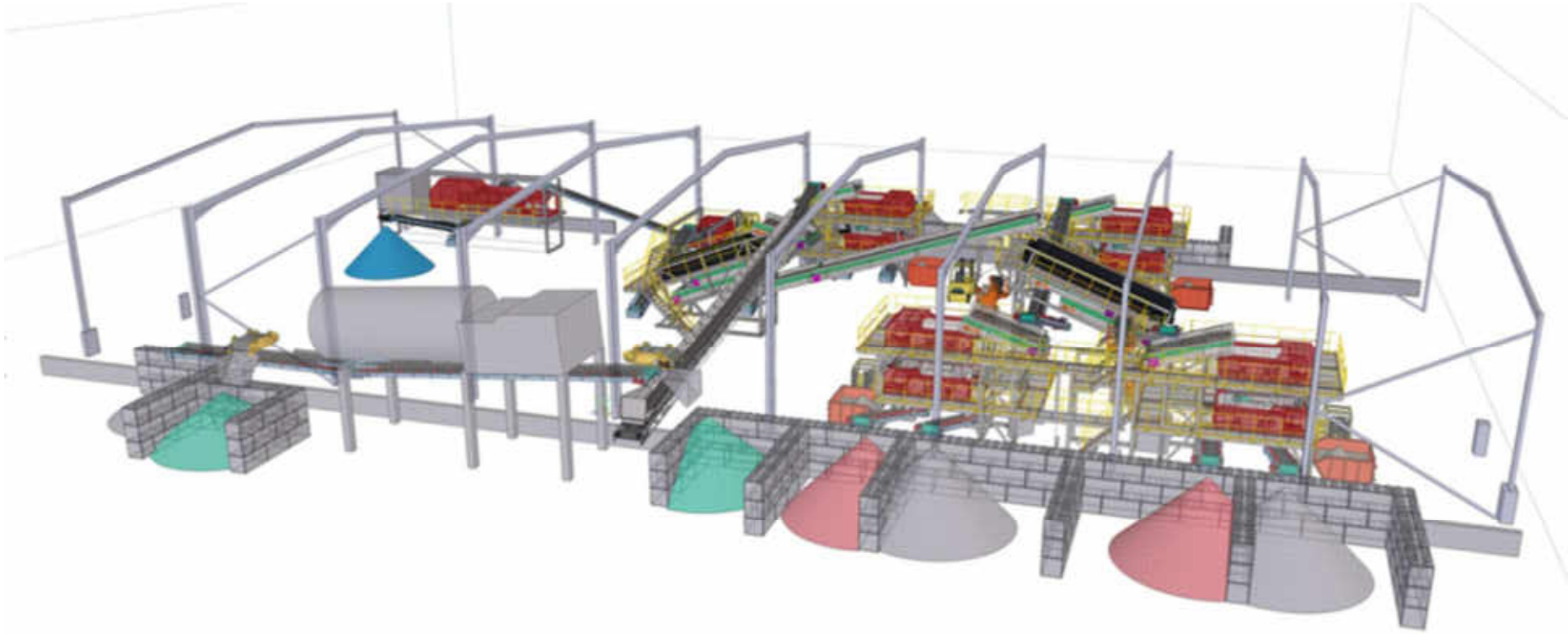
Q	2
S (10 m)	1256.6

Description	63	125	250	500	1k	2k	4k	8k	A
Total Reverb + Direct SPL	93	93	88	87	85	81	76	66	90

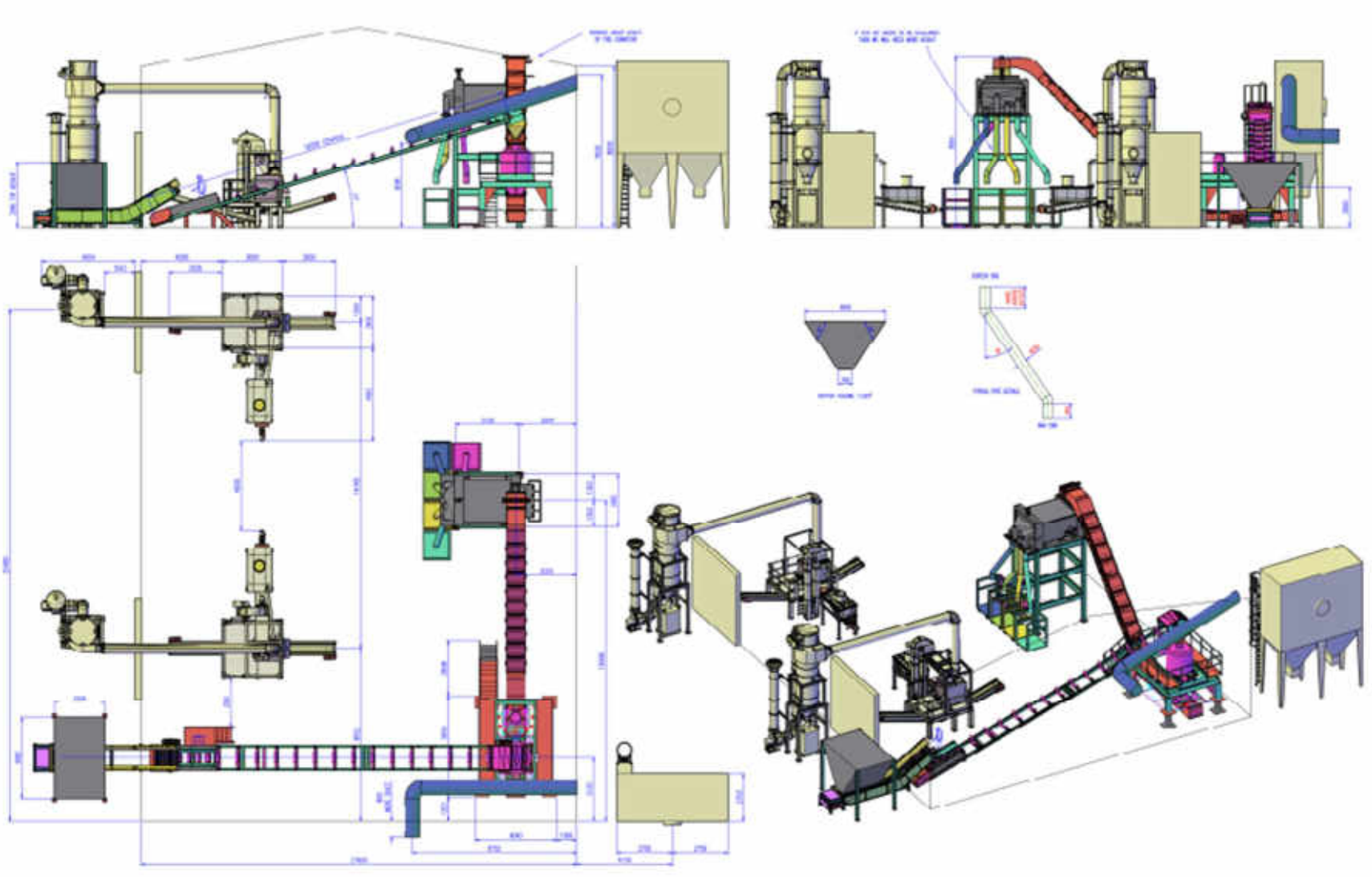
Building 1 – 3D Plan view



Building 1 – 3D Side View



Building 2 – Elevation, Plan and Isometric View



APPENDIX L

SAXON WORKS, PETERBOROUGH ROAD, WHITTLESEY

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Document Reference
Appendix L

To
Ana Afonso
Johnsons Aggregates and Recycling

From
Duncan Martin MIOA
Clement Acoustics Ltd

Subject
Saturday Assessment for Saxon Works, Peterborough Road, Whittlesey

1. Purpose and Scope

Further to review of the revision G noise impact assessment issued in support of the above site (16426-NIA-01 RevG) issued on 14 October 2021, concern has been raised over the anticipated noise levels and resulting noise rating levels, during Saturdays specifically.

A further review has therefore been undertaken in order to investigate possible mitigation measures to further reduce noise levels generally and specifically on Saturdays.

2. Previous Assessment

In revision G of the noise impact assessment (16426-NIA-01 RevG) Saturday daytime activities were considered alongside weekday daytime activities, with proposed operations being the same.

The general periods of different operations were established as follows:

- Period 1: 06:00 to 18:00
    - Includes all onsite processes
- Period 2: 06:00 to 22:00
    - Includes all internal processes
    - No external processing or acceptance of materials
- Period 3: 24-Hour Use
    - Internal operations in Building 2 and associated machinery only
    - No external processing, acceptance of materials or Building 1 operations

Assessment undertaken by the Environment Agency (EA) demonstrated the following findings, when Saturdays were assessed as standalone days, and further broken down into shorter time periods:

Time Period	Proposed Activities	Results of Assessment	
		Receivers on Snoots Road	Receivers on Peterborough Road
Saturday [06:00 to 09:00]	Period 1 Activities	Adverse Impact	Adverse Impact
Saturday [06:00 to 18:00]	Period 1 Activities	Adverse Impact	Below Adverse Impact
Saturday [18:00 to 22:00]	Period 2 Activities	Adverse Impact	Below Adverse Impact

Table 2.1: EA assessed effects for Saturday daytime periods

Additional recommendations have been made in order to reduce the anticipated impact of noise during Saturday periods accordingly.

3. Proposed Measures

In order to provide practicable and effective improvements to the effects of noise, the following measures are proposed, further to discussion with Johnsons Aggregates and Recycling.

Reduced Operating Hours

In order to minimise the impact of noise during early morning and evening periods, Saturday activities will be restricted to the following:

- Saturday 06:00 to 08:00 – Building 2 Operations Only (Period 3)
- Saturday 08:00 to 18:00 – All activities (Period 1), with the noted exceptions below[1]
- Saturday 18:00 to 22:00 – Building 2 Operations Only (Period 3)

[1] Outdoor screener will not be used on Saturdays

Mitigation Measures

In order to reduce noise levels from the main identified sources of noise, the Trommel Feed and Building 1 & 2 Main Feed Hoppers will be lined with sound deadening lining.

The sound deadening lining is in accordance with entry 1 on 'Top 10 Noise Control Techniques' (a UK Government document) found here: *https://www.hse.gov.uk/pubns/top10noise.pdf*

According to guidance found in the document prepared by Engineering Industry Noise Task Group and hosted on the Health and Safety Executive section of the UK Government website, such a treatment applied to a hopper is expected to reduce noise emissions by 5-25 dB.

In order to assess the effects on noise levels in a reasonably onerous way, it has been assumed that a 10 dB reduction in noise levels could be achieved. This is at the lower end of the stated range and is considered appropriate based on the nature of material being deposited into the trommel feed and hoppers.

Note: It is understood commissioning measurements will be undertaken prior to full operation of the site. At this stage, the effectiveness of any applied mitigation should be investigated, in order to assess whether additional measures are necessary.

4. Reassessment of Levels

The noise levels have been recalculated for the different Saturday periods, incorporating the changes to activities and mitigation measures described above.

It should be noted that typical background noise levels during each period where adverse impacts were previously anticipated were calculated as follows:

- Saturday 06:00 to 08:00
  - Snoots Road: 40 dB(A)
  - Peterborough Road: 44 dB(A)
- Saturday 08:00 to 18:00
  - Snoots Road: 41 dB(A)
- Saturday 18:00 to 22:00
  - Snoots Road: 36 dB(A)

The noise models previously generated to calculate propagation of noise from activities has been updated to account for the proposed mitigation. Table 4.1 shows the summary of anticipated effects with the restrictions and mitigation described in Section 3.

Time Period	Proposed Activities	Results of Assessment	
		Receivers on Snoots Road	Receivers on Peterborough Road
Saturday [06:00 to 08:00]	Period 3 Activities	Below Adverse Impact	Below Adverse Impact
Saturday [08:00 to 18:00]	Period 1 Activities[1]	Below Adverse Impact	Below Adverse Impact
Saturday [18:00 to 22:00]	Period 3 Activities	Below Adverse Impact	Below Adverse Impact

Table 4.1: Reassessed effects for Saturday daytime periods

[1] No use of external screener

As shown, the proposed restrictions and mitigation are expected to reduce noise levels on Saturdays to a level below the region where an adverse impact is likely. It should be noted that the trommel feed and hopper linings will also further reduce noise levels on other days, where no adverse impacts are currently predicted.

5. Conclusions

Additional assessment has been undertaken based on a requirement to reduce apparent noise levels from operations during Saturdays specifically.

Restrictions and additional mitigation have been proposed, and it is demonstrated that predicted noise levels can be reduced to a level where no adverse impacts are expected.

The calculations and recommendations rely on the stated typical and manufacturer noise levels shown in report 16426-NIA-01 RevG and the anticipated effectiveness of mitigation measures. It is understood a commissioning exercise will dictate whether additional mitigation is necessary.