

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2019/1059

Date: 27 April 2020



DETACHED DWELLINGS, 169-187 TEVIOT ROAD GREENBANK

QDB MP4.4 Noise Assessment

27 January 2020

Ainat Group

QB824-02F01 Acoustic Report (r0)

Document Details

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Document Control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Authorised
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We have derived data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination and re-evaluation of the data, findings, observations and conclusions expressed in this report.

We have prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

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Executive Summary

Ainat Group proposes to develop a residential estate at 169-187 Teviot Road, Greenbank. The Economic Development Queensland (EDQ) is the assessing authority for the development application.

Renzo Tonin & Associates has been engaged by Ainat Group to assess the traffic noise impacts on the proposed development. The assessment has been undertaken in accordance with the requirements of the Queensland Development Code (QDC) MP4.4 *Buildings in a Transport Noise Corridor*, as required by the EDQ.

On 4th November 2019, our office prepared a subdivision report for the site [Our Ref: *QB824-01F02 Final Acoustic Report (r1)*], which was submitted to the EDQ for assessment. The report recommended the construction of 2.6m high acoustic fences to control traffic noise impacts onto the residential estate.

On 6th January 2020, the Client (via the Town Planner-Ken Burmeister) advised that negotiations with the EDQ resulted for preferred 1.8m high fences instead of the originally proposed 2.6m high fences (See Appendix A).

In this instance, the acoustic model has been updated to include the lower 1.8m high fences. The model has also been updated to include proposed building layouts of detached dwellings within the estate.

Note that the fences should be gap-free and constructed to achieve a minimum superficial density of 15kg/m². This may be achieved using materials such as concrete tilt panel, masonry block wall, 35mm thick CCA treated lapped and capped timber palings or 75mm Hebel Power Panel.

Based upon the analysis presented in this report, the following conclusions have been drawn:

- With 1.8m high fences, lowset dwellings at the eastern part of the site would be subject to traffic noise levels equivalent to QDC MP4.4 Noise Category 3;
- A maximum Noise Category 4 is predicted for highset residences along the eastern boundary of the site;
- Schedule 1 of the QDC MP4.4 can be used to determine the minimum Weighted Sound Reduction Index (R_w) rating for each building component based on the noise categories;
- Schedule 2 of the QDC MP4.4 can be used to determine the building materials that correspond to the required R_w ratings; and
- The future noise modelling is based on design contours provided by Civil Dimensions Pty Ltd on 22nd January 2020 (File name: *Teviot Rd Design Contours.dxf*). Note that if the finished pad levels of lots change substantially (greater than 200mm increase), a revised assessment may be needed using the new finished site levels.

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1 Introduction

Ainat Group proposes to develop a residential estate at 169-187 Teviot Road, Greenbank. The site location is shown in Figure 1. The real property description is Lot 18 on RP184970. The Economic Development Queensland (EDQ) is the assessing authority for the development application.

The purpose of this report is to present an assessment of the traffic noise impacts on the proposed development, and to establish the required attenuation measures to control noise intrusion to acceptable levels.

On 4th November 2019, our office prepared a subdivision report for the site [Our Ref: *QB824-01F02 Final Acoustic Report (r1)*], which was submitted to the EDQ for assessment. The report recommended the construction of 2.6m high acoustic fences to control traffic noise impacts onto the residential estate.

On 6th January 2020, the Client (via the Town Planner-Ken Burmeister) advised that negotiations with the EDQ resulted for preferred 1.8m high fences instead of the originally proposed 2.6m high fences (See Appendix A).

In this instance, the acoustic model has been updated to include the lower 1.8m high fences. The model has also been updated to include proposed layouts of detached dwellings within the estate.

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001. Appendix C contains a glossary of acoustic terms used in this report.

2 Site and Surrounding Area

An aerial photograph of the site and surrounding area is presented in Figure 2. The land adjoins Teviot Road to the east. Teviot Road is a *designated transport noise corridor* (designated by Logan City Council-Gazette Notice on 27th July 2012).

Teviot Road is a single carriageway with one lane in each direction and currently carries approximately 12,000 vehicles per day. The posted speed limit is 80km/hr.

3 Proposed Development

It is proposed to subdivide Lot 18 on RP184970 into 40 residential lots. A site plan of the proposed development is shown in Figure 3. It is proposed to construct 1.8m high acoustic fences at the eastern boundary of the site. Access to the subdivision will be provided off Teviot Road to the east.

The extents of these fence are shown in Figure 4, while the bottom and top RLs of the fences extracted from the model at Locations A to J are presented in Table 1.

Table 1: Bottom and Top RLs of proposed fences

Point (Refer to Figure 7)	Bottom RL of Fence(m)	Fence Height (m)	Top RL of Fence (m)
A	69.8	1.8	71.6
B	69.2	1.8	71.0
C	69.0	1.8	70.8
D	68.7	1.8	70.5
E	68.8	1.8	70.6
F	68.8	1.8	70.6
G	69.0	1.8	70.8
H	68.8	1.8	70.6
I	68.7	1.8	70.5
J	68.2	1.8	70.0

The fences should be gap-free and constructed to achieve a minimum superficial density of 15kg/m². This may be achieved using materials such as concrete tilt panel, masonry block wall, 35mm thick CCA treated lapped and capped timber palings or 75mm Hebel Power Panel.

4 Traffic Noise Intrusion

4.1 Queensland Development Code MP4.4

Department of Housing and Public Works (DHPW) has introduced the Queensland Development Code (QDC) MP4.4 *Buildings in a Transport Noise Corridor* in 2010. The purpose of the QDC MP4.4 is to ensure any habitable rooms of Class 1, 2, 3 and 4 buildings located in a transport noise corridor are designed and constructed to reduce transport noise. The Code requires that each external façade of a habitable room be assigned a noise category which is dependent upon the future L_{10 18hr}¹ noise exposure at the façade. A summary of the noise categories is presented in Table 2.

Table 2: Noise category levels

Noise Category	Level of transport Noise (L _{10 18hr})
Category 4	≥73dBA
Category 3	68-72dBA
Category 2	63-67dBA
Category 1	58-62dBA

¹ L_{10 18hr} is the arithmetic average of the 18 hourly measurements of the L_{A10} level or the noise level exceeded for 10 percent of the time between 6am and midnight on a typical weekday.

Noise Category	Level of transport Noise (L ₁₀ 18hr)
Category 0	≤57dBA

Depending on the assigned noise category, the external facades are selected to achieve a minimum Weighted Sound Reduction Index (R_w) requirement as specified in Schedule 1 of the Code.

4.2 Traffic Noise Methodology

Existing traffic noise levels were measured on-site in accordance with AS2702-1984 - *Acoustics - Methods for the Measurement of Road Traffic Noise* and the DTMR *Road Traffic Noise Management: Code of Practice*.

Traffic volumes and composition for Teviot Road used for modelling traffic noise was supplied by PTT Traffic and Transport Engineering, commissioned by Ainat Group specifically for the project.

Using an annual growth rate of 6% per annum as advised by PTT, the 2029 traffic projection for the road has been calculated and is presented in Table 3.

Table 3: Traffic data for Teviot Road

Road (Both Directions)	Traffic Volumes – AADT		Commercial Vehicles	Speed
	Year 2019	Year 2029		
Teviot Road	12,000	21,490	8.7%	80km/h

Physical data across the site have been obtained from drawings provided by Ainat Group, East Coast Surveys, Civil Dimensions Pty Ltd, aerial photographs and from site inspections. The road levels adjacent to the site have been provided by Logan City Council.

Traffic noise levels have been predicted at various locations using the SoundPLAN² computer program. This program uses the CoRTN (1988)³ algorithms endorsed by DTMR.

The computer model for the site has been developed based upon the existing separation distances and the projected 2019 traffic volumes. The model has been updated using 2029 traffic volumes to predict future traffic noise exposures at the site.

The future noise modelling is based on design contours provided by Civil Dimensions Pty Ltd on 22nd January 2020 (File name: *Teviot Rd Design Contours.dxf*). Note that if the finished pad levels of lots change substantially (greater than 200mm increase), a revised assessment may be needed using the new finished site levels.

² SoundPLAN is an integrated software package for noise and air pollution evaluation developed in Germany by Braunstein + Berndt GmbH. It has been configured to predict the extent of (i) road traffic noise intrusion by application of the CRTN '88 algorithms and (ii) industrial noise emission using the CONCAWE algorithms. It is in use in more than 30 countries and has had widespread application throughout Australia. It is endorsed by Department of Transport and Main Roads, Brisbane City Council, Department of Environment and Heritage Protection and most other State environmental authorities.

³ CoRTN 1988 – *Calculation of Road Traffic Noise*, UK Department of Transport HMSO, 1988.

4.3 Existing Traffic Noise Levels

The existing traffic noise levels were measured using an environmental noise logger. Traffic noise levels were obtained between Monday 9th September 2019 and Friday 13th September 2019.

The noise logger was installed at the location shown in Figure 2. The microphone of the logger was positioned at a height of 1.5m above ground level at that location. The instrumentation was set to record the noise level statistics over consecutive 15-minute intervals throughout the test.

Test instrumentation consisted of:

- *Portable Noise Logger*: RTA02 (S/N 0039, v19.tfb);
- *Sound Level Meter*: NTi-XL2 (S/N: A2A-13505-E0, FW4.03); and
- *Acoustical Calibrator*: Larson Davis/NTi CAL200 (S/N 15600).

The logging results are presented graphically in Appendix B and are summarised in Table 4.

Table 4: Existing traffic noise levels (free field)

Parameter	Average Measured Level (dBA)
L ₁₀ 18hr	66.0

4.4 Verification of Computer Model

The SoundPLAN computer model was verified by comparing the predicted noise level with the result at the measurement location. The parameters used in the model verification are presented in Table 5.

Table 5: Parameters used in the SoundPLAN model for current traffic volume

Parameters	Teviot Road (Both Directions)
18-hour count	11,280
Percentage commercial vehicles (%)	8.7
Traffic speed (km/h) (Zone)	80
Microphone height AGL (m)	1.5
Road Surface Correction – Spray Seal	+2dBA

The predicted and measured values of the logger are compared in Table 6. It can be seen in this table that the difference between measured and predicted levels are within the accepted +/-2dBA tolerance.

Table 6: Comparison between the calculated and measured L₁₀ 18hr values

Predicted	Measured	Difference
66.3dBA	66dBA	+0.3dBA

4.5 Future Traffic Noise Exposure

Using the SoundPLAN computer model, the future traffic noise exposures at each lot have been predicted. The parameters used in the model for the predictions are presented in Table 7.

Table 7: Parameters used in the SoundPLAN model for future traffic volumes

Parameters	Teviot Road (Both Directions)
18-hour count	20,201
Percentage commercial vehicles (%)	8.7
Traffic speed (km/h) (Zone)	80
Receiver height above Pad levels (m)	1.8m – Representing Lowset residences 4.6m – Representing Highset residences
Façade Correction (dBA)	+2.5
Road Surface Correction – Spray Seal	+2dBA

The future noise levels have been predicted in the form of noise contours as shown in the following figures:

Figure 5: QDC MP4.4 Noise Categories for lowset residences – 1.8m high acoustic fences

Figure 6: QDC MP4.4 Noise Categories for highset residences – 1.8m high acoustic fences

With the proposed fences in place, the QDC MP4.4 noise contours have been predicted at each allotment. The contours for ground and upper floors are shown in Figure 5 and Figure 6 respectively.

It can be seen in Figure 5 that with the proposed 1.8m high acoustic fences in place, Noise Categories 1, 2 and 3 are predicted for lowset houses.

As can be seen in Figure 6, a maximum Noise Category 4 is predicted for highset residences along the eastern boundary of the site.

The MP4.4 Code will require that the glazing, external walls, roof, floors and entry doors of the proposed houses achieve minimum R_w ratings based upon the relevant noise category. The Weighted Sound Reduction Index (R_w) ratings are specified in Schedule 1 of the Code. An extract of Schedule 1 for Noise Categories of 1 to 4 are shown in Table 8.

Table 8: Minimum R_w rating for each relevant noise category

Noise Category	Minimum transport noise reduction (dBA) required for habitable rooms	Component of building's external envelope	Minimum R_w required
4	40	Glazing	43
		External Walls	52

Noise Category	Minimum transport noise reduction (dBA) required for habitable rooms	Component of building's external envelope	Minimum R_w required
3	35	Roof	45
		Floors	51
		Entry Doors	35
		Glazing	38 (Total area of glazing for a habitable room is greater than 1.8m ²)
			35 (Total area of glazing for a habitable room is less than or equal to 1.8m ²)
		External Walls	47
		Roof	41
		Floors	45
		Entry Doors	33
		Glazing	35 (Total area of glazing for a habitable room is greater than 1.8m ²)
			32 (Total area of glazing for a habitable room is less than or equal to 1.8m ²)
2	30	External Walls	41
		Roof	38
		Floors	45
		Entry Doors	33
		Glazing	27 (Total area of glazing for a habitable room is greater than 1.8m ²)
1	25	External Walls	35
		Roof	35
		Entry Doors	28
		Glazing	24 (Total area of glazing for a habitable room is less than or equal to 1.8m ²)
		Glazing	24 (Total area of glazing for a habitable room is less than or equal to 1.8m ²)

The minimum R_w rating for each building component can be achieved by:

- Using the materials specified in Schedule 2 of the Code
(<http://www.hpw.qld.gov.au/SiteCollectionDocuments/mp-4-4-buildings-in-transport-noise-corridors.pdf>); or
- Using materials with manufacturer's specifications that, in combination, achieve the minimum R_w rating for the relevant building component and applicable Noise Category.

5 Conclusion

Based upon the analysis presented in this report, the following conclusions have been drawn:

- With 1.8m high fences, lowset dwellings at the eastern part of the site would be subject to traffic noise levels equivalent to QDC MP4.4 Noise Category 3;
- A maximum Noise Category 4 is predicted for highset residences along the eastern boundary of the site;
- Schedule 1 of the QDC MP4.4 can be used to determine the minimum Weighted Sound Reduction Index (R_w) rating for each building component based on the noise categories;
- Schedule 2 of the QDC MP4.4 can be used to determine the building materials that correspond to the required R_w ratings; and
- The future noise modelling is based on design contours provided by Civil Dimensions Pty Ltd on 22nd January 2020 (File name: *Teviot Rd Design Contours.dxf*). Note that if the finished pad levels of lots change substantially (greater than 200mm increase), a revised assessment may be needed using the new finished site levels.

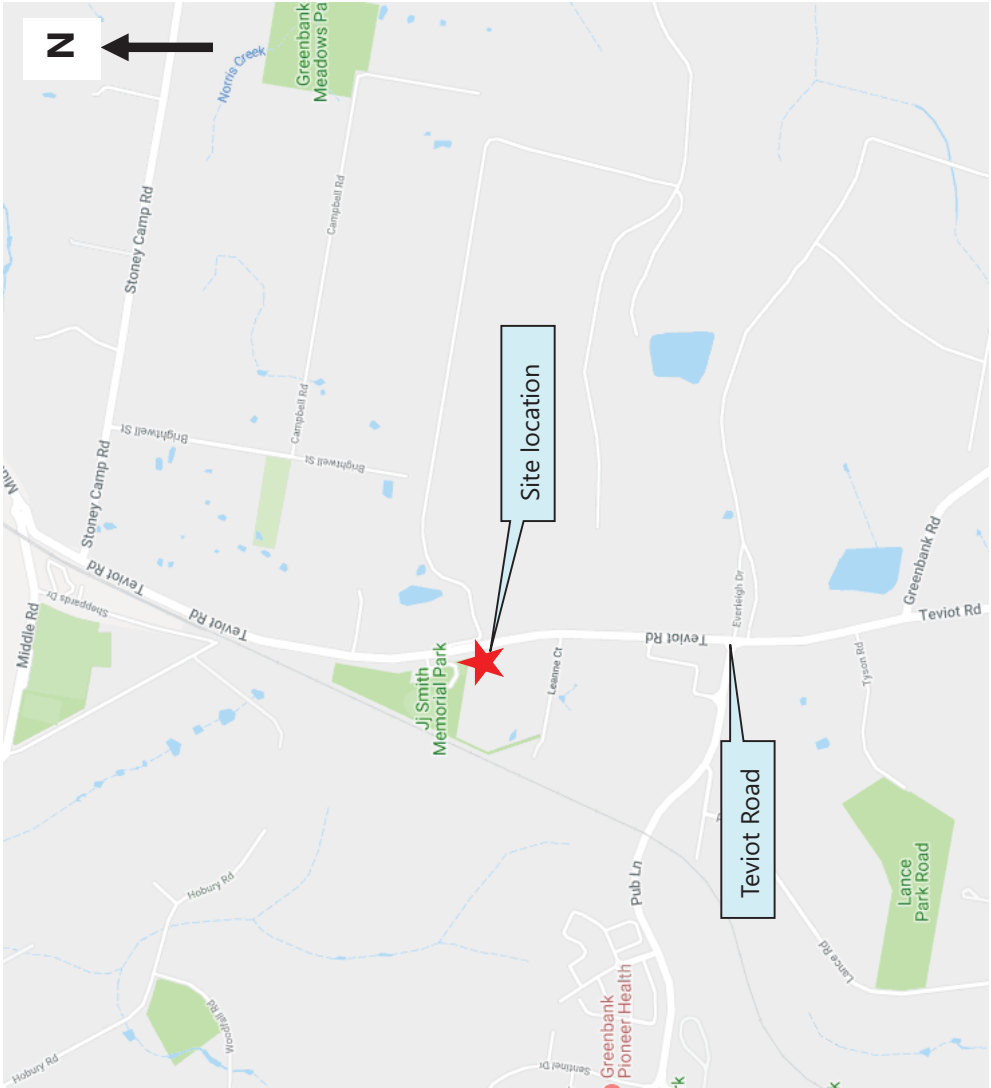


Figure 1: Site Location



Figure 2: Aerial photograph of site and surrounding area

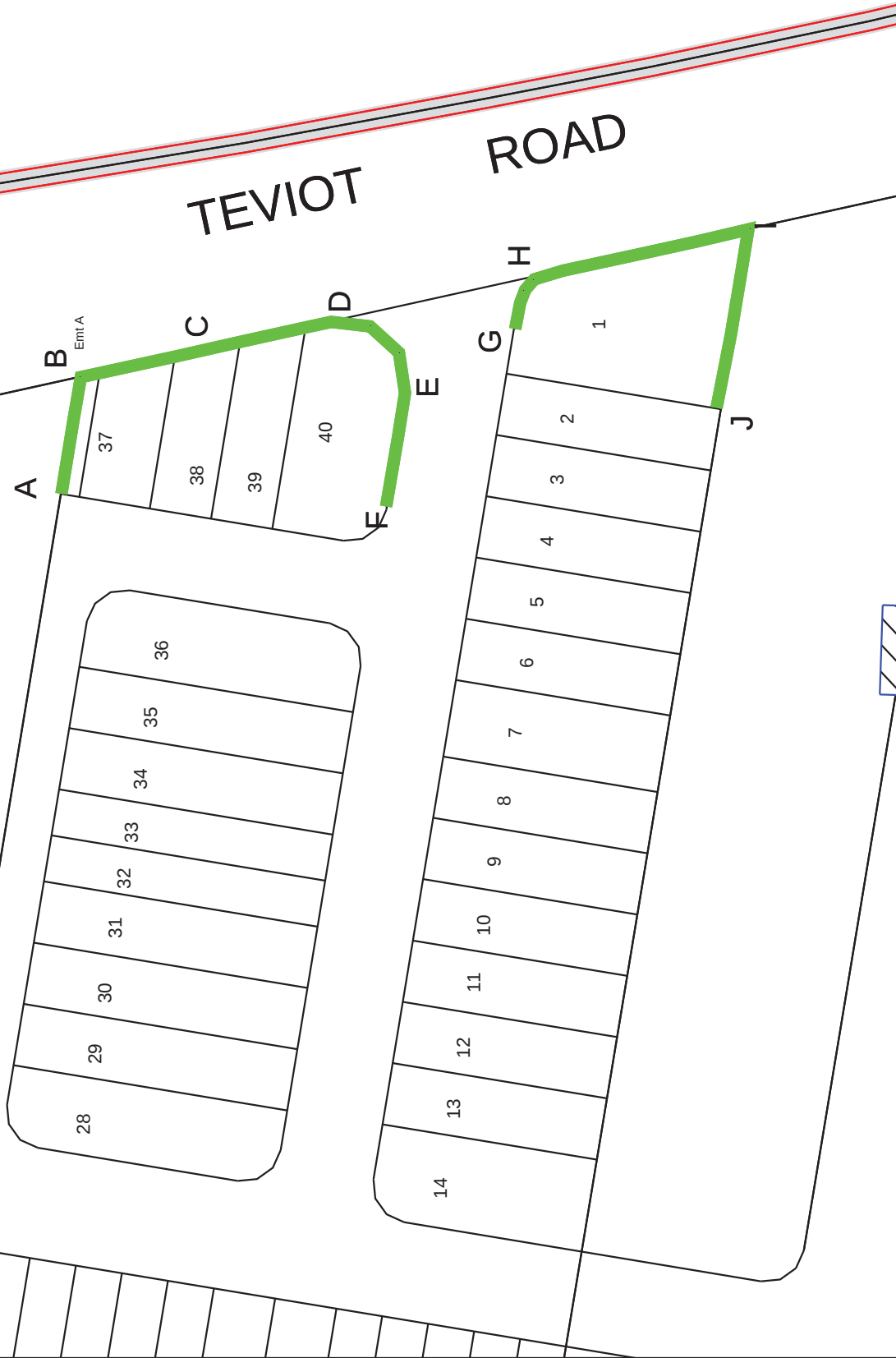
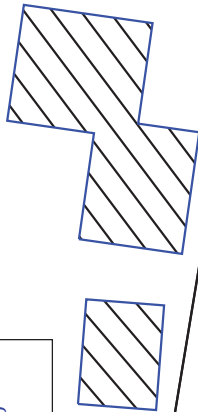


Figure 4: Locations of proposed 1.8m high acoustic fences

Renzo Tonin & Associates
PO Box 820
Spring Hill Qld 4000
Ph: 3367 3131

QB824-01 Residential Subdivision, 169-187 Teviot Road, Greenbank

1.8m high acoustic fences



Scale 1:1000

0 5 10 20 30

Figure 5: QDC MP4.4 Noise Categories for lowset residences – 1.8m high acoustic fences

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 PO Box 820
 Spring Hill Qld 4000
 Ph: 3367 3131

QB824-01 Residential Subdivision, 169-187 Teviot Road, Greenbank
 Facade-Corrected L_{1018hr} Noise Level
 Future Traffic Volumes

1.8m high fences
 Lowset Receivers - QDC Contours



Facade-Corrected L_{1018hr} Noise Level dB(A)
 and QDC MP4.4 Noise Categories

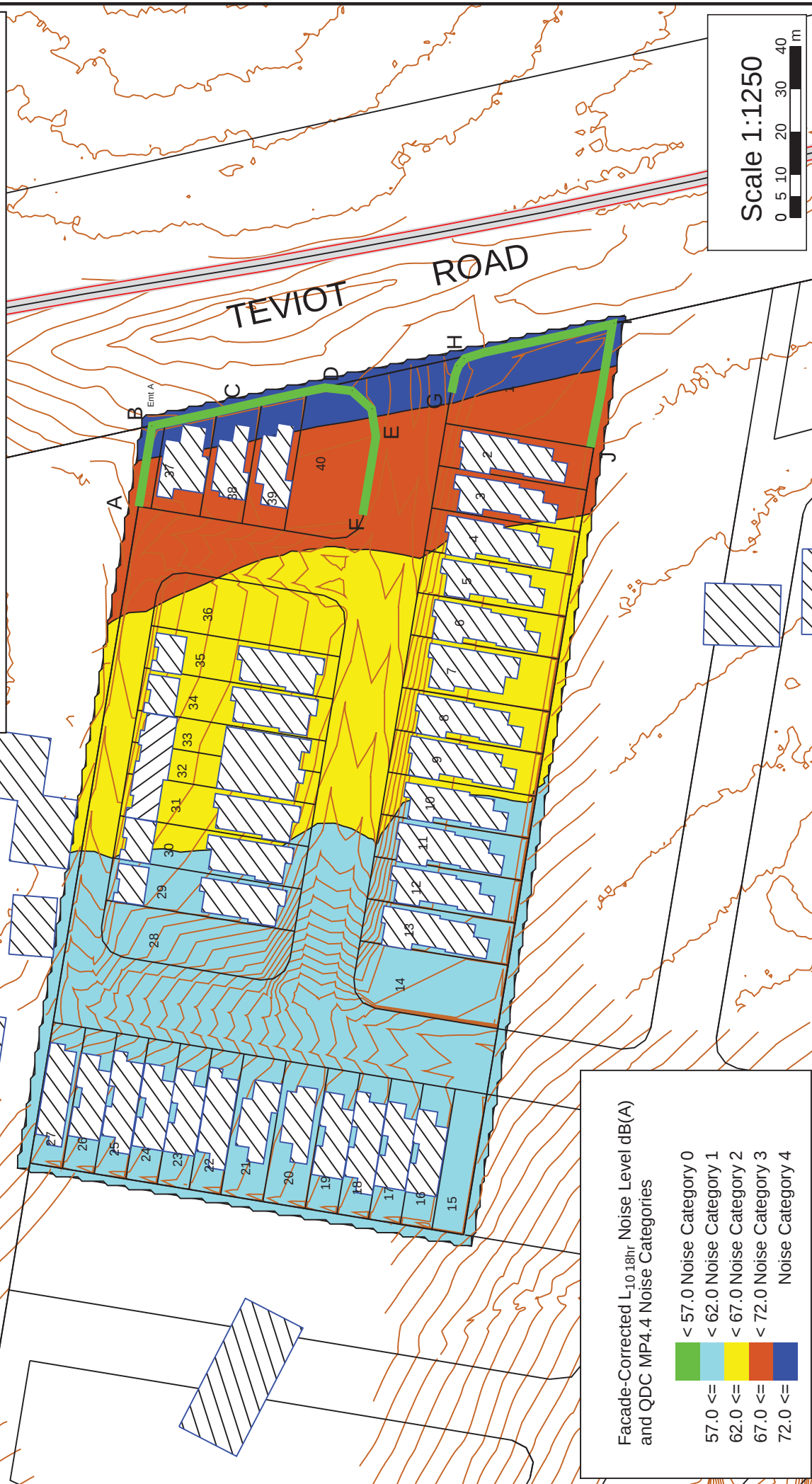
< 57.0 Noise Category 0	57.0 <=
< 62.0 Noise Category 1	62.0 <=
< 67.0 Noise Category 2	67.0 <=
< 72.0 Noise Category 3	72.0 <=
Noise Category 4	

Figure 6: QDC MP4.4 Noise Categories for highset residences – 1.8m high acoustic fences

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PO Box 820
Spring Hill Qld 4000
Ph: 3367 3131

QB824-01 Residential Subdivision, 169-187 Teviot Road, Greenbank
Facade-Corrected L_{1018hr} Noise Level
Future Traffic Volumes

1.8m high fences
Highset Receivers - QDC Contours



Facade-Corrected L_{1018hr} Noise Level dB(A)
and QDC MP4.4 Noise Categories

$57.0 \leq$ Noise Category 0
 $57.0 \leq$ Noise Category 1
 $62.0 \leq$ Noise Category 2
 $67.0 \leq$ Noise Category 3
 $72.0 \leq$ Noise Category 4

Scale 1:1250

0 5 10 20 30 40 m

APPENDIX A Client's Advice

Dwishen Ramanah

From: Ken Burmeister <ken.burmeister@eastcoastsurveys.com.au>
Sent: Monday, 6 January 2020 12:06 PM
To: Dwishen Ramanah
Cc: Nigel Mulitalo
Subject: FW: DEV2019/1059 - Response to Further Issues - Teviot Rd Greenbank

Hi

Please see reply from EDQ re the acoustic fence along Teviot Rd. Can you please update/amend your report as per the discussion for a preferred 1.8m acoustic fence.

Cheers

Ken Burmeister MURP (UQ) MPIA ADip Public Health (QUT)
Senior Town Planner

East Coast Surveys (Aust) Pty. Ltd.
ACN 111 434 005
Phone: 07 3823 1029
Email: ken.burmeister@eastcoastsurveys.com.au
Web: <http://www.eastcoastsurveys.com.au>
Address: 7B Natasha St, Capalaba
Postal Address: PO Box 168, Capalaba Qld 4157

All the Team at East Coast Surveys would like to wish you a Merry Christmas and a Prosperous New Year. The office of East Coast Surveys will be closed from 12pm 20th December 2019 and we will reopen on the 6th January 2020.



From: Brandon Bouda [mailto:Brandon.Bouda@dsdmip.qld.gov.au]
Sent: Friday, 3 January 2020 12:41 PM
To: Ken Burmeister <ken.burmeister@eastcoastsurveys.com.au>
Cc: Nigel Mulitalo <nmulitalo@gmail.com>
Subject: RE: DEV2019/1059 - Response to Further Issues

Hi Ken

Happy New Year.

I have just had a look at this and while it may increase the cost of constructing the dwelling, I believe it is a overall better outcome along Teviot Road.

Regards



Brandon Bouda
Manager
Economic Development Queensland
Department of State Development,
Manufacturing, Infrastructure and Planning
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From: Ken Burmeister <ken.burmeister@eastcoastsurveys.com.au>
Sent: Tuesday, 17 December 2019 11:40 AM
To: Brandon Bouda <Brandon.Bouda@dsdmip.qld.gov.au>
Cc: Nigel Mulitalo <nmulitalo@gmail.com>
Subject: FW: DEV2019/1059 - Response to Further Issues

Hi Brandon

Please see adjusted noise profile with a lower 1.8m fence along Teviot Rd. Basically we have to increase the MP4.4 noise category to level 3 to achieve indoor noise criteria. The developer is probably willing to do that as he generally does not like a 2.6m high fence either. Please let me know your thoughts on this for our response.

Cheers

Ken Burmeister MURP (UQ) MPIA ADip Public Health (QUT)
Senior Town Planner

East Coast Surveys (Aust) Pty. Ltd.
ACN 111 434 005
Phone: 07 3823 1029
Email: ken.burmeister@eastcoastsurveys.com.au
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Address: 7B Natasha St, Capalaba
Postal Address: PO Box 168, Capalaba Qld 4157

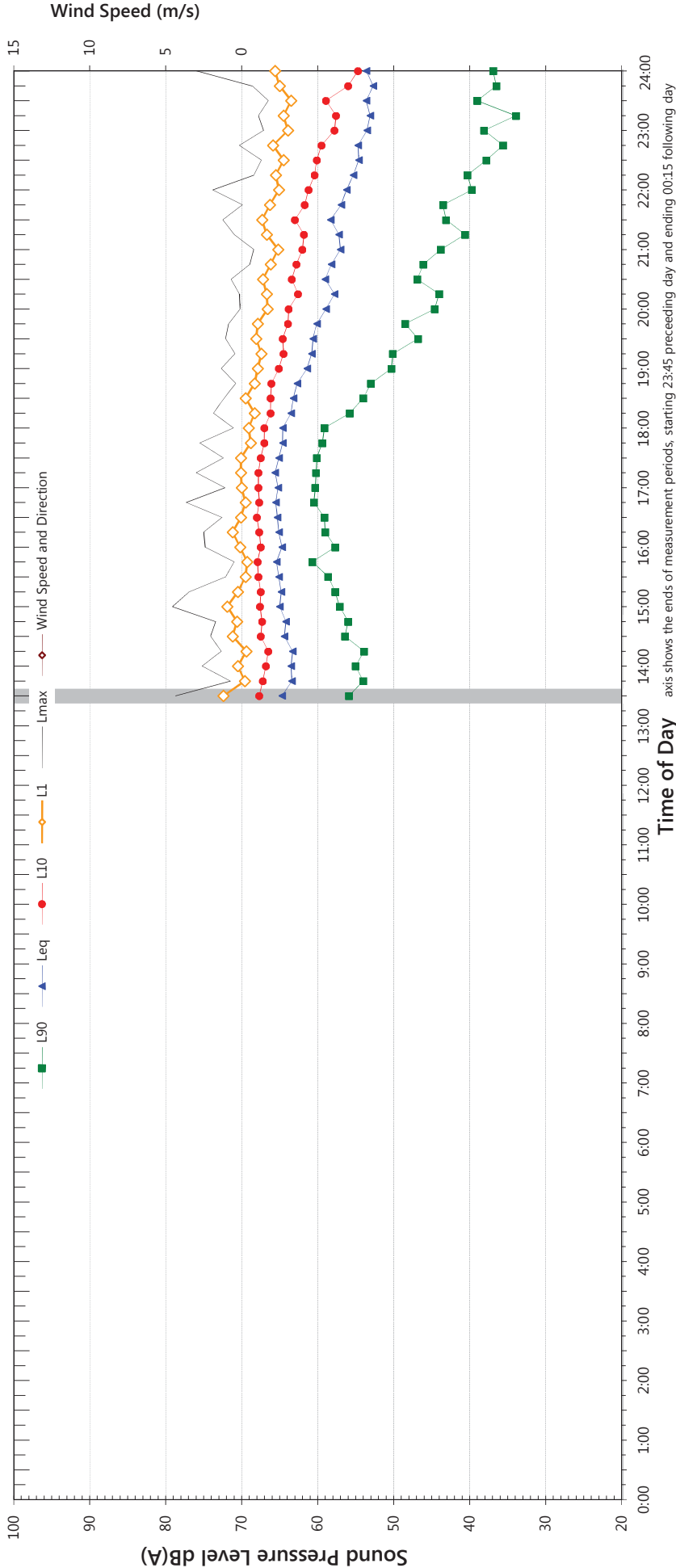
All the Team at East Coast Surveys would like to wish you a Merry Christmas and a Prosperous New Year. The office of East Coast Surveys will be closed from 12pm 20th December 2019 and we will reopen on the 6th January 2020.

APPENDIX B Traffic Noise Measurement Results

Unattended Noise Monitoring Results

169-187 Teviot Road, Greenbank

Monday, 9 September 2019



axis shows the ends of measurement periods, starting 23:45 preceding day and ending 00:15 following day

Representative Noise Levels				
Descriptor	Day		Evening	
	7am-6pm		6pm-10pm	10pm-7am
Lmax	74		71	70
L ₁	70		67	66
L ₁₀	67		64	59
L ₉₀	56		43	33
Leq	65		60	60

Notes:

1. Grey areas indicate periods of time that are either affected by rain, wind or other extraneous factors
2. Graphed & tabulated data measured in free-field

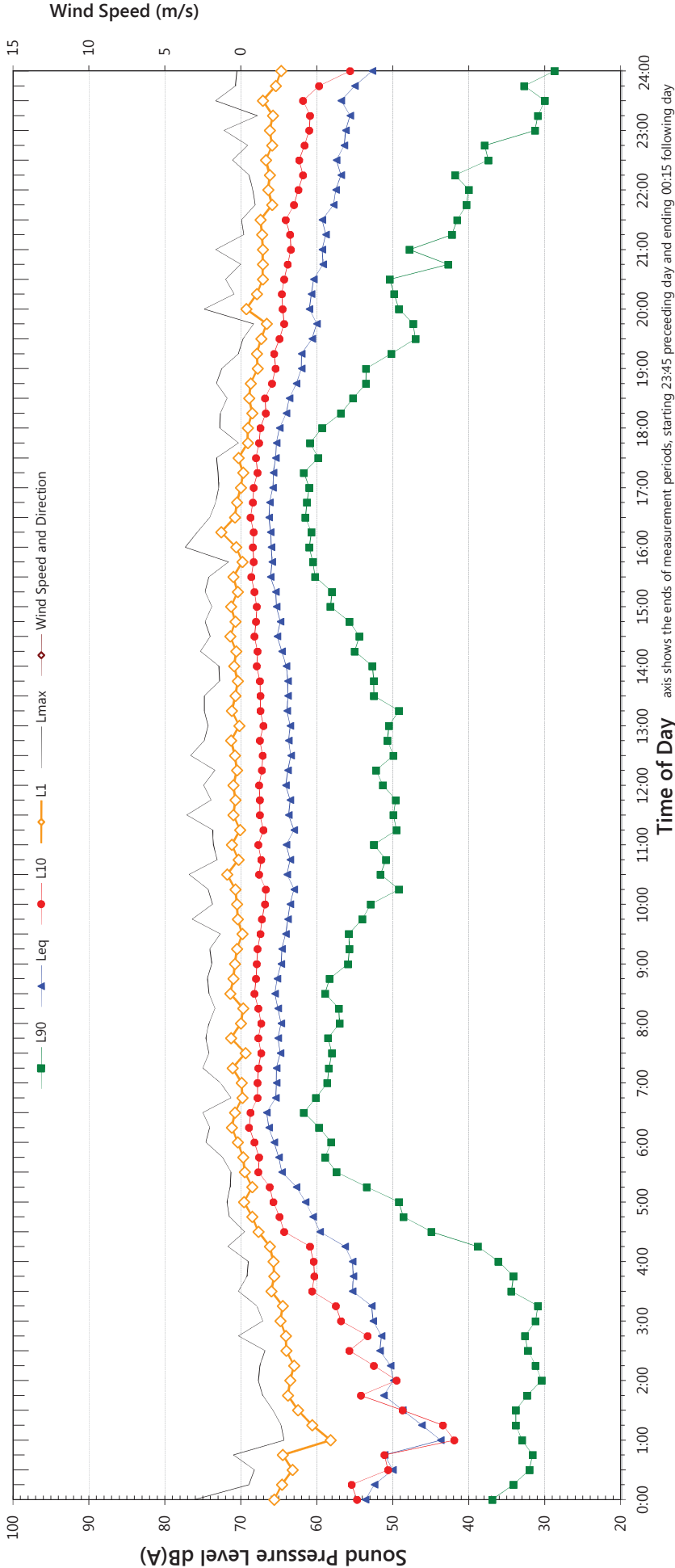
DTMR Summary						
Descriptor	L _{max}	L _{eq}	L _{eq} 1h	L ₁₀	Max L ₁₀ 1h	L ₉₀
Day	-	-	-	65 -	68	-
Night	-	-	-	65 -	67	-
8 Hour	-	-	-	-	-	38
12 Hour	-	-	-	67	68	-
18 Hour	-	-	-	64	-	50
24 Hour	-	-	62 -	-	-	-

3. Night period is taken from 10pm in the first day to 7am the next day

Unattended Noise Monitoring Results

169-187 Teviot Road, Greenbank

Tuesday, 10 September 2019



Representative Noise Levels				
Descriptor	Day		Evening	
	7am-6pm	6pm-10pm	10pm-7am	
Lmax	74	71	71	
L1	71	68	67	
L10	68	65	61	
L90	52	44	30	
Leq	65	61	60	

Notes:

1. Grey areas indicate periods of time that are either affected by rain, wind or other extraneous factors
2. Graphed & tabulated data measured in free-field

axis shows the ends of measurement periods, starting 23:45 preceeding day and ending 00:15 following day

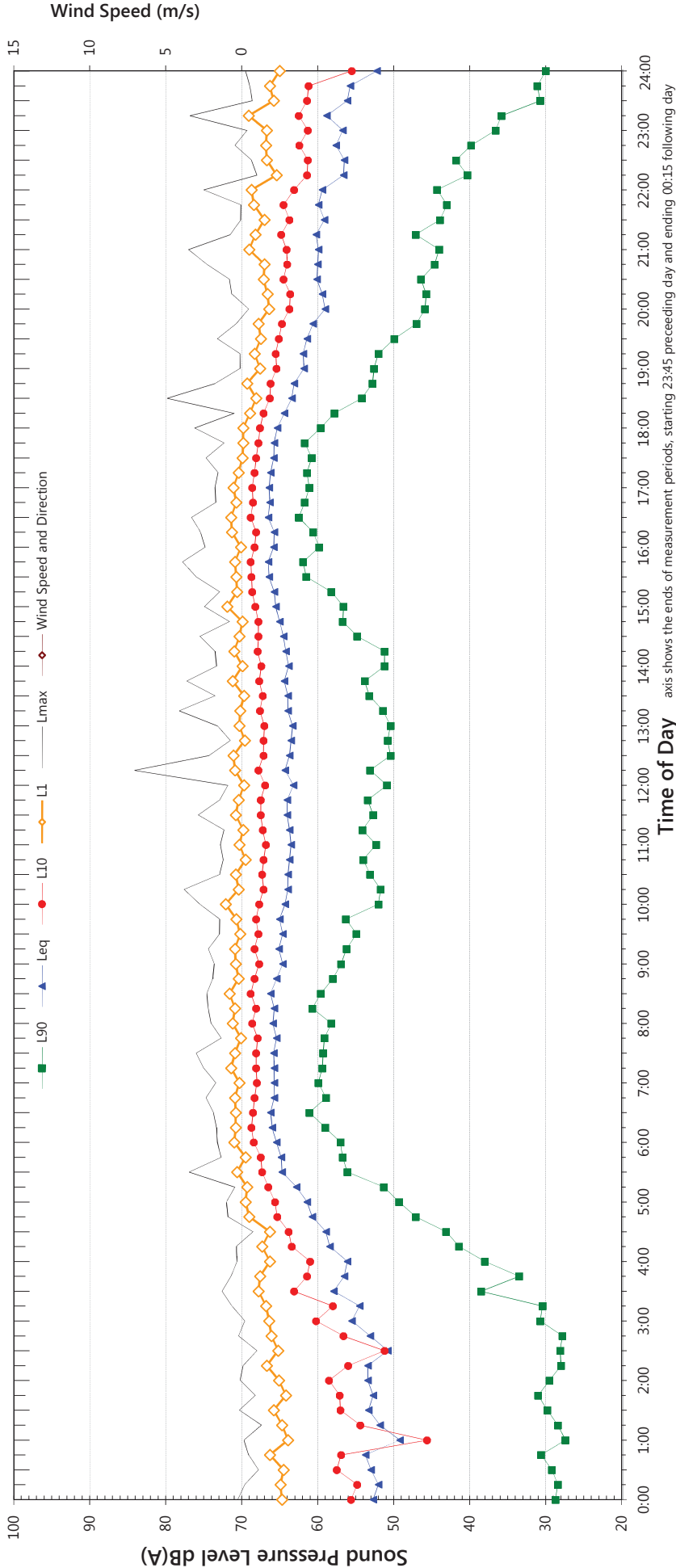
DTMR Summary						
Descriptor	L _{max}	L _{eq}	L _{eq} 1h	L ₁₀	Max L ₁₀ 1h	L ₉₀
Day	-	-	71 -	66 -	68	-
Night	-	-	-	65 -	67	-
8 Hour	-	-	-	-	-	36
12 Hour	-	-	-	68	68	-
18 Hour	-	-	-	66	-	52
24 Hour	-	-	63 -	-	-	-

3. Night period is taken from 10pm in the first day to 7am the next day

Unattended Noise Monitoring Results

169-187 Teviot Road, Greenbank

Wednesday, 11 September 2019



Representative Noise Levels				
Descriptor	Day		Evening	
	7am-6pm	6pm-10pm	10pm-7am	
Lmax	74	72	71	
L1	71	68	67	
L10	68	65	61	
L90	53	45	31	
Leq	65	61	61	

Notes:

1. Grey areas indicate periods of time that are either affected by rain, wind or other extraneous factors
2. Graphed & tabulated data measured in free-field

axis shows the ends of measurement periods, starting 23:45 preceeding day and ending 00:15 following day

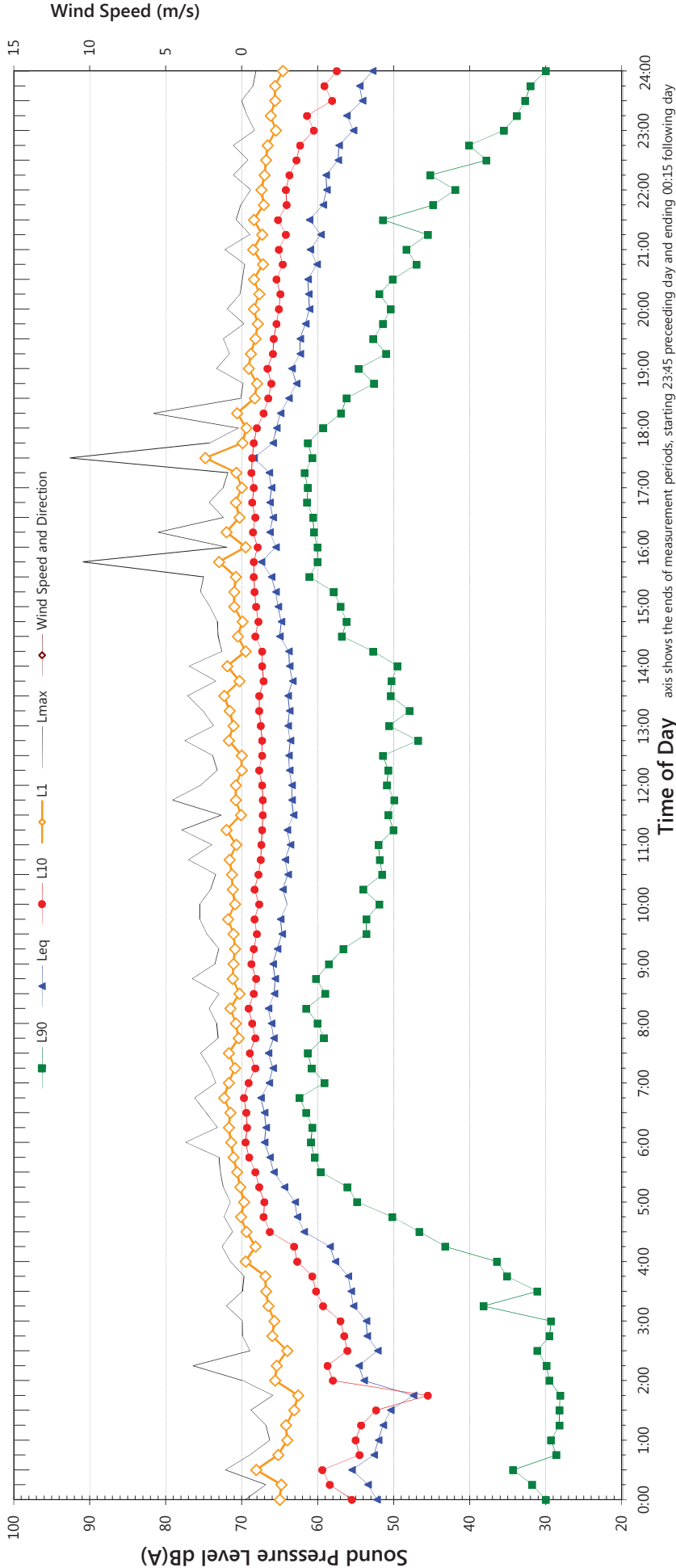
DTMR Summary						
Descriptor	L _{max}	L _{eq}	L _{eq} 1h	L ₁₀	Max L ₁₀ 1h	L ₉₀
Day	-	-	71 -	66 -	69	-
Night	-	-	-	66 -	69	-
8 Hour	-	-	-	-	-	38
12 Hour	-	-	-	68	69	-
18 Hour	-	-	-	66	-	52
24 Hour	-	-	63 -	-	-	-

3. Night period is taken from 10pm in the first day to 7am the next day

Unattended Noise Monitoring Results

169-187 Teviot Road, Greenbank

Thursday, 12 September 2019



Representative Noise Levels				
Descriptor	Day		Evening	
	7am-6pm	6pm-10pm	10pm-7am	
Lmax	75	71	70	
L1	71	68	67	
L10	68	65	61	
L90	52	47	31	
Leq	65	62	61	

Notes:

1. Grey areas indicate periods of time that are either affected by rain, wind or other extraneous factors
2. Graphed & tabulated data measured in free-field

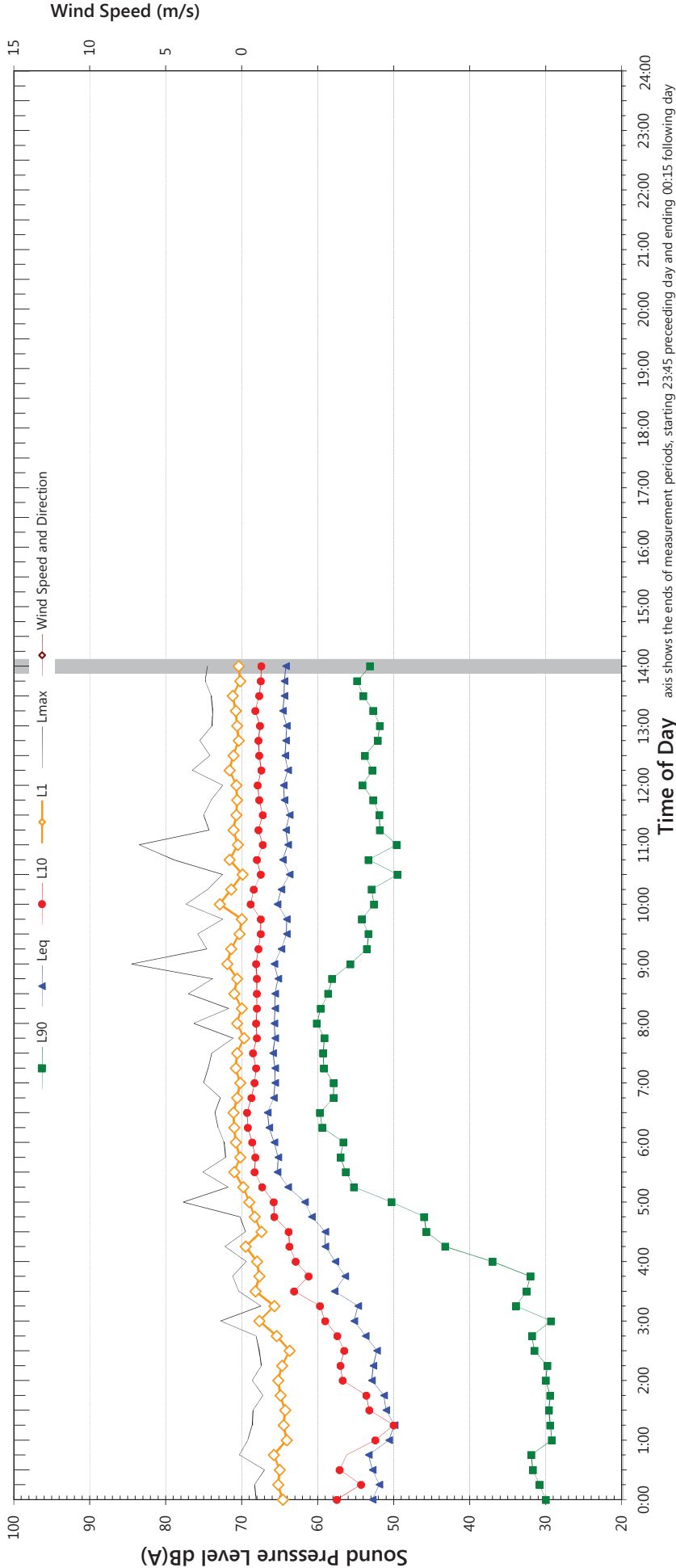
DTMR Summary						
Descriptor	L _{max}	L _{eq}	L _{eq} 1h	L ₁₀	Max L ₁₀ 1h	L ₉₀
Day	-	-	-	67	69	-
Night	-	70	-	65	68	-
8 Hour	-	-	-	-	-	37
12 Hour	-	-	-	68	69	-
18 Hour	-	-	-	67	-	53
24 Hour	-	-	63	-	-	-

3. Night period is taken from 10pm in the first day to 7am the next day

Unattended Noise Monitoring Results

169-187 Teviot Road, Greenbank

Friday, 13 September 2019



Representative Noise Levels				
Descriptor	Day		Evening	
	7am-6pm	6pm-10pm	10pm-7am	
Lmax	75	-	-	
L1	71	-	-	
L10	68	-	-	
L90	52	-	-	
Leq	65	-	-	

Notes:

1. Grey areas indicate periods of time that are either affected by rain,wind or other extraneous factors
2. Graphed & tabulated data measured in free-field

DTMR Summary						
Descriptor	L _{max}	L _{eq}	L _{eq} 1h	L ₁₀	Max L ₁₀ 1h	L ₉₀
Day	-	-	-	66	69	-
Night	-	-	-	-	-	-
8 Hour	-	-	-	-	-	-
12 Hour	-	-	-	68	69	-
18 Hour	-	-	-	68	-	55
24 Hour	-	-	65	-	-	-

3. Night period is taken from 10pm in the first day to 7am the next day

APPENDIX C Glossary of Terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment Period	The period in a day over which assessments are made.
Assessment Point	A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.
Background Noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	The units that sound is measured in. The following are examples of the decibel readings of every day sounds: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 120dB Deafening
dB(A)	A-weighted decibels. The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L _{Max}	The maximum sound pressure level measured over a given period.
L _{Min}	The minimum sound pressure level measured over a given period.
L ₁	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L ₁₀	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.

L ₉₀	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L _{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain L _{eq} sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound Absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound Level Meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound Pressure Level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound Power Level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.