NOISE IMPACT ASSESSMENT

46A TOWNSEND STREET
CONDELL PARK NSW 2200

PREPARED FOR

ZTA Group

Level 1, 538 King Georges Road
Beverly Hills NSW 2209

CONTRACT NO C23 9148
REPORT NO EMS23 1155

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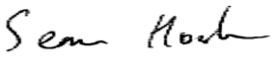
AUTHOR: 	Sean Hook MArchSci (Audio and Acoustics) Acoustic Consultant MAAS	Date: 29.01.2024
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1 INTRODUCTION

1.1 Project Description

Environmental Monitoring Services Pty Ltd (EMS) was engaged by ZTA Group, to conduct a Noise Impact Assessment for the proposed Child Care centre to be located at 46a Townsend Street, Condell Park (the site). An Aircraft Noise Assessment has been conducted in Section 8 of this report.

The proposed Child Care intends to facilitate 49 children in total, 22 children between 3 and 5 years old, 15 children between 2 and 3 years old, and 12 children between 0 and 2 years old. A total of 8 staff members are proposed for the centre.

The play and cot rooms for the 0-2 year olds and play room for 2-3 year olds along with the office and reception will be on the ground floor and the play room for 3-5 year olds, kitchen and laundry areas located on the first floor. Outdoor play areas are located on ground floor (177 m^2) and the first floor balcony (168 m^2) with 78 m^2 of the balcony being under cover. A basement car park area for 9 vehicles (4 staff and 5 visitor spaces) will be accessed by a ramp from Townsend Street.

The Child Care's proposed operating hours are 7am to 7pm Monday to Friday. This Noise Impact Assessment will assess the potential noise generated from the proposed Child Care, including the 49 children and vehicles within the car park and street, and evaluate its impact at the surrounding residential receivers.

This assessment consisted of measuring the background noise levels at the site to establish the noise criteria. Acoustic modelling will be undertaken to predict the noise emissions from the site (children, mechanical plant, and traffic noise from the basement and street parking). The predicted and measured noise emissions at the site will determine the required noise controls for the development.

1.2 Site Location

The site is bound by Townsend Street to the south and Manahan Street to the west. The adjoining northern and eastern properties have the residential dwellings 65 Manahan Street and 44A Townsend Street respectively. The surrounding receivers to the site are residential at a radius of 130 metres with the closest non-residential receiver being Condell Park High School at a distance of 140 metres to south-west.

The map below in Table 1.1 outlines the nearest receivers and the proposed Child Care centre.

Table 1.1 – Surrounding noise receivers

Receiver	Address	Location in Relation to the Development	Description
R1	44A & 44 Townsend St	West	2 storey duplex dwelling
R2	65 Manahan St	North	2 storey residential dwelling
R3	82A & 82 Manahan St	North-West	2 storey duplex dwelling
R4	46B & 46C Townsend St	West	2 storey duplex dwelling
R5	65 Townsend St	South-West	1 storey residential dwelling
R6	63 Townsend St	South	1 storey residential dwelling
R7	61 Townsend St	South-East	1 storey residential dwelling

Figure 1.1

Map provided by SIX Maps

Legends

Proposed Child care centre

Unattended Noise Monitoring

R1 ...Residential Noise Receiver Locations

Site Address:
46a Townsend Street,
Condell Park NSW 2196

Contract No.: C23 9148

Report No.: EMS23 1155

2 METHODOLOGY

2.1 Background Noise Monitoring

Unattended background noise monitoring was conducted from the 6th to 13th December 2023 using the Brüel & Kjær 2250 Sound Analyser (SLM) at the site. The noise monitor was installed on the roof (sheet metal part) of the existing dwelling, with the microphone of the logger approximately 1.3 metres above the roof level.

The logger was set to record the 'A' weighted statistical sound pressure level using a 'fast response'. The unit was calibrated prior to and after the measurement and no significant drift was found.

For the background noise assessment, the L_{A90} will be used to determine the Rating Background Level for the site. This statistical measurement is a sound pressure level measurement that exceeds 90% of the measurement period. The L_{A10} were also obtained during the monitoring period. The L_{A10} represents the sound pressure that is exceeded for 10% of the measurement.

The noise logger also collects the L_{Aeq}, this represents the equivalent continuous noise level – the level of noise equivalent to the energy average of noise levels occurring over a measurement period and is represented by the blue line in the graph found in Appendix A.

For the aircraft noise assessment, L_{ASmax} noise levels were also logged in 1 second intervals.

The SLM was configured to record audio signals on a rising trigger level above 68 dB(A) $L_{Aeq,\ 1\ sec}$ to identify aircraft noise sources and potential extraneous noise.

3 BACKGROUND NOISE MONITORING

3.1 Rating Background Level

As all periods of the day have different background noise levels, the Environment Protection Authority's (EPA) publication *Noise Policy for Industry 2017* (NPfI) defines each period for assessment.

Below is the time category for the noise assessment extracted from the NPfI:

- **Day:** the period from 07:00 am to 06:00 pm Monday to Saturday; or 08:00 am to 06:00 pm on Sundays and public holidays.
- **Evening:** the period from 06:00 pm to 10:00 pm.
- **Night:** the remaining periods 10:00 pm to 07:00 am Monday to Saturday; or 10:00 pm to 08:00 am Sundays and public holidays.

The Rating Background Level (RBL) is described in the NPfI as an 'overall single figure background level representing each assessment period (day/evening/night) and is used for assessment purposes'.

Table 3.1 displays the Rating Background Levels and Existing Noise Levels from the unattended noise monitoring (6th – 13th December 2023) conducted at the monitoring location shown in Figure 1.1.

Table 3.1 – Summary of the Existing Noise Level (L_{Aeq}) and RBL (L_{A90}) in dB at 46a Townsend Street

Time of Day	Monitoring Location	Rating Background Level (RBL) L_{A90}	Existing Noise Level L_{Aeq}
Day Time (07:00 – 18:00)	46a Townsend St, Condell Park (roof)	42	56
Evening Time (18:00 – 22:00)		43	54
Night-Time (22:00 – 07:00)		36	50

Weather data from the Bureau of Meteorology (BOM) – Bankstown Airport AWS (Automatic Weather Station) ID: 066194, located approximately 2.3 km from the proposal, was used to filter out periods affected by rainfall and high windspeeds from the RBL assessment, in accordance with the NPfI. The wind speed at the microphone height was calculated from the method described in the paper titled *Converting Bureau of Meteorology wind speed data to local wind speeds at 1.5m above ground level* (Gowen, Karantonis & Rofail, 2004).

The monitoring location was affected by aircraft from Bankstown airport and road traffic from Townsend and Manahan Streets.

3.2 'Shoulder' Period

To assess the vehicle noise impact of staff arrivals, setup, cleaning or other on-site activities prior to 7am during the night-time period from 6:30am to 7am. The NSW EPA *Noise Policy for Industry* (NPfI) acknowledges (Fact Sheet A3) that it may be unduly stringent to expect such operations to be assessed against the night-time criteria.

For 'shoulder' period RBLs for intrusive noise criteria the NPfI recommends taking the lowest 10th percentile of $L_{AF90,\ 15\ min}$ dB measurements of the equivalent of one weeks' worth of valid data taken over the shoulder period.

Table 3.2 displays the Rating Background Levels and Existing Noise Levels from the external unattended noise monitoring during the 'shoulder' periods conducted at the monitoring locations.

Table 3.2 – Summary of the RBL (L_{A90}) and Existing Noise Level (L_{Aeq}) in dB (6th – 13th December 2023)

Time of Day	Monitoring Location	Rating Background Level (RBL)	Existing Average Noise Levels (L_{Aeq})
Night-time (6:30am – 7am) 'shoulder' period	46a Townsend Street Condell Park	41	53

4 NOISE CRITERIA

4.1 City of Canterbury Bankstown Council

Section 5 from Chapter 10 of the Bankstown Development Control Plan (DCP) 2023 gives the following regarding acoustics for Child Care centres:

> **Acoustic privacy**
>
> **5.1** Air conditioning, mechanical ventilation or any other continuous noise source must not exceed the ambient level at any specified boundary by more than 5dB(A).
>
> **5.2** The location and design of child care centres must consider the projection of noise from various activities to avoid any adverse impacts on the residential amenity of adjoining land.
>
> For the purpose of this clause, Council requires development applications to submit an Acoustic Report prepared by a suitably qualified acoustic consultant to determine:
>
> (a) existing noise levels at the identified sensitive receiver locations;
>
> (b) likely noise levels to emanate from the child care centre at the identified sensitive receiver locations;
>
> (c) whether the development must apply measures to ensure the noise of children playing in outdoor areas does not exceed 10dB(A) above the background noise level;
>
> (d) whether the location and setbacks of the development are sufficient to protect the acoustic privacy of adjacent dwellings;
>
> (e) whether the location of outdoor areas should avoid living areas and bedrooms of adjacent dwellings; and
>
> (f) whether the development must install certain noise attenuation measures to protect the acoustic privacy of adjacent dwellings.
>
> The Acoustic Report must measure the noise readings over a 15 minute period and must provide details of all modelling assumptions including source noise data, noise monitoring positions, receiver heights and locations, prevailing meteorological conditions during the monitoring, confirmation of the methodology adopted along with a copy of the model input and output data.
>
> **5.3** The maximum height for noise attenuation walls and fences along the boundary of an allotment is 2 metres.

Table 4.1 outlines the noise criteria extracted from the DCP for the air conditioning / plant and outdoor play areas at residential receivers.

Table 4.1 – City of Canterbury Bankstown Council – residences adjacent

Receiver	Noise Source	Noise Criteria
Residential	Air Conditioning / Plant	47 (daytime RBL + 5dB)
	Children Playing Outside	52 (daytime RBL + 10dB)

4.2 NSW EPA Noise Policy for Industry

The NSW EPA publication *Noise Policy for Industry* (NPfI) - 2017 provides guidelines for noise assessment and noise mitigation strategies for levels that exceed noise thresholds. The main aims for this policy are:

- To establish noise criteria that will protect the community from excessive intrusive noise and preserve amenity for specific land uses.
- To outline a range of mitigation measures that could be used to minimise noise impacts.

The Noise Policy for Industry implements an Intrusive Noise Criteria and an Amenity Noise Criteria for residential receivers, the more stringent of the two is utilised.

When defining Intrusive noise, the NPfI states 'The intrusiveness of an industrial source may generally be considered acceptable if the level of noise from the source (represented by the L_{Aeq} descriptor), measured over a 15-minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold.'

The Amenity Criteria is used to limit continuing increases in noise by industrial developments.

The evaluated Intrusive and Amenity Noise Criteria for the residential noise receivers surrounding the proposed Child Care centre are displayed below in Table 4.2.

Table 4.2 – NPfI Noise Emission Criteria – Residential (External) dB(A) – residences adjacent to centre

Location	Time of Day	Recommended Acceptable Amenity Noise Level (Suburban)	Rating Background Level (RBL) L_{A90}	Existing Noise Level L_{Aeq}	NPfI Criteria	
					Intrusive $L_{Aeq,15minute}$ Noise Criterion	Amenity $L_{Aeq,period}$ Noise Criterion
Surrounding Residential Receivers	Day (7:00 – 18:00)	55	42	56	**47**	53[1]
	Evening (18:00 – 22:00)	45	43	54	48	**47**[2]
	Night (22:00 – 7:00)	40	36	50	41	43[1]

1. The recommended amenity noise level [recommended amenity noise level – 5 dB] was not 10 dB(A) or more below the existing noise level therefore the project amenity noise level remained [recommended amenity noise level – 5 dB]. 3 dB(A) was added to convert from a period level to a 15-minute level as per the NPfI.
2. The recommended amenity noise level [recommended amenity noise level – 5 dB] was 10 dB(A) or more below the existing noise level therefore the project amenity noise level became [existing noise level – 10 dB]. 3 dB(A) was added to convert from a period level to a 15-minute level as per the NPfI.

4.3 AAAC's Guideline for Child Care Centre Acoustic Assessment

The Child Care assessment shall also be conducted in accordance with the Association of Australasian Acoustical Consultants (AAAC) publication *Guideline for Child Care Centre Acoustic Assessment* which provides noise guidelines to assist Acoustic Consultants to assess the noise impact from proposed Child Care centres. The guideline provides the following:

- Establishment of Noise Criteria for nearby receivers from the proposed Child Care centre and external noise affecting children within the centre.
- Guidelines for Sound Power Level emitting from children, mechanical plants (e.g. condenser units) and traffic noise.
- Noise control recommendations for building design, outdoor play areas and noise management.

The assessment location is defined as the most affected point on or within any residential receiver property boundary. Examples of this location may be:

• 1.5 m above ground level;
• On a balcony at 1.5 m above floor level;
• Outside a window on the ground or higher floors.

Other Noise Emissions

The cumulative $L_{eq,15\ minute}$ noise emission level resulting from the use and operation of the Child Care centre, with the exception of noise emission from outdoor play discussed above, shall not exceed the background noise level by more than 5 dB at the assessment location as defined above. This includes the noise emission resulting from:

- Indoor play;
- Mechanical plant;
- Drop off and pick up;
- Other activities/operations (not including outdoor play)

Aircraft

The L_{ASmax} noise level from aircraft at any location within the indoor play or sleeping areas of the centre during the hours when the Centre is operating shall not exceed 50 dB(A) in accordance with Australian Standard AS 2021.

Sleep Disturbance

The noise impact of staff arrivals, setup, cleaning or other on-site activities prior to 7am or during night-time hours should be assessed at nearby residential premises. The L_{Amax} noise level emitted from vehicles arriving and parking, depending on the requirements of the state or territory where the centre is located shall not exceed the background noise level by more than 15 dB outside the nearest habitable room window.

4.4 The NSW EPA Maximum Noise Level Event Assessment

The EPA raises the assessment of sleep disturbance in a number of its publications, most recently in Section 2.5 of the Noise Policy for Industry – 2017 (NPfI) it is addressed, stating:

> *The potential for sleep disturbance from maximum noise level events from premises during the night-time period needs to be considered. Sleep disturbance is considered to be both awakenings and disturbance to sleep stages.*
>
> *Where the subject development/premises night-time noise levels at a residential location exceed:*
> - *$L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
> - *L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,*
>
> *a detailed maximum noise level event assessment should be undertaken.*
>
> *The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.*
>
> *Some guidance on possible impact is contained in the review of research results in the NSW Road Noise Policy. Other factors that may be important in assessing the extent of impacts on sleep include:*
>
> - *how often high noise events will occur*
> - *the distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development*
> - *whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods)*
> - *current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.*
>
> *Maximum noise level event assessments should be based on the L_{AFmax} descriptor on an event basis under 'fast' time response. The detailed assessment should consider all feasible and reasonable noise mitigation measures with a goal of achieving the above trigger levels.*

The EPA's publication Road Noise Policy gives a conclusion on sleep disturbance when integrating numerous studies on the subject:

- *Maximum internal noise levels below 50–55 dBA are unlikely to cause awakening reactions.*
- *One or two noise events per night, with maximum internal noise levels of 65–70 dBA, are not likely to affect health and wellbeing significantly.*

In summary, a detailed Maximum Noise Level Event Assessment for sleep disturbance should be undertaken if the noise levels in Table 4.3 below are exceeded:

Table 4.3 – Maximum Noise Level Event Assessment in dB(A)

Residential Receivers	Assessment Period	Screening Level L_{Amax} or $L_{A1, 1minute}$ RBL + 15 dB (outdoor level)	Awakening Reaction L_{Amax} (indoor level)
All, outside the nearest bedroom window	Night-time 6:30am to 7am	56	50 – 55

5 NOISE IMPACT ASSESSMENT

The noise predictions were carried out in SoundPLAN (version 9.0). The ground absorption coefficient at the residential receivers surrounding the site was modelled as absorptive 0.9.

Assessment locations at the facades of the adjoining properties 44 Townsend St and 65 Manahan St residences were placed at the centre of the most affected windows of the ground floors and first floor, as determined from the survey plan for the site and from Google Maps. Façade assessment locations on other residences were 1.8 metres above the floor level of the building. Assessment was also made at 1.5 metres above ground level at the most affected point within the yards of adjacent receivers.

The acoustic model has a 2 metre noise barrier fence at the northern and eastern boundaries of the site and a 1.1 metre balustrade around the entire level 1 outdoor play balcony area.

For surrounding buildings, the most affected receiver heights and locations were used for the assessment within the SoundPLAN model.

The noise predictions were based on the measurements and assumptions mentioned below. The main noise sources that may potentially affect the nearby noise receivers are as following:

- Children in Outdoor Play Areas
- Indoor Play and Cot Areas
    - Children Playing
- Vehicle Emissions from Pick Up/Drop Off Areas
- Items of Mechanical Plant.

5.1 Play and Activity Areas

5.1.1 Children Playing

The AAAC's *Guideline for Child care Centre Acoustics Assessment* (Version 3.0) gives the Sound Power Level (SWL) for groups of 10 children playing over different age ranges and is reproduced below in Table 5.1.

Table 5.1 – Effective Sound Power Levels ($L_{Aeq, 15min}$) for Groups of 10 Children Playing Actively taken from AAAC's *GfCCAA*

Number and Age of Children	Sound Power Levels dB(A) at Octave Band Centre Frequencies								
	dB(A)	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
10 Children – 0 to 2 years	78	54	60	66	72	74	71	67	64
10 Children – 2 to 3 years	85	61	67	73	79	81	78	74	70
10 Children – 3 to 5 years	87	64	70	75	81	83	80	76	72

Notes: If applicable, an adjustment to the above Sound Power Levels of -6 dB could be applied in each age group for children involved in passive play.

To calculate the Sound Power Level for a specific number of children, the following formula has been used.

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

Shown below in Table 5.2 are the Sound Power Levels used for the maximum numbers of different age groups of children playing actively.

Table 5.2 – Effective Sound Power Levels ($L_{Aeq, 15min}$) for Maximum Groups of Children Playing Actively

Number and Age of Children	Sound Power Levels dB(A) at Octave Band Centre Frequencies								
	dB(A)	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
12 Children – 0 to 2 years	79	55	61	67	73	75	72	68	65
15 Children – 2 to 3 years	87	63	69	75	81	83	80	76	72
22 Children – 3 to 5 years	90	67	73	78	84	86	83	79	75

Children playing in the outdoor areas of the site have been modelled as area sources covering the play area, at a source height of 1 metre above the ground.

The noise emissions of the internal play areas of the development have been modelled within the rooms of the building as area sources with the Sound Power Levels for the maximum number of children per area playing actively within the play areas. The rooms have been modelled with timber floors, plasterboard walls, glass windows of 8.38mm and 10.5mm thickness, and all operable windows and sliding doors of play areas and the cot room open 25% for ventilation.

5.2 Vehicle Noise Emissions

The proposal has a basement car park, which will adequately contain the noise of vehicles within the basement parking, however, the vehicles entering/exiting the carpark may impact adjacent residences, as will vehicles dropping off/picking up of children on Townsend Street, at the front of the site.

The Traffic Impact Assessment prepared by Transport and Traffic Planning Associates (ttpa) (Ref: 23203, December 2023, Issue: A) gave the flowing characteristics of traffic generation outlined below in Table 5.3.

Table 5.3 – Traffic Generation Peak Hourly Rate

AM (peak)		PM (peak)	
IN	OUT	IN	OUT
10	10	9	10

It is assumed that three quarters of the vehicles will be dropping off or picking up children by parking in the underground car park, with the other one quarter of vehicles using the on-street parking at the front of the centre. There will be an even distribution of vehicles entering and leaving the centre.

For the purpose of this assessment, EMS has assumed the scenario of 5 vehicle movements per hour during the peak hour morning drop off on the street in front of the site (One parking action is made up of 2 moves, entering into the parking bay and leaving the parking bay), and 15 vehicles entering or exiting the basement carpark.

Vehicles entering or exiting the basement carpark have been modelled as moving point sources traversing the carpark ramp at 10 kilometres per hour, with a Sound Power Level of 81 dB(A) as shown in Section 4.3 of the AAAC Guideline, modelled at 0.5m above the driveway height.

EMS calculated the street parking noise emissions in SoundPLAN using ISO 9613-2: 1996 which includes the LFU Bayern 2007 Parking Lot Study algorithm to calculate the Sound Power Level (SWL) of the vehicles within the parking lot. The spectra of a vehicle starting in the study is seen below in Table 5.4.

EMS has previously performed the Sound Power Level measurement of a car door slam and it was calculated at 89 dB(A) L_{Amax}. This SWL was used for the Maximum Noise Level Event Assessment for the on-street parking. LFU Bayern 2007 Parking Lot Study assessed vehicles arriving down a ramp to have a L_{Amax} SWL of 87.1 dB(A) which was assigned to the moving source for the acoustic model.

Table 5.4 – On Street Parking $L_{Aeq,\ 1hour}$ Sound Power Levels

Noise Source	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	SWL
Typical Spectrum of a "car starting" LFU Bayern 2007 Parking Lot	46.3	57.9	50.4	54.9	55.0	55.4	52.7	46.5	63

The LFU Bayern 2007 Parking Lot Study has a number of corrections based on variables used in the algorithm and are listed below.

- K_{PA} Parking Lot Type (Visitor and Staff was used for this assessment) = 0 dB
- K_D Driving Lanes $K_D = 2.5\log_{10}(fB - 9)$ [dB(A)] for $fB \leq 10$ = 0 dB
- K_I Impulse = 4.0 dB
- K_{Stro} Road Surface (Asphaltic driving lanes) = 0.0 dB

The proposed Child Care is not expected to result in an increase of the existing road traffic noise levels on the road network by more than 2 dB thus satisfying the NSW Road Noise Policy.

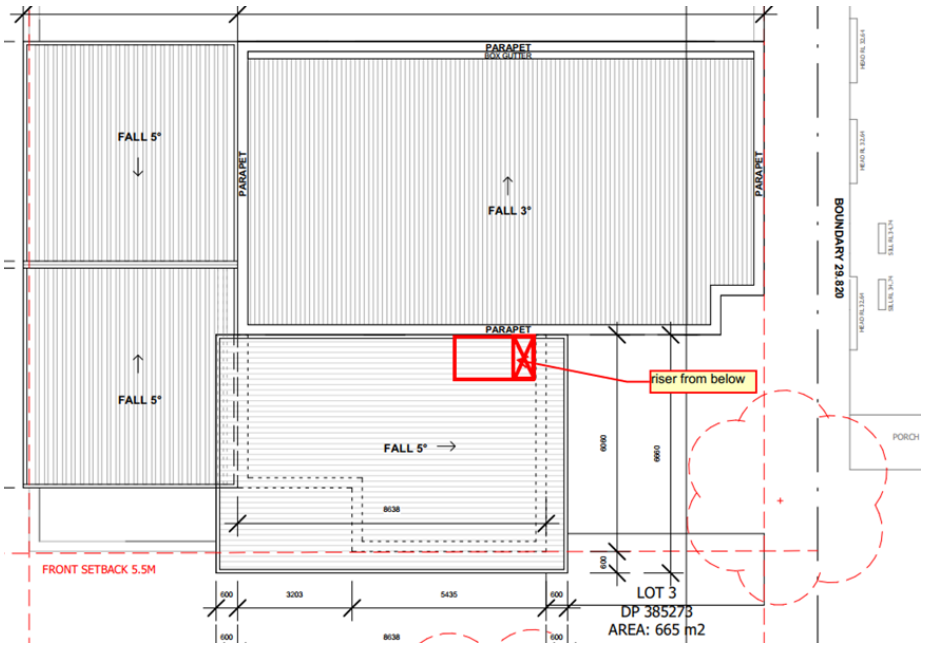
5.3 Mechanical Plant

EMS understands that the proponent intends on implementing air conditioning units, which were modelled on the roof of the proposal adjacent to the riser shaft. A large double fan condenser (outdoor unit) was modelled for the site. As per the AAAC guideline the outdoor air-conditioning unit was given a Sound Power Level (SWL) of 80 dB(A).

The basement car park area will require a mechanical exhaust fan, which will have a vent riser adjacent to the accessible amenities room of the first floor of the development. A maximum sound power level of 75 dB(A) for the basement exhaust vent has been modelled in the assessment, as the fan to be used is yet to be determined.

The location of the garage exhaust fan discharge and air conditioner plant is shown below in Figure 5.1 above the riser.

Figure 5.1 – Mechanical Plant Location



6 PREDICTED NOISE LEVELS

6.1 Cumulative Noise Sources

Table 6.1 below shows the predicted noise levels for cumulative noise sources during the daytime and evening periods and represents a worst-case scenario. The table shows the highest predicted noise level and the individual source contributions at any of the assessed locations for each receiver.

Table 6.1 – Predicted Cumulative Noise Emissions at Residential Receivers (NPfI criteria)

Assessment Period	NPfI $L_{Aeq,15\ minute}$ Noise Criteria (dBA)	Residential Receiver Location (external)	Noise Source	Predicted Noise Level (dBA)	Complies	After Recommendations from Section 7 applied (dBA) Cumulative Level
Day/ Evening	**47**	**R1** 44A & 44 Townsend St	49 Children indoors (windows open)	39.4	✓	46
			Vehicles (drop off/pick up)	35.2	✓	
			Mechanical Plant	52.6	✗	
			Cumulative Noise Level	53	✗	
		R2 65 Manahan St	49 Children indoors (windows open)	47.3	✓	46
			Vehicles (drop off/pick up)	21	✓	
			Mechanical Plant	39.9	✓	
			Cumulative Noise Level	48	✗	
		R3 82A & 82 Manahan St	49 Children indoors (windows open)	36.5	✓	39
			Vehicles (drop off/pick up)	23.4	✓	
			Mechanical Plant	38.3	✓	
			Cumulative Noise Level	41	✓	
		R4 46B & 46C Townsend St	49 Children indoors (windows open)	35.6	✓	40
			Vehicles (drop off/pick up)	26.2	✓	
			Mechanical Plant	40	✓	
			Cumulative Noise Level	42	✓	
		R5 65 Townsend St	49 Children indoors (windows open)	31.6	✓	36
			Vehicles (drop off/pick up)	26.9	✓	
			Mechanical Plant	35.9	✓	
			Cumulative Noise Level	38	✓	
		R6 63 Townsend St	49 Children indoors (windows open)	37.6	✓	42
			Vehicles (drop off/pick up)	35.4	✓	
			Mechanical Plant	40.3	✓	
			Cumulative Noise Level	43	✓	
		R7 61 Townsend St	49 Children indoors (windows open)	39.6	✓	42
			Vehicles (drop off/pick up)	34.5	✓	
			Mechanical Plant	41.7	✓	
			Cumulative Noise Level	44	✓	

Table 6.2 below shows the predicted noise levels for groups of children playing actively in the outside play areas during the daytime period and represents a typical worst-case scenario. The table shows the highest predicted noise level and the individual source contributions at any of the assessed locations for each receiver.

Table 6.2 – Predicted Play Area Noise Emissions at Residential Receivers (Bankstown DCP / AAAC criteria)

Assessment Period	Bankstown DCP / AAAC $L_{Aeq,15\ minute}$ Noise Criteria (dBA)	Residential Receiver Location (external)	Noise Source	Predicted Noise Level (dBA)	Complies	After Recommendations from Section 7 applied (dBA) Cumulative Level
Daytime/ Evening	**52**	**R1** 44A & 44 Townsend St	12x 0-2 y/o (79 dBA)	15.8	✓	47
			15x 2-3 y/o (87 dBA)	23.9	✓	
			22x 3-5 y/o (90 dBA)	47.6	✓	
			Cumulative Noise Level	48	✓	
		R2 65 Manahan St	12x 0-2 y/o (79 dBA)	17.2	✓	50
			15x 2-3 y/o (87 dBA)	25.2	✓	
			22x 3-5 y/o (90 dBA)	53.9	✗	
			Cumulative Noise Level	54	✗	
		R3 82A & 82 Manahan St	12x 0-2 y/o (79 dBA)	2.3	✓	44
			15x 2-3 y/o (87 dBA)	10.3	✓	
			22x 3-5 y/o (90 dBA)	44.4	✓	
			Cumulative Noise Level	44	✓	
		R4 46B & 46B Townsend St	12x 0-2 y/o (79 dBA)	0.9	✓	45
			15x 2-3 y/o (87 dBA)	9.0	✓	
			22x 3-5 y/o (90 dBA)	45.2	✓	
			Cumulative Noise Level	45	✓	
		R5 65 Townsend St	12x 0-2 y/o (79 dBA)	3.8	✓	40
			15x 2-3 y/o (87 dBA)	11.8	✓	
			22x 3-5 y/o (90 dBA)	39.7	✓	
			Cumulative Noise Level	40	✓	
		R6 63 Townsend St	12x 0-2 y/o (79 dBA)	10.0	✓	40
			15x 2-3 y/o (87 dBA)	18.0	✓	
			22x 3-5 y/o (90 dBA)	39.9	✓	
			Cumulative Noise Level	40	✓	
		R7 61 Townsend St	12x 0-2 y/o (79 dBA)	25.1	✓	40
			15x 2-3 y/o (87 dBA)	33.1	✓	
			22x 3-5 y/o (90 dBA)	38.6	✓	
			Cumulative Noise Level	40	✓	

6.2 Maximum Noise Level Event Assessment (Sleep Disturbance) Predicted Noise Levels

Table 6.3 below gives the Maximum Noise Level Event Assessment at the surrounding residential Noise Catchment Areas. The highest predicted level per residential receiver per Noise Catchment Area is presented.

Table 6.3 – Predicted Noise Emissions at Residential Receivers (Sleep Disturbance)

Residential Receiver Location (external)	Assessment Period	NPfI Noise Criteria (dBA) L_{Amax}	Noise Source	Predicted Noise Level (dBA) L_{Amax}	Complies
R1 44A & 44 Townsend St[1]	'Shoulder' Period 6:30 – 7am	56	Vehicles arriving to site	52	✓
R2 65 Manahan St				35	✓
R3 82A & 82 Manahan St				42	✓
R4 46B & 46B Townsend St				44	✓
R5 65 Townsend St				44	✓
R6 63 Townsend St				54	✓
R7 61 Townsend St				53	✓

1. From inspecting internal real estate photos of 44A Townsend St the two Level 1 windows on the western façade are bathroom windows and the nearest Level 1 bedroom window to vehicle noise sources entering the basement parking is the glazed sliding door on the balcony of the southern façade. The Ground Floor window on the western façade closest to Townsend St is the lounge room. The acoustic model had the receiver location modelled at the glazed sliding door on the southern façade of the Level 1 balcony.

7 RECOMMENDATIONS

Table 6.2 shows that with a 2 metre noise barrier fence at the northern and eastern boundaries of the site and a 1.1 metre balustrade around the entire level 1 outdoor play area, the noise emissions from a number of groups of children playing outside will exceed the RBL + 10 dB(A) criteria of the Bankstown DCP for children playing outside at a number of receivers.

EMS recommends the following noise management plan and construction recommendations be incorporated into the design and operation of the Child Care to ensure the centre's noise emissions are within the relevant noise limits.

7.1 Acoustic Fencing / Balustrades

Acoustic boundary fencing is required for the control of noise from the site, particularly from the outdoor play areas. The acoustic fencing required for ground floor and level 1 is shown below in Figure 7.1 and Figure 7.2.

Boundary fencing of the site is to have the following as a minimum:

- **Ground Floor Outdoor Play Area northern and eastern boundary:** Acoustic fencing of 2 metre height above ground
- **Level 1 Outdoor Play Area northern balustrade and 2.5 metres of the western balustrade:** Acoustic fencing/balustrade of 1.8 metre height above FFL.

- **Construction:**
    - The acoustic fence is to be masonry or lapped and capped timber construction, corrugated sheet metal, a transparent solid material (e.g glass or Perspex).
    - The acoustic barrier is to have no untreated holes or gaps, including beneath the fence at the base, or between the vertical and cantilevered sections.
    - Should have a minimum surface density of 15kg/m^2.

All external pedestrian gates should be fitted with appropriate door closers to provide a slow and regulated closing of the gate to prevent the generation of impact sound.

Figure 7.1 – Ground Floor Acoustic Barrier/Fence

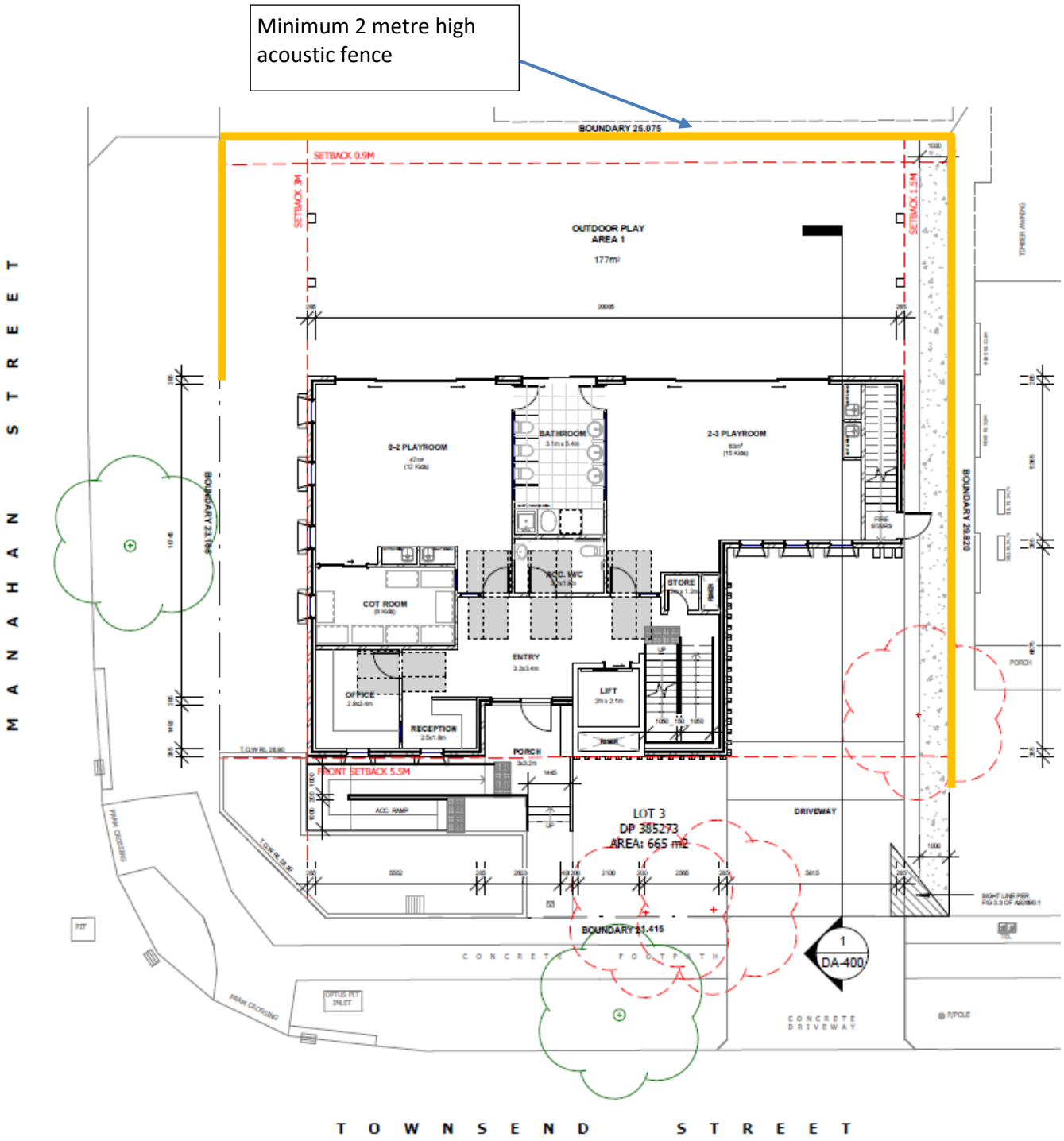
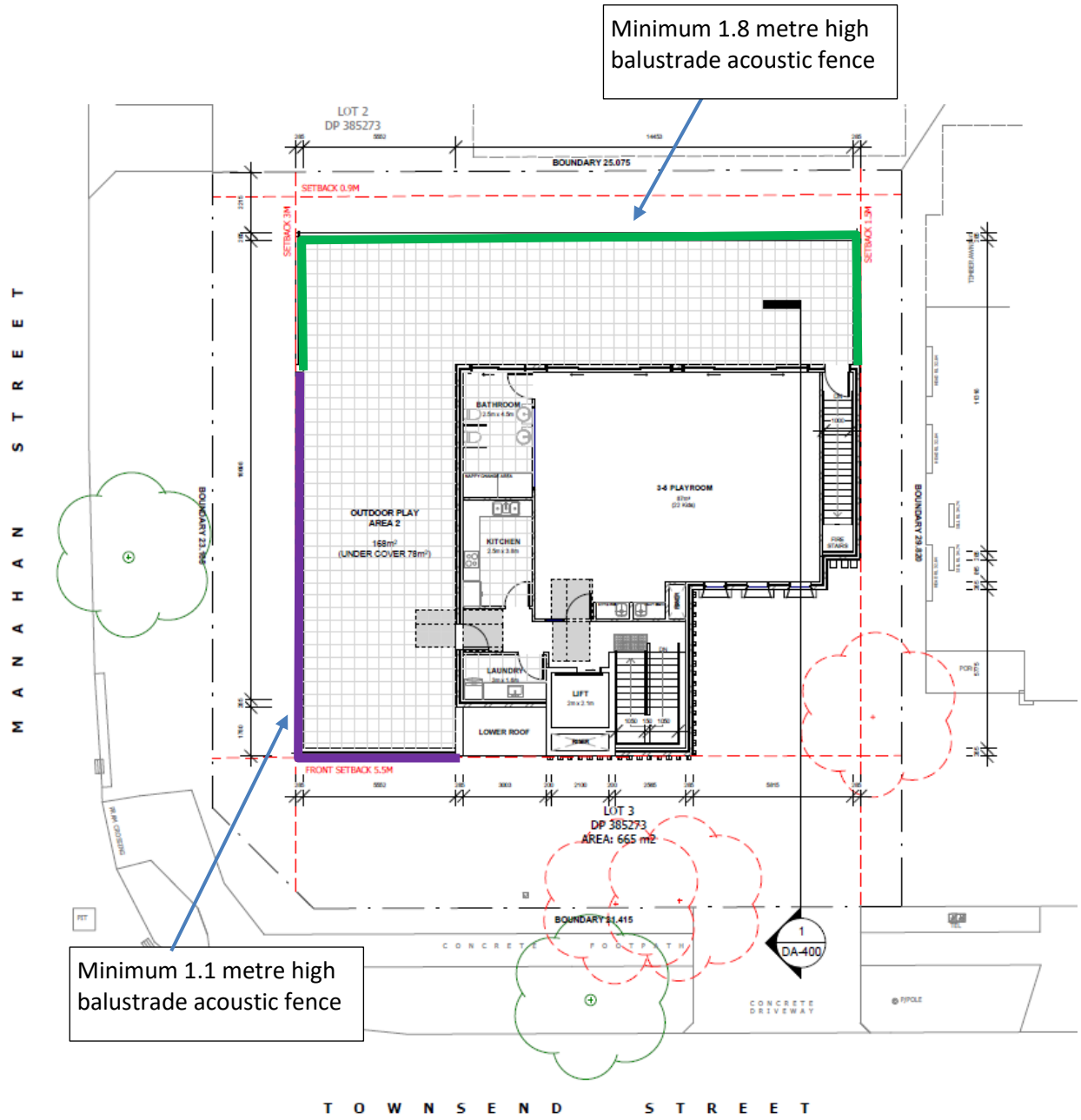


Figure 7.2 – Level 1 Balustrade Acoustic Barrier



7.2 Building Construction Recommendations

7.2.1 External Walls

The external walls of all internal playrooms are to be of masonry construction.

7.2.2 Glazing

All glazing of internal play / cot areas in accordance with Table 9.1 – Window/Door System Requirements[1].

7.2.3 Play Area Absorption

Indoor Play Areas

Ceilings for the play areas fitted with acoustically absorpent panels with a Noise Reduction Coefficient (NRC) of 0.7 to control the buildup of reverberant sound within the room should be considered.

To further lower the reverberation time for the indoor play areas and cot room acoustic blinds and curtains could be installed with a normal incidence NRC of no less than 0.65 such as the Pacific Light Filtering fabric from Acoustic Blinds and Curtains or the ABC Curtain with Exclusive Acoustic Blockout Lining.

Ground Floor Outdoor Play Area

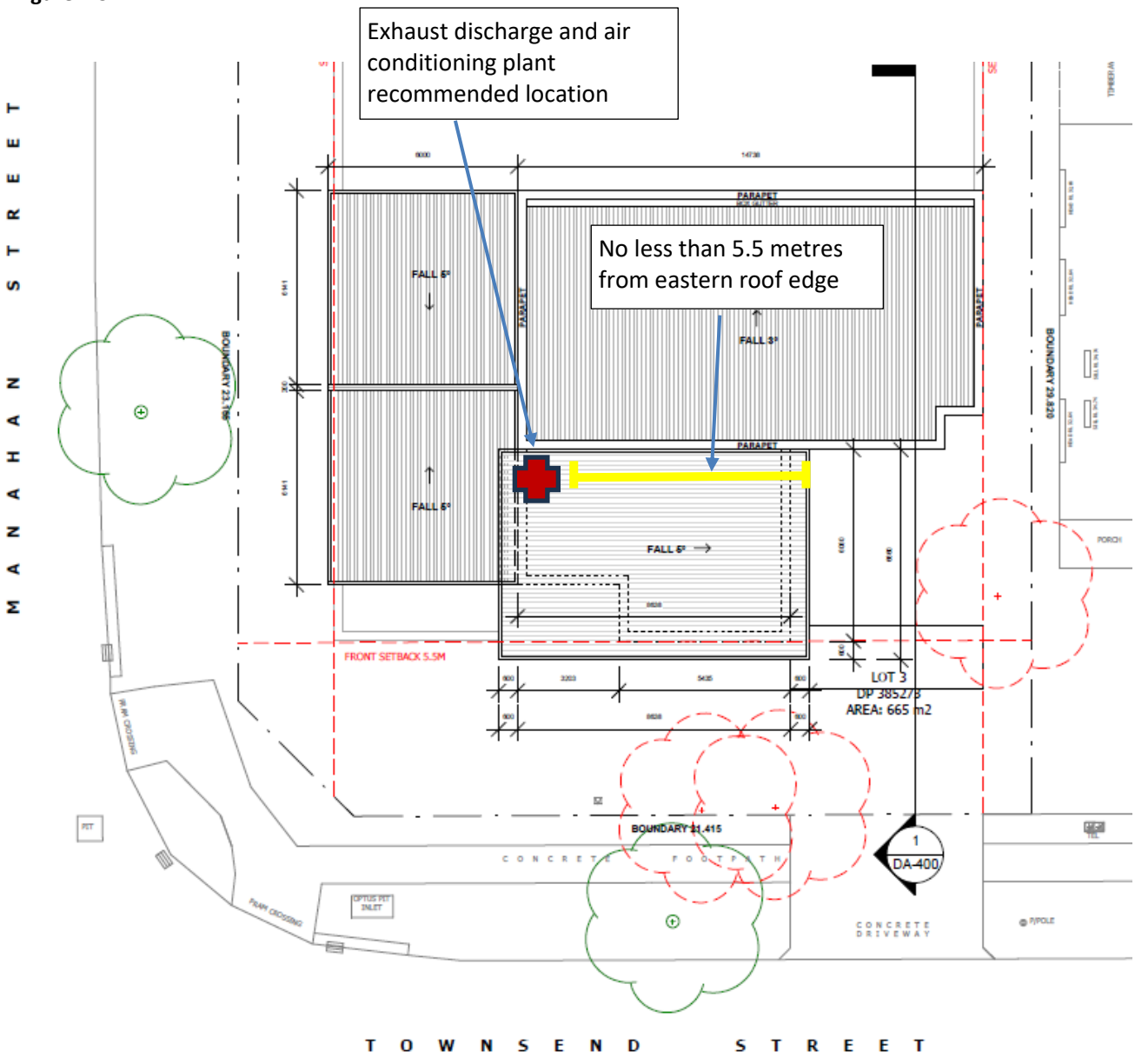
The underside of the Level 1 exposed concrete slab above the 0-2 and 2-3 outdoor play area shall be lined with an absorptive material with a Noise Rating Coefficient of 1.0 such as Stratocell Whisper ® 50mm.

7.3 Items of Mechanical Plant

The following recommendations are made regarding mechanical plant for the proposal.

- The combined level for all rooftop air conditioning plant is not to exceed 80 dB(A). Air conditioning within the basement carpark is permittable.
- The car park exhaust fan is required to:
  - Vent no closer than 5.5 metres from the front eastern edge of the roof as show in Figure 7.3
  - Vent at no more than 0.5 metres above the roof
  - Have a Sound Power Level of no more than 81 dB(A) at the vent. Should an exhaust fan with a higher Sound Power Level be selected noise controls will need to be implemented to attenuate the noise emissions.

Figure 7.3



7.4 General Noise Management Plan

During the operation of the Child Care Centre, we recommend the following noise management, taken from the AAAC *Guideline for Child Care Centre Acoustic Assessment,* to be conducted to ensure the noise amenity of the surrounding receivers. This includes:

- The NMP should be made publicly available to parents and neighbours.
- Contact phone number for the centre's director should be made available to neighbours to facilitate communication and to resolve any neighbourhood issues that may arise due to operation of the centre.
- Parents and guardians should be informed of the importance of noise minimisation when entering the site, dropping off or picking up children. This includes:
    - No door slamming
    - Do not raise voices at the front of the centre
    - Vehicles should not be idling on site
- Crying children should be taken inside the centre and comforted.
- Doors and windows of the indoor playroom may need to remain closed during high noise level activities.
- Carers should be educated to control the level of their voice while outside.
- To meet the noise criteria, amplified music may need to be controlled.
- The number of children playing outside at any one time may need to be limited to meet the noise criteria;
- A separate daily program for both the warmer and cooler months should be established to regulate the total time spent outdoors and indoors;
- The type of outdoor activities may be programmed to only allow quiet or "passive" activities such as painting, garden exploration, reading, block play or drawing in certain areas of the centre's outdoor play area;
- The behaviour of children should be monitored and modified as required by adequately trained Child Care workers;

8 AIRCRAFT NOISE ASSESSMENT

8.1 Project Description

The construction of the 46a Townsend Street development is proposed to be of brick construction from roof to ground and with a sheet metal roof.

The Aircraft Noise Assessment will determine the noise level from nearby aircraft and provide construction recommendations to protect against noise intrusion. The assessment is based on the following:

- Bankstown Master Plan 2019.
- Australian Standard AS 2021:2015–2015 *"Acoustics – Aircraft Noise Intrusion; Building Siting"*
- ZTA drawing plans dated 30 October 2023 (Job No.: 23536).
- AAAC – Guideline for Child Care Centre Acoustic Assessment (Version 3)

8.2 Site Location

Bankstown airport has three parallel runways, Northern 11L/29R, Centre 11C/29C, Southern 11R/29L with the Northern runway being the closest to the proposal. Regarding flightpaths aircraft taking off from the eastern side of the three parallel runways loop the airport for training flights and do not fly directly over the proposal when turning north after take-off. When observing the flight paths on the Envirosuite Web Track helicopter flights were observed to fly directly above the proposed site.

Shown below in Figure 8.1 are the location of the site with regard to the Bankstown Airport runways and helipad, and the Bankstown Airport ANEF contours in Figure 8.2.

Figure 8.1 – Site location regarding Bankstown Airport

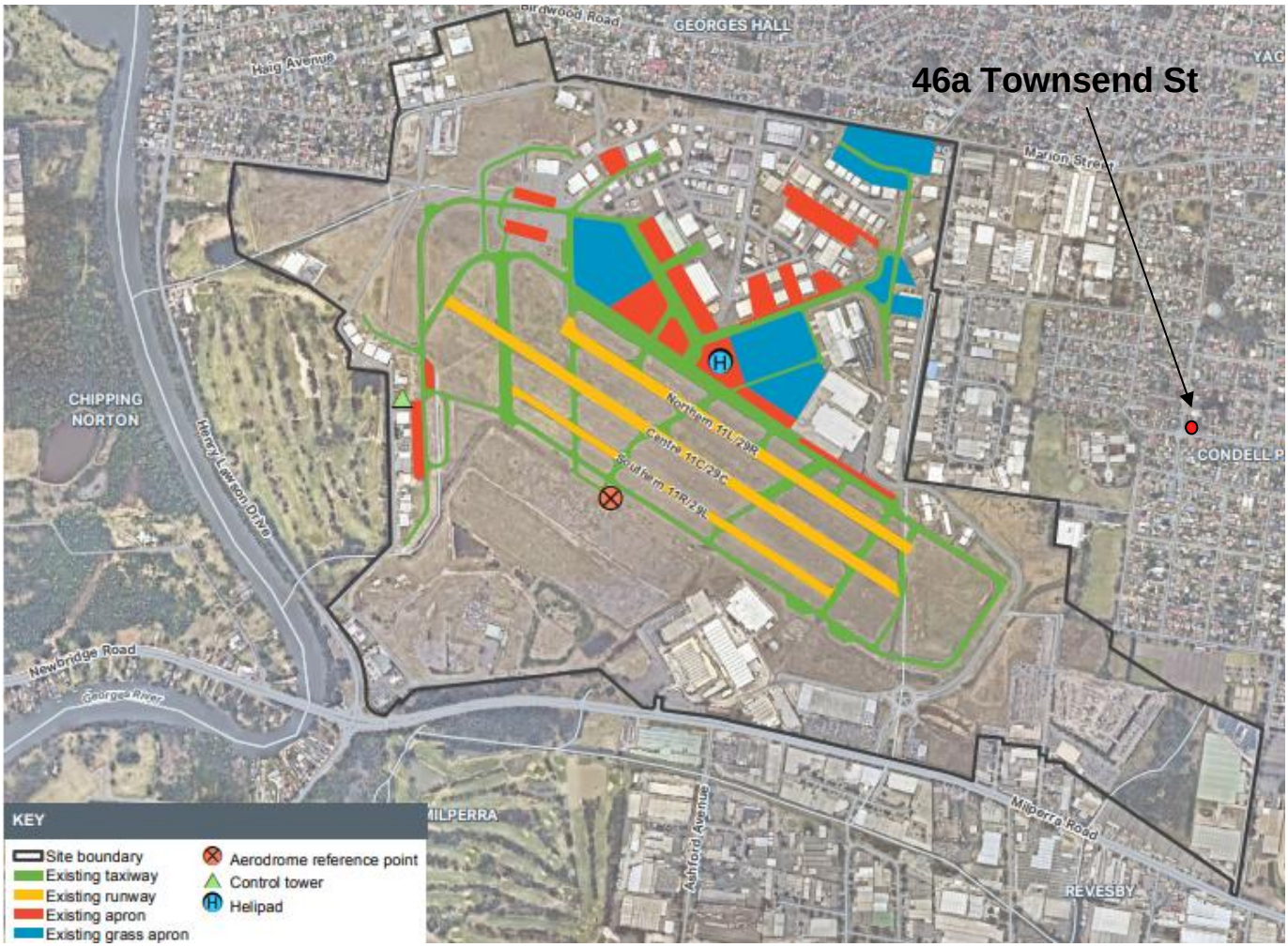
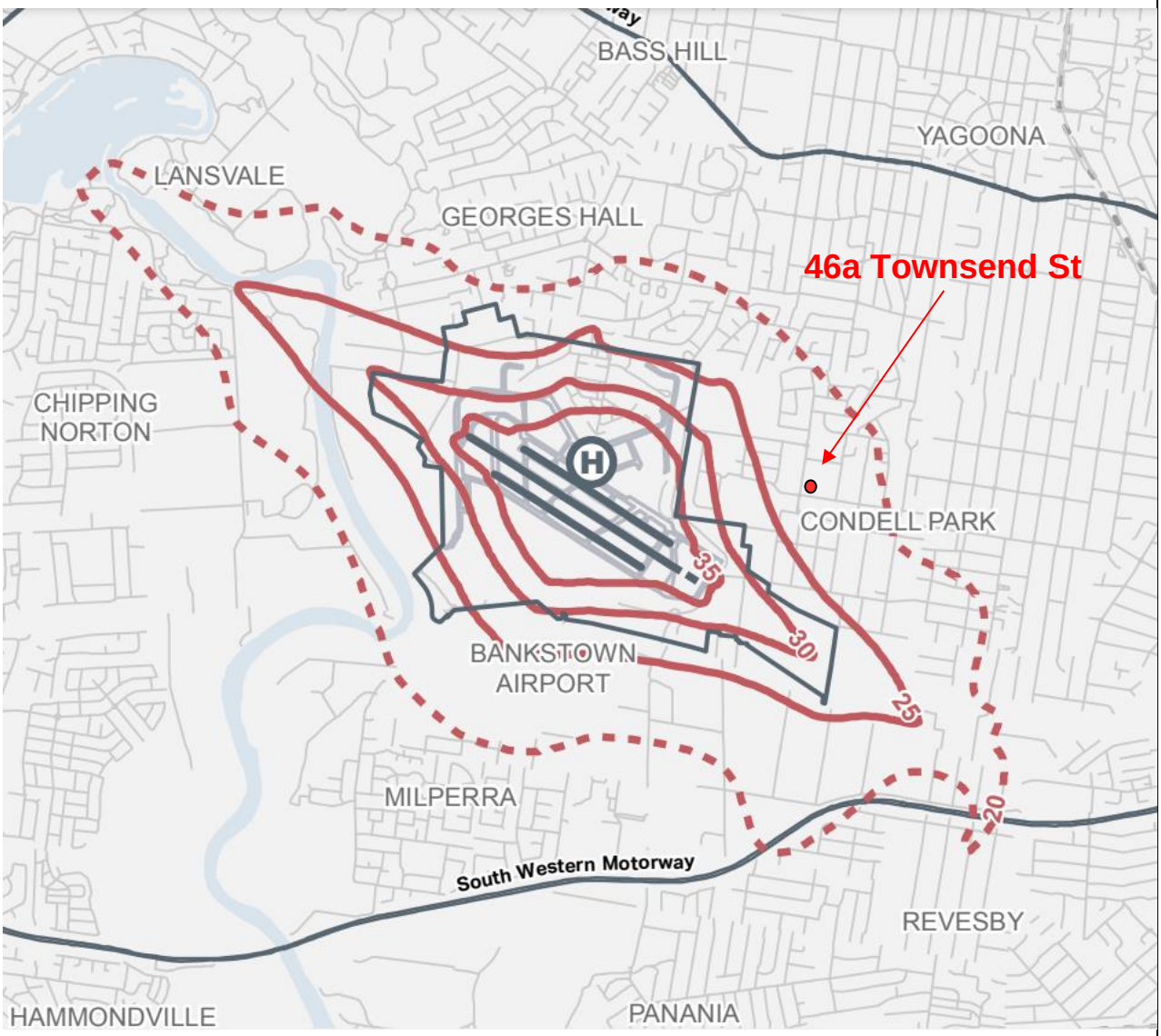


Figure 8.2

ANEF contours are taken Appendix G of Bankstown Airport Master Plan 2019



Environmental Monitoring Services	**Legends** The Site (Proposed Development)	Site: 46a Townsend St, Condell Park NSW 2040 Contract No.: C23 9148 Report No.: EMS23 1155

8.3 Methodology

The Australian Standard 2021:2015 provides construction guidelines for new buildings against aircraft noise intrusion. The Assessment involves determining the maximum noise level emitted from the nearest aircraft and applying the relevant criteria for the proposed site in accordance with the relevant building criteria.

8.4 Aircraft Noise Exposure Forecast (ANEF)

The Australian Standard 2021:2015 gives the following Aircraft Noise Exposure Forecast shown below in Table 8.1.

Table 8.1 – Building Site Acceptability Based On Aircraft Noise Exposure Forecast (ANEF) Zones

Building type	ANEF zone of site		
	Acceptable	Conditionally acceptable	Unacceptable
House, home unit, flat, caravan park	Less than 20 ANEF (Note 1)	20 to 25 ANEF (Note 2)	Greater than 25 ANEF
Hotel, motel, hostel	Less than 25 ANEF	25 to 30 ANEF	Greater than 30 ANEF
School, university	Less than 20 ANEF (Note 1)	20 to 25 ANEF (Note 2)	Greater than 25 ANEF
Hospital, nursing home	Less than 20 ANEF (Note 1)	20 to 25 ANEF	Greater than 25 ANEF
Public building	Less than 20 ANEF (Note 1)	20 to 30 ANEF	Greater than 30 ANEF
Commercial building	**Less than 25 ANEF[3]**	**25 to 35 ANEF**	**Greater than 35 ANEF**
Light industrial	Less than 30 ANEF	30 to 40 ANEF	Greater than 40 ANEF
Other industrial	Acceptable in all ANEF zones		

NOTES:

1. The actual location of the 20 ANEF contour is difficult to define accurately, mainly because of variation in aircraft flight paths. Because of this, the procedure of Clause 2.3.2 may be followed for building sites outside but near to the 20 ANEF contour.

2. Within 20 ANEF to 25 ANEF, some people may find that the land is not compatible with residential or educational uses. Land use authorities may consider that the incorporation of noise control features in the construction of residences or schools is appropriate (see also Figure A1 of Appendix A).

3. EMS notes the proposal is within the **20 to 25 ANEF** and therefore there is usually no need for the building construction to provide protection specifically against aircraft noise. However, in accordance with the AAAC Guideline for Child Care Centre Acoustic Assessment criteria outlined in Section 8.5 of this report gives indoor play areas and sleeping rooms a L_{ASmax} criterion of 50 dB(A).

8.5 Aircraft Noise Criteria

The Australian Standard 2021:2015 is concerned with land use planning and building treatments in the vicinity of an airport. The main objective is to provide guidance to building development and construction of new buildings against aircraft noise intrusion. The Standard provides the following:

- Guidelines for determining the acoustical acceptability of a particular site
- Guidance for the determination of noise exposure from aircraft noise of a particular site
- Guidelines for determining the extent of noise reduction required for the proposed site

Table 8.2 presents the noise goals for this type of development.

Table 8.2 – Indoor Design Sound Levels for Determination of Aircraft Noise Reduction[1]

Building Type and Activity	Indoor Design Noise Level dB (A)
Commercial building, offices and shops	
Private offices, conference rooms	55
Drafting, open offices	65
Typing, data processing	70
Shops, supermarkets, showrooms	75

1. EMS notes although the development is in an Acceptable zone with no need for the building construction to provide protection specifically against aircraft noise the AAAC Guideline for Child Care Centre Acoustic Assessment gives indoor play areas and sleeping rooms a L_{ASmax} criterion of 50 dB(A) as outlined in Section 4.3.

8.6 Maximum Aircraft Noise Level

The background noise monitoring and Envirosuite Web Trak showed the aircraft with highest noise levels at the proposal with more frequent flyovers were from helicopter movements. AS2021:2015 does not recommend using lookup tables to give the maximum aircraft noise levels giving the following advice regarding helicopters:

> *Noise levels from helicopters are more difficult to determine than those from fixed wing aircraft, because their flight tracks and operating parameters depend significantly on local conditions. For this reason it is not considered possible to use (tables) … to determine external noise levels from helicopters at a building site.*

Table 8.3 shows the highest 20 L_{ASmax} flyovers Sound Pressure Levels from the background monitoring on the roof of the existing dwelling at 46a Townsend Street, Condell Park. The background monitoring is described in 2.1 Background Noise Monitoring.

Table 8.3 – Maximum Aircraft Noise Levels at 46a Townsend Street, Condell Park

Time and Date	Aircraft Type	Aircraft Model	Flightpath in relation to development	L_{ASmax}
7 Dec - 9:42:01 AM	Helicopter	A139	Over site, then landing	88.9
7 Dec - 8:49:01 AM	Helicopter	B06	Over site, then landing	87.2
8 Dec - 11:43:24 AM	Helicopter	G2CA	Over site, then landing	83.8
8 Dec - 6:56:51 PM	Plane	No plane ID given	Over site	83.1
11 Dec - 8:21:41 AM	Plane	No plane ID given	Over site	82.9
9 Dec - 1:45:10 PM	Helicopter[2]	– [3]	Unknown	82.7
8 Dec - 11:20:29 AM	Helicopter[2]	– [3]	Over site, then landing	82.6
6 Dec - 3:35:39 PM	Plane	PA24	Over site	82.3
12 Dec - 10:05:26 AM	Helicopter	B412	Over site	82.0
6 Dec - 9:16:52 PM	Helicopter	A139	Over site	81.1
10 Dec - 11:48:55 PM	Helicopter	A139	Approx. 250m N of site	81.0
11 Dec - 7:07:21 AM	Plane[1]	– [3]	Unknown	81.0
13 Dec - 7:44:54 AM	Helicopter	B429	Over site, then landing	80.8
10 Dec - 11:04:21 AM	Plane[1]	C208	Over site	80.6
10 Dec - 10:02:11 AM	Helicopter	B412	Over site	80.4
8 Dec - 8:06:03 AM	Helicopter[2]	– [3]	Unknown	79.4
12 Dec - 1:19:53 PM	Plane	BE36	Approx. 250m E of site	79.0
7 Dec - 1:37:41 PM	Plane	P28A	Take off, then over site	79.0
10 Dec - 2:43:34 PM	Helicopter	A139	Over site	78.9
6 Dec - 10:46:14 AM	Plane	– [3]	Unknown	78.7

1. It is assumed from the lower low frequency content that the aircraft is a plane and not a helicopter.
2. It is assumed from the higher low frequency content that the aircraft is a helicopter and not a plane.
3. The background noise monitoring levels and triggered audio recording data showed an aircraft present at this time, however, no aircraft was displayed on the Envirosuite Web Trak.

From the week of background monitoring data all aircraft that displayed a L_{ASmax} above 75 was analysed. Jets from Bankstown Airport were also identified in the aircraft movements near the proposal however the highest L_{ASmax} was recorded at 78 dB(A).

The arithmetic average of the highest 20 aircraft maximum levels from Table 8.3 was taken to calculate the aircraft noise level used for the assessment being **81.8 dB L_{ASmax}**. The same averaging process was used to obtain the octave band spectral data used for the calculations.

8.7 Aircraft Noise Reduction (ANR)

Using the maximum fly-over noise level from Section 8.6 (above), Table 8.4 shows the required Aircraft Noise Reduction values for child care indoor play areas and sleeping rooms have been derived. The other areas of the proposal do not require aircraft noise attenuation measures.

Table 8.4 – Aircraft Noise Reduction for room type within the proposed childcare centre

Building Type and Activity	Aircraft Noise Reduction (ANR)
Child Care (indoor play areas and sleeping rooms)	32

A conservative reverberation time (RT_{60}) of 0.7 seconds was used for the indoor play areas and sleeping rooms as engineered timber floors are proposed with plasterboard walls and ceilings.

As the required Aircraft Noise Reduction is in excess of 30 dB(A), the calculations and proposed recommendations for the noise attenuation have been conducted using octave band spectral data.

9 AIRCRAFT NOISE CONSTRUCTION RECOMMENDATION

This section provides construction recommendations to achieve the appropriate noise attenuation from aircraft noise for the relevant rooms. The guidelines are based on various factors including runway distance; aircraft noise level of a particular location, indoor design sound level criteria and construction drawing plans.

To achieve the required aircraft noise attenuation for the development, the acoustic performance of the building relies on the quality of workmanship, product specifications and construction methods commensurate with the appropriate acoustic design.

EMS recommends the following for the construction of the development:

- All joints and interfaces between construction elements are to be detailed sufficiently to reduce flanking noise. All joints are to be tight and sealed with non-hardening acoustically rated mastic materials.
- All ceiling and external wall penetrations are to incorporate appropriate detailing to ensure that the acoustic rating of the system is not reduced.
- All joints between walls and ceilings are to be continuous and sealed air-tight and set prior to cornice installation.
- Where multiple layers of plasterboard are required, each layer is to have all joints set and sealed prior to the addition of the next layer. Joints between sheets of material are to be offset by a minimum of 500mm to the joints of the next layer.
- All materials and systems detailed in this report are to be installed in strict accordance with the manufacturers specifications/requirements.
- Ducted air conditioning is not recommended for the Level 1 ceiling space due to the high acoustic rating of the development.

9.1 Roof/Ceiling

The recommended minimum construction for the sheet metal roof/ceiling system of the 3-5 playroom:

- One of the below sheet metal roof cladding with building blanket over
    - Kliplock (minimum 0.55mm BMT)
    - Styline (minimum 0.55mm BMT)
    - Diamonddek 400 (minimum 0.55mm BMT)
- Minimum 250mm ceiling joists,
- Minimum 275mm insulation batts between ceiling joist such as Earthwool R-6.0 Ceiling Batt or similar,
- 2 layers of 13 mm sound rated plasterboard such as CSR Gyprock Soundchek (minimum surface mass of 13kg/m^2 per sheet).

9.2 General Roof/Ceiling Construction Techniques

The installation of the ceiling needs to be carried out in such a way that the acoustic rating is not reduced. This includes but is not limited to sealing of ceiling to wall junctions and proper filling of joints between sheets, back filling with mortar any chasing of walls and filling the junction of walls.

9.2.1 Penetrations

Any penetrations in a sound-rated ceiling should be acoustically treated in order for the minimum requirement sound rating to be achieved.

The following penetrations must be acoustically treated and certified to be equal to or greater than the element in which they are installed to:

- Downlights;
- Mechanical ventilation;
- Air conditioning;
- Ceiling Speakers; and
- Fire sprinklers

9.2.2 Plasterboard

Where multiple layers of plasterboard are specified the following is required:

- All joints between boards of the same layer are to be taped and set prior to the installation of the following layer,
- Each layer is to be positioned so that all joints are offset from the previous layer.

9.2.3 Eaves

Open eaves allow a direct path into the roof space and effectively bypass noise reduction methods in the roof construction. Noise then enters via the ceiling. Open eaves shall be enclosed to the decrease the overall noise in the roof space and hence the rooms. Eaves can be closed by using timber beams between the roof joists, or other materials such as MDF and compressed cement sheeting.

9.3 Walls

Masonry Walls

The proposed double brick masonry walls with internal plasterboard sheeting will provide adequate sound insulation for development.

All penetrations in the internal skin of external walls should be acoustically sealed.

9.4 General Wall Construction Techniques

The installation of walls and partitions needs to be carried out in such a way that the acoustic rating is not reduced below the specificed $R_{w.}$ This includes but not liminted to sealing of wall junctions, back filling with mortar any chasing of walls and filling the junction of walls.

9.4.1 Wall Junctions

With the exception of plasterboard-to-plasterboard sheet joints, acoustically seal all junctions whether they be vertical or horizontal using a fire rated flexible sealant plus foam backing rod.

9.4.2 Penetrations

All penetrations should be acoustically treated in order for the minimum requirement sound rating to be achieved as specified.

9.5 Windows and Doors

Window seals: ensure windows are fitted with high quality acoustic seals and close windows to reduce internal noise levels.

Window frames and their installation in wall openings must be airtight. Table 9.1 outlines the minimum thickness recommendations for the glazing and door systems to achieve the AAAC indoor noise level of 50 dB(A) in the indoor play areas and cot rooms as outlined in Section 4.3. The sound insulation of window/door frames need to meet or be above the acoustic rating of the glazing they are holding.

Table 9.1 – Window/Door System Requirements[1]

Room	Façade	Window/Door	Dimensions (mm)	Window/Door Systems	Acoustic Seals
Cot Room	West	2 x Operable windows	800mm x 1900mm (each widow)	VLam Hush 10.5mm OR 10.38 laminate	Yes
0-2 Playroom	West	2 x Operable windows	980mm x 1900mm (each widow)	8.38 laminate	Yes
	North	Sliding door	4600mm x 2360mm	VLam Hush 10.5mm	Yes
2-3 Playroom	North	Sliding door	6000mm x 2360mm	VLam Hush 10.5mm	Yes
	South	3 x Operable windows	980mm x 1900mm (each widow)	8.38 laminate	Yes
3-5 Playroom	North	2 x Sliding doors	4600mm x 2000mm (each sliding door)	VLam Hush 10.5mm	Yes
	South	3 x Operable windows	980mm x 1900mm (each widow)	8.38 laminate	Yes

1. EMS notes that the glazing recommendations are based solely on the acoustic performance and the client should consider the other desired or required design, such as safety, thermal or energy efficiency in order that they meet the other relevant standards.

Table 9.2 provides typical Reduction Weighting (R_w) value of various windows; however this table should only be used as a guide for window R_w values only. The glass doors and windows recommended in Table 5.1 are based on 1/1 octave band analysis and the windows for the proposed development should not be ordered off the R_w values.

Table 9.2 – Typical Window Weighted Sound Reduction Index (Rw) Value (taken from Insul Version 9)

Glazing	Minimum Rw/STC rating
4mm float window	29
6mm float window	31
6.38mm laminated window	33
8.38 mm laminated window	35
10.38mm laminated window	36
12.38mm laminated window	37
14.38mm laminated window	38
Viridian Vlam Hush 10.5mm	39
6mm window + 6mm window with a 12 mm air gap	36
5mm window + 6mm window with a 44 mm air gap	39
5mm window + 6mm window with a 100 mm air gap	42
6.38mm laminated + 10.38mm laminated window with a 90mm air gap and full perimeter acoustic seals	51
6.38mm laminated + 100mm air gap +10.38mm	52

Certified Laboratory test certificates should be supplied with the installed glazing. Test certificates may be forwarded to this office for review.

9.6 Ventilation

The ventilation conditions are extracted from the Australian Standard 2021:2015 and outline:

An acoustically insulated building must be kept virtually airtight to exclude external noise. Therefore, mechanical ventilation or air conditioning is needed to provide fresh air and to control odours. Requirements for acceptable indoor-air quality are given in AS 1668.2. Recommended design sound levels for different area of occupancy in buildings are given in AS 2107:2016.

Notes:

1. **The requirement of AS 1668 should be viewed as applying also to Class 1 building as defined by the Building Code of Australia.**
2. **In domestic situations, the minimum requirements set out in AS 1668 are not always adequate to remove kitchen cooking odours or to control damping in older residences.**

Rising damp can cause several fungal growths when an insulated house is left closed for a prolonged period. A time clock controlled ventilation cycle of one hour per 24 hours has been found to provide adequate prevention in Sydney.

Special attention should be given to the detailing of ducts in any uninsulated ceiling space to prevent external noise penetrating the occupied spaces by the way of the air ducts. Any fresh air intake systems and discharge ducts are required to incorporate acoustic silencers and non-flammable acoustic lining for the ducts. The insertion loss of the silencers will depend on the location of the fresh air intake or discharge ducts.

10 CONCLUSION

A Noise Impact Assessment for the proposed Child Care centre at 46a Townsend Street, Condell Park was carried out by EMS. The purpose of this assessment was to evaluate the potential noise impact for the proposed new development.

The assessment consisted of monitoring the background noise and providing a noise impact prediction based on various factors (outlined in Section 5). Recommended noise controls, acoustic construction specifications and noise management are found in Section 7.

An aircraft noise assessment with the required acoustic construction recommendations is provided in Section 8.

If the recommendations are installed and/or followed as per this noise report, the noise emissions from the site will comply with the relevant standards and guidelines which include the City of Canterbury Bankstown Council, AAAC's and EPA's Noise Criteria.

11 REFERENCES

Plans for the proposed development "46a Townsend Street, Condell Park 2196", Job No 21447, prepared by ZTA architects, dated 22 Dec 2022

EPA's NSW – *Noise Policy for Industry* 2017

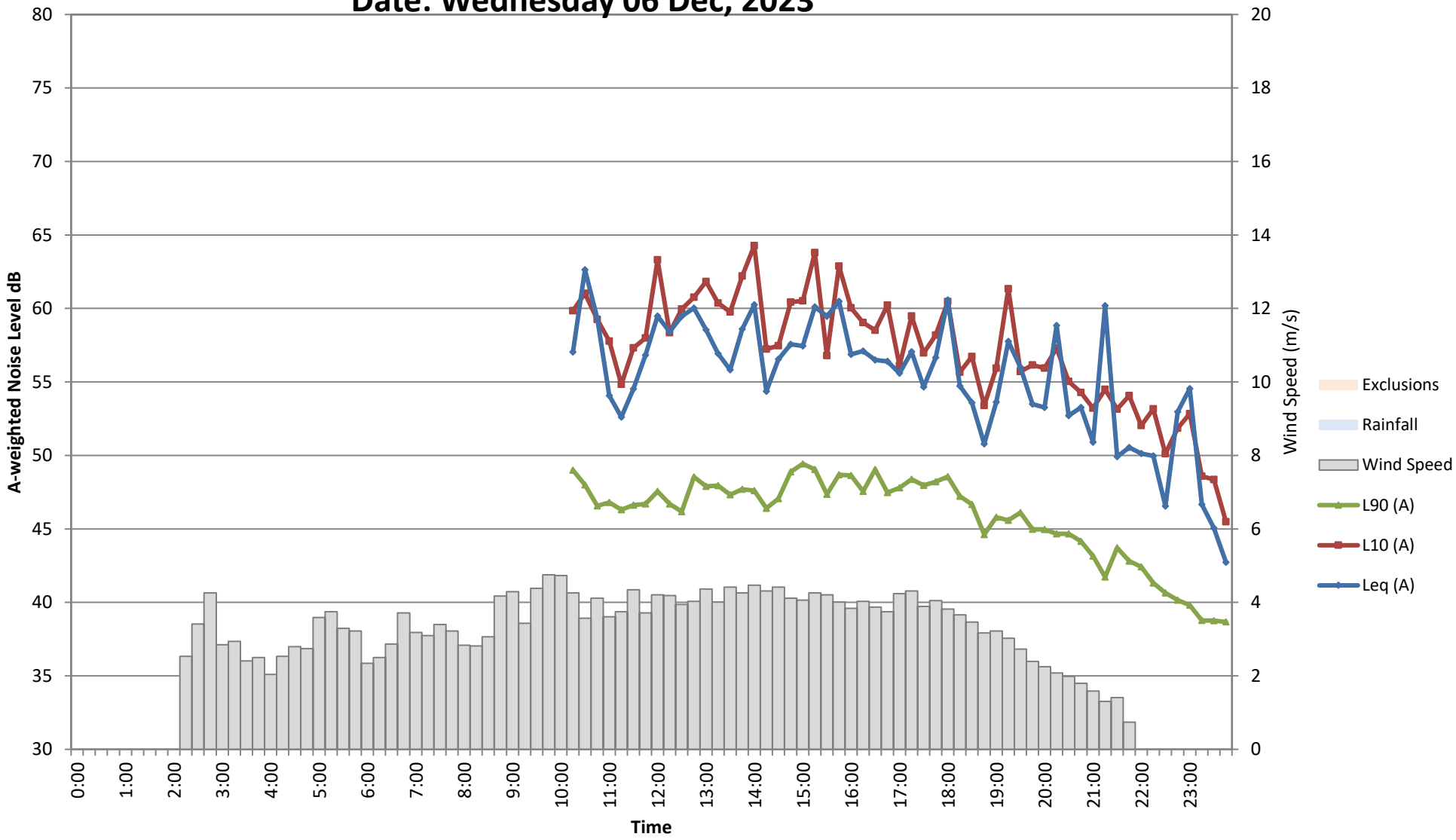
Association of Australian Acoustic Consultants – *Guideline for Child Care Centre Acoustic Assessment* (Version 3) September 2020

Converting Bureau of Meteorology wind speed data to local wind speeds at 1.5m above ground level – Tracy Gowen, Peter Karantonis & Tony Rofail, 2004

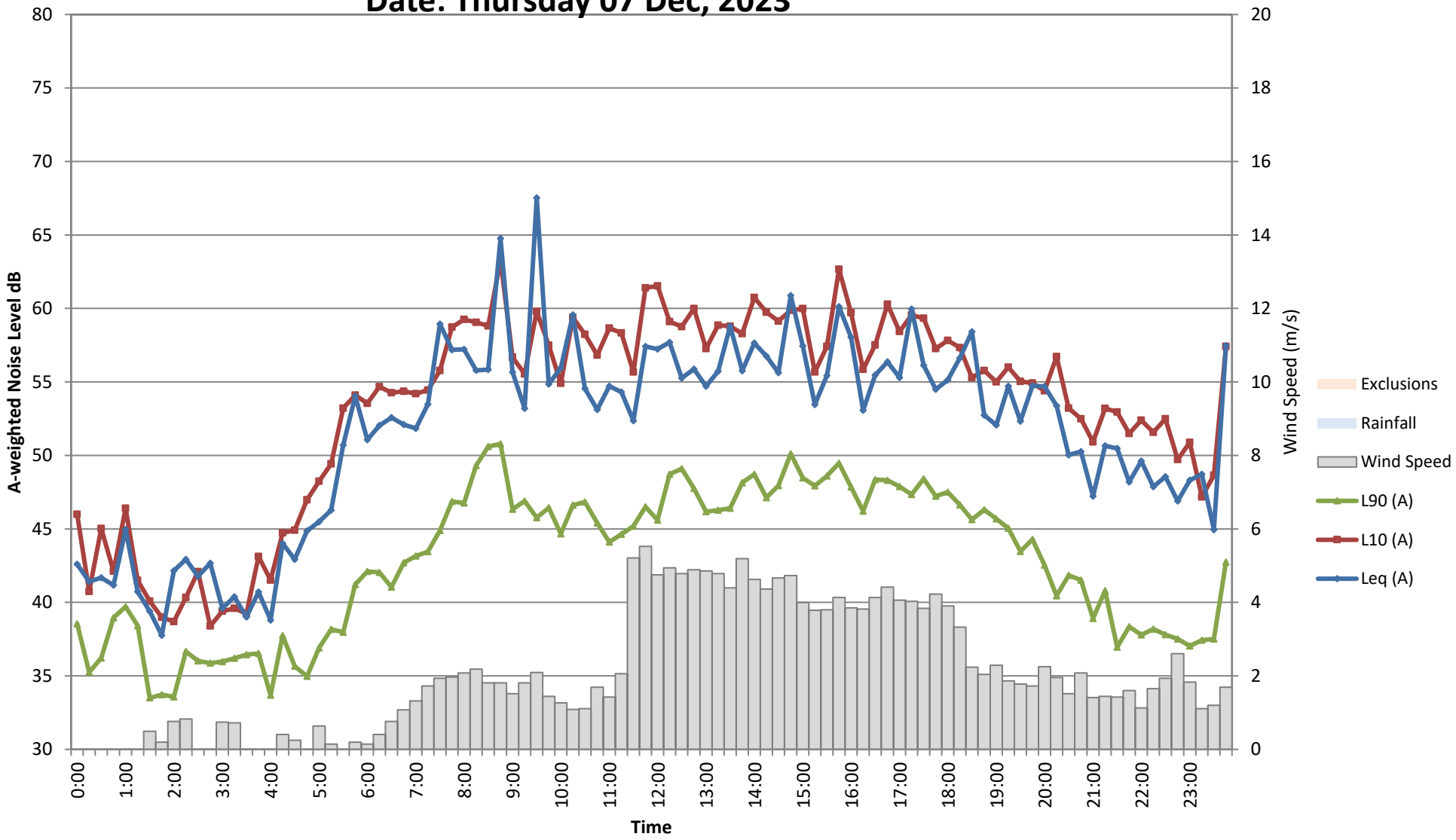
The Traffic Impact Assessment prepared by Transport and Traffic Planning Associates (TTPA) (Ref: 23203, December 2023, Issue: A)

APPENDIX – A (BACKGROUND NOISE MONITORING)

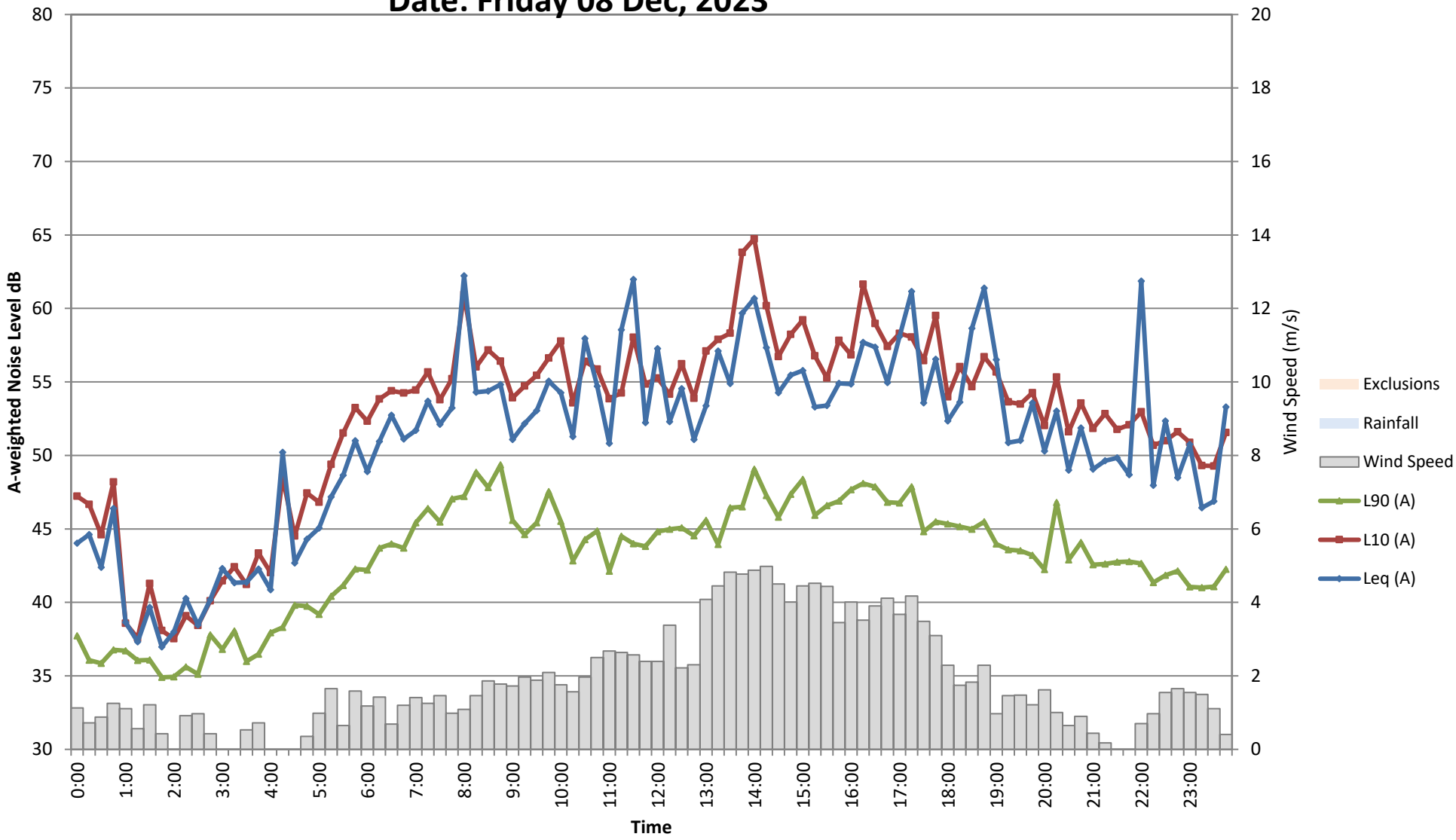
Noise Level Measurements
Monitor Location: 46a Townsend St, Condell Park - Roof
Date: Wednesday 06 Dec, 2023



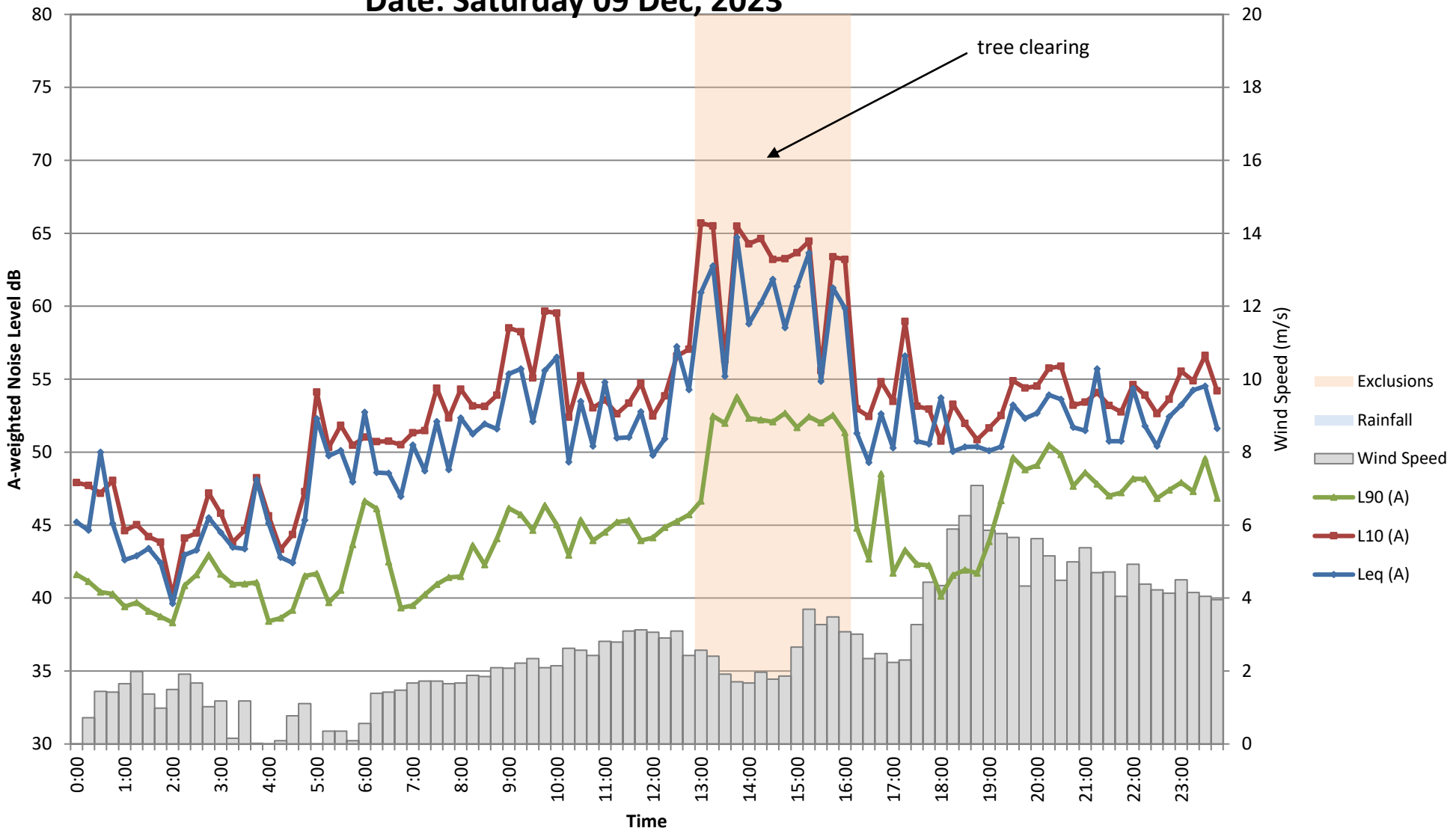
Noise Level Measurements
Monitor Location: 46a Townsend St, Condell Park - Roof
Date: Thursday 07 Dec, 2023



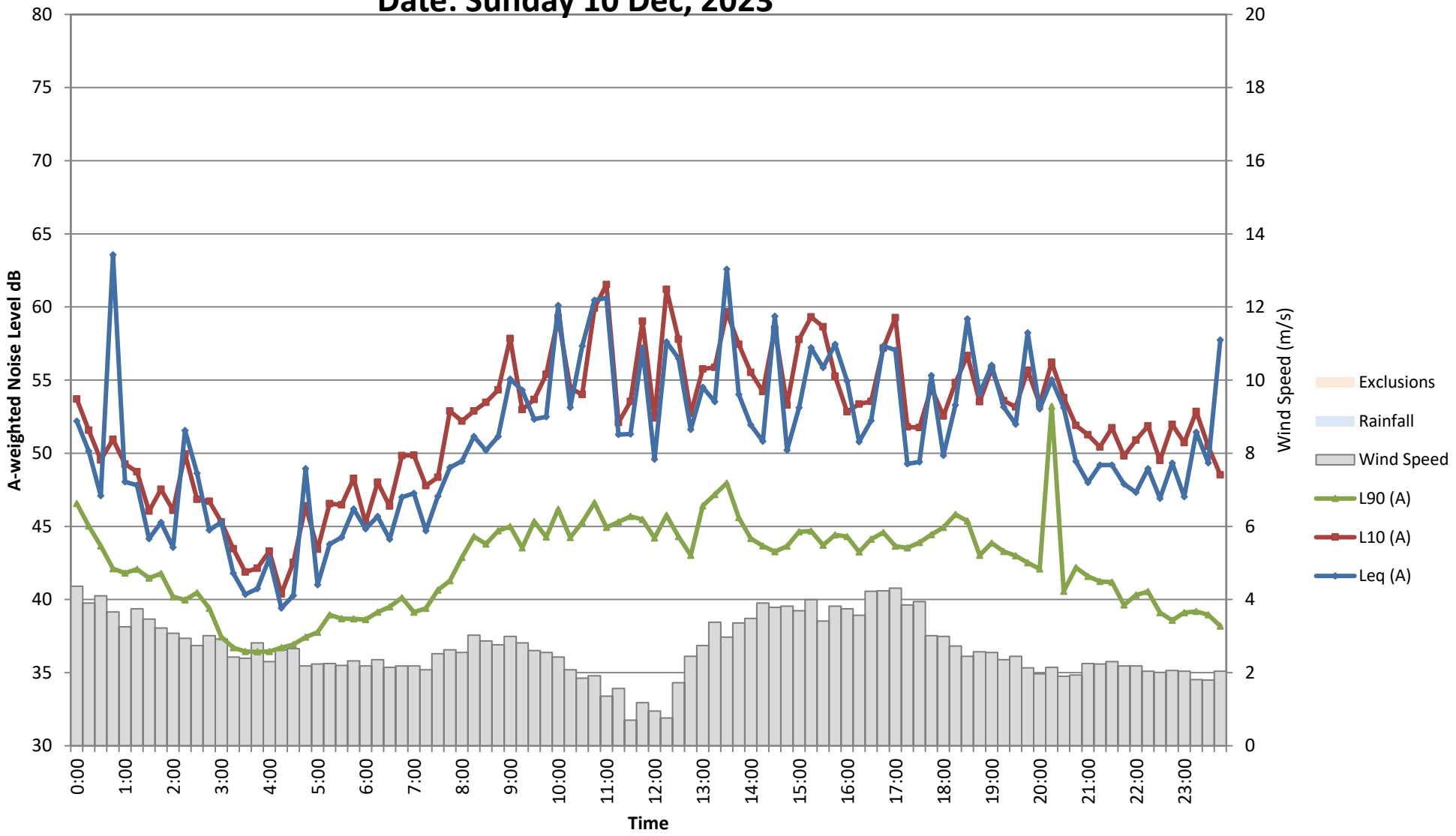
Noise Level Measurements
Monitor Location: 46a Townsend St, Condell Park - Roof
Date: Friday 08 Dec, 2023



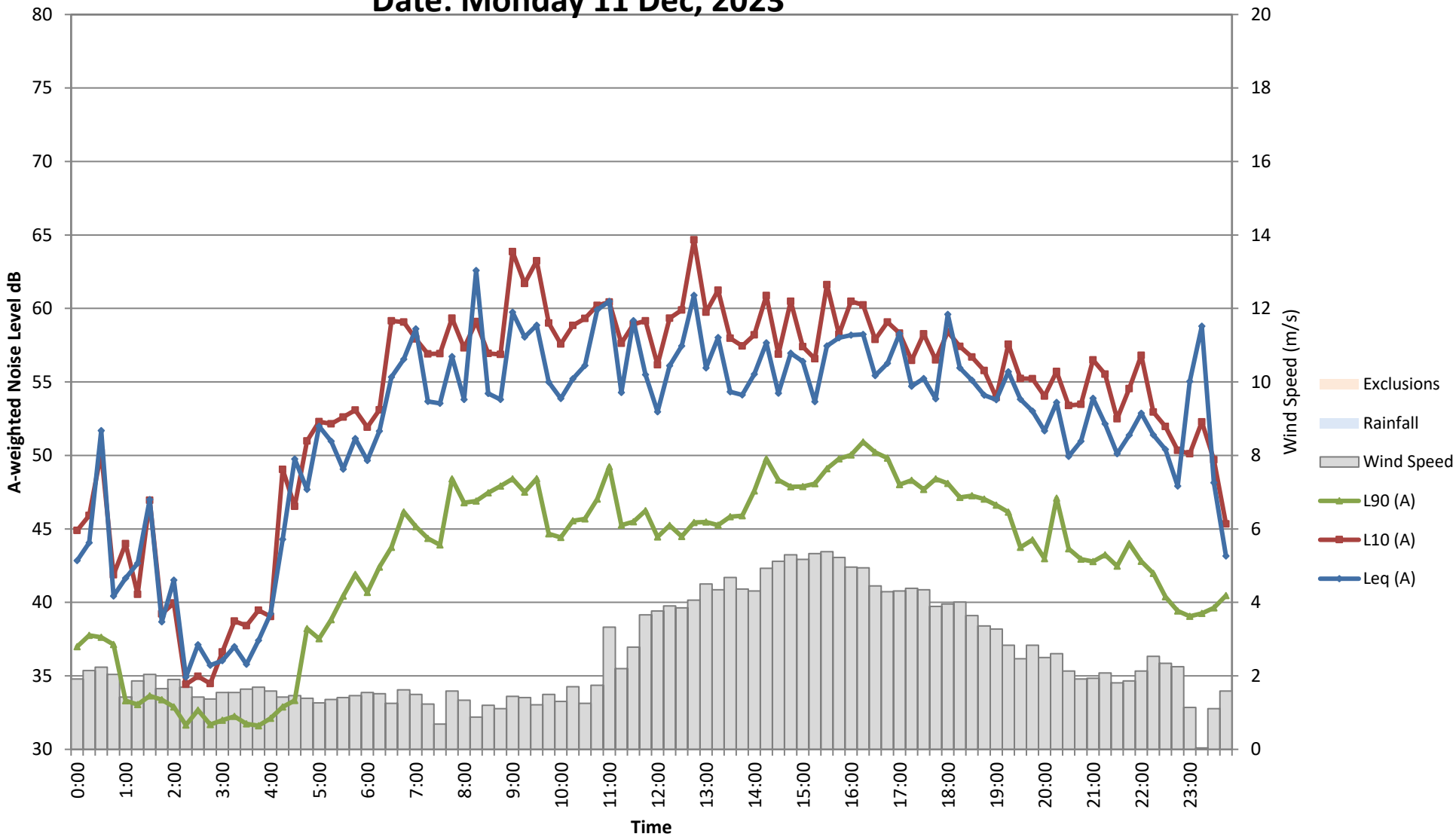
Noise Level Measurements
Monitor Location: 46a Townsend St, Condell Park - Roof
Date: Saturday 09 Dec, 2023



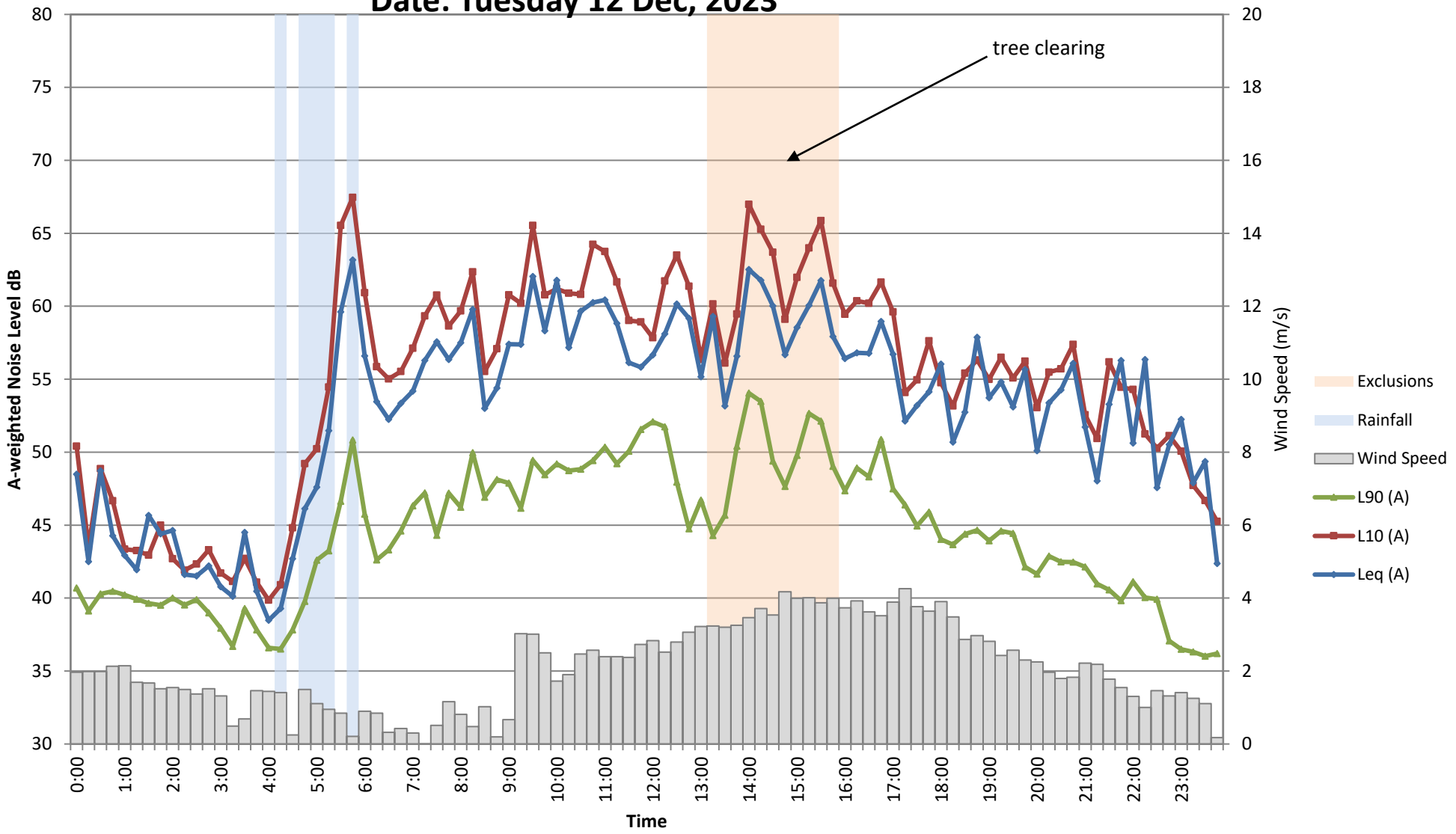
Noise Level Measurements
Monitor Location: 46a Townsend St, Condell Park - Roof
Date: Sunday 10 Dec, 2023



Noise Level Measurements
Monitor Location: 46a Townsend St, Condell Park - Roof
Date: Monday 11 Dec, 2023



Noise Level Measurements
Monitor Location: 46a Townsend St, Condell Park - Roof
Date: Tuesday 12 Dec, 2023



Noise Level Measurements
Monitor Location: 46a Townsend St, Condell Park - Roof
Date: Wednesday 13 Dec, 2023