

NOISE IMPACT ASSESSMENT

1039 OXFORD FALLS ROAD, OXFORD FALLS WEST NSW 2100

PREPARED FOR

Adam Loel

Oxford Falls Early Learning Centre 1039 Oxford Falls Road, Oxford Falls West NSW 2100

MONITORED ON:

25th – 29th December 2017

CONTRACT NO C18 7721 REPORT NO EMS18 5498

Noise and Vibration Consulting and Monitoring
 Building Acoustics
 Noise Impact Statements
 Aircraft, Traffic and Machinery Noise

TABLE OF CONTENT

1. I	NTRODUCTION
1.1	Project Description
1.2	Site Location
2. N	1ETHODOLOGY
2.1	Background Noise Monitoring7
2.2	Sound Pressure Level Measurement
3. E	ACKGROUND NOISE MONITORING
3.1	Background Noise
4. N	IOISE CRITERIA9
4.1	Northern Beaches Council
4.2	EPA's Industrial Noise Policy
4.3	AAAC's Guideline for Child Care Centre Acoustic Assessment10
4.4	EPA's NSW Road Noise Policy10
4.5 1	he EPA's Sleep Disturbance Criteria11
5. N	IOISE IMPACT ASSESSMENT 12
5.1 M	Aechanical Plant (Warringah DCP 2011)13
5.2 (Dutdoor Play Area (AAAC's Guideline for Child Care Centre Acoustic Assessment)13
5.3 I Asse	ndoor Play Area, Mechanical Plant, Pick Up and Drop off (AAAC's Guideline for Child Care Centre Acoustic ssment)15
5.4 E	xternal Noise Intrusion (EPA's NSW Road Noise Policy & AAAC's Guideline)15
5.5 1	he EPA's Sleep Disturbance Criteria15
6. R	RECOMMENDATION
6.1 M	loise Controls16
6.2	CONSTRUCTION RECOMMENDATIONS16
6.3	Noise Management18
١	Noise and Vibration Consulting and Monitoring + Building Acoustics + Noise Impact Statements + Aircraft, Traffic and Machinery Noise
	First Floor, 935 Botany Road, Mascot NSW 2020 Telephone: (02) 9317 0100 Facsimile: (02) 9317 0122 ABN 13 050 039 177

7. DISCUSSION	19
8. CONCLUSION	19
REFERENCES	19
APPENDIX – A (BACKGROUND NOISE MONITORING)	20

PREPARED FOR:	PREPARED BY:
Oxford Falls Early Learning Centre	Environmental Monitoring Services Pty Ltd
1039 Oxford Falls Road,	First Floor, 935 Botany Road,
Oxford Falls West NSW 2100	Mascot NSW 2020
Name: Adam Loel	ABN 13 050 039 177
Phone: 0411 199 655	Phone No: (02) 9317 0100
Email: adamloel@optusnet.com.au	Fax No: (02) 9317 0122

AUTHOR: Sem Mort	Sean Hook	Date: 22.02.2018
CHECKED BY:	Edward Krasilovsky	Date: 22.02.2018
APPROVED FOR RELEASE BY: Milligge.	Mark Wagner	Date: 22.02.2018

DISCLAIMER

This report is valid only in its entire form. Unauthorised reproduction or copying is strictly prohibited. Environmental Monitoring Services have prepared this document and information herein specifically for the purposes of the client in accordance with general professional consulting standards. The findings of this document apply specifically to this project only and are based partially on advice provided by the client. The scope of works was conducted in accordance with the scope of the project brief only. The document may not contain sufficient information other than for the purposes of the client, and no other warranty is made as to the professional advice in this report.

DOCUMENT CONTROL

COPY No: 1

REVISION HISTORY

Revision No	Date Issued	Reason/ Comments
0	22.02.2018	Version 1

DISTRIBUTION

Сору No	Revision No	Destination	
1	0	Oxford Falls Early Learning Centre	
2	0	Environmental Monitoring Services Pty Ltd	

Noise and Vibration Consulting and Monitoring
 Building Acoustics
 Noise Impact Statements
 Aircraft, Traffic and Machinery Noise

1. Introduction

1.1 Project Description

Environmental Monitoring Services Pty Ltd (EMS) was commissioned by Adam Loel from Oxford Falls Early Learning Centre, to conduct a Noise Impact Assessment for the proposed increase in child numbers and change of use of the existing onsite cottage and gardeners shed storage facilities in order for them to be incorporated into the child care centre located at 1039 Oxford Falls Road, Oxford Falls West (the site).

Currently the development is licensed to accommodate 59 children and the proponent is seeking to increase the number of children to 108, having the following number of children per age group:

- 0-1s: 20 children
- 1-2s: 20 children
- 2-3s: 30 children
- 3-5s: 38 children

The existing cottage is proposed to be the location of the relocated 0 - 2 year old's indoor area and the gardeners shed is proposed to be used as an art workroom.

The operating hours of the child care centre are proposed to remain unchanged, being 6:30am – 6:00pm Monday to Friday. The existing parking lot, which currently accommodates 24 car spaces, is proposed to have 5 car spaces added.

This Noise Impact Assessment will assess the potential noise generated from the site (including the 108 children) and evaluate its impact at the surrounding residential receivers. This assessment will consist of measuring the background noise of the site whilst the centre is not operating to establish the noise criteria. Acoustic modelling will be undertaken to predict the noise emissions from the site (children, mechanical ventilation system and traffic noise from the parking lot). The predicted and measured noise emissions from the site will determine whether noise control is required.

1.2 Site Location

The proposed child care centre is bound by Oxford Falls Road to the north-east and a residential property to the south.

The adjoining southern property is the residential premises 1 Spicer Road. North east of the site and east of the site, across Oxford Falls Road, are the residential receivers 1040 and 1041 Oxford Falls Road respectively.

A background noise monitor was installed at the western boundary of the learning centre. The map below in Figure 1 outlines the nearest receivers and the Child Care Centre.

Receiver	Address	Description
R1	1 Spicer Rd	1 storey residential dwelling
<u>R2</u>	1041 Oxford Falls Rd	1 storey residential dwelling
R3	1040 Oxford Falls Rd	1 storey residential dwelling

Noise and Vibration Consulting and Monitoring + Building Acoustics + Noise Impact Statements + Aircraft, Traffic and Machinery Noise

Figure 1



2. Methodology

2.1 Background Noise Monitoring

Unattended background noise monitoring was conducted between the 25th and 29th of December 2017 using the ARL 316 noise monitor at the site.

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 day time Rating Background Level for the site. This statistical measurement is a sound pressure level measurement that exceeds 90% of the measurement period.

2.2 Sound Pressure Level Measurement

The B&K 2250 & 2260 Sound Level Meters (SLM) were used to conduct mechanical plant and traffic noise measurements of cars passing along Oxford Falls Road and the measurement of single car parking within the existing gravel parking lot. Modelling of the proposed parking lot noise emissions was also carried out using the acoustic software SoundPLAN (Version 8.0).

The L_{Aeq} will be used to assess the noise emitted from the noise on site. The L_{Aeq} represents the equivalent continuous noise level – the level of noise equivalent to the energy average of noise levels occurring over a measurement period. The L_{Aeq} will also be used to assess the noise emitted from traffic noise and parking vehicles in comparison with the established noise criterion outlined in Section 4.

The sound level meters were set to record the 'A' weighted statistical sound pressure level using a 'fast response'. The units were calibrated prior to and after the noise measurements and no significant drift was found.

3. Background Noise Monitoring

3.1 Background Noise

Using the results gathered from the unattended background noise monitoring (25th and 29th of December 2017), represented in L_{A90} and L_{Aeq}, the Rating Background Level and Existing Noise Level for the site, outlined in Tables 3.1 and 3.2 (below), was evaluated during the different assessment periods over 5 weekdays.

Table 3.1 – Measured Background Noise Level (LA90) at the western boundary of the 1039 Oxford Falls Road site.

Location	25 Dec	26 Dec	27 Dec	28 Dec	29 Dec	RBL
Daytime — L_{A90} (7:00am — 6:00pm)	40	42	48	52	55	48
Evening Time – L_{A90} (6:00pm – 10:00pm)	37	37	39	39	38	38
Night Time – L_{A90} (10:00pm – 7:00am)	36	35	34	35	36	35

Table 3.2 – Measured Existing Noise Level (L_{Aeq}) at the western boundary of the 1039 Oxford Falls Road site.

Location	25 Dec	26 Dec	27 Dec	28 Dec	29 Dec	L_{Aeq}
Daytime – L_{Aeq} (7:00am – 6:00pm)	48	63	67	67	69	66
Evening Time – L _{Aeq} (6:00pm – 10:00pm)	44	58	59	59	64	60
Night Time – L_{Aeq} (10:00pm – 7:00am)	46	60	43	42	51	54

Cicada noise was the dominant noise source heard at all locations surrounding the site.

Noise data affected by rain was filtered from the background noise monitoring results as determined by the *Bureau of Meteorology (BOM)* – Terrey Hills AWS.

4. Noise Criteria

4.1 Northern Beaches Council

In Section D3 of the Northern Beaches Council's Warringah *Development Control Plan* (2011), from Part D, states:

Requirements

1. Noise from combined operation of all mechanical plant and equipment must not generate noise levels that exceed the ambient background noise by more than 5dB(A) when measured in accordance with the *NSW Industrial Noise Policy* at the receiving boundary of residential and other noise sensitive land uses.

4.2 EPA's Industrial Noise Policy

The EPA's publication NSW Industrial Noise Policy (INP) will be used to assess the noise emission from the mechanical plant from the Child Care Centre in accordance with Section D3 of the Northern Beaches Council *Development Control Plan* (2011), seen above. This Policy provides guidelines for these procedures and noise mitigation strategies if the level exceeds the noise threshold. 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 use the criteria as the basis for deriving project specific noise levels.
- To outline a range of mitigation measures that could be used to minimise noise impacts.

4.2.1 Intrusive Noise Criteria

When defining Intrusive noise, the INP states 'the intrusiveness criterion essentially means that the equivalent continuous (energy-average) noise level of the source should not be more than 5 decibels (dB) above the measured background level.'

Location	Time of Day	Rating Background Level (RBL) L _{A90}	INP Criteria Intrusive L _{Aeq,15minute} Noise Criterion
Surrounding	'Shoulder' period (6:30am – 7:00am)	41*	46
Receivers	Day Time (7:00am – 6:00pm)	48	53

Table 4.1 - INP Noise Emission Criteria - Residential (External) dB(A)

*The child care centre is operational for half an hour (6:30am – 7:00am) during the Night Time period, the period in which Sleep Disturbance is assessed. However, this time period takes place within a timeframe when existing background levels are rising and the INP acknowledges (Section 3.3) that it may be unduly stringent to expect such operations to be assessed against the night-time criteria.

For 'shoulder' periods, the INP recommends taking the midpoint of two RBL assessment periods (e.g. night and day). Using this method the RBL 'shoulder' period was calculated to be **41 dB(A)**.

Noise and Vibration Consulting and Monitoring

Building Acoustics

Noise Impact Statements

Aircraft, Traffic and Machinery Noise

4.3 AAAC's Guideline for Child Care Centre Acoustic Assessment

In the absence of any specific noise criteria outlined by the Northern Beaches Council in their Development Control Plans for noise emissions from child care centres, the AAAC's publication 'Guideline for Child Care Centre Acoustic Assessment' will be used to give the noise objectives.

The AAAC's publication 'Guideline for Child Care Centre Acoustic Assessment' 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.

Outdoor Play Area

This guideline recommends allowing a higher level of noise impact for a shorter duration of outdoor play. The AAAC members regard that a total time limit of approximately 2 hours outdoor play per day should allow an additional emergence above the background of 5dB. Table 4.2 outlines the noise criteria extracted from the guideline for children outdoor playtime.

Table 4.2 – Children Outdoor Playtime Noise Criteria

Receiver	Outdoor Play Area Usage	Noise Criteria
Posidontial	Up to 2 hours (total) per day	58 (L _{A90} + 10dB)
Residential	More than 2 hours per day	53 (L _{A90} + 5dB)

The existing Child Care Centre proposes to have the children play for more than 2 hours per day. Therefore, the noise criteria will be 5dB above the background noise level.

Indoor Play Area, Mechanical Plant, Pick up and Drop off

The $L_{Aeq, 15-minute}$ noise level emitted from the cumulative noise impact of children playing indoors, mechanical plant and traffic on the site shall not exceed the background noise level by more than 5 dB at the assessment location.

Road, Rail Traffic and Industry

The AAAC guideline states regarding external noise impacting children:

The noise level $L_{Aeq, 1hour}$ from road, rail traffic or industry at any location within the outdoor play or activity area during the hours when the Centre is operating shall not exceed **55 dB(A)**.

The noise level $L_{Aeq, 1hour}$ from road, rail traffic or industry at any location within the indoor play or sleeping areas of the Centre during the hours when the centre is operating shall not exceed **40 dB(A)**.

4.4 EPA's NSW Road Noise Policy

Section 2.3.2 of the EPA's NSW Road Noise Policy, outlines the following with regard to noise assessment criteria for internal and external areas of child care centres.

Table 4.3 – NSW Road Noise Policy – Child Care Centres

Space	Assessment criteria Day (7:00am – 10.00pm)	Additional considerations
Sleeping rooms	35 dB(A) L _{eq(1 hour)} (internal)	Multi-purpose spaces, e.g. shared indoor play/sleeping rooms should meet the lower of the respective criteria. Measurements for
Indoor play areas	40 dB(A) L _{eq(1 hour)} (internal)	sleeping rooms should be taken during designated sleeping times for the facility, or if
Outdoor play areas	55 dB(A) L _{eq(1 hour)} (external)	these are not known, during the highest hourly traffic noise level during the opening hours of the facility

4.5 The EPA's Sleep Disturbance Criteria

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 Environmental Criteria for Road Traffic Noise gives a conclusion on sleep disturbance when integrating numerous studies on the subject:

Noise and Vibration Consulting and Monitoring
 Building Acoustics
 Noise Impact Statements
 Aircraft, Traffic and Machinery Noise

- 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 4.4 below are exceeded:

Residential Measurement Location	L _{Aeq} , 15-minute (RBL + 5 dB)	L _{Amax} (RBL + 15 dB)	
Residential location (external)	46 dB	56 dB	
Residential location (internal)	50 – 55 dB		

Table 4.4 – Sleep Disturbance Criteria

5. Noise Impact Assessment

The acoustic modelling software SoundPLAN (version 8.0) was used to model the noise emissions from children playing outside and inside, cars dropping off and picking up children and mechanical plant at the location of the neighbouring residences surrounding the proposed child care centre. Noise emission predictions take into account the following noise data and assumptions:

- The following Effective Sound Power Levels of children playing are adapted from the Association of Australian Acoustic Consultants *Guideline for Child Care Centre Acoustic Assessment:*
 - 10 Children aged 0 to 2 years 77 to 80 dB(A)
 - 10 Children aged 2 to 3 years 83 to 87 dB(A)
 - 10 Children aged 3 to 6 years 84 to 90 dB(A)

To calculate the effective sound power level for a specific number of children, the following formula was used:

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

- 25 cars entering and leaving the driveway and parking lot (water bound surface) within a 15-minute period and adhering to the 10km/h speed limit.
- Receiver location being 1.5 metres above ground.
- Ground coverage on and off-site environment has been modelled as non-reflective.
- Each of the 7 outdoor Panasonic Inverter compressor/condenser units having a sound power level of **71 dB(A).**
- The rooftop exhaust discharger and extraction fan having a sound power level of 69 dB(A).
- Attended noise measurements of a single car parking within the parking lot (64 dB(A) L_{Amax} at 5 metres)
- Attended noise measurements of traffic noise emission from Oxford Falls Road (at the location of the cottage) child care centre.
- The Outdoor Play Areas have the following number of children:
 - Soft Play Area + Deck (0-2s): 40 children
 - Outdoor Playground 1 (3-5s): 20 children

Noise and Vibration Consulting and Monitoring

Building Acoustics
Noise Impact Statements
Aircraft, Traffic and Machinery Noise

- Outdoor Playground 2 (2-3s): 20 children
- Outdoor Playground 3 (3-5s): 18 children & (2-3s) 10 children
- The Indoor Play Areas were modelled with all windows and doors shut and have the following number of children:
 - Cottage Conversion (0-2s): 40 children
 - Indoor Play Area 1 (3-5s): 30 children
 - Indoor Play Area 2 (2-3s): 22 children
 - Art Workroom (3-5s): 8 children & (2-3s) 8 children

5.1 Mechanical Plant (Warringah DCP 2011)

Table 5.1 – Predicted noise levels of the Child Care Centre at nearby receivers over a 15-minute period.

Address	Noise Source	Assessment Period	Northern Beaches Noise Criteria	Noise Prediction dB(A) LAeq, 15 minute	Complies
1 Spicer Rd R1	• 7 x Outdoor Panasonic			32	✓
1041 Oxford Falls Rd $\mathbb{R}2$	Inverter Units 1 x Rooftop Exhaust 	Daytime (7:00 – 18:00)	53	16	~
1040 Oxford Falls Rd R3	discharger			11	~

5.2 Outdoor Play Area (AAAC's Guideline for Child Care Centre Acoustic Assessment)

Table F.D. Duadiated unical laurale of the Child Cours Courture at	manufacture and a 15 minute marined
Table 5.2 – Predicted holse levels of the Child Care Centre at	nearby receivers over a 15-minute period.

Address	Noise Source	Assessment Period	AAAC Criteria	Noise Prediction dB(A) LAeg, 15 minute	Complies
1 Spicer Rd 🛛 🖳 🕄 🕄 🕅 🤶 🕅 R 🛛 🥂 R 🕽 R 🕽 R Spicer Rd	 40 x 0-2s (Soft Playground + Deck) 20 x 3 Ec 			42	✓
1041 Oxford Falls Rd 🕄	 20 x 3-55 (Outdoor Playground 1) 20 x 2-3s (Outdoor Playground 2) 	Daytime (7:00 – 18:00)	53	39	~
1040 Oxford Falls Rd 🕂 🕄	• 28 [(10 x 2-3s) + (18 x 3-5s)] (Outdoor Playground 3)			45	~

Figure 2 – Site Plan – Child Care Centre



5.3 Indoor Play Area, Mechanical Plant, Pick Up and Drop off (AAAC's Guideline for Child Care Centre Acoustic Assessment)

Address	Noise Source	Assessment Period	AAAC Criteria	Noise Prediction dB(A) LAeg, 15 minute	Complies
1 Spicer Rd	• Indoor Play Area			38	✓
1041 Oxford Falls Rd \mathbb{R}^2	 Mechanical Plant Carpark Pick Up 	Daytime (7:00 – 18:00)	53	40	~
1040 Oxford Falls Rd 🕂 🕄	and Drop offs			43	~

Table 5.3 – Predicted noise levels of the Child Care Centre at nearby receivers over a 15-minute period.

5.4 External Noise Intrusion (EPA's NSW Road Noise Policy & AAAC's Guideline)

Table 5.4 – Measured noise levels of Oxford Falls Road at the Child Care Centre's proposed Cottage Conversion (0-2's) over a 1-hour period. Attended measurement locations A1 can be seen in the map from Figure 1.

Location	Noise Source	Assessment criteria L _{Aeq, 1 hour}	Noise Measurement dB(A) L _{Aeq, 1 hour}	Complies
Cottage A1 (proposed room for 0-2s)	Road traffic noise from Oxford Falls Rd	55	53*	~

*The level includes the background noise which was highly affected by cicada noise.

5.5 The EPA's Sleep Disturbance Criteria

Table 5.5 – Predicted noise levels of the Child Care Centre at nearby receivers.

		EPA's Sleep Disturbance Criteria					
Address	Noise Source (Night-time Period 6:30 – 7:00am)	LAeq, 15- minute	Noise Prediction dB(A) L _{Aeq, 15-minute}	Lamax	Noise Prediction dB(A) L _{Amax}	Complies	
1 Spicer Rd R1			38		42	~	
1041 Oxford Falls Rd 💦 2	 Indoor Play Area Mechanical Plant Carpark Pick Up 	46	40	56	42	~	
1040 Oxford Falls Rd R3	and Drop offs		43		50	~	

Noise and Vibration Consulting and Monitoring

Building Acoustics

Noise Impact Statements

Aircraft, Traffic and Machinery Noise

6. Recommendation

6.1 Noise Controls

Tables 5.1 to 5.5 show that the existing and proposed onsite mechanical plant, outdoor playground areas, carpark and indoor play areas are likely to be compliant with the relevant noise criteria. Never-the-less EMS recommends the following measures be incorporated into the design of the child care to adequately manage and minimise the centre's noise emissions.

6.1.1 Outdoor Play Area

Limit the number of children playing at any one time outdoors to 80 children.

The Outdoor Play Areas could have the following number of children:

- Soft Play Area + Deck (0-2s): 25 children
- Outdoor Playground 1 (3-5s): 15 children
- Outdoor Playground 2 (2-3s): 15 children
- Outdoor Playground 3 (3-5s): 15 children & (2-3s): 10 children

6.2 Construction Recommendations

This section provides construction recommendations to achieve the appropriate noise attenuation from traffic noise for the relevant rooms in order to meet the AAAC and EPA's (NSW Road Noise Policy) standards [40dB(A) $L_{Aeq, 1hour}$ indoor play area and 35 dB(A) $L_{Aeq, 1hour}$ indoor sleeping area]. The recommendations are based on various factors including road traffic noise level at a particular location, indoor design sound level criteria and construction drawing plans.

The partitions' Weighted Sound Reduction Index (Rw) value required for the proposed site will be provided below. Typical partition construction with the relevant Rw value required will also be provided but does not necessarily need to be implemented.

Cottage Conversion

6.2.1 Ceiling

The proposed site requires a roof/ceiling for the Cottage Conversion (0-2's indoor play room) with an Rw value of **42**.

A 42 Rw roof/ceiling construction may have the following construction:

- Pitched metal sheet roof with sarking
- 13mm plasterboard ceiling fixed to ceiling joists
- 75 mm (or thicker) acoustic insulation batts (11kg/m³) in roof cavity
- Wall corner construction using either joint sealant or cornice cement as depicted in below in Figure 3



Figure 3 – Ceiling and Wall Construction

6.2.2 External Doors

A glass door shall be constructed using float or laminated glass (at least 6mm) with full perimeter acoustic seals around the door.

A timber door shall be a minimum 40mm solid core construction having perimeter seals on the top and sides of the door and a door bottom seal.

6.2.3 Walls

Where new wall sheeting is required the Cottage Conversion (0-2's) will require a wall Rw value of at least **44**. A typical wall with this value may have the following construction:

Timber Frame or Cladding:

- 6mm fibre cement sheeting or weatherboard or 18mm pine plank cladding externally
- (existing) timber stud
- 13mm standard plasterboard internally
- 75 mm (or thicker) acoustic insulation (11kg/m³) in wall cavity (were applicable)

6.2.4 Windows

Window seals: ensure new windows are fitted with high quality acoustic seals and close windows to reduce internal noises levels. Window frames and their installation in wall openings must be air tight. Table 6.1 outlines the required Reduction Weighting (Rw) requirement for the window to achieve the indoor noise level as outlined in Table 4.3.

Table 6.1 – Windows' Reduction Weighting (Rw) Value Requirement

Building	Window	Glazing Minimum Requirements	Acoustic Seals	Minimum Rw required
Cottage Conversion	New windows	6mm float or laminated	Yes	29

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

EMS notes that the glazing recommendations for the windows and doors 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.

Shed Conversion

EMS recommends 13mm standard plasterboard for the lining of the internal walls for the Shed conversion. EMS recommends the doors and windows found in Section 6.2.2 and 6.2.4 of this report for the proposed new doors and windows within the Shed conversion.

6.3 Noise Management

During the operation of the Child Care Centre we recommend the following noise management be conducted to ensure the noise amenity of the surrounding receivers. This includes:

- Programs 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.
- Amplified music may need to be avoided to meet the noise criteria.

7. Discussion

Deliveries for the child care centre arrive between 9:30am and 5:00pm and are not anticipated to have an adverse effect on the surrounding residential noise receivers.

Outdoor play is not proposed to take place between 6:30am and 7:00am and therefore was not assessed as part of the sleep disturbance assessment.

A potential residential future development on the 1039 Oxford Falls Rd site, at the location of the previous residential development, would be affected by road traffic noise emissions from cars entering and leaving the child care's driveway and (water bound surface) parking spaces during the sleep disturbance assessment period and daytime period.

A noise barrier along the western boundary of the site would be effective to attenuate the traffic noise emissions to within the noise criteria depending on the height and location of any potential future residential development on the property.

8. Conclusion

A Noise Impact Assessment for a child care centre at 1039 Oxford Falls Road, Oxford Falls West was carried out by EMS. The purpose of this assessment was to evaluate the potential noise impact for the proposed increase in child numbers and change of use of the existing onsite cottage and gardeners shed storage at the child care centre.

The assessment consisted of monitoring the background noise and measuring the road traffic noise levels at the site 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 6.

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 Northern Beaches Council, AAAC's and EPA's Noise Criteria.

References

EPA's NSW Industrial Noise Policy

Engineering Noise Control - David A. Bies and Colin H. Hansen

Association of Australian Acoustic Consultants – Guideline for Child Care Centre Acoustic Assessment

M. Long, "Architectural Acoustics," Second Edition, Academic Press, 2014.

Appendix – A (Background Noise Monitoring)

Noise Level Measurements Monitor Location: 1039 Oxford Falls Rd, Oxford Falls Date: 25-December-2017





Noise Level Measurements Monitor Location: 1039 Oxford Falls Rd, Oxford Falls Date: 26-December-2017



Noise Level Measurements Monitor Location: 1039 Oxford Falls Rd, Oxford Falls Date: 27-December-2017



Noise Level Measurements Monitor Location: 1039 Oxford Falls Rd, Oxford Falls Date: 28-December-2017



Noise Level Measurements Monitor Location: 1039 Oxford Falls Rd, Oxford Falls Date: 29-December-2017