



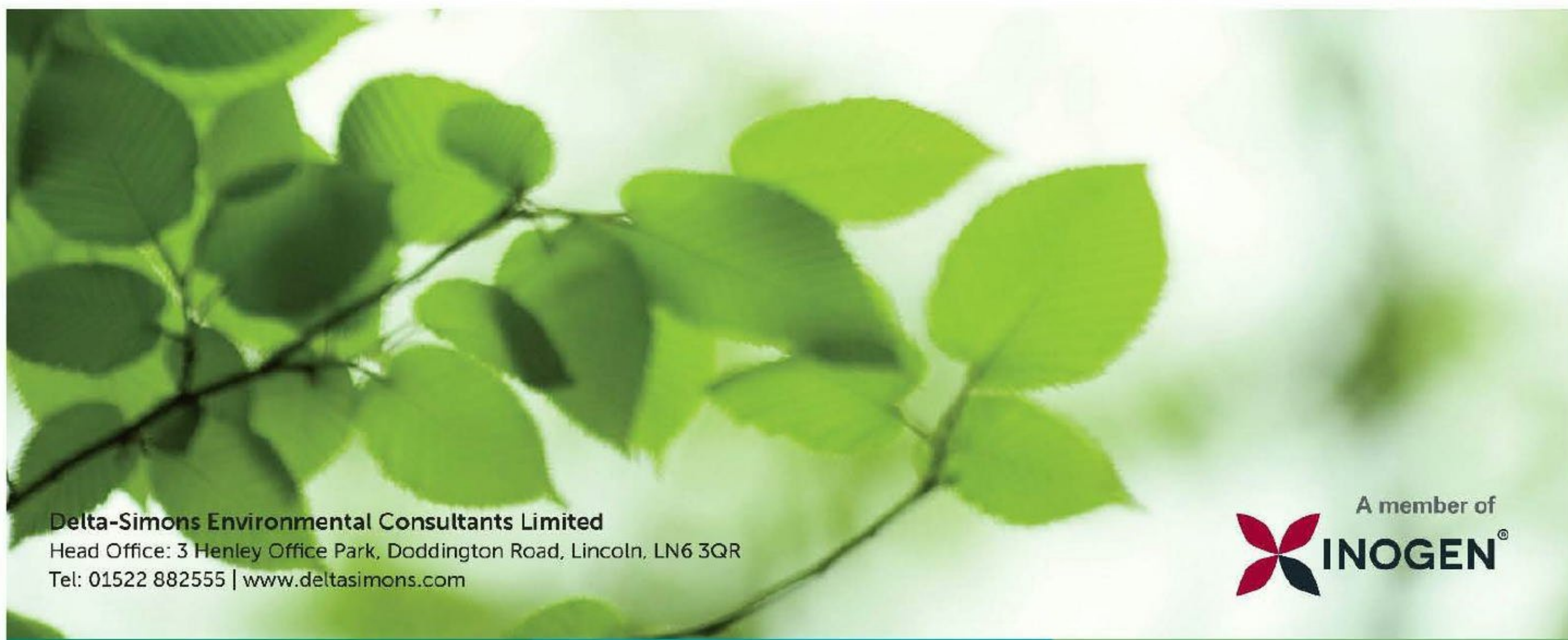
# Planning Noise Assessment

**Millfield Works, Grangefield Road, Stockton-on-Tees**

**Presented to TJ Thomson**

Issued: June 2018

Delta-Simons Project No. 18-0163.03



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## Report Details

<b>Client</b>	TJ Thomson
<b>Report Title</b>	Planning Noise Assessment
<b>Site Address</b>	Millfield Works, Grange field Road, Stockton-on-Tees
<b>Project No.</b>	18-0163.03
<b>Delta-Simons Contact</b>	Ali Yarrow

## Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
1.						
				Graeme Parker Consultant	Chris Chittock Principal Consultant	Alison Yarrow
2.	Final		Typographical amendments			
				Graeme Parker Consultant	Chris Chittock Principal Consultant	Alison Yarrow

## 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 Ltd as term framework suppliers of acoustics services to and on behalf of Delta-Simons.



## Executive Summary

<p><b>Site and Report Context</b></p>	<p>Delta-Simons Environmental Consultants Limited (“Delta-Simons”) was instructed by TJ Thomson (the “Client”) to undertake a planning noise assessment for land at Millfield Works, Grange Road, Stockton-on-Tees (the “Site”) to support a planning application for residential development.</p> <p>The noise assessment has been conducted in accordance with the National Planning Policy Framework.</p> <p>The development site is a former scrap metal merchants approximately covering 20 hectares, North of Grange Road. Surrounding the site are residential and commercial properties in all directions. Adjacent to the proposed development site is the active Durham Coast railway line along the Eastern Boundary, with the Northern boundary marked by trees. Along the Western boundary is Lustrum Beck.</p> <p>It is proposed to develop approximately 600 dwellings (Use Class C3) including elderly accommodation (Use Class C2) with associated works and a local centre (Use Class A1 and/or D1) at Millfield Works, Grange Road, Stockton-on-Tees. All matters are reserved except for points of access.</p> <p>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.</p> <p>The assessment has shown that, when assessing the scenario for a partially open window, the <math>L_{Aeq, 16hr}</math> (Daytime) internal noise levels exceed the limits set by BS8233:2014 at Example Dwelling B and Example Dwelling C.</p> <p>The assessment also shows that, when assessing the scenario for a partially open window, the <math>L_{Aeq, 8hr}</math> (Night time) and the <math>L_{AFMax}</math> internal noise levels are at or below the limits set by BS8233:2014 at all example dwellings with the exception of Dwelling C.</p> <p>Dwelling C is 2.5dB(A) above the recommended night time noise levels as set out by BS8233:2014. Dwellings B and C are 4dB(A) and 3.6dB(A) above the recommended Daytime noise levels set out by BS8233:2014</p> <p>It would be easily possible to achieve the target noise levels from BS8233:2014 by the use of a glazing and ventilation scheme to apply further controls on internal noise. However, this would introduce issues for comfort cooling of dwellings and potentially necessitate the use of additional powered ventilation systems to support that cooling function.</p> <p>Figure 2, Note 7 of the ProPg comments as follows:</p> <p><i>“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal <math>L_{Aeq}</math> target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”</i></p> <p>Given that Dwelling C exceeds the required limit by less than 5dB(A), it is recommended that this should be considered as acceptable without the need for any additional mitigation to bedrooms.</p> <p>In respect of Dwellings B and C and daytime noise it is recommended that additional mitigation is introduced in the form of an acoustic barrier along the boundary between the railway line and the site. This boundary fence should be 2m tall and of closed boarded construction. It is expected that such a barrier would provide a reduction in noise levels of at least 5dB(A). This barrier would provide additional noise mitigation benefits for external amenity areas.</p>
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	<p>Taking account of the recommended mitigation, it is considered that the calculated internal noise levels are below the NOEL set for this project, with the exception of Dwelling C during the night time period, where it is considered the variance is acceptable.</p> <p>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:</p> <p><b>“planning consent be granted subject to the inclusion of suitable noise conditions.”</b></p>
<p>This is intended as a summary only. Further detail and limitations of the assessment is provided within the main body of the Report.</p>	



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## 1.0 Introduction

### 1.1 Appointment

Delta-Simons Environmental Consultants Limited (“Delta-Simons”) was instructed by TJ Thomson (the “Client”) to undertake a planning noise assessment for land at Millfield Works, Grangefield Road, Stockton-on-Tees (the “Site”) to support a proposed planning application for a residential led scheme.

### 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 development site is a former scrap metal merchants approximately covering 20 hectares, North of Grange field Road, Stockton on Tees.

Surrounding the site are residential and commercial properties in all directions. Adjacent to the proposed development site is the active Durham Coast railway line along the Eastern Boundary, with the Northern boundary marked by trees. Along the Western boundary is Lustrum Beck.

### 2.2 Proposed Site Conditions

It is proposed to develop approximately 600 dwellings (Use Class C3) including elderly accommodation (Use Class C2) with associated works and a local centre (Use Class A1 and/or D1) at Millfield Works, Grange field Road, Stockton-on-Tees. All matters are reserved except for points of access.

The proposed site layout is detailed in the drawing issued by BSBA Architects (Drawing No. 17007 P02B) shown overleaf:



### Figure 2.1





## 3.0 Guidance

### 3.1 Stockton-on-Tees Borough Council

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. Stockton-on-Tees Borough Council does not currently have a Local Plan with any relevant guidance on noise. Stockton-on-Tees Borough Council does not currently publish a guidance document on noise supported by local planning policy, its previously published guidance having been withdrawn alongside the withdrawal of PPG24.

It is considered that the main noise impacts at this site will be due to noise from the surrounding road network and railway line (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.

### 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 LAeq levels start to exceed the internal LAeq 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 LAeq 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 do 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 between the 13<sup>th</sup> April and 16<sup>th</sup> April 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.

Three 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 2m from the ground attached to fencing to the Western side of the proposed development site.
- ▲ 'Location 2' – sound level meter positioned externally 1.5m from the ground to the Southern side of the proposed development site.
- ▲ 'Location 3' – sound level meter positioned externally 1.5m from the ground to the Eastern side of the proposed development 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 overleaf and are shown, in full, in Appendix D:



**Table 4.1**  
**Summary of Measured Noise Levels – 13/04/18 to 16/04/18 – free field, dB**

Location	Period	Time (h)	L <sub>Aeq, T</sub>	L <sub>A10</sub>	L <sub>A90</sub>	L <sub>AFmax</sub>
1	Daytime	1640-2300	47.6	48.1	40.1	69.8
	Night Time	2300-0700	53.6	44.0	35.3	82.7
	Daytime	0700-2300	50.3	49.8	40.4	87.2
	Night Time	2300-0700	51.9	46.9	40.4	87.0
	Daytime	0700-2300	49.0	48.2	42.1	84.9
	Night Time	2300-0700	47.6	42.6	35.8	83.2
2	Daytime	1700-2300	46.8	44.9	38.5	74.4
	Night Time	2300-0700	46.2	42.6	35.0	66.1
	Daytime	0700-2300	54.0	47.5	40.3	96.9
	Night Time	2300-0700	46.0	45.9	39.5	68.8
	Daytime	0700-2300	49.2	47.4	41.3	78.0
	Night Time	2300-0700	43.7	41.1	35.2	70.0
3	Daytime	1715-2300	53.2	45.9	39.5	80.3
	Night Time	2300-0700	40.5	41.4	36.3	59.4
	Daytime	0700-2300	55.6	47.4	40.1	90.7
	Night Time	2300-0700	43.7	45.1	39.6	67.0
	Daytime	0700-2300	53.3	49.7	42.4	84.7
	Night Time	2300-0700	48.3	42.4	36.6	81.8

### 4.3 Observations and Comments

The noise environment observed during the attended portion of the survey at the site is characterised as being predominantly noise from the surrounding road network and some birdsong along the western boundary.

The Durham Coast Railway line runs adjacent to the proposed development site along the East and also influences the overall noise environment.

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 surrounding road network and the railway line to the East. It is therefore recommended that, when setting the site layout, consideration should be given to focusing non-residential uses and communal outdoor spaces towards the Eastern side of the site. Thus, residential dwellings should be placed as far away from the Eastern site boundary as possible. The proposed site layout currently detailed in the drawing issued by BSBA Architects (Drawing No. 17007 P02B) shows residential dwellings situated along the Eastern boundary of the development site parallel to the railway line.

However, it is recognised that the size and shape of the site is likely to make it difficult to create significant separation between the dwellings and the railway line at the Eastern side of the site. Therefore, consideration could be given to using the dwellings located close to the Eastern boundary as a barrier to reduce noise levels within the body of the site. These dwellings would be exposed to higher noise levels but would significantly reduce noise levels across the rest of the site. In this instance, consideration should be given to the internal layout of these dwellings to ensure that rooms for residential use do not face the railway line to the East.

#### *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' – West (using 'Location 1' data).
- ▲ 'Example Dwelling B' – South (using 'Location 2' data).
- ▲ 'Example Dwelling C' – East (using 'Location 3' data).

Noise levels 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	Overall Noise Level	Frequency in Hz				
			125	250	500	1000	2000
A (West)	Daytime – $L_{eq}$	50.3	45.8	40.0	38.9	42.4	41.9
	Night Time - $L_{eq}$	53.6	34.3	33.5	36.6	34.7	51.3
	Night Time - $L_{FMax}$	65.9	59.7	57.8	57.7	59.0	54.8
B (South)	Daytime – $L_{eq}$	54.0	57.9	55.0	51.5	49.1	45.0
	Night Time - $L_{eq}$	45.2	42.2	36.0	34.3	34.8	37.8
	Night Time - $L_{FMax}$	63.2	44.6	46.3	44.9	45.4	47.4
C (East)	Daytime – $L_{eq}$	55.6	56.8	47.6	47.6	50.2	47.7
	Night Time - $L_{eq}$	48.3	53.0	43.6	40.9	43.8	41.5
	Night Time - $L_{FMax}$	61.9	55.3	52.0	55.3	55.7	49.3

The maximum noise spectra have been selected for the night time period in to ensure compliance with the ProPg guidance

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

Unusual maximum noise events not consistent with the data set have been excluded as not representative, this equates to a maximum of two events per night time period.

The maximum noise levels detailed above will be exceeded on occasion, but based on the data collected, not more than 10 times in any one night time period. Therefore the next three highest  $L_{Amax}$  noise events during the night time period have been excluded and the and a corrected  $L_{eq}$  noise spectrum has been corrected to equal the same overall level as the fourth highest  $L_{Amax}$ . This spectrum has then been utilised in the assessment.

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.

The following noise levels are taken from the measured noise data and are considered as being incident on the most exposed façades of each example dwelling:

Given a typical modern wall construction comprising an internal leaf of concrete block, lined externally with brick and a cavity between of at least 75mm, the following performance would be expected from the external façade construction:



**Table 5.2**  
**SRI of Façade, dB (R<sub>w</sub>)**

Frequency in Hz	125	250	500	1000	2000
R <sub>w</sub> of Façade	41	45	45	54	58

The area of external façade that is glazed and unglazed has been calculated using the following assumptions:

- ▲ Living Room dimensions of 5m (length) x 4m (width) x 2.3m (height);
- ▲ Bedroom dimensions of 3m (length) x 4m (width) x 2.3m (height);
- ▲ Double glazed window dimensions of 1m (width) x 1.8m (height).

These assumptions have been made based upon typical room sizes of modern family houses. It has been assumed that the most exposed façade would be 4m x 2.3m (9.2m<sup>2</sup>), unglazed, and 7.4m<sup>2</sup> with the aforementioned glazing, for both the Living Room and Bedroom. Acceptable internal noise levels within dwellings are taken from the guidance provided within BS8233:2014, detailed in Section 3.

Given a nominal sound reduction of -15dB for a partially open window, the internal noise levels would be as detailed in Table 5.3:

**Table 5.3**  
**Internal Noise Levels in Rooms in dB(A) – Windows Partially Open**

Example Dwelling	Room	Period	Level	BS8233 Classification
A (West)	Lounge	Daytime	32.9	Below Limit
	Bedroom	Night Time	28.1	Below Limit
		Night Time – Typical Maxima	43.9	Within Adopted Criteria
B (South)	Lounge	Daytime	39.0	Above Limit
	Bedroom	Night Time	26.2	Below Limit
		Night Time – Typical Maxima	36.1	Within Adopted Criteria
C (East)	Lounge	Daytime	38.6	Above Limit
	Bedroom	Night Time	32.5	Above Limit
		Night Time – Typical Maxima	43.3	Within Adopted Criteria

Table 5.7 shows that, when assessing the scenario for a partially open window, the L<sub>Aeq, 16hr</sub> (Daytime) internal noise levels exceed the limits set by BS8233:2014 at Example Dwelling B and Example Dwelling C.

Table 5.7 also shows that, when assessing the scenario for a partially open window, the L<sub>Aeq, 8hr</sub> (Night time) and the L<sub>AFMax</sub> internal noise levels are at or below the limits set by BS8233:2014 at all example dwellings with the exception of Dwelling C.

Dwelling C is 2.5dB(A) above the recommended night time noise levels as set out by BS8233:2014. Dwellings B and C are 4dB(A) and 3.6dB(A) above the recommended Daytime noise levels set out by BS8233:2014

It would be easily possible to achieve the target noise levels from BS8233:2014 by the use of a glazing and ventilation scheme to apply further controls on internal noise. However, this would introduce issues for comfort cooling of dwellings and potentially necessitate the use of additional powered ventilation systems to support that cooling function.

It is noted that Figure 2, Note 7 of the ProPg comments as follows:

*“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.”*



Given that Dwelling C exceeds the required limit by less than 5dB(A), it is recommended that this should be considered as acceptable without the need for any additional mitigation to bedrooms.

In respect of Dwellings B and C and daytime noise it is recommended that additional mitigation is introduced in the form of an acoustic barrier along the boundary between the railway line and the site. This boundary fence should be 2m tall and of closed boarded construction. It is expected that such a barrier would provide a reduction in noise levels of at least 5dB(A).

Taking account of this recommended mitigation, the resulting noise levels in habitable rooms would be as detailed in Table 5.4.

**Table 5.4**  
**Internal Noise Levels in Rooms in dB(A) – Windows Partially Open (Including Mitigation)**

Example Dwelling	Room	Period	Level	BS8233 Classification
A (West)	Lounge	Daytime	32.9	Below Limit
	Bedroom	Night Time	28.1	Below Limit
		Night Time – Typical Maxima	43.9	Within Adopted Criteria
B (South)	Lounge	Daytime	34.0	Below Limit
	Bedroom	Night Time	26.2	Below Limit
		Night Time – Typical Maxima	36.1	Within Adopted Criteria
C (East)	Lounge	Daytime	33.6	Below Limit
	Bedroom	Night Time	32.5	Above Limit
		Night Time – Typical Maxima	43.3	Within Adopted Criteria

It is worth noting that, should the layout of the site change from the current plans, consideration should be taken to ensure rooms for resting and sleeping purposes still conform to good acoustic design.

It is therefore considered that the calculated internal noise levels are below the NOEL set for this project, with the exception of Dwelling C during the night time period, where it is considered the variance is acceptable.

The NOEL is defined as:

**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.

These noise levels are below the NOEL 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.

## 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 calculated  $L_{Aeq,16h}$  noise level at ‘Location 1’ (West) and ‘Location 2’ (South) is below 55dB(A) and currently fulfils the BS8233 criteria. It is considered that no further mitigation measures will be required for external amenity spaces toward the southern end of the development.



The calculated LAeq,16h noise levels at 'Location 3' (East) are above 55dB(A) and currently do not fulfil the BS8233 criteria.

It is considered that the additional mitigation measures recommended above will also provide reductions in excess of 5dB(A) for external amenity spaces within the development. These mitigation measures would bring noise levels in external amenity areas within the requirements of BS8233:2014.

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 rail network, the lowest practicable noise levels should be achieved in external amenity spaces but development should not be prohibited.

## 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  $\pm 2$ dB.

This gives a combined uncertainty for this assessment of  $\pm 2$ dB. 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 Graeme Parker, Acoustic Consultant with responsibilities for completing acoustic reports on behalf of Delta-Simons.

I hold a Bachelor of Science Degree, with Honours, in Biological Sciences from Lancaster University and the Institute of Acoustics Diploma in Acoustics and Noise Control. 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:

- Planning consent may be granted without any need for noise conditions;
- Planning consent may be granted subject to the inclusion of suitable noise conditions;
- 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 was instructed by to undertake a planning noise assessment for land at Millfield Works, Grangefield Road, Stockton-on-Tees.

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

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

The assessment also shows that, when assessing the scenario for a partially open window, the  $L_{Aeq, 8hr}$  (Night time) and the  $L_{AFMax}$  internal noise levels are at or below the limits set by BS8233:2014 at all example dwellings with the exception of Dwelling C.

Dwelling C is 2.5dB(A) above the recommended night time noise levels as set out by BS8233:2014. Dwellings B and C are 4dB(A) and 3.6dB(A) above the recommended Daytime noise levels set out by BS8233:2014

It would be easily possible to achieve the target noise levels from BS8233:2014 by the use of a glazing and ventilation scheme to apply further controls on internal noise. However, this would introduce issues for comfort cooling of dwellings and potentially necessitate the use of additional powered ventilation systems to support that cooling function.

It is noted that Figure 2, Note 7 of the ProPg comments as follows:

*“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal  $L_{Aeq}$  target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”*

Given that Dwelling C exceeds the required limit by less than 5dB(A), it is recommended that this should be considered as acceptable without the need for any additional mitigation to bedrooms.

In respect of Dwellings B and C and daytime noise it is recommended that additional mitigation is introduced in the form of an acoustic barrier along the boundary between the railway line and the site. This boundary fence should be 2m tall and of closed boarded construction. It is expected that such a barrier would provide a reduction



in noise levels of at least 5dB(A). This barrier would provide additional noise mitigation benefits for external amenity areas.

Taking account of the recommended mitigation, it is considered that the calculated internal noise levels are below the NOEL set for this project, with the exception of Dwelling C during the night time period, where it is considered the variance is acceptable.

The NOEL is defined as:

**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.

These noise levels are below the NOEL 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.

### 6.3 External Noise Levels Conclusions

The calculated  $L_{Aeq,16h}$  noise level at 'Location 1' (West) and 'Location 2' (South) is below 55dB(A) and currently fulfils the BS8233 criteria. It is considered that no further mitigation measures will be required for external amenity spaces toward the Southern end of the development.

The calculated  $L_{Aeq,16h}$  noise levels at 'Location 3' (South-East) 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.

It is considered that the additional mitigation measures recommended will also provide reductions in excess of 5dB(A) for external amenity spaces within the development. These mitigation measures would bring noise levels in external amenity areas within the requirements of BS8233:2014.

### 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 Dragonfly Consulting that:

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



## 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 ( $2 \times 10^{-5}$ 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<sub>Aeq</sub>** 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<sub>10</sub> & L<sub>90</sub>** If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L<sub>n</sub> indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L<sub>10</sub> is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L<sub>90</sub> is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L<sub>10</sub> index to describe traffic noise.

**L<sub>Amax</sub>** is the maximum A - weighted sound pressure level recorded over the period stated. L<sub>Amax</sub> is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L<sub>eq</sub> 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	10414
01dB CUBE Sound Level Meter	10619
01dB CUBE Sound Level Meter	11119
Acoustic Calibrator	51030984


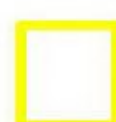


# Appendix C

## Noise Measurement Locations

Figure C-1  
Measurement Location Plan



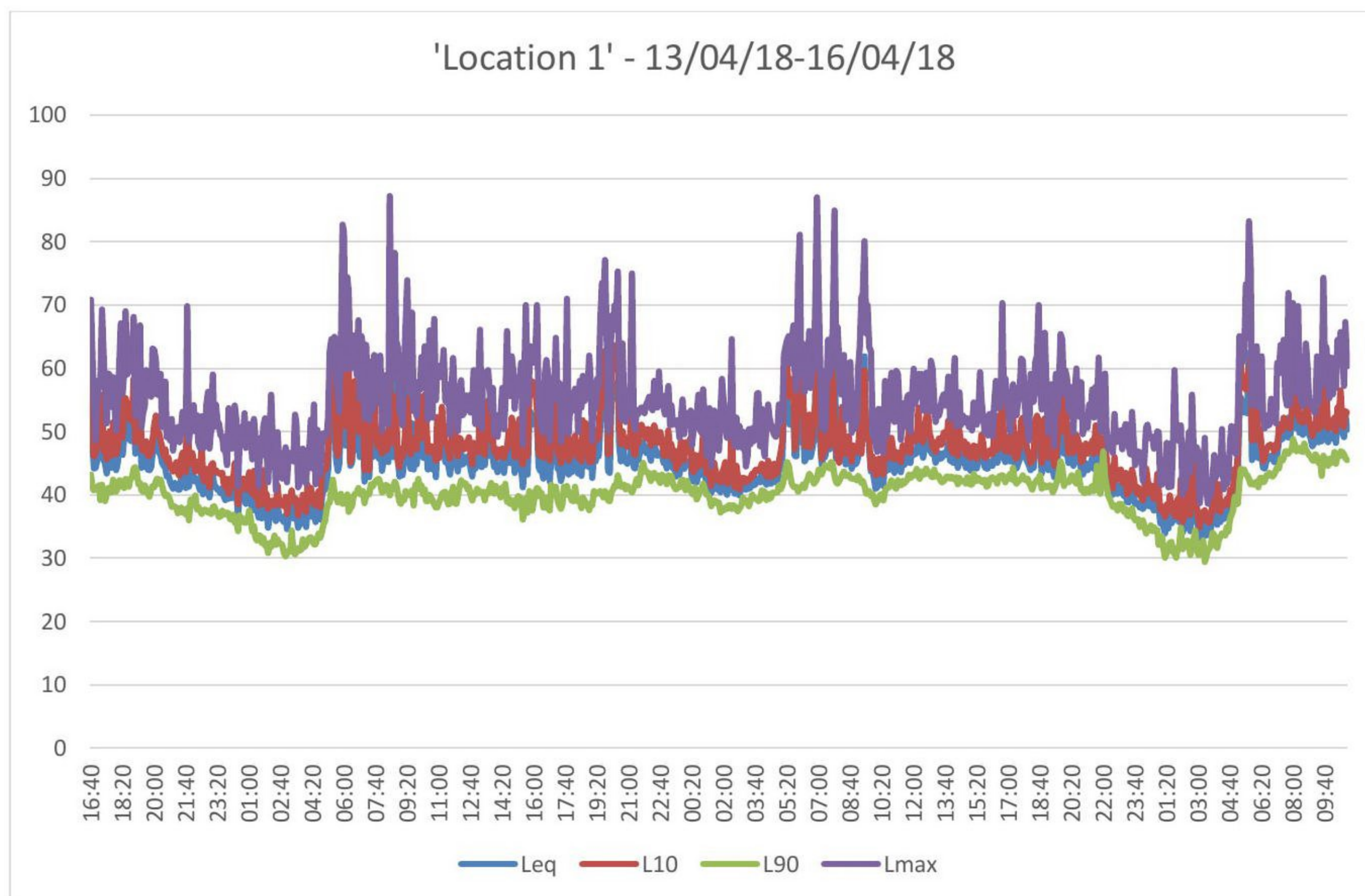
-  Noise Measurement Location
-  Development Site (approx.)



## Appendix D

### Full Survey Results

**Chart D-1**  
**Measured Noise Levels, Location 1, 13/04/18-16/04/18 – free field, dB**

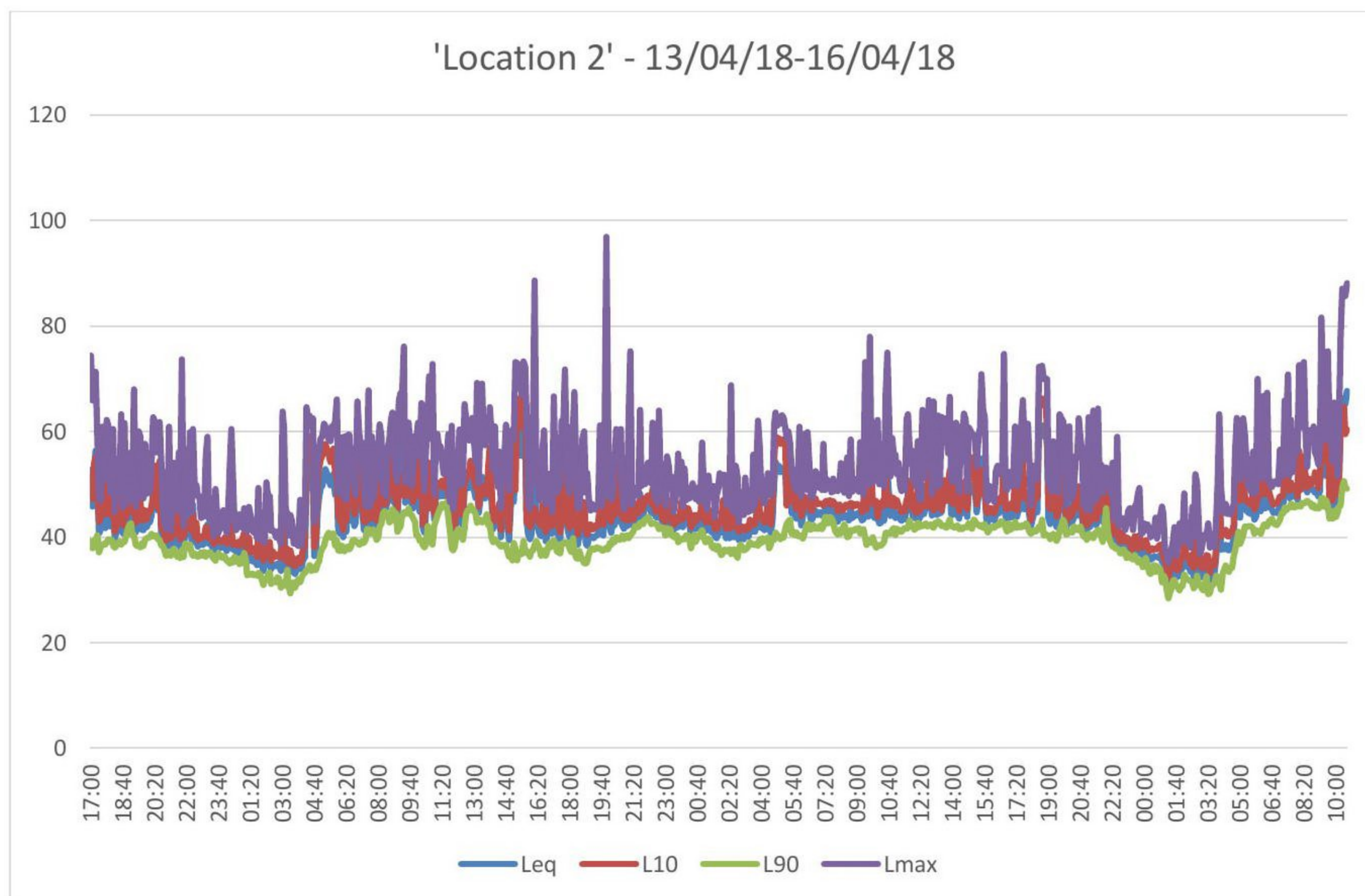




## Appendix D

### Full Survey Results

**Chart D-2**  
**Measured Noise Levels, Location 2, 13/04/18-16/04/18 – free field, dB**

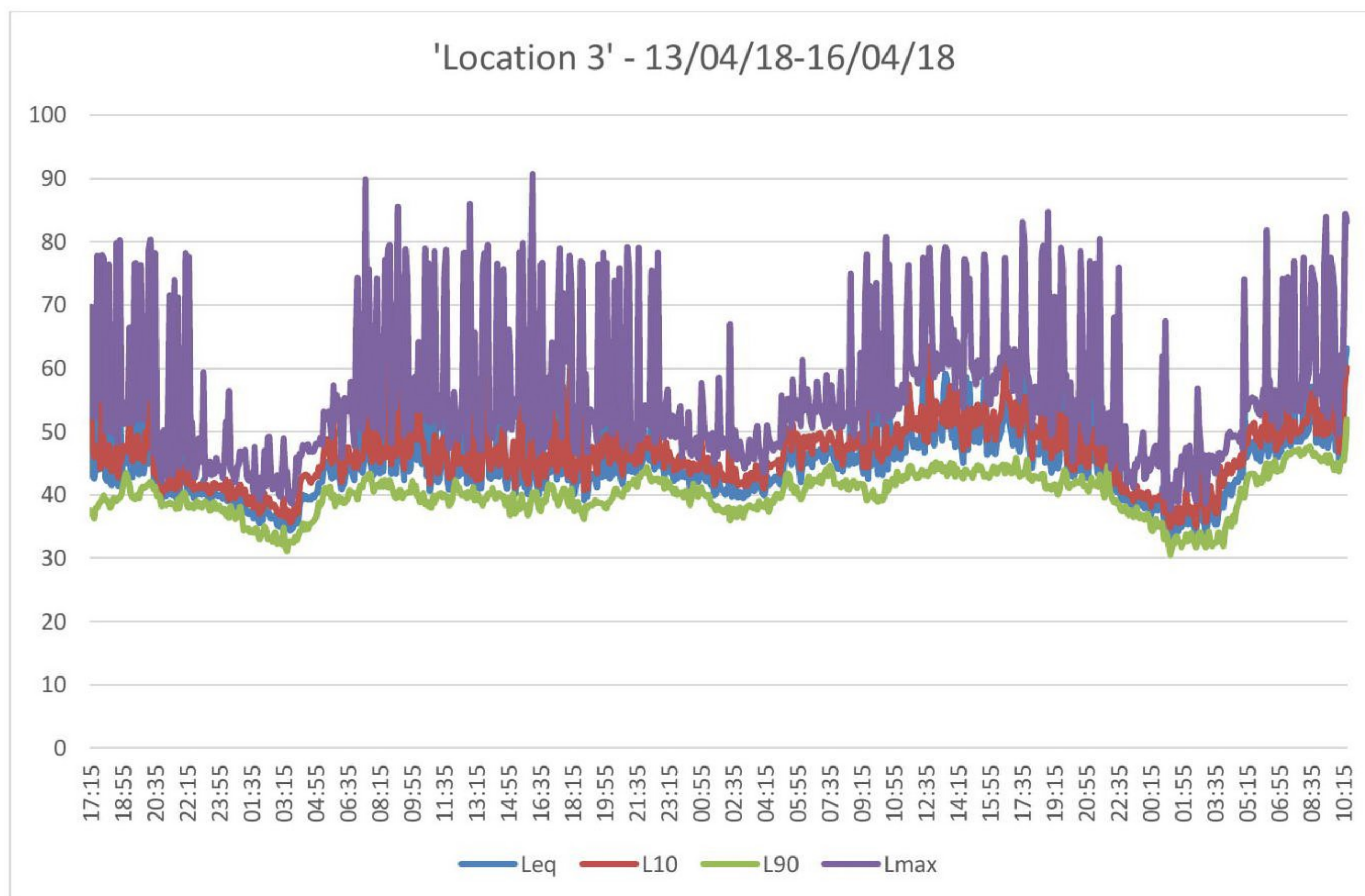




## Appendix D

### Full Survey Results

**Chart D-3**  
**Measured Noise Levels, Location 3, 13/04/18-16/04/18 – free field, dB**





## 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.

This Report was prepared by Delta-Simons for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. In particular, Delta-Simons does not intend, without its written consent, for this Report to be disseminated to anyone other than the Client or to be used or relied upon by anyone other than the Client. Use of the Report by any other person is unauthorised and such use is at the sole risk of the user. Anyone using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by the Consultant.