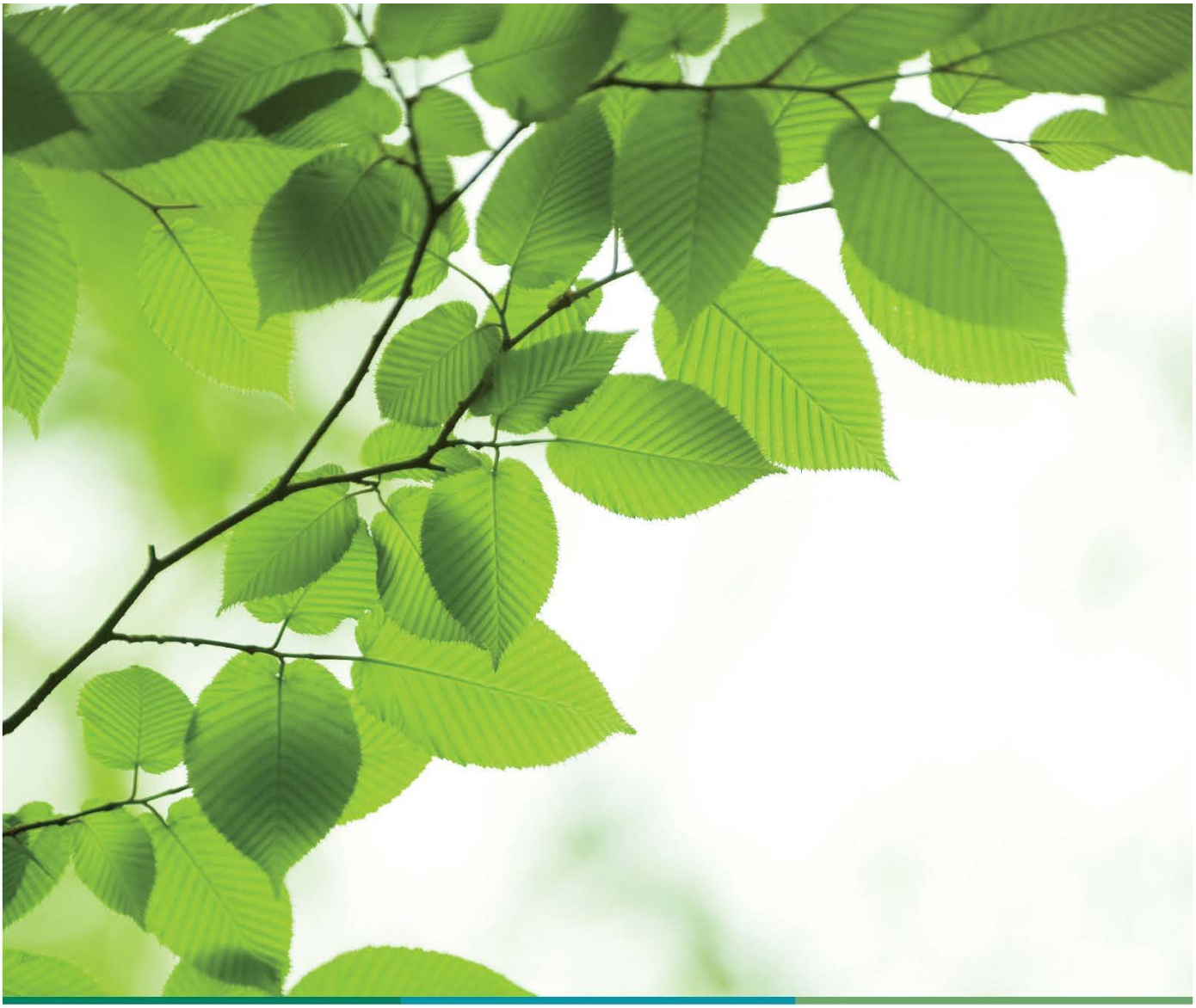


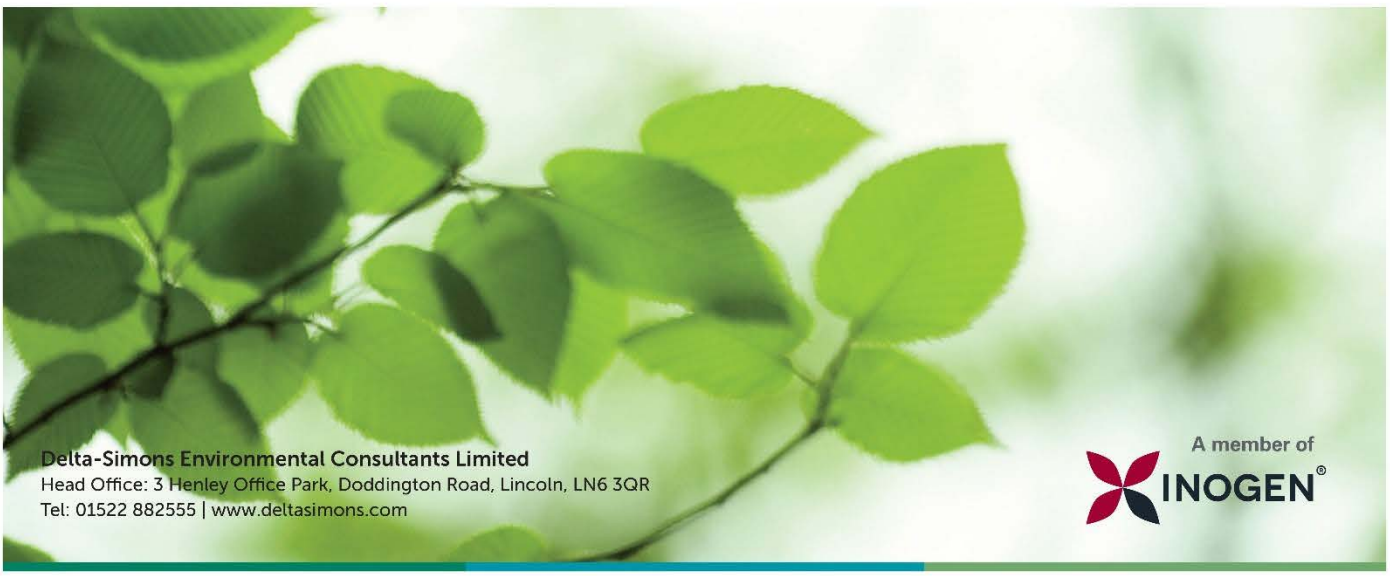
Planning Noise Assessment

Clitheroe Road, Whalley

Presented to Trafford Housing Trust

Issued: October 2018

Delta-Simons Project No. 18-0886.05



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Report Details

Client	Trafford Housing Trust
Report Title	Planning Noise Assessment
Site Address	Clitheroe Road, Whalley
Project No.	18-0886.05
Delta-Simons Contact	Simon Johnson

Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
1.						
				Chris Chittock Principal Consultant	**Graeme Parker Consultant**	**Simon Johnson Principal Consultant**

About us

Delta-Simons is a trusted, multidisciplinary environmental consultancy, focused on delivering the best possible project outcomes for customers.

Specialising in Environment, Health & Safety and Sustainability, Delta-Simons provide support and advice within the property development, asset management, corporate and industrial markets. Operating from eight locations - Lincoln, London, Leeds, Manchester, Birmingham, Norwich, Nottingham, Durham and Dublin - we employ over 70 environmental professionals, bringing experience from across the private consultancy and public sector markets.

Delta-Simons is proud to be a founder member of the Inogen® Environmental Alliance, enabling us to efficiently deliver customer projects worldwide by calling upon over 4,330 resources in our global network of consultants, each committed to providing superior EH&S and sustainability consulting expertise to our customers. Inogen® Environmental Alliance offers its clients more consultants, with more services in more countries than the traditional multinational consultancy.

This report has been prepared by Dragonfly Consulting as term framework suppliers of acoustics services to and on behalf of Delta-Simons.

Executive Summary

Title	Text
	Delta-Simons Environmental Consultants Limited ("Delta-Simons") was instructed by Trafford Housing Trust (the "Client") to undertake a planning noise assessment for land at Clitheroe Road, Whalley (the "Site") to support their planning application for residential use. The noise assessment has been conducted in accordance with the National Planning Policy Framework. The development Site is currently Comprised of two agricultural fields, separated by a rough track. There is residential housing to the West of both parcels of land. There is residential housing to the South of the southern parcel. The A671 road runs along the eastern boarder of the northern parcel of land and to the East of the southern parcel. It is proposed to develop residential dwellings. Based on the noise risk assessment matrix detailed in Figure 1 of the ProPG, it is considered that this Site is subject to noise which generates a medium risk of an adverse effect. It is not expected that noise should be a barrier to the development of a site considered as medium risk. ***Windows Partially Open*** The assessment has shown that, when assessing the Example Dwellings for a partially open window, the $L_{Aeq,\ 16hr}$ (Daytime) internal noise levels exceed the limits set by BS8233:2014 at Example Dwellings A and B. The assessment has also shown that, when assessing the Example Dwellings for a partially open window, the $L_{Aeq,\ 16hr}$ (Daytime) internal noise levels are within the limits set by BS8233:2014 at Example Dwellings C, D and E. The assessment has also shown that, when assessing the Example Dwellings for a partially open window, the $L_{Aeq,\ 16hr}$ (Night Time) internal noise levels are within the limits set by BS8233:2014 at all Example Dwellings Additionally, the L_{AFMax} noise levels are within the standard proposed by Delta-Simons for Night Time maximum noise levels at all Example Dwellings. As the daytime criteria set out by BS8233:2014 are only exceeded by a very small margin (1.4dB(A) for Example Dwelling A and 0.5dB(A) for Example Dwelling B), it is considered that, taking account of the ProPG guidance it would be unreasonable to introduce specific additional mitigation in order to reduce these noise levels by a narrow margin, particularly given the anonymous nature of traffic noise in this context. It is therefore considered that the calculated internal noise levels are below the LOAEL set for this project. The LOAEL is defined as: **LOAEL – Lowest Observed Adverse Effect Level –** Internal noise levels achieve the requirements of the BS8233:2014 standard assuming windows are closed and an additional source of ventilation is provided. These noise levels are below the LOAEL level set for this assessment and, as such, these noise levels are considered to be acceptable and meet the requirements of the NPPF and the Noise Policy Statement for England. It should be noted that these represent the worst-case noise impacts on the Site.

	External Noise Levels The calculated $L_{Aeq,16h}$ noise levels at 'Location 1' are above 55dB(A) and currently do not fulfil the BS8233 criteria. It is considered that further mitigation measures will be required for external amenity spaces within the development. This mitigation could be achieved by the use of appropriate barriers such as garden fences to reduce noise levels. The calculated $L_{Aeq,16h}$ noise levels at 'Location 2' , 'locations 3', 'locations 4' and 'location 5' are bellow 55dB(A) and as such fulfil the BS8233 criteria. Based on the assessment of noise risk, the subsequent detailed noise impact assessment and taking account of the recommended mitigation measures, it is the recommendation of Delta-Simons that: **"planning consent be granted subject to the inclusion of suitable noise conditions."**
This is intended as a summary only. Further detail and limitations of the assessment is provided within the main body of the Report.	

Table of Contents

Appendices

1.0 Introduction

1.1 Appointment

Delta-Simons Environmental Consultants Limited ("Delta-Simons") was instructed by Trafford Housing Trust (the "Client") to undertake a planning noise assessment for land at Clitheroe Road, Whalley (the "Site") to support their planning application.

1.2 Context & Purpose

The noise assessment has been conducted in accordance with the National Planning Policy Framework.

This report therefore describes a noise survey of the Site and the subsequent analysis to determine the noise environment of the proposed development. It then compares the results with the adopted criteria. Recommendations are also made with respect to the design of the development.

Whilst reasonable effort has been made to ensure that this report is easy to understand, it is technical in nature; to assist the reader, a glossary of terminology is included in Appendix A.

2.0 Site Description

2.1 Existing Site Conditions

The Site is currently Comprised of two agricultural fields, separated by a rough track. There is residential housing to the west of both parcels of land. There is residential housing to the south of the southern parcel. The A671 road runs along the eastern boarder of the northern parcel of land and to the east of the southern parcel.

2.2 Proposed Site Conditions

It is proposed to develop residential dwellings with around 188 houses spread across the two plots of land. The proposed outline Site layout is detailed in the drawing shown below:

Figure 2.1
Proposed Outline Site Layout

3.0 Guidance

3.1 Consultation with Local Authority

The National Planning Policy Framework (NPPF) does not provide any specific or quantified guidance with respect to noise and has withdrawn all previous guidance documents on the assessment of noise for planning purposes, which was detailed in Planning and Policy Guidance 24 (PPG24).

Instead, the NPPF places the onus on a local authority to develop a suitable local development plan within which noise is addressed, taking account of the guidance within the NPPF. Ribble Valley Borough Council does not currently have a Local Plan with any relevant quantitative guidance on noise.

It is considered that the main noise impacts at the Site will be due to noise from the surrounding road network (to the east). Therefore, the assessment of noise impact for this development has been undertaken by comparing predicted internal noise levels within properties against the criteria within BS8233:2014 and with reference to the guidance set out in the guidance document ProPG: Planning and Noise.

3.2 ProPG: Planning and Noise

The document 'ProPG: Planning & Noise - *Professional Practice Guidance on Planning & Noise*' provides advice for Local Planning Authorities, developers and their respective advisors and compliments government planning, noise policy and guidance. The document seeks to:

- Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Encourage the process of good acoustic design in around new residential developments;
- Outline what should be taken into account in deciding planning applications for new noise sensitive developments;
- Improve understanding of how to determine the extent of potential noise impact and effect;
- Assist in the delivery of sustainable development.

Following the guidance in paragraph 17 of the NPPF, planning should always seek to secure high quality design and a good standard of amenity for all existing and future occupants of land and buildings. ProPG describes an acoustic design process which seeks to deliver the best acoustic outcome for the Site.

Good Acoustic Design Objectives

With reference to the guidance set out within the ProPG, the following design objectives are considered to represent good acoustic design and are recommended for this Site:

- Full consideration of the acoustic environment from the earliest possible stage of the development process.
- An integrated approach should be taken to achieve optimal acoustic conditions, both internally (inside noise sensitive parts of the building) and externally (in spaces to be used for amenity purposes).
- The basis of good acoustic design should avoid 'unreasonable' acoustic conditions and prevent 'unacceptable' acoustic conditions as defined by the ProPG. Necessary design compromises should ideally not adversely affect living conditions and the quality of life of inhabitants.
- Using fixed unopenable glazing for sound insulation purposes is generally unsatisfactory and should be avoided.
- Solely relying on sound insulation of the building envelope to achieve acceptable acoustic conditions in new residential development, when other methods could reduce the need for this approach, is not regarded as good acoustic design.
- Evidence should be provided that good acoustic design processes have been followed.

The ProPG empowers the assessing acoustician to assess the acceptability of any noise impact and to establish the need for acoustic mitigation measures by considering the guidance detailed in BS8233:2014 (detailed in Section 3.4) whilst also giving consideration to the context of the Site, along with other non-acoustic factors that may affect the need to bring forward a site that is not acoustically ideal.

However, in determining what acoustic conditions would be 'unreasonable' and 'unacceptable', the ProPG also sets out the following guidance:

"The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form".

Additionally, ProPG makes an addendum to Note 4 of the internal noise level guidelines as stated in BS8233:2014 (Figure 2 in the ProPG document), referring to the acceptability of internal night time L_{AFMax} noise levels:

"…In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events to not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night…"

3.3 Noise Policy Statement for England

The document 'Noise Policy Statement for England' sets out the following vision for ongoing noise policy:

"Promote good health and a quality of life through the effective management of noise within the context of Government policy on sustainable development."

This vision should be achieved through the following Noise Policy Aims:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life."

To achieve this vision, the Noise Policy Statement sets 3 noise levels to be defined by the assessor:

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 the 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.

The Noise Policy Statement considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable. Where the assessed noise levels fall between the LOAEL and the SOAEL Noise levels, the Policy Statement requires that:

"…all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development…. This does not mean that such adverse effects cannot occur."

Where noise levels are below the LOAEL it is considered there will be no adverse effect. Once noise levels are below the NOEL there will be no observable change. Summaries of the relevant standards are given below.

3.4 British Standard 8233

The scope of British Standard 8223:2014: *Sound insulation and noise reduction for buildings* is the provision of guidance for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations; the primary intention of these is to guide the design of new buildings or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate. The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table 3.1.

Table 3.1
Indoor Ambient Noise Levels in Spaces When They Are Unoccupied

Activity	Typical Situations	Design Range $L_{Aeq,T}$ dB	
		0700h to 2300h	2300h to 0700h
Resting	Living rooms	35	--
Dining	Dining Room / Area	40	--
Sleeping	Bedrooms	35	30

BS8233 states in Note 4 that:

"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{AMax,f}$ depending on the character and number of events per night. Sporadic noise events could require separate values."

As such, it has been considered appropriate to define a limit for sporadic maximum noise levels not exceeding 45dB(A) on more than 10 occasions.

BS8233 also suggests noise limits for external areas or a property such as gardens or balconies. It states that:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

4.0 Environmental Noise Survey

Daytime and night time measurements were undertaken on the following dates:

- 24th September 2018; and
- 25th September 2018.

The noise measurements established typical external ambient and background noise levels at the Site.

4.1 Survey Methodology

The equipment used during the survey is detailed in Appendix B. The sound level meters were calibrated before and after the measurements and no significant calibration drifts were found to have occurred (>0.2dB). All noise monitoring equipment was calibrated to a traceable standard within the twelve months preceding the survey. Calibration certificates are available on request.

Five measurement locations were surveyed in order to establish the typical ambient and background noise levels at the proposed development site. The measurement locations are hereby referred to in this report as follows:

- 'Location 1' – sound level meter positioned externally 1.5m from the ground North of the proposed development at the Northern Site.
- 'Location 2' – sound level meter positioned externally 1.5m from the ground South-East of the proposed development at the Northern Site.
- 'Location 3' – sound level meter positioned externally 1.5m from the ground South-West of the proposed development at the Northern Site.
- 'Location 4' – sound level meter positioned externally 1.5m from the ground North of the proposed development at the Southern Site.
- 'Location 5' – sound level meter positioned externally 1.5m from the ground South-East of the proposed development at the Southern Site.

The measurement locations are shown at Appendix C.

4.2 Survey Results

The weather during the unattended survey was suitable for the majority of noise measurements, it being dry with low wind speeds.

Records of the prevailing weather conditions were collated throughout the duration of the survey and, when significant precipitation had occurred, the results during those periods and the periods immediately before and after were excluded from the assessment.

Summaries of the measured noise levels are given in Table 4.1 below and are shown, in full, in Appendix D:

Table 4.1
Summary of Measured Noise Levels – free field, dB

Location	Date	Period	Time (h)	$L_{Aeq, T}$	L_{A10}	L_{A90}	L_{AFmax}
1	24/09/18	Daytime	1825-2300	47.1	49.1	41.7	77.6
	24/09/18-25/09/18	Night Time	2300-0220	40.7	43.7	31.5	56.8
	25/09/18	Daytime	0718-1003	56.1	56.5	51.8	77.2
2	24/09/18	Daytime	1840-2300	50.0	52.3	44.7	69.3
	24/09/18-25/09/18	Night Time	2300-0700	46.7	46.8	37.7	68.9
	25/09/18	Daytime	0700-1005	54.7	56.5	51.1	73.1
3	24/09/18	Daytime	1900-2300	47.1	48.9	43.4	63.3
	24/09/18-25/09/18	Night Time	2300-0700	44.4	44.7	36.9	60.6
	25/09/18	Daytime	0700-1020	52.3	53.5	50.0	64.1
4	24/09/18	Daytime	1920-2300	45.1	46.8	41.9	60.4
	24/09/18-25/09/18	Night Time	2300-0700	43.0	43.1	37.1	60.2
	25/09/18	Daytime	0700-0945	51.4	52.4	49.0	68.3
5	24/09/18	Daytime	1930-2300	45.1	46.7	41.7	62.7
	24/09/18-25/09/18	Night Time	2300-0700	41.6	41.3	35.0	64.9
	25/09/18	Daytime	0700-0930	49.9	50.5	47.3	68.6

4.3 Observations and Comments

The noise environment observed during the attended surveys at ‘Location 1’, ‘Location 2’ and ‘Location 3’ is characterised as being predominantly road traffic noise from the A671 road. The noise environment observed during the attended surveys at ‘Location 4’ and ‘Location 5’ is characterised as local road traffic noise from the immediate and surrounding road network.

For both the daytime and night time assessments, it is considered that the noise levels measured are representative of the typical noise environment at the survey locations.

5.0 Assessment

5.1 Site Noise Risk Assessment

Further to the guidance detailed in the ProPG, the Site has initially been assessed to establish the risk of noise adversely affecting the Site. This assessment assists in quantifying whether further consideration of noise impact is required which may lead to the introduction of specific noise mitigation measures to ensure that the principles of good acoustic design are met.

Based on the noise risk assessment matrix detailed in Figure 1 of the ProPG, taking account of the measured noise levels and the context of the Site, it is considered that this Site is subject to noise which generates a **medium** risk of an adverse effect.

A medium risk suggests that detailed consideration should be given to how noise affects the Site and any future development. Development should take account of that noise risk and reflect good acoustic design principles in the layout of dwellings and the use of space.

It is not expected that noise should be a barrier to the development of a site considered as medium risk.

5.2 Selection of Noise Assessment Criteria

For this assessment, the values of the NOEL, LOAEL and SOAEL are drawn from the criteria and values detailed in BS8233:2014. These criteria are set as internal noise levels and are based on the criteria detailed in the above table.

NOEL – No Observed Effect Level – Internal noise levels within rooms achieve the BS8233:2014 standard calculated with windows open and assuming a 15dB(A) noise reduction for an open window.

LOAEL – Lowest Observed Adverse Effect Level – Internal noise levels achieve the requirements of the BS 8233:2014 standard assuming windows are closed and an additional source of ventilation is provided.

SOAEL – Significant Observed Adverse Effect Level – Internal noise levels fail to achieve the BS8233:2014 standard calculated assuming windows are closed and an additional source of ventilation is provided.

5.3 Internal Noise Levels within Dwellings

Site Layout and Design

It is clear from the measured noise data that the main source of noise influencing the Site is noise from the A671 road to the east. Good practice recommends that when designing a future development site layout, consideration should be given to focusing non-residential uses and communal outdoor spaces between the main noise source and the site. This current Outline layout reflects good practice, as, residential dwellings have been placed as far away from the eastern Site boundary as possible.

In-Façade Noise Mitigation

Calculations of internal noise levels have been completed for the proposed development to demonstrate that suitable internal noise levels can be achieved within the most noise exposed dwellings, assuming they are placed close to the respective Site boundaries. These predictions demonstrate that it is possible to provide adequate acoustic mitigation to properties in these locations if other factors necessitate placing dwellings at the Site boundaries.

A proposed Site layout has been produced, although detailed floor plans have not yet been produced at this stage of the development. The internal noise levels have been calculated for the dwellings of the most exposed façade of each building.

- ‘Example Dwelling A’ – (using ‘Location 1’ data).
- ‘Example Dwelling B’ – (using ‘Location 2’ data).
- ‘Example Dwelling C’ – (using ‘Location 3’ data).
- ‘Example Dwelling D’ – (using ‘Location 4’ data).
- ‘Example Dwelling E’ – (using ‘Location 5’ data).

The noise levels used in the prediction for each example dwelling are shown in Table 5.1 below:

Table 5.1
Noise Levels Incident on Façades – free-field, dB

Example Dwelling	Noise Period/Type	Frequency in Hz				
		125	250	500	1000	2000
A	Daytime – L_{eq}	34.8	35.8	44.0	50.2	41.9
	Night Time - L_{eq}	17.6	18.8	28.6	34.8	24.3
	Night Time - L_{FMax}	31.7	25.5	33.7	38.9	28.1
B	Daytime – L_{eq}	45.7	45.8	46.6	48.6	39.1
	Night Time - L_{eq}	37.7	36.3	37.2	40.5	30.7
	Night Time - L_{FMax}	51.2	47.5	45.1	48.8	38.9
C	Daytime – L_{eq}	45.0	41.3	43.7	46.5	35.4
	Night Time - L_{eq}	35.4	32.7	35.1	38.7	27.2
	Night Time - L_{FMax}	47.0	43.1	41.3	45.8	34.2
D	Daytime – L_{eq}	43.5	40.9	44.2	44.5	33.1
	Night Time - L_{eq}	33.9	32.0	35.1	36.8	25.3
	Night Time - L_{FMax}	47.7	43.1	44.1	44.9	32.1
E	Daytime – L_{eq}	43.3	40.7	41.7	43.4	37.2
	Night Time - L_{eq}	33.7	32.0	33.8	35.7	23.6
	Night Time - L_{FMax}	46.7	42.3	42.0	43.8	35.0

For these dwellings, it has been assumed that the Daytime and Night Time data obtained at the noise measurement locations will be representative of the noise environment at these dwellings.

Given a nominal sound reduction of -15dB for a partially open window, the internal noise levels would be as follows:

Table 5.2
Internal Noise Levels in Rooms in dB(A) – Windows Partially Open

Example Dwelling	Room	Period	Level	BS8233 Classification
A	Living Room	Daytime	36.4	Above Limit
	Bedroom	Night Time	20.7	Below Limit
		Night Time – Typical Maxima	24.9	Below Limit
B	Living Room	Daytime	35.5	Above Limit
	Bedroom	Night Time	20.7	Below Limit
		Night Time – Typical Maxima	24.9	Below Limit
C	Living Room	Daytime	33.0	Below Limit
	Bedroom	Night Time	25.0	Below Limit
		Night Time – Typical Maxima	32.3	Below Limit
D	Living Room	Daytime	31.6	Below Limit
	Bedroom	Night Time	23.5	Below Limit
		Night Time – Typical Maxima	32.0	Below Limit
E	Living Room	Daytime	30.8	Below Limit
	Bedroom	Night Time	22.4	Below Limit
		Night Time – Typical Maxima	30.9	Below Limit

Table 5.2 shows that, when assessing the Example Dwellings for a partially open window, the $L_{Aeq, 16hr}$ (Daytime) internal noise levels exceed the limits set by BS8233:2014 at Example Dwellings A and B.

However, Table 5.2 also shows that, when assessing the Example Dwellings for a partially open window, the $L_{Aeq, 16hr}$ (Daytime) internal noise levels are within the limits set by BS8233:2014 at Example Dwellings C, D and E.

Table 5.2 shows that, when assessing the Example Dwellings for a partially open window, the $L_{Aeq, 16hr}$ (Night Time) internal noise levels are within the limits set by BS8233:2014 at all Example Dwellings

Additionally, the L_{AFMax} noise levels are within the standard proposed by Delta-Simons for Night Time maximum noise levels at all Example Dwellings.

However, it is noted that the ProPG states:

"*Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal LAeq target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.*"

As the daytime criteria set out by BS8233:2014 are only exceeded by a very small margin (1.4dB(A) for Example Dwelling A and 0.5dB(A) for Example Dwelling B), it is considered that, taking account of the ProPG guidance it would be unreasonable to introduce specific additional mitigation in order to reduce these noise levels by a narrow margin, particularly given the anonymous nature of traffic noise in this context.

It is therefore considered that no further mitigation is necessary and the calculated internal noise levels are at or below the LOAEL set for this project.

The LOAEL is defined as:

LOAEL – Lowest Observed Adverse Effect Level – Internal noise levels achieve the requirements of the BS8233:2014 standard assuming windows are closed and an additional source of ventilation is provided.

These noise levels are below the LOAEL level set for this assessment and, as such, these noise levels are considered to be acceptable and meet the requirements of the NPPF and the Noise Policy Statement for England. It should be noted that these represent the worst-case noise impacts on the Site.

5.4 External Noise Levels

BS8233 suggests noise limits for external areas or a property such as gardens or balconies. It states that:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

The measured $L_{Aeq,8h}$ noise levels at 'Location 1' are above 55dB(A) and currently do not fulfil the BS8233 criteria. It is noted that the measured evening noise levels are below 50dB(A) and as such the predicted $L_{Aeq,16h}$ noise levels will be below 55dB(A).

If it is considered that further mitigation measures may be required for external amenity spaces within the development to those dwellings in proximity to 'Location 1'. This mitigation could be achieved by the use of appropriate barriers such as garden fences to reduce noise levels.

As the only location where additional mitigation may be required is the properties immediately adjacent to the northern boundary, it is considered that it is likely the mitigation required will be a suitable low level (approximately 1.8m-2m height) boundary fence on the short northern boundary of the site, however the final position and detail of this barrier would be dependent on the final site position of the adjacent dwellings.

The calculated $L_{Aeq,16h}$ noise levels at 'Location 2', 'Location 3', 'Location 4' and 'Location 5' are below 55dB(A) and as such fulfil the BS8233 criteria.

It is also worthy of note that BS8233 does provide an exception for noise levels in external areas as follows:

"In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited."

The standard does recognise that:

"…these guideline values are not achievable in all circumstances where development might be desirable."

The standard further makes clear that, where development is desirable but is in proximity to the strategic road network, the lowest practicable noise levels should be achieved in external amenity spaces but development should not be prohibited.

It is further noted that introduction of mitigation for noise levels to gardens will likely have an impact in reducing noise levels to the dwellings themselves and bringing all internal noise levels below the BS8233:2014 criteria.

5.5 Uncertainty of the Assessment

Following current good practice, an appraisal of the uncertainty within both the on-Site noise survey and the prediction calculations has been completed.

The following negative factors have been noted in considering the uncertainty of the on-site noise survey:

- Sound level meter located at head height level for NSRs.

The following positive factors have been noted in considering the uncertainty of the on-site noise survey:

- Low winds and no precipitation.

As such, it is considered that the uncertainty for the on-Site noise survey element of the work is ±2dB.

This gives a combined uncertainty for this assessment of ±2dB. At this level, the uncertainty will have no impact on the conclusions of the assessment.

5.6 Assertion of Competence

This assessment has been completed by Chris Chittock, Principal Acoustic Consultant with responsibilities for completing acoustic reports on behalf of Delta-Simons.

I hold a Bachelor of Science degree, with Honours, in Audio Technology from the University of Salford. I am a Member of the Institute of Acoustics.

5.7 Recommendation to Decision Makers

The ProPG recommends that the acoustician make one of the following recommendations to a decision maker when considering the suitability in noise terms of a site for residential development. The recommendations are as follows:

A. Planning consent may be granted without any need for noise conditions;

B. Planning consent may be granted subject to the inclusion of suitable noise conditions;

C. Planning consent should be refused on noise grounds in order to avoid significant adverse effects (“avoid”); or

D. Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects (“prevent”).

Based on the assessment of noise risk, the subsequent detailed noise impact assessment and taking account of the recommended mitigation measures, it is the recommendation of Delta-Simons that:

“planning consent be granted subject to the inclusion of suitable noise conditions.”

6.0 Conclusions

Delta-Simons Environmental Consultants Limited ("Delta-Simons") was instructed by Trafford Housing Trust (the "Client") to undertake a planning noise assessment for land at Clitheroe Road, Whalley (the "Site") to support their planning application.

Therefore, the assessment of noise impact for this development has been undertaken by comparing predicted internal noise levels within properties against the criteria within the British Guidance.

This report therefore describes a noise survey of the Site and the subsequent analysis to determine the noise environment of the proposed development and it then compares the results with the adopted criteria. Recommendations are also made with respect to the design of the development.

Measurement of external noise levels have been completed for the proposed development to allow demonstration by calculation that suitable internal noise levels will be achieved within the most noise exposed rooms.

6.1 Site Noise Risk Assessment

Based on the noise risk assessment matrix detailed in Figure 1 of the ProPG, taking account of the measured noise levels and the context of the Site it is considered that this Site is subject to noise which generates a medium risk of an adverse effect.

A medium risk suggests that detailed consideration should be given to how noise affects the Site and any future development. Development should take account of that noise risk and reflect good acoustic design principles in the layout of dwellings and the use of space.

It is not expected that noise should be a barrier to the development of a Site considered as medium risk.

6.2 Internal Noise Levels Conclusions

Windows Partially Open

The assessment has shown that, when assessing the Example Dwellings for a partially open window, the $L_{Aeq, 16hr}$ (Daytime) internal noise levels exceed the limits set by BS8233:2014 at Example Dwellings A and B.

The assessment has also shown that, when assessing the Example Dwellings for a partially open window, the $L_{Aeq, 16hr}$ (Daytime) internal noise levels are within the limits set by BS8233:2014 at Example Dwellings C, D and E.

The assessment has also shown that, when assessing the Example Dwellings for a partially open window, the $L_{Aeq, 16hr}$ (Night Time) internal noise levels are within the limits set by BS8233:2014 at all Example Dwellings

Additionally, the L_{AFMax} noise levels are within the standard proposed by Delta-Simons for Night Time maximum noise levels at all Example Dwellings.

As the daytime criteria set out by BS8233:2014 are only exceeded by a very small margin (1.4dB(A) for Example Dwelling A and 0.5dB(A) for Example Dwelling B), it is considered that, taking account of the ProPG guidance it would be unreasonable to introduce specific additional mitigation in order to reduce these noise levels by a narrow margin, particularly given the anonymous nature of traffic noise in this context.

It is therefore considered that the calculated internal noise levels are below the LOAEL set for this project. The LOAEL is defined as:

LOAEL – Lowest Observed Adverse Effect Level – Internal noise levels achieve the requirements of the BS8233:2014 standard assuming windows are closed and an additional source of ventilation is provided.

These noise levels are below the LOAEL level set for this assessment and, as such, these noise levels are considered to be acceptable and meet the requirements of the NPPF and the Noise Policy Statement for England. It should be noted that these represent the worst-case noise impacts on the Site.

6.3 External Noise Levels Conclusions

The calculated $L_{Aeq,16h}$ noise levels at 'Location 1' are above 55dB(A) and currently do not fulfil the BS8233 criteria. It is considered that further mitigation measures will be required for external amenity spaces within the development. This mitigation could be achieved by the use of appropriate barriers such as garden fences to reduce noise levels.

The calculated $L_{Aeq,16h}$ noise levels at 'Location 2' , 'Location 3', 'Location 4' and 'Location 5' are below 55dB(A) and as such fulfil the BS8233 criteria.

It is also worthy of note that BS8233 does provide an exception for noise levels in external areas as follows:

"In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

The standard does recognise that:

"…these guideline values are not achievable in all circumstances where development might be desirable."

The standard further makes clear that, where development is desirable but is in proximity to the strategic road network, the lowest practicable noise levels should be achieved in external amenity spaces but development should not be prohibited.

6.4 Recommendation to Decision Makers

Based on the assessment of noise risk, the subsequent detailed noise impact assessment and taking account of the recommended mitigation measures, it is the recommendation of Delta-Simons that:

"planning consent be granted subject to the inclusion of suitable noise conditions."

Planning conditions would only be required if the Local Authority consider there is a need for mitigation of noise levels at the northern boundary of the Site adjacent to Location 1.

If the Local Authority consider that mitigation is required in this area then a condition requiring the submission of a design for a suitable boundary treatment at the reserved matters stage would be appropriate.

Appendix A

Glossary of Terminology

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

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

Table A-1
Sound Levels Commonly Found in the Environment

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

Acoustic Terminology

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

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

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

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

L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment.

Appendix B

Noise Monitoring Equipment

Table B-1
Noise Monitoring Equipment

Equipment	Serial Number
01dB CUBE Sound Level Meter	11111
01dB PRE22 Preamplifier	1610358
GRAS 40CD Microphone	287790
01dB CUBE Sound Level Meter (A)	10892
01dB PRE22 Preamplifier	51231429
GRAS 40CD Microphone	231555
01dB CUBE Sound Level Meter	10889
01dB PRE22 Preamplifier	11071
GRAS 40CD Microphone	233511
01dB Solo Sound Level Meter	65782
MCE212 Microphone	134719
PRE21S	10394
Svan sound level meter	55541
SV18 Preamplifier	58916
7052E Microphone	63323
Acoustic Calibrator	039063

Appendix C

Noise Measurement Locations

Figure C-1
Measurement Location Plan

Appendix D

Full Survey Results

Table D-1
Measured Noise Levels – 'Location 1' – 24/09/18 to 25/09/18 – free field, dB

End Date & time	Leq	L10	L90	Lmax
24/09/2018 18:30	50.9	50.6	44.6	77.6
24/09/2018 18:35	48	50.3	44	53.5
24/09/2018 18:40	47.5	49.5	43.6	51.9
24/09/2018 18:45	49.2	50.7	44.3	63.4
24/09/2018 18:50	51.5	55.6	43	63.8
24/09/2018 18:55	48.3	49.5	43.3	66.3
24/09/2018 19:00	47.2	48.7	43.5	65.5
24/09/2018 19:05	47.5	49.4	44.6	51
24/09/2018 19:10	51.8	50.3	44.9	70.8
24/09/2018 19:15	48.4	50	44	61.9
24/09/2018 19:20	48.2	50.4	44.4	56.4
24/09/2018 19:25	49.9	49.9	44.1	67.8
24/09/2018 19:30	46.9	49.4	43.1	56.7
24/09/2018 19:35	45.9	47.7	43.3	52.7
24/09/2018 19:40	46	47.9	42.6	57.1
24/09/2018 19:45	46.2	48.2	43.1	53.7
24/09/2018 19:50	46.9	46.8	40.7	70.1
24/09/2018 19:55	45.5	47.6	42.3	59.9
24/09/2018 20:00	46.9	49	43.3	54.7
24/09/2018 20:05	45.9	48.3	42.2	54.1
24/09/2018 20:10	46.5	49.2	43	53
24/09/2018 20:15	46.1	48.4	41.6	51.6
24/09/2018 20:20	46.3	48.2	43	54.4
24/09/2018 20:25	44.9	47.9	38.8	50.3
24/09/2018 20:30	45.7	48.1	41.5	51.5
24/09/2018 20:35	46.1	48	41.6	64.2
24/09/2018 20:40	44	46.3	40.8	48.2
24/09/2018 20:45	47.1	50.1	42.6	52.9
24/09/2018 20:50	47.5	50.4	43	53.7
24/09/2018 20:55	46.8	49.3	43.6	52.2
24/09/2018 21:00	45.9	48.6	41.3	51.9
24/09/2018 21:05	45.4	48.4	41	51.8
24/09/2018 21:10	45.6	48.4	40.3	51.1
24/09/2018 21:15	47	49.4	41	58.4
24/09/2018 21:20	45.5	48.4	39.1	50.7
24/09/2018 21:25	47.5	50	43.1	53.6
24/09/2018 21:30	47.6	50.6	39.6	54
24/09/2018 21:35	46	49	40.3	53.7

24/09/2018 21:40	45.1	48.2	39.2	52.1
24/09/2018 21:45	46.6	49.7	38.8	53.5
24/09/2018 21:50	45.8	48.9	40.3	51.4
24/09/2018 21:55	45.3	49.1	38.8	53.1
24/09/2018 22:00	48.1	50.7	42.1	54.3
24/09/2018 22:05	47.9	51	39.6	57
24/09/2018 22:10	45.3	47.8	41.4	51.5
24/09/2018 22:15	47.1	49.8	42.7	53.7
24/09/2018 22:20	47.1	49.4	43.5	51.8
24/09/2018 22:25	46	48.7	40.4	57.1
24/09/2018 22:30	45.3	49	39.8	52
24/09/2018 22:35	45.2	47.9	40.2	54.7
24/09/2018 22:40	43.8	46.5	40	51.4
24/09/2018 22:45	43.7	46.8	39.2	50
24/09/2018 22:50	44.8	48	36.1	57.9
24/09/2018 22:55	46	50.3	38	53.6
24/09/2018 23:00	45.8	49	41.1	56.9
24/09/2018 23:05	42.1	45.4	33.6	53.6
24/09/2018 23:10	41.4	45.1	33.2	51.9
24/09/2018 23:15	44.7	48.3	36.1	54.3
24/09/2018 23:20	43.1	47.2	32.3	53.4
24/09/2018 23:25	40.5	44.2	32.5	53.6
24/09/2018 23:30	41.7	45.7	33.1	52.2
24/09/2018 23:35	41.9	46.1	31.4	49.1
24/09/2018 23:40	43.3	47.3	30.7	54.9
24/09/2018 23:45	41.6	45.1	33.6	49.2
24/09/2018 23:50	42	45.8	35.1	52.5
24/09/2018 23:55	44.1	47.6	39.1	53.3
25/09/2018 00:00	41.2	45.1	34.1	49.9
25/09/2018 00:05	42.2	45.6	36	53.1
25/09/2018 00:10	38.7	42.6	31.2	49.5
25/09/2018 00:15	41.3	43.4	33.4	56.8
25/09/2018 00:20	38.5	43.1	30.1	47.6
25/09/2018 00:25	44	47.1	38.1	53.5
25/09/2018 00:30	39.3	43.5	29.1	50.5
25/09/2018 00:35	40.3	44.9	28.6	51
25/09/2018 00:40	41.1	45.2	29	52.4
25/09/2018 00:45	38.2	41.8	30.3	48.9
25/09/2018 00:50	38.3	43.2	29.6	46.5
25/09/2018 00:55	40.1	44.3	28.3	49.1
25/09/2018 01:00	39.4	42.7	28.6	49.8
25/09/2018 01:05	41	44.7	33.7	51.2
25/09/2018 01:10	32.6	34.2	30	40.6
25/09/2018 01:15	37.8	41.8	29	50.6
25/09/2018 01:20	40	45.3	30.2	51.5
25/09/2018 01:25	38.2	40.8	30	51

25/09/2018 01:30	36.9	40.6	29	49.3
25/09/2018 01:35	41.3	46.2	30.5	51.6
25/09/2018 01:40	40.3	44.5	29	51.9
25/09/2018 01:45	31.2	32.9	28.5	39.1
25/09/2018 01:50	34.6	38.1	29.2	44.5
25/09/2018 01:55	35.5	39.6	29.6	45
25/09/2018 02:00	36	40	29.3	48.1
25/09/2018 02:05	41.1	45.2	32.4	51.5
25/09/2018 02:10	41.6	45.8	30.8	51.2
25/09/2018 02:15	39	42.2	31	51
25/09/2018 02:20	40.4	43.9	32.1	49.7
25/09/2018 07:23	54.3	55.7	52.2	72.3
25/09/2018 07:28	54.4	56.4	52.1	59.8
25/09/2018 07:33	54.8	56.5	52.3	59.9
25/09/2018 07:38	55.1	56.9	52.2	65.2
25/09/2018 07:43	56.2	58.1	53	63.1
25/09/2018 07:48	56.3	58.8	52.7	62
25/09/2018 07:53	58	59.7	55.2	69
25/09/2018 07:58	56.7	58.6	53.9	70.5
25/09/2018 08:03	57	58.6	54.2	77.2
25/09/2018 08:08	58.1	59.8	55.4	69.6
25/09/2018 08:13	57.4	59.3	55.1	63.7
25/09/2018 08:18	56.6	58.4	54	66.8
25/09/2018 08:23	57.6	59.5	54.6	67
25/09/2018 08:28	57.9	59.7	54.4	67.5
25/09/2018 08:33	58.1	59.4	55.2	76.6
25/09/2018 08:38	57.8	59.7	55	71
25/09/2018 08:43	57	59.3	53.8	70.3
25/09/2018 08:48	55.6	57.5	53	63.6
25/09/2018 08:53	57.7	59.6	54.9	66.6
25/09/2018 08:58	57.1	59.2	53.2	74.2
25/09/2018 09:03	57.4	58.9	54.2	73.9
25/09/2018 09:08	57	58.3	54.5	71.6
25/09/2018 09:13	56.4	57.9	53.9	65.2
25/09/2018 09:18	56.5	58.3	53.7	65.3
25/09/2018 09:23	55.3	57.3	52.2	65.6
25/09/2018 09:28	54.3	56	51.4	64.7
25/09/2018 09:33	54.9	57.3	51.2	68.8
25/09/2018 09:38	54	56.3	50.3	64.3
25/09/2018 09:43	52.4	53.7	48.5	68.5
25/09/2018 09:48	53.8	55.3	49.4	70.6
25/09/2018 09:53	53.2	55.5	49.6	61.1
25/09/2018 09:58	52.4	54.1	50.1	58
25/09/2018 10:03	53.4	55.7	49.7	63.2
25/09/2018 10:03	12.8	15.5	15.9	17.8

Appendix D

Full Survey Results

Table D-2
Measured Noise Levels – 'Location 2' – 24/09/18 to 25/09/18 – free field, dB

Period start	Leq	L10	L90	Lmax
24/09/2018 18:40	51.3	53.7	47.9	55.7
24/09/2018 18:45	51.6	53.7	46.6	55.8
24/09/2018 18:50	51.8	54.5	46.9	60.6
24/09/2018 18:55	51.7	53.8	47.4	56
24/09/2018 19:00	53.5	55.1	47.2	67.5
24/09/2018 19:05	53.9	54	48.8	69.3
24/09/2018 19:10	51.7	53.8	47.6	56.6
24/09/2018 19:15	51.2	53.6	46.9	56.8
24/09/2018 19:20	51.8	54.5	47.3	59.3
24/09/2018 19:25	50.9	53.6	45.5	58.2
24/09/2018 19:30	50.4	52.8	46.3	54.3
24/09/2018 19:35	51	53.5	47	56
24/09/2018 19:40	50.4	52.6	46.6	56.8
24/09/2018 19:45	48.9	51.9	43.8	55.1
24/09/2018 19:50	50	52.3	46.5	54.6
24/09/2018 19:55	50.9	52.9	46.6	62.1
24/09/2018 20:00	50.8	53.1	46.5	56.4
24/09/2018 20:05	50.4	53.3	46.1	55.1
24/09/2018 20:10	50.2	52.7	43.9	56.9
24/09/2018 20:15	49.7	52	44.9	56.6
24/09/2018 20:20	49.8	52.6	44.1	56.6
24/09/2018 20:25	50.9	52.9	46.8	56.5
24/09/2018 20:30	49.7	52	44.9	55.2
24/09/2018 20:35	48.7	52.1	44.6	53.9
24/09/2018 20:40	50.9	53.5	45.6	56.6
24/09/2018 20:45	51.7	53.4	46.4	62.7
24/09/2018 20:50	50.8	52.9	47.1	56.8
24/09/2018 20:55	50	52.6	45.8	54.8
24/09/2018 21:00	48.5	51.5	43.1	55.5
24/09/2018 21:05	48.5	51.2	44.8	53.4
24/09/2018 21:10	49.6	52.3	44.8	60.1
24/09/2018 21:15	47.6	51	42	53.1
24/09/2018 21:20	49.5	52.3	43.8	55.5
24/09/2018 21:25	48.4	50.9	42.6	55.2
24/09/2018 21:30	48.7	51.2	43.8	55.2
24/09/2018 21:35	47.9	51.1	42.9	53.3
24/09/2018 21:40	49.2	52	43.8	55.8
24/09/2018 21:45	48.9	52	43.3	55.1

24/09/2018 21:50	48.9	52.6	42.7	56.8
24/09/2018 21:55	50.8	53.8	43.8	57.4
24/09/2018 22:00	48.7	51.2	42.4	54.5
24/09/2018 22:05	49.7	52.7	45.5	56.2
24/09/2018 22:10	49.4	51.8	45.9	55.3
24/09/2018 22:15	49.4	51.6	45.5	54.8
24/09/2018 22:20	48.3	50.5	44.8	56.6
24/09/2018 22:25	47.1	51.1	40	54.6
24/09/2018 22:30	47.5	50.2	42	55.4
24/09/2018 22:35	47.4	50.3	43.5	54.7
24/09/2018 22:40	45.9	48.6	41.1	56.2
24/09/2018 22:45	46.4	50.7	37	55.5
24/09/2018 22:50	45.8	49.3	40.2	52.7
24/09/2018 22:55	47.2	51	40.1	55.5
24/09/2018 23:00	41.7	45.1	36.2	49.7
24/09/2018 23:05	44.6	48.2	38	52
24/09/2018 23:10	44.8	48.7	36.3	54.8
24/09/2018 23:15	44.2	48	36.4	53.7
24/09/2018 23:20	42.8	46.1	38.1	52.1
24/09/2018 23:25	43.1	47	36.2	50.8
24/09/2018 23:30	44.9	49	35.6	53.1
24/09/2018 23:35	44.8	49.1	37.5	55.4
24/09/2018 23:40	42.2	45.7	37.9	50.6
24/09/2018 23:45	43.7	46.8	38.6	53.2
24/09/2018 23:50	45.8	49.1	38.8	53
24/09/2018 23:55	43.7	46.8	36.7	54.6
25/09/2018 00:00	42.6	45.5	38.5	49
25/09/2018 00:05	40.5	42.5	35.4	51.8
25/09/2018 00:10	44.2	47.6	35	56.8
25/09/2018 00:15	42	45.9	35.3	52
25/09/2018 00:20	45.2	48.7	38.1	56
25/09/2018 00:25	41.2	45.5	33.6	51.6
25/09/2018 00:30	39.7	42.7	34.3	48.2
25/09/2018 00:35	41.2	43.2	33.5	54.9
25/09/2018 00:40	40.1	42.9	33.9	50.5
25/09/2018 00:45	40.6	45	34	49.7
25/09/2018 00:50	41.1	45.8	32.9	50.1
25/09/2018 00:55	42	45.3	35.7	51.2
25/09/2018 01:00	41.8	45.7	34.8	53.1
25/09/2018 01:05	35.9	37.2	33.9	40.7
25/09/2018 01:10	40.3	41.6	33.6	53.5
25/09/2018 01:15	42.6	46	34.9	53.9
25/09/2018 01:20	36	37.8	33.6	41.5
25/09/2018 01:25	40.9	44.7	35.1	51.2
25/09/2018 01:30	44.1	48.7	36.7	52.6
25/09/2018 01:35	38.7	41.2	36.1	47.7

25/09/2018 01:40	38.5	40.3	36.5	45.2
25/09/2018 01:45	40.2	42.5	37.7	47.1
25/09/2018 01:50	39.2	40.7	35.6	49.9
25/09/2018 01:55	39.5	42	35.9	49.9
25/09/2018 02:00	41.8	44.8	35.6	54.9
25/09/2018 02:05	42.8	46.9	35.4	52.1
25/09/2018 02:10	41.9	46	34.5	53.4
25/09/2018 02:15	40.9	43.3	31.7	52.6
25/09/2018 02:20	37.8	39.3	32.6	50.2
25/09/2018 02:25	37.9	41.2	32.7	47.8
25/09/2018 02:30	41.8	44.9	35.2	53.1
25/09/2018 02:35	40.5	40.9	33.1	55.7
25/09/2018 02:40	39.1	43.2	32.8	50.2
25/09/2018 02:45	40.6	43.8	33.8	51.5
25/09/2018 02:50	39.6	42.2	34.2	51.8
25/09/2018 02:55	38.7	38.8	33.6	52.4
25/09/2018 03:00	39.3	42.5	34.1	50.2
25/09/2018 03:05	36.2	37.9	32.4	47.4
25/09/2018 03:10	40.4	42.2	35	51.8
25/09/2018 03:15	39.3	40.8	34.9	50.8
25/09/2018 03:20	38.6	41.6	33.9	49.8
25/09/2018 03:25	41.7	44.2	35.1	54.7
25/09/2018 03:30	41.6	45.9	34.4	51.7
25/09/2018 03:35	40.5	43.2	33.5	52.8
25/09/2018 03:40	35.8	37.7	32.1	46.8
25/09/2018 03:45	43.5	45.9	34.1	56
25/09/2018 03:50	45.4	50.2	33.7	58.2
25/09/2018 03:55	40.1	44.6	33.6	50.2
25/09/2018 04:00	41.7	46.6	32.4	52.2
25/09/2018 04:05	37	38	32.9	49.4
25/09/2018 04:10	40.1	42.5	36	49.3
25/09/2018 04:15	40.9	44.9	35.3	50.2
25/09/2018 04:20	40	44.1	34.5	50.7
25/09/2018 04:25	43.9	47.7	37.2	54.6
25/09/2018 04:30	44.9	49.3	36	54.5
25/09/2018 04:35	44.1	48.7	36.5	54
25/09/2018 04:40	45.7	49.1	35.2	55.4
25/09/2018 04:45	42.8	47.2	36.9	50.3
25/09/2018 04:50	45.4	50	36	55
25/09/2018 04:55	46	49.2	39	55
25/09/2018 05:00	46.6	50	40	56.2
25/09/2018 05:05	44.3	47.6	39.3	49.8
25/09/2018 05:10	47.6	50.6	42.8	54.7
25/09/2018 05:15	46.9	49.4	42.5	55.7
25/09/2018 05:20	47.3	50.8	41.1	53.3
25/09/2018 05:25	49.4	52.4	42.7	54.3

25/09/2018 05:30	50.5	54.5	42.6	58.5
25/09/2018 05:35	51	54	46.1	56
25/09/2018 05:40	50.5	52.8	46	57.2
25/09/2018 05:45	52.1	55	46.2	57.2
25/09/2018 05:50	51.5	54.2	44.9	63.5
25/09/2018 05:55	47	50	42.1	55.1
25/09/2018 06:00	50.1	53.8	43.8	58.4
25/09/2018 06:05	50.3	53.5	44.9	55.4
25/09/2018 06:10	49.8	52.4	44.6	55.1
25/09/2018 06:15	50.6	53.8	44.8	56.8
25/09/2018 06:20	51.8	54.8	45.5	57
25/09/2018 06:25	52	54.9	46.9	57
25/09/2018 06:30	55.6	57.2	46.8	68.9
25/09/2018 06:35	53	55.9	48.4	58.9
25/09/2018 06:40	53.5	55.7	49.8	57.8
25/09/2018 06:45	53.5	55.9	50.3	57.7
25/09/2018 06:50	54.5	56.5	51.5	57.9
25/09/2018 06:55	54.6	56.4	51.6	60
25/09/2018 07:00	54	55.6	51.4	58.6
25/09/2018 07:05	53.9	56.2	50.7	62
25/09/2018 07:10	55.4	57.5	51.7	60.2
25/09/2018 07:15	54.9	57	52.1	58.3
25/09/2018 07:20	54.7	56.5	51.6	59.2
25/09/2018 07:25	54.9	56.8	51.5	58.6
25/09/2018 07:30	54.5	56.5	51.2	59.9
25/09/2018 07:35	55.4	57.6	51.5	59.3
25/09/2018 07:40	54.9	57.2	50.9	60.3
25/09/2018 07:45	55.6	58	52.1	59.5
25/09/2018 07:50	55.9	57.6	53.1	60.7
25/09/2018 07:55	55.9	57.3	53.9	59.6
25/09/2018 08:00	56	57.5	53.4	59.1
25/09/2018 08:05	55.9	58	52.5	59
25/09/2018 08:10	55.6	57.4	53.3	58.7
25/09/2018 08:15	55.2	56.7	52.3	60.5
25/09/2018 08:20	55.7	57.8	51.8	61.3
25/09/2018 08:25	56.1	57.8	53.1	60.4
25/09/2018 08:30	54.6	56.6	51.5	58.2
25/09/2018 08:35	55.4	57.1	52.6	59.5
25/09/2018 08:40	54.7	56.8	51	60.1
25/09/2018 08:45	54.8	56.7	51.9	58.2
25/09/2018 08:50	54.9	56.8	51	59.1
25/09/2018 08:55	55	57.3	50.7	61.7
25/09/2018 09:00	54.9	57.1	51	59.9
25/09/2018 09:05	54.8	56.4	52.2	58.9
25/09/2018 09:10	54.3	55.9	51.8	58.1
25/09/2018 09:15	53.5	56.1	48.4	58.2

25/09/2018 09:20	53.2	55.1	49.9	57.1
25/09/2018 09:25	53	55.1	48.8	57.9
25/09/2018 09:30	52.7	55.1	49.2	58.5
25/09/2018 09:35	55.3	55.1	47.3	73.1
25/09/2018 09:40	53.2	55.2	49.4	59.6
25/09/2018 09:45	53.5	55.7	50	57.6
25/09/2018 09:50	52.9	54.9	48.7	62.3
25/09/2018 09:55	52.9	55.1	48.9	57.9
25/09/2018 10:00	52.8	54.5	48.7	61.3

Appendix D

Full Survey Results

Table D-3
Measured Noise Levels – 'Location 3' – 24/09/18 to 25/09/18 – free field, dB

Period start	Leq	L10	L90	Lmax
24/09/2018 19:00	49.1	49.6	45.1	63.3
24/09/2018 19:05	49.2	50.1	46	61.6
24/09/2018 19:10	48.4	49.8	46.3	51.4
24/09/2018 19:15	48.4	49.8	45.9	53.8
24/09/2018 19:20	49	50.6	46.9	52.4
24/09/2018 19:25	47.9	49.6	45.2	51
24/09/2018 19:30	47	48.3	45	52.2
24/09/2018 19:35	48.3	50.1	45.7	51.5
24/09/2018 19:40	47	48.4	44.8	51.2
24/09/2018 19:45	46.6	48	44.7	50.3
24/09/2018 19:50	47.3	48.9	45.2	57.5
24/09/2018 19:55	47.5	49.4	44.3	53.4
24/09/2018 20:00	47.5	49.2	45.4	51.1
24/09/2018 20:05	48.3	49.7	46.1	54
24/09/2018 20:10	46.2	48.3	42.9	50.5
24/09/2018 20:15	47.1	49.4	43.8	53.2
24/09/2018 20:20	46.4	47.9	43.7	57.5
24/09/2018 20:25	47.3	48.9	45	51
24/09/2018 20:30	46.9	49.1	43.2	54.1
24/09/2018 20:35	46.2	48.4	43.3	50.1
24/09/2018 20:40	47.3	49.5	44.2	52
24/09/2018 20:45	48.6	51	45.2	55.2
24/09/2018 20:50	48.2	50.3	44.5	52.6
24/09/2018 20:55	46.8	48.5	44.4	50.1
24/09/2018 21:00	46.6	49.2	42.9	51.9
24/09/2018 21:05	46.2	48	43.4	49.7
24/09/2018 21:10	47.1	49.4	42.8	55.4
24/09/2018 21:15	45.9	48.1	41.7	50.1
24/09/2018 21:20	47.6	49.7	43.9	53.3
24/09/2018 21:25	46.6	48.8	41.1	51.8
24/09/2018 21:30	46.7	49.1	42.2	52.4
24/09/2018 21:35	46.1	48.6	40.4	52.7
24/09/2018 21:40	46.6	49.2	42	53.1
24/09/2018 21:45	46.7	49.1	42.2	54.1
24/09/2018 21:50	46.5	49.4	41.4	53.1
24/09/2018 21:55	48.8	51	42.4	55.5
24/09/2018 22:00	47.5	49.3	44.1	51.5
24/09/2018 22:05	47.7	50.1	44.3	51.5

24/09/2018 22:10	47.3	48.9	45.1	53.1
24/09/2018 22:15	47	48.7	44.7	51.1
24/09/2018 22:20	46.2	48.1	42.1	52.5
24/09/2018 22:25	43.3	45.9	38.7	48.1
24/09/2018 22:30	44.3	46.4	40.8	52.4
24/09/2018 22:35	45	47.1	41.1	50.1
24/09/2018 22:40	44.7	46.5	40.8	52.5
24/09/2018 22:45	45.4	49.1	38.4	54.9
24/09/2018 22:50	43.5	46.2	38.4	48.6
24/09/2018 22:55	44.8	47.3	39.3	54.2
24/09/2018 23:00	39.5	42.1	35.4	48.1
24/09/2018 23:05	43.5	46.4	37.8	54.1
24/09/2018 23:10	43.9	47.5	36.7	52
24/09/2018 23:15	42.9	46.6	35.7	50.8
24/09/2018 23:20	42.5	45.7	37.7	49.3
24/09/2018 23:25	41.9	45.1	35.6	49.3
24/09/2018 23:30	42.8	46.1	34.8	50.8
24/09/2018 23:35	43.4	47.4	36.4	51.6
24/09/2018 23:40	41.2	43.8	37.9	46.2
24/09/2018 23:45	42.4	44.7	38	48.7
24/09/2018 23:50	44.1	46.4	38.3	54.9
24/09/2018 23:55	40.6	43.8	35.9	47.7
25/09/2018 00:00	39.7	41.5	36.8	45.9
25/09/2018 00:05	38.2	40.9	34.1	47.9
25/09/2018 00:10	38.3	41.5	32.9	49.5
25/09/2018 00:15	38.9	41.7	33.2	46.6
25/09/2018 00:20	43.4	46.1	38.3	49.5
25/09/2018 00:25	40.2	44.1	32.6	47.7
25/09/2018 00:30	38.5	41.4	33.1	45
25/09/2018 00:35	39.6	42.8	33.7	48.8
25/09/2018 00:40	39	42.1	33.2	46.7
25/09/2018 00:45	39.1	43.3	32.8	48.3
25/09/2018 00:50	39.6	43.2	32.1	47.3
25/09/2018 00:55	39.2	42.3	33.8	46.6
25/09/2018 01:00	40	43.5	33.5	51.8
25/09/2018 01:05	35.7	38	32.9	41.3
25/09/2018 01:10	38.8	41.5	34	47.9
25/09/2018 01:15	41.1	45.2	34.7	50.6
25/09/2018 01:20	35.4	37.1	33.2	39.2
25/09/2018 01:25	38.4	41.3	34.4	47.7
25/09/2018 01:30	42	46.2	35.7	47.8
25/09/2018 01:35	37.3	39.8	34.2	44.2
25/09/2018 01:40	36.7	38.5	34.4	43.7
25/09/2018 01:45	38.2	40.3	35.6	42.6
25/09/2018 01:50	37.3	40.1	32.7	45.7
25/09/2018 01:55	36.8	39.1	33	44.8

25/09/2018 02:00	39	42.2	34.5	46.2
25/09/2018 02:05	40.4	43.7	34.1	48.2
25/09/2018 02:10	38.5	41.8	33.3	46.6
25/09/2018 02:15	38.1	42.4	32.2	47.8
25/09/2018 02:20	35.4	37.9	31.5	43.5
25/09/2018 02:25	36.7	39.3	32.8	44.7
25/09/2018 02:30	38.7	42.2	34	48.7
25/09/2018 02:35	38.1	40.4	32.6	50.2
25/09/2018 02:40	37.7	41.1	32.5	46.3
25/09/2018 02:45	37.9	41.9	32.4	47.3
25/09/2018 02:50	37.4	40.7	32.4	46.4
25/09/2018 02:55	37.3	39.4	33.6	46.3
25/09/2018 03:00	38.3	40.6	34.5	44.8
25/09/2018 03:05	35.4	38.4	31.6	43.2
25/09/2018 03:10	37.8	42.2	33.1	45.8
25/09/2018 03:15	37.2	40.6	33.1	45.6
25/09/2018 03:20	37.6	40.5	34.1	47.1
25/09/2018 03:25	40.4	42.2	34.8	51.5
25/09/2018 03:30	40.5	44	34.8	49
25/09/2018 03:35	39.3	43.6	34.2	47.7
25/09/2018 03:40	38.1	37.7	33.6	55.2
25/09/2018 03:45	42.4	48.2	34	53.8
25/09/2018 03:50	43.8	48.8	34	54.8
25/09/2018 03:55	38.7	42.9	32.6	48.7
25/09/2018 04:00	40.6	44.9	30.6	48.6
25/09/2018 04:05	35.5	38.8	31.8	43.9
25/09/2018 04:10	38.9	41.8	34	45.6
25/09/2018 04:15	39.1	42.6	34.3	49.6
25/09/2018 04:20	38.7	42.2	34.3	47.5
25/09/2018 04:25	41.8	46.2	36.1	49.3
25/09/2018 04:30	42.6	46.1	35.7	50.7
25/09/2018 04:35	41.5	45	35.9	49.5
25/09/2018 04:40	43.8	47.6	35.4	53
25/09/2018 04:45	39.8	42.6	35.6	45.2
25/09/2018 04:50	42.1	46	36.1	48.8
25/09/2018 04:55	43.3	45.6	38.2	50.3
25/09/2018 05:00	44.5	47.8	38.5	52.3
25/09/2018 05:05	42.5	44.8	38.1	49.9
25/09/2018 05:10	45.2	47.5	41.5	49.4
25/09/2018 05:15	45	47.4	41	51.1
25/09/2018 05:20	46	48.6	41.2	51.3
25/09/2018 05:25	47.7	50.1	41.9	53.2
25/09/2018 05:30	49.2	52.5	43	56.7
25/09/2018 05:35	49.4	51.8	44.7	54
25/09/2018 05:40	49.1	51.6	43.8	52.8
25/09/2018 05:45	50.8	53.5	45.5	60.6

25/09/2018 05:50	48.7	51.2	43.6	55.9
25/09/2018 05:55	46.4	48.8	43	54.8
25/09/2018 06:00	48.6	51.3	44.7	55.7
25/09/2018 06:05	47.8	49.7	44.5	55.8
25/09/2018 06:10	49	50.8	45.7	52.4
25/09/2018 06:15	49.2	51	46.6	53.7
25/09/2018 06:20	49.9	52	46.9	53.8
25/09/2018 06:25	49.9	52	47.2	54.2
25/09/2018 06:30	49.8	51.3	47	54.3
25/09/2018 06:35	49.9	51.5	47.8	53.8
25/09/2018 06:40	50.7	51.9	48.9	54.5
25/09/2018 06:45	50.5	51.8	48.8	53.8
25/09/2018 06:50	51	52.1	48.5	56.7
25/09/2018 06:55	51	52.3	49.1	54.5
25/09/2018 07:00	51	52.1	49	55
25/09/2018 07:05	51.3	52.3	49.9	55.7
25/09/2018 07:10	53	54.5	50.6	59
25/09/2018 07:15	52.5	53.9	51	57.5
25/09/2018 07:20	52.6	54	50.2	57
25/09/2018 07:25	53	54.3	51.4	56.3
25/09/2018 07:30	52.9	54.2	51.4	55.7
25/09/2018 07:35	53.5	55	51.1	58.6
25/09/2018 07:40	52.2	53.7	50.5	55.2
25/09/2018 07:45	53.5	55.2	51.2	57.2
25/09/2018 07:50	53.6	54.6	52.1	59.7
25/09/2018 07:55	53	54.1	51.5	55.3
25/09/2018 08:00	53.3	54.8	51.3	58.7
25/09/2018 08:05	53.5	55.1	51.3	56.7
25/09/2018 08:10	53.2	54.7	51.4	56.1
25/09/2018 08:15	53.1	53.8	51.3	61.2
25/09/2018 08:20	53.6	55.3	51.1	57.7
25/09/2018 08:25	54.5	55.9	52.2	57.5
25/09/2018 08:30	53	54.2	51.5	55
25/09/2018 08:35	53.1	54.1	51.3	57.6
25/09/2018 08:40	51.9	53.2	50	54.7
25/09/2018 08:45	52.8	54.2	50.9	56
25/09/2018 08:50	52.9	54.4	50.7	55.1
25/09/2018 08:55	52	53.8	49.5	55
25/09/2018 09:00	52.7	54.4	50.5	56.2
25/09/2018 09:05	52.4	53.9	50.7	60
25/09/2018 09:10	52.2	53.4	50.7	55
25/09/2018 09:15	51	52.2	49.2	53.4
25/09/2018 09:20	50	51.3	48.2	52.4
25/09/2018 09:25	51.2	53	48.1	56.5
25/09/2018 09:30	50.8	52.5	48.3	55.1
25/09/2018 09:35	50.7	52	47	64.1

25/09/2018 09:40	50.6	52.4	47.8	55
25/09/2018 09:45	51.3	53.2	48.6	57.9
25/09/2018 09:50	50.5	52	48.2	55.5
25/09/2018 09:55	50.4	52.5	47.8	54.3
25/09/2018 10:00	50.2	51.4	47.6	59.1
25/09/2018 10:05	50	51.3	47.6	54.5
25/09/2018 10:10	50.1	51.6	47.7	54
25/09/2018 10:15	50.2	52	48	54.6

Appendix D

Full Survey Results

Table D-4
Measured Noise Levels – 'Location 4' – 24/09/18 to 25/09/18 – free field, dB

Period start	Leq	L10	L90	Lmax
24/09/2018 19:20	47.1	48.9	45	52.1
24/09/2018 19:25	46.6	47.8	44.5	56.2
24/09/2018 19:30	45.3	46.9	43.3	48.1
24/09/2018 19:35	46.6	48.5	44	50.2
24/09/2018 19:40	45.5	46.9	43.4	48.6
24/09/2018 19:45	45	46.2	43.3	49.3
24/09/2018 19:50	45.5	46.6	43.8	50.9
24/09/2018 19:55	45.6	47.1	42.8	54.1
24/09/2018 20:00	45.8	47.3	43.7	49.7
24/09/2018 20:05	46.3	48	43.8	53.4
24/09/2018 20:10	44.5	46.4	41.4	48.4
24/09/2018 20:15	46	48	43.3	53.8
24/09/2018 20:20	45.7	47.4	42.8	56.6
24/09/2018 20:25	45.2	47	42.9	49.4
24/09/2018 20:30	44.8	46.6	40.9	54.6
24/09/2018 20:35	44.3	46.3	42	48
24/09/2018 20:40	45.3	47.2	42.9	49.1
24/09/2018 20:45	46.4	48.2	43.5	54.5
24/09/2018 20:50	45.8	47.8	42.9	55.3
24/09/2018 20:55	46.2	47	42.1	60.4
24/09/2018 21:00	44.5	46.9	41.4	50.1
24/09/2018 21:05	43.3	44.7	41	47.8
24/09/2018 21:10	45.9	48.2	42.4	55.8
24/09/2018 21:15	43	44.6	40.8	46.7
24/09/2018 21:20	45.2	46.7	42.4	53.8
24/09/2018 21:25	44.6	46.7	41.3	48.7
24/09/2018 21:30	45.1	47.1	42	51.3
24/09/2018 21:35	43.7	46.2	39.2	48.1
24/09/2018 21:40	43.9	46.6	39.9	50.6
24/09/2018 21:45	45.2	46.7	41.6	59.9
24/09/2018 21:50	44.7	47.1	40.7	50.1
24/09/2018 21:55	47.2	49.7	41.9	54.2
24/09/2018 22:00	46.2	48	43.4	50.7
24/09/2018 22:05	45.4	47.2	42.8	50.1
24/09/2018 22:10	45.5	47	43.4	50.7
24/09/2018 22:15	45.1	46.8	42.9	49.3
24/09/2018 22:20	44.8	46.3	42.3	51.4
24/09/2018 22:25	42.5	45.3	38.5	49.4

24/09/2018 22:30	43.4	45.5	40.4	48.5
24/09/2018 22:35	43	45.3	39.8	48.5
24/09/2018 22:40	43.7	45.7	40.5	49.3
24/09/2018 22:45	42.9	45.8	37.6	55.4
24/09/2018 22:50	42.4	44.7	38	50.7
24/09/2018 22:55	42.4	44.3	38.9	51.5
24/09/2018 23:00	39.4	41.4	35.4	48.2
24/09/2018 23:05	42	44.7	38.3	49.7
24/09/2018 23:10	40.9	43.9	36	49
24/09/2018 23:15	41.1	43.9	36.8	47.9
24/09/2018 23:20	41.3	44.1	36.6	47.5
24/09/2018 23:25	39.3	41.9	33.5	47.6
24/09/2018 23:30	41.5	44.5	34.1	48.4
24/09/2018 23:35	41.2	44.3	35	50.1
24/09/2018 23:40	39.6	41.6	37.2	43.7
24/09/2018 23:45	41	43.7	36.9	46.4
24/09/2018 23:50	43.2	45.7	38.5	52.4
24/09/2018 23:55	39.7	43.4	34.7	46.5
25/09/2018 00:00	40.5	43.2	36.6	48.6
25/09/2018 00:05	38.5	40.8	33.6	49.5
25/09/2018 00:10	36.6	38.9	31.4	49.1
25/09/2018 00:15	37.3	40.4	32.7	43.7
25/09/2018 00:20	42.1	45.2	37.3	50.5
25/09/2018 00:25	38.7	41.2	34	48
25/09/2018 00:30	38.5	41	34.1	46.8
25/09/2018 00:35	38.7	41	34.9	47.1
25/09/2018 00:40	37.8	40.2	32.8	45.2
25/09/2018 00:45	38.5	41.3	34.1	45.8
25/09/2018 00:50	37.5	39.7	34	43.2
25/09/2018 00:55	37.8	40.1	33.3	44.6
25/09/2018 01:00	39.6	42.1	35.6	48.9
25/09/2018 01:05	37.3	38.8	34.9	41.6
25/09/2018 01:10	38.2	40.6	34.5	50.7
25/09/2018 01:15	39.8	43.1	35.3	47.4
25/09/2018 01:20	35	36.3	33.4	40.5
25/09/2018 01:25	37.5	39.6	34.6	46.5
25/09/2018 01:30	39.8	43.1	35.8	45.6
25/09/2018 01:35	38.6	39.9	36.8	44.3
25/09/2018 01:40	38.9	40.4	36.5	44
25/09/2018 01:45	39.4	40.5	37.5	43.5
25/09/2018 01:50	38.8	40.5	36.3	44.3
25/09/2018 01:55	38.4	39.9	36.5	42.3
25/09/2018 02:00	39	41.4	36.2	43.9
25/09/2018 02:05	38.9	41.3	35.2	45.5
25/09/2018 02:10	37.2	39.2	33.9	43.7
25/09/2018 02:15	36	39.4	31.6	42.9

25/09/2018 02:20	33.7	36.1	31.3	40.1
25/09/2018 02:25	36.1	37.5	32.8	45.6
25/09/2018 02:30	38.2	40.9	34.6	45
25/09/2018 02:35	36.7	38.7	32.9	44.7
25/09/2018 02:40	36.6	39.2	32.6	47.1
25/09/2018 02:45	36.8	39.7	33.2	45
25/09/2018 02:50	38.3	40.5	35.5	43.4
25/09/2018 02:55	37.3	40.1	33.6	44.6
25/09/2018 03:00	38.3	40.4	34.6	42.6
25/09/2018 03:05	35.8	37.3	33.4	40.9
25/09/2018 03:10	37.3	39.6	34.1	43.7
25/09/2018 03:15	37.2	39.2	34.4	42.7
25/09/2018 03:20	36.6	39.1	34	43.2
25/09/2018 03:25	39	41.7	34.3	48.1
25/09/2018 03:30	39.1	41.7	35.1	44.2
25/09/2018 03:35	38.1	41.8	34.4	46.4
25/09/2018 03:40	36.1	37.9	33.9	42.8
25/09/2018 03:45	40.8	44.3	35	53.4
25/09/2018 03:50	41.1	45.1	34.4	52.2
25/09/2018 03:55	37.9	40.2	33.5	49.3
25/09/2018 04:00	39.4	42.8	32.8	47.4
25/09/2018 04:05	35.9	38.8	32.2	42.1
25/09/2018 04:10	38.3	40.3	34.9	44.8
25/09/2018 04:15	39.2	41.4	35.7	44.1
25/09/2018 04:20	38.5	40.5	34.9	47.2
25/09/2018 04:25	40.2	43.3	36.8	47.2
25/09/2018 04:30	41.2	44.4	36.2	46.5
25/09/2018 04:35	39.9	42.2	36	47.1
25/09/2018 04:40	41.4	44.3	35.8	47.6
25/09/2018 04:45	38.4	40.6	35	42.9
25/09/2018 04:50	41.2	44.1	36.7	46.6
25/09/2018 04:55	41.6	44.5	37.2	48.6
25/09/2018 05:00	43.6	46.6	39.2	53
25/09/2018 05:05	41.2	43.2	37.9	45
25/09/2018 05:10	44.1	45.9	42	48.3
25/09/2018 05:15	43.6	45.8	40.3	50.2
25/09/2018 05:20	44	45.5	41.8	49
25/09/2018 05:25	45.2	47.5	41.7	48.8
25/09/2018 05:30	46.3	49.1	41.7	52.7
25/09/2018 05:35	47.4	49.3	43.4	54.4
25/09/2018 05:40	47.4	48.8	45	51.4
25/09/2018 05:45	48.3	50	44.9	53.1
25/09/2018 05:50	46.6	48.6	43.1	53.6
25/09/2018 05:55	45	46.4	42.4	54.2
25/09/2018 06:00	46.2	48.3	42.9	51.9
25/09/2018 06:05	47.1	49.1	44.1	52.1

25/09/2018 06:10	47.2	48.7	44.5	50.4
25/09/2018 06:15	47.7	49.2	45	54.5
25/09/2018 06:20	47.6	49.1	45.5	50.5
25/09/2018 06:25	47.8	48.8	45.4	60.2
25/09/2018 06:30	48.5	50.3	46.1	55.3
25/09/2018 06:35	48	49.4	46	51.4
25/09/2018 06:40	49.5	51.3	47.4	55.6
25/09/2018 06:45	49.6	50.9	47.9	53.6
25/09/2018 06:50	51	52.5	48.7	55
25/09/2018 06:55	50.4	51.5	48.2	57.8
25/09/2018 07:00	50.2	51.8	48.5	54.9
25/09/2018 07:05	50.9	52.9	48.2	54.5
25/09/2018 07:10	51.4	52.6	49.5	56.7
25/09/2018 07:15	52	54	49.5	57.6
25/09/2018 07:20	52.1	53.4	50	58.5
25/09/2018 07:25	51.3	52.7	49.5	54.7
25/09/2018 07:30	51.5	52.7	49.7	56.6
25/09/2018 07:35	51.4	52.6	49.6	55.6
25/09/2018 07:40	51.2	52.4	49.8	54.1
25/09/2018 07:45	51.8	53.1	49.8	54
25/09/2018 07:50	52.9	54.8	50.9	58.2
25/09/2018 07:55	53.4	53.8	50.7	65.7
25/09/2018 08:00	52.3	53.3	50.1	63.3
25/09/2018 08:05	52.1	53.4	50.5	54.8
25/09/2018 08:10	54.4	53.4	50.5	68.3
25/09/2018 08:15	53	55.1	50.1	60.7
25/09/2018 08:20	52.8	55.6	49.4	61.2
25/09/2018 08:25	52.1	53.2	50.4	56.7
25/09/2018 08:30	51.1	52.1	49.9	53.7
25/09/2018 08:35	51.4	52.1	49.6	60.6
25/09/2018 08:40	52.6	55.2	49.2	62.1
25/09/2018 08:45	51.2	52.3	49.4	58.2
25/09/2018 08:50	51	52.2	49.3	53.1
25/09/2018 08:55	50	51.2	47.4	58.7
25/09/2018 09:00	50.1	51.3	48.4	52
25/09/2018 09:05	49.7	50.7	48.1	58.9
25/09/2018 09:10	49.7	50.8	48.2	51.8
25/09/2018 09:15	48.9	50.1	47.2	52.4
25/09/2018 09:20	49.4	50.3	46.8	65.6
25/09/2018 09:25	48.5	49.2	46.4	55.6
25/09/2018 09:30	48.6	49.9	46.6	54.8
25/09/2018 09:35	49.4	50.5	46.1	61.9
25/09/2018 09:40	49.9	51	48	59.3
25/09/2018 09:45	50.9	52.7	48.1	57.2

Appendix D

Full Survey Results

Table D-5
Measured Noise Levels – 'Location 2' – 24/09/18 to 25/09/18 – free field, dB

Period start	Leq	L10	L90	Lmax
24/09/2018 19:30	46.4	47.9	44.2	55.3
24/09/2018 19:35	46.6	48.2	44.7	50.3
24/09/2018 19:40	45.5	47.3	43.1	48.9
24/09/2018 19:45	45.5	46.6	43.9	49.4
24/09/2018 19:50	45.5	46.7	44.1	49.8
24/09/2018 19:55	45.7	47.5	42.5	52.7
24/09/2018 20:00	45.3	46.5	43.7	49.3
24/09/2018 20:05	45.9	47.6	44	49.8
24/09/2018 20:10	44.7	46.6	41.6	50.9
24/09/2018 20:15	45.8	47.3	43.5	50.6
24/09/2018 20:20	46.3	47.7	43.4	60.2
24/09/2018 20:25	45.8	46.9	44	53.6
24/09/2018 20:30	45.3	46.9	42.3	49.8
24/09/2018 20:35	44.3	46.1	41	48.2
24/09/2018 20:40	45.4	47.2	43	49.8
24/09/2018 20:45	47.7	49.6	44.8	51.8
24/09/2018 20:50	47.3	49	44.2	52.2
24/09/2018 20:55	45.2	46.8	43.1	48.5
24/09/2018 21:00	44.6	46.8	41.4	50.4
24/09/2018 21:05	43.9	46	40.5	51.6
24/09/2018 21:10	45.7	48.4	41	55.1
24/09/2018 21:15	42.3	44.6	39.6	48.6
24/09/2018 21:20	46.2	46.9	41.7	62.7
24/09/2018 21:25	42.7	44.2	39.8	51.3
24/09/2018 21:30	45	47.7	41.2	56.1
24/09/2018 21:35	43.3	45.5	39.3	48.1
24/09/2018 21:40	43.4	45.6	40.5	48.8
24/09/2018 21:45	44.4	46.2	41.2	58.7
24/09/2018 21:50	44.2	46.3	41	52.5
24/09/2018 21:55	46	48	40.6	55.3
24/09/2018 22:00	45.9	47.6	43.2	51.2
24/09/2018 22:05	45.7	47.6	43.3	52.2
24/09/2018 22:10	44.5	46.4	41.2	48.7
24/09/2018 22:15	46.9	48.3	44.6	51.5
24/09/2018 22:20	46.2	47.8	43.6	50
24/09/2018 22:25	41.9	44.5	37.9	47.5

24/09/2018 22:30	43.5	46	38.7	52
24/09/2018 22:35	43.3	46.1	39.1	49.4
24/09/2018 22:40	42	44.3	38.2	50.9
24/09/2018 22:45	41.8	44.7	36.2	53.7
24/09/2018 22:50	41.5	43.9	37.8	50
24/09/2018 22:55	42.1	45.1	36.8	53.5
24/09/2018 23:00	37.4	39.7	33.4	45.5
24/09/2018 23:05	40.6	43.2	36.3	52.6
24/09/2018 23:10	37.5	39.7	33.6	43.3
24/09/2018 23:15	39.5	41.9	35.5	48.2
24/09/2018 23:20	41.9	45	36.4	51.4
24/09/2018 23:25	39.2	41.6	32.4	48.8
24/09/2018 23:30	40.6	44.2	32.9	47.8
24/09/2018 23:35	37.8	39.9	34.3	43.3
24/09/2018 23:40	39.2	40.9	36.1	43.3
24/09/2018 23:45	42.2	43.7	37.6	51.2
24/09/2018 23:50	41.3	44.3	36.7	49.6
24/09/2018 23:55	40.2	43.4	34.7	46.7
25/09/2018 00:00	39.8	41.8	36.4	47
25/09/2018 00:05	39.2	41.4	33.3	50.8
25/09/2018 00:10	36.7	39.9	32.3	42.5
25/09/2018 00:15	38.3	42.2	32	48
25/09/2018 00:20	40	42.8	34.4	50.1
25/09/2018 00:25	36.2	38.4	31.7	45.7
25/09/2018 00:30	36.8	39.5	32.7	46.1
25/09/2018 00:35	34.9	37.7	30.7	43.1
25/09/2018 00:40	35.7	38.3	31.4	44.6
25/09/2018 00:45	36.1	38.5	31.9	42.2
25/09/2018 00:50	35.5	37.2	31.6	45.5
25/09/2018 00:55	36.8	39.6	32.1	45
25/09/2018 01:00	36.6	39.5	32.2	46.1
25/09/2018 01:05	34.9	37.5	30.7	41.5
25/09/2018 01:10	36.9	37.9	30.9	51.2
25/09/2018 01:15	37.3	40.9	31.3	45.7
25/09/2018 01:20	34	35.9	31.1	42.7
25/09/2018 01:25	38.7	41.9	31.4	52.9
25/09/2018 01:30	35.4	37.5	32.5	44.7
25/09/2018 01:35	34.5	37.1	31.5	42.6
25/09/2018 01:40	37.3	39.9	33.3	45.8
25/09/2018 01:45	36.9	39.1	33.8	44
25/09/2018 01:50	33.8	35.5	31.6	39.8
25/09/2018 01:55	36.4	38.6	33.2	44.3
25/09/2018 02:00	34.5	36.5	32.2	38.5

25/09/2018 02:05	34.8	37.5	31.5	43.5
25/09/2018 02:10	33.5	35.3	31	38.6
25/09/2018 02:15	31.7	34.3	28.2	40.2
25/09/2018 02:20	32.1	35.1	29	37.6
25/09/2018 02:25	36.1	40.3	30.1	46.8
25/09/2018 02:30	34.5	37	30.6	40.1
25/09/2018 02:35	32.9	36.1	29.5	41.5
25/09/2018 02:40	34.4	37	30	43.3
25/09/2018 02:45	33.4	35.7	30.6	41.4
25/09/2018 02:50	33.6	36.5	31	42.3
25/09/2018 02:55	33.7	35.9	30.9	45.4
25/09/2018 03:00	34.2	36.2	31.3	41.2
25/09/2018 03:05	33.3	34.9	30.8	41.1
25/09/2018 03:10	35	37.3	32.4	40.4
25/09/2018 03:15	34.2	36.8	31	41
25/09/2018 03:20	33	35.4	30.1	40.4
25/09/2018 03:25	38.7	41.6	34	46.6
25/09/2018 03:30	36.8	39.7	32	45.8
25/09/2018 03:35	35.1	37.8	31.4	42.9
25/09/2018 03:40	34.6	37.5	30.1	44.3
25/09/2018 03:45	36.4	39.2	31.8	43.3
25/09/2018 03:50	37.6	41.9	30.7	47.7
25/09/2018 03:55	34.2	36.9	30.9	40.8
25/09/2018 04:00	35.2	38.6	31	41.8
25/09/2018 04:05	33.9	36	31.6	39.4
25/09/2018 04:10	38.1	40.5	33.7	46.2
25/09/2018 04:15	37.1	39.2	33.4	44.7
25/09/2018 04:20	36.3	37.6	32	49.4
25/09/2018 04:25	40.6	42.7	36.3	50.4
25/09/2018 04:30	39.4	42.1	34.1	45.9
25/09/2018 04:35	39.1	42.1	34.3	46.9
25/09/2018 04:40	41.6	44.7	33.8	52.7
25/09/2018 04:45	37.8	39.8	34.4	44.1
25/09/2018 04:50	39.6	42.5	34	46.7
25/09/2018 04:55	41.3	44.4	36.6	49.1
25/09/2018 05:00	41.3	43.9	36.7	47.1
25/09/2018 05:05	40.8	43.1	36.5	47.8
25/09/2018 05:10	42.6	44.3	40.2	47.8
25/09/2018 05:15	43.2	45.7	39.6	49.4
25/09/2018 05:20	42	43.9	38.1	48.4
25/09/2018 05:25	43.5	45.4	40.4	48.5
25/09/2018 05:30	45	47.1	42.2	50
25/09/2018 05:35	45.3	47.3	42.5	51.3

25/09/2018 05:40	46.4	48.7	43.6	51.1
25/09/2018 05:45	46.6	48.6	44	52.5
25/09/2018 05:50	45.7	48	43.1	50.5
25/09/2018 05:55	44.5	46.5	41.5	50.3
25/09/2018 06:00	45.6	48	41.2	54.1
25/09/2018 06:05	46.1	47.9	43.6	55.4
25/09/2018 06:10	47.2	49	44.6	53
25/09/2018 06:15	46.4	48.4	44.2	51.1
25/09/2018 06:20	45.6	47	44	49.8
25/09/2018 06:25	49.3	48.7	43.7	64.9
25/09/2018 06:30	47.8	49.6	44.3	58.6
25/09/2018 06:35	46.3	47.7	44.4	51.4
25/09/2018 06:40	47.2	49.2	44.4	54.7
25/09/2018 06:45	47.9	49.2	46	52.2
25/09/2018 06:50	48.7	50.1	47.1	54.1
25/09/2018 06:55	49.1	50.4	47.1	58.3
25/09/2018 07:00	49.3	50.4	47.6	54.1
25/09/2018 07:05	49.6	51.3	47.8	53.3
25/09/2018 07:10	49.6	51	48	55
25/09/2018 07:15	48.8	49.9	47.1	54.6
25/09/2018 07:20	49.8	51.2	47.9	57.7
25/09/2018 07:25	49.4	50.4	48.1	51.9
25/09/2018 07:30	49.6	50.5	48.2	52.7
25/09/2018 07:35	50.8	51.9	49	57.1
25/09/2018 07:40	50.4	51.3	49	53
25/09/2018 07:45	50.2	51.4	48.3	56.8
25/09/2018 07:50	54.9	58.6	48.9	68.6
25/09/2018 07:55	51.2	51.9	49.1	62.1
25/09/2018 08:00	49.7	50.8	48.2	52.2
25/09/2018 08:05	50.5	51.9	48.8	54.8
25/09/2018 08:10	55.2	59.5	48.2	68
25/09/2018 08:15	50.7	51	48	61.9
25/09/2018 08:20	49.7	50.7	47.9	62.4
25/09/2018 08:25	49.4	50.5	47.9	52.1
25/09/2018 08:30	49.1	50.4	47.2	54.3
25/09/2018 08:35	49.7	50.3	48.3	58.5
25/09/2018 08:40	48.9	49.9	47.6	53.3
25/09/2018 08:45	49.2	50.2	48	52.1
25/09/2018 08:50	48.9	50.1	47.4	53.4
25/09/2018 08:55	48.2	49.5	46.2	51.9
25/09/2018 09:00	47.7	48.8	46	50.9
25/09/2018 09:05	47.5	48.4	46.3	52.8
25/09/2018 09:10	47	47.8	45.8	51.3

25/09/2018 09:15	46.2	47	44.9	49.4
25/09/2018 09:20	46	47.1	44.1	53.6
25/09/2018 09:25	46.5	47.7	44.8	57
25/09/2018 09:30	46.5	47.3	44.9	56.7
25/09/2018 09:35	47.1	48.1	44.3	58.7

Appendix E

Limitations

The recommendations contained in this Report represent Delta-Simons professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons conclusions, opinions and recommendations has been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

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