The Acoustic Group
CONSULTING ACOUSTICAL AND VIBRATION ENGINEERS

ACOUSTICAL ASSESSMENT
PROPOSED CHILD CARE CENTRE
4 - 8 ELIZA PLACE, PICTON
52.5489.R1:MSC

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Date: *10 June 2022*

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APPENDICES

1.0 INTRODUCTION

The purpose of this report is to present the results, findings, and recommendations of an acoustic assessment with respect to the amended proposed Childcare Centre at 4 - 8 Eliza Place Picton.

The subject site consists of three separate allotments, which are proposed to be consolidated to provide a child care facility to accommodate a maximum of 87 children. The site is located within an existing residential subdivision and is a cleared site except for a driveway on the access handle.

The Development Application DA010.2020.00000449.001 was refused by Wollondilly Shire Council and is the subject of a Class 1 Appeal before the Land & Environment Court of NSW (Case Number 2021/295821).

The Development Application included an acoustic assessment from Muller Acoustic Consulting (Document ref MAC201104-01RP1D1 dated 73 June 2020).

Contention 11 in the Statement of Facts and Contentions (filed 10 December 2021) refers to the Muller Acoustic Consulting report (the MAC report) and raises matters concerning ambient background levels during Covid-19 lockdown, acoustic design targets for adjacent residential receivers, children sound power levels and results of acoustic modelling.

The amended application has deleted the after school care, increased the setback of the building from the northern boundary, provided a lower ground floor and lowered the rear outdoor play area.

To undertake our acoustic assessment and respond to the Statement of Facts and Contentions, unattended noise monitoring was conducted on the western boundary of the site, towards Argyle Street, in line with the building alignment of the adjacent property between Saturday 12 February and Saturday 26 February 2022. The unattended noise monitoring was supplemented by attended measurements adjacent to the logger and to the rear of the property directly in front of the two storey residential dwelling identified on the plans as Lot 505 DP 1201960 (Residential receiver R4 in the MAC report).

This acoustical assessment report has been prepared to reflect the amended application and at the same time was prepared to address the acoustic issues raised in the SOFAC.

2.0 THE SITE

The subject site is located at 4-8 Eliza Place, at the rear of a battle-axe block bounded by Argyle Street to the west, existing residential receivers to the north, west, east and south, and a future residential receiver to the north.

The location of the site, at the western end of Picton, is identified in the upper figure in Appendix A1.

The lower figure in Appendix A1 shows the subject site and monitoring locations used for this assessment. The google earth map does not show the nearby residential developments.

Appendix A2 reproduces Figure 1 from the MAC report that identifies new dwellings and a numbering system for residential receivers.

Argyle Street is an arterial road and has a roundabout at the intersection of Eliza Place.

Traffic heading along Argyle Street in a northerly direction accelerates up an incline after the roundabout with Eliza Place. Traffic on Argyle Street heading in a southerly direction come down the incline to the roundabout and then accelerates out of the roundabout.

Observations during the installation and retrieval of the logger identified traffic on Argyle Street to be the dominate noise source that was controlling the acoustic environment (in the day) across the site and at adjoining residential dwellings.

In view of traffic on Argyle Street the properties to the rear of the site would experience lower traffic noise levels that at the front of the site (near Argyle Street), resulting in an attended measurements near receiver location R4 being undertaken on the retrieval of the logger to identify background levels at the rear of the site being removed from Argyle Street.

Adjacent to the southern boundary of the site is the residential premises of 42 Argyle Street, Picton, which is identified as a heritage listed item under the Wollondilly LEP. This dwelling was identified as R1 in the MAC report

To the north east, east and south east of the site are new residential dwellings (R2, R3 and R4 in the MAC report). These dwellings are identified in the Accurate Design and drafting plans as Lots 505, 507 and 508 respectively).

To the north west of the site is a vacant lot (identified in the MAC report as FR1) as Lot 504 in the amended plans. Plans for Lot 504 show a proposed dual occupancy with an address as 2 Eliza Place.

Opposite the site, on the western side of Argyle Street are residential dwellings.

The site slopes with a fall towards Argyle Street. The highest point on the site is at the north eastern corner of the site at the boundary of Lots 505 and 507.

3.0 ACOUSTIC CONTENTION

The Statement of Facts and Contentions (filed 10 December 2021) under Contention 11 states the following:

Acoustic Impacts

11. *The development application should be refused having regard to the potential for unreasonable and unsatisfactory acoustic impacts upon adjoining residential properties.*

Particulars

All particulars reference the Noise Assessment report prepared by Muller Acoustic Consulting dated June 2020

a) Section 4.1 Assessed receivers:

i. The Applicant has assessed all future dwellings on the basis that they will be single storey.

ii. The Applicant has failed to demonstrate that the 1.5m assessment height is above the finished floor level of the residential receivers.

iii. The Applicant has failed to take into account the potential for future alterations and additions in the rear yard area of the adjoining heritage item at 42 Argyle Street, given that a two storey development is consistent with the height and number of storeys control (subject to development consent).

b) Section 4.2 Background Noise Levels:

i. The background noise levels adopted by the Applicant are not considered to be appropriate for residences set further back from Argyle Street which have the benefit of attenuation due to distance and shielding from other buildings.

ii. monitoring was undertaken during a Covid-19 lockdown period in May 2020 and is therefore considered not to be reflective of typical traffic flows.

c) Section 5.2. Operational Noise Criteria:

i. These figures have not been demonstrated to be reliable at all receivers having regard to the matters set out in particular (b)(i) and (b).

d) Section 6.1 Sound Power Level:

i. The Applicant has failed to provide Justification for:

- *the application of a duration adjustment to the AAAC sound power levels.*
- *sound power levels for primary school children rather than preschool during before and after school care and vacations.*
- *the number of vehicle arrivals and departures in any 15 minute period.*
- *the source noise data for car parking / driveway noise.*

e) Section 6.2 Modelling Assumptions:

i. The Applicant has failed to identify:

- *how many children and which age groups are playing in each of the four shade structure areas at any one time; and/or*
- *whether allowance has been made for any elevated play structures.*

f) Section 7.1 Noise Intrusion:

i. The Applicant has failed to demonstrate that future traffic growth has been considered in determining traffic noise since measurements occurred in a lockdown period.

g) Section 7.3.1 Cumulative Daytime Level:

i. The Applicant has failed to demonstrate that the shielding provided by the 1.8m fences between the various play areas, elevated play structures, and the surrounding residences, particularly the upper level of residence R4 and future residences, will be sufficient to achieve proposed outcomes.

ii. The Applicant has failed to demonstrate that the impacts of noise from outdoor play, driveway and car park upon existing and future residences have been assessed and will be satisfactory.

h) Section 7.3.2 Cumulative Evening Level.

i. The Applicant has failed to demonstrate that the shielding provided by the 1.8m fences between the various play areas, elevated play structures, and the

surrounding residences, particularly the upper level of residence R4 and future residences, will be sufficient to achieve proposed outcomes.

ii. *The Applicant has failed to demonstrate that the impacts of noise from outdoor play, driveway and car park upon existing and future residences have been assessed and will be satisfactory.*

In response to the Acoustic Contention I accept the majority of the particulars in relation to the lack of information concerning noise emitted from the site and the consequence of noise monitoring during Covid-19 lockdown, that area addressed in this assessment.

However, with respect to Particular a) iii) I am unable to find in the Council's DCP or the Wollondilly LEP where there is a requirement for an assessment of a child care centre to consider what could possibly be developed on an adjacent parcel of land.

The concept of acoustically assessing developments with respect to development potential and impact to the value of neighbouring properties is matter that first needs to be identified as a Council policy that is to be applied on all developments. Secondly, one needs floor plans or elevations to show windows locations and allowance for noise attenuation measures which would be required as part of a future application assessment.

In previous matters involving Parramatta Council reference has been made to the decision in DVCI Pty Ltd v City of Parramatta Council [2020] NSWLEC 1319 (decision date 23 July 2020). Paragraphs 70 – 81 (in the decision) identify the concept of identifying an unknown hypothetical development scenario not be given substantive weight. Accordingly, this particular is not applicable.

With respect to particular (h) I am instructed the amended application does not have operations after 6pm. Therefore this particular s not applicable.

4.0 ACOUSTIC CRITERIA

In terms of general noise criteria, it is common practice for industrial and commercial activities operating on a continuous basis to utilise a concept of ambient background +5 dB(A) at residential receivers. The assessment is normally taken at the nearest residential boundary. This criterion, in terms of EPA noise policies, is described as the "intrusiveness" noise level.

Normally the Council in acoustic matters rely upon criteria issued by the EPA and in particular the EPA's *Noise Policy for Industry* ("NPfI") or the *Noise Guide for Local Government* ("NGLG"). Neither of the two EPA documents specify noise emission limits for Childcare Centres, and in particular noise emitted from outdoor play areas.

The NPfI does not provide specific noise emission criteria for Childcare Centre developments. Sections 1.4 and 1.5 of the policy indicates that the noise criteria set out in the policy could apply to the noise emission of mechanical plant servicing the Childcare Centre (i.e., a commercial premises), but would not be applicable to the noise emission of children conducting indoor/outdoor play.

Section 1.4 of the NPfI identifies the noise sources that are appliable to the policy which includes "commercial premises (generally limited to noise from heating, ventilation, air conditioning and refrigeration, and energy generation equipment)".

Section 1.5 of the NPfI provides a list of noise sources that are excluded from the policy. The list identifies that the policy does not apply to "amplified music/patron noise from premises including those licensed by Liquor & Gaming NSW".

Volume 5 of the Wollondilly DCP relates to Commercial and Community Uses. Part 3 in Volume 5 of the WDCP provides specific land use controls. Part 3.3 relates to Child Care Centres but does not provide any noise requirements.

Volume 7 of the DCP relates to industry and infrastructure with part 2.11 identifying for those developments there is a requirement to comply with the NSW Industrial Noise Policy. The Industrial Noise Policy did not identify criteria in relation to noise emitted from a child care centre.

The Industrial Nosie Policy was discontinued in 2017 and replaced by the NPfI.

It is noted that the State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017 identifies in Clause 26 that DCP criteria/restrictions in relation to the operation of Childcare Centres (i.e., prior to the Educational Establishments and Child Care Facilities SEPP) no longer apply.

For various Childcare Centres/Pre-Schools/Kindergartens/Long Day Care Centres that have come before the Land & Environment Court of New South Wales, there has been no adjustment for tonality associated with children playing, although there have been adjustments in terms of the general background +5 dB(A) criterion in relation to the total duration of the outdoor play.

The Land & Environment Court has adopted over the years the concept of reduced use of outdoor areas for active play to permit a noise criterion of background +10 dB for outdoor play areas where outdoor play occurs for 2 hours per day or less. This concept has been adopted by the Association of Australasian Acoustical Consultants ("AAAC") as recommended criteria for outdoor play at Childcare Centres. Where the outdoor play exceeds 2 hours per day, the noise limit reduces to the general background +5 dB(A) limit. This position represents the current practice of the Land & Environment Court with respect to acoustic criteria for Childcare Centres.

The Council has in matters before the Land & Environment Court relied upon the AAAC Guideline for Childcare Centres. The AAAC Guideline that has been before the Land & Environment Court for various childcare centre applications has been Version 2 (dated October 2013). In September 2020, the AAAC released Version 3 of the guideline that alters the noise source levels for the children and recommends a base criterion of 45 dB(A) for the assessment of **outdoor play** in residential areas where the background noise level is less than 40 dB(A).

Version 3 of the AAAC Guideline permits the use of a background +10 dB noise criterion for outdoor play areas, where outdoor play occurs for up to 4 hours per day (limited to no more than 2 hours in the morning and 2 hours in the afternoon). Where outdoor play exceeds 4 hours in total per day (i.e., more than 2 hours in the morning and 2 hours in the afternoon), then the noise limit reduces to background +5 dB(A)

There is no technical justification in Version 3 of the AAAC Guideline as to why on a total Leq basis the background +10 dB noise target for 2 hours of outdoor play in Version 2 of the Guideline has been extended to 4 hours of outdoor play per day. On a Leq basis to achieve the same dose response the provision of 4 hours a day of outdoor play would result in a background + 7 dB(A) limit. A few Councils before the Land & Environment Court have rejected the use of the AAAC background +10 dB noise target for outdoor play operations to 4 hours per day.

In many situations, barriers may be erected to reduce noise emission from the site (or noise intrusion to the site), in addition to the provision of a management plan to identify the use of the outdoor areas.

With the arrival of staff prior to the operating hours of the Childcare Centre, there is a possibility that the driveway to the underground carpark will be in use before 7:00 am. The use of the driveway prior to 7:00 am falls under the night-time period set out in the NPfI.

Section 2.5 of the NPfI specifies that where the night-time noise levels (from industrial noise sources) at residential locations exceed the following limits, a detailed maximum noise level event assessment should be undertaken.

- an $L_{Aeq,\ 15\ minutes}$ noise target of 40 dB(A) or the prevailing Rating Background Level +5 dB whichever is the greater, and/or
- a maximum level of 52 dB(A) or the prevailing Rating Background Level +15 dB whichever is the greater.

There is normally a requirement to consider the noise impact from external road traffic on the Childcare Centre. In considering noise impacts from external road traffic on the Childcare Centre, Table 4 of the EPA's *NSW Road Noise Policy* ("RNP") provides the following noise criteria:

- The maximum internal noise level within sleeping and indoor play areas of the centre to be 35 dB(A) and 40 dB(A) respectively during operation when assessed as an $L_{Aeq,\ 1\ hour}$.
- The maximum noise level in the outdoor play areas of the centre to be 55 dB(A) during operation when assessed as an $L_{Aeq,\ 1\ hour}$.

The RNP provides road traffic noise assessment criteria in terms of existing residences affected by additional traffic on existing roads generated by land use developments. For residences affected by additional traffic on local roads, Table 3 of the RNP specifies an $L_{Aeq,\ 1\ hour}$ of 55 dB, whilst for additional traffic on freeways, arterial roads and sub-arterial roads the noise target is an $L_{Aeq,\ 15\ hours}$ of 60 dB (façade corrected, external to residential buildings). If such levels are already exceeded, then traffic noise associated with the development is permitted to be 2 dB above the existing noise level.

The centre is to be accessed via Eliza Place that would be classified as a local road. However, the acoustic environment at the centre and the residential premises adjoining the proposed centre is controlled by traffic on Argyle Street which is an arterial road. The additional traffic generated by the Childcare Centre has been assessed with respect to the RNP's $L_{Aeq,\ 15\ hour}$ noise target of 60 dB.

From the RNP and the AAAC Guideline (version 3), the following noise targets would apply:

- Internal noise levels (from road traffic) 40 dB(A), $L_{Aeq,\ 1\ hour}$
- Internal noise levels of cot rooms (from road traffic) 35 dB(A), $L_{Aeq,\ 1\ hour}$
- External play areas (from road traffic) 55 dB(A), $L_{Aeq,\ 1\ hour}$
- When the total outdoor play occurs for more than 2 hours per day in either the morning or afternoon (i.e., no time restriction to the operation of the outdoor play areas), noise emission from the outdoor play area is not to exceed background +5 dB(A), $L_{Aeq,\ 15\ minutes}$ or 45 dB(A) $L_{Aeq,\ 15\ minutes}$ at residential receivers, whichever is greater
- When the total outdoor play occurs for not more than 2 hours in the morning and not more than 2 hours in the afternoon per day, noise emission from the outdoor play area is not to exceed background +10 dB(A) at residential receivers, $L_{Aeq,\ 15\ minutes}$ or 50 dB $L_{Aeq,\ 15\ minutes}$, whichever is greater
- Noise emission from traffic generated by the Childcare Centre with respect to Argyle Street is 60 dB, $L_{Aeq,\ 15\ hour}$ or existing $L_{Aeq,\ 15\ hour}$ +2 dB where the existing $L_{Aeq,\ 15\ hour}$ exceeds 60 dB.
- With respect to Eliza Place technically one could apply for noise from traffic generated a limit of 55 dB, $L_{Aeq,\ 1\ hour}$ or existing $L_{Aeq,\ 1\ hour}$ +2 dB where the existing $L_{Aeq,\ 1\ hour}$ exceeds 55 dB.

With respect to the EPA's NPfI, there are no industrial noise sources influencing the site and therefore the only applicable NPfI criteria relates to mechanical plant and vehicles arriving before 7:00 am. For the vehicle movements prior to 7:00 am, the following criteria have been applied:

- Noise emission from vehicles on site before 7:00 am not to exceed background +15 dB or 52 dB L_{AFmax} at bedroom windows (considered to the be most sensitive location for assessing sleep disturbance), whichever is greater
- Noise emission from vehicles on site before 7:00 am not to exceed background +5 dB(A) or 40 dB(A) $L_{Aeq,\ 15\ minutes}$ at bedroom windows, whichever is greater

5.0 AMBIENT MEASUREMENTS

To utilise the acoustic criteria in the previous section, it is necessary to obtain ambient background (L_{90}) and L_{eq} levels to be applied at the residential boundaries, and on the site respectively.

Sound level measurements for this assessment were taken in accordance with Australian Standard AS1055:2018 *Acoustics – Description and Measurement of Environmental Noise* and the ambient background measurement procedures set out in Fact Sheet B of the NPfI.

Whilst one can utilise ambient background levels from short duration measurements for compliance purposes, the preferred procedure set out in the NPfI during the planning and consent stage is to conduct noise monitoring over a period for several days to determine the daily background noise levels, which in turn are used to determine the Rating Background Level ("RBL") to be used for assessment purposes.

With respect to the NPfI document, the background level is classified in terms of a daytime period (7.00 am to 6.00 pm), an evening period (6.00 pm to 10.00 pm), and a night time period (10.00 pm to 7.00 am), except for Sundays and public holidays when the night time period is extended to 8.00 am.

5.1 Unattended Logger Measurements

Determination of the RBL and road traffic noise level at the site involved unattended noise monitoring on the western boundary of the site (towards Argyle Street, in line with the building alignment of the adjacent property) between Saturday 12 February and Saturday 26 February 2022.

The unattended sound level measurements were recorded using a SVAN 977 Sound Level Meter (serial no. 92623). The reference calibration of the meter was checked prior to and after measurements and exhibited no deviation. The calibration of the meter to manufacturer's requirements is current.

Observation of data from the Bureau of Meteorology weather stations at Camden Airport indicates that there were intermittent periods of adverse weather (rain and/or strong winds) during the monitoring period.

In accordance with EPA procedures, the noise logger data for these periods affected by adverse weather have been excluded in the determination of the RBL.

In general, the logger graphs in Appendix B show ambient background levels during the daytime and evening periods that are higher than the night-time period which is typical of sites affected by road traffic noise (because of the daytime and evening periods having greater road traffic volumes).

The EPA's RBL assessment procedure requires determination of a background level for each day and then the derivation of the median of the individual days for the entire monitoring period. The daytime background L_{90} and L_{eq} levels shown in Table 1 below have been derived in accordance with the NPfI procedure.

Table 1: Logger Ambient L_{90} and L_{eq} Levels – dB(A)

Date	ABL	Daily L_{eq} Level
Saturday 12 February 2022	-	-
Sunday 13 February 2022	43.4	64.6
Monday 14 February 2022	48.0	63.4
Tuesday 15 February 2022	46.7	62.0
Wednesday 16 February 2022	47.8	63.0
Thursday 17 February 2022	47.6	61.9
Friday 18 February 2022	46.4	62.9
Saturday 19 February 2022	45.5	6.26
Sunday 20 February 2022	43.3	64.0
Monday 21 February 2022	*	62.0
Tuesday 22 February 2022	44.8	62.4
Wednesday 23 February 2022	41.8	62.2
Thursday 24 February 2022	46.9	64.2
Friday 25 February 2022	49.1	63.6
Median **	**46.6**	**-**
Average **	**-**	**63.1**

** The Rating Background Level (RBL) is the median of the daily background levels (ABL), whilst the Ambient Leq is the logarithmic average of the daily results.

As the Childcare Centre is proposed to operate on weekdays, elimination of the ambient noise data obtained during the Saturdays and Sundays reveals a weekday RBL and a weekday ambient Leq level of 47 dB(A) and 63 dB(A) respectively.

The above levels are higher than the ambient background level and road traffic Leq levels identified in Table 6 of the MAC report and confirms the Council's position in relation to particular (b).

5.2 Attended Measurements

As identified in Section 2.0 of this report, there is a range of noise levels across the site and at residential premises immediately adjoining the centre because of different exposure/distances to traffic on Argyle Street.

To determine the ambient noise levels across the site, attended measurements were conducted at the retrieval of the logger. Measurements were conducted at the logger and at the rear of the site in front of the dwelling at Lot 508.

During the attended measurements, the weather conditions were overcast and mild (19 ^{o}C) with no wind detected at the monitoring locations.

The measurements were conducted using two Brüel & Kjær Sound Level Meters Type 2270 (serial nos. 3029844 & 3009636). The reference calibration of each meter was checked prior to and after measurements and exhibited no deviation. The calibration of the meters to manufacturer's requirements is current.

The results of the attended measurement are provided in Appendix C as an A-weighted time splice graph and a table of statistical octave band data.

Attendance to Location 1, adjacent to the logger adjacent the boundary with 42 Argyle Street, found the acoustic environment to be dominated by the noise of traffic on Argyle Street gave rise a background level of 46 dB(A) and an Leq level of 60 dB(A). The background level accords with the RBL determined by the logger that occurs in the middle of the day.

The second meter at Location 2 at the rear of the site gave rise to ambient background and Leq levels of 43 dB(A) and 50 dB(A) respectively.

5.3 Allocation of Background Levels

The assessment procedure in the AAAC Guideline requires one to determine which location represents the most affected receiver and to apply the background level at the most affected receiver location to all receivers. That may be appropriate for situations where the ambient background level is consistent across the site and the immediate surrounding area, but for this site the nearest residential receivers have different exposures to the noise of traffic on Argyle Street.

We have considered for this development to apply the background +5 dB(A) noise target to the background levels determined for each receiver location.

Appendix A2 presents an aerial view (from the MAC report) with identification of the residential receiver locations that have been utilised previously for the site. Taking into consideration the results of the attended and unattended noise monitoring in February 2022, Table 2 below presents the daytime background levels and noise targets that have been assigned to the various receiver locations.

Table 2: Allocation of Background Levels and Noise Design Targets – dB(A)

Location		Daytime Background Level	Noise Design Target (outdoor play)	Noise Design Target (cumulative level excl. outdoor play)
FR1	Western side (front) of proposed dwelling of 2 Eliza Place	48	53	53
FR1	Southern side of proposed dwelling of 2 Eliza Place	46	51	51
R2	South western façade of Lot 505	44	49	49
R3	South western façade of Lot 506	43	48	48

Location		Daytime Background Level	Noise Design Target (outdoor play)	Noise Design Target (cumulative level excl. outdoor play)
R4	Western façade of Lot 508	43	48	48
R5	Western yard of Lot 622	42	47	47
R1	Northern side of dwelling 42 Argyle Street	47	52	52
R1	Rear yard of 42 Argyle Street	45	50	50

In terms of potential sleep disturbance from the arrival of Childcare Centre staff prior to 7:00 am on weekdays and utilising L90 background levels from 6:00 am to 7:00 am for each of the weekdays (set out in Appendix B), the background level obtained from the logger (using the shoulder period methodology set out in Section A3 of the NPfI) reveals for the weekday period of 6:00 am to 7:00 am a range of 51 to 54 with a median of 52 dB(A) for the logger location.

The primary function of considering the background level in the 6:00 am to 7:00 am period is in relation to the use of the entrance driveway to the site by staff arriving before the Childcare Centre opens for business, where such vehicle movements before 7:00 am falls within the night-time period set out in the NPfI document.

As the background level measured at the rear boundary of the site (Location 2) was 4 dB lower than the attended measurement adjacent to the logger location (Location 1), this assessment considers a background level of 52 - 4 = 48 dB(A) at the western façade of Lots 506 and 508 the period of 6:00 am to 7:00 am and 50 dB(A) for the western side of Lot 505.

This gives rise to sleep arousal criteria of 65 dB(A) L_{AFmax} and an $LA_{eq,\ 15\ minutes}$ of 55 dB(A) applied in this assessment outside bedroom windows of Lot 505, and a sleep arousal criterion of 63 dB(A) L_{AFmax} and an $LA_{eq,\ 15\ minutes}$ of 53 dB(A) applied in this assessment outside bedroom windows of Lots 507 and 508.

6.0 ACOUSTIC ANALYSIS

6.1 Impact of Childcare Centre on Surrounding Neighbourhood

In relation to the assessment of noise emission of the Childcare Centre we rely upon the noise source levels nominated in Table 1 of the AAAC Guideline (version 3).

With respect to the noise emitted from children playing, Version 3 of the AAAC guideline amends the noise source level data to provide a single sound power level for each of the different age groupings (rather than a range of sound power levels). Therefore, if one adopts a worst case scenario, it would be using the single (only) sound power level value for the respective age groupings and considering all children generating the relevant sound power level.

Version 3 of the AAAC guideline provides spectral information for the noise emitted from children relevant to the specified age categories and nominates for passive play sound power levels 6 dB below that specified for active play.

The Plan of Management for the centre (May 2022) identifies a capacity of 87 children with the following breakup:

- 0-2 years 12
- 2-3 years 15
- 3-4 years 30
- 4-6 years 30

Appendix E4 presents a satellite image of the site and surrounding residential properties with an illustration of the residential assessment locations indicated by blue circles.

Appendix E5 presents an extract of the ground floor plan with an illustration of the outdoor play noise source locations and residential assessment locations adjacent to the eastern and southern boundaries of the site.

The amended application has lowered the rear play area which will be used by the toddlers and the nursey. The lowering of the rear play area (designated OPA3) requires a retaining wall at the rear of the site.

The modelling has utilised the topography of the site/finished levels and existing fences for the assessment of the amended proposal

6.1.1 Outdoor Areas

The development of larger Childcare Centres and the requirement for outdoor activities has led to the concept of passive areas/activities that may be separate (physically and in time) to active activities.

The use of a Plan of Management document to identify the different activities/areas form the development of the Childcare Centre in accordance with regulations governing the operation of a Childcare Centre. The different types of outdoor activities have different noise emission levels that form the basis of this acoustic assessment.

Table 3 below identifies the range of effective sound power levels nominated in the AAAC guideline for groups of 10 children playing.

Table 3: Effective Sound Power Levels for groups of 10 children playing

Age Group	dB(A)	Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
10 Children (0-2 years)	78	54	60	66	72	74	71	67	64
10 Children (2-3 years)	85	61	67	73	79	81	78	74	70
10 Children (3-5 years)	87	64	70	75	81	83	80	76	72

Effective Sound Power Level for “n” children = Effective Sound Power Level for 10 children + 10 log (n/10)

Our analysis considers the children distributed across the outdoor area and a worst-case scenario of all children talking simultaneously at the A-weighted sound power levels nominated by the AAAC guideline. This is a more conservative than the approach adopted by other acoustical engineering firms which in some cases may consider one-third of the children talking simultaneously. As an averaged level across the entire play area can lead to an underestimate of noise emission, our analysis utilises nominated source locations and groups of children per source location, noting that typically children move around the play area and do not remain at a fixed location over a 15-minute period, except for the use of a sandpit.

From the A-weighted and octave band sound power levels nominated in the AAAC Guideline, the relevant distance attenuation and shielding effects were determined for each source location to derive a contribution with respect to each receiver location.

The rear outdoor play area (OPA3) is in proximity to single storey dwellings with existing fences that provide shielding for the new residential dwellings on Lots 505, 506 and 622.

The proposal is to have 1.8 metre high fences on the boundaries to be consistent with the current existing fences.

The critical acoustic issue for OPA3 is the two storey dwelling at Lot 508 that has first floor windows above the existing fences.

Placing a 1.8 metre fence on top of the proposed retaining wall will result in a fence no higher than the existing fence to Lot 508 but will maximise the acoustic shielding for children on OPA3.

Whilst the background level for the first floor level is expected to be slightly higher than the level obtained at ground level the conservative approach has been to adopt the 43 + 5 = 48 dB(A) limit for both levels of Lot 508.

Utilising all 15 x 2-3 year olds (toddlers) undertaking active play whilst satisfying the background + 5 dB(A) for the ground floor level of Lot 508 would not satisfy the background + 5 dB(A) for the first floor level.

In a practical sense where classes have to be split into different activities considering 50% as one group is readily managed by the Plan of Management. Restricting active play for half of the toddlers will result in a noise level contribution below the background level.

Appendix D8 & D9 set out manual calculations of the contributions from each of the noise sources nominated for active play in OPA3 with respect to the upper level of Lot 504 (identified as receiver A3).

From the summary table on Appendix D9 the contributions for the active source locations for 2-3 year olds is shown for receiver locations A1, A2, A3, A4 and A5.

An additional table on Appendix D9 presents the contribution from the 0-2 year olds with all 12 children outside and utilising the south west side of OPA3.

For OPA 1 the barriers are required primarily to address road traffic noise intruding into the outdoor play areas as discussed in Section 5.5 of this report. The barriers for attenuating road noise provide additional attenuation to that required for noise emission from the outdoor play areas. For the boundary to 2 Eliza Place the plans identify a 1.8m high palisade fence. Taking into account assessment location A7A the internal faced of the fence is to be lined with 10mm polycarbonate panel but to a height of 1.9m.

For the proposed dwelling on 2 Eliza Place there is a window on the front façade that for analysis purposes has been identified as location A7. The distribution of 30 children is shown in Appendix D6.

Appendices D10 – D14 present the analysis for OPA 1 with all 30 children in active play. The individual calculations are presented for 3-5 year olds to accord with the sound power levels in Table 3. To address the 34- 6 year olds for OPA 1 an additional 1 dB has been added to the octave band results for the 3-5 year old calculation. This gives rise to a contribution of 49 dB(A) versus a target of 53 dB(A). For the same distribution of children in active play the contribution for location A6 north side of dwelling at 42 Argyle Street is 41 dB(A) versus a design target of 52 dB(A).

For OPA 2 the proposed drawings for the dwelling at 2 Eliza Place adjacent the centre indicates a step up in the floor levels along OPA 2 to account for the topography of that site. The western end of the step up has a window above the nominated 1800mm fence that causes restrictions on the use of OPA2.

To achieve acoustic compliance this one window requires OPA 2 be restricted to passive play only, with a maximum of 15 children at any time with the construction of an acoustic barrier inside the property line that has a height of 1.8 metres as a vertical section and then a tapered panel (at 45 degrees into the site to obtain a height of 2.5m).

To provide acoustic shielding of noise emission from the outdoor play areas to the nearest residential receivers (and incorporating the barrier for road traffic noise), based on our assessment the following noise control measures are to be incorporated into the design of the Childcare Centre:

- The palisade fence on the western side of OPA 1 is to have a backing of 12mm solid polycarbonate for a height of 1.8m.
- The palisade fence on the north eastern side of OPA 1 is to have a backing of 10mm solid polycarbonate for a height of 1.9m.
- OPA 1 can be used for active play up to 30 children from either the Junior Pre School class or the Senior Pre Scholl class.
- On the basis of the proposed concept plans for 2 Eliza Place, the boundary to 2 Eliza Place for the entire length of OPA2 require s an internal barrier that is of solid construction for a vertical height of 1.9m and an angled 45 degree panel of solid polycarbonate into the play area to a total height of 2.5 metres above ground level.
- OPA 2 can only be used for passive play with a maximum of 12 Pre School children
- For OPA3 there is to be a lapped and capped timber fence on the top of the proposed retaining wall 1 metre in from the rear boundary. The fence is to extend across the rear of the outdoor play area and extend to the north eastern end of the staff parking spaces.
- OPA 3 can have all 12 0-2 years old using the space but for active play the Toddlers (2 – 3 year olds) will be restricted to 50% of the children at any time. Passive play can have all toddlers in the OPA3 area.

Appendix D7 presents an illustration of the proposed barriers in plan view.

Appendix D presents the methodology used in the analysis of noise emission from children in the outdoor play areas by identification of the allocated noise source locations, the receiver assessment locations, the height of the source/receiver locations, the number of children at each noise source location and the type of activities occurring at the noise source locations.

In accordance with the AAAC Guideline, the source heights of the children are 1 metre above the floor or ground level, whilst the height of the residential assessment locations are at the centre of the window of the dwellings or 1.5 metres above the ground level.

6.1.2 Indoor Areas

Under the AAAC Guideline (version 3) there is a requirement for the cumulative level of noise from indoors areas of the Centre, vehicle movements on site and mechanical plant to not exceed background +5 dB(A).

The plan drawings of the proposed Childcare Centre shows that the ground floor level will have two classrooms for pre-school children, one classroom for toddlers and one classroom for the nursery.

From the site view, it was observed that the Leq noise level of traffic was controlled by Argyle Street to the west. The layout of the ground floor level classrooms had some external doors that are set in from the western facade which results in these doors being

The noise levels on the western side of the indoor activity areas are subject to road traffic noise that requires the doors to be closed.

The north eastern doors are partially shielded from the noise of traffic on Argyle Street by reason of the palisade fencing (with polycarbonate panel) on the western end of OPA1 and partially shielded by the building and can be permitted to be open in non-peak periods.

Typically, the structured nature of the activities that take place indoors (such as structured learning, sleeping and painting, etc.) generate lower noise emission levels in comparison to active outdoor play. For the assessment of noise emission from the classrooms related to noisier activities such as music/singing we have considered reverberant noise emission levels from such activities to be equivalent to the sound power levels nominated in the AAAC guideline for active outdoor play.

Utilising the same procedure for calculating the noise emission of outdoor play and a 10 dB reduction of the sound power level from inside to outside and consideration of the reverberant nature of the classrooms Appendix E presents the A-weighted noise contribution levels for the various classrooms.

The analysis reveals that for noisy activities the Junior Pre School classroom and the Senior Pre School classroom requires the doors to be closed to result in a noise contribution below the background level.

6.2 Vehicle Movements On-Site

The proposed Childcare Centre will have carpark in the eastern portion of the site. The carpark is accessed via a driveway off Eliza Place.

The assessment of noise emission from vehicle movements on the driveway has been conducted with respect to the western side of Lot 505 which is nearest receiver to the driveway.

6.2.1 Sleep Disturbance

If staff arrive before the operating hours of the Childcare Centre and utilise the carpark, there is a requirement to consider sleep disturbance of vehicle movements on the site before 7:00 am.

The NPfI presents maximum level and Leq, 15 minute noise targets to be considered as trigger levels for sleep disturbance which are assessed external to bedroom windows.

From previous sound level measurements of carpark noise, the maximum noise level of a vehicle pass-by at low speeds was measured to have an average maximum level of 51 dB(A) at a distance of 9 metres from the vehicle path, whilst the closing of car doors was measured to have an average maximum level of 68 dB(A) at a distance of 2 metres to the side of the car door.

For the assessment of vehicle movements in the carpark the considers the southern façade of Lot 505 and the western façade of Lots 506 and 508.

Taking into consideration distance attenuation and any acoustic shielding by the residential building, Table 3 presents the maximum noise levels of the events listed above with respect to the residential receiver locations

Table 4: Maximum Noise Level from Vehicle Movements on Site – dB(A)

Event	Maximum Noise Level – dB(A)		
	A1	A2	A3
Vehicle movements on northern driveway	49	33	39
Vehicle movements to staff car park	51	32	36
Car door closing in Staff Eastern Parking Bay	57	51	34

The arrival of a staff vehicle gives rise to a maximum noise level not exceeding the ambient background level during the period of 6:30 am to 7:00 am and an $L_{eq,\ 15\ minute}$ level that is significantly less than the background level. Therefore, the threshold levels for an assessment of sleep disturbance are not exceeded and no detailed assessment of maximum noise level events is required.

Taking into consideration distance attenuation and any acoustic shielding by the residential building, the calculations of noise emission from vehicle movements on the site prior to 7:00 am are presented in Appendix F1.

The maximum noise level from the use of the carpark prior to 7:00 am is less than the maximum noise level target of 63/65 dB(A), whilst the Leq, 15 minute level from the use of the carpark prior to 7:00 am is below the ambient background level. Therefore, the threshold levels for an assessment of sleep disturbance are not exceeded and no detailed assessment of maximum noise level events is required.

In terms of the cumulative impact of noise emission from the site prior to 7:00 am, the contribution of mechanical plant and sleep disturbance levels are clearly less than background +5 dB(A).

6.2.2 Drop-Off/Pick-Up of Children

In terms of vehicle movements on site during the operating hours of the Childcare Centre (drop-off/pick-up of children), the vehicle noise (when vehicles are on the site) is required to be assessed in terms of the EPA's intrusiveness noise target of background +5 dB(A) as an Leq over 15 minutes, or the cumulative noise requirement of the AAAC Guideline.

Typically, the drop-off of children occurs over a 2 hour period. If the arrival of 87 children (maximum capacity of the proposed Childcare Centre) occurs steadily over a 2 hour period, there will be on average 11 children arriving in a 15-minute period. This assessment considers a total of 22 vehicle movements on the driveway (one vehicle movement entering and one vehicle movement leaving per child) in a 15-minute period.

The noise emission from each vehicle will consist of one vehicle movement entering the carpark, three car doors opening/closing (driver's door and passenger door during drop-off, and then the driver's door when leaving), an engine start and one vehicle movement exiting the carpark.

Taking into consideration distance attenuation to Location A1, A2 and A3 the $L_{eq,\ 15\ minute}$ noise level of vehicle movements on the Childcare Centre site during the drop-off period is calculated to be dB(A) (see Appendix G).

6.3 Mechanical Plant

The noise criteria set out in the EPA's NPfI and the AAAC Guideline are applicable to the noise emission of mechanical plant servicing the Childcare Centre. The EPA's NPfI specifies an intrusiveness noise target of background +5 dB(A) for mechanical plant which is assessed at residential premises.

The AAAC Guideline also specifies a noise criterion of background +5 dB(A) at residential premises but is more stringent than the intrusiveness noise target in the EPA's NPfI as the AAAC noise criterion covers all noise from the Childcare Centre (excluding outdoor play) as a cumulative level. Under the AAAC Guideline, the cumulative noise emission of the Childcare Centre includes indoor play, vehicle movements on-site and mechanical plant.

Utilising the background +5 dB(A) noise target in the AAAC Guideline and the predicted noise levels from the classrooms and vehicle movements on site, the assessment determined the permitted maximum noise level of mechanical plant for the subject site (by logarithmic subtraction).

The resultant mechanical plant noise targets set out in Table 5 below have been nominated.

Table 5: Mechanical Plant Noise Targets – dB(A)

Residential Reference Location	Noise Target
A1	44
A2	43
A3	43
A4	42
A5	45
A6 (front yard)	47
A7 (front yard)	48
A7A (south western façade)	46

Based on other Childcare Centre developments, achieving the above mechanical plant noise targets is not envisaged to present any major difficulty. At the development application stage, the location and selection of mechanical plant is currently unknown. Normally, identification of mechanical plant associated with the proposed development and controls (if necessary) to comply with acoustic criteria occur at the Construction Certificate stage.

6.4 Cumulative Level of On-Site Noise

As discussed above, under the AAAC Guideline (version 3) the assessment of noise emission from outdoor play is not included in the assessment of cumulative noise from the site.

Appendix E presents calculations of the noise contribution from indoor play to the various residential reference locations (for the original application, whilst Appendix F presents calculations of the noise contribution of vehicle movements accessing the carpark during drop-off/pick-up of children.

Taking into consideration the calculated noise contribution from classrooms and vehicle movements on site and the noise contribution of mechanical plant nominated in Table 5, Appendix G presents the cumulative noise impact of the Childcare Centre site which will not exceed the background levels by more than 5 dB(A).

6.5 Traffic Noise Impact on Outdoor Play Areas

With respect to the traffic noise at the site intruding into the outdoor areas of the Childcare Centre, the EPA's RNP identifies an $L_{Aeq,1\ hour}$ noise level target of 55 dB.

Page 48 of the RNP (Appendix B3 – Noise Monitoring Procedures) reveals the $L_{Aeq,1\ hour}$ is the "average maximum" one-hour noise level, not an energy average level over the day. The general procedure is to determine the $L_{Aeq,1\ hour}$ from the logger measurements that is exceeded 10% of the time for each day and then the median value of the individual days.

The logger on the northern western is exposed to the noise of the traffic on Argyle Street and revealed an $L_{Aeq,\ 1\ hour}$ level 63 dB(A) on weekdays.

The logger was located 15 metres from the edge of the road whilst the centre of OPA1 is 11 metres from the edge of the road. Both locations are outside the 10m setback for determination of barrier attenuation by *Calculation of Road Traffic Road* that would provide an increase of 1.3 dB to the OPA 11 location.

To achieve the RNP requirements the fence shown on the Argyle Street side of OPA 1 need to achieve a 9 dB(A) attenuation. By reason of the elevated nature of OPA 1 (3m above the road surface) the effective attenuation of the barrier is increased to that for a barrier on level ground.

The plans show an 1800mm high palisade fencing to which there is a requirement for the placement of 12mm thick polycarbonate to provide the necessary attenuation. The polycarbonate is to be solid – not multicell polycarbonate.

6.6 Traffic Noise Impact on Indoor Play Areas

With respect to the traffic noise at the site intruding into the indoor areas of the Childcare Centre, the RNP identifies internal noise targets of 40 dB for indoor play areas and 35 dB for sleeping areas.

Generally, the outside-to-inside attenuation of an open window is taken as 10 dB(A), whilst an attenuation of 20 – 25 dB(A) is applied for closed (single glazing) windows dependent upon the glazing thickness and area of the glazing.

The Childcare Centre has barriers along the Argyle Street boundary to control the traffic noise intrusion into the ground floor level outdoor play area and give rise to traffic noise levels in the ground floor level outdoor play areas less than 55 dB(A).

Therefore, the Argyle Street façade of the Senior Pre School Classroom cannot be open for natural ventilation and satisfy the internal traffic noise target of 40 dB(A) in the classrooms. The provision of laminated glazing not less than 6.38mm is required for the windows/doors for both the Junior Pre School and Senior Pre School classrooms, and those classrooms will require mechanical ventilation.

The cot room is in the rear portion of the child care centre and not directly exposed to traffic noise are required to be closed when the cot room is in use to satisfy the RNP noise target of 35 dB(A) for sleeping areas.

6.7 Traffic Movements External to Site

With respect to the additional traffic that will be generated by the Childcare Centre, the RNP specifies an $L_{Aeq,\ 15\ hours}$ level of 60 dB(A) for residences affected by additional traffic on arterial/sub-arterial roads. If such levels are already exceeded, then traffic noise associated with the development is permitted to be 2 dB above the existing noise level. The assessment location is external to the façade of residential dwellings and therefore requires a façade correction from free field measurements/prediction of +2.5 dB.

The logger results on the western side of the site revealed a 15 hour L_{Aeq} façade reflected level of 65 dB(A) on weekdays.

The proposed Childcare Centre has a maximum capacity of 87 children and a total of 14 staff. The traffic assessment (by Terraffic Pty Ltd) for the amended proposal nominates in the morning period 1hr period (8am – 9am) 40 trips in and 30 trips out. The report identifies in the morning peak Argyle Street carried 910 vehicles per hour.

For the afternoon peak the Terraffic Pty Ltd report identifies 26 vehicles in and 35 vehicles out, whilst at the same time Argyle Street has 960 vehicles per hour.

As the site is dominated by traffic noise from vehicles on Argyle Street the additional traffic as a result of the centre would result in a 0.3 dB(A) increase in the level of noise from Argyle Street on an hourly basis. This increase represents an insignificant increase in the traffic noise level on an hourly basis and a lower increment in noise when considered in terms of the LAeq, 15 hour basis.

7.0 CONCLUSION

An acoustic assessment from Muller Acoustic Consulting failed to provide the necessary information to confirm compliance with the relevant noise targets and failed to provide information to substantiate the outdoor play area could operate and be acoustically compliant at nearby residential receivers.

The Council prepared a Statement of Facts and Contentions with respect to a Class 1 Appeal in the Land & Environment Court requiring additional ambient measurements and details of acoustic compliance.

The proposal has been modified to address matters raised by Council. In particular the rear outdoor play area has been lowered so to provide additional acoustic shielding to the upper floor of the two storey dwelling at Lot 508.

This amended report has been prepared to address issues raised by Council and accordingly, additional monitoring and assessment was undertaken.

The acoustic assessment utilised noise targets from the AAAC Guideline (version 3) with respect to noise emission from the children, $L_{eq,\ 1\ hour}$ traffic noise intrusion targets for internal and outdoor play areas from the EPA's RNP, and noise targets for vehicle movements prior to 7:00 am from the EPA's NPfI.

In terms of noise emission from the outdoor play areas and noise intrusion into the outdoor play areas, the following physical noise controls are to be implemented into the design of the Childcare Centre:

- The 1800mm high palisade fencing to the Argyle Street frontage on the ground level outdoor play area (OPA1) requires 12mm thick polycarbonate for a height of 1800mm to be fixed behind the fencing to reduce traffic noise into the outdoor play area.
- The 1800mm high palisade fencing on the boundary with 2 Eliza Place for OPA1 is to have 10mm thick polycarbonate for a height of 1900mm to be fixed behind the fencing to reduce the emission of outdoor play to the front yard of 2 Eliza Place.

- On the basis of the proposed concept plans for 2 Eliza Place, the boundary to 2 Eliza Place for the entire length of OPA2 require s an internal barrier that is of solid construction for a vertical height of 1.9m and an angled 45 degree panel of solid polycarbonate into the play area to a total height of 2.5 metres above ground level.
- The glazing to the Junior and Senior Pre School classrooms is to be not less than 6.38mm thick laminated glass. These two classrooms will require mechanical ventilation.
- The south western boundary fence (to 42 Argyle Street) is to have a solid construction (such as lapped-and-capped timber or similar with a density of not less than 12 kg/m^2) with a height of not less than 1.8 metres above the natural ground level.
- For OPA3 a 1.8m high fence is to be constructed on top of the new retaining wall on the south eastern side (rear) of OPA3. The fence on top of the retaining wall is to have a solid construction (such as lapped-and-capped timber or similar with a density of not less than 12 kg/m^3) with a height of 1.8 metres above the top of the retaining wall. NB This is an additional wall required for acoustic purposes and requires the existing timber boundary fence to be maintained. The additional fence is to be extended to the north eastern end of the staff car parking area.

Appendices D5 and D7 identify the proposed acoustic barriers for the outdoor play areas in plan view.

With respect to operational noise controls:

- OPA 1 can be used for an active play for any age group for a maximum of 30 children
- OPA 2 can only be used for passive play with a maximum of 12 Pre School children
- OPA 3 can have all 12 0-2 years old using the space but for active play the Toddlers (2 – 3 year olds) will be restricted to 50% of the children at any time. Passive play can have all toddlers in the OPA3 area.
- When noisy activities such as singing and active play is to occur inside the Junior Pre School and the Senior Pre School Classrooms the external doors and windows are to be closed.

The AAAC Guideline's background +5 dB(A) noise target covers all noise from the Childcare Centre (except for outdoor play) as a cumulative level. Table 5 in Section 5.3 of this report presents noise design targets for the mechanical plant so that the total noise contribution of the Childcare Centre does not exceed the background +5 dB(A) noise target.

An assessment of noise emission from vehicle movements on the site revealed compliance with the EPA's intrusiveness noise level during the drop-off/pick-up of children and the sleep arousal criteria for the arrival of staff before 7:00 am.

The assessment of noise emission from the additional traffic on Eliza Place generated by the Childcare Centre has been undertaken in terms of the EPA collector road classification because the noise from Argyle Street dominates the acoustic environment. The additional traffic from the proposed development will generate an insignificant increase in road traffic noise and significantly below EPA traffic noise criteria.

The acoustic assessment identifies that for the noise targets set out in Section 3 of this report (being the applicable targets from the AAAC Guideline, the RNP and the NPfI), the proposed development will satisfy all the noise targets.

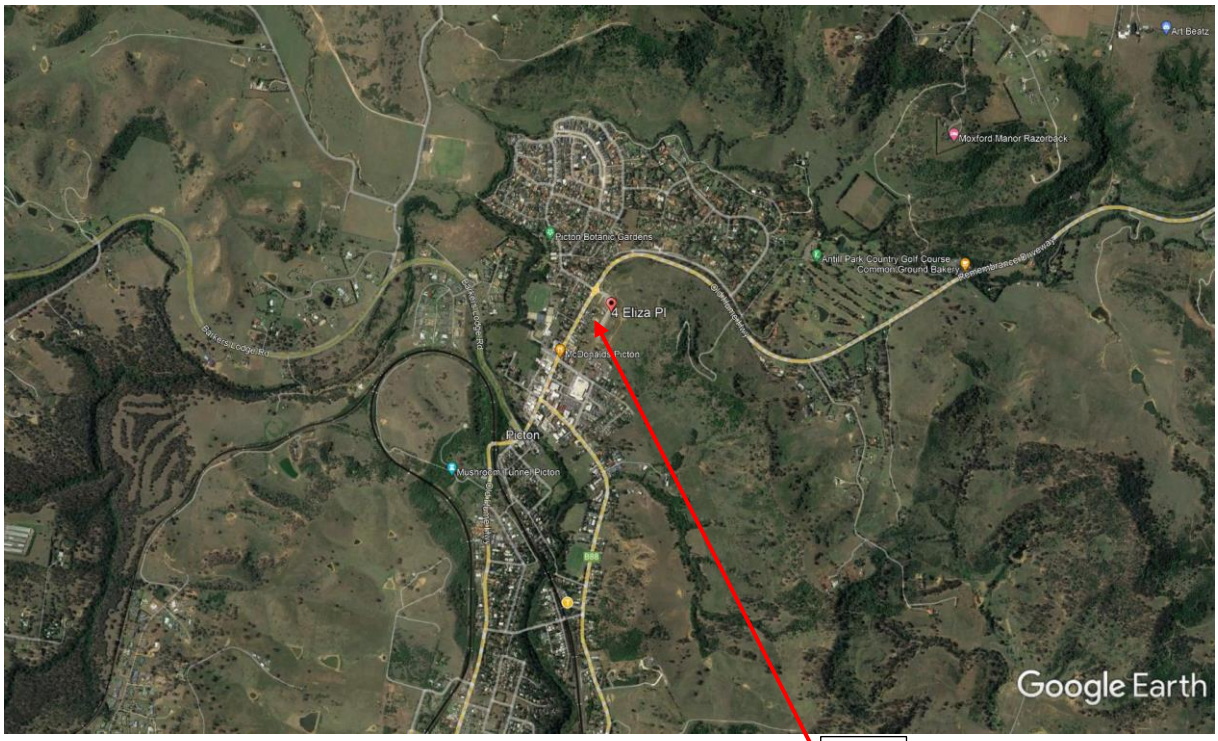
The Plan of Management is to incorporate the nominated noise control measures (physical and operational).

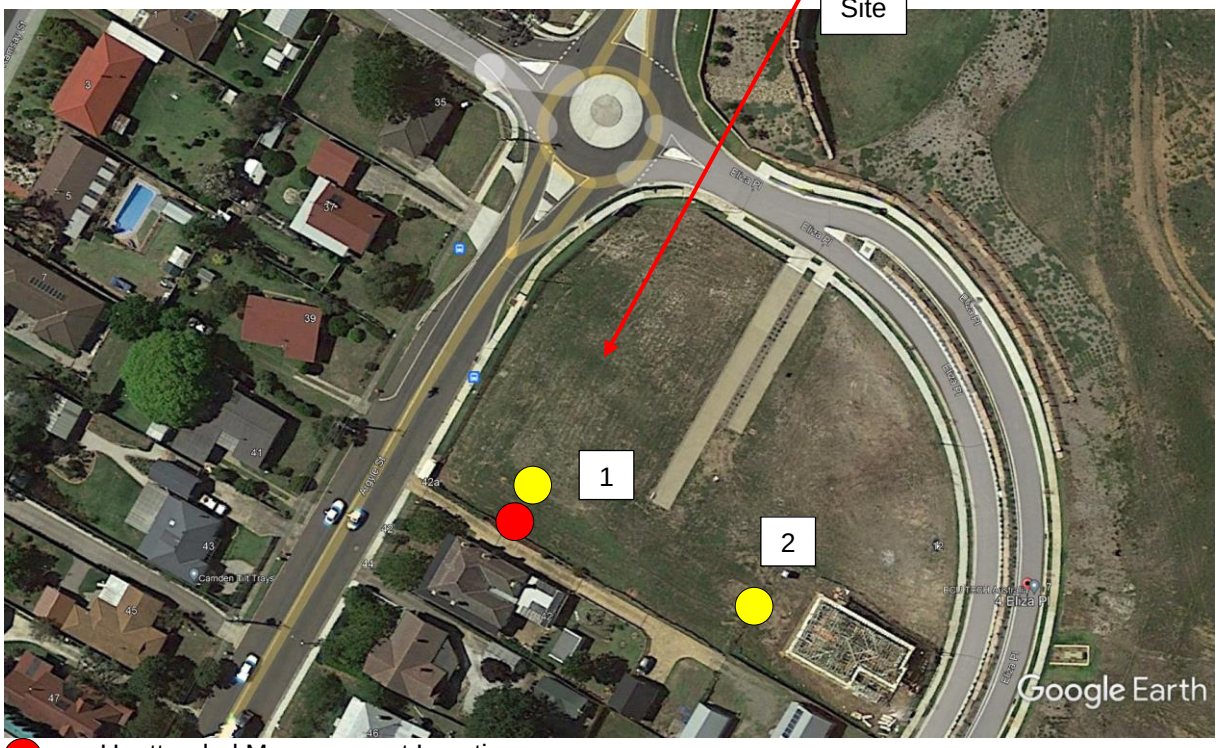
Yours faithfully,

THE ACOUSTIC GROUP PTY LTD

STEVEN E. COOPER

APPENDIX A: Site and Measurement Locations





Unattended Measurement Location

Attended Measurement Locations


FIGURE 1
LOCALITY PLAN
REF: MAC201104
0
50m
KEY
RECEIVER LOCATION
LOGGER LOCATION
SITE LOCATION
MAC
Muller Acoustic Consulting
ELIZA PLACE
ARGYLE STREET
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
L1

Logger Location

Logger & Attended Measurement

View of Argyle Street and Roundabout from Logger

View of dwelling on Lot 505 from logger location

View of attended measurement lcoation in front of dweeling at Lot 508

View from end of access handle to south west

View from end of access handle to south

View from end of access handle to south east showing portion of fence and dwelling for Lot 505, dwelling at lot 507 and portion of dwelling at Lot 508

APPENDIX B: Logger Results

4-8 Eliza Place , Picton

Job Number: 5489
Instrumentation: SVAN 977 s/n 92623
Logger Location: front building alignment
Free Field: yes
Monitoring Period: Saturday 12 February 2022 to Saturday 26 February 2022

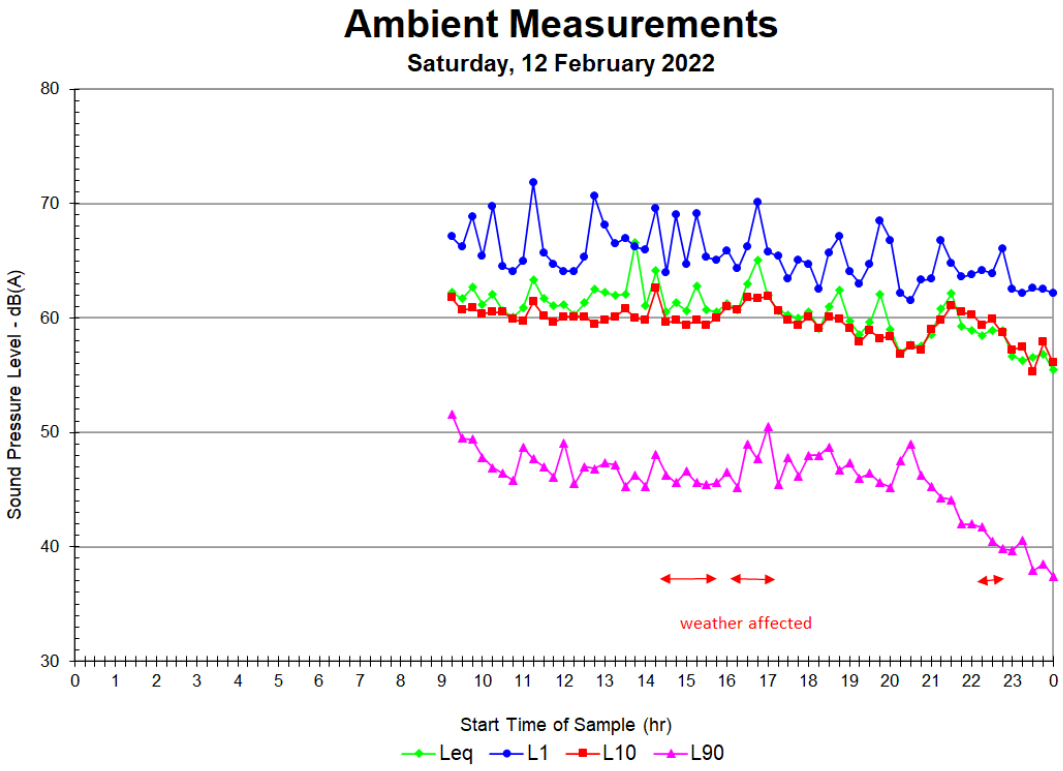
BACKGROUND AND AMBIENT NOISE MONITORING RESULTS
NSW EPA's NOISE POLICY FOR INDUSTRY, 2017

Day	L90 Background Noise Levels			Leq Ambient Noise Levels		
	Day 7am - 6pm	Evening 6pm - 10pm	Night 10pm - 7am	Day 7am - 6pm	Evening 6pm - 10pm	Night 10pm - 7am
Saturday 12 February 2022	*	44.1	37.0	*	60.0	55.1
Sunday 13 February 2022	43.4	43.3	34.7	64.6	61.9	58.5
Monday 14 February 2022	48.0	*	39.5	63.4	62.1	59.2
Tuesday 15 February 2022	46.7	*	40.9	62.0	62.0	58.9
Wednesday 16 February 2022	47.8	47.0	39.2	63.0	61.2	58.5
Thursday 17 February 2022	47.6	*	43.0	61.9	61.8	59.2
Friday 18 February 2022	46.4	44.6	*	62.9	62.4	56.3
Saturday 19 February 2022	45.5	43.9	41	62.6	61.0	54.8
Sunday 20 February 2022	43.3	44.5	43.6	64.0	64.3	62.9
Monday 21 February 2022	*	43.0	42	62.0	59.9	57.3
Tuesday 22 February 2022	44.8	*	*	62.4	59.8	61.8
Wednesday 23 February 2022	41.8	46.4	*	62.2	62.6	58.8
Thursday 24 February 2022	46.9	45.1	*	64.2	64.6	59.3
Friday 25 February 2022	49.1	44.7	*	63.6	60.6	56.7
RBL Median	**46.6**	**44.6**	**40.9**	-	-	-
Log Average	**-**	**-**	**-**	**63.1**	**62.0**	**58.9**

TRAFFIC NOISE MONITORING RESULTS
DECCW's NSW Road Noise Policy 2011

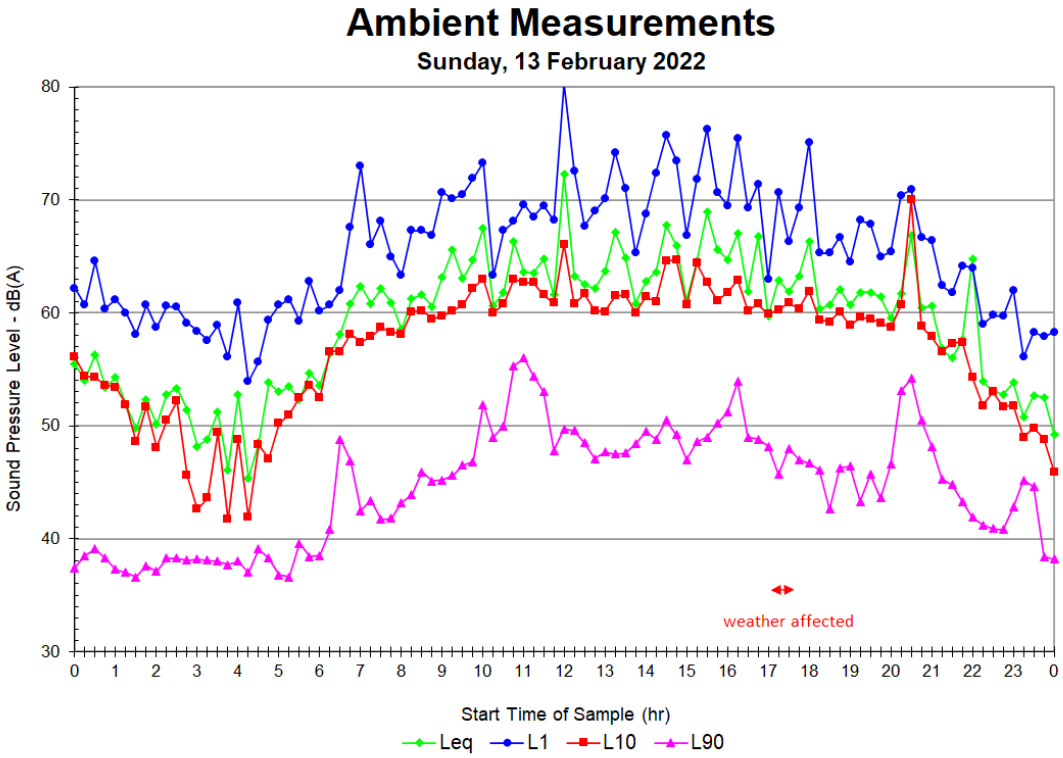
Day	Leq Ambient Noise Levels		Leq 1 Hr Noise Levels			
	Day 7am - 10pm	Night 10pm - 7am	Day - Max	Day - Min	Night - Max	Night - Min
Saturday 12 February 2022	*	57.6	*	*	61.3	51.5
Sunday 13 February 2022	66.5	61.0	70.0	60.6	66.6	52.1
Monday 14 February 2022	65.6	61.7	68.5	59.8	66.9	55.2
Tuesday 15 February 2022	64.5	61.4	66.1	62.9	67.3	52.7
Wednesday 16 February 2022	65.1	61.0	67.4	61.1	67.2	53.2
Thursday 17 February 2022	64.4	61.7	67.7	59.1	67.0	52.7
Friday 18 February 2022	*	*	67.5	60.5	63.2	53.2
Saturday 19 February 2022	64.7	57.3	66.8	60.6	61.5	53.5
Sunday 20 February 2022	66.6	65.4	71.2	60.6	72.9	55.8
Monday 21 February 2022	64.0	59.8	66.5	60.8	65.2	51.7
Tuesday 22 February 2022	64.4	64.3	66.4	59.7	70.0	59.0
Wednesday 23 February 2022	64.8	61.3	68.0	61.3	66.0	57.4
Thursday 24 February 2022	66.8	61.8	72.4	62.9	66.7	57.7
Friday 25 February 2022	65.5	59.2	*	61.1	63.7	54.5
Log Average	**65.3**	**61.6**	**68.6**	**61.0**	**67.2**	**54.9**

* indicates an incomplete set of data for a given time period
# Nighttime for a given day continues through to the following morning



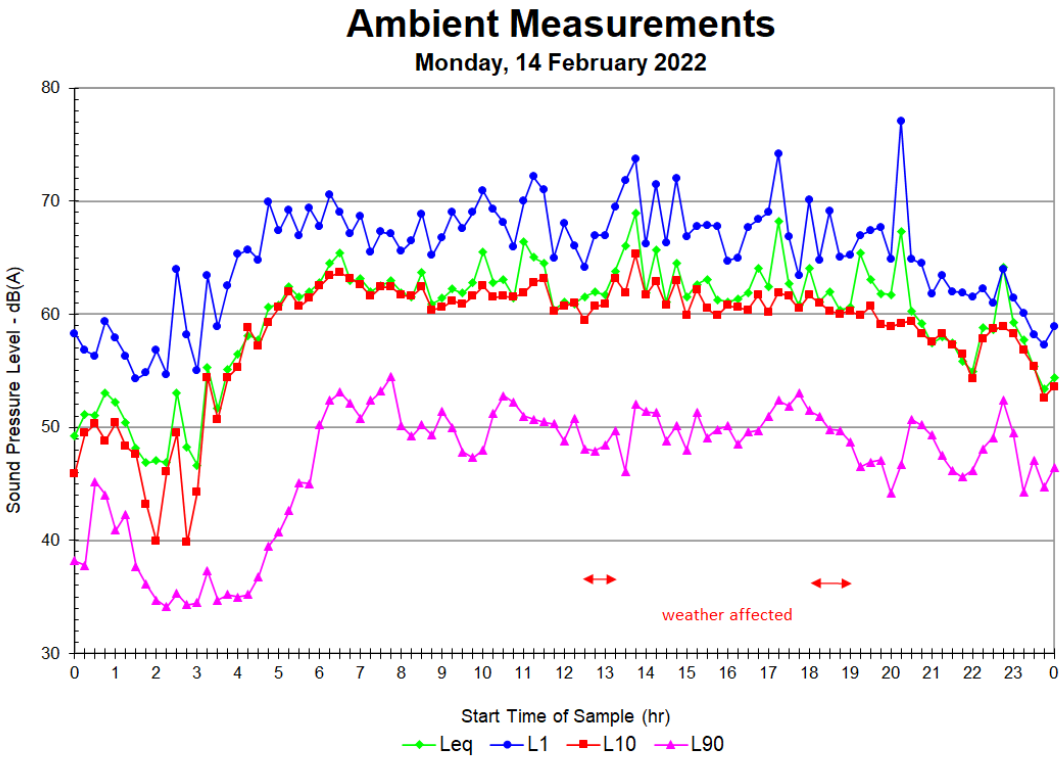
4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment



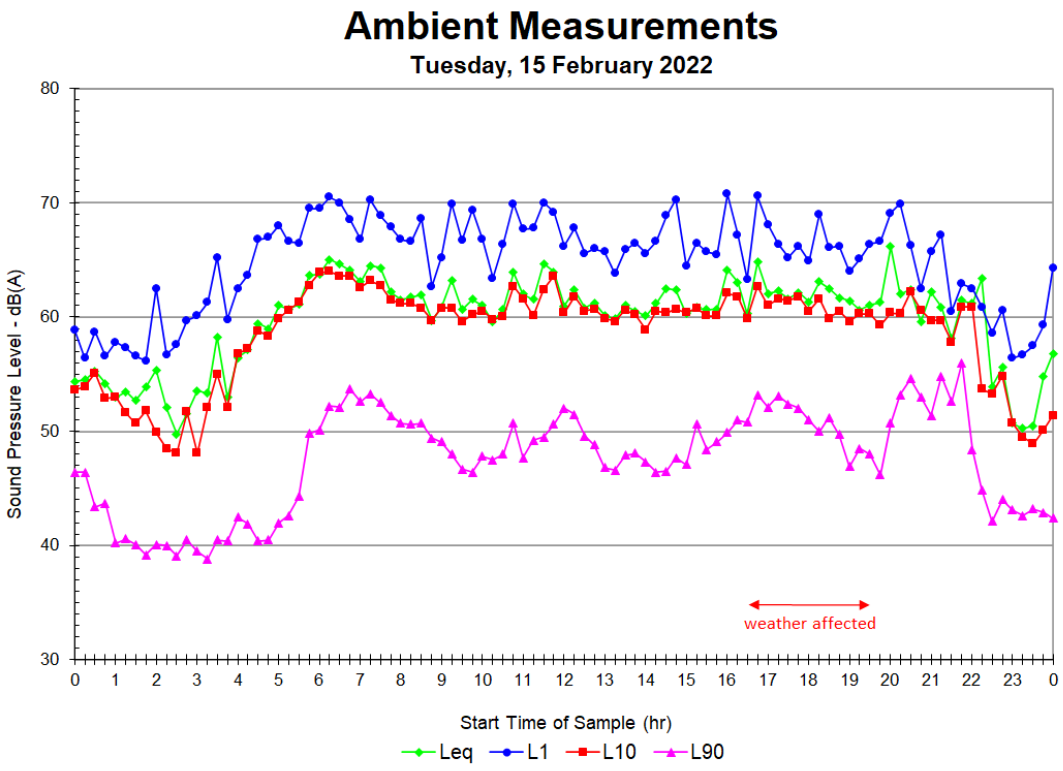
4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment



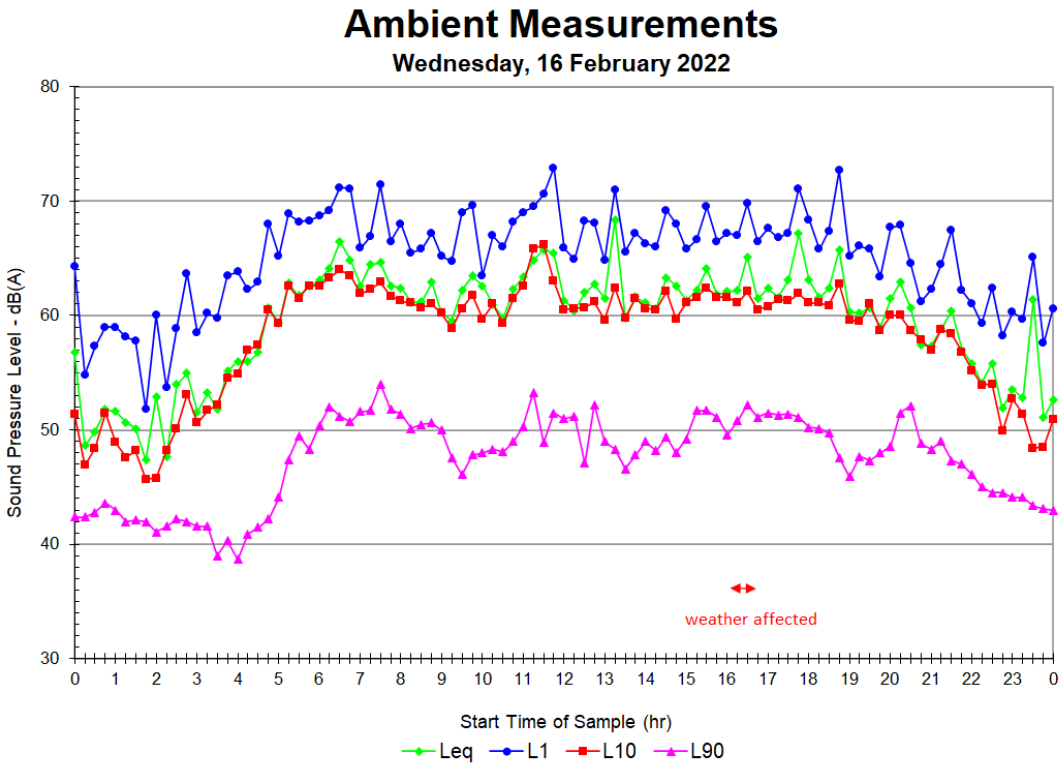
4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment



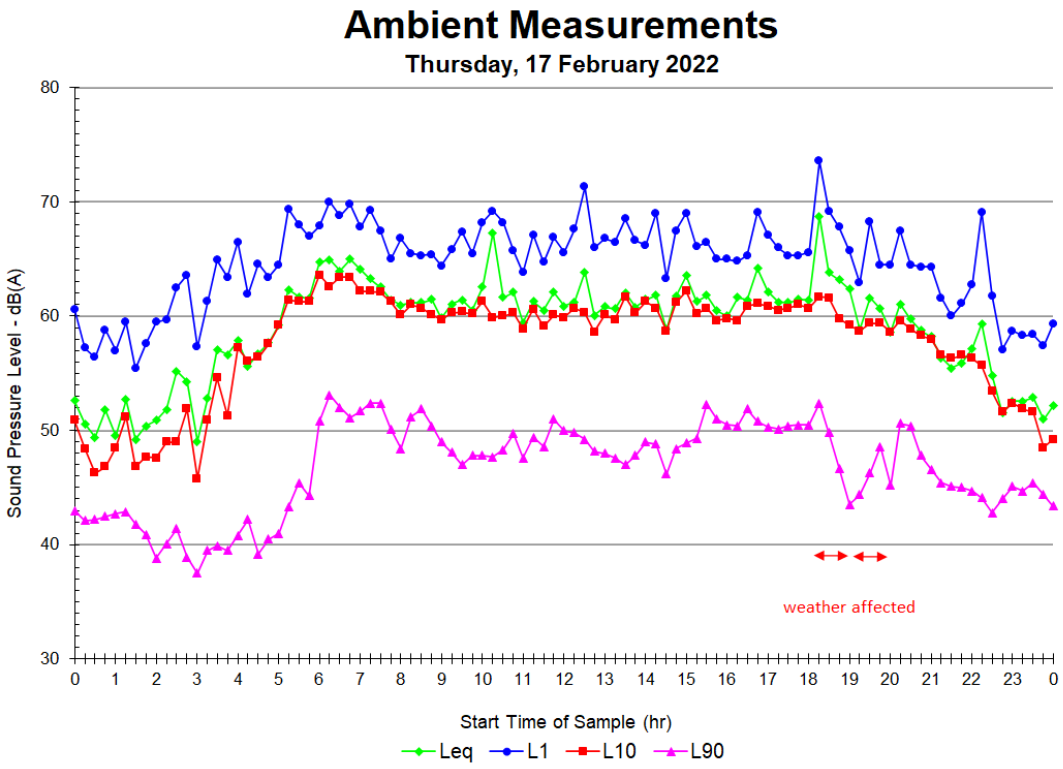
4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment



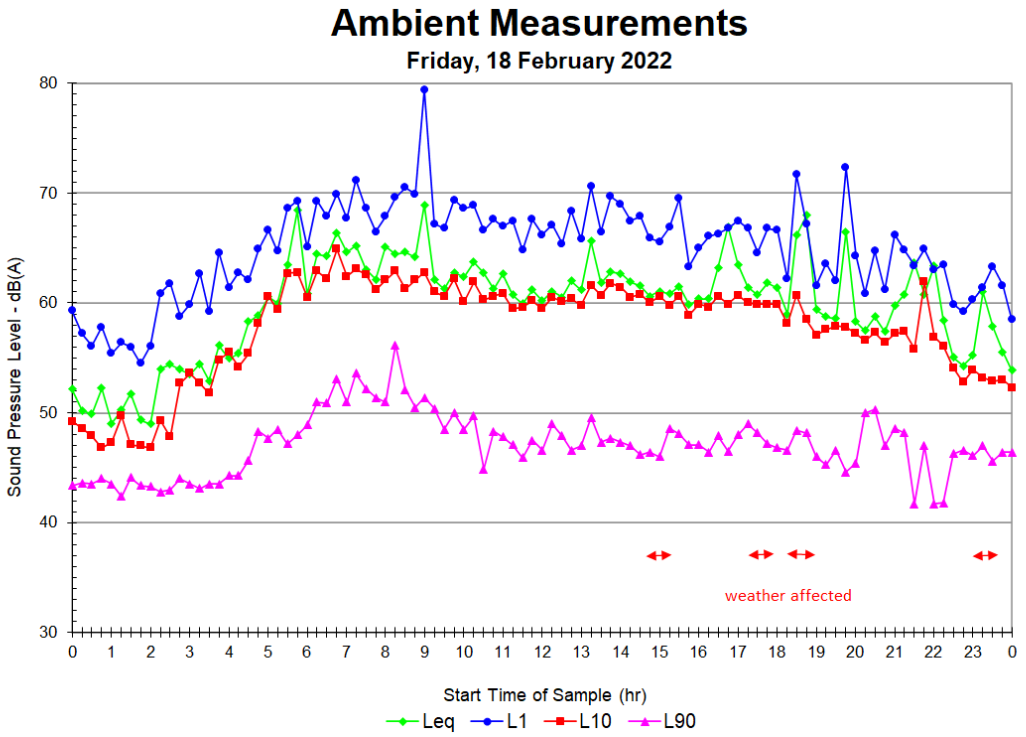
4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment



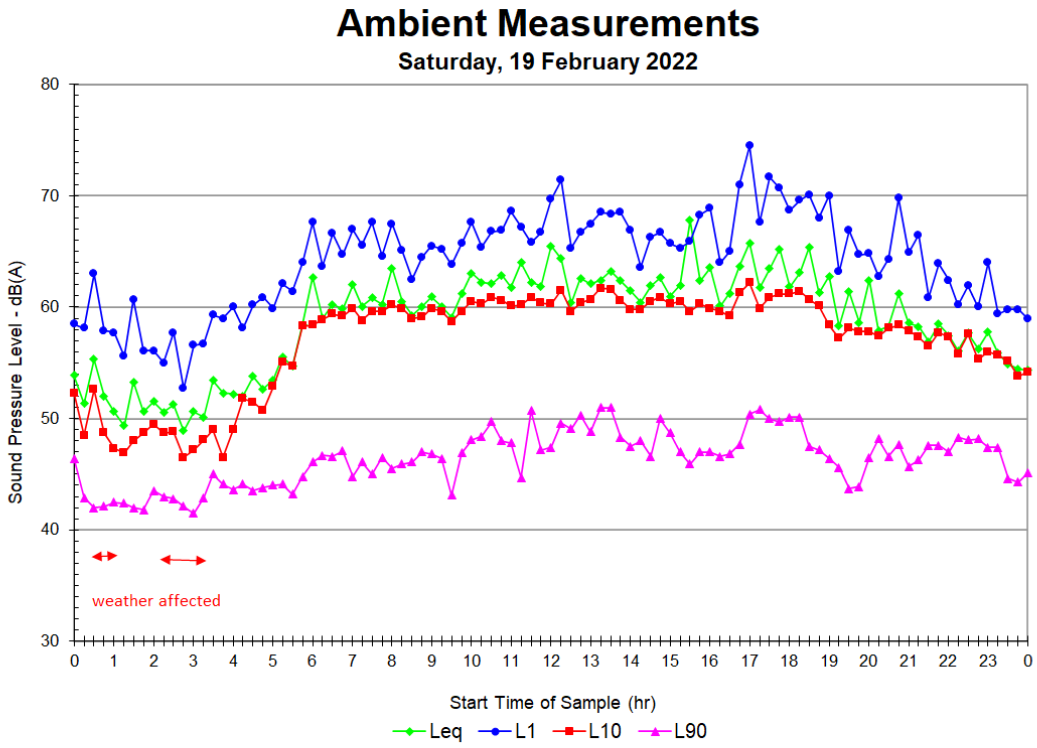
4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment



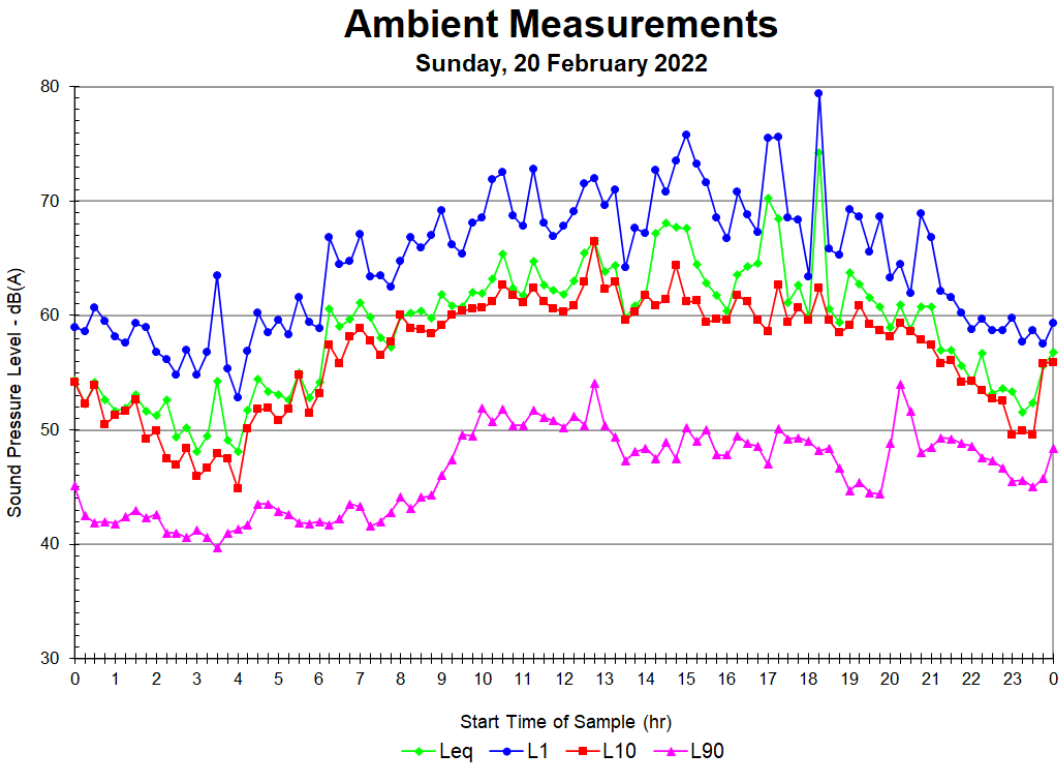
4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment



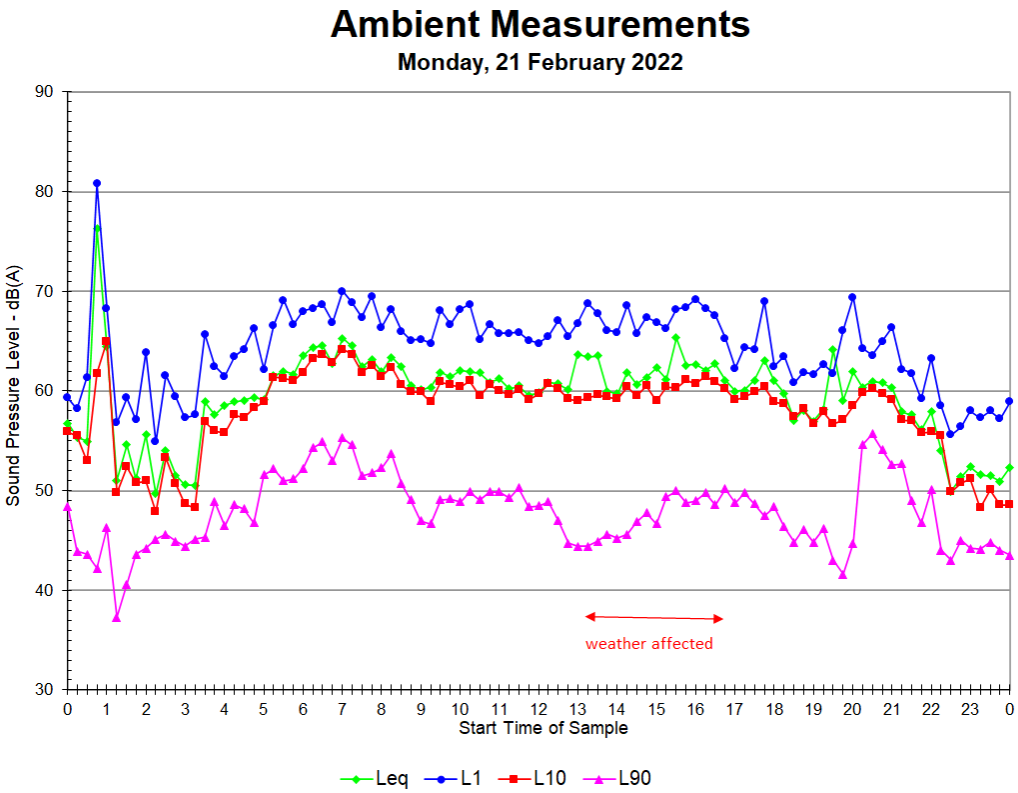
4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment



4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment

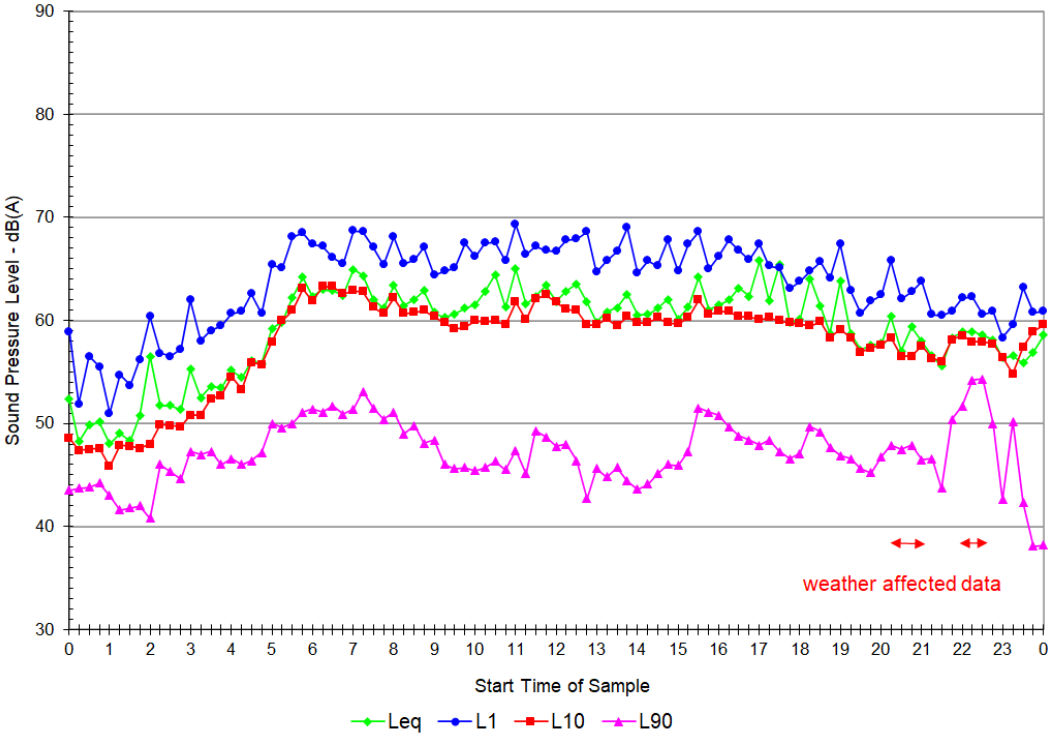


4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment

Ambient Measurements

Tuesday, 22 February 2022

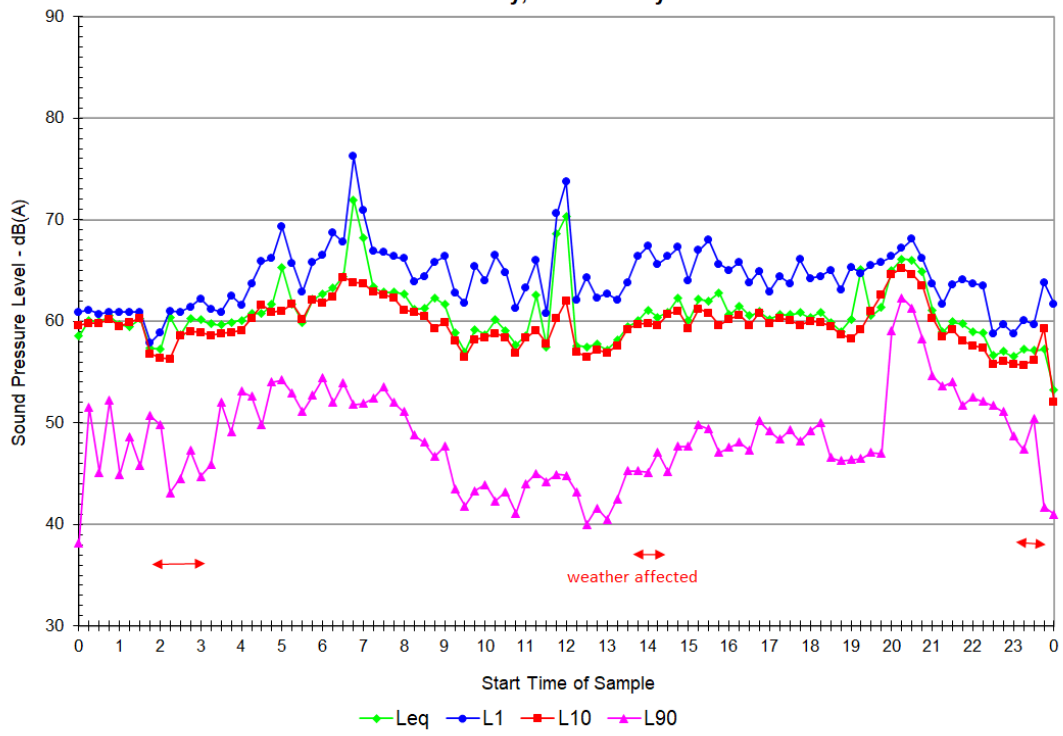


4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment

Ambient Measurements

Wednesday, 23 February 2022

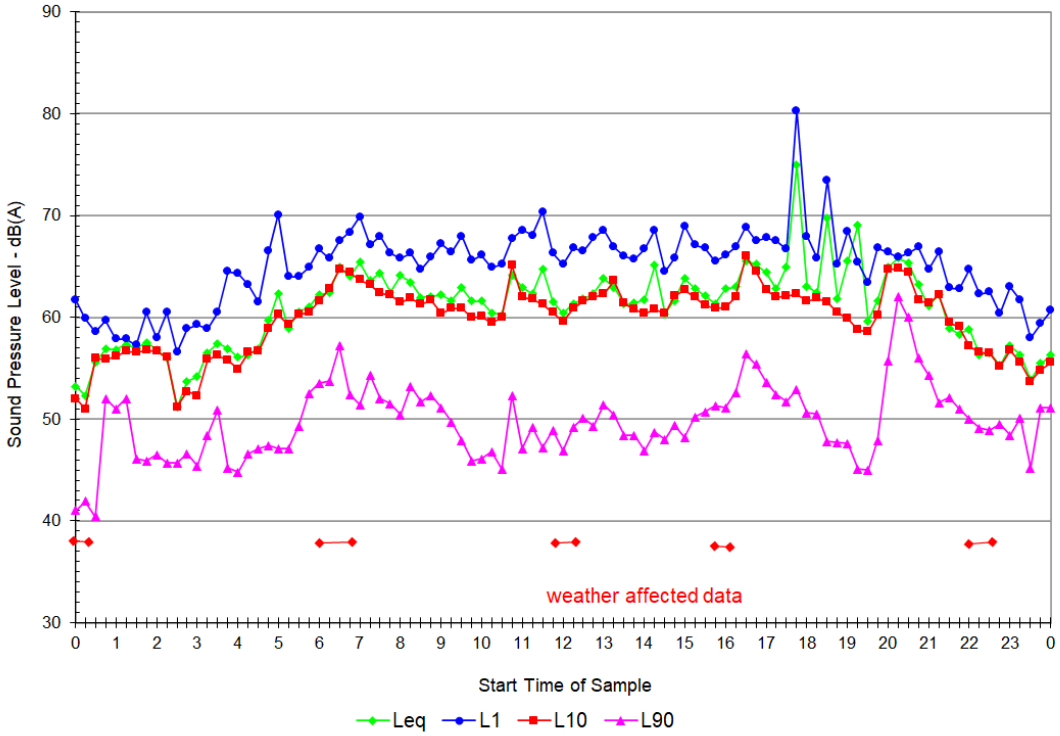


4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment

Ambient Measurements

Thursday, 24 February 2022

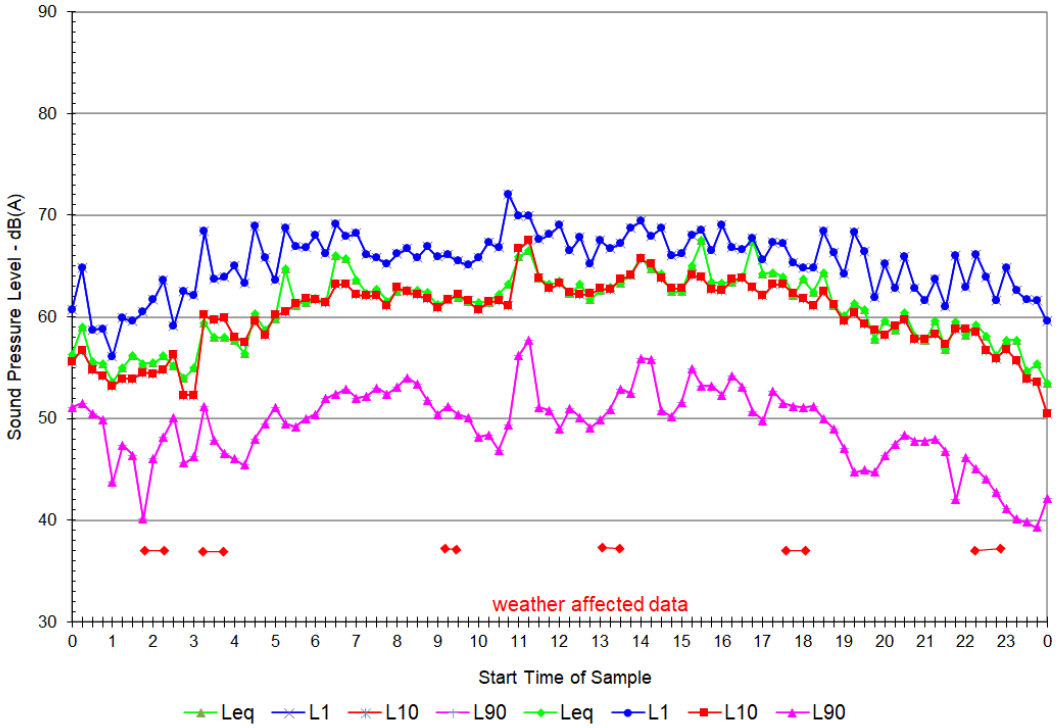


4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment

Ambient Measurements

Friday, 25 February 2022

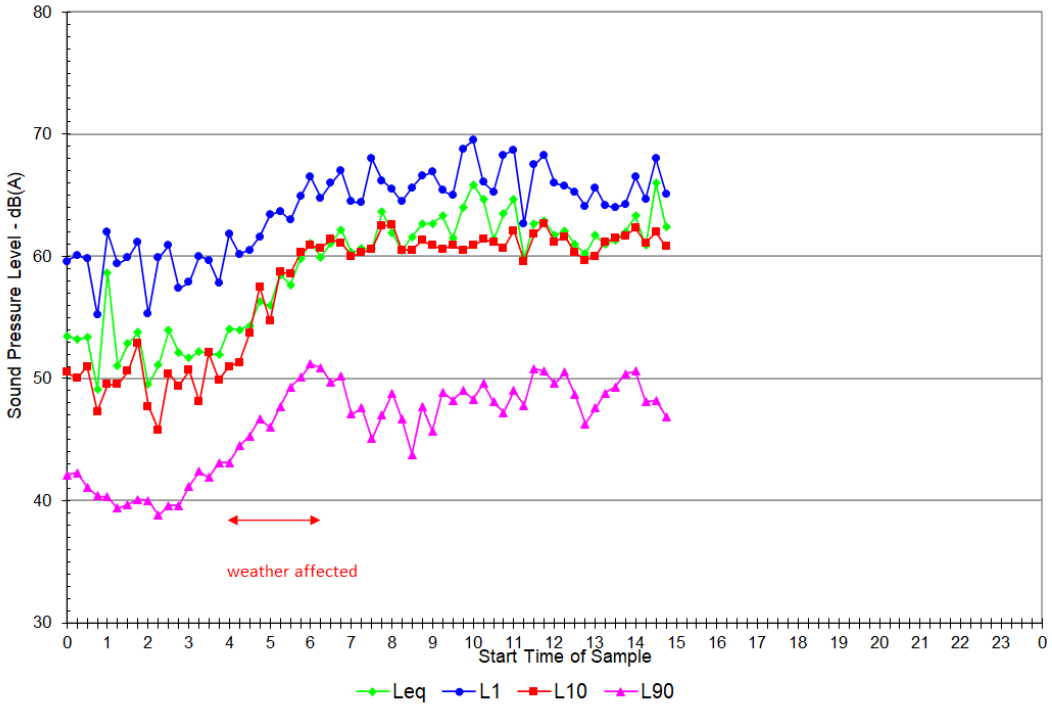


4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment

Ambient Measurements

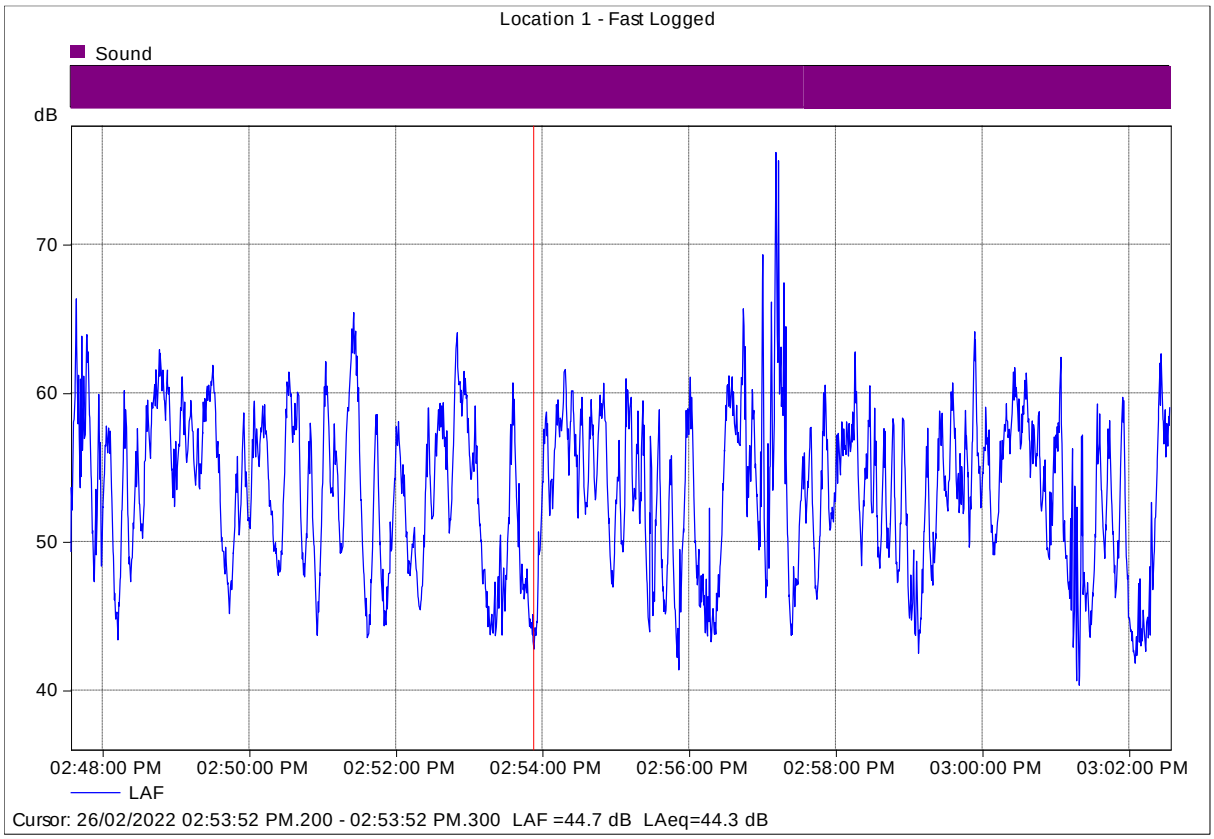
Saturday, 26 February 2022

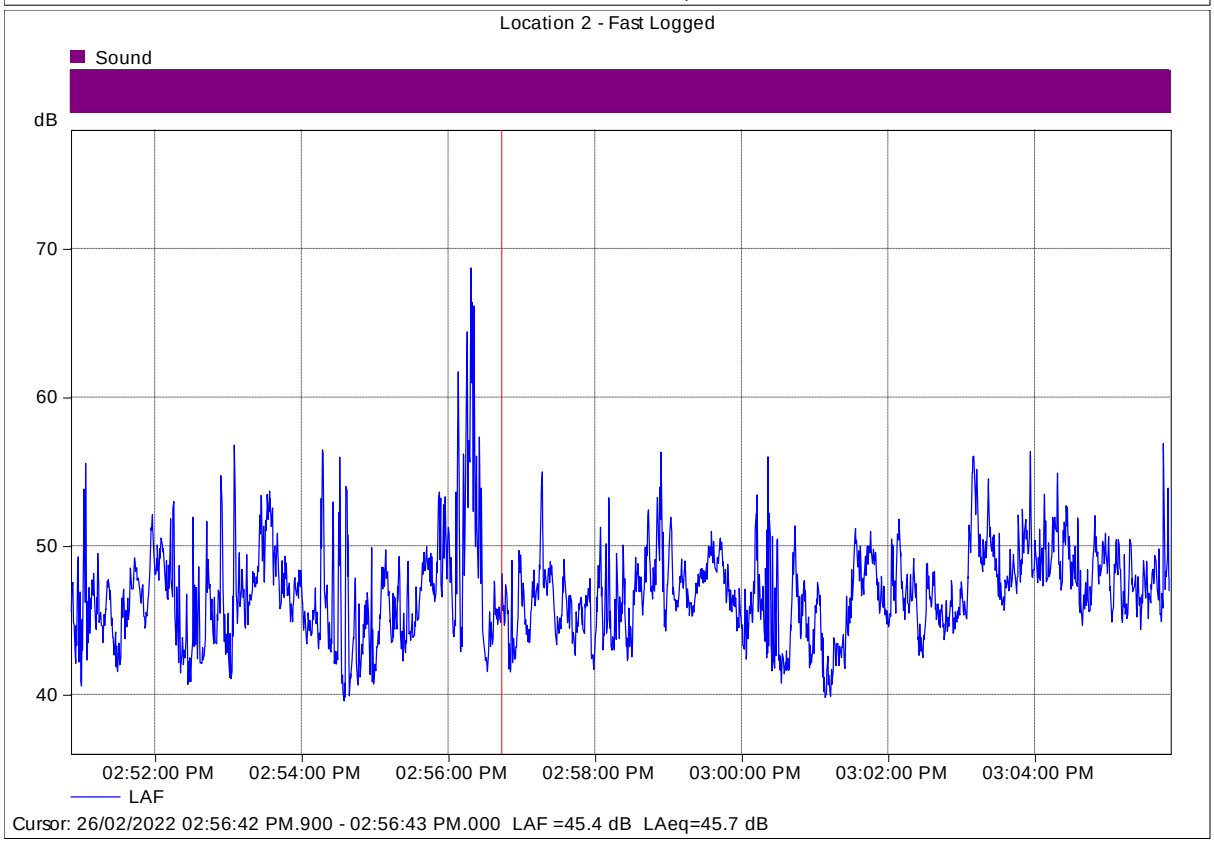


4-8 Eliza Place , Picton
SVAN 977 s/n 92623

5489
front building alignment

APPENDIX C: Attended Measurement Results





Location	Parameter	dB(A)	A-weighted Octave Band Centre Frequency (Hz)								
			31	63	125	250	500	1k	2k	4k	8k
1	Ambient L_{10}	60	27	41	46	49	51	54	53	51	45
	Ambient L_{eq}	56	24	38	44	49	48	50	49	48	42
	Ambient L_{90}	46	13	25	30	34	35	39	40	37	28
2	Ambient L_{10}	50	22	36	41	42	38	44	44	42	32
	Ambient L_{eq}	49	18	34	39	42	38	42	41	39	29
	Ambient L_{90}	43	11	21	27	29	32	38	36	34	23

APPENDIX D: Analysis of Outdoor Area Noise Emissions

The proposed Childcare Centre has the main outdoor play area located in the northern and western yard with an outdoor play area at the rear of the property along the south western and south eastern boundaries of the site (OPA 3).

As a result of the acoustic requirements the different areas in which outdoor play may occur leads to several permutations with respect to the combination of outdoor play areas that can be used simultaneously. The following pages set out the basis of the analysis.

Appendix D2 utilised the site analysis Plan from Accurate design & drafting to show the Childcare Centre site and surrounding residential properties with an illustration of the residential assessment locations.

Appendix D3 presents a portion of the ground floor plan of the Childcare Centre with an illustration of the outdoor play area at the rear of the site (OPA3).

Appendix D4 presents the noise source locations and used in this assessment for OPA 3.

Appendix D5 presents a portion of the ground floor plan of the Childcare Centre with an illustration of the outdoor play areas fronting to Argyle Street and adjacent to 2 Eliza Place.

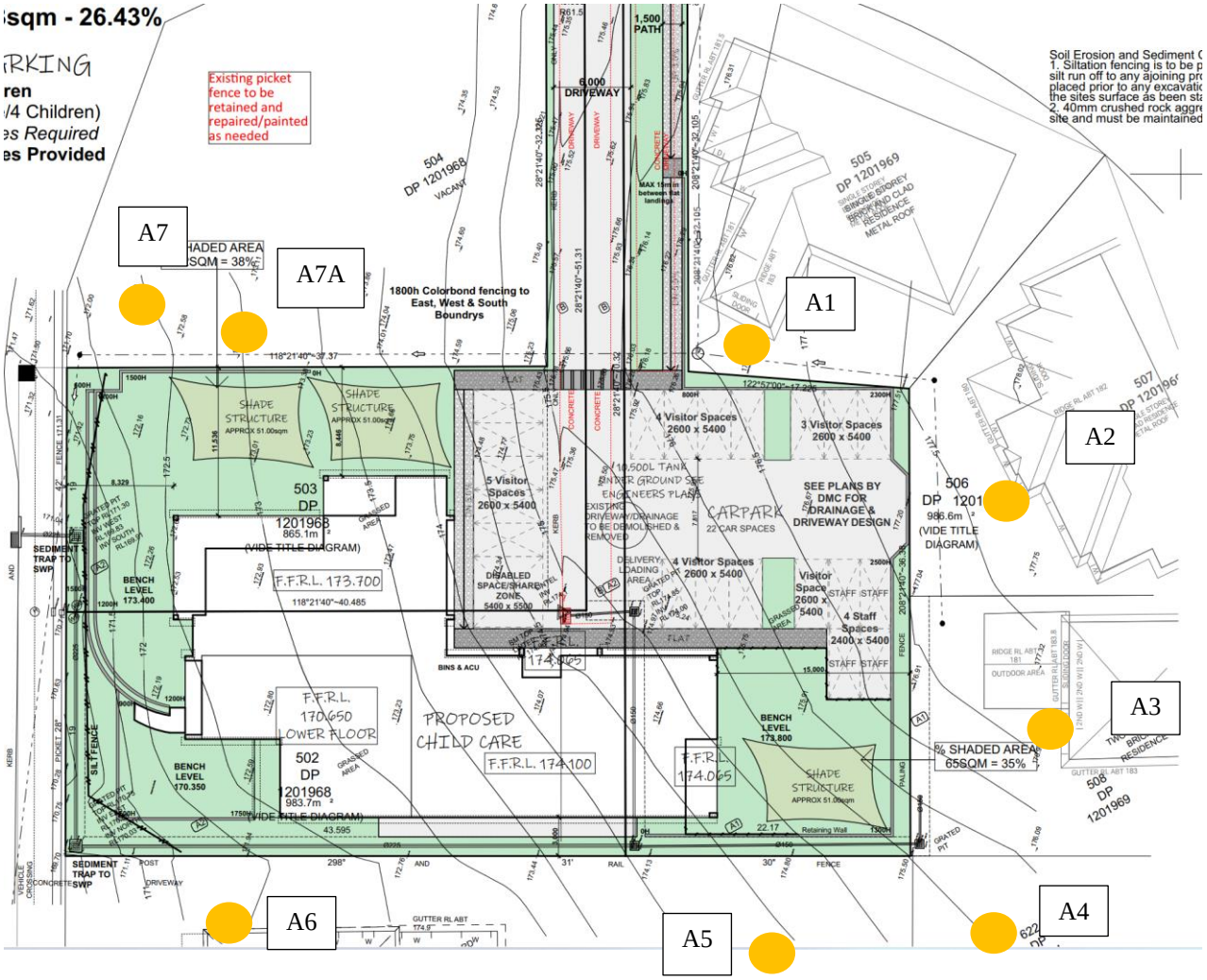
Appendix D6 identifies the noise source locations and used in this assessment for the front play area and the three residential assessment locations A6, A7 and A7A.

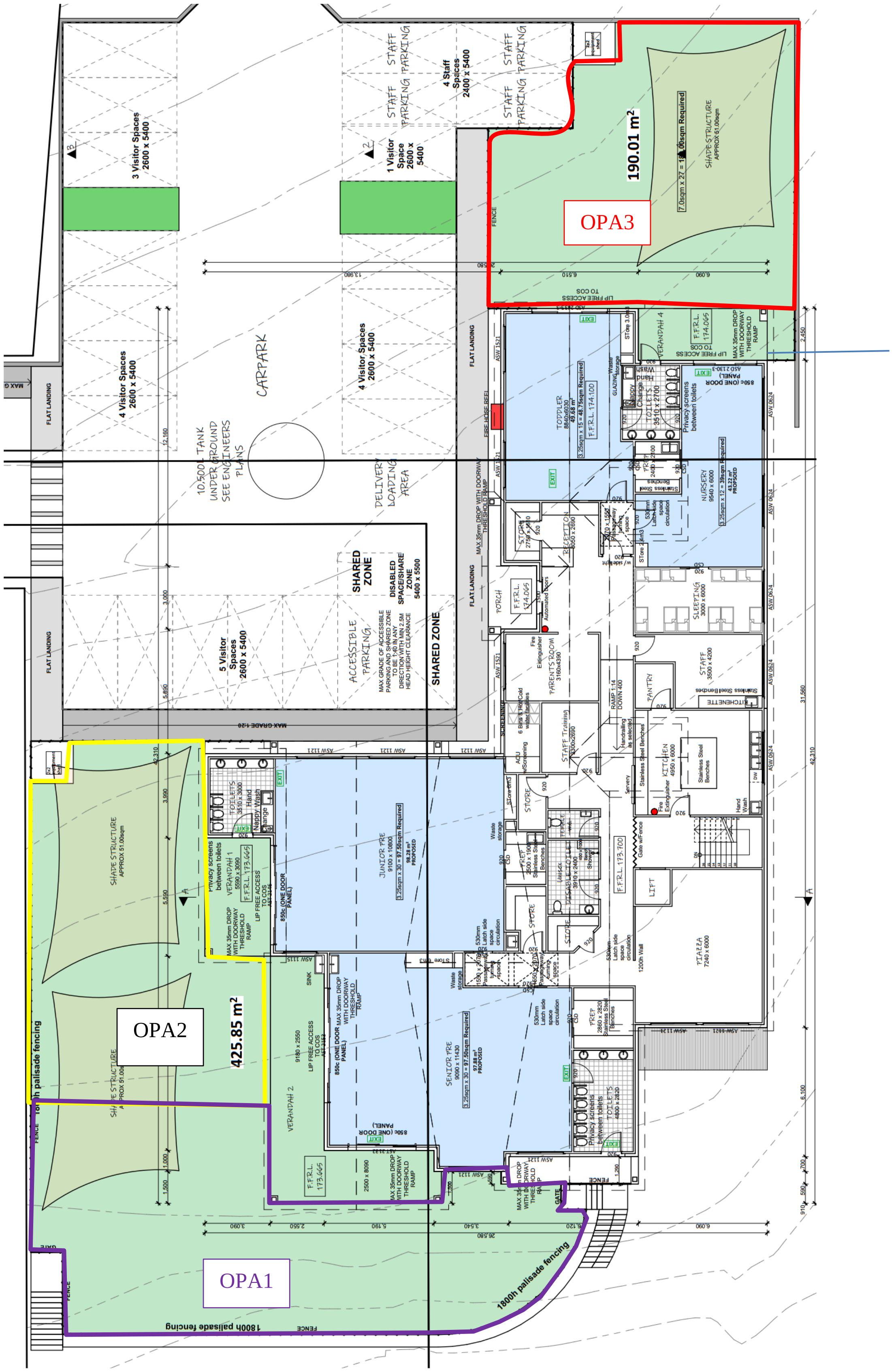
Appendix D7 presents a plan view to identify the required barriers

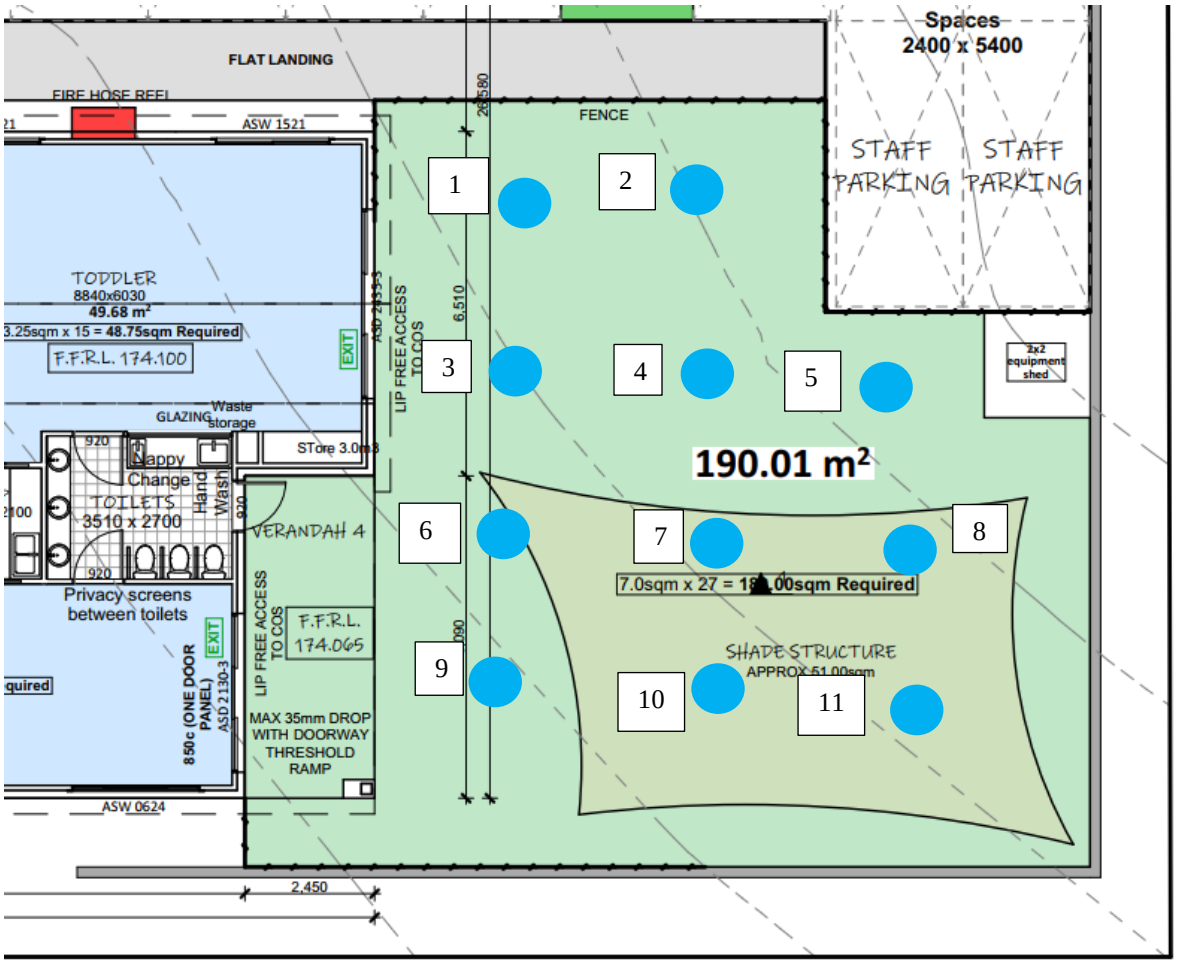
Appendices D8–D9 provide the calculations of noise emission from OPA 3 to the elevated residential receiver at Location A3 for active 2- 3 year olds. The appendices provide individual calculations from each source location to Location A3 which identify the source sound power level of the children, attenuation from barriers/buildings (if applicable) and distance attenuation (including conversion of sound power level to sound pressure level) to determine the resultant contribution of that source location to the receiver location.

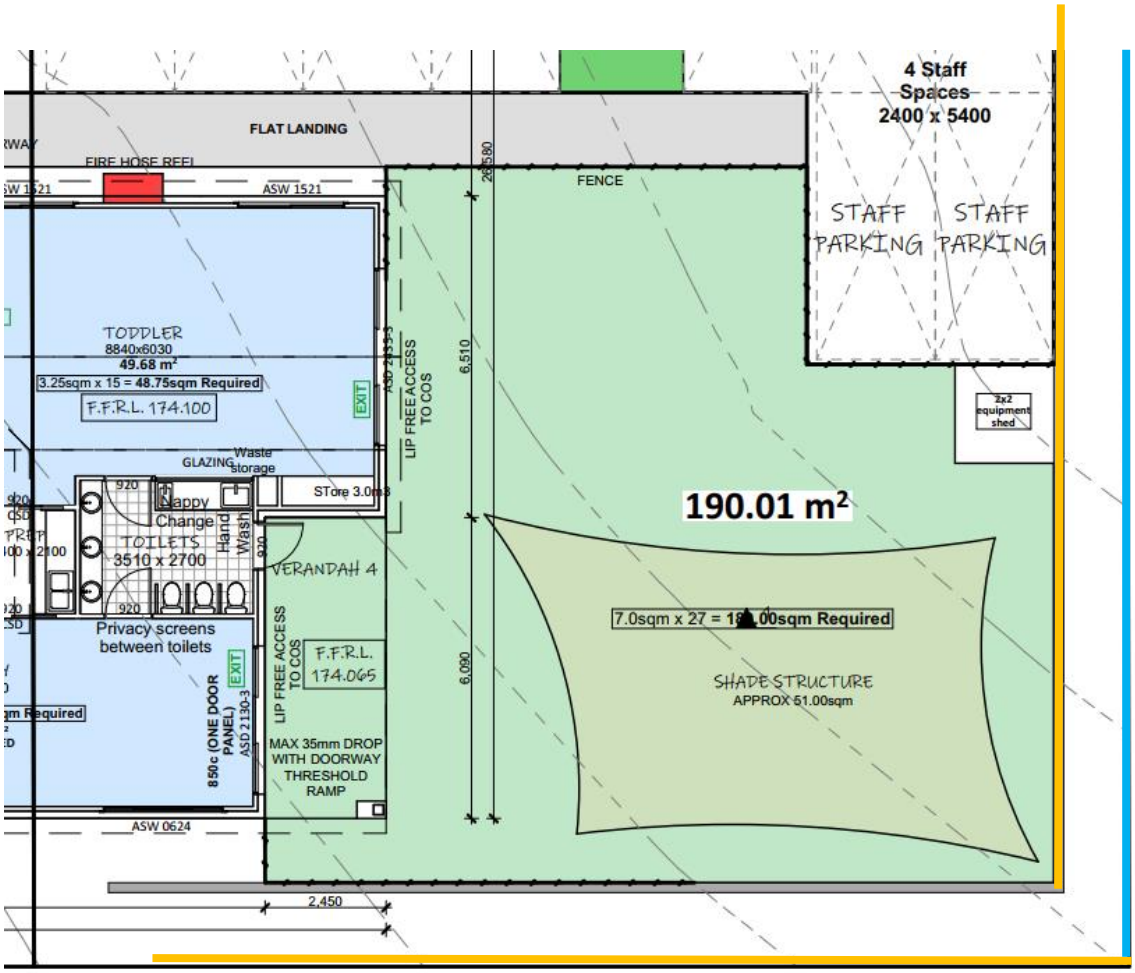
As the attenuation for barriers is dependent upon the frequency of the noise source and cannot be expressed as a dB(A) value, the calculations are carried out in octave bands from which the resultant dB(A) contribution is determined. Appendix D8 then provides the individual contributions in octave bands per source location and the cumulative noise level to Location A3 (first floor window on Lot 508).

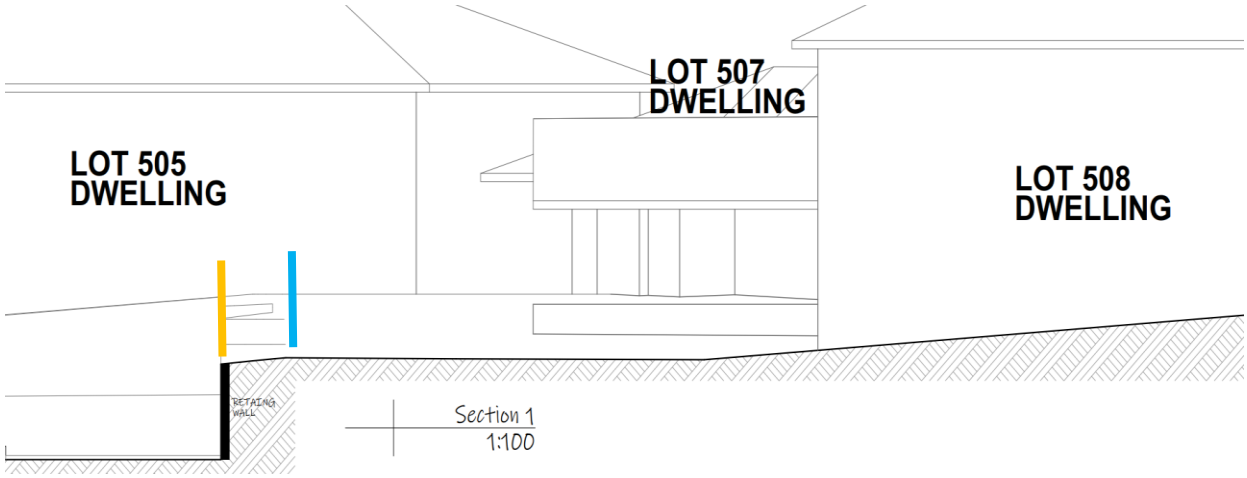
Appendices D10 – D14 provide the calculations for the use of OPA 1 by 30 4 – 6 year children for active play.




OPA3
190.01 m²
OPA2
425.85 m²
OPA1
CARPARK
SHARED ZONE
1800h palisade fencing

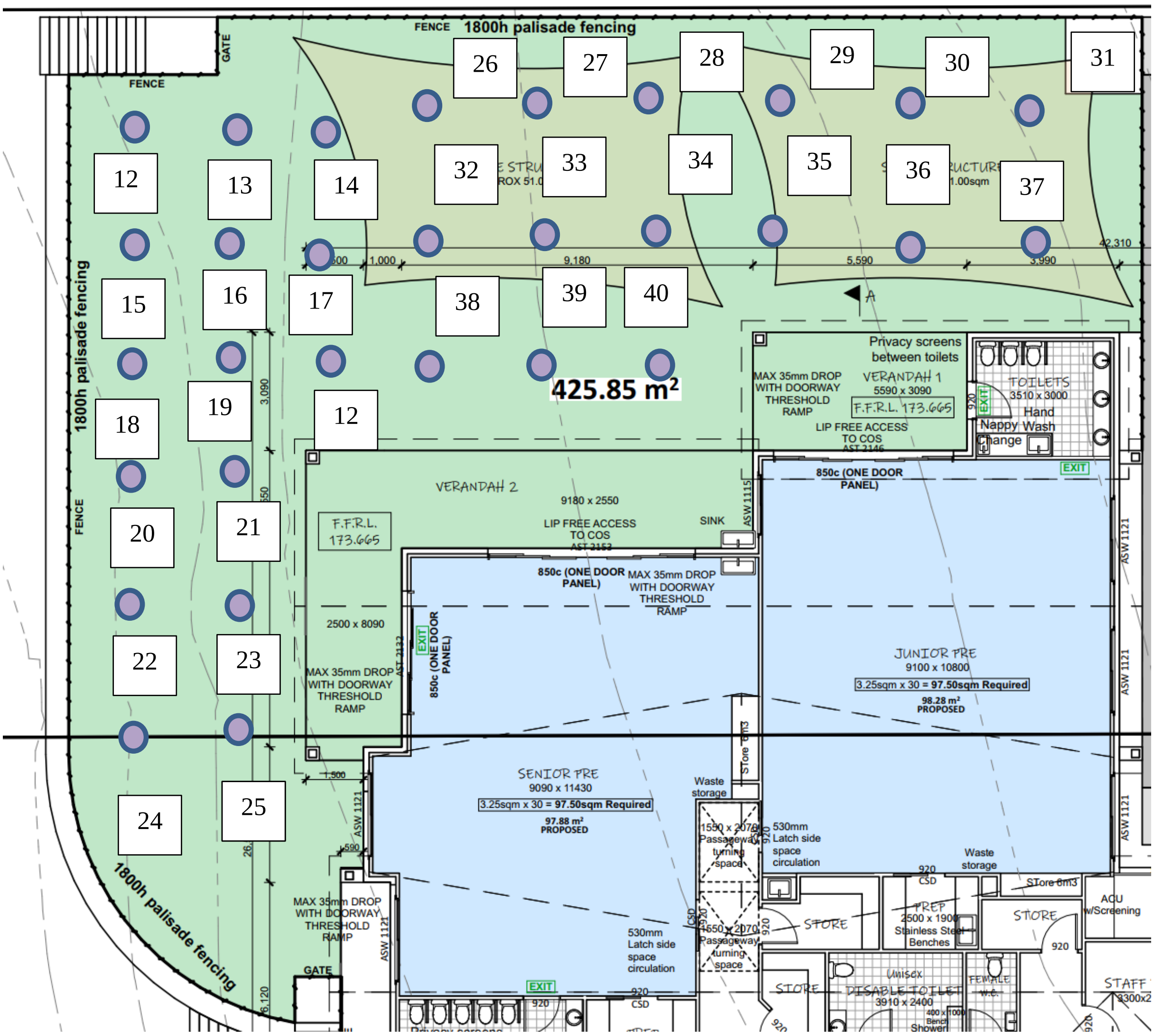

FLAT LANDING
FIRE HOSE REEL
ASW 1521
FENCE
Spaces
2400 x 5400
STAFF PARKING
STAFF PARKING
TODDLER
8840x6030
49.68 m²
3.25sqm x 15 = 48.75sqm Required
F.F.R.L. 174.100
EXIT
GLAZING
Waste storage
Store 3.0m²
Nappy Change
Hand Wash
TOILETS
3510 x 2700
VERANDAH 4
Privacy screens between toilets
EXIT
F.F.R.L. 174.065
LIP FREE ACCESS TO COS
MAX 35mm DROP WITH DOORWAY THRESHOLD RAMP
850c (ONE DOOR PANEL) AS/NZS 2130-3
ASW 0624
2,450
6,510
LIP FREE ACCESS TO COS
2x2 equipment shed
190.01 m²
7.0sqm x 27 = 189.00sqm Required
SHADE STRUCTURE
APPROX 51.00sqm
1
2
3
4
5
6
7
8
9
10
11

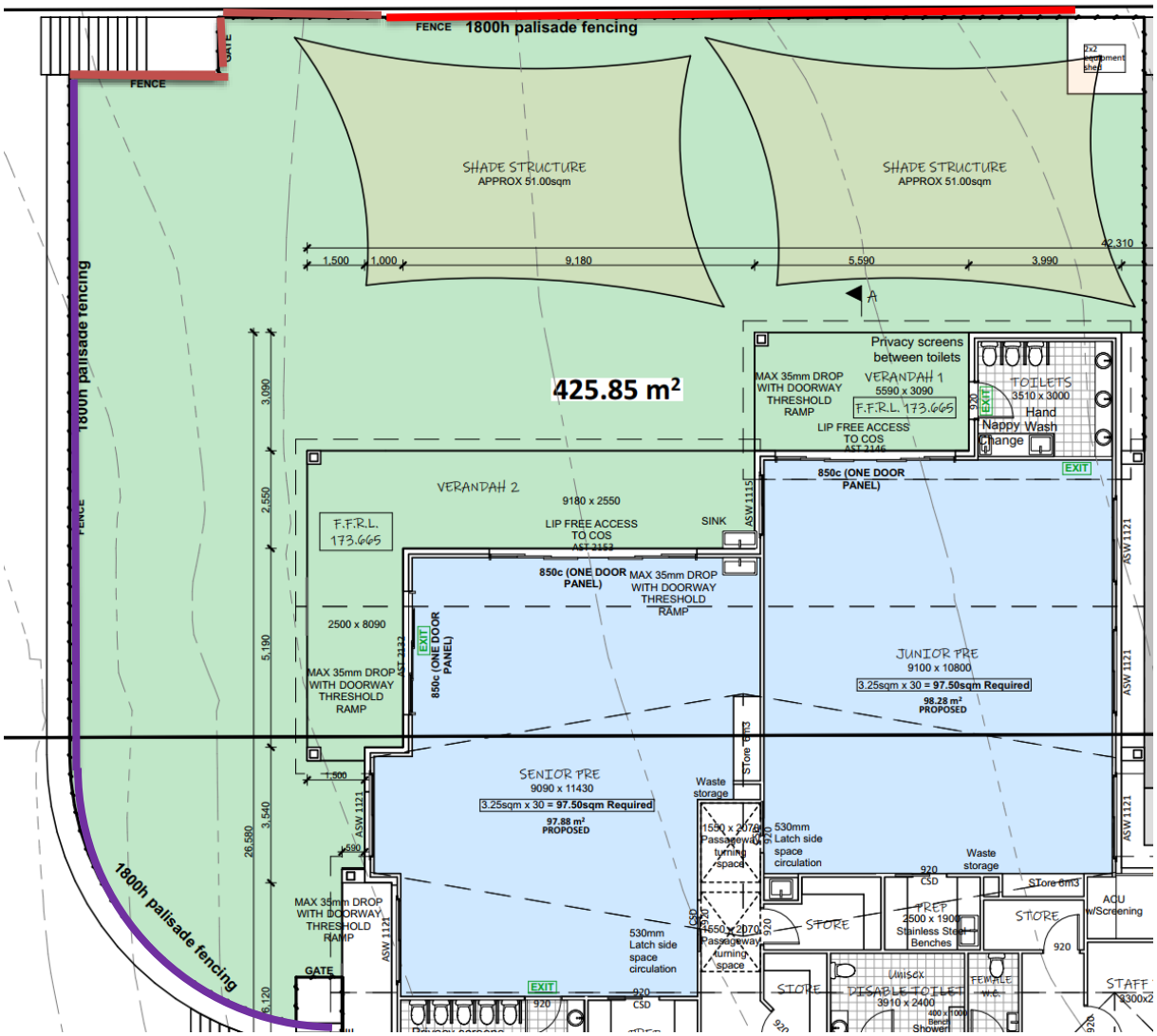




Existing fence

Proposed 1.8metre high acoustic barrier


1800h palisade fencing
FENCE
GATE
26
27
28
29
30
31
12
13
14
32
33
34
35
36
37
15
16
17
38
39
40
18
19
12
425.85 m²
20
21
22
23
24
25
VERANDAH 2
9180 x 2550
VERANDAH 1
5590 x 3090
TOILETS
3510 x 3000
SENIOR PRE
9090 x 11430
3.25sqm x 30 = 97.50sqm Required
97.88 m² PROPOSED
JUNIOR PRE
9100 x 10800
3.25sqm x 30 = 97.50sqm Required
98.28 m² PROPOSED
1800h palisade fencing



12mm solid polycarbonate (1800mm high) behind palisade fence (1800mm high)

10mm solid polycarbonate (1900mm high) behind palisade fence (1800mm high)

Acoustic fence vertical to 1800 – 2000mm with 45 degree panel angled into the centre to obtain a height of 2.5m above ground level

Calculation of 8 Children (2-3 years) in OPA3 Conducting Active Play to Assessment Location A3 – first floor window

Location	1	
Source	2	children (2-3 years)
Distance from Source to Receiver	25.5	m
Path Length Difference	0.06	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (passive)	72	22	38	51	63	68	66	62	56
Barrier Attenuation		0	0	0	0	0	0	0	0
Distance Attenuation		-36	-36	-36	-36	-36	-36	-36	-36
SPL Contribution	35	-14	2	15	27	32	30	26	20

Location	2	
Source	2	children (2-3 years)
Distance from Source to Receiver	22.4	m
Path Length Difference	0.01	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (passive)	72	22	38	51	63	68	66	62	56
Barrier Attenuation		0	0	0	0	0	0	0	0
Distance Attenuation		-35	-35	-35	-35	-35	-35	-35	-35
SPL Contribution	37	-13	3	16	28	33	31	27	21

Location	3	
Source	2	children (2-3 years)
Distance from Source to Receiver	24.6	m
Path Length Difference	0.07	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (passive)	72	22	38	51	63	68	66	62	56
Barrier Attenuation		0	0	0	0	0	0	0	0
Distance Attenuation		-36	-36	-36	-36	-36	-36	-36	-36
SPL Contribution	36	-14	2	15	27	32	30	26	20

Location	4	
Source	1	child (2-3 years)
Distance from Source to Receiver	21.3	m
Path Length Difference	0.01	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (passive)	69	19	35	48	60	65	63	59	53
Barrier Attenuation		0	0	0	0	0	0	0	0
Distance Attenuation		-35	-35	-35	-35	-35	-35	-35	-35
SPL Contribution	34	-16	0	13	25	30	28	24	18

Location	5	
Source	1	child (2-3 years)
Distance from Source to Receiver	18.6	m
Path Length Difference	0.01	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (passive)	69	19	35	48	60	65	63	59	53
Barrier Attenuation		-5	-5	-5	-5	-6	-6	-7	-9
Distance Attenuation		-33	-33	-33	-33	-33	-33	-33	-33
SPL Contribution	29	-19	-3	9	21	26	23	19	11

2-3 Years Active Play OPA 3 to Location A3 (first floor)

Source Contribution	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
1 (2 x active, 2-3yr)	35	-14	2	15	27	32	30	26	20
2 (2 x active, 2-3yr)	37	-13	3	16	28	33	31	27	21
3 (2 x active, 2-3yr)	36	-14	2	15	27	32	30	26	20
4 (1 x active, 2-3yr)	34	-16	0	13	25	30	28	24	18
5 (1 x active, 2-5yr)	29	-19	-3	9	21	26	23	19	11
Total Contribution	42	-8	8	21	33	38	36	32	26

Summary of A-weighed Outdoor Play Area 3 Noise Contributions

2 to 3-year-old Outdoor Play Area – 8 Children

Source		Contribution at Residential Receiver – dB(A)				
Location	No. of Children	A1	A2	A3	A4	A5
1 (active)	2 (2-3yr)	35	24	35	30	35
2 (active)	2 (2-3yr)	36	25	37	30	35
3 (active)	2 (2-3yr)	36	25	36	30	35
4 (active)	1 (2-3yr)	33	21	34	27	32
5 (active)	1 (2-3yr)	33	18	29	24	32
Total Contribution		42	30	42	36	41

0 to 2-year-old Outdoor Play Area 3 – 12 Children

Source		Contribution at Residential Receiver – dB(A)				
Location	No. of Children	A1	A2	A3	A4	A5
6 (active)	3 (0-2yr)	30	19	37	24	31
7 (active)	3 (0-2yr)	30	18	38	24	31
9 (active)	3 (0-2yr)	30	18	37	22	31
10 (active)	3 (0-2yr)	25	16	38	21	31
11 (active)	3 (0-2yr)	25	15	33	19	31
Total Contribution		36	24	44	29	38

Calculation of 30 Children (3-5 years) in OPA1 Conducting Active Play to Assessment Location A7A – front window to 2 Eliza Place

Location	12	
Source	2	children (3-5 years)
Distance from Source to Receiver	7.7	m
Path Length Difference	0.11	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-6	-6	-8	-9	-12	-14	-17	-20
Distance Attenuation		-26	-26	-26	-26	-26	-26	-26	-26
SPL Contribution	42	-1	15	26	36	39	34	27	18

Location	13	
Source	2	children (3-5 years)
Distance from Source to Receiver	7.8	m
Path Length Difference	0.24	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-7	-8	-10	-12	-15	-18	-21	-24
Distance Attenuation		-26	-26	-26	-26	-26	-26	-26	-26
SPL Contribution	39	-1	13	24	33	35	31	24	15

Location	14	
Source	2	children (3-5 years)
Distance from Source to Receiver	9.1	m
Path Length Difference	0.53	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-8	-10	-13	-15	-18	-21	-24	-27
Distance Attenuation		-27	-27	-27	-27	-27	-27	-27	-27
SPL Contribution	34	-4	10	19	28	30	25	18	9

Location	15	
Source	2	children (3-5 years)
Distance from Source to Receiver	10.6	m
Path Length Difference	0.06	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-5	-6	-6	-8	-9	-12	-14	-17
Distance Attenuation		-29	-29	-29	-29	-29	-29	-29	-29
SPL Contribution	41	-3	13	24	35	38	34	27	18

Location	16	
Source	2	children (3-5 years)
Distance from Source to Receiver	10.7	m
Path Length Difference	0.14	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-6	-7	-8	-10	-12	-15	-18	-21
Distance Attenuation		-29	-29	-29	-29	-29	-29	-29	-29
SPL Contribution	38	-4	12	22	33	35	30	23	14

Location	17	
Source	2	children (3-5 years)
Distance from Source to Receiver	11.7	m
Path Length Difference	0.36	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-7	-9	-11	-14	-17	-20	-23	-26
Distance Attenuation		-29	-29	-29	-29	-29	-29	-29	-29
SPL Contribution	33	-6	9	19	28	30	25	18	9

Location	18	
Source	2	children (3-5 years)
Distance from Source to Receiver	13.6	m
Path Length Difference	0.04	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-5	-6	-6	-7	-8	-10	-13	-16
Distance Attenuation		-31	-31	-31	-31	-31	-31	-31	-31
SPL Contribution	40	-5	11	22	33	37	33	26	18

Location	19	
Source	2	children (3-5 years)
Distance from Source to Receiver	13.6	m
Path Length Difference	0.11	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-6	-6	-7	-9	-11	-14	-17	-20
Distance Attenuation		-31	-31	-31	-31	-31	-31	-31	-31
SPL Contribution	37	-5	10	21	31	34	29	22	13

Location	20	
Source	2	children (3-5 years)
Distance from Source to Receiver	14.4	m
Path Length Difference	0.30	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-7	-8	-10	-13	-16	-19	-22	-25
Distance Attenuation		-31	-31	-31	-31	-31	-31	-31	-31
SPL Contribution	32	-7	8	18	27	29	24	17	8

Location	21	
Source	2	children (3-5 years)
Distance from Source to Receiver	16.8	m
Path Length Difference	0.03	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-5	-5	-6	-7	-8	-10	-12	-15
Distance Attenuation		-33	-33	-33	-33	-33	-33	-33	-33
SPL Contribution	39	-7	9	21	32	36	32	26	17

Location	22	
Source	2	children (3-5 years)
Distance from Source to Receiver	16.5	m
Path Length Difference	0.09	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-6	-6	-7	-9	-11	-13	-16	-19
Distance Attenuation		-32	-32	-32	-32	-32	-32	-32	-32
SPL Contribution	36	-7	9	20	30	33	28	21	12

Location	23	
Source	2	children (3-5 years)
Distance from Source to Receiver	19.8	m
Path Length Difference	0.25	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-7	-8	-10	-12	-15	-18	-21	-24
Distance Attenuation		-34	-34	-34	-34	-34	-34	-34	-34
SPL Contribution	30	-9	5	16	25	27	22	15	6

Location	24	
Source	2	children (3-5 years)
Distance from Source to Receiver	19.5	m
Path Length Difference	0.03	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-5	-5	-6	-6	-7	-9	-11	-14
Distance Attenuation		-34	-34	-34	-34	-34	-34	-34	-34
SPL Contribution	38	-8	8	20	31	35	31	25	16

Location	25	
Source	2	children (3-5 years)
Distance from Source to Receiver	22.8	m
Path Length Difference	0.07	m

Description	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Source Lw (active)	80	31	47	59	71	76	74	70	64
Barrier Attenuation		-5	-6	-7	-8	-10	-12	-15	-18
Distance Attenuation		-35	-35	-35	-35	-35	-35	-35	-35
SPL Contribution	34	-10	6	17	28	31	27	20	11

4-6 Years Active Play OPA 1 to Location A7 (front façade)

Source Contribution	dB(A)	A-weighted Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
12 (2 x active, 4-6yr)	43	-13	-1	3	15	16	26	28	36	33	39	31	34	27	22	21	18
13 (2 x active, 4-6yr)	40	0	14	25	34	36	32	25	16
14 (2 x active, 4-6yr)	35	-3	11	20	29	31	26	19	10
15 (2 x active, 4-6yr)	42	-2	14	26	36	39	35	28	19
16 (2 x active, 4-6yr)	39	-3	13	23	34	36	31	24	15
17 (2 x active, 4-6yr)	34	-5	10	20	29	31	26	18	10
18 (2 x active, 4-6yr)	41	-4	12	23	34	38	34	27	19
19 (2 x active, 4-6yr)	38	-4	11	22	32	35	30	23	14
20 (2 x active, 4-6yr)	33	-6	9	19	28	30	25	18	9
21 (2 x active, 4-6yr)	40	-6	10	22	33	37	33	27	18
22 (2 x active, 4-6yr)	37	-6	10	21	31	34	29	22	13
23 (2 x active, 4-6yr)	31	-8	6	17	26	28	23	16	7
24 (2 x active, 4-6yr)	39	-7	9	21	32	36	32	26	17
25 (2 x active, 4-6yr)	35	-9	7	18	29	32	28	21	12
Total Contribution	49	7	22	33	43	46	42	35	27

APPENDIX E: Analysis of Classroom Noise Emissions to nearest Residential Boundary

Classroom	Nursery	Toddler	Junior Pre school	Senior Pre School
Lw Active Play	79	87	92	93
Room correction	+3	+3	+3	+3
Open window TL	-10	-10	-10	-10
Barrier Shielding	-8	-9	-6	-5
Distance with Lw to Spl correction	-34	-32	-31	-31
Contribution	30	39	48	50
RBL	43	43	46	46
Residence	A3	A3	A7A	A7A

APPENDIX F: Analysis of Noise Emission from Vehicle Movements

Noise of Vehicle on Driveway to Lot 505 western façade (prior to 7am)

	L_{AE}	Correction for distance	Barrier Attenuation	L_{AE} to $L_{eq,\ 15\ min}$	Contribution dB(A)
Vehicles arriving	61 dB(A) @ 9m	+ 4	-6	-30	29

Noise of Vehicle to car park to Lot 505 southern façade (prior to 7am)

	L_{AE}	Correction for distance	Barrier Attenuation	L_{AE} to $L_{eq,\ 15\ min}$	Contribution dB(A)
Vehicles arriving	61 dB(A) @ 9m	0	0	-30	31
1 car door closing	61 dB(A) at 2m	-26	0	-30	5
				Total	31

Noise from vehicle movements on site to Location A1 (daytime)

	LAE	Correction for distance	Barrier attenuation	LAE to Leq, 15 min	Contribution
Drop-off of children					
22 vehicle movements	74 dB(A) @ 9 m	-5	-7	-30	32
33 car doors opening/closing	76 dB(A) @ 2 m	-18	-7	-30	21
11 engine starts	80 dB(A) @ 2 m	-18	-7	-30	25
				Total	33

Noise from vehicle movements on site to Location A2 (daytime)

	LAE	Correction for distance	Barrier attenuation	LAE to Leq, 15 min	Contri bution
Drop-off of children					
22 vehicle movements	74 dB(A) @ 9 m	-4	-9	-30	31
33 car doors opening/closing	76 dB(A) @ 2 m	-17	-9	-30	20
11 engine starts	80 dB(A) @ 2 m	-17	-9	-30	24
				Total	32

Noise from vehicle movements on site to Location A3 (daytime)

	LAE	Correction for distance	Barrier attenuation	LAE to Leq, 15 min	Contribution
Drop-off of children					
22 vehicle movements	74 dB(A) @ 9 m	-9	0	-30	35
33 car doors opening/closing	76 dB(A) @ 2 m	-11	0	-30	35
11 engine starts	80 dB(A) @ 2 m	-11	0	-30	39
				Total	42

APPENDIX G: Cumulative Noise Contribution

Area	Reference	A1	A2	A3	A4	A5	A6	A7	A7A
Classrooms	Appendix E	<30	<35	40	<38	<38	<30	<35	42
Vehicle Movements on Site	Appendix F	33	32	42	-	-	-	-	-
Mechanical Plant	Table 5	44	43	43	42	45	47	48	46
Total Noise Contribution		45	44	47	43	46	47	48	48
Daytime RBL + 5 dB		49	48	48	47	50	50	53	51