Project No: 181670

Noise Assessment
Proposed Crematorium
48 Old North Road
Farley, NSW

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1.0 – INTRODUCTION

This report presents the results, findings and recommendations arising from an acoustic assessment of the construction and operation of a proposed crematorium at No. 48 Old North Road, Farley NSW. The site location is shown in **Figure 1**.

Figure 1 Location Plan

The assessment was requested by SHAC on behalf of H.L. Fry Properties Pty Ltd to support a Development Application to Maitland City Council (MCC) for the proposal.

2.0 - BACKGROUND TO THE PROPOSAL

The entire site is shown outlined (approximately) in red on Figure 1. The proposed development is to be staged over several phases as shown in **Figure 2**.

An existing residence on the site will remain and act as a caretakers quarters. Part of the residence will be converted to a tea room.

The initial stages of the development will involve site clearing and construction of roadways and car parks. This will be accompanied by

the construction of a chapel, crematorium and then the construction of a stand alone tea room.

Further stages of the development will involve site works and construction of memorial gardens and a lawn cemetery.

Figure 2 Site Plan

The crematorium may operate between 7am and 7pm, seven days per week.

From an acoustic point of view the most significant aspects of the proposal will involve;

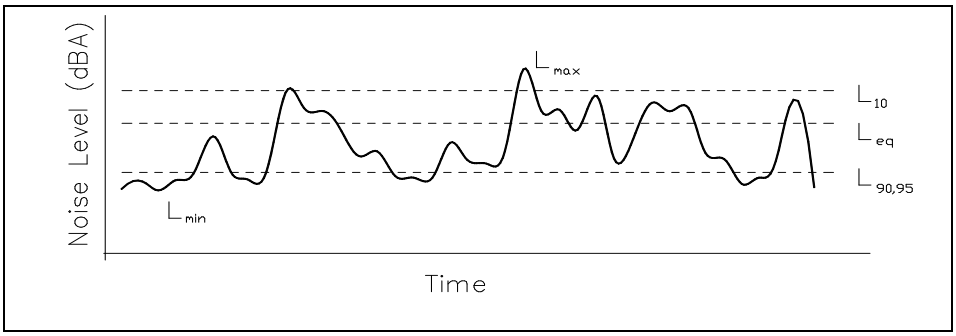
- The noise from funeral services, including people arriving and departing;
- Cremations;
- Car park and traffic noise, and
- Construction noise

3.0 - TERMS AND DEFINITIONS

Table 1 contains the definitions of commonly used acoustical terms and is presented as an aid to understanding this report.

TABLE 1
DEFINITION OF ACOUSTICAL TERMS

Term	Definition
dB(A)	The quantitative measure of sound heard by the human ear, measured by the A-Scale Weighting Network of a sound level meter expressed in decibels (dB).
SPL or Lp	Sound Pressure Level. The incremental variation of sound pressure above and below atmospheric pressure and expressed in decibels. The human ear responds to pressure fluctuations, resulting in sound being heard.
STL	Sound Transmission Loss. The ability of a partition to attenuate sound, in dB.
SWL or Lw	Sound Power Level radiated by a noise source per unit time re 1pW.
Leq	Equivalent Continuous Noise Level - taking into account the fluctuations of noise over time. The time-varying level is computed to give an equivalent dB(A) level that is equal to the energy content and time period.
L1	Average Peak Noise Level - the level exceeded for 1% of the monitoring period.
L10	Average Maximum Noise Level - the level exceeded for 10% of the monitoring period.
L90	Average Minimum Noise Level - the level exceeded for 90% of the monitoring period and recognised as the Background Noise Level. In this instance, the L90 percentile level is representative of the noise level generated by the surrounds of the residential area.
RBL	Rating Background Level (RBL) + 5dB. RBL is the median value of each ABL (Assessment Background Level) over the entire monitoring period. The ABL is a single figure representing the "L_{90} of the $L_{90's}$" for each separate day of the monitoring period.



4.0 – AMBIENT NOISE ENVIRONMENT AND CRITERIA

4.1 Operational Noise

The Office of Environment and Heritage (OEH) and MCC share responsibility for the approval and control of noise emissions from commercial and industrial premises within council boundaries.

There are no specific regulations or guidelines in the Noise Policy for Industry (NPI) or the Noise Guide for Local Government (NGLG) that cover the operation of a crematorium or funeral parlour. In lieu of any specific criteria the operation of the crematorium is assessed here under the procedures and criteria set out in the NPI.

The NPI describes intrusive and amenity criteria which are dependant on the existing ambient noise levels at potentially affected residential receiver areas.

The site under assessment is located approximately 1km from the industrial area at Rutherford. Residences in the area would be subject to some industrial noise, particularly during the day, however, this noise would not be a significant contributor to the overall acoustic environment.

The Main North Rail Line (MNRL) passes along the northern boundary of the site. Previous noise monitoring undertaken by Spectrum Acoustics in nearby areas, at similar distances and topography from the MNRL indicate the noise from coal (and other) trains on this line is a regular feature of the acoustic environment. Noise from the trains, therefore, would be a significant contributor to the overall Leq noise levels in the area.

Residential receivers in the vicinity of the project site would be considered “suburban” as per the definitions in the NPI and shown below (extract from Table 2.3 of the NPI).

Suburban *– an area that has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry. This area often has the following characteristic:*

- *evening ambient noise levels defined by the natural environment and human activity.*

Spectrum Acoustics has previously undertaken long tern noise logging in a similar acoustic environment in Farley approximately 2.5km east of the current project site. An unattended noise logger was located at 121 Wollombi Road, Farley. The logging was undertaken in 2011, but as little development has occurred in the area in the intervening period the background noise levels are considered valid.
Ambient Leq and background noise levels, obtained from the loggers, are summarised below in **Table 2**. The rating Background Level (RBL) is the median of the daily L90 levels in each assessment period (day/evening/night), over all valid days in the monitoring period. The NPI defines "Day" as 7am to 6pm Monday to Friday and 8am to 6pm Sundays and Public Holidays, "Evening" as 6pm to 10pm and "Night" as all other times.

TABLE 2
MEASURED AMBIENT NOISE LEVELS – 121 WOLLOMBI RD.

	Noise Levels dB(A)		
Percentile	Day	Evening	Night
L_{90}	34[1]	34	33
L_{eq}	52	45	49

1. See text re daytime RBL

As shown in Table 2, the measured day time RBL at the logger location was 34 dB(A) L90. Discussions in the NPI recognise that excursions of noise above the project intrusiveness noise level during the day would not usually have the same impact as they would during the evening or night. The NPI thus details a minimum background noise level of 35 dB(A) during the day. This level will be adopted in this assessment for the development of noise criteria.

The intrusiveness criteria are based on the RBL for the time period, plus 5 dB(A). The RBL (L90) is defined as the overall single figure background level representing each assessment period.

The project amenity noise level (as an Leq (15 min)) for an industrial development is equal to the recommended amenity noise level (from Table 2.2 in the NPI, and detailed above) minus 2 dB(A) (as detailed in the notes to **Table 3**, below).

The adopted noise criterion for the site is shown in Table 3. As the crematorium would only operate during the day, only the criterion for this time is shown.

TABLE 3
NOISE CRITERIA

Location	Criterion	Day
Old North Road	Intrusiveness dB(A),Leq(15-min.)[1]	40
	Amenity dB(A),Leq(15 min)[2]	53
	Project-Specific Noise Goal	**40 (15 min.)**

1 Rating Background Level (RBL) + 5dB. RBL is the median value of each ABL (Assessment Background Level) over the entire monitoring period. The ABL is a single figure representing the "L_{90} of the $L_{90's}$" for each separate day of the monitoring period.
2. Project amenity noise level (ANL) is suburban ANL (NPI Table 2.1) minus 5 dB(A) plus 3 dB(A) to convert from a period level to a 15-minute level.

4.2 Sleep Disturbance

As the crematorium will not operate at night there is no requirement to consider the potential for sleep disturbance.

4.3 Road Traffic

Noise generated by road traffic associated with the proposed crematorium is assessed separately to site noise as per procedures detailed in the OEH Road Noise Policy (RNP).

The RNP, as adopted by Roads and Maritime Services of NSW (RMS), recommends traffic noise criteria for different road developments and uses.

Based on definitions in the RNP, Old North Road is classified as an arterial road. An extract of the relevant section of the RNP relating to land use developments with the potential to create traffic on arterial roads is shown in **Table 4**.

TABLE 4
BASE TRAFFIC NOISE OBJECTIVE

Situation	Recommended Criteria	
	Day - (7am - 10pm)	Night – (10pm – 7am)
6. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	60 Leq(15hr) (external)	55 Leq(9hr) (external)

4.4 Construction Noise

The assessment of construction noise impacts is undertaken in accordance with the Interim Construction Noise Guideline (ICNG, 2009). The ICNG is a non-mandatory guideline that is usually referred

to by local councils and the NSW Department of Planning when construction/demolition works require development approval.

Section 1.5 of the ICNG outlines the steps for management of construction noise impacts as follows:

1. **identify sensitive land uses** that may be affected.
2. **identify hours** for the proposed construction works.
3. **identify impacts** at sensitive land uses.
4. **select and apply the best work practices** to minimise noise impacts.

Each of the above four points is assessed in detail in the following sections.

4.4.1. Surrounding Land Uses

The subject site lies within a rural residential area with no other particular sensitive receiver types in the near vicinity.

4.4.2. Operating Hours

The recommended standard hours for construction works are shown in **Table 5** which is a reproduction of Table 1, section 2.2 of the ICNG.

TABLE 5
STANDARD CONSTRUCTION HOURS

Work Type	Recommended standard hours of work[1]
Normal construction	Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays
Blasting	Monday to Friday 9 am to 5 pm Saturday 9 am to 1 pm No blasting on Sundays or public holidays

1 The relevant authority (consent, determining or regulatory) may impose more or less stringent construction hours

Construction work outside the hours in Table 5 is normally only permissible for delivery of oversized structures, emergency works, public infrastructure works that are supported by the affected community or where the proponent demonstrates and justifies a need to work outside the recommended standard hours (ICNG, p9).

4.4.3 Impacts at Sensitive Land Uses

The ICNG provides two assessment methodologies for construction noise impacts: a ‘qualitative’ assessment where works occur for less than three weeks and a ‘quantitative’ assessment for works of longer duration. As construction works on the site will take longer than three weeks, the quantitative methodology is applicable.

4.4.4 Noise Management Levels

Table 6 sets out noise management levels for construction works, (as reproduced from section 2.2 of the ICNG).

TABLE 6
NOISE AT RESIDENCES USING QUANTITATIVE ASSESSMENT

Time of day	Management level Leq (15 min)	How to apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured L_{Aeq} (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected RBL + 5 dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2.

* Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Based on the measured noise levels from the unattended logger the daytime background (RBL) of 34 dB(A),L90 was established. The

daytime construction noise management level is therefore **44 dB(A),Leq (15 min)** in accordance with Table 2 from the ICNG.

5.0 - NOISE ASSESSMENT

The layout of the crematorium and surrounds is shown in **Figure 3**.

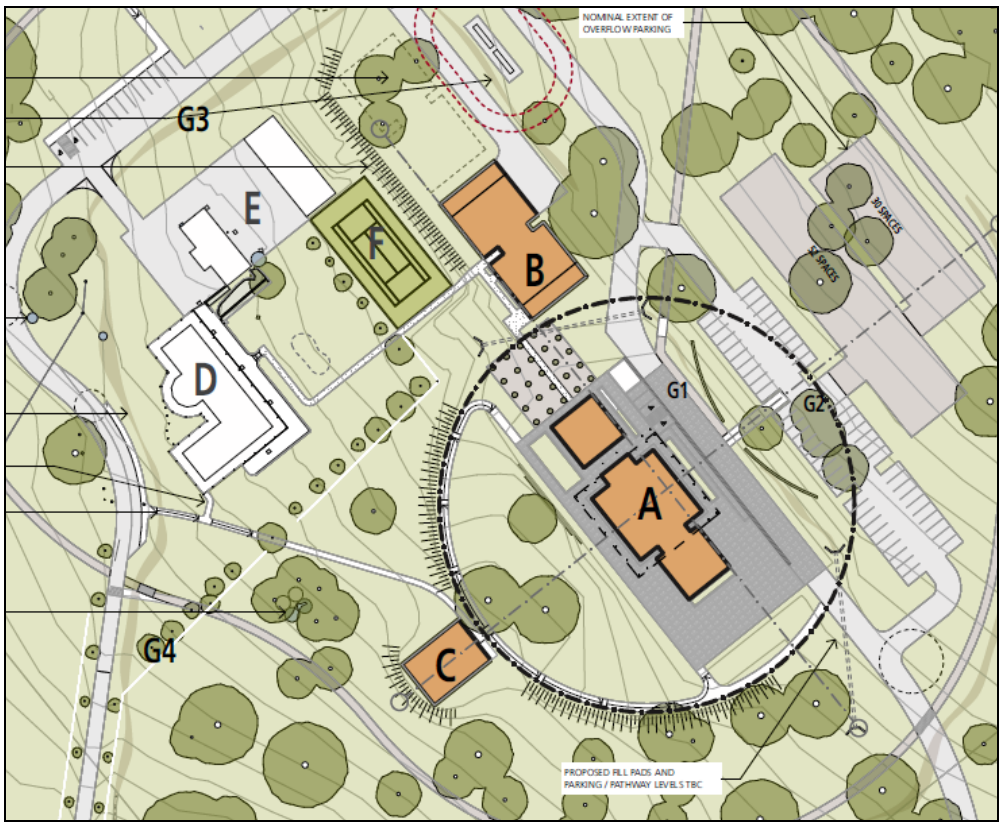


Figure 3 – Crematorium and Surrounds

5.1 Chapel

The chapel is labelled as “A” on Figure 3.

The chapel will be the venue for funeral services. These services may at times include the use of amplified music and speech and this would be considered to be the major potential for noise impacts from the chapel.

The layout of the chapel is shown in **Figure 4**.

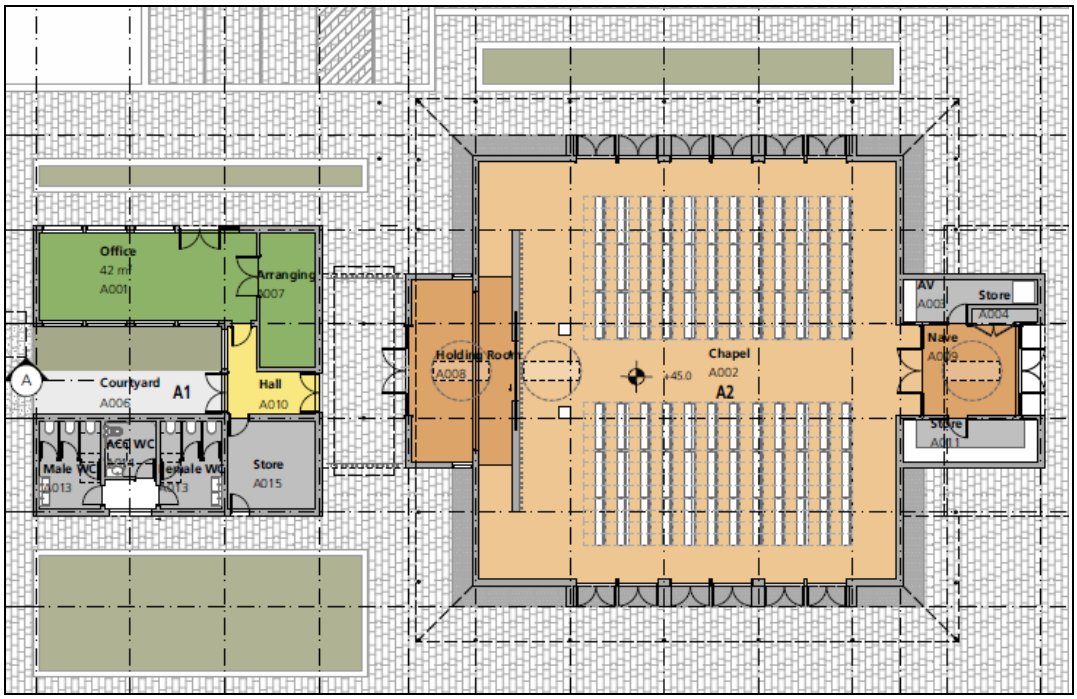


Figure 4 – Layout of the Chapel

The noise level (Lw) for amplified music which would be typical of a venue such as a funeral chapel was taken from the Spectrum Acoustics technical database and is detailed in **Table 7**.

TABLE 7
Lw OF FUNERAL SERVICE (Leq 15 min)

	Octave Band Centre Frequency, Hz dB(A)								
Lw	dB(A)	63	125	250	500	1k	2k	4k	8k
	97	75	80	84	93	92	89	84	72

For determination of potential impacts a noise source representing the amplified music was assumed to be located in the chapel. This was then theoretically propagated through the open doors in the western façade of the building with potential impacts calculated at the nearest receiver to the west in Old North Road.

The layout shown in Figure 4 indicates that the chapel will have glass doors along much of the eastern and western facades. It is envisaged that, at times during services these doors will be open. To consider the worst case it was assumed that these doors were all open.

Procedures in the NPI indicate that where a receiver is more than 30m from the boundary the theoretical reception point for the assessment of potential noise impacts is the most affected point within 30m of the residence.

The results of the calculations are shown in **Table 8** determined to the point 30m from the residence to the west.

The music would typically accompany parts of the funeral service and is unlikely to be played constantly for a full 15 minute assessment period. To consider a worst case, however, the current assessment assumes the noise level shown in Table 7 is present for 15 minutes.

TABLE 8
CALCULATED SPL – OLD NORTH ROAD (WEST)
Leq (15 min) - CHAPEL NOISE

	Octave Band Centre Frequency, Hz								
Item	dB(A)	63	125	250	500	1k	2k	4k	8k
Source Lw	97	75	80	84	93	92	89	84	72
Loss in Building (10m)		19	19	19	19	19	19	19	19
Exterior SPL	78	56	61	65	74	73	70	65	53
SPL @ receiver	37								
Criterion Leq (15 min)	40								

The results in Table 8 show that, under the assessed conditions, there will be no adverse impacts due to noise emissions from amplified music being played in the chapel. Noise emissions at other times during funeral services would be at lower levels than those assessed and are, therefore, not assessed separately here.

5.2 Crematorium

The crematorium is labelled as "B" on Figure 3. The internal layout of the crematorium building is shown in **Figure 5**.

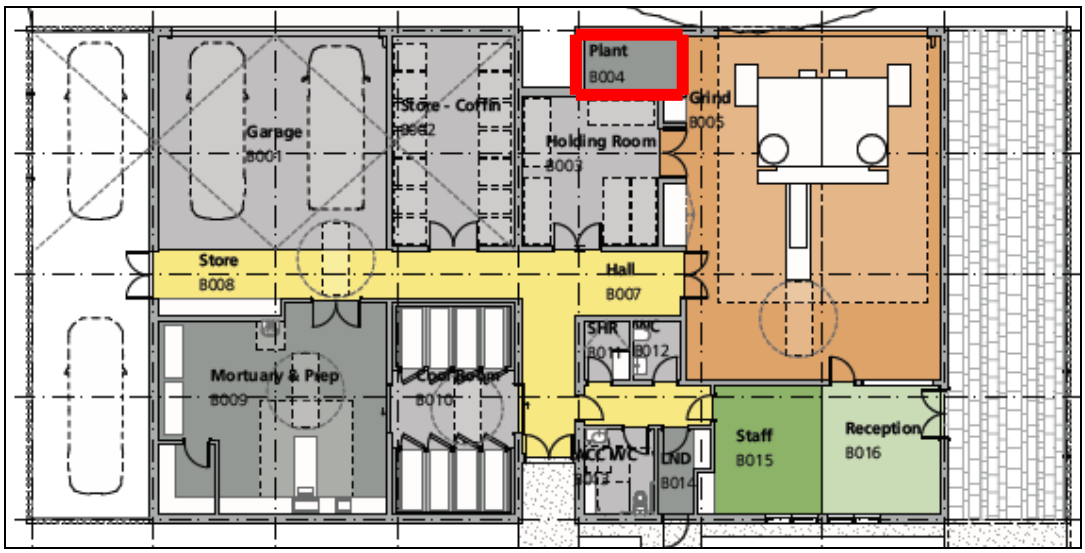


Figure 5 – Layout of the Crematorium

The major source of noise from the crematorium is considered to be that from mechanical plant associated with heating/cooling, refrigeration and ventilation and also from the noise of the cremators.

The plans for the crematorium show there is to be a plant room on the eastern side of the building (which is outlined in red on Figure 5). The nearest residence in this direction is approximately 500m away.

Noise from the plant room will be sufficiently attenuated by the structure of the building and the distance to the receiver.

The cremators will be inside the building. Data obtained from the manufacturer indicates that the cremator unit to be installed has has a sound power level of 78 dB(A), with a spectrum as shown in **Table 9**.

Table 9 also show the theoretical calculation of potential impacts at the nearest receiver to the west as a result of noise emissions from such a cremator operating inside the crematorium building.

TABLE 9
CALCULATED SPL – OLD NORTH ROAD (WEST)
Leq (15 min) - CREMATORIUM

		Octave Band Centre Frequency, Hz							
Item	dB(A)	63	125	250	500	1k	2k	4k	8k
Source Lw	77	75	71	59	50	47	32	19	14
Loss in Building (10m)		19	19	19	19	19	19	19	19
TL of concrete wall		26	30	34	40	50	50	52	53
Exterior SPL	31	30	22	<0	<0	<0	<0	<0	<0
SPL @ receiver[1]	<0								
Criterion Leq (15 min)	40								

[1.] Propagated to the nearest receiver using an equation giving the sound field due to an incoherent plane radiator.

The results in Table 9 show that, under the assessed conditions, there will be no adverse noise impacts due to noise emissions from the operation of the crematorium.

The cremator has an external stack. The sound power level for the stack supplied by the manufacturer is shown in Table 10.

Table 10 also show the theoretical calculation of potential impacts at the nearest receiver to the west as a result of noise emissions from the cremator stack.

TABLE 10 CALCULATED SPL – OLD NORTH ROAD (WEST) Leq (15 min) – EXTERNAL STACK									
	Octave Band Centre Frequency, Hz								
Item	dB(A)	63	125	250	500	1k	2k	4k	8k
Source Lw	83	59	70	74	75	81	72	70	65
Distance loss (390m)		60	60	60	60	60	60	60	60
SPL @ receiver	23								
Criterion Leq (15 min)	40								

The results in Table 10 show that, under the assessed conditions, there will be no adverse impacts as result of the noise emission from the external cremator stack.

5.3 Tea Room

Initially part of the existing residence will be utilised as a tea room. A new stand alone tea room will also be constructed to the west of the main chapel building.

The new tea room is labelled as “C” on Figure 3 and the internal layout of the room is shown in **Figure 6**.

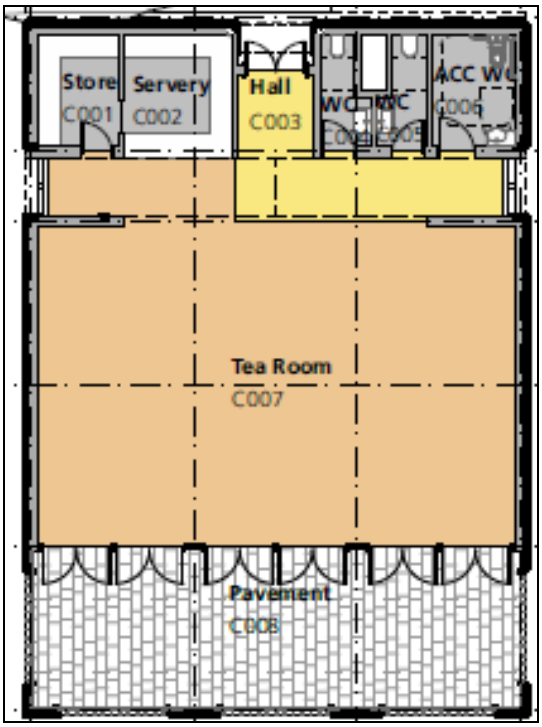


Figure 6 – Layout of the Tea Room

People may use the tea room after a funeral service. The major potential for noise impacts is considered to be that of people talking in the outdoor pavement area of the tea room.

Based on the size of the tea room a scenario was assessed where there were 20 people speaking at loud conversation level located on the outdoor pavement area. As the noise assessment criterion is based on a 15 minute Leq noise level it was assumed that the noise source representing people talking was assumed to be constant for a full 15 minute period. This would add a degree of conservatism to the results. A sound power level (Lw) of 78 dB(A) Leq (15 min) was used for each individual speaker.

Table 11 shows the results of calculations of noise from the tea room impacting on the nearest receiver to the west in Old North Road.

TABLE 11
CALCULATED SPL – OLD NORTH ROAD (WEST)
Leq (15 min) – TEA ROOM NOISE

		Octave Band Centre Frequency, Hz							
Item	dB(A)	63	125	250	500	1k	2k	4k	8k
Lw (20 people (Leq 15 min)	91	43	60	75	85	88	86	75	61
Distance loss to receiver (120m)		58	58	58	58	58	58	58	58
SPL @ receiver	**33**	<0	2	17	27	30	28	17	3
Criterion Leq (15 min) (Day)	**40**								

The results in Table 11 show that, under the assessed conditions, there will be no adverse impacts due to noise emissions from the outdoor areas of the tea room.

5.4 Car Park

The car parking areas are shown on Figure 3. The plans show that there will be approximately 100 parking spaces with additional overflow parking for a further approximately 80 vehicles available.

The worst case for noise generation from the car park would be close to the start or end of a funeral service. People arriving and departing a service would not do so all at once. To ensure consideration of a conservative scenario it was assumed that 75% of the car parks would be used in a single 15 minute period.

Noise in car parks typically comes from people walking to and from cars, doors opening and closing etc., as well as vehicles moving at slow speeds. Each noise event is characterised by a brief peak which when averaged out over a 15 minute period has a relatively low Leq.

The impact of each noise event on any single receiver is also variable depending upon the location of individual cars within a car park and as they move in and out.

Typical noise levels from car parks have been sourced from the Spectrum Acoustics technical database. This contains noise measurements from a series of vehicles arriving and departing a car park with people moving to and from vehicles. The measurements were made over a representative period to ascertain a typical noise level from these activities.

The measurements were made at varying distances from each car to approximate the situation in relation to an adjacent residence over a 15 minute interval. That is, at any time throughout each 15 minute interval various car parks, at different distances from the nearest residences, will be in use.

The measurements in the database show a noise level of 53 dB(A) Leq measured over a 5 minute period where up to 6 vehicles moved in and out of a car park. The measurements were made at an average distance of 7m.

Assuming the noise from the 6 vehicles is consistent for a full 15 minutes at a distance of 7m this equates to a sound power level of 73 dB(A) Leq (15 min) for car park noise. This value has been used to determine impacts over a 15 minute assessment period at, say, the end of a funeral service.

Due to the layout of the car park, individual parking spaces will be at various distances from receivers. To assess potential impacts the car park has been considered to be 14 separate “banks” of approximately 8 to 10 parking spaces, each with an average sound power level of 75 dB(A) Leq (15 min).

Received noise levels were determined for each “bank” and the combined result calculated for the closest receivers to the south, west and east of the project site.

The noise from the car parks will be at different levels when measured at various points on any individual receiver boundary, that is, depending on the distance from individual cars/noise events etc. To assess the practical impacts the noise was calculated for a single theoretical reception point at 30m from the closest residences in each direction (in keeping with procedures in the NPI).

A summary of the results of the assessment of car park noise, as described above, is shown in **Table 12**. Car park numbers referred to in the tables are as shown diagrammatically in **Appendix I**.

TABLE 12 CALCULATED SPL – OLD NORTH ROAD Leq (15 min) - CAR PARK			
Car Park Number	South	West	East
1	16 (350m)	14 (430m)	14 (440m)
2	16 (350m)	14 (440m)	14 (430m)
3	16 (360m)	14 (430m)	14 (440m)
4	16 (360m)	14 (440m)	14 (430m)
5	16 (360m)	14 (450m)	14 (420m)
6	16 (360m)	14 (460m)	15 (410m)
7	16 (370m)	14 (450m)	15 (420m)
8	15 (400m)	14 (450m)	15 (410m)
9	15 (400m)	16 (340m)	13 (530m)
10	16 (370m)	13 (480m)	14 (400m)
11	16 (360m)	13 (480m)	14 (400m)
12	16 (360m)	13 (480m)	14 (400m)
13	17 (270m)	13 (500m)	16 (380m)
14	17 (360m)	13 (500m)	16 (380m)
Total Leq (15 min)	**28**	**26**	**26**
Criterion Leq (15 min)	**40**	**40**	**40**

The results in Table 12 show there will be no exceedance of the day time noise criterion at any receivers as a result of the assessed car park noise.

5.5 Driveway Noise

Based on the assumption that 75% of car parks will be utilised in a single 15 minute period either at the start or end of a service this would equate to approximately 100 cars using the driveway in this time. For acoustic purposes the traffic, and therefore the noise emissions, would be considered to be constant.

Cars entering and leaving the site and using the driveway would do so at low speeds, generally less than 15 kph. The Lw of a car moving at 15 kph was taken from the Spectrum Acoustics technical database. For the assessment of potential impacts it was assumed that the noise was constant for the entire 15 minute period during the day. The results of the assessment of driveway noise are shown in **Table 13**.

The calculation has been made on the assumption of the noise source (all vehicles) being at the boundary of the site just off Old North Road, 220m from the nearest residence, which is to the south across Old North Road.

TABLE 13 CALCULATED SPL – OLD NORTH ROAD (Leq (15 min)) – DRIVEWAY NOISE	
Item	Old North Road
Sound Power Level Leq (15 min)	84
Distance Loss to Receiver (m)	-38 (220m)
Received Noise Leq (15 min)	**29**
Criterion (day) Leq (15 min)	**40**

The results in Table 13 show that, under the assessed conditions, there will be no adverse impacts due to the noise emissions from vehicles using the driveway to the crematorium.

5.6 Road Traffic Noise

All vehicles will arrive and depart the site via the driveway from Old North Road. At the end of a service it was considered that 120 cars would exit onto Old North Road and then travel east along Wollombi road before dispersing into the local road system.

Equation 1, below, outlines the mathematical formula used in calculating the Leq,T noise level for intermittent traffic noise.

$$L_{eq},T = L_b + 10\log\left[1 + \frac{ND}{T}\left(\frac{10^{(L\max - Lb)/10} - 1}{2.3} - \frac{\left(L_{\max} - L_b\right)}{10}\right)\right]$$

Equation 1

Where

L_b is background noise level, dB(A)

L_{MAX} is vehicle noise, dB(A)

T is the time for each group of vehicles (min)

N is number of vehicle trips

D is duration of noise of each vehicle (min)

Noise from the vehicles has been assessed to a point 1m from the facade of a theoretical receiver on Wollombi Road at 15m from the centre of the eastbound lane. All of the vehicles were assumed to be travel east at 80 k.p.h. Results are shown in **Table 14**.

TABLE 14 CALCULATED SPL – WOLLOMBI ROAD Leq (1 hr) – ROAD TRAFFIC NOISE	
Item	dB(A)
No. of Vehicle movements (peak hourly period)	120
Lw per vehicle @ 80 kph	92
Received Noise (Leq 1 hour) from eqn. 1	**48**
Criterion – Day (Leq 1 hour)	**60**

The results in Table 14 show that, under the assessed conditions, noise from traffic generated by the proposal will not exceed the RMS criterion at any residences along Old North, or Wollombi Roads.

5.7 Construction Noise

The most significant noise emissions from construction activities will occur during the site excavation and preparation and initial foundation works for the buildings, roads and car park etc.

Other works will involve construction and fitout of the various buildings. For the most part these will be undertaken internally within the buildings with resultant reduced received noise.

Typical noise levels of construction plant items are shown in **Table 15** (as adapted from the Environmental Noise Management Manual and supplemented with data from the Spectrum Acoustic technical database).

TABLE 15 TYPICAL NOISE LEVELS Leq (15 min) – CONSTRUCTION PLANT			
Equipment	Range of Indicative Lw dB(A)	Range of Indicative Lp @ 10m dB(A)	Lw for Assessment as Leq (15 min)
Dozer	102 - 114	74 - 86	104
Grader	101	77	101
Excavator	97 - 117	69 - 89	102
Dump Truck	112	89	103
Truck	107	79	100
Concrete Agitator	99 - 104	71 - 76	104
Concrete Pump	103 - 108	75 - 80	106
Vibrator	91 - 106	63 - 78	103
General Construction			108

The figure shown as “general construction” in the above table is an arithmetical average of several measurements of noise emissions from typical construction activity during the ground preparation stage of a

development. It includes noise from a dozer, grader, excavator and two trucks all working in relatively close proximity.

During the construction work the mobile plant, such as that detailed in Table 15 will, by definition, move about and will be, be at various operating levels (and thus producing various levels of noise) throughout any 15 minute period.

Noise emission from the construction works will vary throughout individual days and also throughout the length of the overall project. The noise level at individual receivers will also be dependent upon the location of the various works, relative to those receivers, at various times.

To gauge some potential construction noise impacts the "general construction" scenario for the site preparation phase has been considered as described above.

Table 16 shows the results of a sample calculation of potential noise impacts at receivers at various distances from the site, as a result of the assessed operations taking place.

TABLE 16
Leq (15 min) – GENERAL CONSTRUCTION NOISE

	@ 300 m	@ 400 m	@ 500 m	@ 600 m
Construction works noise source	108	108	108	108
Distance loss to receiver	58	60	62	64
Received noise	**50**	**48**	**46**	**44**

The results in Table 16 show the construction noise may exceed the relevant noise management level of 44 dB(A) Leq (15 min) when the works are closer than about 600m from a receiver.

The closest residential receivers to parts of the construction works are approximately 300m away.

It must be noted that any exceedance of the construction noise criteria would only occur during the initial phase of construction involving heavy machinery undertaking excavation work and site preparation for the closest parts of the car park to the residence, as described previously. This phase of the construction will be only relatively short term in nature.

As construction progresses the major noise generating activities will be carried out inside buildings or will be substantially shielded by building elements. As a result, at theses times, received noise levels will be less than those shown in Table 16.

In keeping with the requirements of the ICNG the following general recommendations are made to minimise potential impacts, and maintain the amenity of, the surrounding areas.

All neighbouring residents should be notified of the proposed works. Particular emphasis should be placed on the time frame of the works. A contact name and phone number of a responsible person should be given out so that complaints can be dealt with effectively and efficiently. All complaints or communication should be answered.

During the liaison process note should be made of any particularly noise sensitive times of day and care be taken to avoid scheduling noisy works at these times.

All personnel working on the job including contractors and their employees should be made aware of their obligations and responsibilities with regard to minimising noise emissions.

Contractors should familiarise themselves with methods of controlling noisy machines and alternative construction procedures. These are explained in AS2436-1981 “Guide to Noise Control on Construction, Maintenance and Demolition Sites”.

Activities that are known or have the potential to create excessive noise should, where possible, be scheduled to occur at times to cause least annoyance to the community. Carrying out such work during early morning should be avoided. This includes start up and idling etc. of heavy machinery prior to commencement of work.

Mechanical plant should be silenced using best available control technology. Noise suppression devices should be maintained to manufacturer’s specifications. Internal combustion engines should be fitted with appropriate, well maintained, high efficiency mufflers.

Machines which are used intermittently should either be shut down in the intervening periods between work or throttled down to a minimum.

Alternatives to reverse alarms such as manually adjustable or ambient noise sensitive types (“smart” reversing alarms) should be considered. Alternative site management strategies can be developed, in accordance with a site OH&S Plan, with the concurrence of the appropriate OH&S Officer.

Any portable equipment with the potential to create high levels of noise eg compressors, generators etc should only be selected for use if it incorporates effective noise control. This equipment should be located where practical so that natural ground barriers or site sheds etc are between it and the nearest potentially affected receivers.

Where possible loading and unloading of plant and materials should be carried out away from potentially affected receivers.

6.0 – CONCLUSION

An acoustical assessment has been conducted of theoretical noise emissions from the construction and operation of a proposed crematorium at No. 48 Old North Road, Farley NSW.

The proposal is to involve the construction of a crematorium, chapel, tea room and car parking.

The noise impacts at the nearest residential boundaries have been assessed, due to the noise emissions from each of;

- Funeral services,
- Cremations,
- Car park and traffic noise, and
- Construction noise.

The assessment has shown that there will not be an exceedance of any noise criteria as a result of the assessed operation of the crematorium.

There is potential for short term elevated noise levels associated with construction activities to exceed the relevant noise goals at the closest receivers and a series of recommendations have been made in relation to this to minimise adverse impacts.

With these recommendations in place, and provided operations of the facility are in keeping with the assumptions made in this assessment, we see no acoustic reason why the development should not be approved.

APPENDIX I

CAR PARK NOISE SOURCE LOCATIONS