

DEVELOPMENT CONSULTANT
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ENVIRONMENTAL MANAGEMENT
& LICENSING

PLANS AND DOCUMENTS
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APPROVAL dated 25 / 2 / 11

APPLICATION TYPE:

Development Permit for a Material Change of Use

APPLICATION DESCRIPTION:

Visitor Accommodation and Food Premise

ADDRESS:

65 O'Connell Terrace, Bowen Hills



Prepared by DTS GROUP QLD
PO Box 361 Paddington, QLD 4064

On behalf of Jeff Yuen

November 2010

Local Authority: UDLA

Noise Impact Assessment

65 O'Connell Terrace, Bowen Hills
Being described as Lot 31 on RP208866

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Document Status

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LIMITATIONS

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1 Executive Summary

1.1 Site Details

ADDRESS:	65 O'Connell Terrace, Bowen Hills
LOT DESCRIPTION:	'Lot 31 on RP208866
TOTAL SITE AREA:	409m2
SEQ PLAN DESIGNATION:	Urban footprint
LOCAL AUTHORITY:	ULDA
AREA CLASSIFICATION:	Mix Use Zone

1.2 Application Details

DEFINED USES:	Visitor Accommodation and Food Premises
APPLICANT:	Jeff Yuen C/- DTS GROUP QLD Po Box 361, Paddington Q 4064
DTS REFERENCE:	A04051

2 Introduction

2.1 Locality Introduction

DTS Group QLD Pty Ltd has been commissioned by Jeff Yuen to prepare a Noise Impact Assessment for the proposed use of the abovementioned site located at 65 O'Connell Terrace, Bowen Hills. A site plan is attached as Appendix A and described as Lot 31 on RP208866. In regards to this site, the proposed use is located within the identified site and manoeuvring areas for vehicles to the rear of the site. The entire site is located within a Mixed Use Zone.

This existing precinct locates significant noise sources and adjoining commercial operations within close proximity and borders the site to the north south, east across Wren Street and to the west.

The current extent of development consists of an existing building historically used for commercial uses.

The topographical characteristics of the site, location and the orientation of the proposed buildings and location of plant and equipment on-site facilitate sufficient attenuation from the existing sensitive receptors and furthermore, the adjoining buildings serve to provide additional screening to the ICB alignment which is located at a distance of 62-metres to the east of the site.

As demonstrated on the aerial photography, the site is provided screening to the ICB alignment due to the intervening commercial buildings and the LR dwellings to the northeast. The recent opening of the Clem Jones tunnel adds to the current ambient monitoring, a line noise source which replicates the line source of the ICB however is located at a distance of 221-metres to the east of the site. Given the submerged nature of the exit tunnel, together with the intervening permanent buildings associated with the operational characteristics of the Clem Jones Tunnel, DTS Group Qld considers that the noise impacts from the Clem Jones are negligible on the proposal.

The proposal is for the construction of a purpose built Visitor or short term accommodation building, which given the proximity of the site to the Royal Brisbane Hospital will serve to provide for much needed short term accommodation within the area.

Nonetheless, this Noise Impact Assessment will serve to identify the noise impacts on the eastern façade of the proposed accommodation building and determine if compliance with the appropriate internal noise level standards can be readily achieved.

3 Site Description

3.1 Surrounding Land Uses

- North : Residential
- East : Commercial, residential and ICB
- South : Community Use - Royal Show Grounds
- West : Commercial uses

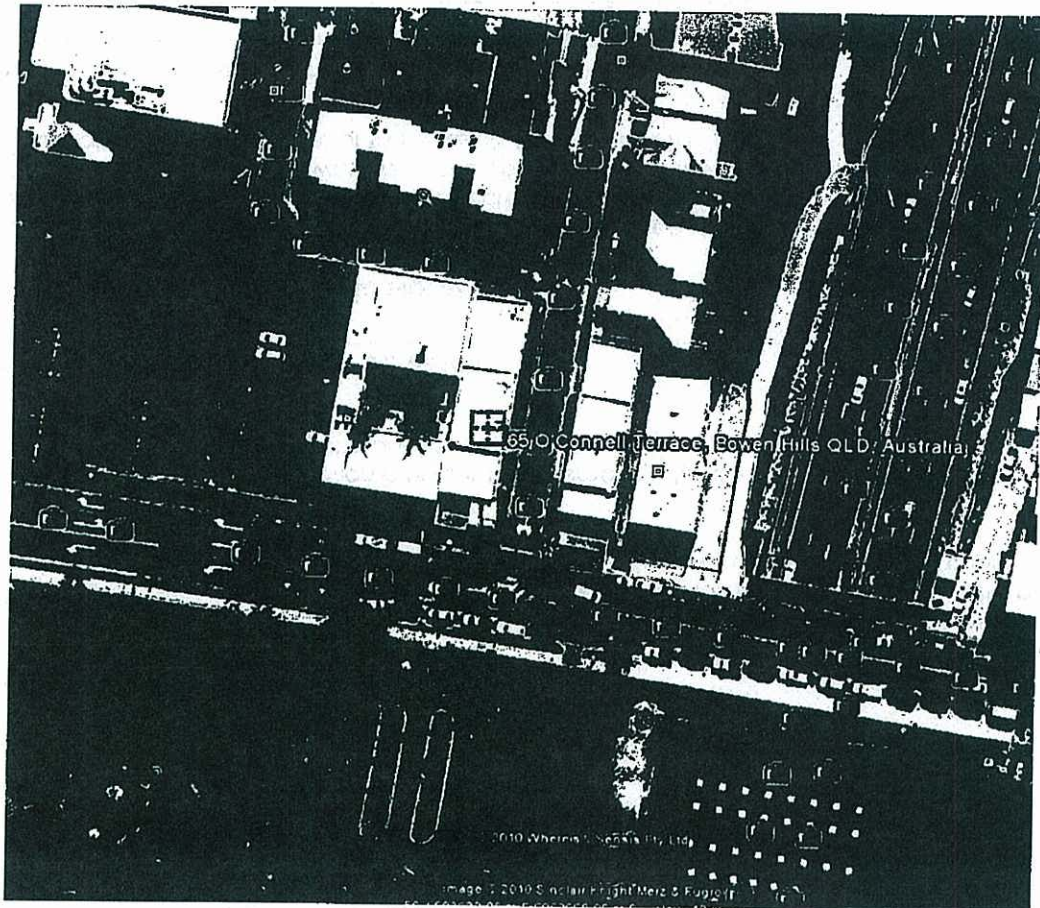


Figure 2: Aerial view of site and surrounding localities.

4 Equipment and Procedures

4.1 Instrumentation

The following instruments were used to measure environmental noise impact levels.

- Rion NL22 (Type 1) Noise Logger; and
- Rion NC 73 Calibrator.

The operation of the sound level measuring equipment was field calibrated to the reference signal and checked at the end of each measurement session to ensure it was within 0.5dB of the reference signal. All instrumentation used in this assessment hold a current calibration certificate from a certified NATA calibration laboratory.

4.2 Measurement Procedure

Ambient noise was measured at the site on from 1st December to 3rd December (ambient). The weather conditions during the survey were noted as fine with a temperature of approximately 21°C and a negligible wind speed however the sampling was shortened due to pending weather.

Table 2.0 in the following section provides the average statistical noise levels recorded by the noise level meter during the on-site monitoring.

5 Measured Noise Levels

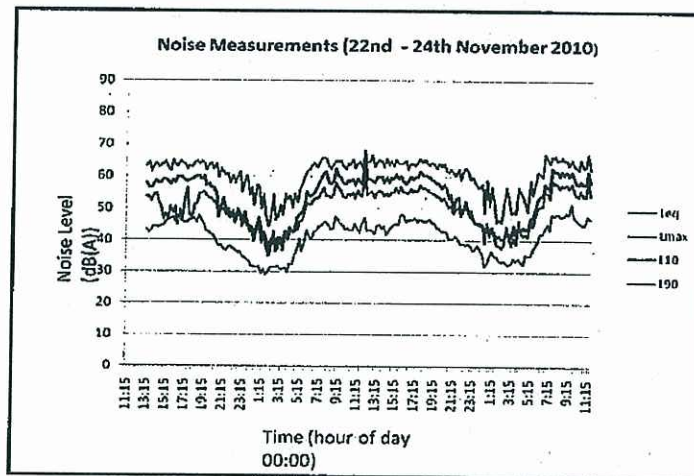
5.1 Measured Road Traffic Noise Levels

Existing free-field noise exposure levels were determined and the typical noise levels measured at ML1 as detailed in the attached site plan are presented in Table 2.0. The ambient noise of the area was dominated by rail traffic noise and commercial and local industrial sources. Summaries of these results are shown in Table 2.0.

Table 2.0 Measured Ambient Noise Levels

Parameter	Period	Recorded Noise Levels
		Average
L _{max}	Daytime (7am-6pm)	64.2
	Evening (6pm-10pm)	61.8
	Nighttime (10pm-7am)	54.8
L ₁₀	Daytime (7am-6pm)	59.2
	Evening (6pm-10pm)	53.4
	18 Hour	57.0
	Nighttime (10pm-7am)	45.4
	8Hour	45.3
L ₉₀	Daytime (7am-6pm)	45.4

Leq	Evening (6pm-10pm)	40.5
	8Hour	35.2
	Nighttime (10pm-7am)	54.2
	Daytime (7am-6pm)	54.1
	Evening (6pm-10pm)	44.0
	Nighttime (10pm-7am)	45.4



5.2 Source Noise Levels

The maximum-recorded (worst-case scenario) source noise levels have been calculated by this consultancy previously and for the equipment currently being used on this site and the relevant levels are as follows:

Table 3.0 Source Noise Levels

Machine/Activity	Noise Levels, dB(A)	
	L10	LMAX
Car driving in car park	50 @ 8-metres	55 @ 8-metres
Car engine starting	52 @30-metres	55 @30-metres
Car door Closing	52 @ 30-metres	55 @ 30-metres

The aforementioned noise level measurements were conducted in accordance with the following generally accepted practices. General requirements of the Queensland Environmental Protection Act 1994; Environmental Protection Regulation 1998; Environmental Protection Policy (Noise) 1997; BCC Noise Impact Assessment Planning Scheme Policy 2000; and Australian Standard AS 1055.1-1997 Acoustics-Description and measurement of environmental noise - General procedures.

6 Noise Criteria and Limits

6.1 Brisbane City Council Noise Criteria and Noise Limits

Based on the use of the site and the time of day that the noise sources are being emitted from the operation an appropriate assessment methodology can be determined from the NIAPS policy.

As the site is located in a noisy area which has relatively high background levels the following noise sources from the operation of the site are determined.

- Heavy vehicle manoeuvring noise; and,
- General Commercial operational noise.

Comparison of Like Parameters is to be used for all vehicle movements except for the fixed plant and equipment noise and when occurring between daytime and evening periods. As detailed in the NIAPS Policy, the criterion for the comparative methodology is:

- **Methodology One: Comparison of like parameters or descriptors**—the chosen parameter assessing the impact of the development does not exceed the same parameter describing the ambient noise by more than 3dB (A).

Appropriate noise assessment should consider the following:

- Emissions of any contaminants including air pollutants, noise, and vibration do not cause environmental harm or nuisance.
- The design of the proposal minimises noise impacts on surrounding uses.
- Noise emission and vibrations from the site must not cause an environmental nuisance.
- No significant emissions occur beyond the boundary of the site.
- The building design and layout locates potential noise sources away from sensitive surrounding uses.
- Major openings in buildings and all areas where work maybe conducted outside the buildings are located away from the nearest sensitive receiving environment. Noise emission and vibrations from the site must not cause an environmental nuisance.
- Where the site has a common boundary with a sensitive receiving environment:
- No openings occur in walls facing a common boundary or sensitive land uses with significant emissions;
- Effective acoustic screening is provided; and
- Noise emitting services are located as far away as possible.

This criterion applies to all time-varying noise, while noting:

- applies during the day-time;
- requires adjustment for tonality and impulsiveness;
- applies at sensitive receptors, not uses within industrial areas;
- applies as a measured level, NOT component; and
- Applies at a distance of at least 3.5-metres from the receptor.

- **Methodology Four: Sleep Disturbance due to Noise Sources other than Aircraft**—this methodology applies to noise sources operational during the night periods (2200-0700) that are neither steady State nor Quasi-steady (L_{max}).

6.2 Road Traffic Noise

The road traffic noise criteria for the proposed development are as detailed in BCC City Plan Noise Impact Assessment Planning Scheme Policy, Noise Methodologies Guideline. The internal noise limits are the maximum recommended design sound levels from Australian/New Zealand Standard AS/NZ 2107. The site is located within an R4-5 noise area category under the BCC City Plan, due to the extent of traffic in the immediate area and the monitored background noise levels. This equates to a limit of **40dB (A) LAeq, 1hour inside bedrooms (night) and 45 dB (A) LAeq, 1hour** in living and work areas (day).

Since AS2107 does not include limits for outdoor recreation areas, external recreation areas should comply with the criteria nominated in the EPP (Noise). The requirements for this development are identified in Table 2.

The private outdoor areas are detailed on the Site Plan.

(a) Compliance with 2107	
Area Category According to AS 1055	R4-5
Max Limit in Bedroom	40dB (A) LAeq, 1hr
Max in Living Areas	45 dB (A) LAeq, 1hr
Max (free field) DMR external level	60 dB(A)L10, 18-h
(b) Outdoor recreational Areas	
Max Limits (façade Corrected)	60 dB(A) Leq – 1 hr (any one hour) 55 dB(A) Leq – 24hr 63 dB(A) L10 18hr 80 dB(A) L _{Amax}

Table 2: Noise Criteria

Given the ambient noise measurements gathered for this development it is considered that the internal noise levels can be readily achieved through additional construction component or façade attenuation. The max internal noise limit for bedrooms as indicated in Table 3 is 40 dB (A) LAeq-1h where the measurements taken at the most exposed boundary are 48.9 dB (A) LAeq 1h.

As indicated in NIAPS Policy recreational areas are also required to achieve an appropriate level of acoustic amenity in terms of Traffic Noise. From the noise sampling conducted for the development at the south-western corner of the site the L10 noise level at ML1 achieves the 63-dB (A) L10 requirement usually implemented by DMR and the 55 dB(A) Leq 24-hr indicated by BCC (currently level is 50.7 dB(A) Leq-24hr).

7 Assessment of Noise Impact

7.1 Existing Car Parking Noise Level

The only external on-site noise with a potential to cause noise impacts on the adjoining residences are vehicle movements on the subject site. The maximum recorded (worst case scenario) source noise levels have been calculated by this consultancy previously and for the equipment currently being used on this site and the relevant levels are as follows;

Table 3: Source noise Levels

Machine/Activity	Noise Levels, dB(A)
	L _{Amax}
Car start and drive in car park	67 @ 5-metres
Car door Closing	70 @ 5-metres

From the above, desired minimum criterion noise level to achieve would be +3 dB (A) L1 at 3.5 metres from the nearest residential receptor in the daytime and evening periods from Car parking Noise for the same parameter.

From the measured ambient noise levels, the noise limits for on-site vehicle activities will be;

- Daytime = 67.2-dB(A) L_{AMAX,T}
- Evening = 64.8-dB(A) L_{AMAX,T}

The maximum recorded (worst case scenario) source noise levels have been calculated by this consultancy previously and for the equipment currently being used on this site and the relevant levels are as follows;

At the closest adjoining residence to the east of the subject site on-site vehicle noise levels during entrance and exit from the underground car parking will be;

Given the reduced separation distance to the nearest residence to the east (13.7 metres) the following demonstrates the resultant noise level from car parking activity along the driveway:

Source noise level (L_{p1}): 67.0 dB (A)

From $L_{p2} = L_{p1} - 20 \log (r_2/r_1) = 58.2 \text{ dB (A)}$

Resultant estimated Noise impact level at the façade of the adjoining LMR allotment to the west of the site: 58.2-dB (A) L_{AMAX,T}

Thus the noise of car parking activity in the daytime and evening periods should not present any adverse noise amenity impact on the surrounding and adjoining residential areas, and would be consistent with the ambient noise levels of the locality as monitored on-site.

7.2 Fixed Plant and Equipment Noise

Plant and equipment installed on-site will consist of roof mounted A/C systems and plant and equipment.

However, as fixed plant and equipment be installed installed/mounted on the roof and is associated with a 24-hour operation, it requires an assessment in accordance with the AS2107 methodology. The criteria in this regard are: **The maximum recommended design sound levels stated in Table 1 of AS2107.**

Assuming that any fixed plant and equipment may be required to operate at any time, from table 1 of AS2107 the minimum design sound level to be achieved at the nearest residential area will be 40 dB (A) L_{eq} internal, being that for sleeping areas for houses and apartments near major roads.

As for pervious night-time and sleeping area assessment, the construction of the nearest residences is not known, and thus a maximum 5-dB (A) noise transmission loss must be assumed through an open window. This, the criterion noise level to be achieved is **45 dB (A)** external to the nearest residence.

Given the separation distance from the nearest part of the proposed building, for where fixed plant and equipment may be located, to the adjacent residences, the following provides advice on the level of noise emission to be achieved for fixed plant and equipment.

Distance separation to the nearest receptor:	21.2-metres (min) (r_2)
Noise loss over distance:	37.5-dB (A) = (from $10\log(4\pi r^2)$)
Criterion Noise Level:	45-dB (A)

Therefore, fixed plant and equipment noise from the identified roof mounted plant in Figure 5 the noise level should not exceed:

$45 + 37.5 = 81.5$ dB (A) SWL – combined resultant noise level from all required fixed plant or equipment, not a single component noise level.

No correction for path difference has been made to ensure demonstration of worst case scenario.

Therefore the maximum permissible SWL at the source is 81.5 dB (A) (@ 1-metre) to ensure no exceedance of the Night-time internal noise criteria as detailed in AS 2107. As detailed in Table 4, the source noise levels associated with the type of roof mounted plant and equipment that can be expected with an office operation will be achieved on the basis of the measured source noise levels.

Therefore, as indicated above the location of the office use associated with the warehousing operation will achieve the required internal Noise Level within the closest residential receptor with windows open.

Engineering options available to achieve/comply with these limits can include:

- Low sound pressure level equipment;

- Silencers;
- Acoustic Enclosures;
- Noise Barriers; and,
- Vibration isolation systems.

The application of such engineering treatments, along with providing maximum separation distances where possible between sources and sensitive areas will ensure that noise from plant and equipment is kept to within the design limits.

7.3 Traffic Noise Control External Living Areas

At the closest external living area associated with the proposed development which has a line of sight to the ICB to the east, the roof top decks will be most exposed. As indicated on the attached aerial photograph, the separation distance is 66-metres to the centre of the ICB alignment. As detailed by the ambient noise monitoring, the sign has high vehicle noise background levels however, given the L_{eq-1hr} levels identified are not expected to exceed the 55 dB(A) $L_{eq-24hr}$ criteria. As indicated the modelling of external noise has been completed and identified that the external noise level on the communal recreational area on level 5 with the proposed Balustrade, complies with the DMR requirements of 63 dB(A) L_{10} levels.

Based on the ultimate predicted traffic noise levels at the setback on the proposal plans, the external noise criterion is expected to be achieved from traffic noise given the current monitoring and modelling conducted for all levels 1-5. The ultimate AADT emission levels have been applied to the modelling for this development. As detailed in Table 1, the external L_{eq} levels comply with the BCC criterion of 55 L_{eq-24h} (currently 50.7 dB(A) $L_{eq-24hr}$). The ICB is located at approximately 66-metres to the east of the site which is providing significant separation distance to ensure that future traffic noise will have negligible impact on the ambient noise levels at 65 O'Connell Terrace.

Consideration for future traffic noise increase indicates that in the unlikely event (due to the proposed tunnelling) that if the traffic volumes were to double over the next 10-years, the traffic noise $L_{10-18hr}$ would only increase by 2.8dB(A). As the currently level is 50.7 dB(A) $L_{eq-24hr}$ a future increase demonstrates that the proposed MCU development would still comply with the external noise level criterion. As such there is no further requirement for Noise attenuation as part of this external assessment. As the ambient monitoring indicates, the $L_{10-18hr}$ noise levels together with the L_{eq-1hr} are currently lower than the criterion level without applying the façade reduction applied through an open window.

On this basis it is expected that construction of these units is unrestricted and given the proposed 5 level construction, DTS Group Qld has decided to further provide justification through associated acoustic modelling of the façade impacts along the eastern façade of the proposed Short-term Accommodation to ensure compliance with required BCC (NIAPS) and AS2107 criterion as evident from the on-site monitoring.

7.4 Existing and Future Traffic Volumes

The traffic volumes for the ICB have been obtained from a Traffic Consultancy and confirmed by BCC traffic census data recorded in 2009 and appropriately extrapolated to 2021 (given the expected completion of construction is 2011). The traffic volumes are contained in Table 4.

Road	Traffic Volumes		% CV.	Speed Zone
	Existing 18hr 2010	2021 (based on traffic growth)		
ICB	65,275 vpd	79,397 vpd (3.8% assumed growth as reduction expected)	4.5	60km/h

Table 4: Traffic Volumes

7.5 Verification of Road Traffic Noise Model

To verify the road traffic noise prediction model, the LA10 (18hour) traffic noise levels are calculated and compared to the measured noise level. Table 5 presents a summary of the input variables used in the preparation of the Tnoise model.

Parameter	ICB
Ultimate (18 hour)	79397
Traffic Composition (%CV)	4.5
Dis Road to Receiver (m) centreline	66
Traffic Speed	60
Angle of View	90
Road Gradient (%)	0
Average propagation Height (m)	1.2
Free Field/façade corrected	Free Field and Façade corrected
Receiver Height (m)	1.5

Table 5: Road Traffic Noise Prediction Model Inputs for the Existing Scenario O'Connell Terrace ML1

The current level of traffic noise exposure at ML1 was measured as 57.0-dB (A) LA10 (18hour). The Tnoise model predicted at the same location a level of 53.9-dB (A) LA10 (18hour). An acceptable tolerance is ± 2 dB (A), however as Wren Street is used as a short cut, in addition to traffic movement along O'Connell terrace, the acoustic model for major line noise sources for the ML1 is considered appropriate.

On the basis of the traffic predictions of 79397 18-hr traffic volume for the acoustic horizon for this proposal, modelling indicates that the resultant LA10 (18hour) in 2021 will be 54.8: LA10 (18hour) resulting in a 1.5dB (A) increase at ML1. On this basis the current exposure levels can be corrected to determine the external future noise levels. Furthermore, it is expected with the additional proposed levels increasing to 28.9m AHD, a greater level of exposure will eventuate.

7.6 Future Road Traffic Noise Impacts

Ultimate traffic flow model noise predictions for ICB been made and modelled for the proposed additional development. As the modelling indicates the most exposed units along the northern boundary to the ICB have been modelled on the ultimate traffic generation determined from the traffic data obtained. As detailed by the current and future ML1 modelling scenario the L_{10-18hr} levels are consistent with an application of a standard traffic growth factor.

The ultimate traffic noise modelling has been conducted using the identified building pad levels or FFL's in the Architectural drawings.

Tnoise has been set-up to predict the L₁₀ (18-hour) noise levels under Ultimate conditions (2021) with the provided setbacks. These results are presented in Table 6 below and include facade reflection.

Additionally the corresponding Leq have been determined for criteria comparison.

These results for the ultimate traffic flow (2021) indicate that the proposed units will be exposed to traffic noise levels exceeding the BCC criterion (façade corrected).

	Receptor Location at outdoor recreation area - Balcony	Finished surface level	External Receptor Location			
			(ext & façade corrected) L _{10-18-hr}	(ext & façade corrected) Leq _{24-hr}	External Leq _{1-hr} Day/night	Criteria Internal
	ML 1 – (Measured 57.0)	16.9	Tnoise Current 53.9 (ultimate 54.8)	50.7		
Façade Correction (db(A))	MUD					
	RL 1 – Standard receptor external, façade corrected Level 1	16.9	57.3	51	54.5/44	45/40
	RL 2 – Standard receptor external, façade corrected Level 2	19.9	59.9	53.6	57.1/46.6	45/40
	RL 3 – Standard receptor external, façade corrected Level 3	22.9	63.2	56.9	60.4/49.9	45/40
	RL 4 – Standard receptor external, façade corrected Level 4	25.9	64.9	58.6	62.1/51.6	45/40
	RL 5 – Standard receptor external, façade corrected Level 5 – OUTDOOR REC	28.9	62.7	56.4	59.9/49.4	63 L _{10,18-hr} /55Leq 24-hr

Table 6: Predicted 2020 road traffic noise levels at the BCA building setback (façade corrected) for proposed units (refer to site plan in Appendix A for receptor locations).

The predicted ultimate traffic noise levels are provided in Table 6 above have been modelled to reflect the latest proposal layout, provided in Appendix A. Table 6 details the external noise impacts (façade corrected) modelled for the proposed most exposed Short term accommodate rooms (northern façade). As indicated the external façade corrected levels currently exceed the internal criterion, however these are external and do not account for façade reduction Rw associated with the built design. The proposal, however can achieve the internal night-time criterion with an assumed reduction of 5 dB (A) through open windows. Further consideration of building form is required as the proposal does include the inclusion of mechanical ventilation in all rooms.

External noise impact levels comply with the BCC external noise level exposure for permanent residential dwellings. On the basis of the proposed use for Short-term accommodation, the external noise level on level 5 is considered appropriate for this use.



Based on the predicted noise level at the most exposed facades of the proposed rooms, the internal 45/40dB (A) Leq-1hour internal noise levels criteria is NOT achieved for the ultimate traffic volume within living areas. HOWEVER it is based on external noise levels and does not account for façade attenuation through building components.

On this basis additional building construction for the facade of this short-term accommodation uses is not required as the following detailed demonstrate. Standard building construction materials are appropriate.

7.7 Road Traffic Noise – Façade Attenuation

Inside the proposed Multi Unit Development, as detailed previously the noise limits are;

- 45 dB(A) LAeq 1-h for living areas; and,
- 40 dB (A) LAeq 1-h for bedrooms.

Therefore, to determine the noise impacts for internal areas, the TNR values would be, relative to the closest possible location of bedrooms to the line noise source as detailed in Table 7;

- Bedrooms: $51.6 \text{ dB(A) LAeq,T} - 40 = 11.6 \text{ dB(A)}$

As detailed in the appendix of this report, bedrooms associated with the short-term accommodation use will be located along the eastern façade of the proposed and require further consideration of building components as the following calculations detail.

To calculate the minimum Rw requirements or material to be incorporated into the façade / construction material of the proposed units/rooms (specifically associated with the building component associated with the bedrooms along the eastern façade of the proposal, the following formula would be used based on the design components of each individual unit. A general assessment of the site has been conducted and preliminary calculations from the TNR calculation indicate that standard construction across the site will be appropriate.

With respect to this minimum STC and therefore RW values, the following example indicates the construction requirements for the corresponding RW values. The proposed development will require standard typical construction given the relatively low TNR required achieving the internal noise levels from road noise located to the north of the site.

$$RNA_c = RNR + 10 \log_{10} [(S_c + S_f) \times (3 + h) \times 2T_{60} \times C]$$

- where
- RNA_c = traffic noise attenuation required for the component
 - RNR = traffic noise reduction
 - S_c = surface area of the component
 - S_f = surface area of the floor
 - h = ceiling height
 - T_{60} = reverberation time = 0.5 seconds
 - C = number of components.
 - Rw = $RNA_c + 5$ (approximately).

ace, Bowen Hills – NIA

Indicative Rw for most exposed areas of the site are provided in the following Table. Constructional component of the proposed MUD are to achieve the RW/STC provided in AS 3671.

Item	Rw / STC range	Description of construction.
Roof/Ceiling	39 to 41	Pitched roof clad with tiles, or 0.5 mm corrugated galvanized iron or 6 mm corrugated cellulose-cement over 10 mm gypsum plasterboard., plus 50 mm thick 12 kg/m ³ glass fibre blanket between ceiling joists
Roof/Ceiling	42 to 44	Pitched roof clad with tiles, or 0.5 mm corrugated galvanized iron or 6 mm corrugated cellulose-cement over 10 mm gypsum plasterboard., plus 75 mm thick 85 kg/m ³ mineral wool batts between ceiling joists
Wall	45 to 47	Single-skin, 150 mm thick masonry of hollow dense concrete blocks, mortar joints laid to prevent moisture bridging
Window	25	Sliding window, 4 mm float
	26	2 Panel sliding door, 6.38 mm laminated glass
	33	2 Panel sliding door, 10.38 mm laminated glass & 'acoustic construction'
	33 to 35	6 mm + 5 mm at 70 mm in horizontally pivoted aluminium sash - openable; 10 mm single glazed - fixed
	36 to 38	10 mm laminated with metallic film in aluminium frame - fixed

Rw and STC Cals

STC = Multi Unit

Project

65 O'Connell Tce, Bowen Hills

Unit	Room	Element	Source	Ext Leg	Criteria	TNR	Comp area (Sc)	Floor Area (Sf)	Roof Height (h)	RT60	C	TNAc	STC
	Level 1	Windows and Doors	RTN	44	40	4	3.5	10.5	3	0.5	3	4	10
	Level 1	External Walls	RTN	44	40	4	12.5	10.5	3	0.5	3	9.5	15.5
	Level 1	Roof/ceiling	RTN	44	40	4	12.5	10.5	3	0.5	3	9.5	15.5
	Level 2	Windows and Doors	RTN	46.6	40	6.6	3.5	10.5	3	0.5	3	6.6	12.6
	Level 2	External Walls	RTN	46.6	40	6.6	12.5	10.5	3	0.5	3	12.1	18.1
	Level 2	Roof/ceiling	RTN	46.6	40	6.6	12.5	10.5	3	0.5	3	12.1	18.1
	Level 3	Windows and Doors	RTN	49.9	40	9.9	3.5	10.5	3	0.5	3	9.9	15.9
	Level 3	External Walls	RTN	49.9	40	9.9	12.5	10.5	3	0.5	3	15.4	21.4
	Level 3	Roof/ceiling	RTN	49.9	40	9.9	12.5	10.5	3	0.5	3	15.4	21.4
	Level 4	Windows and Doors	RTN	51.6	40	11.6	3.5	10.5	3	0.5	3	11.6	17.6
	Level 4	External Walls	RTN	51.6	40	11.6	12.5	10.5	3	0.5	3	17.1	23.1
	Level 4	Roof/ceiling	RTN	51.6	40	11.6	12.5	10.5	3	0.5	3	17.1	23.1
	Level 5	Windows and Doors	RTN	49.4	40	9.4	3.5	10.5	3	0.5	3	9.4	15.4
	Level 5	External Walls	RTN	49.4	40	9.4	12.5	10.5	3	0.5	3	14.9	20.9
	Level 5	Roof/ceiling	RTN	49.4	40	9.4	12.5	10.5	3	0.5	3	14.9	20.9

Table 7: Calculated Rw/STC associated with the proposed development on the basis of the internal characteristics of each room.

8 Conclusions

For the proposed establishment of the short-term accommodation development as detailed in the site plans in Appendix (A) ambient noise level measurements were conducted at the Wren Street boundary of the existing allotment.

Based on source noise level measurements conducted by this consultancy at the current site, source noise levels were calculated at the closest exposed line of sight to the ICB line noise source and compared to relevant noise limits.

A development application is being sort for a Material Change of Use for the establishment of a Short-term accommodation style development over 5 levels. As detailed in Table 2 the noise impacts currently associated with the site are dominated by vehicle movements along the ICB, Wren and O'Connell Tce.

The locality in which this site is situated supports significant Low-Medium Density residential uses Low-density residential and commercial operations consistent with the proposal which are established in the immediate area.

9 Recommendations

As demonstrated above the location of the proposed Short-term accommodation style development in the layout provided by the applicant, can be established on this site with no additional annoyance to existing low and low-medium-density residential uses within the immediate locality;

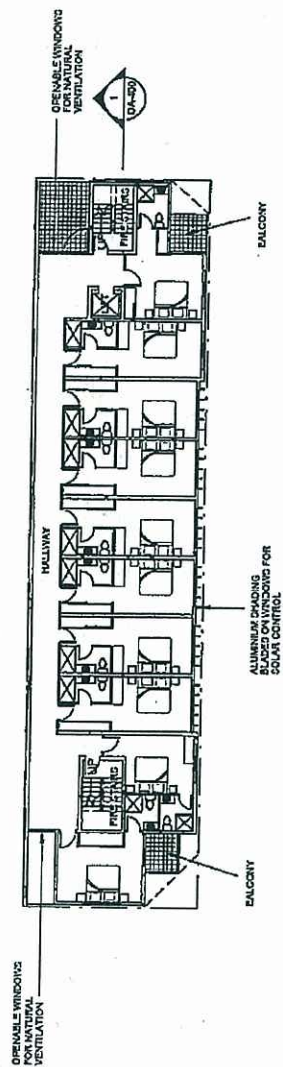
Furthermore, based on the experience of this consultancy the following recommendations for the operation of this facility are made to the ULDA.

1. External Plant and Equipment is installed to achieve the Sound Weighting Level detailed in Section 7.2 of this report;
2. Façade Construction along the eastern façade of levels 1-5 is to achieve at a minimum the STC ratings detailed in Table 7.0 of Section 7.8 as a minimum. Standard construction components will easily achieve these reductions.



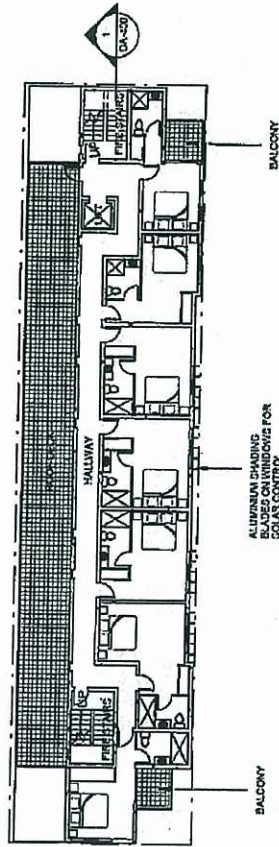
APPENDIX A

Site & Architectural Plans



Level 1-3
1 : 200

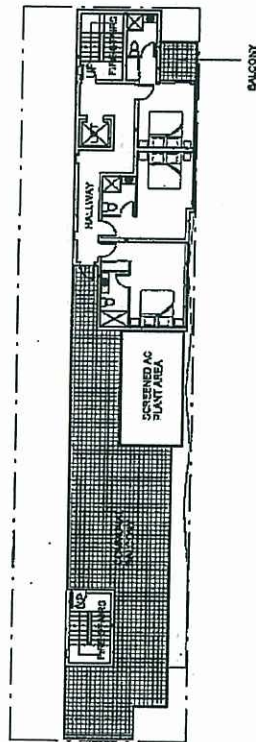
PERSONAL NOTES 1. The above information was obtained from the file of the subject and is being furnished to you for your information only. It is not to be used for any other purpose. 2. If you have any questions or need further information, please contact the source who provided this information.		DATE 17 JUL 68	BY [Signature]	APPROVED [Signature]
GENERAL INFORMATION 1. Name: [Redacted] 2. Address: [Redacted] 3. Date of Birth: [Redacted] 4. Place of Birth: [Redacted] 5. Current Residence: [Redacted] 6. Date of Arrival: [Redacted] 7. Date of Departure: [Redacted] 8. Date of Return: [Redacted] 9. Date of Departure: [Redacted] 10. Date of Return: [Redacted]		11. Date of Arrival: [Redacted] 12. Date of Departure: [Redacted] 13. Date of Return: [Redacted] 14. Date of Departure: [Redacted] 15. Date of Return: [Redacted]		
ADDITIONAL INFORMATION 1. [Redacted] 2. [Redacted] 3. [Redacted] 4. [Redacted] 5. [Redacted] 6. [Redacted] 7. [Redacted] 8. [Redacted] 9. [Redacted] 10. [Redacted]		11. [Redacted] 12. [Redacted] 13. [Redacted] 14. [Redacted] 15. [Redacted]		



1

Level 4
1 : 200

PROJECT INFORMATION PROJECT NO: 100079 PROJECT NAME: 65 O'CONNELL TERRACE, BOWEN HILLS PROJECT TYPE: ACCOMMODATION PROJECT LOCATION: BOWEN HILLS, QLD PROJECT STATUS: IN PROGRESS PROJECT START DATE: 10/01/2018 PROJECT END DATE: 03/31/2019		CLIENT INFORMATION CLIENT NAME: JEFF YUEN CLIENT ADDRESS: 65 O'CONNELL TERRACE, BOWEN HILLS, QLD CLIENT PHONE: 07 551 1111 CLIENT EMAIL: jeff@yuen.com.au	
DESIGNER INFORMATION DESIGNER NAME: DTS GROUP QLD DESIGNER ADDRESS: 100079, BOWEN HILLS, QLD DESIGNER PHONE: 07 551 1111 DESIGNER EMAIL: dts@group.com.au		ARCHITECT INFORMATION ARCHITECT NAME: ARCHITECT ARCHITECT ADDRESS: 100079, BOWEN HILLS, QLD ARCHITECT PHONE: 07 551 1111 ARCHITECT EMAIL: arch@group.com.au	
ENGINEER INFORMATION ENGINEER NAME: ENGINEER ENGINEER ADDRESS: 100079, BOWEN HILLS, QLD ENGINEER PHONE: 07 551 1111 ENGINEER EMAIL: eng@group.com.au		CONTRACTOR INFORMATION CONTRACTOR NAME: CONTRACTOR CONTRACTOR ADDRESS: 100079, BOWEN HILLS, QLD CONTRACTOR PHONE: 07 551 1111 CONTRACTOR EMAIL: con@group.com.au	



Level 5
1 : 200

[illegible]

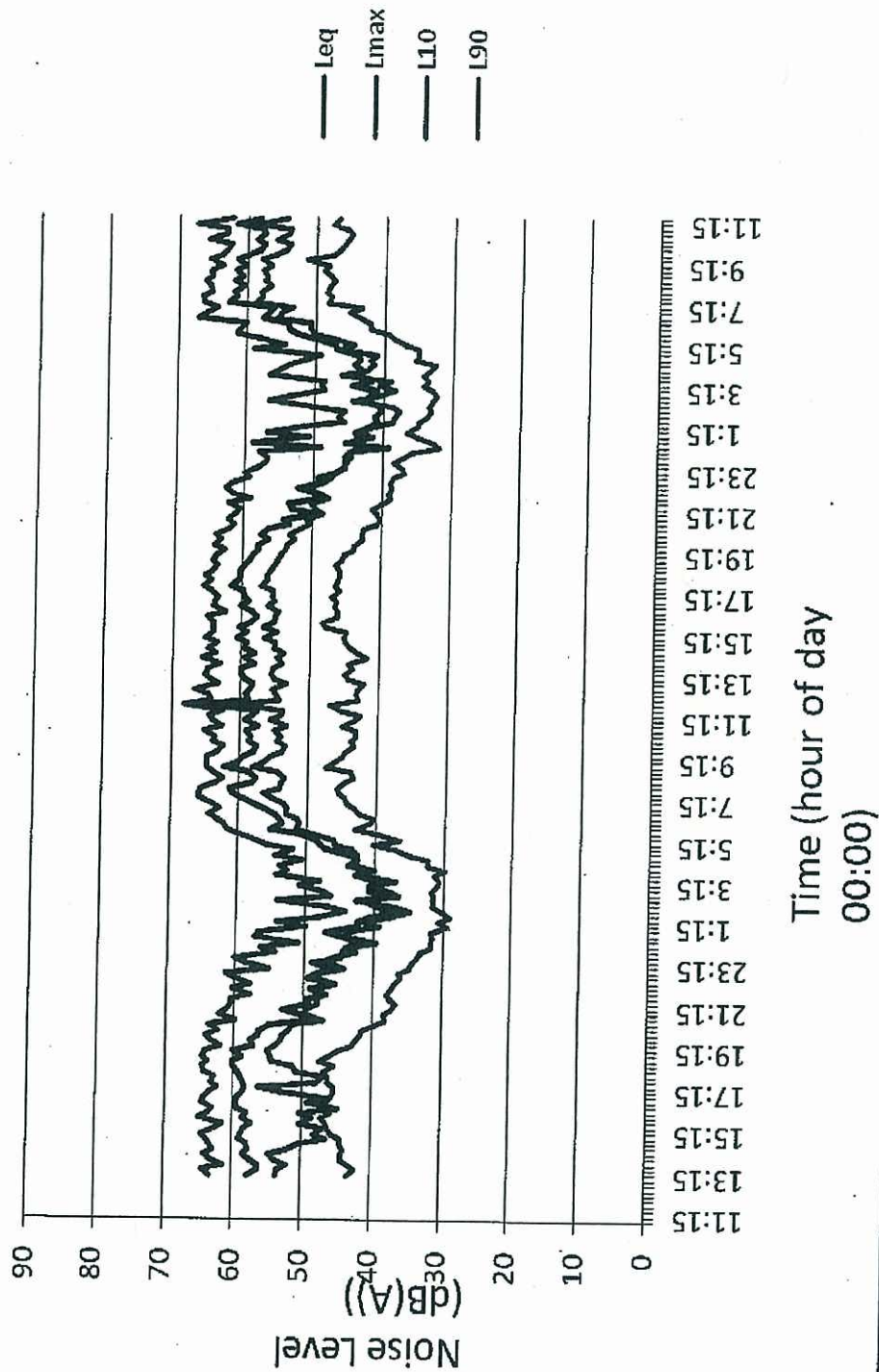
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APPENDIX B

Noise Sampling

Noise Measurements (22nd - 24th November 2010)



APPENDIX C

Noise Modelling

connell ML1 CAL

Segment	Abbrev	L10	Seg Group	Group Total
1 ICB	ICB	53.9		

Total is the L10(18hour) = 53.9 dB(A)

INPUT DATA

Seg 1
ICB

Total Flow (veh/18h)	65275
Heavy Vehicles (%)	4.2
SPEED:	
Average (km/h)	60
Origin (Zone or Est)	Z
Road RL (m)	10
Road Gradient (%)	0
ROAD SURFACE:	
Surface Type (B,C,P)	b
Texture Depth (mm)	2
Dist Road-Rec (m)	66
Absorbing Ground (%)	90
Av Prop Ht (m)	1.2
Angle View (deg)	90
SPECIAL ADJUSTMENT?	
Value (±dBA)	
Comment	
BARRIERS ?	
1:Dist Road-Barr (m)	19
Barrier RL (m)	14.9
Description	Cuttin
2:Dist Road-Barr (m)	32
Barrier RL (m)	17.3
Description	Buildi
3:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
REFLECTORS ONLY ?	
Refl Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	16.9
Height of Receiver above ground:	1.5
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	No
User's overall adjustment to CRTN:	0.0

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TNOISE -- CONNEL C

Page 2.

CORRECTIONS		Seg 1 ICB
Total Flow 18h	(Ch3)	77.2
Low Flow 18h	(Ch12)	0.0
Heavy Vehicles	(Ch4)	-0.3
{SpChange,km/h}	(Ch5)	0.0
Road Gradient	(Ch6)	0.0
Road Surface	(CRTN)	-1.0
Dist Road-Rec	(Ch7)	-7.1
{h,metres}	(Ch7)	7.9
Av Prop Ht	(Ch8)	-4.2
Angle View	(Ch10)	-3.0
Special	(User)	0.0
BARRIERS		
Barrier Absent	(Ch8)	-4.2
1:Pot Barr Corr	(Ch9)	-9.5
{PathDiff,metres}	(P21)	0.109
Description		CutIn
2:Pot Barr Corr	(Ch9)	-10.9
{PathDiff,metres}	(P21)	0.216
Description		Buildi
3:Pot Barr Corr	(Ch9)	
{PathDiff,metres}	(P21)	
Description		
Barr Multiple Effect:		
Barr Numbers		1,2
Pot Barr Corr	(P35)	-11.9
REFLECTORS		
Refl Angle of View	(P26)	
COMBINED REFL/BARR		
Correction	(P36)	
{Y}	(P36)	
{W}	(P36)	
{Alpha}	(P36)	
{Delta1}	(P36)	
{Delta2}	(Ch13)	
{Delta3}	(Ch13)	
{Delta4}	(Ch14)	
{Delta5}	(Ch15)	

Receiver position not at a building facade
User's overall adjust to CRTN: 0



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TNOISE -- CON UL

Page 1.

connell ML1 Ultimate

Segment	Abbrev	L10	Seg Group	Group Total
1 ICB	ICB	54.8		

Total is the L10(18hour) = 54.8 dB(A)

INPUT DATA	Seg 1
	ICB

Total Flow (veh/18h)	79397
Heavy Vehicles (%)	4.2
SPEED:	
Average (km/h)	60
Origin (Zone or Est)	Z
Road RL (m)	10
Road Gradient (%)	0
ROAD SURFACE:	
Surface Type (B,C,P)	b
Texture Depth (mm)	2
Dist Road-Rec (m)	66
Absorbing Ground (%)	80
Av Prop Ht (m)	1.2
Angle View (deg)	90
SPECIAL ADJUSTMENT?	
Value (±dBA)	
Comment	
BARRIERS ?	
1:Dist Road-Barr (m)	19
Barrier RL (m)	14.9
Description	Cuttin
2:Dist Road-Barr (m)	32
Barrier RL (m)	17.3
Description	Buildi
3:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
REFLECTORS ONLY ?	
Refl Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	16.9
Height of Receiver above ground:	1.5
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	No
User's overall adjustment to CRTN:	0.0

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TNOISE - CON UL

Page 2.

CORRECTIONS Seg 1
ICB

Total Flow 18h	(Ch3)	78.1
Low Flow 18h	(Ch12)	0.0
Heavy Vehicles	(Ch4)	-0.3
{SpChange,km/h}	(Ch5)	0.0
Road Gradient	(Ch6)	0.0
Road Surface	(CRTN)	-1.0
Dist Road-Rec	(Ch7)	-7.1
{h,metres}	(Ch7)	7.9
Av Prop Ht	(Ch8)	-4.2
Angle View	(Ch10)	-3.0
Special	(User)	0.0
BARRIERS		
Barrier Absent	(Ch8)	-4.2
1:Pot Barr Corr	(Ch9)	-9.5
{PathDiff,metres}	(P21)	0.109
Description		Cuttin
2:Pot Barr Corr	(Ch9)	-10.9
{PathDiff,metres}	(P21)	0.216
Description		Buildi
3:Pot Barr Corr	(Ch9)	
{PathDiff,metres}	(P21)	
Description		
Barr Multiple Effect:		
Barr Numbers		1,2
Pot Barr Corr	(P35)	-11.9
REFLECTORS		
Ref Angle of View (P26)		
COMBINED REFL/BARR		
Correction	(P36)	
{Y}	(P36)	
{W}	(P36)	
{Alpha}	(P36)	
{Delta1}	(P36)	
{Delta2}	(Ch13)	
{Delta3}	(Ch13)	
{Delta4}	(Ch14)	
{Delta5}	(Ch15)	

Receiver position not at a building facade
User's overall adjust to CRTN: 0

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TNOISE -- CON RL1

Page 1.

Connell RL1 Ultimate

Segment	Abbrev	L10	Seg Group	Group Total
1 ICB	ICB	57.3		

Total is the L10(18hour) = 57.3 dB(A)

INPUT DATA

Seg 1
ICB

Total Flow (veh/18h) 79397
 Heavy Vehicles (%) 4.2
 SPEED:
 Average (km/h) 60
 Origin (Zone or Est) Z
 Road RL (m) 10
 Road Gradient (%) 0
 ROAD SURFACE:
 Surface Type (B,C,P) b
 Texture Depth (mm) 2
 Dist Road-Rec (m) 66
 Absorbing Ground (%) 80
 Av Prop Ht (m) 1.2
 Angle View (deg) 90
 SPECIAL ADJUSTMENT?
 Value (±dBA)
 Comment
 BARRIERS ?
 1:Dist Road-Barr (m) 19
 Barrier RL (m) 14.9
 Description Cuttin
 2:Dist Road-Barr (m) 32
 Barrier RL (m) 17.3
 Description Buildi
 3:Dist Road-Barr (m)
 Barrier RL (m)
 Description
 REFLECTORS ONLY ?
 Refl Angle View (deg)
 COMBINED REFL/BARR?
 Reflector RL (m)
 Reflector Tilt (deg)
 DistanceBetween (m)
 Either on Embankment?

Ground RL at Receiver: 16.9
 Height of Receiver above ground: 1.5
 Road Surface Corrections supplied by: CRTN
 Building Facade at Receiver: Yes
 User's overall adjustment to CRTN: 0.0

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TNOISE -- CON RL1

Page 2.

CORRECTIONS		Seg 1
		ICB
Total Flow 18h	(Ch3)	78.1
Low Flow 18h	(Ch12)	0.0
Heavy Vehicles	(Ch4)	-0.3
{SpChange,km/h}	(Ch5)	0.0
Road Gradient	(Ch6)	0.0
Road Surface	(CRTN)	-1.0
Dist Road-Rec	(Ch7)	-7.1
{h,metres}	(Ch7)	7.9
Av Prop Ht	(Ch8)	-4.2
Angle View	(Ch10)	-3.0
Special	(User)	0.0
BARRIERS		
Barrier Absent	(Ch8)	-4.2
1:Pot Barr Corr	(Ch9)	-9.5
{PathDiff,metres}	(P21)	0.109
Description		Cuttin
2:Pot Barr Corr	(Ch9)	-10.9
{PathDiff,metres}	(P21)	0.216
Description		Buildi
3:Pot Barr Corr	(Ch9)	
{PathDiff,metres}	(P21)	
Description		
Barr Multiple Effect:		
Barr Numbers		1,2
Pot Barr Corr	(P35)	-11.9
REFLECTORS		
Refl Angle of View	(P26)	
COMBINED REFL/BARR		
Correction	(P36)	
{Y}	(P36)	
{W}	(P36)	
{Alpha}	(P36)	
{Delta1}	(P36)	
{Delta2}	(Ch13)	
{Delta3}	(Ch13)	
{Delta4}	(Ch14)	
{Delta5}	(Ch15)	

Building facade at receiver: +2.5
 User's overall adjust to CRTN: 0

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TNOISE -- CON RL2

Page 1.

connell RL2 Ultimate

Segment	Abbrev	L10	Seg Group	Group Total
1 ICB	ICB	59.9		
Total is the L10(18hour) = 59.9 dB(A)				

INPUT DATA Seg 1 ICB

Total Flow (veh/18h) 79397
 Heavy Vehicles (%) 4.2
 SPEED:
 Average (km/h) 60
 Origin (Zone or Est) Z
 Road RL (m) 10
 Road Gradient (%) 0
 ROAD SURFACE:
 Surface Type (B,C,P) b
 Texture Depth (mm) 2
 Dist Road-Rec (m) 68
 Absorbing Ground (%) 80
 Av Prop Ht (m) 1.2
 Angle View (deg) 90
 SPECIAL ADJUSTMENT?
 Value (±dBA)
 Comment
 BARRIERS ?
 1:Dist Road-Barr (m) 19
 Barrier RL (m) 14.9
 Description Cuttin
 2:Dist Road-Barr (m) 32
 Barrier RL (m) 17.3
 Description Buildi
 3:Dist Road-Barr (m)
 Barrier RL (m)
 Description
 REFLECTORS ONLY ?
 Refl Angle View (deg)
 COMBINED REFL/BARR?
 Reflector RL (m)
 Reflector Tilt (deg)
 DistanceBetween (m)
 Either on Embankment?

Ground RL at Receiver: 19.9
 Height of Receiver above ground: 1.5
 Road Surface Corrections supplied by: CRTN
 Building Facade at Receiver: Yes
 User's overall adjustment to CRTN: 0.0

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TNOISE -- CON RL2

Page 2.

CORRECTIONS

Seg 1
ICB

Total Flow 18h	(Ch3)	78.1
Low Flow 18h	(Ch12)	0.0
Heavy Vehicles	(Ch4)	-0.3
{SpChange,km/h}	(Ch5)	0.0
Road Gradient	(Ch6)	0.0
Road Surface	(CRTN)	-1.0
Dist Road-Rec	(Ch7)	-7.2
{h,metres}	(Ch7)	10.9
Av Prop Ht	(Ch8)	-4.2
Angle View	(Ch10)	-3.0
Special	(User)	0.0
BARRIERS		
Barrier Absent	(Ch8)	-4.2
1:Pot Barr Corr	(Ch9)	-7.3
{PathDiff,metres}	(P21)	0.024
Description		Cutlin
2:Pot Barr Corr	(Ch9)	-8.0
{PathDiff,metres}	(P21)	0.042
Description		Buildi
3:Pot Barr Corr	(Ch9)	
{PathDiff,metres}	(P21)	
Description		
Barr Multiple Effect:		
Barr Numbers		1,2
Pot Barr Corr	(P35)	-9.2
REFLECTORS		
Ref Angle of View	(P26)	
COMBINED REFL/BARR		
Correction	(P36)	
{Y}	(P36)	
{W}	(P36)	
{Alpha}	(P36)	
{Delta1}	(P36)	
{Delta2}	(Ch13)	
{Delta3}	(Ch13)	
{Delta4}	(Ch14)	
{Delta5}	(Ch15)	

Building facade at receiver: +2.5
User's overall adjust to CRTN: 0

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TNOISE -- CON RL4

Page 1.

connell RL4 Ultimate

Segment	Abbrev	L10	Seg Group	Group Total
1 ICB	ICB	64.9		

Total is the L10(18hour) = 64.9 dB(A)

INPUT DATA	Seg 1 ICB
------------	--------------

Total Flow (veh/18h)	79397
Heavy Vehicles (%)	4.2
SPEED:	
Average (km/h)	60
Origin (Zone or Est)	Z
Road RL (m)	10
Road Gradient (%)	0
ROAD SURFACE:	
Surface Type (B,C,P)	b
Texture Depth (mm)	2
Dist Road-Rec (m)	66
Absorbing Ground (%)	80
Av Prop Ht (m)	1.2
Angle View (deg)	90
SPECIAL ADJUSTMENT?	
Value (±dBA)	
Comment	
BARRIERS ?	
1:Dist Road-Barr (m)	19
Barrier RL (m)	14.9
Description	Cuttin
2:Dist Road-Barr (m)	32
Barrier RL (m)	17.3
Description	Buildi
3:Dist Road-Barr (m)	
Barrier RL (m)	
Description	
REFLECTORS ONLY ?	
Refl Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	25.9
Height of Receiver above ground:	1.5
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	Yes
User's overall adjustment to CRTN:	0.0

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TNOISE -- CON RL4

Page 2.

CORRECTIONS

Seg 1
ICB

Total Flow 18h	(Ch3)	78.1
Low Flow 18h	(Ch12)	0.0
Heavy Vehicles	(Ch4)	-0.3
{SpChange,km/h}	(Ch5)	0.0
Road Gradient	(Ch6)	0.0
Road Surface	(CRTN)	-1.0
Dist Road-Rec	(Ch7)	-7.2
{h,metres}	(Ch7)	16.9
Av Prop Ht	(Ch8)	-4.2
Angle View	(Ch10)	-3.0
Special	(User)	0.0
BARRIERS		
Barrier Absent	(Ch8)	-4.2
1:Pot Barr Corr	(Ch9)	-2.2
{PathDiff,metres}	(P21)	0.035
Description		Cuttin
2:Pot Barr Corr	(Ch9)	-1.2
{PathDiff,metres}	(P21)	0.089
Description		Buildi
3:Pot Barr Corr	(Ch9)	
{PathDiff,metres}	(P21)	
Description		
Barr Multiple Effect:		
Barr Numbers		1,2
Pot Barr Corr	(P35)	-2.7
REFLECTORS		
Refl Angle of View (P26)		
COMBINED REFL/BARR		
Correction	(P36)	
{Y}	(P36)	
{W}	(P36)	
{Alpha}	(P36)	
{Delta1}	(P36)	
{Delta2}	(Ch13)	
{Delta3}	(Ch13)	
{Delta4}	(Ch14)	
{Delta5}	(Ch15)	

Building facade at receiver: +2.5
User's overall adjust to CRTN: 0



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TNOISE -- CON RL5

Page 1.

connell RL5 Ultimate

Segment	Abbrev	L10	Seg Group	Group Total
1 ICB	ICB	62.7		

Total is the L10(18hour) = 62.7 dB(A)

INPUT DATA	Seg 1 ICB
------------	--------------

Total Flow (veh/18h)	79397
Heavy Vehicles (%)	4.2
SPEED:	
Average (km/h)	60
Origin (Zone or Est)	Z
Road RL (m)	10
Road Gradient (%)	0
ROAD SURFACE:	
Surface Type (B,C,P)	b
Texture Depth (mm)	2
Dist Road-Rec (m)	68
Absorbing Ground (%)	80
Av Prop Ht (m)	1.2
Angle View (deg)	90
SPECIAL ADJUSTMENT?	
Value (±dBA)	
Comment	
BARRIERS ?	
1:Dist Road-Barr (m)	19
Barrier RL (m)	14.9
Description	Cuttin
2:Dist Road-Barr (m)	32
Barrier RL (m)	17.3
Description	Buildi
3:Dist Road-Barr (m)	66
Barrier RL (m)	29.9
Description	Bal
REFLECTORS ONLY ?	
Ref Angle View (deg)	
COMBINED REFL/BARR?	
Reflector RL (m)	
Reflector Tilt (deg)	
DistanceBetween (m)	
Either on Embankment?	

Ground RL at Receiver:	28.9
Height of Receiver above ground:	1.5
Road Surface Corrections supplied by:	CRTN
Building Facade at Receiver:	Yes
User's overall adjustment to CRTN:	0.0

17 Dec 10 13:17

TNOISE -- CON RL5

Page 2.

CORRECTIONS		Seg 1 ICB
Total Flow 18h	(Ch3)	78.1
Low Flow 18h	(Ch12)	0.0
Heavy Vehicles	(Ch4)	-0.3
{SpChange,km/h}	(Ch5)	0.0
Road Gradient	(Ch6)	0.0
Road Surface	(CRTN)	-1.0
Dist Road-Rec	(Ch7)	-7.4
{h,metres}	(Ch7)	19.9
Av Prop Ht	(Ch8)	-4.3
Angle View	(Ch10)	-3.0
Special	(User)	0.0
BARRIERS		
Barrier Absent	(Ch8)	-4.3
1:Pot Barr Corr	(Ch9)	-1.1
{PathDiff,metres}	(P21)	0.108
Description		Cutlin
2:Pot Barr Corr	(Ch9)	-0.4
{PathDiff,metres}	(P21)	0.244
Description		Buildi
3:Pot Barr Corr	(Ch9)	-5.9
{PathDiff,metres}	(P21)	0.006
Description		Bal
Barr Multiple Effect:		
Barr Numbers		1,3
Pot Barr Corr	(P35)	-6.2
REFLECTORS		
Refl Angle of View	(P26)	
COMBINED REFL/BARR		
Correction	(P36)	
{Y}	(P36)	
{W}	(P36)	
{Alpha}	(P36)	
{Delta1}	(P36)	
{Delta2}	(Ch13)	
{Delta3}	(Ch13)	
{Delta4}	(Ch14)	
{Delta5}	(Ch15)	

Building facade at receiver: +2.5
 User's overall adjust to CRTN: 0