PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2021/1238

Date: 11 March 2022

Queensland Government

acousticworks

Proposed Childcare Centre
Plaza Parade
Carseldine

ACOUSTIC REPORT




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Town Planning Alliance

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Document Information

Contact Details

Acoustic Works
Unit 2/8 Castlemaine Street
Coorparoo QLD 4151
(07) 3393 2222
ABN: 56 157 965 056

PO Box 1271
Coorparoo DC
QLD 4151

Greg Pearce
Email: gpearce@acousticworks.com.au

Mark Enersen
Email: menersen@acousticworks.com.au

Report Register

Date	Revision	Author	Reviewer	Manager
17/09/21	R01A	Andrew Hiscox	Michael Gunning	GP
20/09/21	R01B	Andrew Hiscox	Michael Gunning	GP
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1. Introduction

This report is in response to a request by Town Planning Alliance for an environmental noise assessment of a proposed childcare centre located at Plaza Parade, Carseldine. To facilitate the assessment, unattended noise monitoring was conducted to establish traffic noise levels in the vicinity of the site and to establish the criteria for onsite activities. Based on the outcomes of the assessment, recommendations for acoustic treatments are specified.

2. Site Description

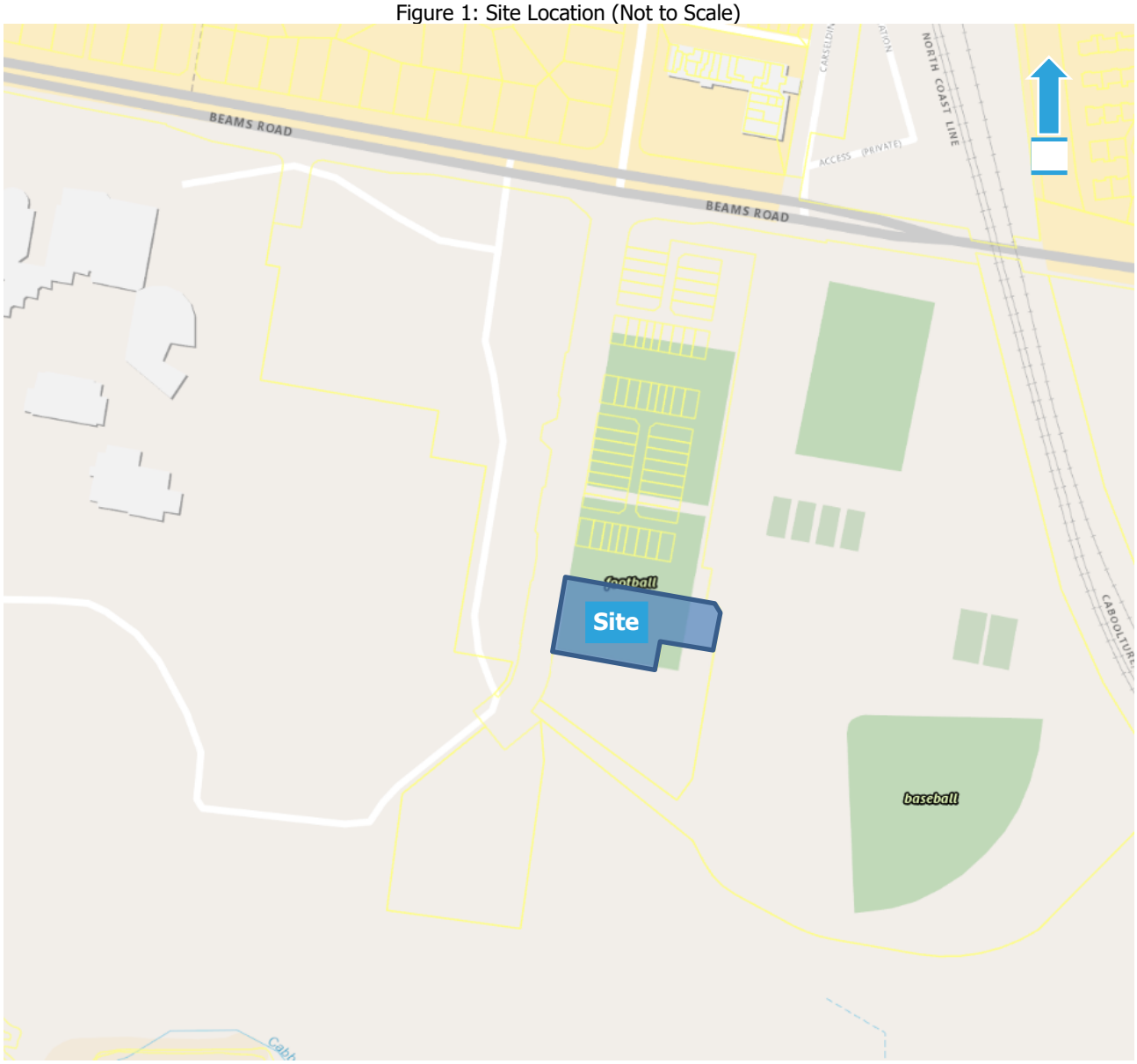
2.1 Site Location

The site is described by the following:

Plaza Parade, Carseldine
Lot 3001 on SP324677

Refer to Figure 1 for site location.

Figure 1: Site Location (Not to Scale)



A comprehensive site survey was conducted on 31st August 2021 and identified the following:

a) The site is currently part of a construction site.
b) A park is located adjacent the eastern site boundary.
c) Beams road separates the development from residential dwellings to the north.

2.2 Proposal

The proposal is to construct a single storey childcare centre comprised of the following:

- Capacity for 12 children aged 0-1 years, 12 children aged 1-2 years, 30 children aged 2-3 years and 44 children aged 3-5 years.
- 6 indoor play rooms, 2 sleep rooms, office, 2 verandas, babies and child's outdoor play areas, art garden, laundry, toilets, kitchen, staff room, planning room, dining room, reception and storerooms.
- 22 outdoor car parking spaces.
- Proposed operating hours of 6:30am to 6:30pm.
- Site access via a proposed new access road to the north.

Refer to the Appendix for proposed development plans.

2.3 Zoning

Review of the Brisbane City Council (BCC) City Plan 2014 interactive mapping indicates that the area of the proposed development is zoned Emerging Community. The nearest residential receivers are zoned Low Density Residential. Based on this information, the applicable criteria are specified in Section 6.2.

2.4 Acoustic Environment

The site is primarily affected by road traffic noise from Beams Road.

3. Equipment

The following equipment was used to record noise levels:

- Rion NL42 Environmental Noise Monitor
- BSWA Technology Co. Ltd Sound Calibrator

The Rion NL42 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. Noise Monitoring

4.1 Receiver Locations

The nearest sensitive receiver locations were identified as follows;

1. Proposed aged care facility located adjacent the southern site boundary.
2. Proposed residential development located north of the site.
3. Beams Road separates the site from single and two storey residential dwellings to the north at 2 Balcara Avenue and 527-541 Beams Road.

These locations were chosen as being representative of the nearest sensitive receivers to the proposed development. Refer to Figure 2 for these locations.

Figure 2: Noise Monitoring Location

4.2 Road Traffic and Ambient Noise Monitoring

A Rion NL42 environmental noise monitor was placed at 539 Beams Road approximately 5m from the nearest lane of Beams Road to measure existing road traffic and ambient noise levels. This location was selected as it was considered being representative of the nearest residential receivers. The monitor was located in a free field position with the microphone approximately 1.4 metres above ground surface level. The monitor was set to record noise levels between the 31st August and 8th September 2021.

The noise monitor was set to record noise levels in "A" Weighting, Fast response using 15 minute statistical intervals. Ambient noise monitoring was conducted generally in accordance with Australian Standard AS1055:2018 *Acoustics – Description and measurement of environmental noise*. Road traffic noise monitoring was conducted in accordance with Australian Standard *AS2702:1984 'Acoustics - Methods for the measurement of road traffic noise*.

Refer to Figure 2 for noise monitoring location.

5. Measured Noise Levels

The following tables present the measured road traffic and background noise levels from the unattended noise survey and meteorological conditions. Any periods of inclement weather or extraneous noise were omitted from the measured data prior to determining the results.

5.1 Meteorological Conditions

Meteorological observations during the unattended noise monitoring survey were obtained from the Bureau of Meteorology website (http://www.bom.gov.au/climate/data), shown in Table 1 below.

Table 1: Meteorological Conditions – Brisbane Airport

Day	Date	Rainfall (mm)	Wind			
			9am		3pm	
			Speed (km/h)	Direction	Speed (km/h)	Direction
Tuesday	31/08/21	0	9	W	15	NE
Wednesday	01/09/21	0	13	SW	17	NE
Thursday	02/09/21	2.8	13	ESE	17	SE
Friday	03/09/21	0.8	11	E	24	ENE
Saturday	04/09/21	2.6	13	SW	20	NNE
Sunday	05/09/21	0.2	13	W	11	NNW
Monday	06/09/21	1.2	24	SW	22	NE
Tuesday	07/09/21	0.2	24	SSW	13	NE
Wednesday	08/09/21	0	13	SSW	17	ESE

5.2 Ambient Noise Levels

The background noise levels measured at the monitoring location are as follows:

Table 2: Measured Background Noise Levels – All Time Periods

Day	Date	L90 dB(A) (Rating Background Level)		
		Day	Eve	Night
Wednesday	01/09/21	50	42	29
Thursday	02/09/21	*52	*46	35
Friday	03/09/21	*52	*48	*36
Saturday	04/09/21	50	*46	*37
Sunday	05/09/21	47	42	32
Monday	06/09/21	50	45	30
Tuesday	07/08/21	50	*46	*38
Overall value		49	43	31

*Note rainfall and wind on the 2nd, 3rd and 7th of September was found to affect the measurements, therefore the data was omitted for the affected time periods. Refer to the appendix for a graphical representation of the measured noise levels.

5.3 Road Traffic Noise Levels

The road traffic noise levels measured at the monitoring location are as follows:

Table 3: Measured Road Traffic Noise Levels - All Time Periods

Day	Date	L10 (18h)	Leq (1h) Day	Leq (1h) Night
Wednesday	01/09/21	67.9	68.0	64.9
Thursday	02/09/21	67.7	66.5	65.2
Friday	03/09/21	68.6	68.8	65.4
Saturday	04/09/21	66.9	66.4	62.2
Sunday	05/09/21	65.8	65.3	59.1
Monday	06/09/21	67.4	65.7	64.9
Tuesday	07/08/21	67.3	66.7	65.1
Overall value		67.8	67.1	65.1

Data for the weekends was not used as this was not considered relevant to the assessment. Refer to the appendix for a graphical representation of the measured noise levels.

6. Noise Criteria

6.1 Road Traffic Noise Criteria

6.1.1 AS/NZS 2107:2016

As no specific road traffic noise criteria are nominated for childcare centres in the BCC City Plan 2014, indicative guidance was taken from AS/NZS 2107:2016 – *Acoustics – Recommended design sound levels and reverberation times for building interiors*. While AS 2107 does not specifically nominate indoor design sound levels for childcare centres, levels from the "Educational Buildings" and "Residential Buildings" category were deemed to be applicable.

Table 4: AS/NZS 2107:2016 Design Sound levels

Type of Occupancy/Activity	Design Sound Level ($L_{Aeq,T}$) range
EDUCATIONAL BUILDINGS	
Open Plan teaching Spaces	35-45
Staff Common rooms	40-45
Conference Rooms	35-40
RESIDENTIAL BUILDINGS	
Sleeping Areas	30-35

6.2 BCC - Environmental Noise Criteria

To ensure a reasonable acoustic amenity is maintained, Brisbane City Council (BCC) requires environmental noise be assessed in accordance with Noise Impact Assessment PSP (2014). To accurately assess environmental noise, the noise must first be classified as to the type and its duration. Section 6.1.1 outlines the noise criteria based on the applicable zoning and overlay codes for the site.

6.2.1 Childcare Centre Code

To ensure a reasonable amenity is maintained, the following criteria shall be applied for the assessment of onsite activities to surrounding sensitive receivers. The noise criteria as applied by Brisbane City Council in accordance with the Childcare Centre Code in Brisbane City Plan 2014 as follows;

Table 5: Performance Outcomes and Acceptable Outcomes

Performance Outcome	Acceptable Outcome
PO10 Development is of a nature and scale which does not result in noise emissions that exceed the following criteria: a) $L_{Aeq,adj,T}$ emitted from the development is not greater than the rating background level plus 3 at a sensitive use not associated with the development. Where T is: a) (7am to 6pm): 11hr b) (6pm to 10pm): 4hr c) (10pm to 7am): 9hr Where $L_{Aeq,adj,T}$ is the A-weighted equivalent continuous sound pressure level during measurement time T, adjusted for tonal and impulsive noise characteristics, determined in accordance with the methodology described in the Noise impact assessment planning scheme policy.	**AO10.1** Development provides a 2m high acoustic fence and a minimum 2m wide landscaped buffer along any boundary adjoining land in a zone in the Residential zones category.
	AO10.2 Development ensures mechanical plant or equipment is acoustically screened from adjoining sensitive uses. Note—Mechanical plant includes generators, motors, compressors and pumps, for example air-conditioning, refrigeration or coldroom motors.
	AO10.3 Development does not operate before 7am or after 7pm.

Based upon the measured noise levels presented in Table 2, the intrusive noise criteria applicable to this development is provided in Table 6.

Table 6: Applicable Intrusive Noise Criteria

Time Period	Measured RBL $L_{A90,T}$	Criteria dB(A) (RBL L_{90} + 3 dB(A))
Day (7am-6pm)	49	52
Evening (6pm-10pm)	43	46
Night (10pm-7am)	31	34

6.2.2 Mechanical Plant

Development that included mechanical plant (including air-conditioning plant, heat pumps and swimming pool pumps) ensures it is located, designed and attenuated to achieve the following criteria:

> *$L_{Aeq,adj,T}$ emitted from mechanical plant is not greater than the rating background level plus 3 at a sensitive use not associated with the development.*
>
> *Where T is:*
>
> - *(7am to 6pm): 11hr*
> - *(6pm to 10pm): 4hr*
> - *(10pm to 7am): 9hr*
>
> *Where $L_{Aeq,adj,T}$ is the A-weighted equivalent continuous sound pressure level during measurement time T, adjusted for tonal and impulsive noise characteristics, determined in accordance with the methodology described in the Noise impact assessment planning scheme policy.*

The noise criteria applicable to this development are as follows:

Table 7: Applicable Noise Criteria

Time Period	Criteria dB(A) (RBL L_{90} + 3 dB(A))
Day 7am – 6pm	52
Evening 6pm – 10pm	46
Night 10pm – 7am	34

7. Road Traffic Assessment

Road traffic noise associated with Beams Road for the ten year planning horizon was assessed at the development to determine compliance with Brisbane City Council criteria (refer to Section 6.1), including any requirements for acoustic treatments.

Traffic volumes for Beams Road are provided in Table 8. Traffic volumes for the years 2021 and 2031 were based upon an annual growth rate of 2% per annum.

Table 8: Traffic Volumes

Location	2020 AADT	2021 Predicted AADT	2031 Predicted AADT	Percentage of Heavy Vehicles
Beams Road	17,000	17,340	21,137	3.2%

7.1 Road Traffic Noise Verification

To ensure the CoRTN noise model is accurate, a verification model of the predicted $L_{A10(18hr)}$ was created 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 9: Comparison of Measured and Predicted Noise Levels

Location	Measured $L_{A10(18hr)}$ dB(A)	Predicted $L_{A10(18hr)}$ dB(A)	Correction
Beams Road	67.8	68.7	0

7.2 Predicted Road Traffic Noise Levels - 2031

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

- Site layout, floor plans and elevations provided by Alto Architects Pty Ltd, drawing nos. SD-100 to SD-104 and SD-400 to SD-402, issue no E dated 15/10/21.
- Beams Road speed limit of 60km/h.
- Receiver heights were based on 1.5m above finished floor level.
- +2.5dBA facade correction.
- -0.7dB(A) (Free field) and -1.7dB(A) (Façade) corrections for Queensland Conditions.

Table 10 presents the predicted road traffic noise impacts for the development.

Table 10: Predicted Road Traffic Noise Impacts

Predicted Noise Impacts 2031			
Room	LA10 (18hr) (dBA)	LAeq (1hr) Day (dBA)	LAeq (1hr) Night (dBA)
Indoor Play 1	47.6	46.9	44.9
Indoor Play 2	47.6	46.9	44.9
Indoor Play 3	47.1	46.4	44.4
Indoor Play 4	46.6	45.9	43.9
Indoor Play 5	45.9	45.2	43.2
Indoor Play 6	44.5	43.8	41.8
Sleep 1	47.6	46.9	44.9
Sleep 2	47.4	46.7	44.7
Office	46.6	45.9	43.9
Staff	46.4	45.7	43.7
Planning	26.5	25.8	23.8

Based on the predicted noise impacts, additional acoustic treatments are required. Refer to Section 8.1.4 for recommendations.

8. Environmental Assessment

8.1 Noise from General Sources

Noise associated with the development was assessed based on previous assessments of similar activities. The calculations assume that the nominated activities are located at the closest representative point within the development site to the receiver location. Any relevant shielding or building transmission loss is taken into account for these activities.

8.1.1 Noise Levels Due to Children Playing

The noise source levels for childcare centres are based on the *'Technical Guideline Child Care Centre Noise Assessment'* by the Association of Australian Acoustical Consultants, dated September 2020.

As described in the guideline, the noise level of children playing can vary widely depending on the age of the children and the type of activity. Sound power levels of children are presented in the guideline as follows;

Table 11: Sound Power Levels of Children Playing

Age group	Number of children	Sound power level dB(A) (Leq 30sec)
0 to 2 years	10	78
2 to 3 years	10	85
3 to 6 years	10	87

Sound pressure levels are taken to be 8dB lower than the sound power levels presented.

The proposed development will cater to the following age groups;

- 24 children 0 to 2 years
- 30 children 2 to 3 years
- 44 children 3 to 5 years

8.1.2 Onsite Activities – Outdoor Play Areas

The average noise source levels and predicted impacts at the receiver locations are shown in Table 12 as follows. L_{Aeq} results are not shown where the calculated total is less than 0dBA.

Table 12: Average Noise Levels from Site Activities, All Time Periods

	Receivers																		
	1. Proposed Age Care Facility (S) 2. Proposed Residential Development (N) 3. 2 Balcara Avenue & 527-541 Beams Road (N)	Source @1m dB(A)	Correction dB(A)*	Corrected dB(A)	Number of events day	Number of events eve	Number of events night	Duration per event	Distance (m)	Barrier (height (m))	Barrier screening dB	Building Screening dB	Building Transmission Loss dB	Dist atten. @-6dB/dd	LAeq adj,T ext. dB(A) Day	LAeq adj,T ext. dB(A) Eve	LAeq adj,T ext. dB(A) Night	Intrusive Compliance LAeq		
	Description									No								Day	Eve	Night
	Criteria																	52	46	34
	Car door closure	75	2	77	132	32	14	2	11					-21	34	32	25	Yes	Yes	Yes
1	Car start	74	2	76	132	32	14	2	11					-21	33	31	24	Yes	Yes	Yes
	Car passby	69		69	132	32	14	15	11					-21	35	33	26	Yes	Yes	Yes
	24 Children 0-2 Years Outdoors (Babies Outdoor Play)	74		74	4			3600	23			-5		-28	37			Yes	n/a	n/a
	30 Children 2-3 Years Outdoors (Child's Outdoor Play)	82		82	4			3600	31			-5		-30	43			Yes	n/a	n/a
	44 Children 3-5 Years Outdoors (Child's Outdoor Play)	85		85	4			3600	31			-5		-30	46			Yes	n/a	n/a
	Voice conversation	70		70	12		0.5	3600	23					-28	42		29	Yes	n/a	Yes
	Total														49	37	33	**Yes**	**Yes**	**Yes**
	Criteria																	52	46	34
	Car door closure	75	2	77	132	32	14	2	28					-29	26	24	17	Yes	Yes	Yes
2	Car start	74	2	76	132	32	14	2	28					-29	25	23	16	Yes	Yes	Yes
	Car passby	69		69	132	32	14	15	25					-28	28	26	19	Yes	Yes	Yes
	24 Children 0-2 Years Outdoors (Babies Outdoor Play)	74		74	4			3600	25	2	-12			-28	30			Yes	n/a	n/a
	30 Children 2-3 Years Outdoors (Child's Outdoor Play)	82		82	4			3600	32	2	-12			-31	35			Yes	n/a	n/a
	44 Children 3-5 Years Outdoors (Child's Outdoor Play)	85		85	4			3600	32	2	-12			-31	38			Yes	n/a	n/a
	Voice conversation	70		70	12		0.5	3600	25					-28	42		29	Yes	n/a	Yes
	Total														45	30	30	**Yes**	**Yes**	**Yes**
	Criteria																	52	46	34
	Car door closure	75	2	77	132	32	14	2	273					-49	6	4		Yes	Yes	Yes
3	Car start	74	2	76	132	32	14	2	273					-49	5	3		Yes	Yes	Yes
	Car passby	69		69	132	32	14	15	270					-49	7	5		Yes	Yes	Yes
	24 Children 0-2 Years Outdoors (Babies Outdoor Play)	74		74	4			3600	265	2	-12			-49	9			Yes	n/a	n/a
	30 Children 2-3 Years Outdoors (Child's Outdoor Play)	82		82	4			3600	260	2	-12			-49	17			Yes	n/a	n/a
	44 Children 3-5 Years Outdoors (Child's Outdoor Play)	85		85	4			3600	260	2	-12			-49	20			Yes	n/a	n/a
	Voice conversation	70		70	12		0.5	3600	260					-49	21		8	Yes	n/a	Yes
	Total														25	13	13	**Yes**	**Yes**	**Yes**

*Correction due to tonality and impulsiveness as per AS1055:2018.

Compliance is predicted with PO10 of the Childcare Centre Code on the condition the recommendations in Section 9 are implemented.

8.1.3 Onsite Activities – Indoor Play Areas (Day & Evening)

The average noise source levels and predicted impacts at the receiver locations are shown in Table 13 as follows. L_{Aeq} results are not shown where the calculated total is less than 0dBA.

Table 13: Average Noise Levels from Site Activities, All Time Periods

	Receivers																
	1. Proposed Age Care Facility (S) 2. Proposed Residential Development (N) 3. 2 Balcara Avenue & 527-541 Beams Road (N)	Source @1m dB(A)	Correction dB(A)*	Corrected dB(A)	Number of events day	Number of events eve	Duration per event	Distance (m)	Barrier (height (m))	Barrier screening dB	Building Screening dB	Building Transmission Loss dB	Dist atten. @-6dB/dd	LAeq adj,T ext. dB(A) Day	LAeq adj,T ext. dB(A) Eve	Intrusive Compliance LAeq	
	Description								No							Day	Eve
	Criteria															52	46
	12 Children 0-1 Years Indoor Play 1	71		71	5	0.5	3600	16				-10	-25	33	27	Yes	Yes
1	12 Children 1-2 Years Indoor Play 2	71		71	5	0.5	3600	23				-10	-28	30	24	Yes	Yes
	15 Children 2-3 Years Indoor Play 3	79		79	5	0.5	3600	12				-10	-22	44	38	Yes	Yes
	15 Children 2-3 Years Indoor Play 4	79		79	5	0.5	3600	12				-10	-22	44	38	Yes	Yes
	22 Children 3-5 Years Indoor Play 5	82		82	5	0.5	3600	12				-10	-22	47	41	Yes	Yes
	22 Children 3-5 Years Indoor Play 6	82		82	5	0.5	3600	12				-10	-22	47	41	Yes	Yes
	Voice conversation	70		70	11	0.5	3600	18				-10	-26	34	25	Yes	Yes
	Total													52	46	**Yes**	**Yes**
	Criteria															52	46
	12 Children 0-1 Years Indoor Play 1	71		71	5	0.5	3600	33				-10	-31	27	21	Yes	Yes
2	12 Children 1-2 Years Indoor Play 2	71		71	5	0.5	3600	33				-10	-31	27	21	Yes	Yes
	15 Children 2-3 Years Indoor Play 3	79		79	5	0.5	3600	51				-10	-35	31	25	Yes	Yes
	15 Children 2-3 Years Indoor Play 4	79		79	5	0.5	3600	51				-10	-35	31	25	Yes	Yes
	22 Children 3-5 Years Indoor Play 5	82		82	5	0.5	3600	51				-10	-35	34	28	Yes	Yes
	22 Children 3-5 Years Indoor Play 6	82		82	5	0.5	3600	51				-10	-35	34	28	Yes	Yes
	Voice conversation	70		70	11	0.5	3600	51				-10	-35	25	16	Yes	Yes
	Total													39	33	**Yes**	**Yes**
	Criteria															52	46
	12 Children 0-1 Years Indoor Play 1	71		71	5	0.5	3600	276				-10	-49	9	3	Yes	Yes
3	12 Children 1-2 Years Indoor Play 2	71		71	5	0.5	3600	273				-10	-49	9	3	Yes	Yes
	15 Children 2-3 Years Indoor Play 3	79		79	5	0.5	3600	283				-10	-50	16	10	Yes	Yes
	15 Children 2-3 Years Indoor Play 4	79		79	5	0.5	3600	284				-10	-50	16	10	Yes	Yes
	22 Children 3-5 Years Indoor Play 5	82		82	5	0.5	3600	285				-10	-50	19	13	Yes	Yes
	22 Children 3-5 Years Indoor Play 6	82		82	5	0.5	3600	286				-10	-50	19	13	Yes	Yes
	Voice conversation	70		70	11	0.5	3600	273				-10	-49	11	2	Yes	Yes
	Total													24	19	**Yes**	**Yes**

*Correction due to tonality and impulsiveness as per AS1055:2018.

Compliance is predicted with PO10 of the Childcare Centre Code on the condition the recommendations in Section 9 are implemented.

8.1.4 Onsite Activities – Indoor Play Areas (Night)

The average noise source levels and predicted impacts at the receiver locations are shown in Table 14 as follows. L_{Aeq} results are not shown where the calculated total is less than 0dBA.

Table 14: Average Noise Levels from Site Activities, All Time Periods

	Receivers													
	1. Proposed Age Care Facility (S) 2. Proposed Residential Development (N) 3. 2 Balcara Avenue & 527-541 Beams Road (N)	Source @1m dB(A)	Correction dB(A)*	Corrected dB(A)	Number of events night	Duration per event	Distance (m)	Barrier (height (m))	Barrier screening dB	Building Screening dB	Building Transmission Loss dB	Dist atten. @-6dB/dd	LAeq adj,T ext. dB(A) Night	Intrusive Compliance LAeq
	Description							No						Night
	Criteria													34
	12 Children 0-1 Years Indoor Play 1	71		71	0.5	3600	16				-10	-25	23	Yes
1	12 Children 1-2 Years Indoor Play 2	71		71	0.5	3600	23				-10	-28	20	Yes
	15 Children 2-3 Years Indoor Play 3	79		79	0.5	3600	12				-21	-22	23	Yes
	15 Children 2-3 Years Indoor Play 4	79		79	0.5	3600	12				-21	-22	23	Yes
	22 Children 3-5 Years Indoor Play 5	82		82	0.5	3600	12				-21	-22	26	Yes
	22 Children 3-5 Years Indoor Play 6	82		82	0.5	3600	12				-21	-22	26	Yes
	Voice conversation	70		70	0.5	3600	18				-21	-26	10	Yes
	Total												32	**Yes**
	Criteria													34
	12 Children 0-1 Years Indoor Play 1	71		71	0.5	3600	33				-10	-31	17	Yes
2	12 Children 1-2 Years Indoor Play 2	71		71	0.5	3600	33				-10	-31	17	Yes
	15 Children 2-3 Years Indoor Play 3	79		79	0.5	3600	51				-21	-35	10	Yes
	15 Children 2-3 Years Indoor Play 4	79		79	0.5	3600	51				-21	-35	10	Yes
	22 Children 3-5 Years Indoor Play 5	82		82	0.5	3600	51				-21	-35	13	Yes
	22 Children 3-5 Years Indoor Play 6	82		82	0.5	3600	51				-21	-35	13	Yes
	Voice conversation	70		70	0.5	3600	51				-21	-35	1	Yes
	Total												23	**Yes**
	Criteria													34
	12 Children 0-1 Years Indoor Play 1	71		71	0.5	3600	276				-10	-49		Yes
3	12 Children 1-2 Years Indoor Play 2	71		71	0.5	3600	273				-10	-49		Yes
	15 Children 2-3 Years Indoor Play 3	79		79	0.5	3600	283				-21	-50		Yes
	15 Children 2-3 Years Indoor Play 4	79		79	0.5	3600	284				-21	-50		Yes
	22 Children 3-5 Years Indoor Play 5	82		82	0.5	3600	285				-21	-50		Yes
	22 Children 3-5 Years Indoor Play 6	82		82	0.5	3600	286				-21	-50		Yes
	Voice conversation	70		70	0.5	3600	273				-21	-49		Yes
	Total												12	**Yes**

*Correction due to tonality and impulsiveness as per AS1055:2018.

Compliance is predicted with PO10 of the Childcare Centre Code on the condition the recommendations in Section 9 are implemented.

9. Recommendations

9.1 Road Traffic Noise and Onsite Activities

All building treatments were calculated using Australian Standard *AS3671:1989 'Road Traffic Noise Intrusion – Building Siting and Construction'*. The acoustic treatments specified in this section are recommended, however other construction materials may be suitable for use subject to achieving compliance with the Rw ratings.

9.1.1 Glazing

The minimum glazing treatments are presented in Table 15 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 glass unless the glazier can provide a specific (non generic) NATA Test report proving the proposed glazing system complies (the test report must be based on the same configuration proposed for the development). Note an estimation or calculated performance will not accepted.
- If compliance cannot be achieved with the minimum R_w ratings for the glass thickness nominated, then glazing system shall be upgraded until compliance is achieved.
- Glazing specified with acoustic seals requires a seal that has been tested with a glazing system or door to achieve an Rw in accordance with AS/NZS ISO 717.1, 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 15: Glazing Treatments

Room	Rw Ratings				Glazing		Acoustic seals
	Walls	Roof	Windows	Sliding Doors	Windows	Sliding Doors	
Indoor Play 1	35	35	-	23	-	4mm tough	No
Indoor Play 2	35	35	-	23	-	4mm tough	No
Indoor Play 3	35	35	27	28	4mm float	5mm tough	Yes
Indoor Play 4	35	35	27	28	4mm float	5mm tough	Yes
Indoor Play 5	35	35	27	28	4mm float	5mm tough	Yes
Indoor Play 6	35	35	27	28	4mm float	5mm tough	Yes
Sleep 1	35	35	27	-	4mm float	-	Yes
Sleep 2	35	35	27	-	4mm float	-	Yes
Office	35	35	27	-	4mm float	-	Yes
Staff	35	35	27	28	4mm float	5mm tough	Yes
Planning	35	35	-	28	-	5mm tough	Yes

Any locations not identified in Table 15 shall require 4mm float for windows (minimum R_W 22) and 4mm toughened for sliding doors (minimum R_W 23).

9.1.2 Wall Construction

For the wall Rw ratings nominated in Table 15, the following nominal wall constructions would be recommended;

Table 16: Nominal Wall Constructions

Description	Cavity insulation	R_W Rating
110mm thick brick veneer external, 20mm cavity, sarking, 90mm studs at 600mm centres, 10mm plasterboard internal	-	35
9mm fibre cement sheet external, sarking, 90mm studs at 600mm centres, cavity with infill, 13mm plasterboard internal	75mm glasswool batts (11kg/m^3)	35

Other wall systems may be implemented provided they achieve the necessary Rw rating presented in Table 15. Penetrations through the external walls shall not reduce the overall acoustic performance of the installed wall system.

9.1.3 Roof/Ceiling Construction

For the roof/ceiling Rw ratings nominated in Table 15, the following nominal roof/ceiling constructions would be recommended.

Table 17: Nominal Roof/Ceiling Constructions

Description	Cavity insulation	R_W Rating
Sheet metal roof, 60mm Anticon over 40mm battens, ceiling joists at 450mm centres, 13mm thick plasterboard ceiling	165mm glasswool batts (11kg/m^3)	35

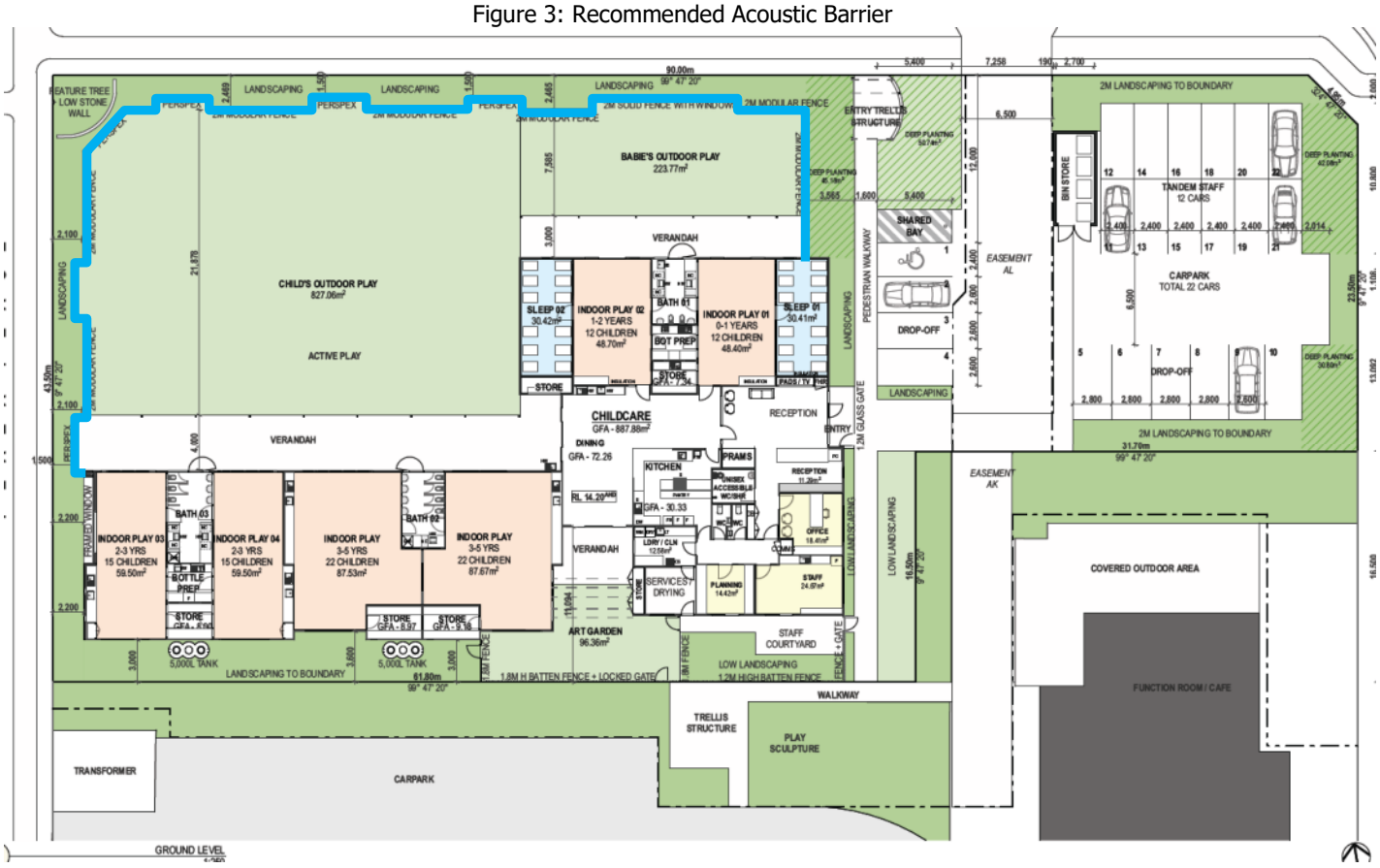
Other roof systems may be implemented provided they achieve the nominated acoustic rating or greater. Penetrations through the ceiling shall not reduce the overall acoustic performance of the installed ceiling system.

9.2 Onsite Activities

Compliance is predicted with Brisbane City Council assessment criteria at the nearest receivers for the proposed hours of operation on the condition the following recommendations are implemented:

- An acoustic barrier is recommended to be constructed to the height and extent shown in Figure 3. The barrier shall be constructed using materials that achieve a minimum surface density of 10kg/m². Suitable materials may include 16mm thick lapped timber (minimum 40% overlap), 6mm laminate glazing, masonry, 9mm fibre cement sheeting, Hebel, 8mm Perspex, 17mm plywood, or other material which satisfy the minimum surface density requirement. The barrier shall be free of gaps and holes.
- Use of the outdoor play areas shall be limited to the day time period only (7am-6pm).
- Waste collection shall be conducted in accordance with existing residents in the area.
- Windows for indoor play areas 3 to 6 are to be constructed using 4mm float.
- Windows on the southern façade of indoor play areas 3 to 6 are to remain closed during the night period.
- We recommend indoor play areas 3-6 to have the provision for an alternative ventilation system similar to air-conditioning or mechanical ventilation to allow windows and doors to be closed.

Figure 3: Recommended Acoustic Barrier



9.2.1 Onsite Mechanical Plant

No information regarding mechanical services was available at the time of the assessment. We recommend that any new mechanical plant is designed to comply with the noise criteria stated in Section 6.2.2 with an assessment by a qualified acoustic consultant to be conducted prior to installation.

10. Conclusion

An environmental noise assessment was conducted for the proposed childcare centre at Plaza Parade, Carseldine. On the condition the recommendations detailed in Section 8.1.4 are implemented, compliance is predicted with Brisbane City Council assessment criteria.

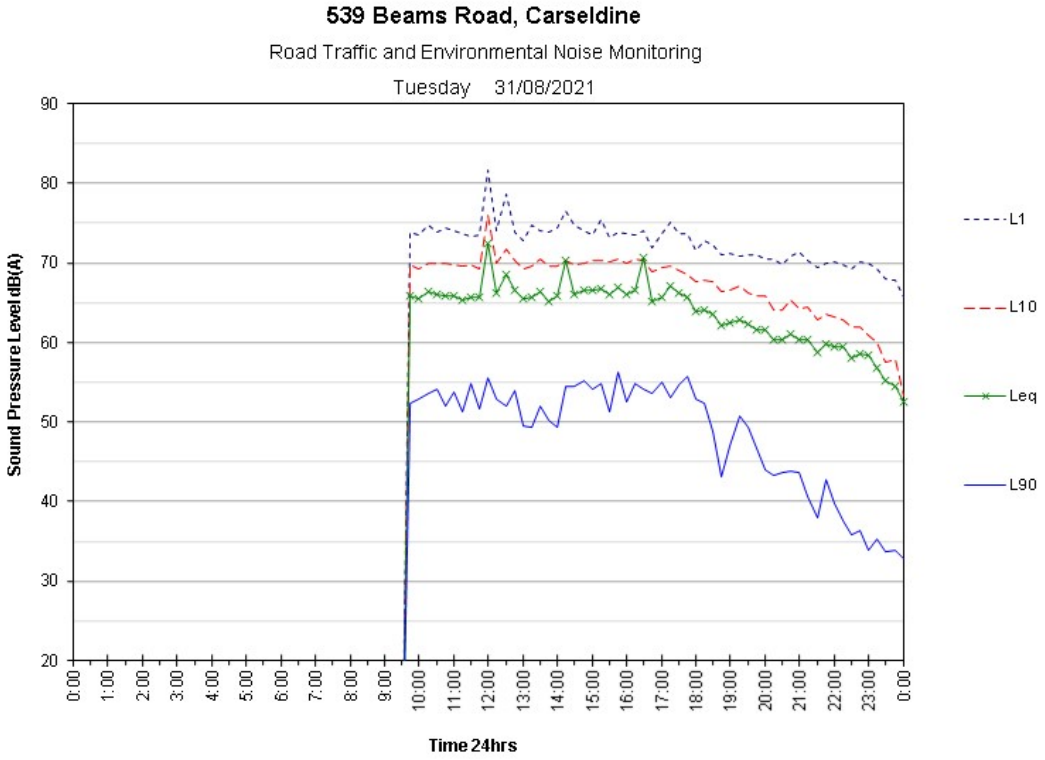
If you should have any queries, please do not hesitate to contact us.

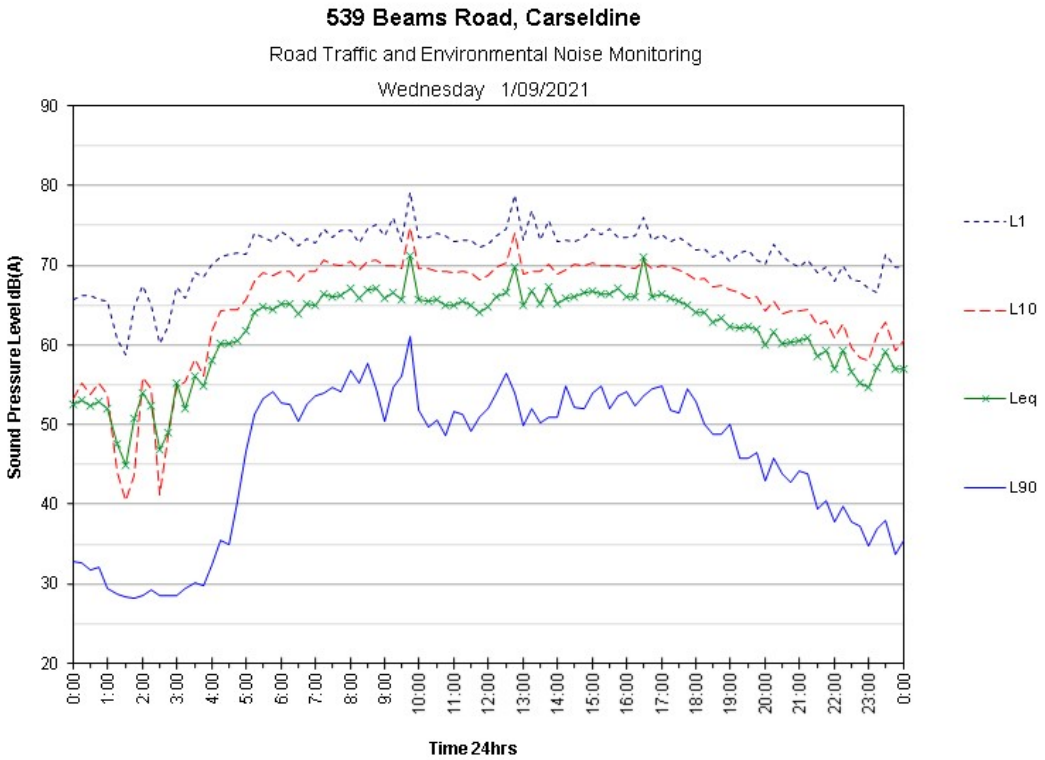
Report Prepared By

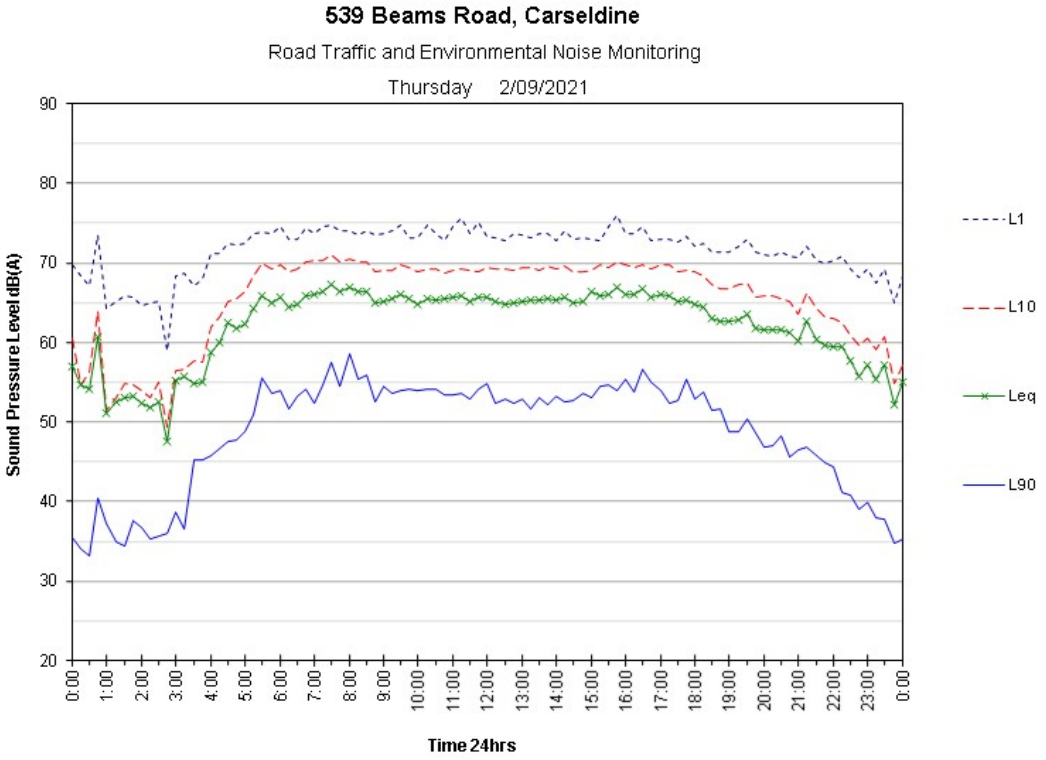
Andrew Hiscox
Acoustic Consultant
acousticworks)))

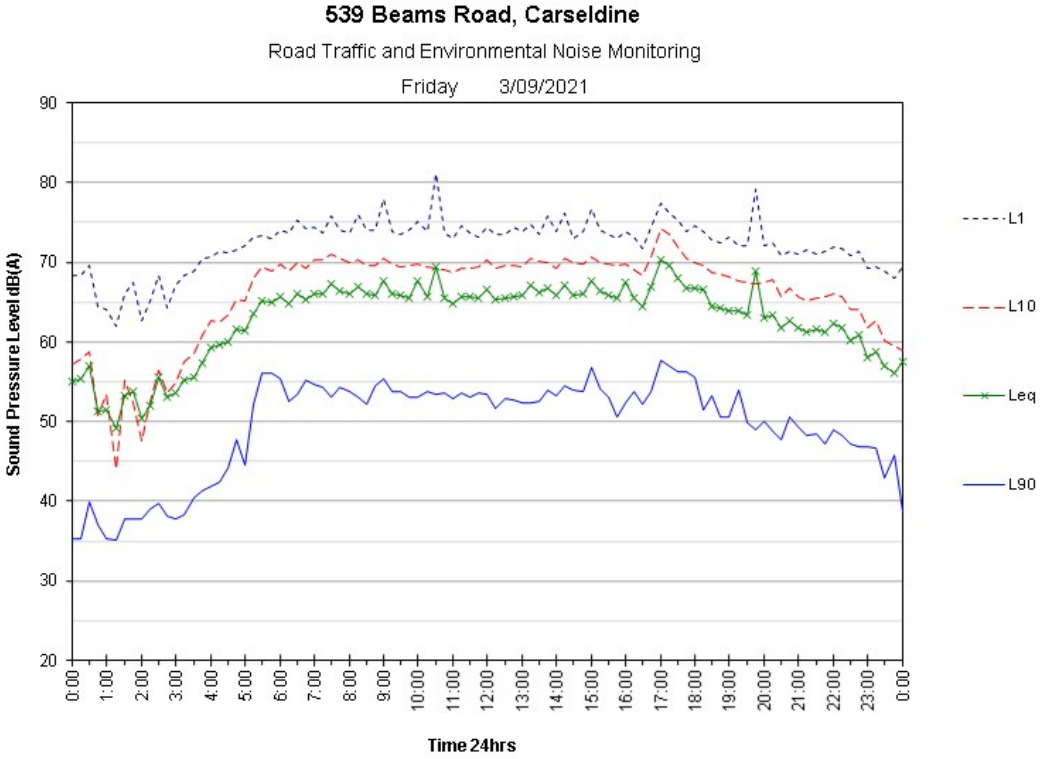
11. Appendices

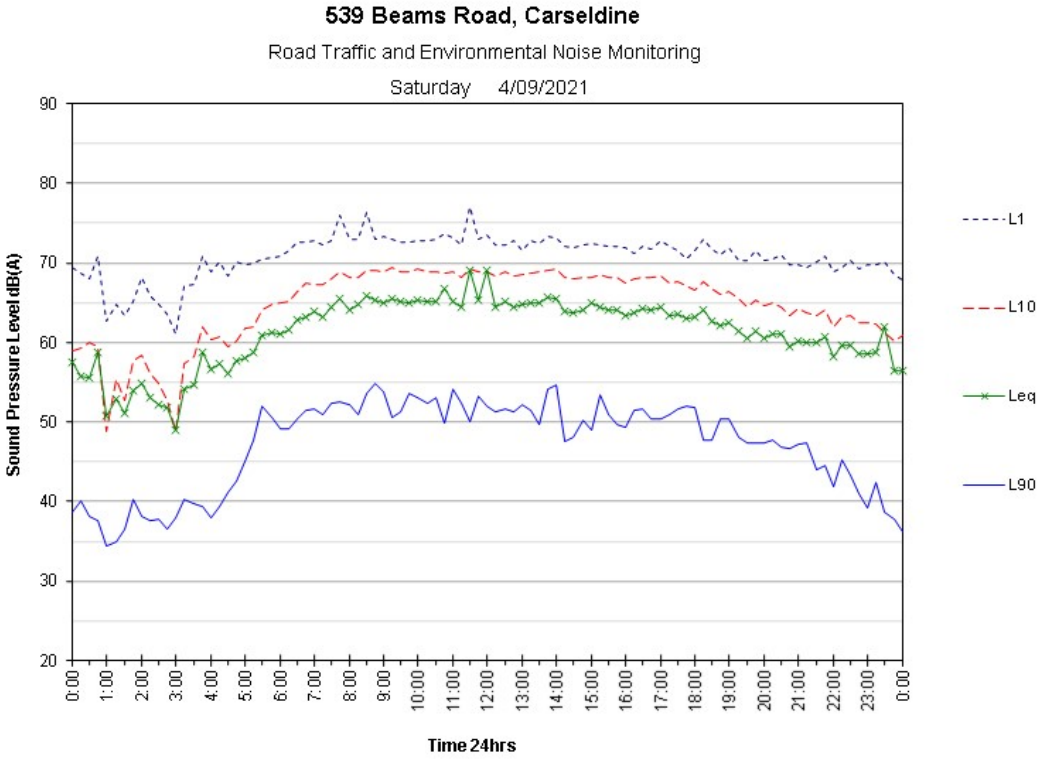
11.1 Ambient Noise Monitoring Charts

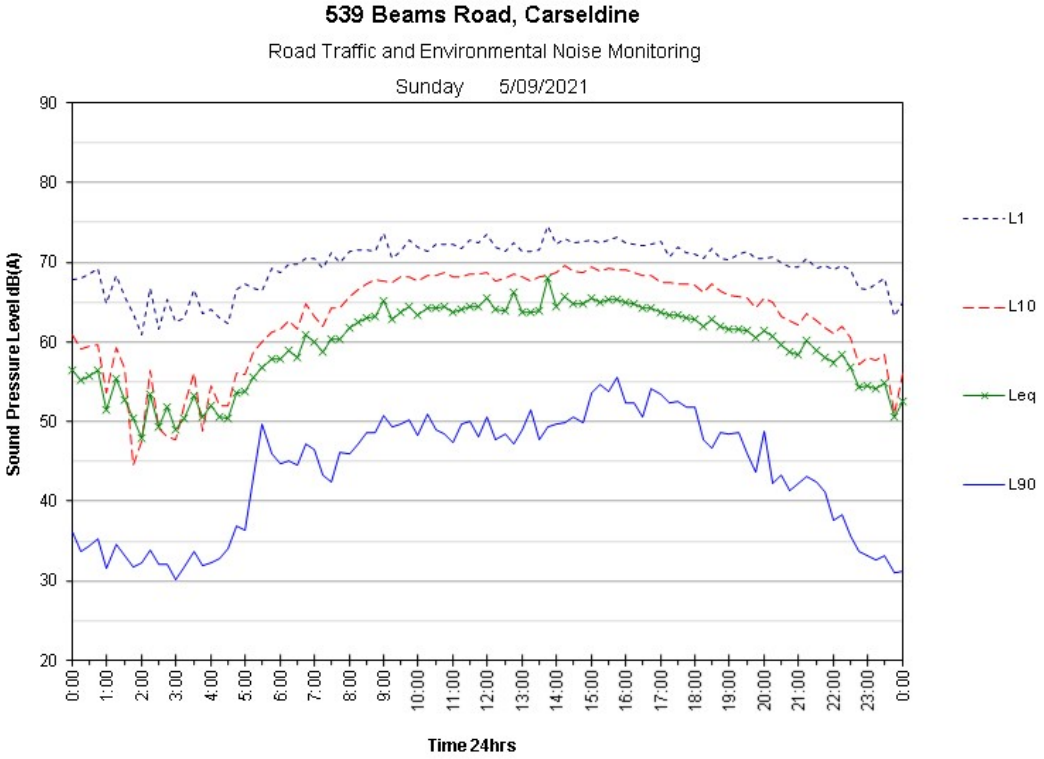


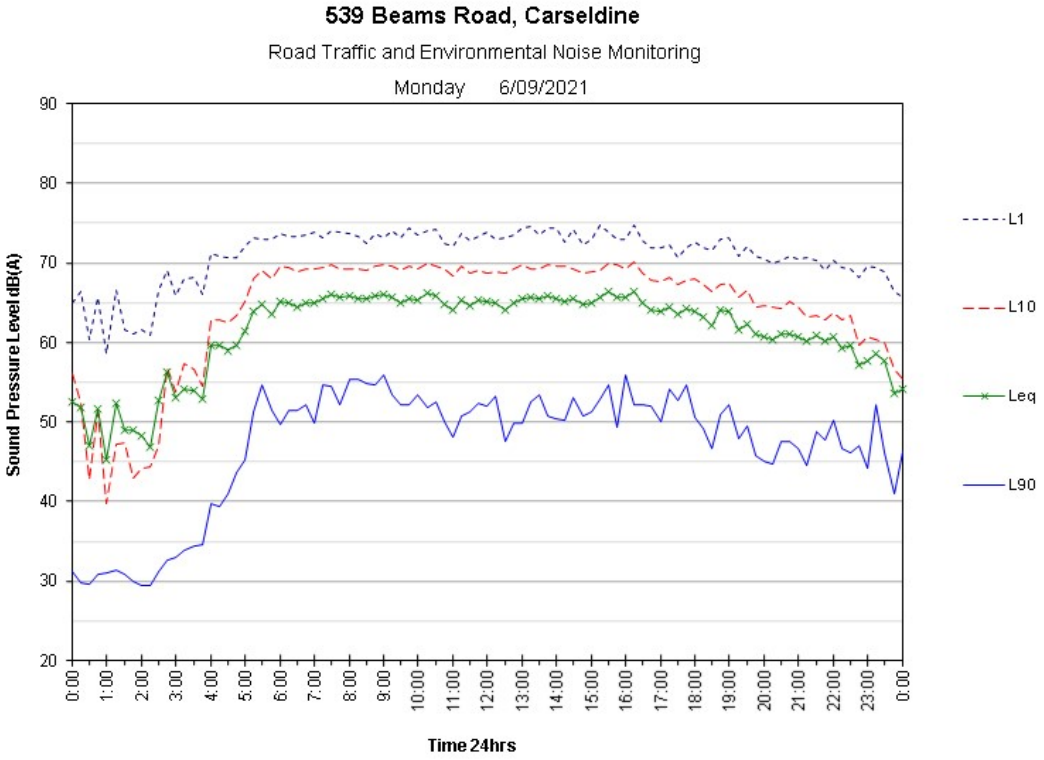



539 Beams Road, Carseldine
Road Traffic and Environmental Noise Monitoring
Thursday 2/09/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90


539 Beams Road, Carseldine
Road Traffic and Environmental Noise Monitoring
Friday 3/09/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90


539 Beams Road, Carseldine
Road Traffic and Environmental Noise Monitoring
Saturday 4/09/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90


539 Beams Road, Carseldine
Road Traffic and Environmental Noise Monitoring
Sunday 5/09/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90


539 Beams Road, Carseldine
Road Traffic and Environmental Noise Monitoring
Monday 6/09/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
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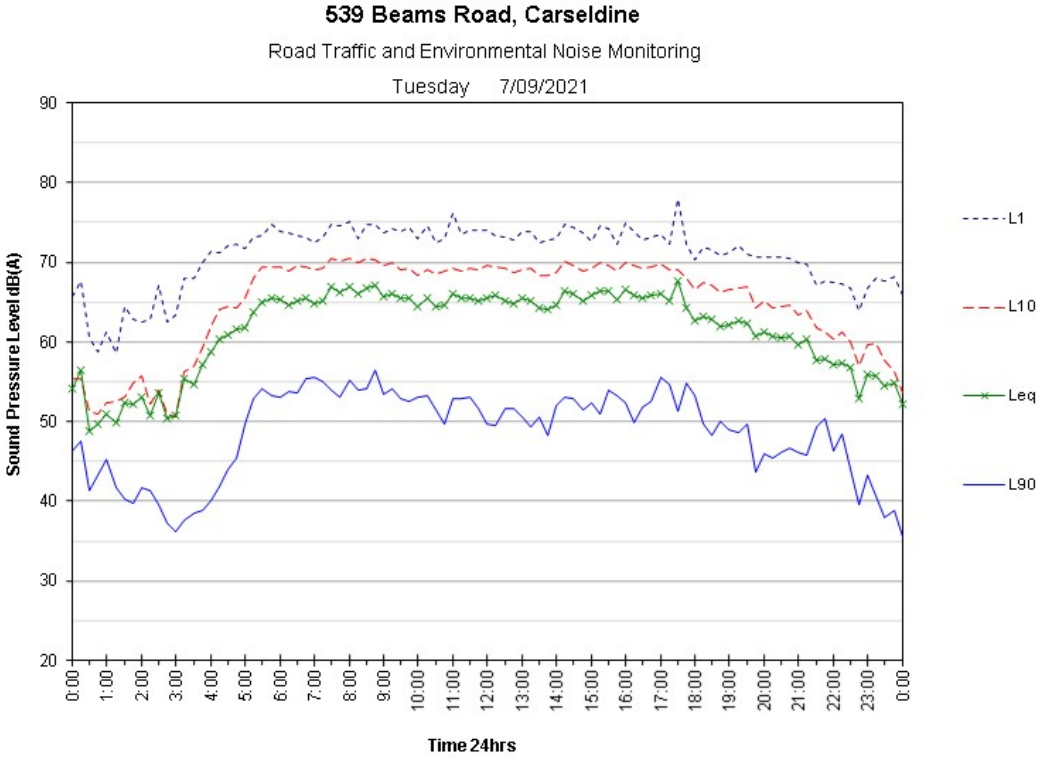
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90


539 Beams Road, Carseldine
Road Traffic and Environmental Noise Monitoring
Tuesday 7/09/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
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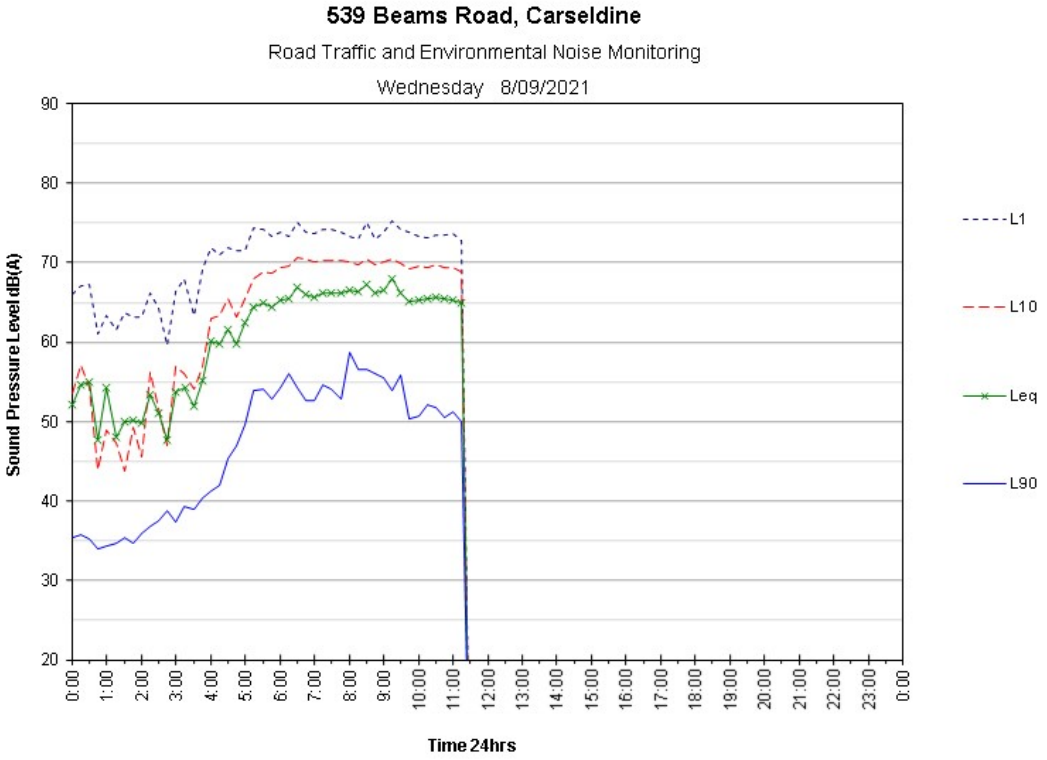
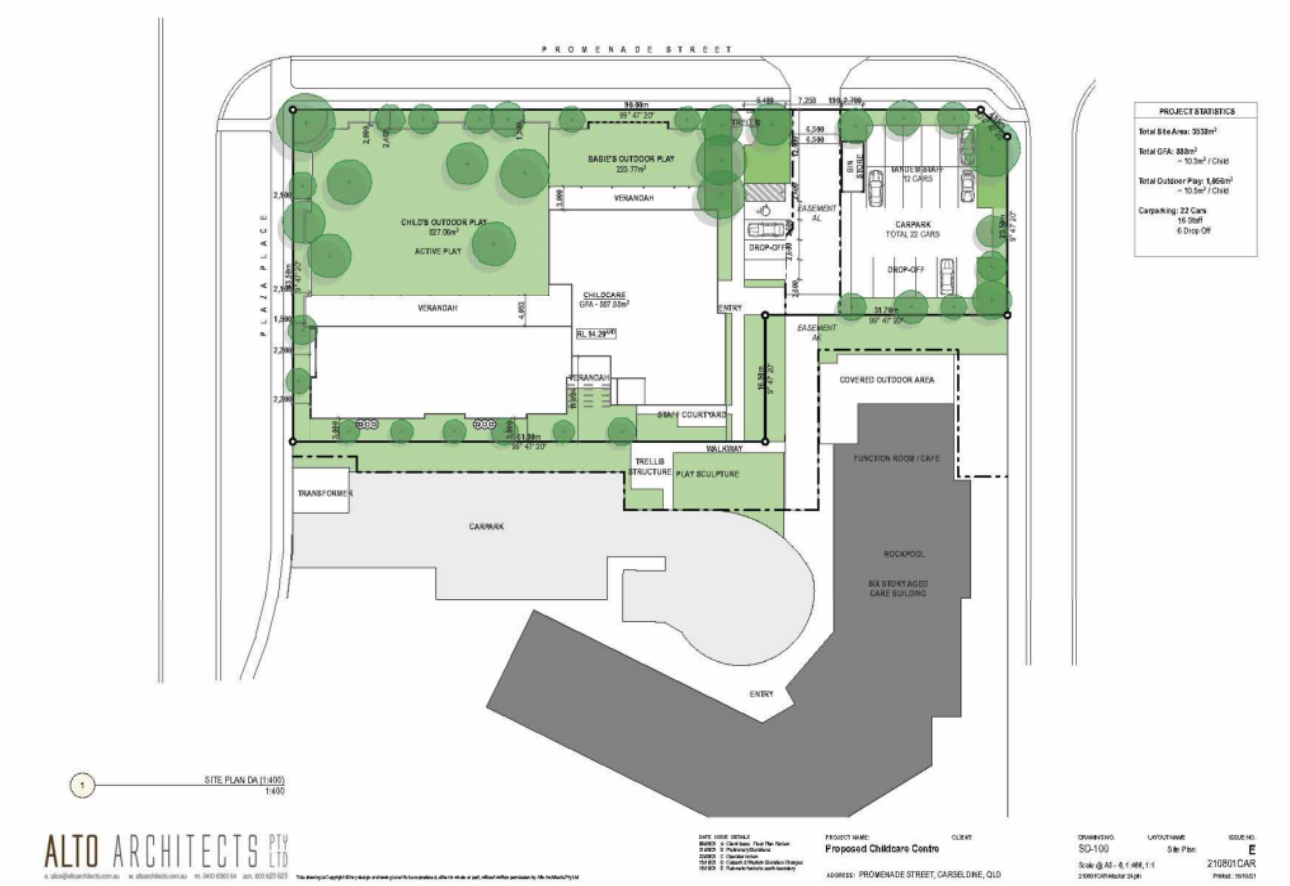
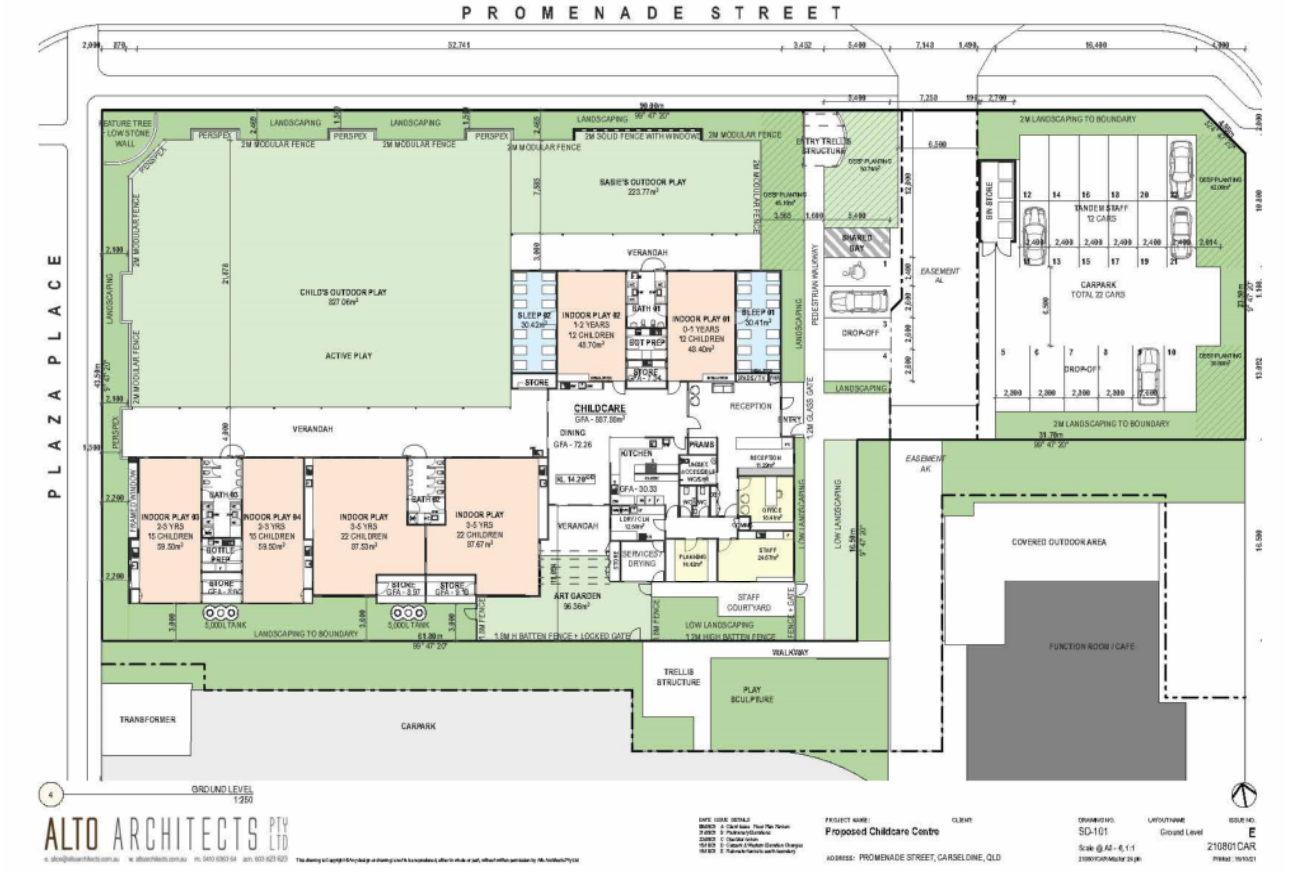
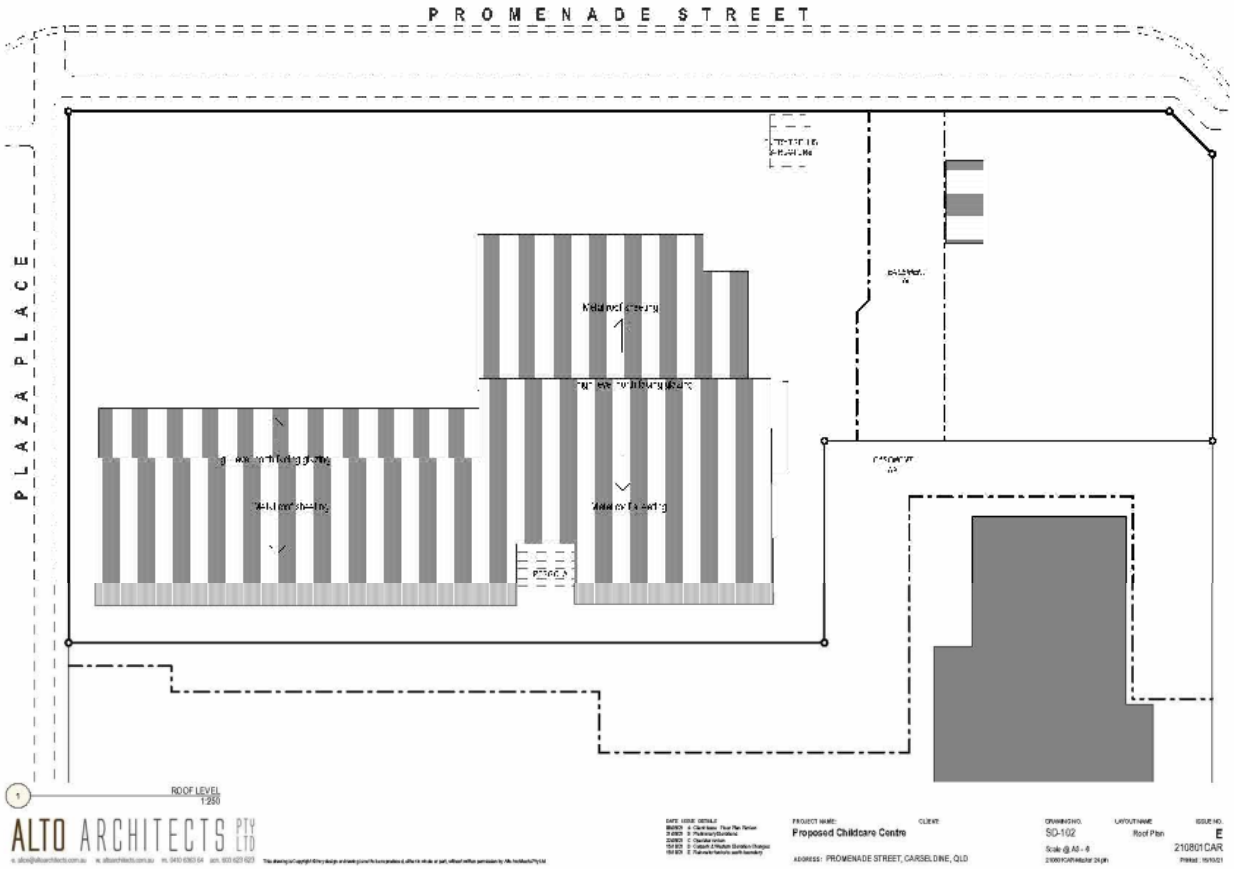
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90


539 Beams Road, Carseldine
Road Traffic and Environmental Noise Monitoring
Wednesday 8/09/2021
Sound Pressure Level dB(A)
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time 24hrs
L1
L10
Leq
L90

11.2 Development Plans



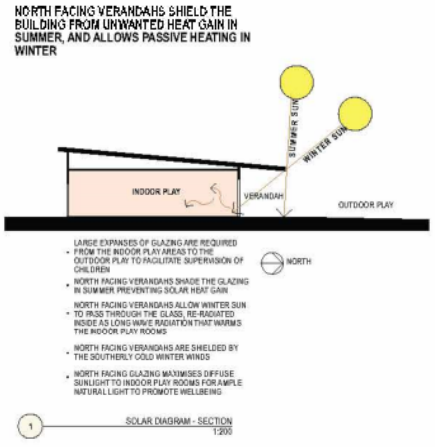


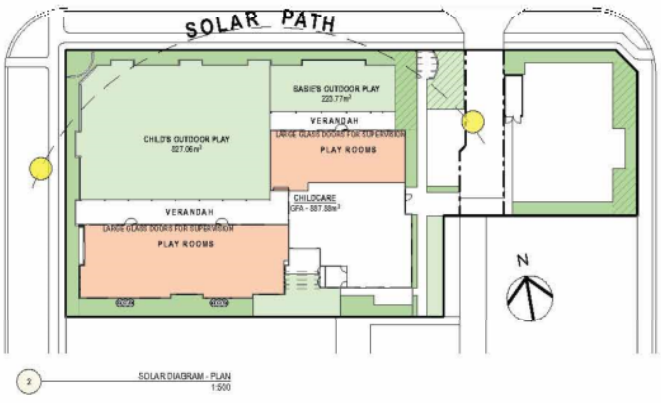


SUSTAINABLE BUILDING DESIGN

An education and care service premises must make sure that the indoor spaces contain ample natural light, ventilation and thermal comfort. Natural light contributes to a sense of wellbeing, is important to the development of children & creates comfortable learning environments.

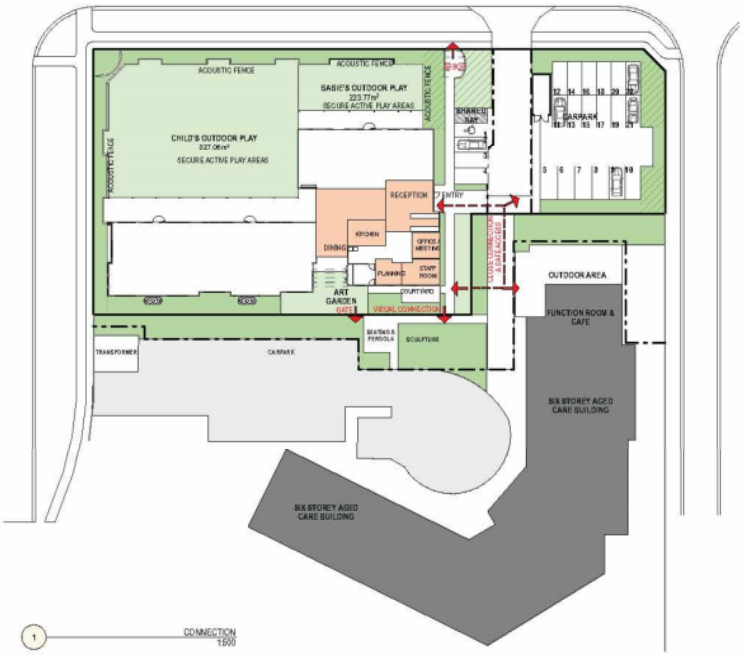
With the correct orientation and building envelope, solar heat gain can be excluded in summer and admitted in winter, minimising energy use for air-conditioning and heating.





CONNECTIVITY WITH ROCKPOOL

Childcare centres require a single point of entry for security. Locating the reception & staff areas close to the function room and cafe area creates a visual connection and physical proximity between the centre and Rockpool, encouraging interaction and safe access between the buildings.



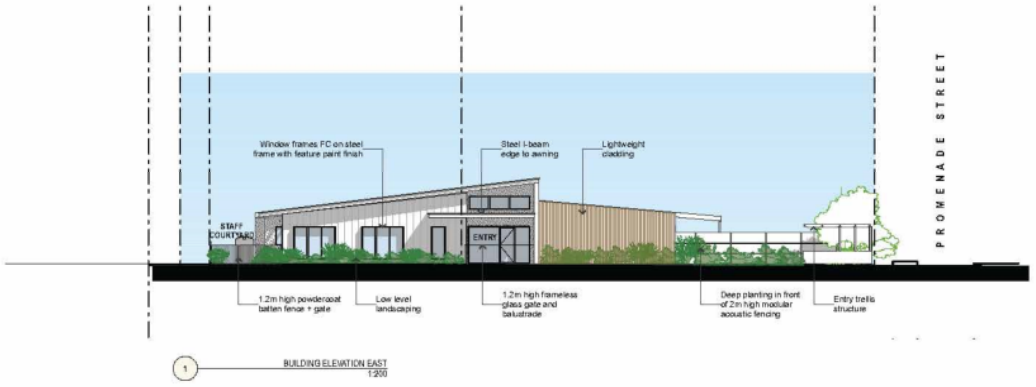
ALTO ARCHITECTS PTY LTD

Proposed Childcare Centre

ADDRESS: PROMENADE STREET, CARSELDINE, QLD

SD-104 Connection E

Scale @ A0 - 1 210801CAR



ALTO ARCHITECTS PTY LTD

Proposed Childcare Centre

ADDRESS: PROMENADE STREET, CARSELDINE, QLD

SD-400 Building North & East Elevations E

Scale @ A0 - 1 210801CAR

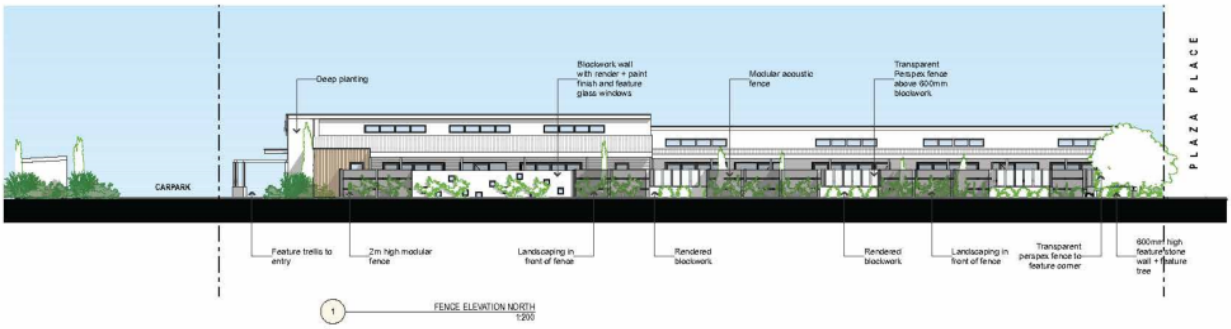
ALTO ARCHITECTS PTY LTD

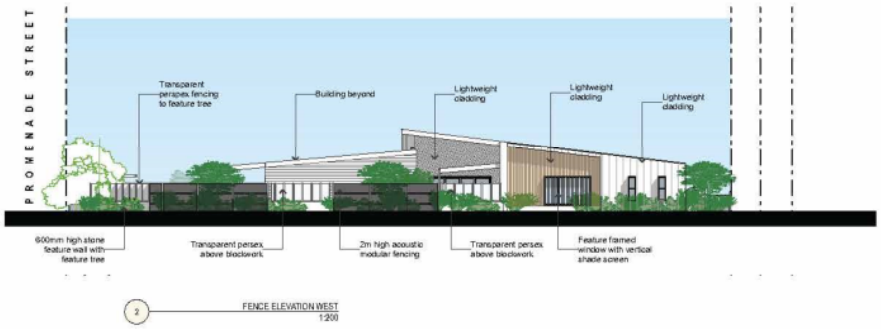
Proposed Childcare Centre

ADDRESS: PROMENADE STREET, CARSELDINE, QLD

SD-401 South Elevation

210801CAR





ALTO ARCHITECTS PTY LTD

Proposed Childcare Centre

ADDRESS: PROMENADE STREET, CARSELDINE, QLD

SD-402 North & West Fence Elevations

210801CAR

11.3 CoRTN Calculations

Project: Plaza Parade, Carseldine **Project Number:** 2021415

	Lanes		Lane 1 ☑	Lane 2 ☑	Lane 3 ☐	Lane 4 ☐	Lane 5 ☐	Lane 6 ☐	Lane 7 ☐	Lane 8 ☐
CoRTN Noise Calculation V4			E	W						
Traffic Flow AADT 24hr	17340	total	8670	8670						
Traffic Speed			60	60						
% Heavy Vehicles			3.2	3.2						
Gradient %			0	0						
Road surface			bitumen	bitumen						
Road surface type			impervious	impervious						
Road surface texture depth			2	2						
RL of road surface			0	0						
Distance from receiver to lane (m)			7.5	19						
RL of receiver ground level			0	0						
Height of receiver above ground			1.4	1.4						
Average height of propagation			0.95	0.95						
Angle of View			175	175						
Proportion of absorbent ground %			30	20						
Façade reflection	○ ◉	No	0	0						
Basic Noise Level dB(A)			68.4	68.4						
Change in mean speed due to %HV and %G			0	0						
Mean Traffic Speed and % HV			-0.6	-0.6						
Gradient			0.0	0.0						
Road surface			-1.0	-1.0						
Distance			0.9	-2.2						
Angle of view			-0.1	-0.1						
Absorbing ground			-0.5	-0.9						
Façade reflection			0.0	0.0						
L10 18hr free field dB(A)		**68.7**	67.1	63.6						
Barrier Calculation										
Distance barrier to nearside (m)			0.0001	0.0001						
RL of barrier base (m)			0	0						
Height of barrier above ground (m)			0.00	0.00						
Barrier attenuation dB(A)			-0.1	-0.1						
L10 18hr free field dB(A) with barrier		**68.6**	67.0	63.5						
Barrier Height to Satisfy Criteria										
Criteria L10 18hr dB(A)			57.0	60.0						
Barrier height to satisfy criteria (m)			**3.15**	**3.11**						
Barrier attenuation to satisfy criteria dB(A)			-19.7	-19.5						
L10 18hr free field dB(A) with barrier		**49.1**	47.4	44.1						
Notes										
Logger Verification										

2021415 C02A Plaza Parade Carseldine RTN ENV - CoRTN Noise levels.xlsm

Project: Plaza Parade, Carseldine **Project Number:** 2021415

	Segments		Seg 1 ☑	Seg 2 ☑	Seg 3 ☑	Seg 4 ☑	Seg 5 ☑	Seg 6 ☑	Seg 7 ☐	Seg 8 ☐
CoRTN Noise Calculation V4			W	E						
Traffic Flow AADT 24hr	21137	total	10568	10568	10568	10568	10568	10568		
Traffic Speed			60	60	60	60	60	60		
% Heavy Vehicles			3.2	3.2	3.2	3.2	3.2	3.2		
Gradient %			0	0	0	0	0	0		
Road surface			bitumen	bitumen	bitumen	bitumen	bitumen	bitumen		
Road surface type			impervious	impervious	impervious	impervious	impervious	impervious		
Road surface texture depth			2	2	2	2	2	2		
RL of road surface			0	0	0	0	0	0		
Distance from receiver to lane (m)			237	248	237	248	237	248		
RL of receiver ground level			0	0	0	0	0	0		
Height of receiver above ground			1.5	1.5	1.5	1.5	1.5	1.5		
Average height of propagation			1	1	1	1	1	1		
Angle of View			2	2	10	10	103	103		
Proportion of absorbent ground %			79	76	77	74	95	91		
Façade reflection	Yes ◉ ○		2.5	2.5	2.5	2.5	2.5	2.5		
Basic Noise Level dB(A)			69.3	69.3	69.3	69.3	69.3	69.3		
Change in mean speed due to %HV and %G			0	0	0	0	0	0		
Mean Traffic Speed and % HV			-0.6	-0.6	-0.6	-0.6	-0.6	-0.6		
Gradient			0.0	0.0	0.0	0.0	0.0	0.0		
Road surface			-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		
Distance			-12.5	-12.7	-12.5	-12.7	-12.5	-12.7		
Angle of view			-19.5	-19.5	-12.6	-12.6	-2.4	-2.4		
Absorbing ground			-6.7	-6.8	-6.7	-6.8	-9.0	-9.1		
Façade reflection			2.5	2.5	2.5	2.5	2.5	2.5		
L10 18hr inc façade dB(A)		**49.9**	31.5	31.2	38.4	38.1	46.3	46.0		
Barrier Calculation										
Distance barrier to nearside (m)			0.0001	0.0001	89	100	0.0001	0.0001		
RL of barrier base (m)			0	0	0	0	0	0		
Height of barrier above ground (m)			0.00	0.00	5.00	5.00	0.00	0.00		
Barrier attenuation dB(A)			-0.1	-0.1	-10.2	-10.0	-0.1	-0.1		
L10 18hr inc façade dB(A) with barrier		**49.3**	31.4	31.1	28.2	28.1	46.2	45.9		
Barrier Height to Satisfy Criteria										
Criteria L10 18hr dB(A)			57.0	60.0	57.0	54.0	52.5	55.0		
Barrier height to satisfy criteria (m)			**3.15**	**3.11**	**ot require**	**ot require**	**ot require**	**ot require**		
Barrier attenuation to satisfy criteria dB(A)			-19.5	-19.4						
L10 18hr inc façade dB(A) with barrier		**49.8**	12.0	11.8	38.4	38.1	46.3	46.0		

Notes

Indoor Play 1

Seg 3 & 4 - Screening from childcare to the north west.

Project: Plaza Parade, Carseldine **Project Number:** 2021415

	Segments		Seg 1 ☑	Seg 2 ☑	Seg 3 ☑	Seg 4 ☑	Seg 5 ☑	Seg 6 ☑	Seg 7 ☐	Seg 8 ☐
CoRTN Noise Calculation V4			W	E						
Traffic Flow AADT 24hr	21137	total	10568	10568	10568	10568	10568	10568		
Traffic Speed			60	60	60	60	60	60		
% Heavy Vehicles			3.2	3.2	3.2	3.2	3.2	3.2		
Gradient %			0	0	0	0	0	0		
Road surface			bitumen	bitumen	bitumen	bitumen	bitumen	bitumen		
Road surface type			impervious	impervious	impervious	impervious	impervious	impervious		
Road surface texture depth			2	2	2	2	2	2		
RL of road surface			0	0	0	0	0	0		
Distance from receiver to lane (m)			237	249	237	249	237	249		
RL of receiver ground level			0	0	0	0	0	0		
Height of receiver above ground			1.5	1.5	1.5	1.5	1.5	1.5		
Average height of propagation			1	1	1	1	1	1		
Angle of View			3	3	9	9	103	103		
Proportion of absorbent ground %			79	76	77	74	95	91		
Façade reflection	Yes ◉ ○		2.5	2.5	2.5	2.5	2.5	2.5		
Basic Noise Level dB(A)			69.3	69.3	69.3	69.3	69.3	69.3		
Change in mean speed due to %HV and %G			0	0	0	0	0	0		
Mean Traffic Speed and % HV			-0.6	-0.6	-0.6	-0.6	-0.6	-0.6		
Gradient			0.0	0.0	0.0	0.0	0.0	0.0		
Road surface			-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		
Distance			-12.5	-12.7	-12.5	-12.7	-12.5	-12.7		
Angle of view			-17.8	-17.8	-13.0	-13.0	-2.4	-2.4		
Absorbing ground			-6.7	-6.8	-6.7	-6.8	-9.0	-9.1		
Façade reflection			2.5	2.5	2.5	2.5	2.5	2.5		
L10 18hr inc façade dB(A)		**49.9**	33.2	32.9	38.0	37.7	46.3	46.0		
Barrier Calculation										
Distance barrier to nearside (m)			0.0001	0.0001	89	100	0.0001	0.0001		
RL of barrier base (m)			0	0	0	0	0	0		
Height of barrier above ground (m)			0.00	0.00	5.00	5.00	0.00	0.00		
Barrier attenuation dB(A)			-0.1	-0.1	-10.2	-10.0	-0.1	-0.1		
L10 18hr inc façade dB(A) with barrier		**49.3**	33.1	32.8	27.8	27.7	46.2	45.9		
Barrier Height to Satisfy Criteria										
Criteria L10 18hr dB(A)			57.0	60.0	57.0	54.0	52.5	55.0		
Barrier height to satisfy criteria (m)			**3.15**	**3.11**	**ot require**	**ot require**	**ot require**	**ot require**		
Barrier attenuation to satisfy criteria dB(A)			-19.5	-19.4						
L10 18hr inc façade dB(A) with barrier		**49.8**	13.7	13.5	38.0	37.7	46.3	46.0		

Notes

Indoor Play 2

Seg 3 & 4 - Screening from childcare to the north west.

Project: Plaza Parade, Carseldine **Project Number:** 2021415

	Segments		Seg 1 ☑	Seg 2 ☑	Seg 3 ☑	Seg 4 ☑	Seg 5 ☑	Seg 6 ☑	Seg 7 ☐	Seg 8 ☐
CoRTN Noise Calculation V4			W	E						
Traffic Flow AADT 24hr	21137	total	10568	10568	10568	10568	10568	10568		
Traffic Speed			60	60	60	60	60	60		
% Heavy Vehicles			3.2	3.2	3.2	3.2	3.2	3.2		
Gradient %			0	0	0	0	0	0		
Road surface			bitumen	bitumen	bitumen	bitumen	bitumen	bitumen		
Road surface type			impervious	impervious	impervious	impervious	impervious	impervious		
Road surface texture depth			2	2	2	2	2	2		
RL of road surface			0	0	0	0	0	0		
Distance from receiver to lane (m)			252	264	252	264	252	264		
RL of receiver ground level			0	0	0	0	0	0		
Height of receiver above ground			1.5	1.5	1.5	1.5	1.5	1.5		
Average height of propagation			1	1	1	1	1	1		
Angle of View			7	7	12	12	93	93		
Proportion of absorbent ground %			81	78	76	73	97	93		
Façade reflection	Yes ◉ ○		2.5	2.5	2.5	2.5	2.5	2.5		
Basic Noise Level dB(A)			69.3	69.3	69.3	69.3	69.3	69.3		
Change in mean speed due to %HV and %G			0	0	0	0	0	0		
Mean Traffic Speed and % HV			-0.6	-0.6	-0.6	-0.6	-0.6	-0.6		
Gradient			0.0	0.0	0.0	0.0	0.0	0.0		
Road surface			-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		
Distance			-12.8	-13.0	-12.8	-13.0	-12.8	-13.0		
Angle of view			-14.1	-14.1	-11.8	-11.8	-2.9	-2.9		
Absorbing ground			-6.8	-6.9	-6.8	-6.9	-9.1	-9.2		
Façade reflection			2.5	2.5	2.5	2.5	2.5	2.5		
L10 18hr inc façade dB(A)		**49.6**	36.5	36.2	38.8	38.5	45.4	45.1		
Barrier Calculation										
Distance barrier to nearside (m)			0.0001	0.0001	89	100	0.0001	0.0001		
RL of barrier base (m)			0	0	0	0	0	0		
Height of barrier above ground (m)			0.00	0.00	5.00	5.00	0.00	0.00		
Barrier attenuation dB(A)			-0.1	-0.1	-10.1	-9.9	-0.1	-0.1		
L10 18hr inc façade dB(A) with barrier		**48.8**	36.4	36.1	28.7	28.6	45.3	45.0		
Barrier Height to Satisfy Criteria										
Criteria L10 18hr dB(A)			57.0	60.0	57.0	54.0	52.5	55.0		
Barrier height to satisfy criteria (m)			**3.15**	**3.11**	**ot require**	**ot require**	**ot require**	**ot require**		
Barrier attenuation to satisfy criteria dB(A)			-19.5	-19.4						
L10 18hr inc façade dB(A) with barrier		**49.1**	17.0	16.8	38.8	38.5	45.4	45.1		

Notes

Indoor Play 3

Seg 3 & 4 - Screening from childcare to the north west.

Project: Plaza Parade, Carseldine **Project Number:** 2021415

	Segments		Seg 1 ☑	Seg 2 ☑	Seg 3 ☑	Seg 4 ☑	Seg 5 ☑	Seg 6 ☑	Seg 7 ☐	Seg 8 ☐
CoRTN Noise Calculation V4			W	E						
Traffic Flow AADT 24hr	21137	total	10568	10568	10568	10568	10568	10568		
Traffic Speed			60	60	60	60	60	60		
% Heavy Vehicles			3.2	3.2	3.2	3.2	3.2	3.2		
Gradient %			0	0	0	0	0	0		
Road surface			bitumen	bitumen	bitumen	bitumen	bitumen	bitumen		
Road surface type			impervious	impervious	impervious	impervious	impervious	impervious		
Road surface texture depth			2	2	2	2	2	2		
RL of road surface			0	0	0	0	0	0		
Distance from receiver to lane (m)			252	264	252	264	252	264		
RL of receiver ground level			0	0	0	0	0	0		
Height of receiver above ground			1.5	1.5	1.5	1.5	1.5	1.5		
Average height of propagation			1	1	1	1	1	1		
Angle of View			6	6	11	11	84	84		
Proportion of absorbent ground %			81	78	76	73	97	93		
Façade reflection	Yes ◉ ○		2.5	2.5	2.5	2.5	2.5	2.5		
Basic Noise Level dB(A)			69.3	69.3	69.3	69.3	69.3	69.3		
Change in mean speed due to %HV and %G			0	0	0	0	0	0		
Mean Traffic Speed and % HV			-0.6	-0.6	-0.6	-0.6	-0.6	-0.6		
Gradient			0.0	0.0	0.0	0.0	0.0	0.0		
Road surface			-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		
Distance			-12.8	-13.0	-12.8	-13.0	-12.8	-13.0		
Angle of view			-14.8	-14.8	-12.1	-12.1	-3.3	-3.3		
Absorbing ground			-6.8	-6.9	-6.8	-6.9	-9.1	-9.2		
Façade reflection			2.5	2.5	2.5	2.5	2.5	2.5		
L10 18hr inc façade dB(A)		**49.1**	35.8	35.5	38.5	38.2	45.0	44.7		
Barrier Calculation										
Distance barrier to nearside (m)			0.0001	0.0001	89	100	0.0001	0.0001		
RL of barrier base (m)			0	0	0	0	0	0		
Height of barrier above ground (m)			0.00	0.00	5.00	5.00	0.00	0.00		
Barrier attenuation dB(A)			-0.1	-0.1	-10.1	-9.9	-0.1	-0.1		
L10 18hr inc façade dB(A) with barrier		**48.3**	35.7	35.4	28.4	28.3	44.9	44.6		
Barrier Height to Satisfy Criteria										
Criteria L10 18hr dB(A)			57.0	60.0	57.0	54.0	52.5	55.0		
Barrier height to satisfy criteria (m)			**3.15**	**3.11**	**ot require**	**ot require**	**ot require**	**ot require**		
Barrier attenuation to satisfy criteria dB(A)			-19.5	-19.4						
L10 18hr inc façade dB(A) with barrier		**48.7**	16.3	16.1	38.5	38.2	45.0	44.7		

Notes

Indoor Play 4

Seg 3 & 4 - Screening from childcare to the north west.

Project: Plaza Parade, Carseldine **Project Number:** 2021415

	Segments		Seg 1 ☑	Seg 2 ☑	Seg 3 ☑	Seg 4 ☑	Seg 5 ☑	Seg 6 ☑	Seg 7 ☐	Seg 8 ☐
CoRTN Noise Calculation V4			W	E						
Traffic Flow AADT 24hr	21137	total	10568	10568	10568	10568	10568	10568		
Traffic Speed			60	60	60	60	60	60		
% Heavy Vehicles			3.2	3.2	3.2	3.2	3.2	3.2		
Gradient %			0	0	0	0	0	0		
Road surface			bitumen	bitumen	bitumen	bitumen	bitumen	bitumen		
Road surface type			impervious	impervious	impervious	impervious	impervious	impervious		
Road surface texture depth			2	2	2	2	2	2		
RL of road surface			0	0	0	0	0	0		
Distance from receiver to lane (m)			252	264	252	264	252	264		
RL of receiver ground level			0	0	0	0	0	0		
Height of receiver above ground			1.5	1.5	1.5	1.5	1.5	1.5		
Average height of propagation			1	1	1	1	1	1		
Angle of View			5	5	11	11	71	71		
Proportion of absorbent ground %			81	78	76	73	97	93		
Façade reflection	Yes ◉ ○		2.5	2.5	2.5	2.5	2.5	2.5		
Basic Noise Level dB(A)			69.3	69.3	69.3	69.3	69.3	69.3		
Change in mean speed due to %HV and %G			0	0	0	0	0	0		
Mean Traffic Speed and % HV			-0.6	-0.6	-0.6	-0.6	-0.6	-0.6		
Gradient			0.0	0.0	0.0	0.0	0.0	0.0		
Road surface			-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		
Distance			-12.8	-13.0	-12.8	-13.0	-12.8	-13.0		
Angle of view			-15.6	-15.6	-12.1	-12.1	-4.0	-4.0		
Absorbing ground			-6.8	-6.9	-6.8	-6.9	-9.1	-9.2		
Façade reflection			2.5	2.5	2.5	2.5	2.5	2.5		
L10 18hr inc façade dB(A)		**48.6**	35.0	34.7	38.5	38.2	44.3	44.0		
Barrier Calculation										
Distance barrier to nearside (m)			0.0001	0.0001	89	100	0.0001	0.0001		
RL of barrier base (m)			0	0	0	0	0	0		
Height of barrier above ground (m)			0.00	0.00	5.00	5.00	0.00	0.00		
Barrier attenuation dB(A)			-0.1	-0.1	-10.1	-9.9	-0.1	-0.1		
L10 18hr inc façade dB(A) with barrier		**47.6**	34.9	34.6	28.4	28.3	44.2	43.9		
Barrier Height to Satisfy Criteria										
Criteria L10 18hr dB(A)			57.0	60.0	57.0	54.0	52.5	55.0		
Barrier height to satisfy criteria (m)			**3.15**	**3.11**	**ot require**	**ot require**	**ot require**	**ot require**		
Barrier attenuation to satisfy criteria dB(A)			-19.5	-19.4						
L10 18hr inc façade dB(A) with barrier		**48.2**	15.5	15.3	38.5	38.2	44.3	44.0		

Notes

Indoor Play 5

Seg 3 & 4 - Screening from childcare to the north west.

Project: Plaza Parade, Carseldine **Project Number:** 2021415

	Segments		Seg 1 ☑	Seg 2 ☑	Seg 3 ☑	Seg 4 ☑	Seg 5 ☑	Seg 6 ☑	Seg 7 ☐	Seg 8 ☐
CoRTN Noise Calculation V4			W	E						
Traffic Flow AADT 24hr	21137	total	10568	10568	10568	10568	10568	10568		
Traffic Speed			60	60	60	60	60	60		
% Heavy Vehicles			3.2	3.2	3.2	3.2	3.2	3.2		
Gradient %			0	0	0	0	0	0		
Road surface			bitumen	bitumen	bitumen	bitumen	bitumen	bitumen		
Road surface type			impervious	impervious	impervious	impervious	impervious	impervious		
Road surface texture depth			2	2	2	2	2	2		
RL of road surface			0	0	0	0	0	0		
Distance from receiver to lane (m)			252	264	252	264	252	264		
RL of receiver ground level			0	0	0	0	0	0		
Height of receiver above ground			1.5	1.5	1.5	1.5	1.5	1.5		
Average height of propagation			1	1	1	1	1	1		
Angle of View			5	5	10	10	49	49		
Proportion of absorbent ground %			81	78	76	73	97	93		
Façade reflection	Yes ◉ ○		2.5	2.5	2.5	2.5	2.5	2.5		
Basic Noise Level dB(A)			69.3	69.3	69.3	69.3	69.3	69.3		
Change in mean speed due to %HV and %G			0	0	0	0	0	0		
Mean Traffic Speed and % HV			-0.6	-0.6	-0.6	-0.6	-0.6	-0.6		
Gradient			0.0	0.0	0.0	0.0	0.0	0.0		
Road surface			-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		
Distance			-12.8	-13.0	-12.8	-13.0	-12.8	-13.0		
Angle of view			-15.6	-15.6	-12.6	-12.6	-5.7	-5.7		
Absorbing ground			-6.8	-6.9	-6.8	-6.9	-9.1	-9.2		
Façade reflection			2.5	2.5	2.5	2.5	2.5	2.5		
L10 18hr inc façade dB(A)		**47.3**	35.0	34.7	38.0	37.7	42.6	42.3		
Barrier Calculation										
Distance barrier to nearside (m)			0.0001	0.0001	89	100	0.0001	0.0001		
RL of barrier base (m)			0	0	0	0	0	0		
Height of barrier above ground (m)			0.00	0.00	5.00	5.00	0.00	0.00		
Barrier attenuation dB(A)			-0.1	-0.1	-10.1	-9.9	-0.1	-0.1		
L10 18hr inc façade dB(A) with barrier		**46.2**	34.9	34.6	27.9	27.8	42.5	42.2		
Barrier Height to Satisfy Criteria										
Criteria L10 18hr dB(A)			57.0	60.0	57.0	54.0	52.5	55.0		
Barrier height to satisfy criteria (m)			**3.15**	**3.11**	**ot require**	**ot require**	**ot require**	**ot require**		
Barrier attenuation to satisfy criteria dB(A)			-19.5	-19.4						
L10 18hr inc façade dB(A) with barrier		**46.8**	15.5	15.3	38.0	37.7	42.6	42.3		

Notes

Indoor Play 6

Seg 3 & 4 - Screening from childcare to the north west.

Project: Plaza Parade, Carseldine **Project Number:** 2021415

	Segments		Seg 1 ☑	Seg 2 ☑	Seg 3 ☑	Seg 4 ☑	Seg 5 ☑	Seg 6 ☑	Seg 7 ☐	Seg 8 ☐
CoRTN Noise Calculation V4			W	E						
Traffic Flow AADT 24hr	21137	total	10568	10568	10568	10568	10568	10568		
Traffic Speed			60	60	60	60	60	60		
% Heavy Vehicles			3.2	3.2	3.2	3.2	3.2	3.2		
Gradient %			0	0	0	0	0	0		
Road surface			bitumen	bitumen	bitumen	bitumen	bitumen	bitumen		
Road surface type			impervious	impervious	impervious	impervious	impervious	impervious		
Road surface texture depth			2	2	2	2	2	2		
RL of road surface			0	0	0	0	0	0		
Distance from receiver to lane (m)			237	248	237	248	237	248		
RL of receiver ground level			0	0	0	0	0	0		
Height of receiver above ground			1.5	1.5	1.5	1.5	1.5	1.5		
Average height of propagation			1	1	1	1	1	1		
Angle of View			2	2	10	10	103	103		
Proportion of absorbent ground %			79	76	77	74	95	91		
Façade reflection	Yes ◉ ○		2.5	2.5	2.5	2.5	2.5	2.5		
Basic Noise Level dB(A)			69.3	69.3	69.3	69.3	69.3	69.3		
Change in mean speed due to %HV and %G			0	0	0	0	0	0		
Mean Traffic Speed and % HV			-0.6	-0.6	-0.6	-0.6	-0.6	-0.6		
Gradient			0.0	0.0	0.0	0.0	0.0	0.0		
Road surface			-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		
Distance			-12.5	-12.7	-12.5	-12.7	-12.5	-12.7		
Angle of view			-19.5	-19.5	-12.6	-12.6	-2.4	-2.4		
Absorbing ground			-6.7	-6.8	-6.7	-6.8	-9.0	-9.1		
Façade reflection			2.5	2.5	2.5	2.5	2.5	2.5		
L10 18hr inc façade dB(A)		**49.9**	31.5	31.2	38.4	38.1	46.3	46.0		
Barrier Calculation										
Distance barrier to nearside (m)			0.0001	0.0001	89	100	0.0001	0.0001		
RL of barrier base (m)			0	0	0	0	0	0		
Height of barrier above ground (m)			0.00	0.00	5.00	5.00	0.00	0.00		
Barrier attenuation dB(A)			-0.1	-0.1	-10.2	-10.0	-0.1	-0.1		
L10 18hr inc façade dB(A) with barrier		**49.3**	31.4	31.1	28.2	28.1	46.2	45.9		
Barrier Height to Satisfy Criteria										
Criteria L10 18hr dB(A)			57.0	60.0	57.0	54.0	52.5	55.0		
Barrier height to satisfy criteria (m)			**3.15**	**3.11**	**ot require**	**ot require**	**ot require**	**ot require**		
Barrier attenuation to satisfy criteria dB(A)			-19.5	-19.4						
L10 18hr inc façade dB(A) with barrier		**49.8**	12.0	11.8	38.4	38.1	46.3	46.0		

Notes

Sleep 1

Seg 3 & 4 - Screening from childcare to the north west.

2021415 C02A Plaza Parade Carseldine RTN ENV - CoRTN Noise levels.xlsm

Project: Plaza Parade, Carseldine **Project Number:** 2021415

	Segments		Seg 1 ☑	Seg 2 ☑	Seg 3 ☑	Seg 4 ☑	Seg 5 ☑	Seg 6 ☑	Seg 7 ☐	Seg 8 ☐
CoRTN Noise Calculation V4			W	E						
Traffic Flow AADT 24hr	21137	total	10568	10568	10568	10568	10568	10568		
Traffic Speed			60	60	60	60	60	60		
% Heavy Vehicles			3.2	3.2	3.2	3.2	3.2	3.2		
Gradient %			0	0	0	0	0	0		
Road surface			bitumen	bitumen	bitumen	bitumen	bitumen	bitumen		
Road surface type			impervious	impervious	impervious	impervious	impervious	impervious		
Road surface texture depth			2	2	2	2	2	2		
RL of road surface			0	0	0	0	0	0		
Distance from receiver to lane (m)			237	249	237	249	237	249		
RL of receiver ground level			0	0	0	0	0	0		
Height of receiver above ground			1.5	1.5	1.5	1.5	1.5	1.5		
Average height of propagation			1	1	1	1	1	1		
Angle of View			3	3	11	11	100	100		
Proportion of absorbent ground %			79	76	77	74	95	91		
Façade reflection	Yes ◉ ○		2.5	2.5	2.5	2.5	2.5	2.5		
Basic Noise Level dB(A)			69.3	69.3	69.3	69.3	69.3	69.3		
Change in mean speed due to %HV and %G			0	0	0	0	0	0		
Mean Traffic Speed and % HV			-0.6	-0.6	-0.6	-0.6	-0.6	-0.6		
Gradient			0.0	0.0	0.0	0.0	0.0	0.0		
Road surface			-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		
Distance			-12.5	-12.7	-12.5	-12.7	-12.5	-12.7		
Angle of view			-17.8	-17.8	-12.1	-12.1	-2.6	-2.6		
Absorbing ground			-6.7	-6.8	-6.7	-6.8	-9.0	-9.1		
Façade reflection			2.5	2.5	2.5	2.5	2.5	2.5		
L10 18hr inc façade dB(A)		**49.9**	33.2	32.9	38.9	38.6	46.1	45.8		
Barrier Calculation										
Distance barrier to nearside (m)			0.0001	0.0001	89	100	0.0001	0.0001		
RL of barrier base (m)			0	0	0	0	0	0		
Height of barrier above ground (m)			0.00	0.00	5.00	5.00	0.00	0.00		
Barrier attenuation dB(A)			-0.1	-0.1	-10.2	-10.0	-0.1	-0.1		
L10 18hr inc façade dB(A) with barrier		**49.1**	33.1	32.8	28.7	28.6	46.0	45.7		
Barrier Height to Satisfy Criteria										
Criteria L10 18hr dB(A)			57.0	60.0	57.0	54.0	52.5	55.0		
Barrier height to satisfy criteria (m)			**3.15**	**3.11**	**ıot require**	**ıot require**	**ıot require**	**ıot require**		
Barrier attenuation to satisfy criteria dB(A)			-19.5	-19.4						
L10 18hr inc façade dB(A) with barrier		**49.7**	13.7	13.5	38.9	38.6	46.1	45.8		

Notes

Sleep 2

Seg 3 & 4 - Screening from childcare to the north west.

Project: Plaza Parade, Carseldine **Project Number:** 2021415

	Lanes		Lane 1 ☑	Lane 2 ☑	Lane 3 ☐	Lane 4 ☐	Lane 5 ☐	Lane 6 ☐	Lane 7 ☐	Lane 8 ☐
CoRTN Noise Calculation V4			W	E						
Traffic Flow AADT 24hr	21137	total	10568	10568						
Traffic Speed			60	60						
% Heavy Vehicles			3.2	3.2						
Gradient %			0	0						
Road surface			bitumen	bitumen						
Road surface type			impervious	impervious						
Road surface texture depth			2	2						
RL of road surface			0	0						
Distance from receiver to lane (m)			255	266						
RL of receiver ground level			0	0						
Height of receiver above ground			1.5	1.5						
Average height of propagation			1	1						
Angle of View			57	57						
Proportion of absorbent ground %			68	67						
Façade reflection	Yes ◉ ○		2.5	2.5						
Basic Noise Level dB(A)			69.3	69.3						
Change in mean speed due to %HV and %G			0	0						
Mean Traffic Speed and % HV			-0.6	-0.6						
Gradient			0.0	0.0						
Road surface			-1.0	-1.0						
Distance			-12.8	-13.0						
Angle of view			-5.0	-5.0						
Absorbing ground			-6.9	-6.9						
Façade reflection			2.5	2.5						
L10 18hr inc façade dB(A)		**48.4**	45.5	45.3						
Barrier Calculation										
Distance barrier to nearside (m)			0.0001	0.0001						
RL of barrier base (m)			0	0						
Height of barrier above ground (m)			0.00	0.00						
Barrier attenuation dB(A)			-0.1	-0.1						
L10 18hr inc façade dB(A) with barrier		**48.3**	45.4	45.2						
Barrier Height to Satisfy Criteria										
Criteria L10 18hr dB(A)			57.0	60.0						
Barrier height to satisfy criteria (m)			**3.15**	**3.11**						
Barrier attenuation to satisfy criteria dB(A)			-19.5	-19.4						
L10 18hr inc façade dB(A) with barrier		**29.0**	26.0	25.9						
Notes										

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Project: Plaza Parade, Carseldine **Project Number:** 2021415

	Lanes		Lane 1 ☑	Lane 2 ☑	Lane 3 ☐	Lane 4 ☐	Lane 5 ☐	Lane 6 ☐	Lane 7 ☐	Lane 8 ☐
CoRTN Noise Calculation V4			W	E						
Traffic Flow AADT 24hr	21137	total	10568	10568						
Traffic Speed			60	60						
% Heavy Vehicles			3.2	3.2						
Gradient %			0	0						
Road surface			bitumen	bitumen						
Road surface type			impervious	impervious						
Road surface texture depth			2	2						
RL of road surface			0	0						
Distance from receiver to lane (m)			260	271						
RL of receiver ground level			0	0						
Height of receiver above ground			1.5	1.5						
Average height of propagation			1	1						
Angle of View			57	57						
Proportion of absorbent ground %			68	67						
Façade reflection	Yes ◉ ○		2.5	2.5						
Basic Noise Level dB(A)			69.3	69.3						
Change in mean speed due to %HV and %G			0	0						
Mean Traffic Speed and % HV			-0.6	-0.6						
Gradient			0.0	0.0						
Road surface			-1.0	-1.0						
Distance			-12.9	-13.1						
Angle of view			-5.0	-5.0						
Absorbing ground			-6.9	-7.0						
Façade reflection			2.5	2.5						
L10 18hr inc façade dB(A)		**48.3**	45.4	45.1						
Barrier Calculation										
Distance barrier to nearside (m)			0.0001	0.0001						
RL of barrier base (m)			0	0						
Height of barrier above ground (m)			0.00	0.00						
Barrier attenuation dB(A)			-0.1	-0.1						
L10 18hr inc façade dB(A) with barrier		**48.1**	45.3	45.0						
Barrier Height to Satisfy Criteria										
Criteria L10 18hr dB(A)			57.0	60.0						
Barrier height to satisfy criteria (m)			**3.15**	**3.11**						
Barrier attenuation to satisfy criteria dB(A)			-19.5	-19.4						
L10 18hr inc façade dB(A) with barrier		**28.9**	25.9	25.7						

Notes

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Project: Plaza Parade, Carseldine **Project Number:** 2021415

	Lanes		Lane 1 ☑	Lane 2 ☑	Lane 3 ☐	Lane 4 ☐	Lane 5 ☐	Lane 6 ☐	Lane 7 ☐	Lane 8 ☐
CoRTN Noise Calculation V4			W	E						
Traffic Flow AADT 24hr	21137	total	10568	10568						
Traffic Speed			60	60						
% Heavy Vehicles			3.2	3.2						
Gradient %			0	0						
Road surface			bitumen	bitumen						
Road surface type			impervious	impervious						
Road surface texture depth			2	2						
RL of road surface			0	0						
Distance from receiver to lane (m)			263	274						
RL of receiver ground level			0	0						
Height of receiver above ground			1.5	1.5						
Average height of propagation			1	1						
Angle of View			1	1						
Proportion of absorbent ground %			95	91						
Façade reflection	Yes		2.5	2.5						
Basic Noise Level dB(A)			69.3	69.3						
Change in mean speed due to %HV and %G			0	0						
Mean Traffic Speed and % HV			-0.6	-0.6						
Gradient			0.0	0.0						
Road surface			-1.0	-1.0						
Distance			-13.0	-13.1						
Angle of view			-22.6	-22.6						
Absorbing ground			-9.2	-9.3						
Façade reflection			2.5	2.5						
L10 18hr inc façade dB(A)		**28.3**	25.4	25.2						
Barrier Calculation										
Distance barrier to nearside (m)			0.0001	0.0001						
RL of barrier base (m)			0	0						
Height of barrier above ground (m)			0.00	0.00						
Barrier attenuation dB(A)			-0.1	-0.1						
L10 18hr inc façade dB(A) with barrier		**28.2**	25.3	25.1						
Barrier Height to Satisfy Criteria										
Criteria L10 18hr dB(A)			57.0	60.0						
Barrier height to satisfy criteria (m)			**3.15**	**3.11**						
Barrier attenuation to satisfy criteria dB(A)			-19.5	-19.4						
L10 18hr inc façade dB(A) with barrier		**11.4**	5.9	5.8						

Notes

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