NOISE MANAGEMENT PLAN APPENDIX 1

RF | ENVIRONMENTAL

NOISE | VIBRATION | AIR QUALITY

GARDENSCAPE LTD

GARDENSCAPE YARD, THE WHARF, RYE ROAD NEWENDEN, KENT

NOISE IMPACT ASSESSMENT

TECHNICAL REPORT: RFE-0226-18-02

DATE: DECEMBER 2018

PROJECT TITLE: GARDENSCAPE YARD, THE WHARF, RYE ROAD, NEWENDEN, KENT

REPORT REF: RFE-0226-18-02

DATE: DECEMBER 2018

	Name	Position	Signature	Date
Prepared By	Richard Fenton	Director		10th December 2018
For and on behalf of RF Environmental Ltd				

DOCUMENT HISTORY		
Status	**Description**	**Date**
01	Draft Report for Client Comment	03/12/18
02	Final report issued	10/12/18

RF | ENVIRONMENTAL
Director: RICHARD FENTON
BSc (Hons) MSc MCIEH MIOA

27 Greenleaf Gardens
Polegate
East Sussex BN26 6PE

T 01323 488396
M 07872 929883
E info@rfenvironmental.co.uk

Registered in England & Wales
Registered No 10086337
Registered Office 4a Gildredge Rd
Eastbourne BN21 4RL

GARDENSCAPE YARD, THE WHARF, RYE ROAD
NEWENDEN, KENT
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1.0 INTRODUCTION

1.1 RF Environmental Ltd (RFE) was commissioned by Gardenscape Ltd in October 2018 to provide an acoustic report to accompany a retrospective planning application for the redevelopment of a site at Bourne Amenity, land near Bodium Boating Station, Newenden, East Sussex.

1.2 The planning application is for *'Change of Use of land to a mixed use comprising the storage and distribution of aggregates and other landscaping materials (Class B8) with ancillary waste operations, together with a proposed building to accommodate brick crushing equipment and operations (Class B2). Retention of an open fronted bagging shed and existing pond/reed bed and formation of new open pond/soakaway.'*

1.3 The aim of this report is to assess the noise impact at the nearest noise sensitive receptors, under the current site layout and following the requirement for any noise mitigation measures, in accordance with BS4142:2014.

1.4 The existing site and proposed development are described in the following section of this report, whilst the legislation and criteria used for the assessment are included within Section 3 of this report. The noise survey is presented in Section 4, whilst the noise impact assessment is addressed in Section 5. Mitigation options are discussed in Section 6 and finally, the conclusions of this study are summarised in Section 7. A description of useful acoustic terms can be found in Appendix C.

1.5 The report has been produced by Richard Fenton (MIOA, MCIEH). Richard is experienced in the production of noise impact assessments following the methodology provided in BS 4142. Richard has produced a significant number of noise assessments in consultancy roles and reviewed them in local authority roles. He has also provided training workshops on the implementation of BS4142:2014 to Local Authority Environmental Health Teams.

2.0 SITE DESCRIPTION AND OPERATION

Site Description

2.1 The site is located just off the A28 Station Road in Newenden. It is located to the south of the River Rother and therefore falls within the boundary of Rother District Council.

2.2 The site is bounded to the south, east and west by open pastoral land, although immediately to the south, on the boundary of the site, is a small campsite. Immediately to the north of the site is the river Rother, beyond which are residential properties located on Lossenham Lane, approximately 115m from the edge of the site. Also to the north is a cricket ground and small pavilion and further residential and commercial properties along the A28.

2.3 A plan of the site and immediate area is presented in Figure A1 of Appendix A.

2.4 The ambient noise climate in the immediate vicinity of the site is influenced by road traffic noise on the A28.

Existing Use

2.5 The site has been used for the recycling, manufacture and distribution of horticultural blends for the landscape industry and private gardeners for over 10 years.

2.6 The business operates with 4 on-site staff between 07:00 hrs to 18:00 hrs Monday to Friday and 07:00 hrs to 12:00 hrs on Saturdays.

2.7 The yard contains a number of open holding bays and buildings used for the storage of materials including barks, wood chippings and different grades of aggregate.

2.8 These materials are bagged up and loaded into lorries and private vehicles/trailers using wheeled loaders and a forklift truck.

2.9 In addition, the site also contains a brick crusher, which is used to manufacture substrate for the roof garden industry. The bricks are transferred from a storage pile to the crusher hopper via a wheeled loader and the crushed substrate is transferred from the crusher via a conveyor to a separate storage pile, from where it is loaded into bags ready for transfer to customers. The brick crusher is powered by a diesel generator which is located adjacent to the crusher.

2.10 It is intended to enclose the brick crushing operation within a specially designed building to minimise the impact of dust and noise.

2.11 As part of the recycling process, waste which has been delivered to site is tipped into the delivery area, where it is sorted using the loader before being stored in the appropriate bay.

2.12 The current mobile plant on site comprises the following:

- Delivery lorry movements (up to 15 per day);

- 1no. Manatou fork lift loader;
- 2no. wheeled excavator/loaders;
- 1no. brick crusher; and
- 1no. diesel powered generator;

2.13 Architects drawings of the proposed development site, showing the location of the proposed brick crusher enclosure are presented in Figure A2 of Appendix A. The enclosure is shown in more detail in Figure A3 of Appendix A.

Enclosure for the Brick Crusher

2.14 The enclosure has been designed so that the open area, required to allow continuous access to the crusher for loading operations, is facing away from noise sensitive receptors to ensure noise breakout is minimised.

2.15 The walls of the building will be constructed from polyester coated box profile cladding, which has an approximate sound reduction index of c.25dB. The roof will consist of profile 6 reinforced corrugated fibre cement sheets, with clear plastic roof light set within the structure. The fibre cement sheets have an approximate sound reduction index of c.25dB however, the overall value of the roof will be reduced to approximately 15dB R_w, due to the inclusion of the roof lights.

2.16 The dividing internal wall, which separates the brick crushing area and the open fronted bay, will consist of lightweight block work up to 2m, with a metal frame above. The metal frame up will be filled with 100mm of rockwool insulation (min density 33 kg/m3) and lined on either side by 2no. layers of 15mm dense plasterboard.

3.0 ASSESSMENT CRITERIA

Noise Policy Statement for England (NPSE)

3.1 The Noise Policy Statement for England (March 2010) [1], sets out the long-term vision of Government noise policy.

3.2 The vision of the NPSE is to 'Promote good health and a good quality of life through the effective management and control of noise within the context of Government policy on sustainable development.' This vision is supported by three key aims:

- avoid significant adverse impacts on health and quality of life;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

3.3 The NPSE should apply to all forms of noise including environmental noise, neighbour noise and neighbourhood noise but does not apply to noise in the workplace (occupational noise).

3.4 The NPSE had adopted the following concepts, to help consider whether noise is likely to have 'significant adverse' or 'adverse' effects on health and quality of life:

NOEL – No Observed Effect Level
This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observed Adverse Effect Level
This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level
This is the level above which significant adverse effects on health and quality of life occur.

3.5 However the NPSE goes on to state that:

'it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.'

National Planning Policy Framework

3.6 The Department for Communities and Local Government introduced the National Planning Policy Framework (NPPF) in April 2012 and updated in July 2018 [2].

3.7 It does not present specific noise criteria to be applied but does provide the following statements regarding noise impacts:

"15. Conserving and enhancing the natural environment

170. Planning policies and decisions should contribute to and enhance the natural and local environment by: (bullet point points reduced to those regarding noise only)

- *Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.*

180. Planning policies and decisions should ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and quality of life; and*

- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

183. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.

<u>Planning Practice Guidance - Noise</u>

3.8 Planning Practice Guidance (PPG) on noise [3] was issued in March 2014. This web-based guidance advises local planning authorities to take into account the acoustic environment, and in doing so consider the following:

- whether or not a significant adverse effect is occurring or likely to occur;
- whether or not an adverse effect is occurring or likely to occur; and
- whether or not a good standard of amenity can be achieved.

3.9 The PPG includes examples of how to recognise when noise could be a concern and provides example outcomes to which the Observed Effect Levels can apply. The PPG noise exposure hierarchy is presented in Table 3.1, based on the likely average response, along with example outcomes.

3.10 While it is acknowledged that planning and nuisance regimes are separate entities, the hierarchy table does provide useful information regarding how the concept of SOAELs and LOAELs, introduced through the NPSE, could be applied and does allow for subjective observations to be considered in the context of potential effect levels. The presence of an "Effect Level" does not infer whether a nuisance is or is not present.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not Noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

TABLE 3.1: PPG NOISE EXPOSURE HIERARCHY
(Source –Planning Practice Guidance)

British Standard 4142

3.11 Guidance on the rating and assessing of sound of an industrial and/or commercial nature is contained in British Standard (BS) 4142: 2014 'Methods for rating and assessing industrial and commercial sound' [4].

3.12 The standard states that:

"This standard is applicable to the determination of the following levels at outdoor locations:

a) rating levels for sources of sound of an industrial and/or commercial nature; and

b) ambient, background and residual sound levels

for the purposes of:

1) investigating complaints;
2) assessing sound from proposed, new, modified or additional source(s) of sound of an industrial nature and/or commercial nature; and
3) assessing sound at proposed new dwellings or premises used for residential purposes."

3.13 The determination of noise amounting to a nuisance is beyond the scope of this British Standard.

3.14 The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs.

3.15 Typically, the greater the difference between rating level and background noise level, the greater the magnitude of the impact:

- a difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- a difference of around +5 dB is likely to be an indication of an adverse impact, depending on context; and
- the lower the rating level is relative to the measured background sound level, the less likely it is that the specific source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

3.16 Certain acoustic features can increase the significance of the impact of a specific sound source. These features include tonality and impulsivity, as well as additional characteristics and intermittency of the sound.

3.17 Where appropriate, a rating penalty for sound based on a subjective assessment of its characteristics should be established. In other circumstances an objective appraisal of tonal and/or impulsive characteristics may be appropriate.

Local Authority Criteria

3.18 The Planning Noise Advice Document: Sussex [5] is provided to offer advice for developers and their consultants when making a planning application. The document seeks to complement the noise policy aims as set out by the Noise Policy Statement for England (NPSE) 2010.

3.19 Section 2.2.1 of the Planning Advice Document stipulates that *"The starting point for designing any industrial / commercial development should be to minimise noise "as far as reasonably practicable. The rating level of the plant / process, when measured in accordance with BS4142:2014, should, where practicable, be no greater than the existing background levels."* It is further stated that *"Where these criteria are not attainable, the noise report should explain why, and how best practicable means will be implemented to control noise in order to satisfy the Local Planning Authority (LPA) that the development is acceptable".*

3.20 Annex 1 of the Planning Advice Document provides a summary of key information from relevant standards and guidance documents. Listed under the development category titled "Waste Sites" the BS4142:2014 criteria is reiterated. Reference is also made to The Department for Transport's Design Manual for Roads and Bridges (DMRB) and also Horizontal Guidance Note IPPC H3(Part2). It is further stated that background levels are very low other criteria such as BS8233:2014 and WHO (2009) may be of relevance further to the agreement of the LPA.

4.0 ENVIRONMENTAL NOISE SURVEY

4.1 Unattended continuous monitoring of existing ambient noise levels was undertaken at the monitoring location shown as LT1 on Figure A1 of Appendix A. The equipment used during the survey is presented in Table 4.1 below.

Manufacturer	Model No.	Description	Serial No.	Calibration Due Date
Larson Davis	LxT	Sound Level Meter	004968	April 2020
Larson Davis	LxTPRM1L	Microphone Preamplifier	042703	April 2020
Larson Davis	337B02	½" Electret microphone	161390	April 2020
Larson Davis	CAL200	Calibrator	13096	April 2019

TABLE 4.1: SOUND MONITORING EQUIPMENT

4.2 The sound level meter was powered by a dry cell battery and stored inside a weatherproof security box.

4.3 Measurements were obtained using the 'F' time weighting and A-weighting frequency network. The equipment was calibrated before and after the survey to generate a calibration level of 114.0 dB at 1 kHz, with the noted drift falling within acceptable tolerances.

4.4 15-minute measurements of $L_{Amax,F}$, L_{Aeq}, and L_{A90} noise levels were obtained at this monitoring location between 10:48 hrs Friday 19th October 2018 and 09:07 hrs Wednesday 24th October 2018, with the microphone position set at a height of approximately 1.5 m above local ground level. A photograph of the monitoring equipment can be seen below in Figure 4.1.

FIGURE 4.1: UNATTENDED MONITORING LOCATION

4.5 The dominant noise sources observed during site visits are discussed in section 2.

Weather Conditions

4.6 Weather conditions during the site visits are presented below in Table 4.2.

Date of Site Visit	Noted Weather
19/10/2018	No rain, 2/8 cloud cover, Sunny and clear 15 °C, windspeed <1m/s
24/10/2018	No rain, 3/8 cloud cover, 13°C, windspeed <1m/s

TABLE 4.2: WEATHER CONDITIONS DURING SITE VISITS

4.7 A history of the weather conditions during the continuous survey period has been obtained from a weather station near to Newenden (www.wunderground Hawkhurst, Rye Road **IHAWKHUR5**). Analysis of the data shows periods of stable weather with no periods of rainfall.

4.8 The weather conditions obtained for the survey period are presented in Figure A4 of Appendix A.

Attended Short Term Noise Measurements

4.9 Attended short-term noise measurements were obtained of the on-site operations. These measurements were obtained between 09:05 hrs and 11:09 hrs on Friday 19th October 2018 at locations ST1 to ST9, as highlighted in Figure A1 of Appendix A.

4.10 Measurements were obtained using the 'F' time weighting and A-weighting frequency network. The sound level meter was calibrated before and after the survey period to generate a calibration level of 114.0 dB at 1 kHz.

4.11 Attended sample measurements were undertaken at between 1 and 5 metres from the site activities and plant operating. The main plant/activities in use during the measurements were:

- Lorry loaded using hydraulic grab;
- Excavator loading bricks into crusher;
- Diesel generator;
- Brick crusher operating;
- Trailer loaded with aggregate; and
- Manatou loading soil into bags.

4.12 A photo of the monitoring is shown in Figure 4.2 below.

FIGURE 4.2: ATTENDED MONITORING LOCATION

Continuous Noise Survey Results

4.13 The results of the unattended noise measurement survey are presented graphically in Figure A4 of Appendix A and summarised in Table 4.3 below.

Date	Measured Noise Levels, dB					
	Daytime (07:00 - 23:00)			Night-time (23:00 - 07:00)		
	$L_{Amax,F}$	$L_{Aeq,16hr}$	$L_{A90,16hr}$	$L_{Amax,F}$	$L_{Aeq,8hr}$	$L_{A90,8hr}$
Fri 19/10/18	68(54-82)*	51*	37*	56(38-67)	40	22
Sat 20/10/18	66(56-82)	49	38	54(47-63)	39	22
Sun 21/10/18	65(54-78)	48	36	55(47-62)	40	28
Mon 22/10/18	65(55-79)	48	36	57(45-65)	43	24
Tue 23/10/18	66(55-81)	49	39	57(46-70)	42	23
Wed 24/10/18	71(62-83)*	52*	42*			
Average	***67(65-71)***	***50***	***38***	***56(54-57)***	***41***	***24***

TABLE 4.3: SUMMARY OF DAYTIME UNATTENDED NOISE MEASUREMENTS, LT1

*Note: * denotes incomplete period.*

4.14 The results of the unattended noise measurement show that ambient day time $L_{Aeq,16hr}$ sound levels ranged from 48 to 52 dB with an arithmetic mean of 50 dB $L_{Aeq,16hr}$. During the night time period, the ambient $L_{Aeq,\ 8hr}$ sound levels ranged from 39 to 43 with an arithmetic mean of 41dB $L_{Aeq,\ 8hr}$.

Attended Noise Survey Results

4.15 The results of the attended measurements obtained on Friday 19th October 2018 are summarised in Table 4.4 overleaf.

Monitoring Location	Date	Start Time	Duration	Measured Noise Levels, dB			Observations
				$L_{Amax,F}$	$L_{Aeq,T}$	$L_{A90,T}$	
ST1	19/10/2018	09:05:15	00:05:01	84.0	67.0	61.4	Lorry loading bags using hydraulic grab
ST3		09:17:55	00:01:01	89.2	75.3	62.6	Loader bringing bricks from pile to crusher
ST2		09:20:04	00:01:03	94.8	93.6	93.2	Diesel generator @1m from side
ST2		09:21:25	00:01:18	89.3	88.3	88.0	Diesel generator @1 m from end
ST4		09:23:42	00:00:36	104.7	93.1	85.2	Crusher in operation with bricked loaded in @2m
ST4		09:24:27	00:01:01	89.9	86.5	85.1	Crusher in operation @ 5m
ST5		09:26:23	00:00:38	82.3	78.9	74.7	Crusher in operation @5 from conveyor
ST5		09:28:54	00:01:01	92.3	81.7	79.1	Crusher in operation @5 from conveyor with bricks being loaded.
ST6		09:30:34	00:01:01	93.9	89.5	87.8	Crusher operating @4m
ST7		09:37:53	00:01:31	85.2	75.1	68.8	Loading ballast into low trailer @ 2m
ST8		09:48:07	00:00:20	81.8	77.5	72.3	Manatou moving with full bag @2m
ST8		09:49:36	00:01:01	87.6	74.3	68.2	Loading bark/chippings into bag @2m
ST8		09:50:57	00:02:46	88.5	73.0	65.1	Full loading and moving of bags using manatou @2m
ST9		10:07:33	00:17:00	73.2	51.4	34.2	Residual measurement without brick crushing at noise sensitive receptor
ST9		10:59:38	00:10:03	73.2	52.9	38.8	Brick crusher in operation, measured at noise sensitive receptor

TABLE 4.4: SUMMARY OF SHORT-TERM ATTENDED NOISE SURVEY

5.0 ASSESSMENT OF NOISE LEVELS

Calculation of Noise Levels

5.1 A computer model of noise propagation has been constructed using SoundPLAN version 4.1. This commercial software package implements complex calculations using acoustical ray-tracing techniques, taking into account the acoustically reflective and absorptive properties of the building elements. The environmental noise propagation from source to receiver position is calculated in accordance with the procedures defined in ISO 9613-2:1996 Attenuation of sound during propagation outdoors, part 2: General method of calculation [6], using the following acoustic algorithm:

$$L_{ft}(DW) = L_w + D_c - A$$

where

$L_{ft}(DW)$	=	equivalent continuous downwind octave-band sound pressure level at a receiver location
L_w	=	sound power level of the noise source
D_c	=	directivity correction
A	=	attenuation that occurs during propagation from the point sound source to the receiver. $A = A_{div} + A_{atm} + A_{gr} + A_{bar} + A_{misc}$
A_{div}	=	attenuation due to geometrical divergence
A_{atm}	=	attenuation due to atmospheric absorption
A_{gr}	=	attenuation due to the ground effect
A_{bar}	=	attenuation due to a barrier
A_{misc}	=	attenuation due to miscellaneous other effects

5.2 The commercial noise sources from the existing operations have been incorporated into the noise prediction model, with the site in its current form. The operations are listed in paragraph 4.11 above:

5.3 The noise model has then been used to estimate the noise levels at the closest noise sensitive receptors with the site in its current form and following the inclusion of the enclosure building for the brick crusher. The receptor locations are displayed in Figure A1 of Appendix A.

5.4 The following assumptions have been made for the noise modelling exercise:

- All plant represented as point sources, except for the lorry entering site, which is represented as a line source;
- Omni-directional radiation assumed for plant;
- For worst case assessment, all plant operating continuously and simultaneously;
- Ground absorption modelled as hard ground;

- Receptor positions one metre from façade at all occupied floor levels;
- Assumed 15dB attenuation of the brick crusher afforded by new enclosure building;
- Existing plant L_w levels obtained from on-site measurements;

British Standard 4142 – Assessment of Commercial Noise

5.5 The method for predicting the significance of noise of an industrial and/or commercial nature in accordance with the principles of BS 4142:2014 is based on a comparison of the rating level, defined as the specific sound level plus any adjustment for the characteristic features of the sound, with the background sound level, $L_{A90,T}$.

5.6 The standard is applicable for assessing noise at proposed new dwellings or premises used for residential purposes.

Background Sound Levels

5.7 The $L_{A90,T}$ background sound level is the sound level exceeded for 90 % of the time in the absence of any sound from the specific source of interest.

5.8 'Typical' background sound levels observed over the period of interest, as described in BS4142:2014, are usually established for the purposes of a noise assessment of this kind, with BS4142 stating that a *'representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value'.*

5.9 Owing to the on-going activities at the site during the proposed operating periods, background sound levels obtained during Saturday afternoon and Sunday have been used to establish a representative background sound level in the absence of any works on site.

5.10 Background sound levels of 32 to 45 dB $L_{A90,15min}$ have been recorded during these periods. The daytime background sound level adopted for the purposes of this assessment is 39 dB $L_{A90,15min}$ as this is considered a representative value for this time period.

Plant Specific Sound Level

5.11 When evaluating the specific sound level during the daytime period, a reference period of one hour is recommended. The plant noise levels calculated in the noise model have been corrected to adjust for this reference period and to take account of the number and expected % on-time for each item of plant to determine the specific sound levels of the site activities. These calculations are presented in Table B2 of Appendix B.

5.12 The noise levels measured at the monitoring locations were such that they were not likely to have been influenced by the residual noise environment and therefore no correction was required to establish the specific sound level.

Rating Level Assessment

5.13 The Specific sound level of the site activities was then used to determine the Rating noise level at the closest noise sensitive receptors.

5.14 Where appropriate, a rating penalty for sound based on a subjective assessment of its characteristics should be established and added to the specific sound level.

5.15 The loading of the bricks into the hopper will be impulsive in nature and likely to be clearly perceptible at the noise sensitive receptors ,therefore a 6dB rating penalty has been applied to the specific noise levels for the existing scenario.

5.16 Once this operation is enclosed within the proposed building, this impulsive character will become less perceptible and therefore the rating penalty has been reduced to 3dB for this scenario. At R1, the main noise contribution from the site is expected to be the lorries leaving and entering site. This noise will not be distinguishable from existing road traffic and therefore a correction has not been applied.

5.17 The assessment is set out in Tables 5.1 and 5.2 respectively for the existing site layout and for the proposed use of the site (incorporating the acoustic enclosure for the brick crushing activity).

Item	Nearest Noise Sensitive Receptors					
	R1	R2	R3	R4	R5	R6
Specific Noise Level (dB $L_{Aeq, Tr}$)	48	47	48	50	60	54
Rating Penalty (dB)	6	6	6	6	6	6
Rating Noise Level (dB $L_{Ar, Tr}$)	54	53	54	56	66	60
Background Noise Level (dB $L_{A90, T}$)	39					
BS4142 Assessment Level	15	14	15	17	27	21
Assessment	Significant Adverse Impact	Significant Adverse Impact	Significant Adverse Impact	Significant Adverse Impact	Significant Adverse Impact	Significant Adverse Impact

TABLE 5.1: ASSESSMENT OF CURRENT SITE ACTIVITIES

Item	Nearest Noise Sensitive Receptors					
	R1	R2	R3	R4	R5	R6
Specific Noise Level (dB $L_{Aeq, Tr}$)	42	33	34	36	47	41
Rating Penalty (dB)	0	3	3	3	3	3
Rating Noise Level (dB $L_{Ar, Tr}$)	42	36	37	39	50	44
Background Noise Level (dB $L_{A90, T}$)	39					
BS4142 Assessment Level	3	-3	-3	0	11	5
Assessment	Low Impact	Low Impact	Low Impact	Low Impact	Significant Adverse Impact	Adverse Impact

TABLE 5.2: ASSESSMENT OF SITE ACTIVITIES WITH ENCLOSURE FOR BRICK CRUSHER

5.18 The results presented in Table 5.1 indicate that the rating noise levels from the site in its existing form, at the closest residential receptors and at the campsite is likely to be an indication of a significant adverse impact when assessed against the criteria presented in BS4142:2014.

5.19 With the proposed new building housing the brick crushing operation, the rating noise levels at the closest residential receptors are at a level which is an indication of low impact, when assessed against the criteria presented in BS4142:2014, depending on context. The context of the development is set out below and, based on these considerations, the development should not lead to unacceptable levels of noise at sensitive receptors.

5.20 At the campsite itself, the noise rating level is still expected to exceed the adverse impact threshold, however, it should be noted that assessing noise at commercial premises falls outside of the scope of BS4142:2014. The campsite would not usually be afforded as high a level of protection as a typical residential receptor. It should also be noted that the campsite business began with the yard already in operation and therefore the new building will ensure there is an overall reduction in the noise levels at the campsite.

5.21 In addition, any impacts to those staying at the campsite can be mitigated by limiting the hours of operation of the brick crushing plant, as referred to at Section 6.5

Context

5.22 As already discussed, assessing noise at commercial premises falls outside of the scope of BS4142:2014 and it is important that the assessment impacts are acknowledged as being pertinent to residential dwellings only.

5.23 When absolute levels are considered, the internal noise levels at sensitive receptors, if calculated with windows open, would fall at least 8dB below the daytime design criteria set out in BS8233:2014.

5.24 In addition, it should also be noted that the derived background sound level is taken from weekend periods, when noise from road traffic is likely to be at a minimum. The background sound level during typical operating hours, in the absence of the site noise, is likely to be higher.

5.25 The assessment model has incorporated all plant operating simultaneously and with a minimum level of attenuation afforded by the proposed building. The results presented very much reflect a worst-case estimate of the noise rating levels at sensitive receptors.

Uncertainty

5.26 There are a variety of factors that inevitably limit the accuracy associated with all steps of any noise assessment, including measurement, calculation or prediction. Factors includes, but are not limited to:

- The inherent limitation of calculation/prediction methodology in Standards and guidance;

- Variability in meteorological conditions;
- The accuracy of sound source input data of a calculation or noise model.

5.27 It is imperative to minimise the uncertainty to a level commensurate with the intention of the assessment objective. Measures taken in this assessment to minimise uncertainty are:

- Baseline sound levels have been measured over an extended time frame therefore are a good indication of representative background sound levels;
- Sound level measurements were undertaken in accordance with recognised Standards and were undertaken during suitable weather conditions, e.g. acceptable wind speeds and no precipitation;
- Field calibration checks were undertaken prior and after measurements to record acceptable drift;
- The sound sources data was either measured on site or provided by manufacturer's data;
- Subjective observations of any acoustic features were made at an existing sensitive receptor;
- Recognised sound prediction calculations have been used to calculate sound levels at sensitive locations and any assumptions have been stated.

5.28 The aforementioned measures reduce uncertainty to a level considered not to have any significance to the outcome of the assessment.

6.0 MITIGATION OPTIONS

6.1 The results indicate that, with the proposed building for the brick crushing activities, the noise rating levels can be reduced so that a low impact is likely at residential receptors.

6.2 However, to ensure that noise emanating from the site is reduced as far as reasonably practicable, further mitigation options have been considered and are presented below.

Building for brick crushing

6.3 The open fronted design will help to reduce the level of reverberation within the building but it is also recommended that additional rockwool insulation, in the form of stiff panels or slabs are lined along the walls inside the building to improve the levels of adsorption within the space, should it be required.

6.4 Should the generator need specific ventilation to disperse the diesel fumes, this should be designed so that it extracts on the eastern facade of the building.

Site Operating Times

6.5 The proposed site operating times are 07:00hrs to 18:00hrs Monday to Friday and 07:00hrs to 12:00hrs on Saturdays, however, further restrictions will be placed on certain activities to ensure noise is minimised:

- The brick crushing will not take place before 08:00 on weekdays and will not take place at any time on Saturdays.
- Loading of aggregate will not occur before 07:30am;

Plant Operation

6.6 All new plant and machinery to be sourced with regard to noise output. The Planning Authority will be notified of any new plant or machinery.

6.7 All plant and machinery to be serviced and maintained as per the manufacturer's specifications

6.8 All plant will be switched off when not in use and not be left to idle.

6.9 All new and existing staff will be made aware of the noise management requirements and will be briefed on the importance of noise control. Measures to include the handling of materials, revving of engines, lowing of drop heights when loading material etc.

6.10 The hopper of the brick crusher should be lined with rubber/neoprene to reduce impact noise from the loading of bricks.

7.0 CONCLUSIONS

7.1 A noise impact assessment has been undertaken at the Gardenscape site in Newenden, within the boundary of Rother District Council.

7.2 The assessment considered the potential noise impact on the nearest noise sensitive receptors, from the use of the land for recycling, manufacture and distribution of horticultural products.

7.3 Continuous noise monitoring was undertaken to establish the existing ambient noise levels in the vicinity of the proposed development, while attended source term measurements were undertaken to establish specific noise levels of existing on-site activities.

7.4 Following the criteria and methodology set out in BS4142:2014, an assessment of the rating noise level for the existing and future activities was undertaken.

7.5 The results indicate that with the site in its current form, the rating noise level at the nearest residential receptors are likely to result in significant adverse impact.

7.6 However, with the introduction of a new building to house the brick crushing activity, the rating noise levels at the closest residential receptors are at a level which is an indication of low impact, when assessed against the criteria presented in BS4142:2014.

7.7 In addition to the proposed building, further mitigation options have been presented, to ensure noise levels emanating from the site are further reduced.

7.8 It is therefore concluded that, when considered in context, the development should not lead to unacceptable levels of noise at sensitive receptors.

8.0 REFERENCES

1. Department for Environment, Food and Rural Affairs (DEFRA). Noise *Policy Statement for England (NPSE),* 2010.

2. Department of Communities and Local Government. *National Planning Policy Framework*, 2012.

3. Department for Communities and Local Government: *Planning Practice Guidance* – Noise. Revision date March, 2014.

4. British Standard BS 4142:2014: *Methods for Rating and Assessing Industrial and Commercial Sound.*

5. *The Planning Noise Advice Document: Sussex*. 2014.

6. ISO 9613-2 *'Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation'*.

APPENDIX A: FIGURES

FIGURE A1: LOCATION OF PROPOSED DEVELOPMENT SITE

(source: Google 2018)

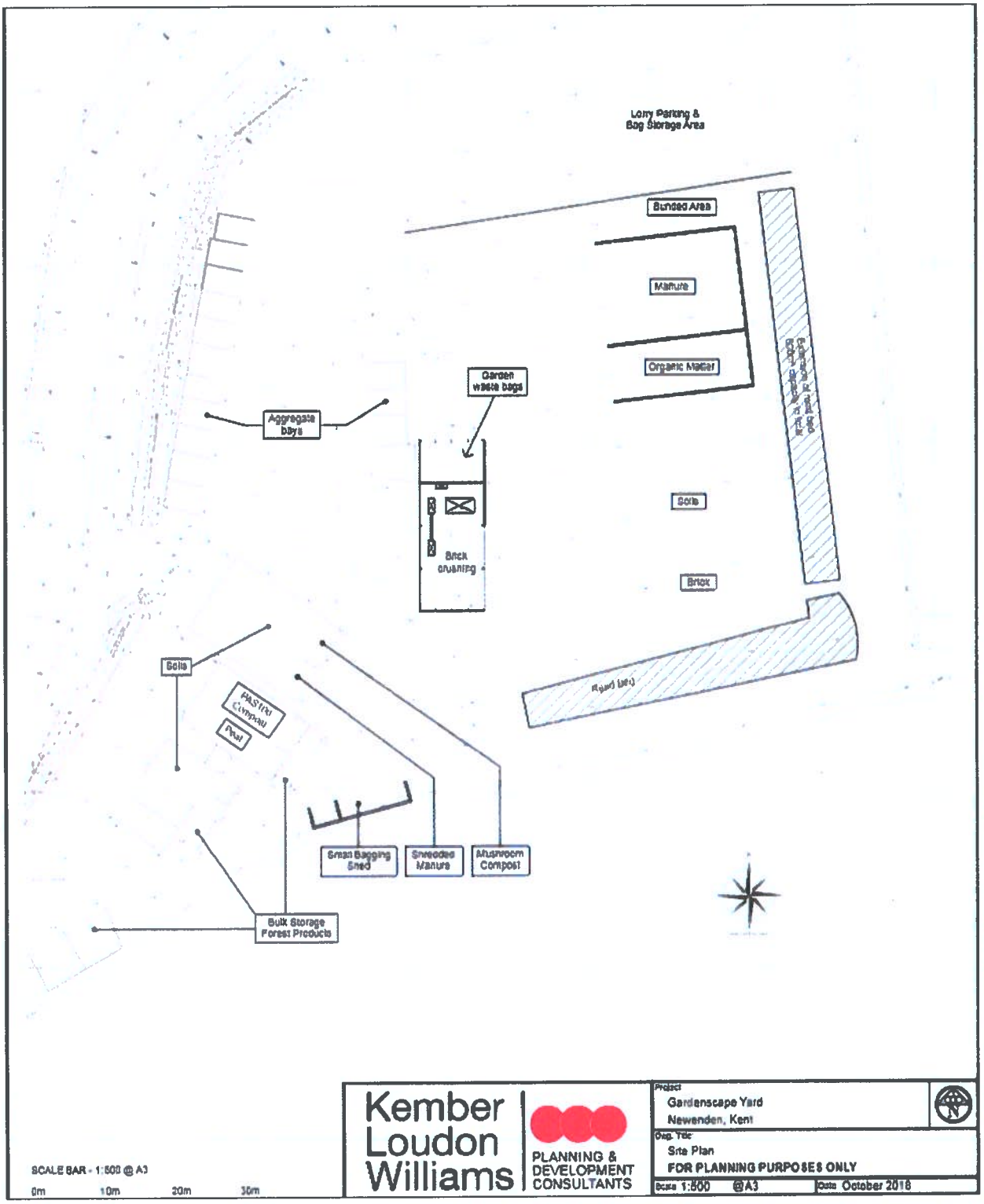

FIGURE A2: PROPOSED SITE LAYOUT PLAN

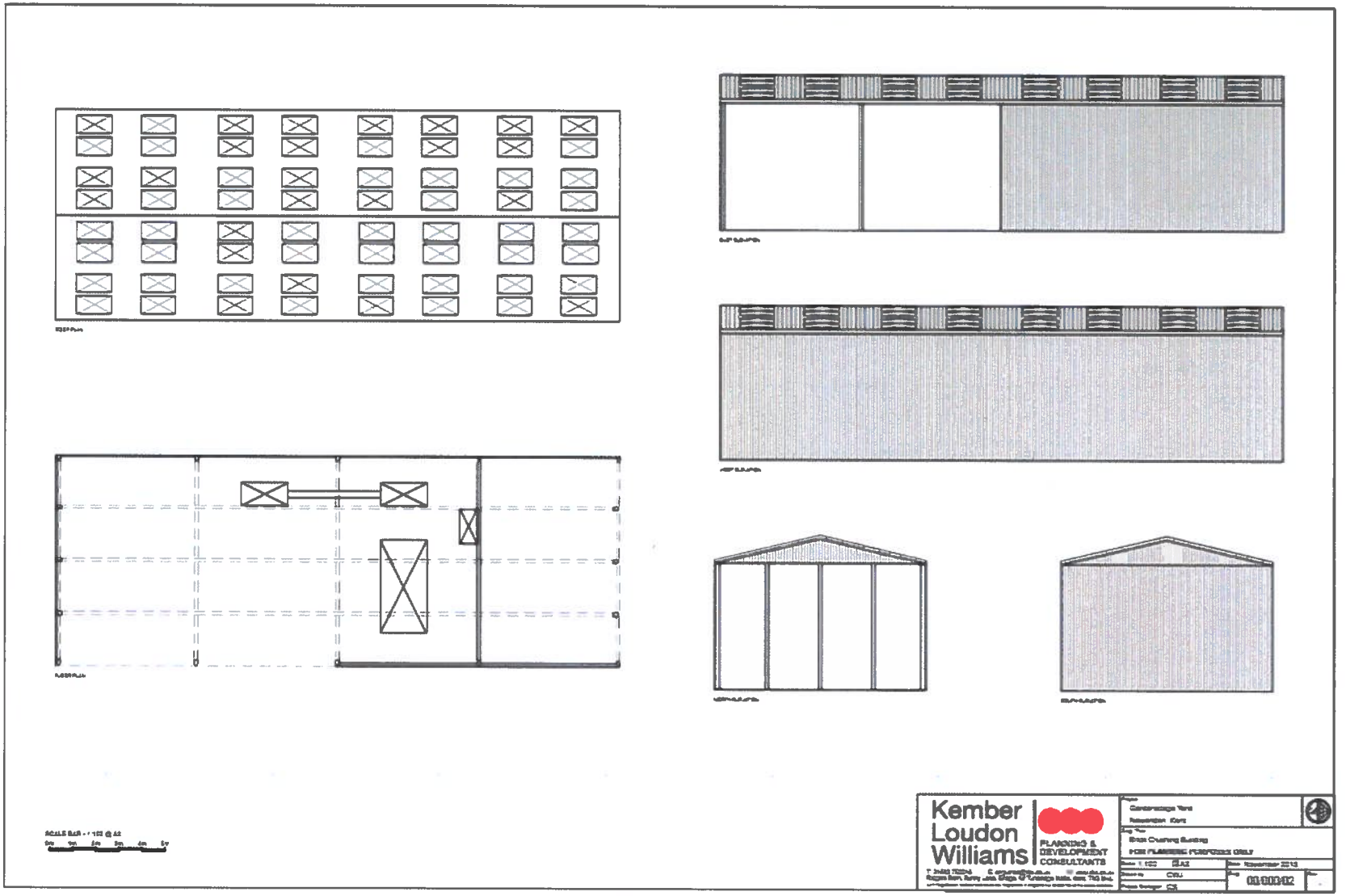

FIGURE A3: ARCHITECTS DRAWINGS OF PROPOSED BRICK CRUSHING BUILDING

Weather History Graph
October 19, 2018 - October 24, 2018

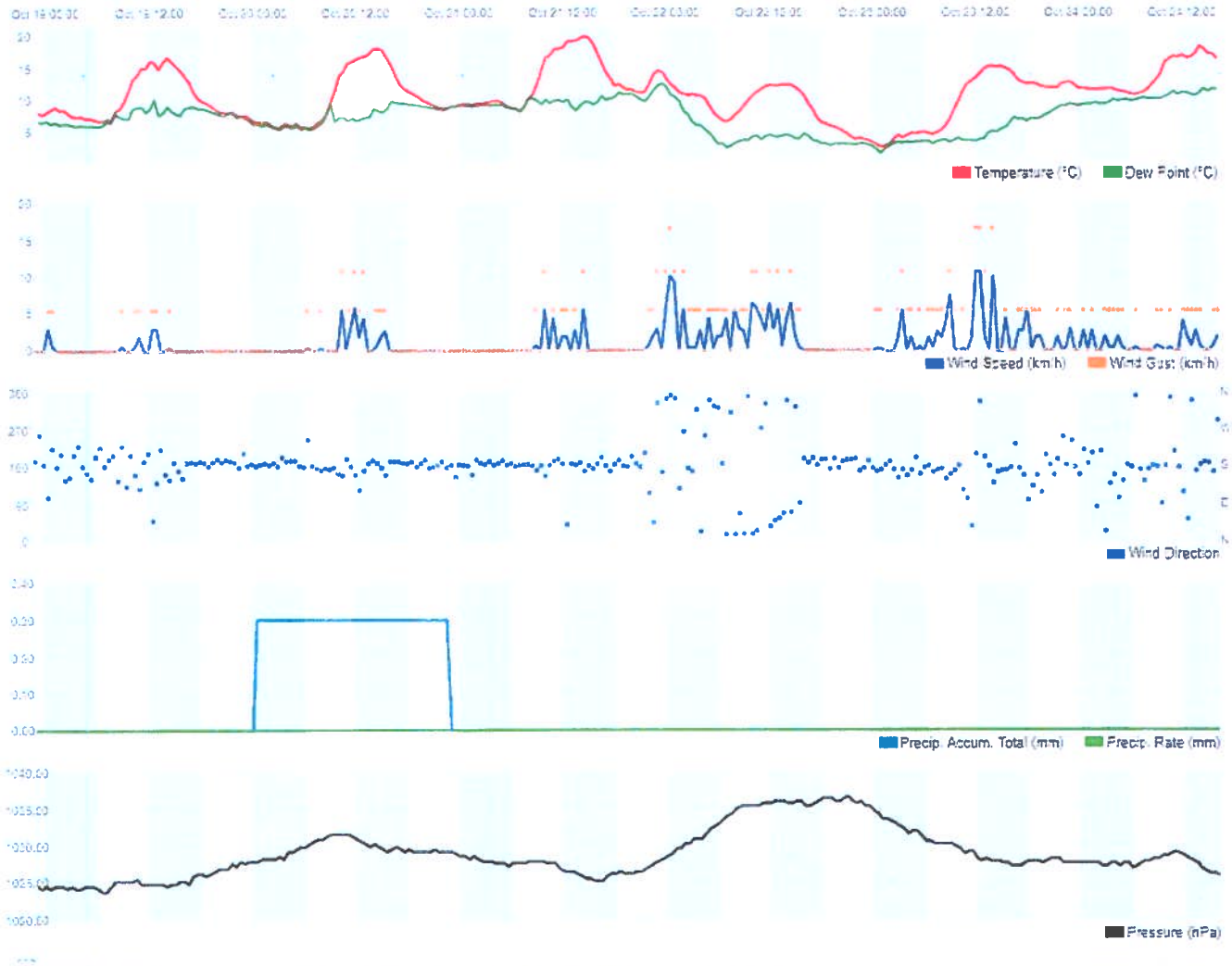

FIGURE A4: WEATHER DATA DURING PERIOD 19TH OCTOBER TO 24TH OCTOBER 2018

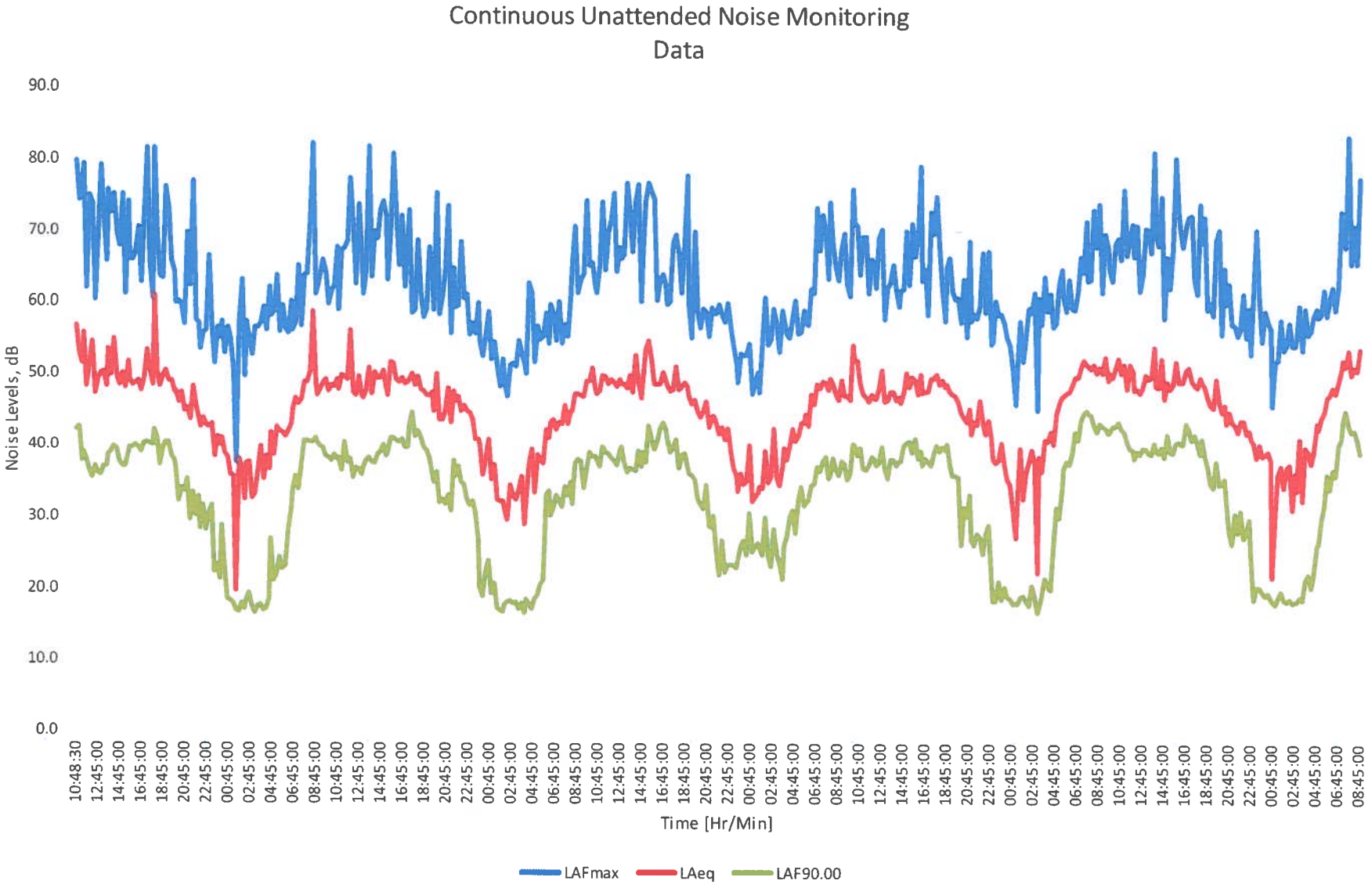

FIGURE A4: CONTINUOUS SOUND MONITORING RESULTS AT LT1, FRIDAY 19TH OCTOBER TO WEDNESDAY 24TH OCTOBER

APPENDIX B: TABLES

Date of Meas.	Start Time	Measured Noise Levels, dB re. 2 x 10^{-5} Pa.		
		$L_{Amax,F}$	$L_{Aeq,15min}$	$L_{A90,15min}$
Friday 19th October 2018	10:48:30	80.0	56.7	42.3
	11:00:00	74.6	53.0	42.8
	11:15:00	77.2	51.6	37.8
	11:30:00	79.6	55.8	39.2
	11:45:00	62.0	48.3	38.0
	12:00:00	75.1	51.5	36.5
	12:15:00	74.1	54.6	35.5
	12:30:00	60.3	47.4	37.1
	12:45:00	69.4	49.4	36.0
	13:00:00	79.3	50.2	35.8
	13:15:00	72.0	50.4	37.0
	13:30:00	65.9	48.3	37.1
	13:45:00	76.0	53.5	38.7
	14:00:00	72.6	49.9	39.1
	14:15:00	75.3	54.9	40.0
	14:30:00	69.8	49.7	39.5
	14:45:00	68.0	48.5	37.6
	15:00:00	75.2	50.2	37.0
	15:15:00	61.2	48.1	37.0
	15:30:00	74.2	51.8	38.9
	15:45:00	66.1	49.3	39.8
	16:00:00	65.9	48.5	39.8
	16:15:00	67.3	48.8	40.2
	16:30:00	70.6	49.2	39.7
	16:45:00	62.8	47.7	39.1
	17:00:00	72.0	49.3	40.4
	17:15:00	81.7	53.3	40.5
	17:30:00	65.8	50.8	40.3
	17:45:00	60.7	48.5	40.1
	18:00:00	81.6	61.1	42.4
	18:15:00	69.9	50.4	41.1
	18:30:00	63.8	48.3	37.3
	18:45:00	63.5	49.7	39.6
	19:00:00	76.2	50.5	40.5
	19:15:00	73.2	49.1	40.6
	19:30:00	65.9	49.2	38.5
	19:45:00	64.1	47.5	37.9
	20:00:00	60.0	47.7	36.8
	20:15:00	60.2	46.1	32.3
	20:30:00	59.5	47.6	34.0
	20:45:00	57.0	44.9	33.6
	21:00:00	69.8	45.3	35.2

	21:15:00	62.5	43.8	29.7
	21:30:00	77.1	48.4	33.4
	21:45:00	57.6	45.5	30.2
	22:00:00	57.1	43.8	32.8
	22:15:00	53.6	42.8	28.5
	22:30:00	55.8	43.9	31.6
	22:45:00	56.2	43.0	28.3
	23:00:00	66.7	42.6	30.5
	23:15:00	57.1	43.1	31.7
	23:30:00	51.5	38.6	22.4
	23:45:00	56.6	41.4	23.4
Saturday 20th October 2018	00:00:00	55.2	40.1	21.5
	00:15:00	57.4	41.2	28.8
	00:30:00	52.9	39.0	23.4
	00:45:00	56.6	38.3	18.6
	01:00:00	54.9	35.8	18.3
	01:15:00	50.6	35.7	18.0
	01:30:00	37.7	19.8	17.0
	01:45:00	57.0	38.1	16.7
	02:00:00	63.2	36.6	18.0
	02:15:00	49.7	32.5	17.1
	02:30:00	57.5	37.5	18.3
	02:45:00	55.2	37.7	19.5
	03:00:00	52.8	32.6	17.5
	03:15:00	56.6	33.2	16.6
	03:30:00	56.6	36.5	17.6
	03:45:00	57.2	39.9	17.8
	04:00:00	59.4	35.2	16.9
	04:15:00	56.2	38.4	17.1
	04:30:00	62.3	36.7	18.8
	04:45:00	58.2	41.8	27.1
	05:00:00	58.9	38.7	21.2
	05:15:00	63.9	42.6	22.1
	05:30:00	56.0	42.0	24.5
	05:45:00	59.5	41.9	22.8
	06:00:00	56.5	41.3	23.3
	06:15:00	55.7	42.2	28.1
	06:30:00	60.2	43.2	31.0
	06:45:00	56.1	45.1	33.6
	07:00:00	57.3	46.6	35.6
	07:15:00	65.3	46.0	33.9
	07:30:00	56.8	46.6	37.5
	07:45:00	63.9	49.0	40.7
	08:00:00	64.0	48.9	40.8
	08:15:00	71.5	50.4	40.6

	08:30:00	82.4	58.8	40.5
	08:45:00	61.3	48.7	41.1
	09:00:00	62.0	47.1	40.6
	09:15:00	63.7	48.0	39.9
	09:30:00	66.0	48.7	39.7
	09:45:00	64.3	49.4	38.5
	10:00:00	59.9	47.7	38.2
	10:15:00	61.6	48.5	37.8
	10:30:00	62.3	48.4	38.7
	10:45:00	67.8	49.4	38.0
	11:00:00	59.0	48.0	38.2
	11:15:00	67.5	49.9	36.4
	11:30:00	67.7	49.8	40.6
	11:45:00	68.6	49.3	37.7
	12:00:00	77.5	56.1	38.1
	12:15:00	70.7	47.5	35.5
	12:30:00	62.6	47.1	36.8
	12:45:00	73.8	49.7	36.6
	13:00:00	66.8	47.2	35.9
	13:15:00	61.3	46.8	36.8
	13:30:00	64.1	47.8	37.8
	13:45:00	81.9	51.0	38.2
	14:00:00	63.7	47.3	37.6
	14:15:00	70.0	50.3	37.4
	14:30:00	69.1	49.6	38.7
	14:45:00	73.1	49.6	39.2
	15:00:00	74.2	50.6	40.1
	15:15:00	72.4	48.2	38.4
	15:30:00	63.2	47.2	39.2
	15:45:00	70.4	51.7	41.2
	16:00:00	81.0	51.6	41.2
	16:15:00	72.8	49.4	40.8
	16:30:00	65.2	48.9	40.6
	16:45:00	72.3	49.5	41.0
	17:00:00	62.3	48.8	39.7
	17:15:00	68.9	49.0	39.7
	17:30:00	73.1	49.3	42.9
	17:45:00	58.6	50.1	44.7
	18:00:00	58.9	48.6	41.4
	18:15:00	68.8	49.8	42.1
	18:30:00	61.4	47.9	41.1
	18:45:00	58.0	47.8	39.8
	19:00:00	59.2	47.1	39.3
	19:15:00	67.8	47.1	38.1
	19:30:00	63.5	47.5	35.9

	19:45:00	59.1	45.0	34.9
	20:00:00	75.5	50.3	36.3
	20:15:00	58.3	43.8	32.1
	20:30:00	60.7	43.8	32.5
	20:45:00	64.4	45.0	31.9
	21:00:00	73.7	48.2	33.0
	21:15:00	55.8	43.3	30.9
	21:30:00	64.9	47.7	37.8
	21:45:00	59.5	46.3	35.7
	22:00:00	59.5	46.9	37.0
	22:15:00	68.5	45.0	34.8
	22:30:00	60.6	45.6	34.5
	22:45:00	61.2	44.9	32.4
	23:00:00	55.7	44.7	31.6
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	23:45:00	60.0	40.9	27.1
Sunday 21st October 2018	00:00:00	54.5	39.9	20.3
	00:15:00	52.5	35.9	19.0
	00:30:00	55.4	38.2	22.2
	00:45:00	58.7	40.8	24.0
	01:00:00	52.2	35.2	19.5
	01:15:00	54.5	37.4	20.9
	01:30:00	51.1	32.5	17.4
	01:45:00	48.3	32.4	17.0
	02:00:00	52.1	32.3	16.8
	02:15:00	48.9	31.3	17.8
	02:30:00	47.0	29.7	18.2
	02:45:00	51.5	34.4	18.3
	03:00:00	51.5	33.0	17.9
	03:15:00	51.2	32.6	18.1
	03:30:00	54.8	33.6	17.1
	03:45:00	53.0	35.6	18.0
	04:00:00	51.6	29.1	16.5
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	05:15:00	56.9	38.8	19.3
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	06:15:00	54.5	41.1	33.7
	06:30:00	59.8	43.2	30.3
	06:45:00	58.7	43.6	31.2

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	07:30:00	54.3	43.1	31.5
	07:45:00	57.0	45.8	34.2
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	08:15:00	61.0	44.9	34.8
	08:30:00	65.4	45.0	31.8
	08:45:00	70.9	47.3	37.4
	09:00:00	61.4	47.4	38.1
	09:15:00	63.2	47.1	37.8
	09:30:00	64.0	46.9	34.1
	09:45:00	74.5	49.2	36.7
	10:00:00	65.2	49.2	39.1
	10:15:00	65.7	51.0	38.4
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	13:30:00	76.8	48.1	36.3
	13:45:00	73.0	49.9	36.9
	14:00:00	67.2	47.6	36.6
	14:15:00	74.5	52.7	36.5
	14:30:00	76.7	49.1	39.4
	14:45:00	60.1	46.8	37.0
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	16:30:00	63.1	48.8	42.5
	16:45:00	64.1	50.5	43.3
	17:00:00	62.4	49.1	42.4
	17:15:00	59.9	48.6	41.0
	17:30:00	60.2	47.8	39.1
	17:45:00	68.5	48.0	39.7
	18:00:00	69.7	51.2	40.9

	18:15:00	67.1	48.0	36.8
	18:30:00	61.4	48.3	38.6
	18:45:00	68.5	48.9	38.9
	19:00:00	77.9	48.3	37.0
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	19:30:00	55.2	45.9	35.8
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	20:00:00	58.8	44.9	32.6
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	21:30:00	58.6	44.3	30.2
	21:45:00	58.7	43.4	25.5
	22:00:00	59.8	41.6	22.0
	22:15:00	58.5	42.7	26.9
	22:30:00	57.3	40.9	22.5
	22:45:00	60.1	42.6	23.4
	23:00:00	56.6	39.0	23.4
	23:15:00	54.1	36.9	23.5
	23:30:00	51.6	35.8	23.1
	23:45:00	48.9	33.6	24.1
Monday 22nd October 2018	00:00:00	53.0	36.1	26.1
	00:15:00	52.7	34.7	26.9
	00:30:00	52.8	35.1	24.8
	00:45:00	54.4	40.1	30.6
	01:00:00	47.3	32.2	25.3
	01:15:00	48.9	33.0	26.1
	01:30:00	50.4	33.4	26.5
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	02:45:00	54.9	35.8	23.2
	03:00:00	59.2	42.6	28.5
	03:15:00	57.0	35.7	25.0
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	04:00:00	57.8	39.6	26.0
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	05:30:00	56.0	43.4	34.2
	05:45:00	58.9	43.2	31.7
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	06:45:00	61.4	46.0	34.6
	07:00:00	73.4	48.8	37.0
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	09:00:00	63.3	46.5	35.9
	09:15:00	67.8	49.3	37.9
	09:30:00	69.8	47.2	37.5
	09:45:00	62.7	47.0	35.2
	10:00:00	60.9	46.5	36.0
	10:15:00	76.1	54.1	40.4
	10:30:00	71.5	52.2	40.2
	10:45:00	70.9	52.0	38.7
	11:00:00	64.1	48.8	39.8
	11:15:00	69.3	47.4	36.8
	11:30:00	69.4	46.9	36.7
	11:45:00	61.5	46.4	37.3
	12:00:00	66.2	47.3	38.5
	12:15:00	65.5	46.7	38.0
	12:30:00	62.2	46.7	37.3
	12:45:00	69.3	48.2	37.7
	13:00:00	70.5	50.8	40.0
	13:15:00	57.8	46.3	36.9
	13:30:00	62.2	46.6	35.5
	13:45:00	63.1	47.8	38.1
	14:00:00	65.4	47.8	38.1
	14:15:00	62.0	46.5	37.2
	14:30:00	59.6	46.9	37.8
	14:45:00	61.8	46.2	37.9
	15:00:00	62.1	47.5	40.1
	15:15:00	70.2	50.4	40.6
	15:30:00	62.5	48.4	40.7
	15:45:00	71.2	49.8	39.2
	16:00:00	66.6	49.4	41.2
	16:15:00	69.7	47.3	38.2
	16:30:00	79.2	50.2	39.3

	16:45:00	63.1	47.5	37.2
	17:00:00	64.8	47.8	38.2
	17:15:00	58.5	47.8	37.8
	17:30:00	72.9	49.6	37.3
	17:45:00	69.8	49.5	38.8
	18:00:00	75.1	50.2	40.2
	18:15:00	67.6	48.8	39.3
	18:30:00	62.1	49.3	39.9
	18:45:00	57.7	48.4	39.5
	19:00:00	65.1	48.8	40.3
	19:15:00	66.4	47.8	37.5
	19:30:00	61.9	47.3	35.8
	19:45:00	60.5	47.2	35.8
	20:00:00	60.8	46.3	35.7
	20:15:00	57.5	44.6	26.2
	20:30:00	63.4	44.1	31.4
	20:45:00	55.5	43.5	30.3
	21:00:00	68.9	45.3	33.2
	21:15:00	57.6	41.6	27.0
	21:30:00	58.6	43.5	26.2
	21:45:00	58.1	43.1	27.9
	22:00:00	59.6	46.5	27.5
	22:15:00	67.3	43.5	25.1
	22:30:00	58.8	41.8	27.7
	22:45:00	67.3	43.7	29.1
	23:00:00	54.3	41.1	21.7
	23:15:00	54.7	38.3	18.4
	23:30:00	60.5	37.7	18.4
	23:45:00	58.4	38.0	21.2
Tuesday 23rd October 2018	00:00:00	58.7	40.4	18.7
	00:15:00	57.1	37.3	20.4
	00:30:00	55.2	35.3	19.0
	00:45:00	54.1	34.6	18.9
	01:00:00	50.6	31.0	17.9
	01:15:00	45.8	27.3	18.1
	01:30:00	51.0	32.0	18.0
	01:45:00	57.6	39.7	19.0
	02:00:00	51.9	32.6	19.3
	02:15:00	55.6	36.3	18.4
	02:30:00	59.4	37.8	17.8
	02:45:00	58.8	39.6	20.7
	03:00:00	61.7	37.5	19.0
	03:15:00	45.0	22.4	16.7
	03:30:00	60.8	38.5	17.5
	03:45:00	57.3	36.5	19.2

	04:00:00	63.8	40.8	21.7
	04:15:00	59.1	40.8	20.6
	04:30:00	61.4	42.1	20.1
	04:45:00	56.9	40.2	26.1
	05:00:00	57.3	44.8	31.5
	05:15:00	62.9	46.2	30.1
	05:30:00	64.8	47.2	34.0
	05:45:00	60.9	47.1	36.9
	06:00:00	59.0	47.5	37.9
	06:15:00	63.4	47.8	37.4
	06:30:00	59.5	48.8	39.2
	06:45:00	59.3	49.7	42.1
	07:00:00	61.6	49.7	41.0
	07:15:00	66.7	51.1	43.8
	07:30:00	64.4	52.1	44.7
	07:45:00	71.6	51.6	45.1
	08:00:00	63.3	51.3	44.8
	08:15:00	63.5	50.9	44.5
	08:30:00	73.3	51.5	43.2
	08:45:00	68.0	50.4	42.2
	09:00:00	74.0	51.2	43.4
	09:15:00	61.6	50.3	42.9
	09:30:00	69.9	52.5	42.8
	09:45:00	67.7	49.4	41.9
	10:00:00	65.1	50.3	42.1
	10:15:00	63.3	49.7	42.9
	10:30:00	68.4	50.9	43.0
	10:45:00	69.3	52.3	43.6
	11:00:00	66.2	50.4	42.6
	11:15:00	76.0	51.6	42.1
	11:30:00	66.9	48.1	40.8
	11:45:00	69.5	51.5	39.8
	12:00:00	71.2	50.8	39.6
	12:15:00	66.6	48.0	38.2
	12:30:00	71.1	48.1	39.4
	12:45:00	61.8	47.5	38.9
	13:00:00	64.0	48.3	39.7
	13:15:00	70.8	50.1	39.7
	13:30:00	70.4	49.5	39.2
	13:45:00	67.3	49.8	38.8
	14:00:00	81.4	54.0	40.6
	14:15:00	70.1	48.5	39.6
	14:30:00	68.3	48.4	39.1
	14:45:00	75.0	52.4	40.0
	15:00:00	58.0	46.8	38.5

	15:15:00	66.6	49.1	41.7
	15:30:00	62.1	48.2	39.4
	15:45:00	67.9	48.8	39.2
	16:00:00	80.5	52.0	40.6
	16:15:00	72.9	49.2	40.8
	16:30:00	70.7	49.1	40.6
	16:45:00	68.0	49.1	40.4
	17:00:00	70.8	50.8	43.3
	17:15:00	72.3	51.1	42.5
	17:30:00	72.5	49.3	40.9
	17:45:00	63.6	48.7	41.8
	18:00:00	61.4	48.4	40.6
	18:15:00	74.0	49.8	39.0
	18:30:00	68.6	49.2	41.1
	18:45:00	72.2	48.5	39.0
	19:00:00	59.2	47.0	37.3
	19:15:00	60.2	46.0	34.8
	19:30:00	58.3	45.5	34.3
	19:45:00	69.0	49.5	37.8
	20:00:00	70.4	46.3	34.7
	20:15:00	55.9	44.8	34.8
	20:30:00	64.9	46.0	35.4
	20:45:00	59.9	43.4	32.7
	21:00:00	62.8	45.0	28.0
	21:15:00	57.2	43.5	26.5
	21:30:00	57.0	43.1	30.7
	21:45:00	55.7	42.1	28.1
	22:00:00	56.6	43.6	31.0
	22:15:00	61.4	43.8	27.3
	22:30:00	55.3	42.0	28.2
	22:45:00	59.4	42.2	29.8
	23:00:00	53.0	41.1	24.7
	23:15:00	61.6	40.6	18.7
	23:30:00	70.4	38.5	20.4
	23:45:00	61.0	40.3	20.4
Wednesday 24th October 2018	00:00:00	54.8	38.6	19.8
	00:15:00	58.9	38.8	19.2
	00:30:00	57.5	39.2	19.6
	00:45:00	56.6	38.1	18.9
	01:00:00	45.8	21.8	18.3
	01:15:00	51.9	30.2	17.9
	01:30:00	52.1	36.1	19.1
	01:45:00	57.8	37.3	19.8
	02:00:00	53.6	34.2	18.6
	02:15:00	54.4	37.0	18.5

	02:30:00	57.4	37.4	18.9
	02:45:00	54.2	31.3	18.2
	03:00:00	54.2	36.3	18.4
	03:15:00	55.4	33.8	18.5
	03:30:00	59.7	41.1	19.1
	03:45:00	53.7	32.5	18.6
	04:00:00	59.3	39.9	21.5
	04:15:00	55.9	39.3	22.2
	04:30:00	56.4	37.6	20.4
	04:45:00	58.3	39.3	22.2
	05:00:00	59.4	43.4	26.2
	05:15:00	58.3	42.5	26.5
	05:30:00	58.7	44.1	29.7
	05:45:00	61.9	45.0	31.7
	06:00:00	58.4	46.8	36.1
	06:15:00	60.5	47.4	34.0
	06:30:00	62.3	48.3	36.7
	06:45:00	59.2	47.5	35.8
	07:00:00	62.3	49.1	40.2
	07:15:00	73.0	50.7	41.2
	07:30:00	70.8	52.1	43.5
	07:45:00	68.0	51.4	45.1
	08:00:00	83.5	53.5	43.2
	08:15:00	65.6	50.2	42.2
	08:30:00	71.1	51.1	42.3
	08:45:00	65.7	50.7	41.1
	09:00:00	77.8	53.8	39.1

TABLE B1: UNATTENDED NOISE MEASUREMENTS FRIDAY 19TH TO WEDNESDAY 24TH OCTOBER 2018

Plant/Activity	Measured Sound Level, dB $L_{Aeq,T}$	Measurement Distance (m)	Estimated Sound Level at 10m, dB(A)	Estimated Sound Power Level, dB(A)	No. of Plant	% On-Time	Adjusted Sound Power Level, dB(A)
Lorry being loaded	67	2	53	81	1	25	75
Excavator loading bricks	75	5	69	97	1	20	90
Diesel Generator	94	1	74	102	1	100	102
Brick crusher	90	4	82	110	1	100	110
Loading trailer with aggregate	75	2	61	89	1	10	79
Manatou loading soil	73	2	59	87	1	100	87
Lorry arriving/leaving site				75*	1	12.5	66

TABLE B2: DERIVED SOUND POWER LEVELS FOR ON-SITE PLANT

*Note: * Based on data given for 'Truck Accelerating' given in plant list of SoundPlan 4.1*

APPENDIX C: GLOSSARY OF ACOUSTIC TERMS

Noise

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness. Noise is measured on a logarithmic scale in decibels (dB) because of the ears' sensitivity to a wide range of pressure changes. The sound pressure level (SPL) of a signal is denoted by the symbol L_p and defined by the equation $L_p = 10 \log (p/p_o)^2$ where p is the root mean square pressure of the signal and p_o is the reference sound pressure (2×10^{-5} Pa).

An indication of the range of sound pressure levels commonly found in the environment is given below:

Location	L_{pA} dB(A)
Normal threshold of hearing	-10 to 20
Music halls and theatres	20 to 30
Living rooms and offices	30 to 50
Inside motor vehicles	50 to 70
Industrial premises	70 to 100
Burglar alarms at 1 m	100 to 110
Jet aircraft on take-off	110 to 130
Threshold of pain	130 to 140

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 [2] as the " value of the A-weighted sound pressure

level of a continuous, steady sound that, within a specified time internal, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

Community response to environmental noise sources is dependent on both acoustic and non-acoustic factors. The acoustic factors include absolute noise level, changes or exceedances of background and ambient levels as well as the characteristics, time, duration and frequency of noise.