

Background Noise Assessment

Report No: 3273-R2 – Land at 315 Dodworth Road, Barnsley, S70 6PN - 28/04/2015

Client: Townsend Planning Consultants

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1. Introduction

Clover Acoustics Ltd has been commissioned by Townsend Planning Consultants to undertake a noise assessment of a proposed residential development at 315 Dodworth Road, Barnsley, S70 6PN.

A baseline noise survey has been carried out over a typical 24-hour period in order to assess the impact of noise from rail and road sources at the proposed development. The survey was conducted at two monitoring locations covering a typical 24-hour period commencing on Wednesday 15th April 2015.

2. Scope

This report assesses the noise impact generated from existing sources, in this instance the dominant noise source impacting on the proposed development site is rail and road traffic.

The scope for this assessment is as follows:

- a) A description of the sources of noise which the development site is likely to be subject to i.e. Passing trains & cars, pedestrians etc.
- b) An assessment of the impact which these sources have on the proposed development, including bedrooms, amenity areas and gardens, having regard to the following sources of guidance and assessment methodologies, where appropriate:
 - Noise Policy Statement for England
 - BS8233:2014 – Sound Insulation and Noise Reduction for Buildings.
 - World Health Organisation – Guidelines for Community Noise 1999.
 - Night Noise Guidelines for Europe

Noise Policy Statement for England

A new document dealing with noise was released in March 2012 under the National Planning Policy Framework (NPPF). This document supersedes and replaces Planning Policy Guidance note 24 (PPG24) which previously covered issues related to noise and planning in England. Paragraph 123 of the NPPF states that planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts (see Explanatory Note to the Noise Policy Statement for England (DEFRA)) on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts (see Explanatory Note to the Noise Policy Statement for England (DEFRA)) on health and quality of life arising from noise from new development, including through the use of conditions;
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on

them because of changes in nearby land use since they were established (Subject to the provisions of the Environmental Protection Act 1990 and other relevant law); and

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

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010 with the stated aim to ‘Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development.’

Noise Policy Statement England (NPSE)

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.
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A further stated aim is outlined in para 2.7:

2.7 In addition, the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications.

The Noise Policy Statement further extrapolates on the aims of the policy with a discussion of key phrases and concepts:

“What do the aims of the Noise Policy Statement for England mean?”

2.19 There are several key phrases within the NPSE aims and these are discussed below.

“Significant adverse” and “adverse”

2.20 There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

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.

2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.¹

The document goes on to advise that it is *“not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations”* advising that by not having specific SOAEL values the document retains *“necessary policy flexibility until further evidence and guidance is available”²*

BS8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings.

BS8233 gives guidance for internal noise levels within buildings to achieve reasonable or good resting/sleeping conditions within residential properties as follows:

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35dB $L_{Aeq, 16 \text{ hour}}$	---
Dining	Dining room/area	40dB $L_{Aeq, 16 \text{ hour}}$	---
Sleeping	Bedroom	35dB $L_{Aeq, 16 \text{ hour}}$	30dB $L_{Aeq, 8 \text{ hour}}$

The building envelope design will be considered to ensure that these internal criteria are met. With regard to night time noise it is noted that reference to a specific level (45dB L_{Amax} derived from WHO guidelines values 1999) has been removed from BS8233:2014. It does however make comment that such a limit may be desirable for specific events: *“NOTE 4 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.”*

¹ Page 8 NSPE

² Page 9 NPSE

World Health Organisation – Guidelines for Community Noise 1999.

The World Health Organisation gives guidance for maximum recommended noise levels outside residential properties as follows:

Specific Environment	Critical health effect	dB L_{Aeq}	Time (hr)	dB L_{Amax}
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

WHO Guidelines 1999 indicate that the stated level of 45dB L_{Amax} can be exceeded up to 15 times per night before effects occur. We would view this as representative of the Significant Observed Adverse Effect Level or SOAEL referred to in NSPE derived on the basis that if noise levels are 45 dB L_{Amax} or less, they will not give rise to significant sleep disturbance effects. This should be regarded as a maximum limit. The Lowest Observed Adverse Effect Level or LOAEL would in our view be 42 dB L_{Amax} , since the WHO Night Noise Guidelines for Europe 2009 state that this is the threshold of any observed effect on night time awakening.

3. Site Description

The development site is open land to the rear of 315 Dodworth Road, Barnsley. The proposal is to demolish the existing house and to build 5 detached dwellings. The site is bounded to the south by existing residential dwellings fronting Dodworth Road, to the west by the M1 Motorway set below the level of site, to the north by a rail line set into a cutting and to the east by an open aspect. Subjectively the dominant noise source affecting site is from both the surrounding road traffic and railway line.

Figure 1 shows the proposed site.



Figure 1 – Proposed Site

4. Survey Information

Measurement Instrumentation

The measurement instrumentation used on the survey was as follows:

Equipment	Manufacturer & Type	Serial Number	Calibration Certificate
Sound Level Meter	Norsonic 118	28952	U12135
Sound Level Meter	Cassella CEL 480	089653	STD3208
Acoustic Calibrator	Norsonic 1251	32856	U16611

The equipment was calibrated to comply with section 4.2 of BS7445:1-2003 before and after the surveys. The calibration was as follows:

Meter	Serial	Before		After	
Norsonic 118	28952	113.9	-26.1	113.9	-26.1
Cassella CEL 480	089653	114.0	-	114.0	-

Measurements & Timescales

During the survey 1-minute and 5-minute measurements were made over a typical daytime and night-time period commencing on Wednesday 15th April 2015. The measurements were subsequently analysed into hourly periods.

The following measurements are reported: $L_{Aeq,T}$, $L_{A90,T}$, $L_{AMAX,T}$

The measurements and their interpretation shall be in accordance with BS 7445: Parts 1 and 2. All sound pressure levels are in dB (re 20 μ Pa).

Meteorology

During the survey the weather was considered to be mainly with a light breeze.

Position of Monitoring Equipment

The equipment was positioned 1.5m from the ground at the façade of the property. The monitoring location is shown in figure 2.

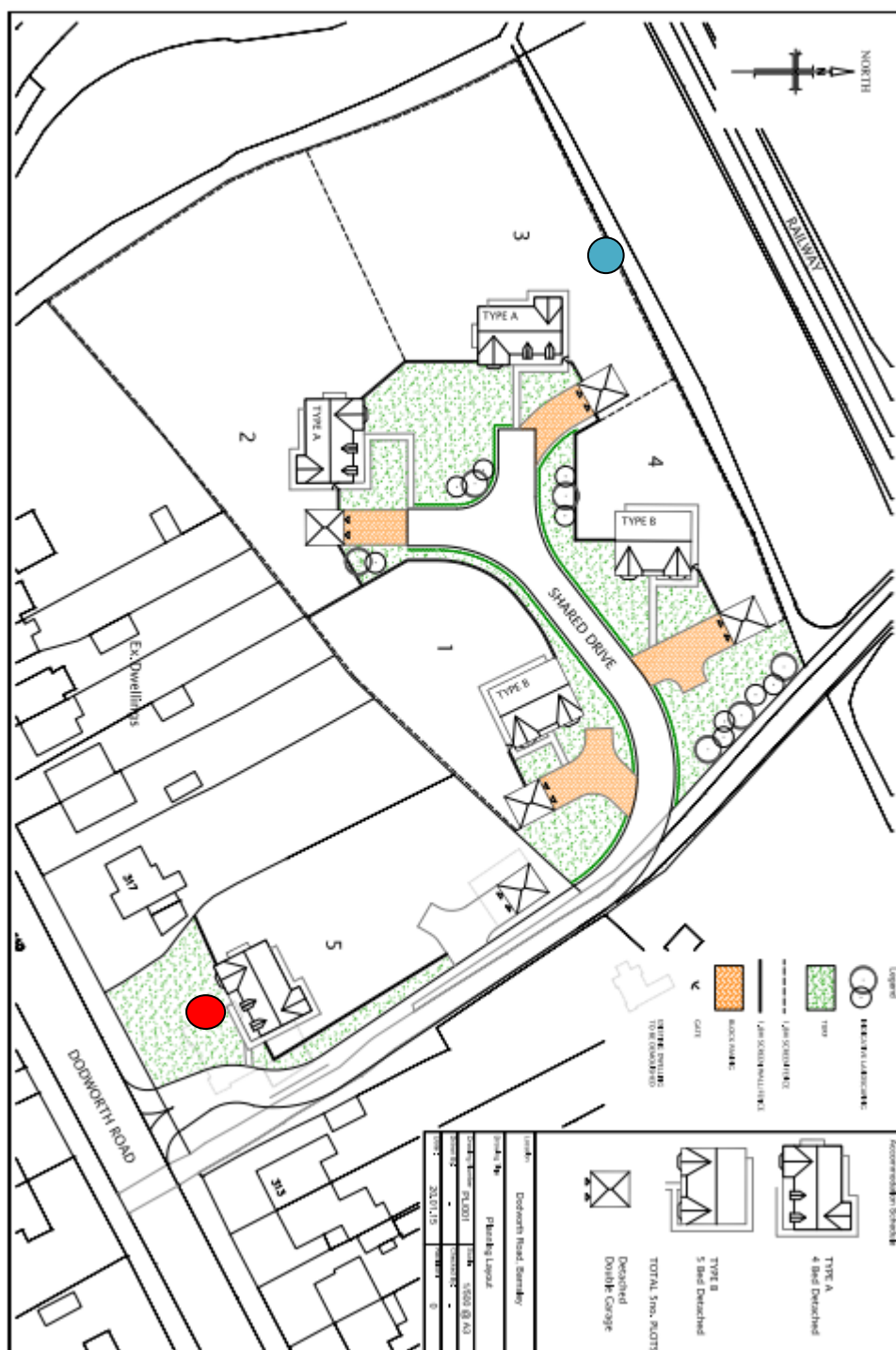


Figure 2 – Monitoring Location

5. Survey Results

Background Noise Summary

The following tables show the summary of the background noise levels monitored. The reported results represent the free field sound pressure levels.

Position 1

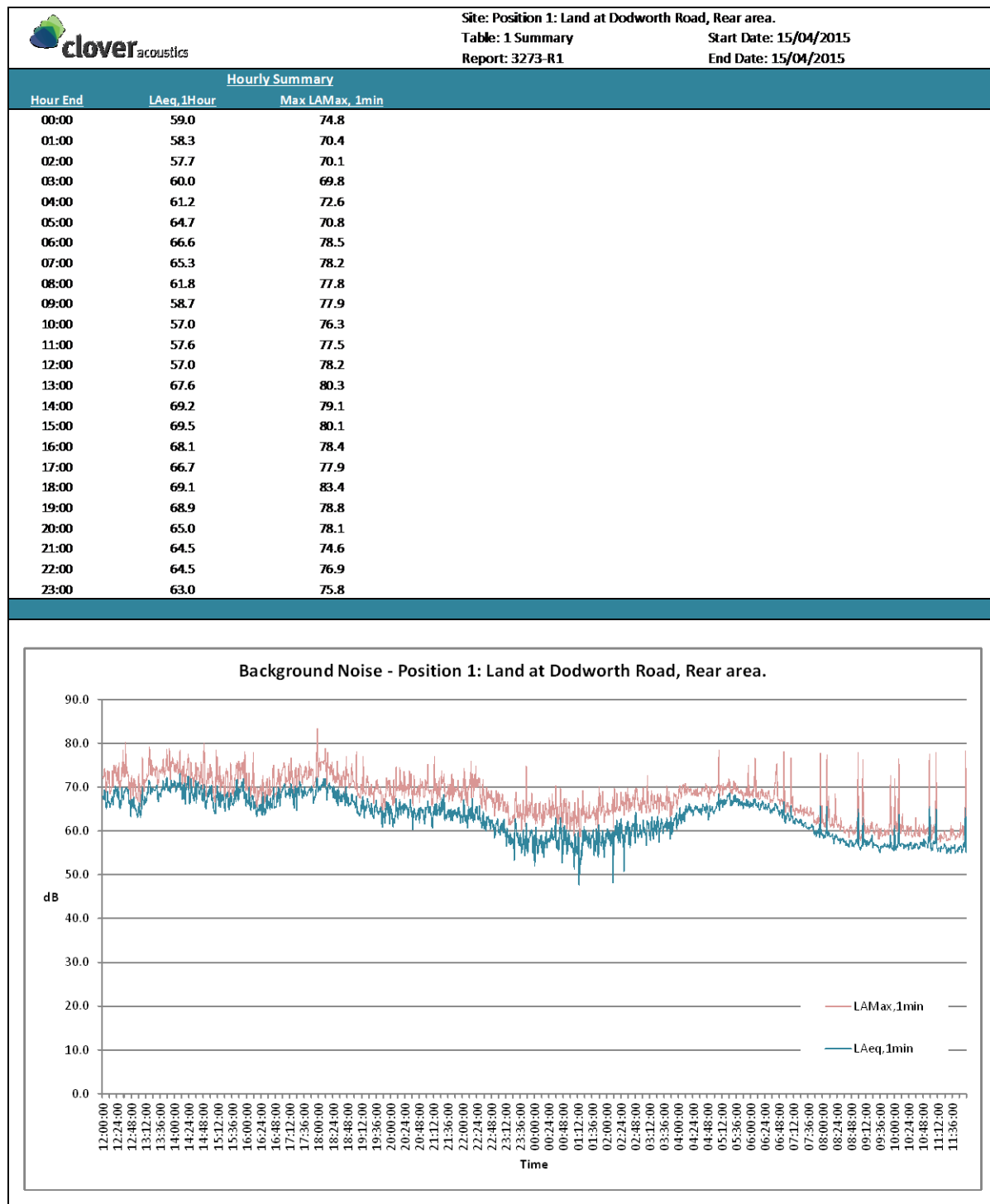


Figure 3 - Background Monitoring Summary - Position 1

Monitoring Position 1				
Measurement	Daytime	Hour Ending/ Period	Night-time	Hour Ending/ Period
Maximum dB $L_{Aeq,1hr}$	69	15:00	67	03:00
Minimum dB $L_{Aeq,1hr}$	57	10:00	58	07:00
Average dB $L_{Aeq,16hr}/L_{Aeq,8hr}$	66	07:00 – 23:00	63	23:00 – 07:00
Night dB $L_{Amax,1Min}$ ³	–	–	71	06:41

The daytime hourly equivalent continuous sound pressure levels at the proposed façade fronting the railway ranged between 57dB $L_{Aeq,1hr}$ and 69dB $L_{Aeq,1hr}$ with an average level during the daytime period of 66dB $L_{Aeq,16hr}$.

The night-time hourly equivalent continuous sound pressure levels at the proposed façade fronting the railway ranged between 58dB $L_{Aeq,1hr}$ and 67dB $L_{Aeq,1hr}$ with an average level during the night-time period of 63dB $L_{Aeq,8hr}$. The 15th highest³ night-time individual noise event between the hours of 23:00 and 07:00 was 71dB $L_{Amax,1min}$.

³ The 15th highest LAMAX has been selected as in line with good sleep conditions identified in “The Guidelines for Community Noise” Section 3.4 Sleep Disturbance.

Position 2

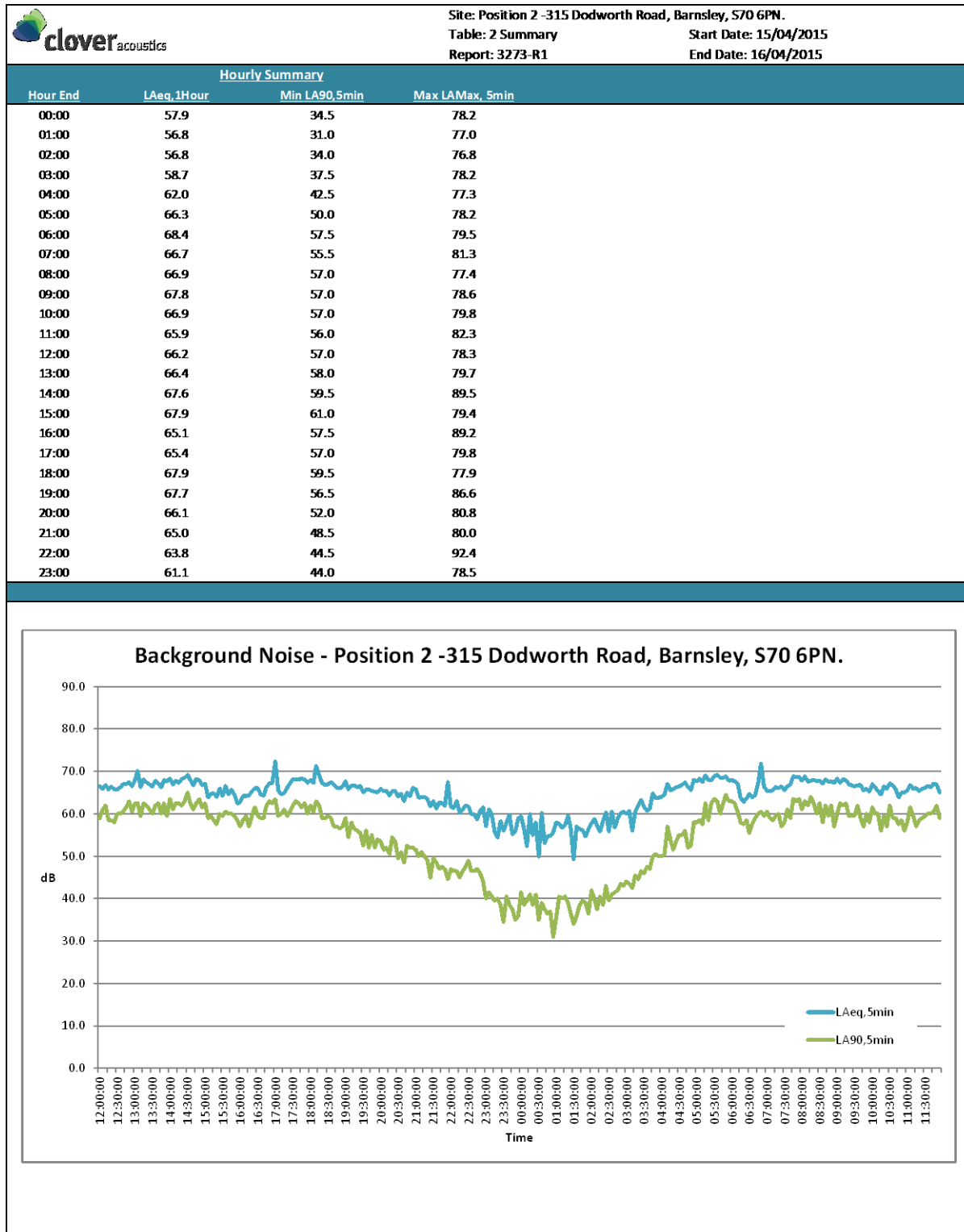


Figure 4 - Background Monitoring Summary - Position 2

Monitoring Position 2				
Measurement	Daytime	Hour Ending/ Period	Night-time	Hour Ending/ Period
Maximum dB $L_{Aeq,1hr}$	68	18:00	68	06:00
Minimum dB $L_{Aeq,1hr}$	61	23:00	57	01:00
Average dB $L_{Aeq,16hr}/L_{Aeq,8hr}$	66	07:00 – 23:00	64	23:00 – 07:00

The daytime hourly equivalent continuous sound pressure levels at the proposed façade fronting Dodworth Road ranged between 61dB $L_{Aeq,1hr}$ and 68dB $L_{Aeq,1hr}$ with an average level during the daytime period of 66dB $L_{Aeq,16hr}$.

The night-time hourly equivalent continuous sound pressure levels at the proposed façade fronting the Dodworth Road ranged between 57dB $L_{Aeq,1hr}$ and 68dB $L_{Aeq,1hr}$ with an average level during the night-time period of 64dB $L_{Aeq,8hr}$.

6. Design Criteria

Internal Design Criteria

The internal design criteria proposed is in line with the guidance from BS8233:2014 for indoor ambient noise levels within spaces when they are unoccupied. The proposed target for bedrooms, living and dining areas is as follows:

Area	Internal Level, dB(A)
Living Rooms (07:00 – 23:00)	35dB
Dining Rooms (07:00 – 23:00)	40dB
Bedrooms (23:00 – 07:00)	30dB

As the nature of noise affecting the rear of site is partially rail traffic the previously referred to level of 45dB L_{Amax} should be applied in line with the discussion in section 2 of this report.

The follow section gives recommendations for achieving the proposed internal design criteria.

7. Mitigation

Glazing Design

The internal design criteria can be achieved through a glazing performance requirement. The following table summarises the recorded levels on site and show the glazing performance requirement to achieve the criteria. This uses the simple calculation method from BS8233:2014. Standard forms of construction are assumed therefore it is likely the glazing will be the lowest performing façade element.

Monitoring Position 1	Living Room Areas	Dining Room Areas	Bedroom Areas	
Average Case Levels	66 dB $L_{Aeq,16hr}$	66 dB $L_{Aeq,16hr}$	63 dB $L_{Aeq,8hr}$	71 dB L_{Amax}
Internal Design Criteria	35dB(A)	40 dB(A)	30 dB(A)	45 dB L_{Amax}
Glazing Performance Requirement	31dB R_{RAIL}	26 dB R_{RAIL}	33 dB R_{RAIL}	26 dB R_{RAIL}

The glazing performance requirement is based on the rail traffic corrected sound reduction index R_{RAIL} . The night-time average $L_{Aeq,8hr}$ criteria exceeds the single event L_{Amax} criteria, therefore should be used for selection in glazing performance for bedroom areas.

Glazing Configurations

The table below is a summary of the typical performance of Pilkington glazed units as detailed in *Pilkington Design Guide "Glass & Noise Control" – Technical Bulletin May 1997*. Glazing from any other manufacturer can be used providing it can be shown that it will achieve the glazing performance requirements above.

Pilkington Configurations	dB R_{RAIL}	Position 1	
		Living/Dining	Bed
4.12.4	28	-	-
6.12.6	29	-	-
6.12.6-4p ⁴	30	-	-
10.12.4	32	✓	-
10.12.6	35	✓	✓
10.12.6-4p ⁴	37	✓	✓
6.100.4 Secondary	40	✓	✓
6.150.4 Secondary	42	✓	✓
10.200.6 Secondary	48	✓	✓

Monitoring Position 1 - Rear – The minimum Pilkington glazing configuration to achieve 31dB R_{RAIL} within living areas is 10.12.4 double glazing. The minimum Pilkington glazing configuration to achieve 33dB R_{RAIL} within bedroom areas is 10.12.6 double glazing.

⁴ PVB laminated glass - polyvinyl butyral.

Monitoring Position 2	Living Room Areas	Dining Room Areas	Bedroom Areas
Average Case Levels	66 dB $L_{Aeq,16hr}$	66 dB $L_{Aeq,16hr}$	64 dB $L_{Aeq,8hr}$
Internal Design Criteria	35dB(A)	40 dB(A)	30 dB(A)
Glazing Performance Requirement	31dB R_{TRA}	26 dB R_{TRA}	34 dB R_{TRA}

The glazing performance requirement is based on the traffic corrected sound reduction index R_{TRA} .

Glazing Configurations

The table below is a summary of the typical performance of Pilkington glazed units as detailed in *Pilkington Design Guide "Glass & Noise Control" – Technical Bulletin May 1997*. Glazing from any other manufacturer can be used providing it can be shown that it will achieve the glazing performance requirements above.

Pilkington Configurations	dB R _{TRA}	Position 2	
		Living/Dining	Bed
Double Glazing			
4.12.4	25	-	-
6.12.6	26	-	-
6.12.6-4pvb ⁵	27	-	-
10.12.4	29	-	-
10.12.6	32	✓	-
10.12.6-4pvb	34	✓	✓
Secondary Glazing			
6.100.4 Secondary	37	✓	✓
6.150.4 Secondary	39	✓	✓
10.200.6 Secondary	45	✓	✓

Monitoring Position 2 Front – The minimum Pilkington glazing configuration to achieve 31dB R_{TRA} within living room areas is 10.12.6-4pvb double glazing with a performance of 32dB R_{TRA} . The minimum Pilkington glazing configuration to achieve 34dB R_{TRA} within bedroom areas is 10.12.6-4pvb double glazing with a performance of 34dB R_{TRA} . Alternative manufacturers may be selected as long as the selected glazing unit acoustic performance achieves the specified dB R_{TRA} requirement.

⁵ PVB laminated glass - polyvinyl butyral.

World Health Organisation – Guidelines for Community Noise 1999.

The World Health Organisation gives guidance for maximum recommended noise levels outside residential properties as follows:

Specific Environment	Critical health effect	dB L _{Aeq}	Time (hr)	dB L _{Amax}
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

It is understood that there are no external amenity areas to the front of the proposed development facing Dodworth Road. Levels at the rear of the development are in excess of the upper limit for outdoor living areas. A 2.2m close boarded fence has been calculated to provide sufficient attenuation to predict levels below the serious annoyance guideline values. The calculation sheet is presented in the Appendix. The total barrier fence height is to be 2.2 meters with a minimum superficial mass of 15Kg/m² to ensure the barrier attenuation is not compromised by sound passing through the barrier. The barrier should be of solid construction with timber thickness of at least 20mm in all places. 25mm timber boards mass is around 16Kg/m². The timber boards should continue across fence posts and with large overlaps to prevent gaps appearing over time.

8. Conclusion

The site has been surveyed in line with the recommendations in BS7445:1 – 2003 and BS7445:2 – 1991. This report has shown that the target internal noise levels for bedroom and living/dining areas in accordance with internal ambient levels from the guidance in BS8233:2014 can be achieved by using the correct glazing specification.

Monitoring position 1 – Rear of development: In living areas to achieve the design target internal ambient levels from the guidance in BS8233:2014 a glazing specification with a performance of 31dB R_{RAIL} is required. Based on the Pilkington Design Guide performance tables, the glazing configuration that will achieve this performance is 10.12.4 double glazing with a performance of 32dB R_{RAIL} .

In bedroom areas to achieve the design target internal ambient levels from the guidance in BS8233:2014 a glazing specification with a performance of 33dB R_{RAIL} is required. Based on the Pilkington Design Guide performance tables, the glazing configuration that will achieve this performance is 10.12.6 double glazing with a performance of 33 R_{RAIL} .

Monitoring Position 2 – Dodworth Road Façade: In living/dining areas to achieve the design target internal ambient levels from the guidance in BS8233:2014 a glazing specification with a performance of 31dB R_{TRA} is required. Based on the Pilkington Design Guide performance tables, the glazing configuration that will achieve this performance is 10.12.6 double glazing with a performance of 32dB R_{TRA} .

In bedroom areas to achieve the design target internal ambient levels from the guidance in BS8233:2014 a glazing specification with a performance of 34dB R_{TRA} is required. Based on the Pilkington Design Guide performance tables, the glazing configuration that will achieve this performance is 10.12.6-4pnb double glazing with a performance of 34B R_{TRA} .

Care should be taken with regard to selection of ventilation so it shall not compromise the glazing specification and as such we would recommend Greenwood Airvac. Please contact Greenwood for the correct selection of acoustic vents based on our glazing performance specification.
Greenwood Airvac Contact: Mike Beck – M:07801 039584



Steve Clow MIOA
Acoustic Consultant

9. Appendix

Glossary of Terms

Specific Noise Source

The noise source under investigation for assessing the likelihood of complaints.

Specific Noise Level, $L_{Aeq,T}$

The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.

Rating Level, $L_{A,T}$

The specific noise level plus any adjustment for the characteristic features of the noise.

Background Noise Level, $L_{A90,T}$

The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 % of a given time interval, T.

Residual Noise

The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.

Ambient Noise

Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

Reference Time Interval, T

The specified interval over which an equivalent continuous A-weighted sound pressure level is determined.

$L_{Aeq,T}$

The A-weighted equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as the fluctuating sound over a specified measurement period, T.

$L_{A10,T}$

The A-weighted sound level exceeded for 10% of the specified measurement period, T.

L_{Amax}

The highest short duration A-weighted sound level recorded during a noise event.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to approximate to the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies.

Octave Band

A frequency band in which the upper limit of the band is twice the frequency of the lower limit.

One-third-octave Band

A frequency band in which the upper limit of the band is 1/3 times the frequency of the lower limit.

Data Appendix – Position 1 L_{Amax}

 acoustics Site: Position 1: Land at Dodworth Road, Resor area. Table: 5 - Night L_{Amax} Events Report: 3273-R1 Start Date: 15/04/2015 End Date: 16/04/2015												Table: 6 - L_{Amax} Events Ranked						
Date	Time	L _A (max)	Date	Time	L _A (max)	Date	Time	L _A (max)	Date	Time	L _A (max)	#	Date	Time	L _A (max)			
15/04/15	23:00	64.6	16/04/15	00:36	61.4	16/04/15	02:12	67.2	16/04/15	03:48	63.6	16/04/15	05:24	71.7	1	15/04/15	05:07	78.5
15/04/15	23:01	68.4	16/04/15	00:37	63.1	16/04/15	02:13	69.7	16/04/15	03:49	64.1	16/04/15	05:25	71.2	2	15/04/15	06:55	78.2
15/04/15	23:02	64.8	16/04/15	00:38	65.5	16/04/15	02:14	66.2	16/04/15	03:50	65.7	16/04/15	05:26	68.5	3	15/04/15	06:07	76.6
15/04/15	23:03	66.5	16/04/15	00:39	61.5	16/04/15	02:15	64.2	16/04/15	03:51	65.3	16/04/15	05:27	68.6	4	15/04/15	06:08	76.5
15/04/15	23:04	66.3	16/04/15	00:40	62.3	16/04/15	02:16	65.2	16/04/15	03:52	68.7	16/04/15	05:28	69.6	5	15/04/15	06:44	75.3
15/04/15	23:05	67.3	16/04/15	00:41	65.1	16/04/15	02:17	68.6	16/04/15	03:53	68.2	16/04/15	05:29	68.5	6	15/04/15	06:43	75.2
15/04/15	23:06	68.4	16/04/15	00:42	65.8	16/04/15	02:18	65.3	16/04/15	03:54	67.8	16/04/15	05:30	69.1	7	15/04/15	05:56	74.9
15/04/15	23:07	68.3	16/04/15	00:43	69.7	16/04/15	02:19	64.9	16/04/15	03:55	68.3	16/04/15	05:31	69.9	8	16/04/15	23:46	74.8
15/04/15	23:08	64.4	16/04/15	00:44	61.7	16/04/15	02:20	64.5	16/04/15	03:56	68.0	16/04/15	05:32	71.5	9	15/04/15	06:42	73.5
15/04/15	23:09	66.7	16/04/15	00:45	66.3	16/04/15	02:21	65.6	16/04/15	03:57	65.1	16/04/15	05:33	69.4	10	15/04/15	06:56	73.2
15/04/15	23:10	65.7	16/04/15	00:46	60.8	16/04/15	02:22	64.5	16/04/15	03:58	67.2	16/04/15	05:34	71.0	11	15/04/15	03:08	72.6
15/04/15	23:11	66.6	16/04/15	00:47	62.3	16/04/15	02:23	65.2	16/04/15	03:59	67.2	16/04/15	05:35	69.9	12	15/04/15	05:23	71.8
15/04/15	23:12	64.2	16/04/15	00:48	67.0	16/04/15	02:24	68.9	16/04/15	04:00	69.5	16/04/15	05:36	68.9	13	15/04/15	05:24	71.7
15/04/15	23:13	64.2	16/04/15	00:49	64.1	16/04/15	02:25	66.2	16/04/15	04:01	68.8	16/04/15	05:37	69.6	14	15/04/15	05:32	71.5
15/04/15	23:14	65.5	16/04/15	00:50	67.5	16/04/15	02:26	65.7	16/04/15	04:02	70.3	16/04/15	05:38	70.2	15	15/04/15	06:41	71.4
15/04/15	23:15	66.7	16/04/15	00:51	65.9	16/04/15	02:27	67.8	16/04/15	04:03	68.5	16/04/15	05:39	68.8	16	15/04/15	05:25	71.2
15/04/15	23:16	63.4	16/04/15	00:52	61.8	16/04/15	02:28	65.1	16/04/15	04:04	67.4	16/04/15	05:40	68.6	17	15/04/15	05:34	71.0
15/04/15	23:17	61.3	16/04/15	00:53	67.4	16/04/15	02:29	63.5	16/04/15	04:05	69.8	16/04/15	05:41	69.1	18	15/04/15	04:11	70.8
15/04/15	23:18	62.1	16/04/15	00:54	60.4	16/04/15	02:30	65.9	16/04/15	04:06	69.5	16/04/15	05:42	68.5	19	15/04/15	04:45	70.8
15/04/15	23:19	63.1	16/04/15	00:55	61.7	16/04/15	02:31	66.9	16/04/15	04:07	70.3	16/04/15	05:43	69.0	20	15/04/15	05:14	70.8
15/04/15	23:20	61.4	16/04/15	00:56	64.6	16/04/15	02:32	68.9	16/04/15	04:08	70.7	16/04/15	05:44	69.4	21	15/04/15	04:08	70.7
15/04/15	23:21	62.2	16/04/15	00:57	66.6	16/04/15	02:33	64.8	16/04/15	04:09	70.1	16/04/15	05:45	68.4	22	15/04/15	05:21	70.7
15/04/15	23:22	61.8	16/04/15	00:58	66.3	16/04/15	02:34	66.8	16/04/15	04:10	68.2	16/04/15	05:46	69.1	23	15/04/15	05:05	70.5
15/04/15	23:23	63.0	16/04/15	00:59	60.3	16/04/15	02:35	69.7	16/04/15	04:11	70.8	16/04/15	05:47	67.1	24	15/04/15	05:11	70.5
15/04/15	23:24	63.6	16/04/15	01:00	61.9	16/04/15	02:36	66.8	16/04/15	04:12	70.0	16/04/15	05:48	67.0	25	15/04/15	05:35	70.4
15/04/15	23:25	63.0	16/04/15	01:01	64.1	16/04/15	02:37	64.3	16/04/15	04:13	68.3	16/04/15	05:49	68.1	26	15/04/15	05:04	70.4
15/04/15	23:26	62.0	16/04/15	01:02	61.3	16/04/15	02:38	67.5	16/04/15	04:14	68.9	16/04/15	05:50	68.7	27	15/04/15	05:20	70.4
15/04/15	23:27	67.4	16/04/15	01:03	62.9	16/04/15	02:39	67.2	16/04/15	04:15	70.1	16/04/15	05:51	67.9	28	15/04/15	03:40	70.3
15/04/15	23:28	66.9	16/04/15	01:04	64.6	16/04/15	02:40	64.6	16/04/15	04:16	69.7	16/04/15	05:52	68.3	29	15/04/15	04:02	70.3
15/04/15	23:29	68.8	16/04/15	01:05	63.8	16/04/15	02:41	66.6	16/04/15	04:17	69.4	16/04/15	05:53	69.8	30	15/04/15	04:07	70.3
15/04/15	23:30	66.3	16/04/15	01:06	58.3	16/04/15	02:42	65.5	16/04/15	04:18	68.8	16/04/15	05:54	68.3	31	15/04/15	04:47	70.3
15/04/15	23:31	63.1	16/04/15	01:07	66.6	16/04/15	02:43	66.2	16/04/15	04:19	69.6	16/04/15	05:55	67.9	32	15/04/15	04:52	70.2
15/04/15	23:32	66.0	16/04/15	01:08	62.9	16/04/15	02:44	68.3	16/04/15	04:20	69.7	16/04/15	05:56	74.9	33	15/04/15	05:38	70.2
15/04/15	23:33	63.1	16/04/15	01:09	63.6	16/04/15	02:45	67.2	16/04/15	04:21	68.1	16/04/15	05:57	68.0	34	15/04/15	06:40	70.2
15/04/15	23:34	62.9	16/04/15	01:10	60.6	16/04/15	02:46	66.0	16/04/15	04:22	68.7	16/04/15	05:58	67.5	35	15/04/15	01:47	70.1
15/04/15	23:35	64.9	16/04/15	01:11	62.3	16/04/15	02:47	64.8	16/04/15	04:23	68.7	16/04/15	05:59	69.0	36	15/04/15	04:09	70.1
15/04/15	23:36	66.0	16/04/15	01:12	67.6	16/04/15	02:48	69.8	16/04/15	04:24	68.2	16/04/15	06:00	68.1	37	15/04/15	04:15	70.1
15/04/15	23:37	62.9	16/04/15	01:13	66.1	16/04/15	02:49	69.6	16/04/15	04:25	69.4	16/04/15	06:01	68.1	38	15/04/15	03:01	70.0
15/04/15	23:38	60.1	16/04/15	01:14	57.2	16/04/15	02:50	69.6	16/04/15	04:26	68.3	16/04/15	06:02	68.9	39	15/04/15	04:12	70.0
15/04/15	23:39	61.9	16/04/15	01:15	60.3	16/04/15	02:51	67.0	16/04/15	04:27	68.1	16/04/15	06:03	69.4	40	15/04/15	05:10	70.0
15/04/15	23:40	64.7	16/04/15	01:16	58.6	16/04/15	02:52	67.5	16/04/15	04:28	69.5	16/04/15	06:04	67.5	41	15/04/15	05:17	70.0
15/04/15	23:41	67.1	16/04/15	01:17	62.9	16/04/15	02:53	65.9	16/04/15	04:29	68.6	16/04/15	06:05	69.6	42	15/04/15	05:31	69.9
15/04/15	23:42	63.9	16/04/15	01:18	65.2	16/04/15	02:54	64.7	16/04/15	04:30	68.0	16/04/15	06:06	68.9	43	15/04/15	05:35	69.8
15/04/15	23:43	63.4	16/04/15	01:19	63.3	16/04/15	02:55	64.6	16/04/15	04:31	69.8	16/04/15	06:07	76.6	44	15/04/15	02:48	69.8
15/04/15	23:44	61.0	16/04/15	01:20	69.3	16/04/15	02:56	66.9	16/04/15	04:32	67.8	16/04/15	06:08	76.5	45	15/04/15	04:05	69.8
15/04/15	23:45	65.7	16/04/15	01:21	63.8	16/04/15	02:57	66.4	16/04/15	04:33	68.7	16/04/15	06:09	67.7	46	15/04/15	04:31	69.8
15/04/15	23:46	74.8	16/04/15	01:22	65.8	16/04/15	02:58	64.1	16/04/15	04:34	68.6	16/04/15	06:10	68.8	47	15/04/15	04:39	69.8
15/04/15	23:47	67.6	16/04/15	01:23	64.0	16/04/15	02:59	64.2	16/04/15	04:35	68.4	16/04/15	06:11	67.4	48	15/04/15	05:12	69.8
15/04/15	23:48	63.0	16/04/15	01:24	61.9	16/04/15	03:00	67.9	16/04/15	04:36	68.9	16/04/15	06:12	67.8	49	15/04/15	05:18	69.8
15/04/15	23:49	63.5	16/04/15	01:25	62.6	16/04/15	03:01	70.0	16/04/15	04:37	68.7	16/04/15	06:13	69.0	50	15/04/15	05:22	69.8
15/04/15	23:50	64.7	16/04/15	01:26	65.3	16/04/15	03:02	66.0	16/04/15	04:38	67.9	16/04/15	06:14	67.1	51	15/04/15	05:53	69.8
15/04/15	23:51	66.6	16/04/15	01:27	63.2	16/04/15	03:03	66.8	16/04/15	04:39	69.8	16/04/15	06:15	67.3	52	15/04/15	00:43	69.7
15/04/15	23:52	63.5	16/04/15	01:28	63.6	16/04/15	03:04	66.8	16/04/15	04:40	69.4	16/04/15	06:16	67.6	53	15/04/15	02:13	69.7
15/04/15	23:53	64.3	16/04/15	01:29	62.7	16/04/15	03:05	65.4	16/04/15	04:41	69.7	16/04/15	06:17	68.9	54	15/04/15	02:35	69.7
15/04/15	23:54	66.4	16/04/15	01:30	63.0	16/04/15	03:06	64.0	16/04/15	04:42	69.2	16/04/15	06:18	69.6	55	15/04/15	04:16	69.7
15/04/15	23:55	68.6	16/04/15	01:31	66.7	16/04/15	03:07	67.7	16/04/15	04:43	68.9	16/04/15	06:19	67.9	56	15/04/15	04:20	69.7
15/04/15	23:56	64.6	16/04/15	01:32	62.7	16/04/15	03:08	72.6	16/04/15	04:44	69.3	16/04/15	06:20	69.3	57	15/04/15	04:41	69.7
15/04/15	23:57	63.4	16/04/15	01:33	63.5	16/04/15	03:09	66.3	16/04/15	04:45	70.8	16/04/15	06:21	68.6	58	15/04/15	04:55	69.7
15/0																		



Site: Position 2 -315 Dodworth Road, Barnsley, S70 GPN.

Table: 2

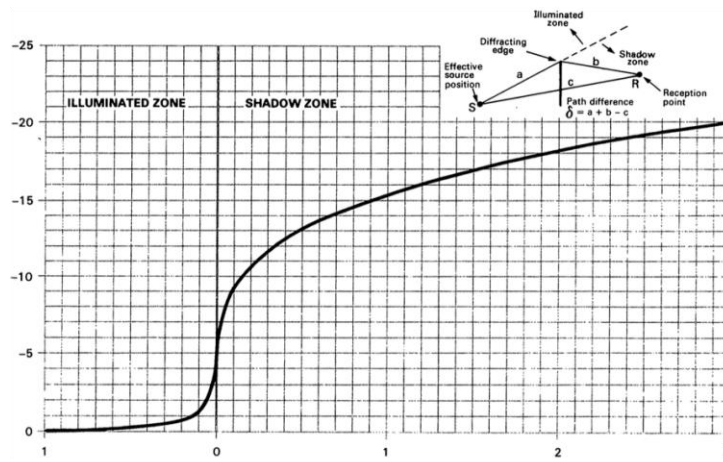
Start Date: 15/04/2015

Report: 3273-R1

End Date: 16/04/2015

Time	LAeq	LA90	LAMax	Time	LAeq	LA90	LAMax	Time	LAeq	LA90	LAMax	Time	LAeq	LA90	LAMax
12:00	66.5	59.0	74.8	16:50	67.2	63.0	76.1	21:40	62.7	47.0	76.0	02:30	55.9	39.5	73.4
12:05	65.9	61.0	73.8	16:55	67.3	62.5	73.6	21:45	62.5	47.5	73.7	02:35	60.5	41.0	75.5
12:10	66.8	62.0	74.7	17:00	72.4	63.5	73.6	21:50	61.9	47.0	72.7	02:40	56.7	41.5	74.9
12:15	65.7	58.5	74.9	17:05	65.6	59.5	72.4	21:55	67.5	44.5	92.4	02:45	59.0	42.0	74.5
12:20	66.4	58.5	77.1	17:10	64.6	60.0	70.1	22:00	61.6	47.0	73.7	02:50	60.1	43.5	73.9
12:25	65.8	58.0	76.5	17:15	64.9	61.0	77.2	22:05	61.4	46.5	73.1	02:55	60.5	43.0	74.9
12:30	65.7	60.0	74.7	17:20	66.1	59.5	72.7	22:10	63.0	46.5	78.5	03:00	60.0	44.0	72.2
12:35	66.2	60.0	74.5	17:25	67.2	60.5	73.3	22:15	60.2	45.0	73.6	03:05	60.7	43.5	75.4
12:40	67.0	60.5	76.0	17:30	68.1	62.0	74.4	22:20	61.0	46.5	73.6	03:10	56.1	42.5	70.8
12:45	67.0	61.5	79.7	17:35	68.1	63.0	75.0	22:25	62.0	47.5	74.0	03:15	60.6	45.5	76.0
12:50	67.4	63.0	76.7	17:40	68.1	62.5	75.0	22:30	61.7	49.0	72.5	03:20	62.0	44.5	76.8
12:55	66.5	60.5	75.2	17:45	68.3	61.5	77.9	22:35	60.0	46.5	77.4	03:25	63.3	46.5	75.3
13:00	67.9	62.5	76.7	17:50	68.1	62.5	75.0	22:40	59.8	46.5	73.5	03:30	61.6	46.0	76.8
13:05	70.1	62.5	89.5	17:55	67.3	60.0	75.1	22:45	58.7	47.0	73.4	03:35	60.7	47.5	73.1
13:10	66.3	59.5	76.9	18:00	68.0	62.0	74.7	22:50	60.7	46.0	76.7	03:40	61.3	47.0	75.2
13:15	68.1	62.5	74.2	18:05	67.3	60.5	76.4	22:55	61.5	44.0	75.2	03:45	64.8	50.0	77.3
13:20	67.4	62.0	75.4	18:10	71.3	63.0	76.2	23:00	57.1	40.0	73.4	03:50	63.7	50.5	75.3
13:25	66.9	61.0	73.6	18:15	69.1	62.0	86.6	23:05	61.1	41.5	75.1	03:55	63.8	50.0	74.9
13:30	66.4	60.0	73.8	18:20	67.3	59.0	75.7	23:10	59.6	40.5	72.2	04:00	64.0	50.0	75.3
13:35	67.8	62.0	78.0	18:25	66.8	59.0	74.6	23:15	55.8	39.5	69.6	04:05	64.6	50.5	74.8
13:40	67.1	62.5	76.7	18:30	67.0	59.5	74.9	23:20	54.4	40.0	69.9	04:10	67.1	57.0	77.7
13:45	66.2	60.0	73.6	18:35	67.5	59.0	77.3	23:25	58.3	38.5	72.9	04:15	65.5	54.0	76.0
13:50	67.9	62.5	78.3	18:40	66.9	57.0	73.8	23:30	56.0	34.5	73.0	04:20	65.8	51.5	74.5
13:55	67.6	59.5	75.8	18:45	66.1	57.0	73.9	23:35	57.9	40.5	71.8	04:25	66.3	53.5	73.6
14:00	68.3	63.5	75.2	18:50	66.0	56.5	72.7	23:40	59.7	38.5	78.2	04:30	66.5	55.0	75.6
14:05	66.9	61.0	75.4	18:55	66.4	57.0	74.2	23:45	55.1	37.5	73.6	04:35	66.8	55.0	76.8
14:10	67.8	62.5	79.4	19:00	67.7	59.0	76.3	23:50	55.9	35.0	72.5	04:40	67.4	56.0	78.2
14:15	67.3	62.5	75.9	19:05	65.8	54.5	74.9	23:55	58.9	36.0	75.1	04:45	66.3	52.0	75.1
14:20	68.2	62.0	76.9	19:10	66.6	58.0	75.6	00:00	59.4	41.5	74.7	04:50	65.6	52.5	76.4
14:25	68.5	63.0	77.8	19:15	66.7	56.5	75.9	00:05	56.6	38.5	74.3	04:55	68.0	58.0	78.1
14:30	69.2	65.0	77.7	19:20	66.3	56.0	75.9	00:10	52.4	39.5	68.6	05:00	67.7	58.0	76.9
14:35	67.9	62.5	76.2	19:25	66.6	55.5	75.9	00:15	59.9	41.0	74.4	05:05	68.3	58.5	75.9
14:40	66.7	61.0	74.4	19:30	65.1	52.5	80.8	00:20	55.0	38.5	70.0	05:10	67.5	57.5	74.9
14:45	68.2	62.5	75.9	19:35	65.7	56.0	74.5	00:25	57.9	41.0	73.3	05:15	69.1	62.5	79.5
14:50	67.9	63.5	75.8	19:40	65.7	52.0	76.2	00:30	49.9	35.0	69.4	05:20	68.0	58.5	75.5
14:55	66.7	61.5	72.2	19:45	65.4	55.0	75.6	00:35	60.2	39.0	77.0	05:25	67.9	62.5	73.8
15:00	67.1	62.5	75.8	19:50	65.2	52.0	73.7	00:40	53.1	37.5	71.1	05:30	68.9	63.5	75.5
15:05	63.9	59.0	73.5	19:55	65.1	54.0	74.5	00:45	54.7	36.5	71.0	05:35	69.2	63.0	79.3
15:10	64.7	59.5	72.4	20:00	65.9	53.5	75.7	00:50	54.8	37.0	70.4	05:40	68.5	60.0	75.5
15:15	64.8	58.5	73.4	20:05	65.3	51.5	77.2	00:55	55.6	31.0	69.7	05:45	68.5	62.5	75.1
15:20	64.0	57.5	73.1	20:10	65.4	52.0	77.9	01:00	58.0	35.5	72.5	05:50	68.8	64.5	74.1
15:25	66.0	60.0	76.5	20:15	64.3	50.5	74.0	01:05	57.6	40.5	74.9	05:55	67.8	63.0	74.6
15:30	64.2	59.5	72.4	20:20	65.3	54.5	73.4	01:10	56.7	40.0	75.9	06:00	67.9	63.0	76.0
15:35	66.6	60.5	89.2	20:25	65.4	53.5	76.4	01:15	57.4	40.5	72.3	06:05	67.7	62.5	75.0
15:40	64.6	60.0	72.4	20:30	64.1	49.5	80.0	01:20	59.5	39.0	76.8	06:10	67.1	60.5	76.4
15:45	65.7	60.0	73.1	20:35	64.7	51.0	74.3	01:25	56.6	36.5	75.9	06:15	63.8	58.0	70.4
15:50	64.5	59.5	70.9	20:40	63.0	48.5	75.3	01:30	49.3	34.0	69.6	06:20	62.8	57.5	73.4
15:55	62.5	58.5	71.0	20:45	65.0	52.5	76.0	01:35	57.0	36.0	72.8	06:25	63.6	58.5	73.1
16:00	62.7	57.0	71.5	20:50	64.1	52.0	76.6	01:40	56.4	38.5	73.8	06:30	64.7	55.5	76.3
16:05	64.2	58.5	79.8	20:55	66.1	52.0	78.0	01:45	56.2	39.5	73.3	06:35	63.9	57.5	71.3
16:10	64.2	59.5	72.0	21:00	65.8	51.5	78.3	01:50	54.7	39.0	70.7	06:40	64.4	59.0	72.3
16:15	64.3	57.0	74.1	21:05	63.8	50.0	75.5	01:55	56.3	36.5	72.6	06:45	67.2	60.0	81.3
16:20	65.3	59.5	70.8	21:10	63.9	51.0	72.6	02:00	57.7	42.0	77.3	06:50	71.8	60.5	72.0
16:25	66.0	61.5	72.9	21:15	64.0	50.0	74.4	02:05	58.8	40.0	77.2	06:55	66.4	59.5	74.8
16:30	66.0	59.5	74.0	21:20	63.4	49.0	72.9	02:10	57.3	37.5	72.1	07:00	65.4	60.5	75.4
16:35	64.5	59.0	73.2	21:25	61.8	45.0	72.1	02:15	55.8	40.5	72.2	07:05	65.3	59.0	73.1
16:40	64.3	59.0	75.9	21:30	63.0	49.5	74.3	02:20	58.2	38.5	72.6	07:10	65.5	58.5	73.5
16:45	66.3	62.0	76.5	21:35	61.2	48.5	73.3	02:25	60.3	43.0	78.2	07:15	66.3	59.5	75.9

Barrier Attenuation



from CRTN Appendix 3

Barrier Attenuation - 1				0	1	2	3	4	5	6	7
Source to Barrier	30	Receiver to Barrier	10	A Shadow							
Source Height	-3	Receiver Height	1	A(Logd)^n							
Barrier Height	2.2			-15.40	-8.26	-2.79	-0.83	-0.20	0.15	0.12	0.02
Path Difference	0.32			-15.40	4.09	-0.68	0.10	-0.01	0.00	0.00	0.00
				Barrier Effect							
				-11.9							

3273-R2



Photo Appendix



Figure 6 - View toward Dodworth Road



Figure 6 - View toward Railway Cutting