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Village National Blackwater
Proposed Non-Resident Workers Accommodation
Lot 4 Capricorn Hwy
Blackwater

ACOUSTIC REPORT



Client:

Kyronn Pty Ltd
ATTN: Mark Russell

Reference:

2012013 R02 Lot 4 Capricorn Hwy RTN Rail

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1. Introduction

The following report is in response to a request by Kyronn Pty Ltd for an environmental noise assessment of a proposed non-residential, workers accommodation located at Lot 4 Capricorn Hwy, Blackwater. To facilitate the assessment, unattended and attended noise monitoring was conducted for the following:

- Blackwater Hwy for road traffic noise.
- Measurements of rail noise onsite to determine noise impacts associated with the rail line.

Based on the noise data obtained, the following was assessed:

- Road traffic noise impacting the proposed development.
- Rail noise impacting the proposed development.

2. Site Description

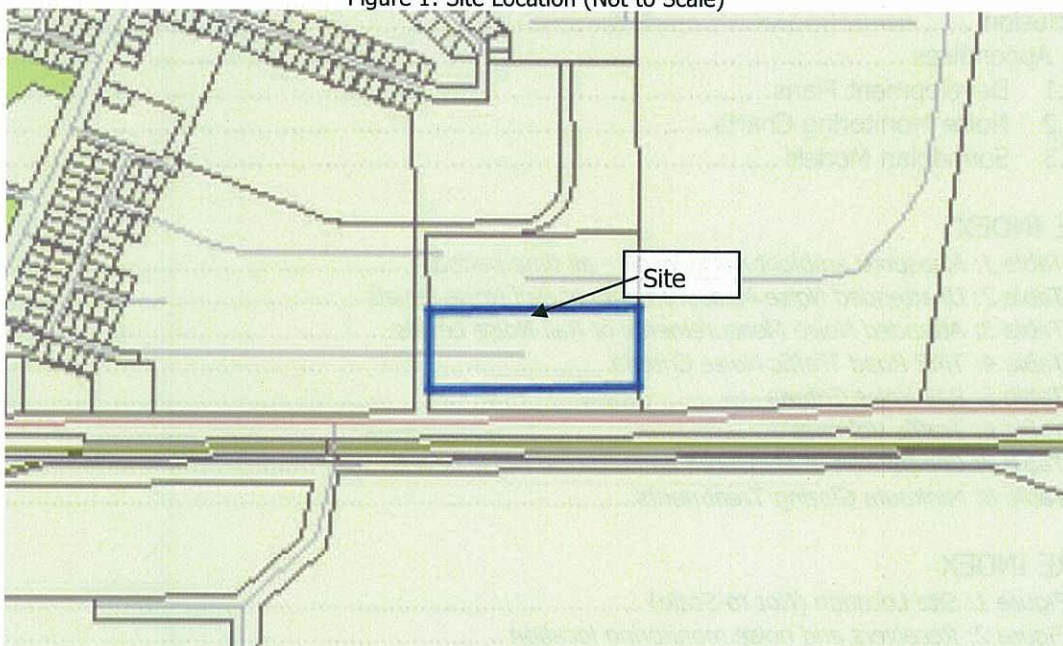
2.1 Site Location

The site is described by the following:

Lot 4 Capricorn Hwy, Blackwater
Lot 4, SP243869

Refer to Figure 1 for site location.

Figure 1: Site Location (Not to Scale)



A comprehensive site survey was conducted on the 21st February, 2012 and identified the following:

- a) Capricorn Hwy bounds the site to the south and separates the site from the Blackwater railway line.

- b) Currently vacant land surrounds the site to the north and east
- c) Vacant land is located to west and separates the site from the township of Blackwater.

2.2 Proposal

The proposal is to develop the site to be comprised of the following:

- Site area of 4.313 ha
- 492 Prefab buildings
- Car parking – 375 car space.
- Communal recreational areas.
- Site access is via Railway Road.

Refer to the Appendices for development plans.

2.3 Acoustic Environment

The site is primarily affected by road traffic noise from Capricorn Hwy and rail noise from the Blackwater railway line.

3. Equipment

The following equipment was used to record noise levels:

- ARL EL215 Environmental Noise Monitor (SN# 194632)
- BSWA Technology Co. Ltd Sound Calibrator (SN # 44095)
- Norsonics Nor140 Sound Analyser(SN#1403792).

The Nor140 SLM and ARL EL215 Environmental Noise Monitor holds current NATA Laboratory Certification and was field calibrated before and after the monitoring period, with no significant drift from the reference signal recorded.

4. Receivers and Monitoring

4.1 Unattended Ambient Noise Monitoring Procedure

An ARL EL215 environmental noise monitor was placed 8m from the nearest lane of the Capricorn Hwy to measure road traffic noise. The monitor had an unobstructed view of the road and was located in a free field position. The microphone was approximately 1.4 metres above ground surface level. The noise monitor was set to record noise levels between the 21st to the 23rd of February 2012.

For the unattended noise monitoring location refer to Figure 2.

Figure 2: Receivers and noise monitoring location



The noise monitor was set to record noise levels in "A" weighting, Fast response with 15 minute statistical intervals. Ambient noise monitoring was conducted generally in accordance with Australian Standard AS1055. Road traffic noise monitoring was conducted in general accordance with Australian Standard AS2702:1984 '*Acoustics - Methods for the measurement of road traffic noise*'. Weather conditions during the survey period were generally fine with light winds.

4.2 Rail Noise Measurements

Attended noise measurements of train passbys were conducted on the 21st and 22nd of February, 2012. The Norsonics Nor140 Sound Level Meter was located on Rhoda Street approximately 17 metres from the nearest rail line. The microphone was positioned 1.5 metres above ground level. Refer to Figure 2 for the location.

Noise measurements were conducted in "A" weighting "Fast" response, 5 minute statistical interval which recorded the L_{Amax} and SEL_{LAE} , (used to calculate the 24 hour L_{AEQ}). Based on the measured L_{AE} level, calculations were conducted utilising the number of trains per day to determine the $L_{Aeq,24hr}$ noise impact at the proposed development.

All measurements were conducted in accordance with Australian Standard AS 2377:2002 'Acoustics – Methods for the Measurement of Railbound Vehicle Noise'.

During the survey, weather conditions were fine with only light winds observed over the measurement period.

5. Measured Noise Levels

The following tables present the attended measurements of train noise levels and existing ambient noise levels from the unattended noise survey. Any periods of inclement weather or extraneous noise are omitted from the measured data prior to determining the results.

5.1 Ambient Noise Levels

The measured ambient noise levels measured at the monitoring location are as follows;

Table 1: Measured ambient noise levels - all time periods

Day	Date	L10(12h)	L10(18h)	L10(1h)	Leq(1h) Day	Leq(1h) Night	Leq(24h)	L90(8h)
Wednesday	22/02/12	72	70	73	70	67	67	44

Refer to the appendix for graphical representation.

5.2 Train Noise Levels

The measured rail noise levels from attended and unattended monitoring location are as follows.

Table 2: Unattended Noise Measurements of Rail Noise Levels

Rail Noise Descriptor	Measured Level dB(A)
$L_{Aeq(24hr)}$	67

Table 3: Attended Noise Measurements of Rail Noise Levels

Train Type	Measured Level L_{Amax} dB(A)
Freight	76
Freight	75
Freight	85
Freight	83
Freight	73
Freight	75
Freight	74
Freight	66
Freight	70
L_{Amax}	85

Refer to the appendix for graphical representation.

6. Noise Criteria

6.1 Road Traffic Noise Criteria

The criteria applied by TMR is in accordance with the Main Roads "Road Traffic Noise Management – Code of Practice, January 2000". The applicable criteria for the development in the year 2022 (ten year planning horizon) requires road traffic noise to be assessed as follows;

Table 4: TMR Road Traffic Noise Criteria

Location	Noise Level dB(A)
External Criteria	
Balconies & Formal External Open Areas (faced Corrected)	L_{A10} (18hr) 63 dB(A)
Open Spaces – Parkland & Recreational Areas (free field)	L_{A10} (12hr) 63 dB(A)
Building Façade (faced Corrected)	L_{A10} (18hr) 60 dB(A)
Internal Criteria – AS2107:2000	
Living Areas	L_{Aeq} 45 dB(A)
Sleeping Areas	L_{Aeq} 40 dB(A)
Work Areas	L_{Aeq} 45 dB(A)

6.2 Rail Noise Criteria

The criterion applied by Queensland Rail (TMR) for developments in the vicinity of rail corridors requires compliance with the levels stated in Table 7.

Table 5: Rail Noise Criteria

Location	Noise Level dB(A)
External Criteria	
Outdoor Recreational Area	L_{Amax} 87 dB(A)
	L_{eq} (24 hour) 65 dB(A)
Internal Criteria – AS2107:2000	
Living Areas	L_{Amax} 50 dB(A)
Sleeping Areas	L_{Amax} 50 dB(A)

7. Road Traffic Assessment

Road traffic noise associated with Capricorn Hwy for the ten year planning horizon was assessed at the development to determine compliance with the ULDA and TMR criteria (refer to section 6.1) to determine the requirements for any acoustic treatments.

7.1 Traffic Volumes

Current and future traffic volumes were obtained from CRG Consulting and are presented in the table below. A growth of 4% was advised for the road with 26.5% heavy vehicles for 2022.

Table 6: Traffic Volumes

Location	2012 AADT	2022 Predicted AADT	Percentage of Heavy Vehicles
Capricorn Hwy	3,013	4,460	26.5

7.2 Road Traffic Noise Verification

To ensure the 3D Cortn (Soundplan) noise model is accurate, a verification model of the predicted $L_{A10(18hr)}$ was create and compared to the measured noise level. The Cortn method allows a 2dB(A) variation from the predicted and measured level, if the variation exceeds 2dB(A) a correction to the predicted level is required.

Table 7: Comparison of Measured an Predicted Noise Levels

Location	Measured $L_{A10(18hr)}$ dB(A)	Predicted $L_{A10(18hr)}$ dB(A)	Correction
Capricorn Hwy	70	68.5	0

A copy of the verification model is shown in the appendix.

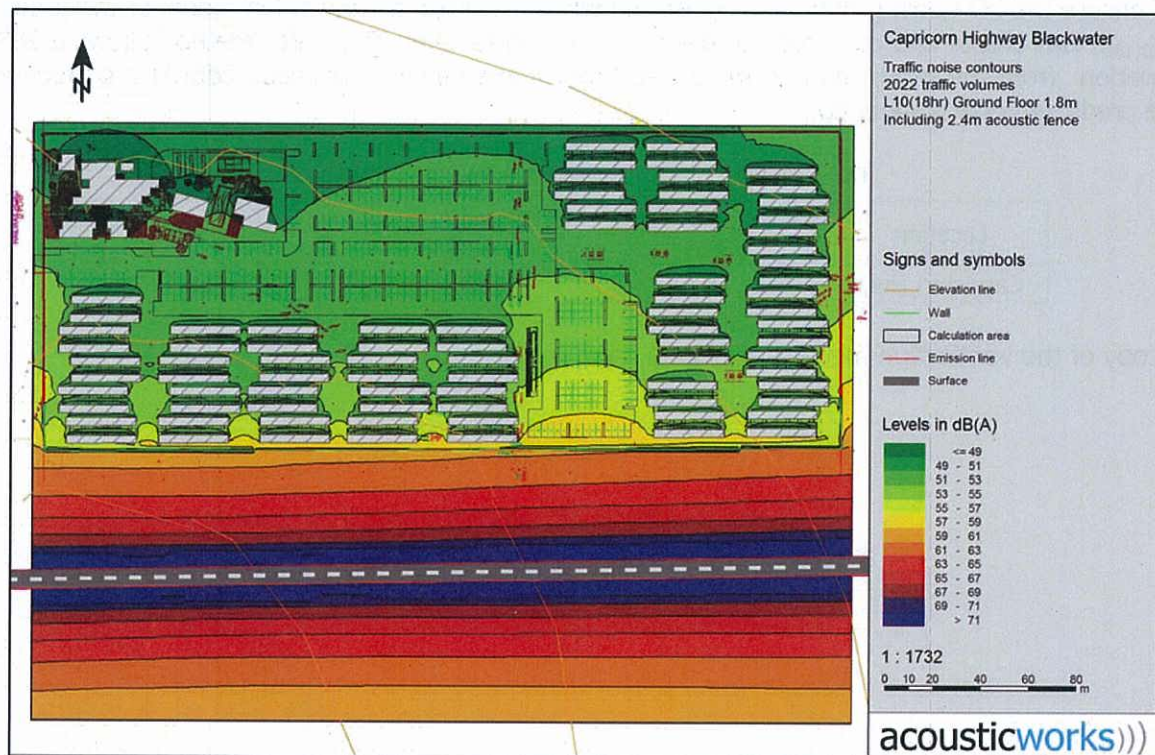
7.3 Predicted Road Traffic Noise Levels - 2021

Road traffic noise modelling for the proposed development was based on the following information:

- Site layout, floor plans and elevations provided by THG, Drawing No. G5329-PP01, Issue C.
- Capricorn Hwy speed limit of 60km/h.
- Receiver Height were based on 1.5m above finished floor level.
- Percentage of heavy vehicles was 26.5 and 2022 projected traffic flow.
- All 3D Soundplan modelling figures includes façade correction.

The Soundplan 3D Cortn noise model predicted $L_{A10,18\text{hour}}$ levels, utilising measured data from table 1, correction were applied to convert the level into $L_{Aeq,1\text{hour}}$ and $L_{A10}(12\text{hr})$ to compare with the TMR assessment criteria and AS2107:2000. Figure 3 present the predicted noise contour data for the development.

Figure 3: Ground floor noise contour data (Not to Scale)



Based on the predicted noise impacts, all buildings will comply with the assessment criteria for buildings and private recreation areas on the condition the recommendation in section 8 are implemented.

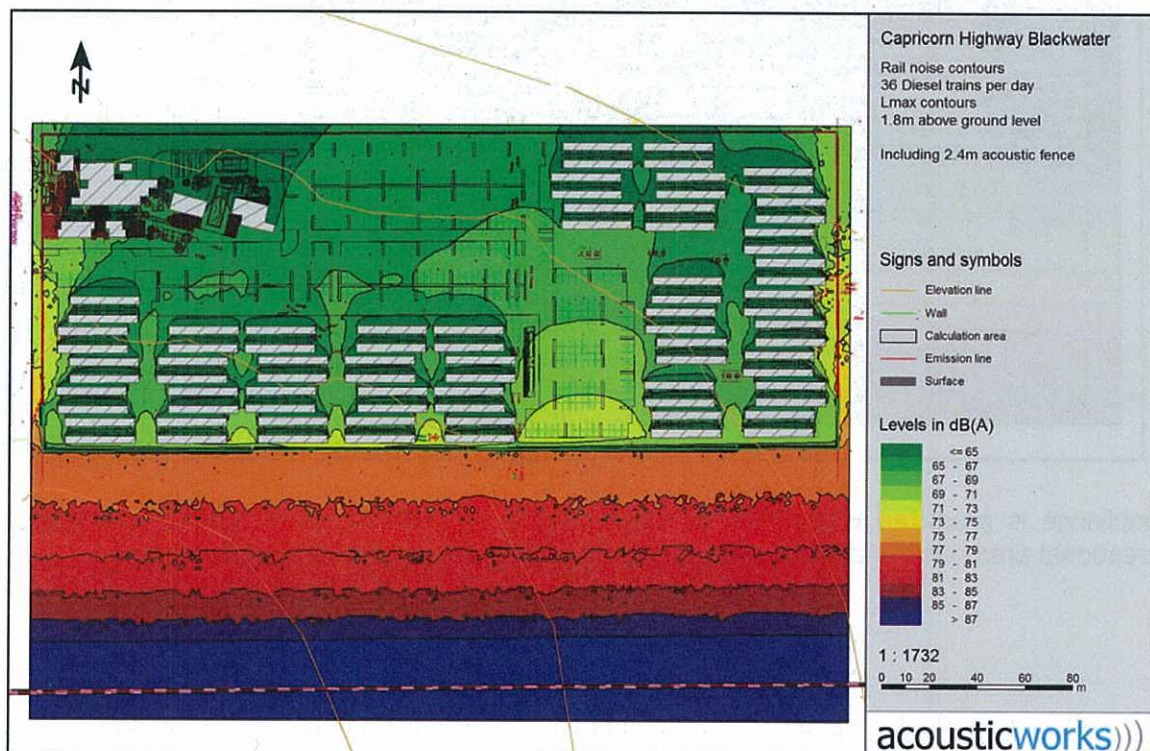
7.4 Predicted Rail Noise Levels

Rail noise modelling for the proposed development was based on the following information:

- Site layout, floor plans and elevations provided by THG, Drawing No. G5329-PP01, Issue C.
- Capricorn Hwy speed limit of 60km/h.
- Receiver Height were based on 1.5m above finished floor level.
- Percentage of heavy vehicles was 26.5 and 2022 projected traffic flow.
- All 3D Soundplan modelling figures includes façade correction.

Figure 4 present the predicted L_{Amax} noise contour data for the development.

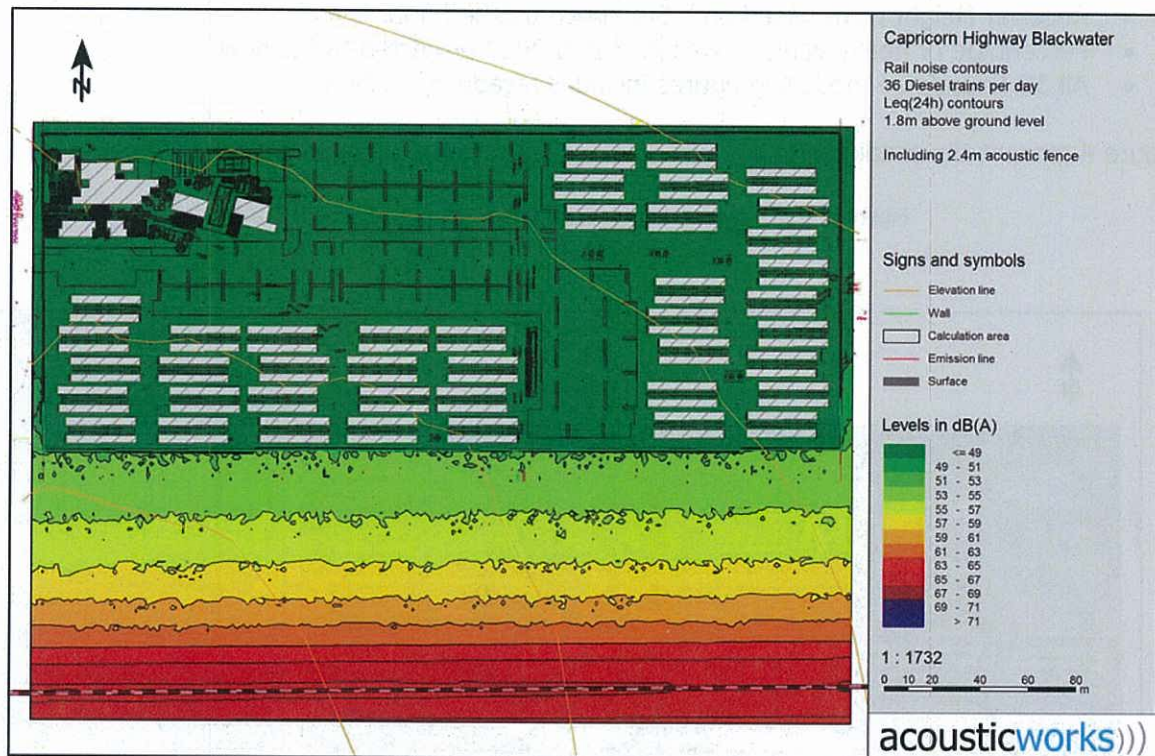
Figure 4: Rail - Ground floor noise contour data L_{Amax} (Not to Scale)



Compliance is predicted the TMR rail noise criteria of 87dB(A) on the condition the minimum acoustic treatment as detailed in section 8 are implemented.

To ensure compliance of private and communal recreation areas with TMR criteria ($L_{eq(24hr)}$), modelling was conducted using Soundplan with the results presented in Figure 5.

Figure 5: Rail - Ground floor noise contour data $L_{Aeq(24hr)}$ (Not to Scale)



Compliance is predicted with TMR rail noise criteria of 65dB(A) for all private and communal recreational areas on the condition the recommendation in section 8 are implemented.

8. Recommendations

8.1 Road Traffic & Rail Noise

All building treatments were calculated using Australian Standard *AS3671:1989 'Road Traffic Noise Intrusion – Building Siting and Construction'*.

8.1.1 Glazing

The minimum glazing treatments are presented in table 8, with the installed glazing system to comply with the following:

- The minimum glass thickness specified shall not be reduced regardless of the R_w performance of the glazing system.
- If compliance cannot be achieved with the minimum R_w ratings, the glass thickness shall be increased until compliance is achieved.
- Glazing specified with acoustic seals requires a Q-lon seal or an equivalent product, mohair seals are not acceptable.
- The glazier shall provide NATA test reports on request to verify compliance with the minimum R_w ratings. Generic reports are not acceptable.

Table 8: Minimum Glazing Treatments

Location	Buildings	Floor	Location	Rw Ratings					Glazing			Acoustic seals
				Wall	Roof	Windows 1	Windows 2	Sliding door	Windows 1	Windows 2	Sliding door	
South	Rows Nearest Hwy	Ground	All	33	33	27		28	4mm float	4mm float	5mm tough	yes

All location not identified in the table shall require 4mm float for windows (minimum R_w 22) and 5mm toughened for sliding doors (minimum R_w 23)

8.1.2 Wall Construction

The proposed wall systems nominated for the prefabricated buildings with insulation in the cavity are predicted to be sufficient. Penetrations through the wall shall not reduce the overall acoustic performance of the wall system.

8.1.3 Ceiling Construction

The proposed wall systems nominated for the prefabricated buildings with insulation in the cavity are predicted to be sufficient.

Penetrations through the ceiling shall not reduce the overall acoustic performance of the ceiling system.

8.2 Acoustic fence

An acoustic fence is recommended to be constructed along the boundary as shown in figure 3. The height of the fence should be 2.4m above the finished ground floor level of the units. The fence should be constructed using lapped timber (minimum 50% lap), masonry, fibre cement sheet, Hebel, perspex, plywood or other material with a minimum surface density of 12kg/m^2 . The fence should have no holes or gaps evident.

The position of the acoustic fence is shown in Figure 6 below.

Figure 6: Recommended acoustic fence



9. Conclusion

An environmental noise assessment was conducted for the proposed non-residential, workers accommodation located at Lot 4 Capricorn Hwy, Blackwater. On the condition the recommendations detailed in section 8 are implemented, compliance is predicted with TMR and ULDA assessment criteria.

If you should have any queries please do not hesitate to contact us.

Report Prepared By



GREG PEARCE B.Eng (Mech)
Director

10. Appendices

10.1 Development Plans

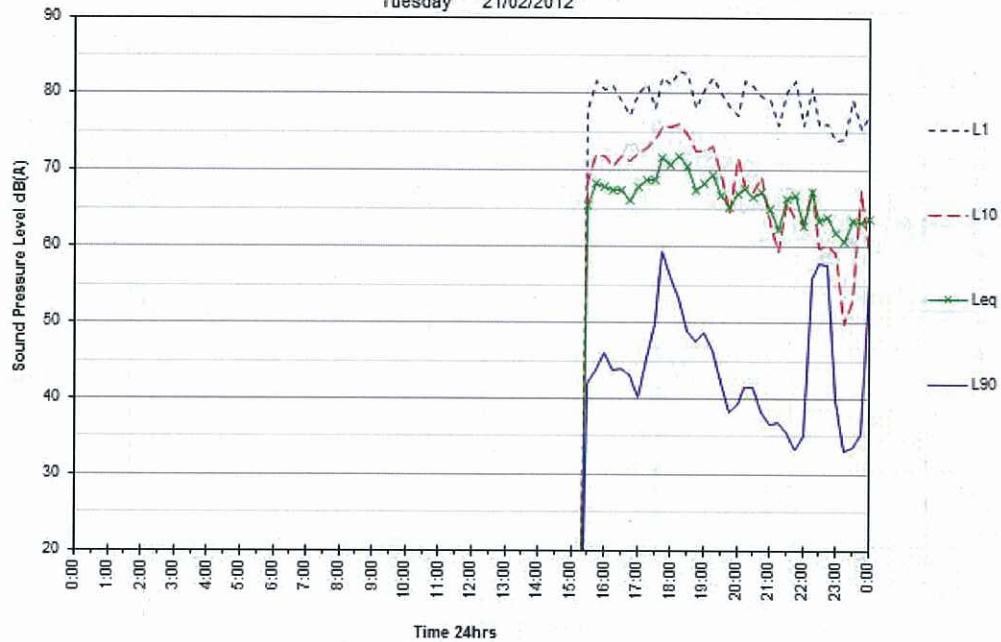


10.2 Noise Monitoring Charts

Capricorn Highway Blackwater

Traffic noise monitoring

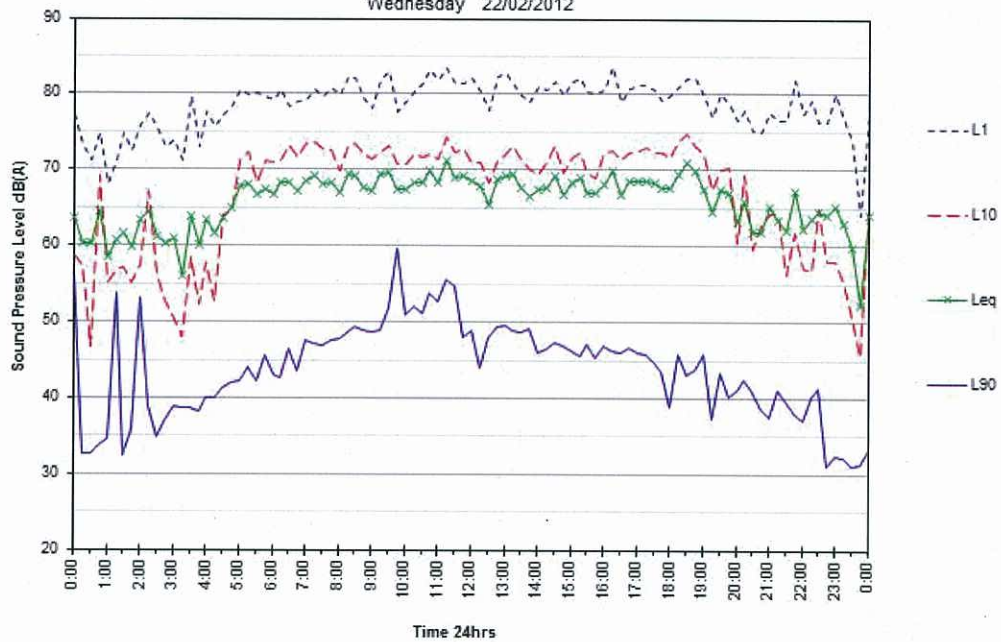
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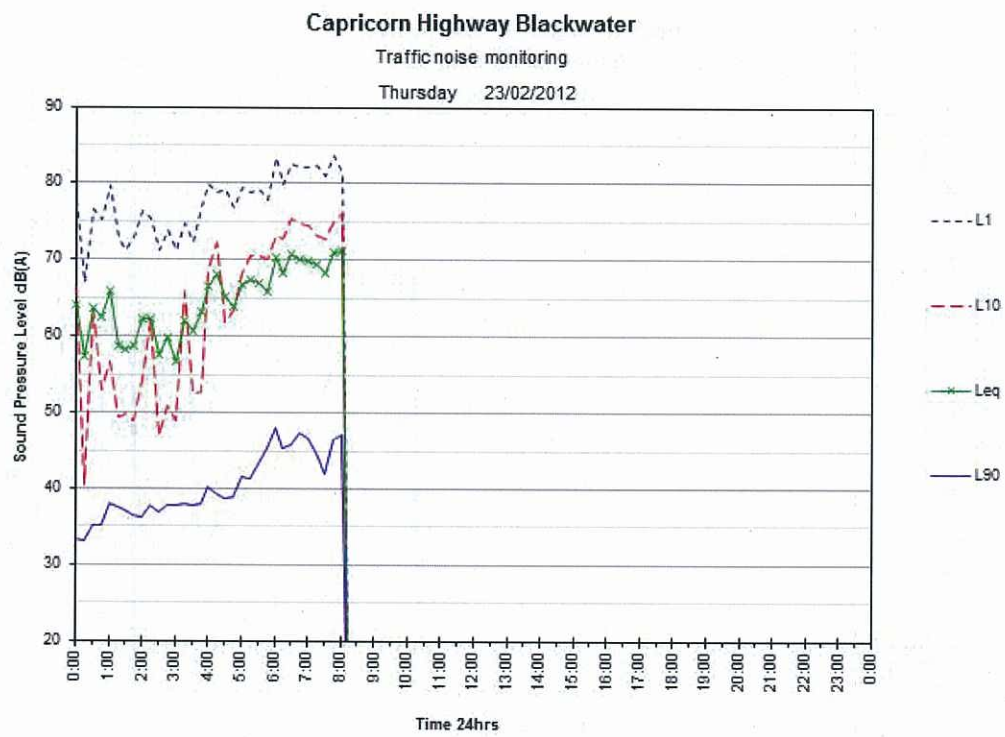


Capricorn Highway Blackwater

Traffic noise monitoring

Wednesday 22/02/2012





10.3 Soundplan Models

