ACOUSTICS AND AIR

QUEANBEYAN TRANSFER STATION

NOISE IMPACT ASSESSMENT

REPORT NO. 13246
VERSION B

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PREPARED FOR

TODOROSKI AIR SCIENCES
SUITE 2B, 14 GLEN STREET
EASTWOOD NSW 2122

WILKINSON MURRAY

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Wilkinson Murray is an independent firm established in 1962, originally as Carr & Wilkinson. In 1976 Barry Murray joined founding partner Roger Wilkinson and the firm adopted the name which remains today. From a successful operation in Australia, Wilkinson Murray expanded its reach into Asia by opening a Hong Kong office early in 2006. 2010 saw the introduction of our Queensland office and 2011 the introduction of our Orange office to service a growing client base in these regions. From these offices, Wilkinson Murray services the entire Asia-Pacific region.

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

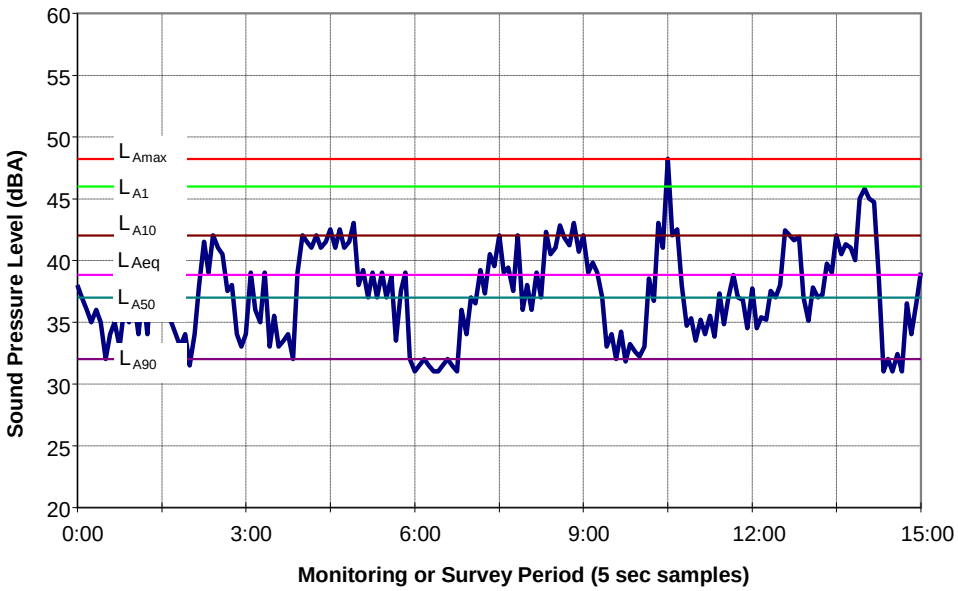
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



1 INTRODUCTION

It is proposed to establish a Resource Recovery facility on a parcel of land at 184 Gilmore Road, Queanbeyan West.

Wilkinson Murray (WM) has been commissioned by Todoroski Air Sciences on behalf of Wild Environment and SITA Australia (SITA) to conduct a Noise Impact Assessment (NIA) for the proposed development. The assessment has been undertaken in accordance with the Director General's Requirements (DGR), pursuant to Section 78A (8) of the Environmental Planning and Assessment Act 1979.

The NIA has been conducted in general accordance with the following NSW Government guidelines and policies:

- NSW Industrial Noise Policy (EPA, 2000);
- NSW Road Noise Policy (DECCW, 2011); and,
- Interim Construction Noise Guideline (DECC, 2009).

2 PROJECT SETTING

2.1 Site Location

The proposed site is located on industrial land adjacent to Canberra Avenue. The subject land is Lots 348, 349 and 350 DP 8456; Lot 2 DP 1000911; and Lot 1 DP 1169293. The site is bounded by the NSW/ACT border to the west, Canberra Avenue to the north, John Bull Street to the east and the Queanbeyan West race track to the south.

The site location is shown in Figure 2-1.

Figure 2-1 Site Location

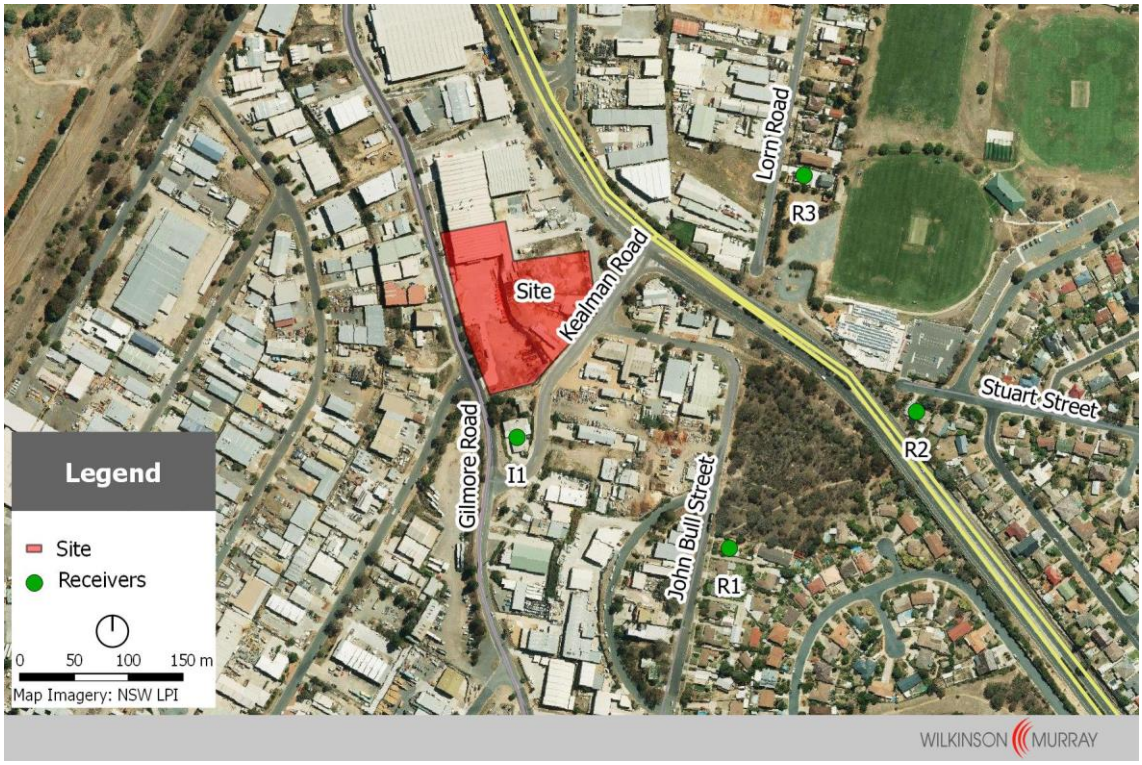
2.2 Surrounding Land Uses and Sensitive Receivers

The land use immediately surrounding the proposed site is industrial. The nearest residential receivers to the development have been identified and are presented in Table 2-1 and Figure 2-2.

Table 2-1 Sensitive Receivers

Receiver	Address	Distance (m)
R1	15 John Bull Street, Queanbeyan West	230
R2	31 Stuart Street, Crestwood	315
R3	54 Lorn Road, Crestwood	210
I1	1 Kealman Road, Queanbeyan West	35

Figure 2-2 Sensitive Receivers



Receivers R1 through R3 are located on land zoned specifically for residential use. A residential dwelling has been identified at 1 Kealman Road (I1), and is on land zoned for industrial use.

3 PROJECT DESCRIPTION

SITA's existing resource recovery facility at Hume, ACT is to be relocated to this new site at Queanbeyan West in June 2015. The facility accepts cardboard and temporarily stores batteries and handles the secure destruction of paper. It is also used for the storage and repair of heavy vehicles and machinery, small paint bay for bin repairs, storage of small and large bins (used for various festivals around NSW and ACT) and the storage of fluorescent tubes. A bailer and conveyor equipment is used to process approximately 3,600 tonnes per year of cardboard that that is bailed at the site.

In addition to these existing services, SITA has proposed to expand their operations to also include the recovery of a range of waste sources. The following additional waste streams would be targeted by SITA:

- General Solid Waste (putrescible and non-putrescible);
- Paper, cardboard and plastics recyclables (source separated and co-mingled);
- K110 Grease Trap Waste (liquid waste); and
- J120 Waste oil/hydrocarbons mixtures/emulsions in water (liquid waste).

To cater for the additional waste streams, a new transfer station would be constructed and operated on the eastern portion of the site. It is proposed that up to 95,000 tonnes/year of material would be accepted at the site. Waste material would be processed and sorted into separate streams with putrescible waste transferred from the site within 24 hours to a Veolia operated site at Woodlawn for processing.

An indicative site layout drawing is presented in Figure 3-1.

Delivery trucks and vehicles travelling to the area dedicated to grease trap waste, hydrocarbon/water emulsions, paper and cardboard bailing, fluorescent tubes and bin storage, would enter the site via Gilmore Road. This area is within the existing building on the site.

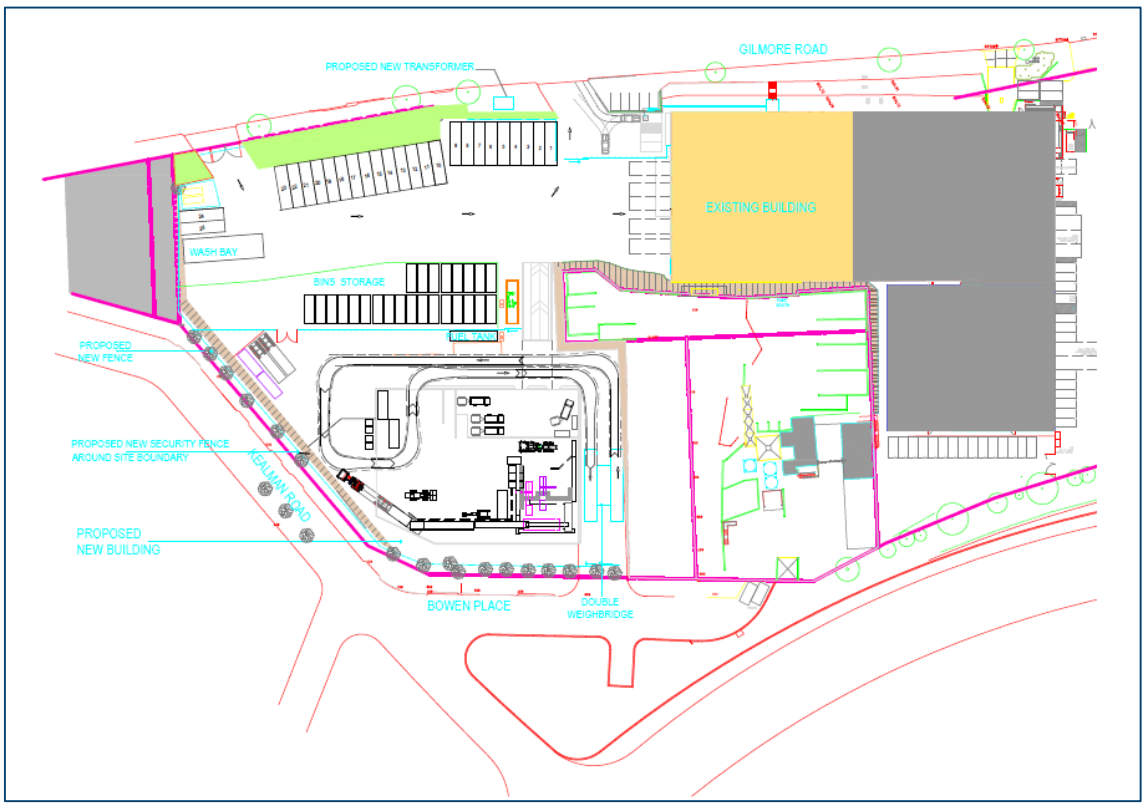
Delivery trucks entering the proposed new waste transfer station would enter the site from Bowen Place. Materials would be unloaded from the trucks within the building and sorted and processed into separate designated storage areas within the building. The materials will then be hauled off-site.

3.1 Operating Hours

The proposed site operations are 24 hours per day, seven days per week. This will allow services to be offered in peak waste collection times and minimise congestion and travel time associated with operations during peak hours. Sufficient storage will be incorporated to enable off-peak deliveries to and from the facility.

A key consideration for the extended operating hours is ensuring noise is appropriately managed. Site activities will be considered against applicable noise criteria for the day (7:00am – 6:00pm), evening (6:00pm – 10:00pm) and night time (10:00pm – 7:00am) periods. If required, site operations will be adapted throughout these time periods to ensure noise limits are met.

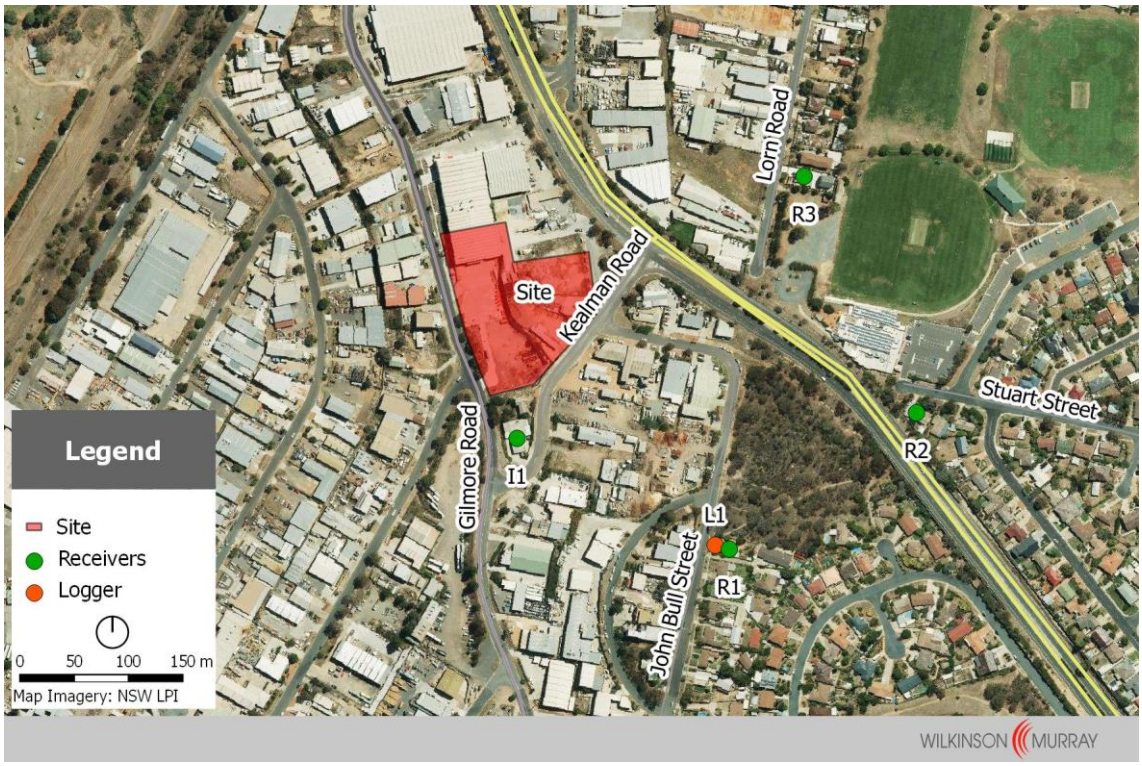
Figure 3-1 Site Plan



4 EXISTING NOISE ENVIRONMENT

To establish existing noise levels in the area surrounding the development, unattended noise monitoring was conducted between 27 June and 3 July 2014. The noise monitoring was conducted at 15 John Bull Street, Queanbeyan West, as shown in Figure 4-1.

Figure 4-1 Noise Monitoring Location



The noise monitoring equipment used for these measurements consisted of an environmental noise logger set to A-weighted, fast response. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift was noted.

From the background noise levels (L_{A90}) the Rating Background Levels (RBLs) were determined using the methodology recommended in the NSW *Industrial Noise Policy*.

The existing ambient noise levels are presented in Table 4-1. Daily plots of the noise logger data are presented in Appendix A.

Table 4-1 Existing Ambient Noise Levels

Time Period	Noise Levels (dBA)	
	L_{Aeq}	RBL
Day (7:00am – 6:00pm)	60	47
Evening (6:00pm – 10:00pm)	54	42
Night (10:00pm – 7:00am)	52	32

5 NOISE & VIBRATION CRITERIA

5.1 Operational Noise Criteria

The NSW *Industrial Noise Policy* (INP) provides the framework for establishing noise criteria and assessing impacts from sources of industrial noise. This policy seeks to promote environmental well-being through preventing and minimising noise.

There are two noise criteria which should be satisfied under the INP. The first being the "intrusiveness" criterion which assesses the likelihood of noise being intrusive above the ambient noise level. The second noise criterion, known as the "amenity" criterion, ensures the total industrial noise from all sources in the area does not rise above a maximum acceptable level.

The INP stipulates that intrusiveness and amenity criteria are determined for the daytime (7:00am 6:00pm), evening (6:00pm 10:00pm) and night time (10:00pm 7:00am) periods, as relevant. The determined criteria apply at the most affected point on or within the receiver property boundary.

5.1.1 INP Intrusiveness Criteria

The intrusiveness criterion requires that the L_{Aeq} noise level from the source being assessed, when measured over 15 minutes, should not exceed the Rating Background Noise Level (RBL) by more than 5 dBA.

The intrusiveness criterion applies for residential receivers only, and does not apply to dwellings located on land zoned for industrial use.

Based on the established background noise levels, as per Section 4, Table 5-1 summarises the intrusiveness noise criteria which apply to the identified receivers.

Table 5-1 Project-Specific Intrusiveness Criteria

Receiver	$L_{Aeq,15min}$ Intrusiveness Criterion (dBA)		
	Day (7am–6pm)	Evening (6pm–10pm)	Night Time (10pm–7am)
R1, R2 & R3	47+5 = 52	42+5 = 47	32+5 = 37

5.1.2 INP Amenity Criteria

The amenity criterion sets a limit on the total noise level from *all industrial noise sources* affecting a receiver. Different criteria apply for different types of receiver (e.g. residence, school classroom); different areas (e.g. rural, suburban); and different time periods, namely daytime (7:00am-6:00pm), evening (6:00pm-10:00pm) and night time (10:00pm-7:00am).

The noise level to be compared with the amenity criterion is the L_{Aeq} noise level, measured over the relevant day, evening or night time period, due to all industrial noise sources, but excluding non-industrial sources such as off-site transportation, i.e. on public roads.

Where a new noise source is proposed in an area with negligible existing industrial noise, the amenity criterion for that source may be taken as being equal to the overall amenity criterion. However, if there is significant existing industrial noise, the amenity criterion for any new source

must be set at a lower value. If existing industrial noise already exceeds the relevant amenity criterion, noise from any new source must be set well below the overall criterion to ensure that any increase in noise levels is negligible. Methods for determining a source-specific amenity criterion where there is existing industrial noise are set out in the INP.

Table 5-2 shows the amenity criteria for various receiver types, and times of day.

Table 5-2 INP Amenity Criteria

Type of Receiver	Indicative Noise Amenity Area	Time of Day[1]	Recommended $L_{Aeq, period}$ Noise Level,(dBA)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
Place of Worship – internal	All	When in use	40	45
Passive recreation area (e.g. National park)	All	When in use	50	55
Active recreation area (e.g. playground, golf course)	All	When in use	55	60
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75

Note: (1) EPA (2000) considers daytime (7:00am-6:00pm); evening (6:00pm-10:00pm); night time (10:00pm-7:00am).

In accordance with Section 2.2.1 of the INP, the "urban" amenity criteria are applicable to residential receivers R1, R2 and R3.

Section 2.2.1 of the INP recommends that isolated residences within industrial zones, such as I1, are treated as industrial receivers and that the "industrial" amenity criterion should be applied.

During site visits in 2014, it was noted that the existing ambient noise environment in the vicinity of R1, R2 and R3 exhibited significant levels of traffic noise from Canberra Avenue, however did not exhibit significant levels of industrial noise. Therefore, no correction to the INP amenity criteria to account for existing levels of industrial noise at these receiver locations is warranted.

During the 2014 site visits, Wilkinson Murray was not aware that a dwelling was located at 1 Kealman Road (I1); and therefore, the existing levels of industrial noise at this receiver location are unknown. Accordingly, the project specific amenity criterion for I1 has been set at 10 dB below the acceptable level in Table 5-2 of 70 dBA.

The project specific INP amenity criteria for the receivers investigated in this assessment are presented in Table 5-3.

Table 5-3 Project Specific Amenity Criteria

Receiver	$L_{Aeq,period}$ Amenity Criterion (dBA)		
	Day (7am–6pm)	**Evening (6pm–10pm)**	**Night Time (10pm–7am)**
R1, R2 & R3	60	50	45
I1	60	60	60

5.1.3 Project-Specific Noise Levels

Table 5-3 summarises the determined Project-specific noise levels, with the controlling criteria shown in bold font. It is noted that the evening intrusiveness criterion for residential receivers R1, R2 and R3 is 2 dB above the corresponding amenity criterion. For an industrial facility of this type, $L_{Aeq,\ 15min}$ noise levels are typically at least 3 – 5 dBA higher than $L_{Aeq,\ period}$ noise levels. Therefore, the evening $L_{Aeq,\ 15min}$ criterion of 47 dBA is more stringent than the evening $L_{Aeq,\ period}$ criterion of 45 dBA.

Table 5-4 Project-Specific Noise Levels

Receiver	Intrusiveness Criterion ($L_{Aeq,15min}$ dBA)			Amenity Criterion ($L_{Aeq,Period}$ dBA)		
	Day	Evening	Night	Day	Evening	Night
R1, R2 & R3	**52**	47	**37**	55	**45**	40
I1	n/a	n/a	n/a	**60**	**60**	**60**

As the site is proposed to operate on a continual 24/7 basis, the focus of the operational noise assessment will be night time operations. Accordingly, the night time intrusiveness noise level of 37 dBA ($L_{Aeq,\ 15min}$) is the primary noise goal for R1, R2 and R3; and the industrial amenity noise level of 60 dBA ($L_{Aeq,\ period}$) is the noise goal for I1.

5.2 Sleep Disturbance

Noise sources that operate over short durations at night have the potential to cause sleep disturbance despite complying with criteria based upon L_{Aeq} and L_{A10} noise descriptors. For this reason, the EPA's Application Notes state:

> *"Research on sleep disturbance is reviewed in the NSW Road Noise Policy. This review concluded that the range of results is sufficiently diverse that it was not reasonable to issue new noise criteria for sleep disturbance.*
>
> *From the research, the EPA recognised that the current sleep disturbance criterion of an $L_{A1, 1min}$ not exceeding the $L_{A90, 15min}$ by more than 15 dB(A) is not ideal. Nevertheless, as there is insufficient evidence to determine what should replace it, the EPA will continue to use it as a guide to identify the likelihood of sleep disturbance. This means that where the criterion is met, sleep disturbance is not likely, but where it is not met, a more detailed analysis is required."*

The L_{Amax} noise descriptor is considered equivalent to the $L_{A1, 1min}$ noise descriptor. Sleep disturbance criteria are applied only to residential receivers.

Based on the measured night time RBLs, sleep disturbance screening criteria have been established and are summarised in Table 5-5.

Table 5-5 Project-Specific Sleep Disturbance Screening Criteria

Receiver	Time Period	RBL	Sleep Disturbance Screening Criteria, L_{Amax} (dBA)
R1, R2 & R3	Night (10:00pm – 7:00am)	32	47

Additionally the NSW Road Noise Policy states that from the research on sleep disturbance to date it can be concluded that:

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

Assuming that the typical noise reduction through a bedroom facade with normally open windows is 10dBA, then an external noise level of 60-65dBA is unlikely to cause sleep disturbance. As such it should be noted that the Project-specific sleep disturbance criterion is considerably lower than 60-65dBA.

5.3 Traffic Noise Criteria

The *NSW Road Noise Policy* (RNP) provides guidance on assessing road traffic noise impacts from traffic generating developments. The RNP road traffic noise assessment criteria for residential land uses are presented in Table 5-6.

In addition to the criteria in Table 5-6, the RNP advises that in cases where existing levels of road traffic noise exceed the applicable criteria, and that a development has the potential to increase road traffic noise levels; an increase of up to 2 dBA represents a minor impact that is considered barely perceptible to the average person.

Table 5-6 Road Traffic Noise Criteria

Road Category	Type of project/land use	Assessment Criteria - dBA	
		Day (7am – 10pm)	Night (10pm – 7am)
Freeway/ arterial/ sub-arterial roads	Existing residences affected by noise from **new** freeway/arterial/sub-arterial road corridors	$L_{Aeq,\ 15\ hour}$ 55 (external)	$L_{Aeq,\ 9\ hour}$ 50 (external)
	Existing residences affected by noise from **redevelopment** of existing freeway/arterial/sub-arterial roads	$L_{Aeq,\ 15\ hour}$ 60 (external)	$L_{Aeq,\ 9\ hour}$ 55 (external)
	Existing residences affected by **additional traffic** on existing freeway/arterial/sub-arterial roads generated by land use developments		
Local roads	Existing residences affected by noise from **new** local road corridors	$L_{Aeq,\ 1\ hour}$ 55 (external)	$L_{Aeq,\ 1\ hour}$ 50 (external)
	Existing residences affected by noise from **redevelopment** of existing local roads		
	Existing residences affected by **additional traffic** on existing local roads generated by land use developments		

Note: Land use developers must meet internal noise goals in the Infrastructure SEPP (Department of Planning NSW 2007) for sensitive developments near busy roads.

Only residents adjacent to Canberra Avenue have the potential to be impacted by noise from traffic generated by the proposed development. Canberra Avenue is classified as an 'arterial' road by the RNP.

5.4 Construction Noise Criteria

The NSW EPA's *Interim Construction Noise Guidelines (ICNG)* recommends noise management levels (NML) to reduce the likelihood of noise impacts arising from construction activities. The ICNG NML for residential receivers are shown in Table 5-7.

Table 5-7 ICNG Noise Management Levels for Residential Receivers

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected RBL + 10 dBA	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,15min}$ 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 dBA	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: • 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; • 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 5dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2.

In addition to specifying external construction noise goals for residential receivers, the ICNG recommends external NML for commercial and industrial premises as presented in Table 5-8

Table 5-8 Construction NML for Non-Residential Receivers

Receiver Type	NML $L_{Aeq, 15min}$
Industrial	75 dBA
Commercial	70 dBA

It is expected that all construction activities will be conducted within standard construction hours. Based on the RBLs in Table 4-1, the construction noise management levels for this project are presented in Table 5-9.

Table 5-9 Project Specific Construction NML

Receiver	Acceptable $L_{Aeq, 15min}$ Noise Level (Standard daytime construction hours)
R1, R2 & R3	57
I1	75

6 ASSESSMENT OF IMPACTS

6.1 Noise Modelling Methodology and Assumptions

To predict the potential noise impacts from the operation and construction of the project an acoustic model, implementing the ISO 9613 algorithms, has been prepared using the CadnaA environmental noise modelling software. Factors addressed in the noise model are:

- Noise source levels and locations;
- Shielding from ground topography and nearby structures;
- Noise attenuation due to geometric spreading;
- Ground absorption; and,
- Atmospheric absorption.

6.2 Operational Noise Impacts

The following section identifies equipment and activities, associated with the operation of the development, which are likely to generate significant noise emissions and presents the predicted noise levels at nearby receivers.

A conservative approach has been taken to assess operational noise impacts, whereby the worst case $L_{Aeq,\ 15min}$ noise levels have been predicted, and compared to both the $L_{Aeq,\ 15min}$ and $L_{Aeq,\ period}$ criteria.

6.2.1 Sources of Operational Noise

The most significant sources of operational noise from the site are vehicle movements within the site boundary and material handling activities within the transfer station building.

Approximately 30 trucks would visit the transfer station per day, totalling 60 total movements. These would generally occur during off-peak periods to reduce travel time and avoid congestion. Therefore, it is anticipated that at most four truck deliveries would occur in a given 15 minute period. Additionally, it has been assumed that another truck movement is occurring on the western side of the site, associated with other site activities.

Approximately 24 car parking spaces are located along the western site boundary, which have been approved as part of the initial development application to Queanbeyan City Council (DA#337-2014). As part of this application, it is proposed to remove these approved car spaces, and place them under the transfer station in a basement car park (64 parking spaces) It has been assumed that the worst case 15 minute car-park activities would involve 12 vehicle movements.

Within the transfer station building; trucks and other material handling machinery will generate a significant amount of noise. Based on previous experience of similar sites, the activities within the transfer station building are expected to produce an internal sound pressure level (SPL) of approximately 85 dBA. Taking into account the proposed dimensions of the transfer station building and its steel construction, the assumed internal noise level of 85 dBA has been used to calculate the amount of sound power which is transmitted through the walls and roof of the building.

6.2.2 Predicted Operational Noise Levels at Nearby Receivers

Sources of operational noise as described above were included in the computer noise model to predict noise levels at nearby receivers.

The predicted operational noise levels at nearby residential receivers are presented in Table 6-1.

Table 6-1 Predicted $L_{Aeq, 15min}$ Operational Noise Levels at Nearby Receivers.

Receiver	Predicted Level ($L_{Aeq, 15min}$)	Criterion (Night)	Exceedance
R1	37	37	0
R2	34	37	0
R3	37	37	0
I1	46	60	0

Review of Table 6-1 indicates that the predicted worst case operational $L_{Aeq, 15min}$ noise levels comply with the night time intrusiveness criterion at residential receivers R1, R2 and R3; and also comply with the amenity criterion at industrial receiver I1.

6.3 Sleep Disturbance Impacts

6.3.1 Transient Noise Sources

The most significant short duration, high intensity noise events associated with the operation of the facility are pneumatic truck brakes. When truck brakes are applied and released, compressed air is vented and results in significant L_{Amax} noise levels. Truck will apply their brakes when they stop at the weighbridge at the northern side of the transfer station building, and when they stop at the automatic entry doors at the southern side of the transfer station building.

The typical L_{Amax} sound power level of truck brakes is 115 dBA.

6.3.2 Predicted Maximum Noise Levels at Nearby Receivers

Transient noise sources as described above were included in the computer noise model to predict maximum noise levels at nearby receivers.

The predicted maximum operational noise levels at nearby residential receivers are presented in Table 6-2.

Table 6-2 Predicted L_{Amax} Operational Noise Levels at Nearby Receivers

Receiver	Predicted Level (L_{Amax})	Screening Criterion (Night)	Exceedance	RNP Criterion (Night)	Complies (Yes/No)
R1	43	47	0	60-65	Yes
R2	41		0		Yes
R3	48		1 dBA		Yes
I1	55	n/a	n/a	n/a	n/a

Review of Table 6-2 indicates that predicted maximum noise levels comply with the established sleep disturbance criterion at receivers R1 and R2, and exceed the criterion by 1 dBA at R3. A 1 dBA is considered negligible and is not perceptible to human hearing.

6.4 Traffic Noise Impacts

6.4.1 Traffic Generated by Proposed Development

Approximately 60 truck movements associated with the transfer station are expected per day, generally during off-peak periods to reduce travel time and avoid congestion. On weekends, around 10 truck movements are expected each day. In addition to truck movements, approximately 24 car movements are expected daily.

6.4.2 Predicted Increases in Traffic Noise Levels

The existing Annual Average Daily Traffic (AADT) volume on Canberra Avenue exceeds 30,000 vehicles. At residences in the vicinity of development which are adjacent to Canberra Avenue, existing traffic noise levels are expected to be in excess of 60 dBA ($L_{Aeq,15hour}$) and 55 dBA ($L_{Aeq,9hour}$) during the day time (7:00am – 10:00pm) and night time (10:00pm – 7:00am) respectively.

Assuming the worst case scenario where all truck movements generated by the development occurred during the night time period, the predicted increase in traffic noise levels at the most affected receivers (R2 & R3) would be less than 0.1 dBA. Such an increase is not perceptible to human hearing and therefore, no mitigation is warranted.

6.5 Construction Noise Impacts

The proposed facility will involve the development of a new transfer building, and associated infrastructure. The most noise intensive construction activities identified are those associated with establishing new pavement and hardstand areas and the construction of the new transfer building.

6.5.1 Typical Construction Plant

With consideration to the identified work's phases and activities, the construction plant and sound power levels set out in have been assumed for the purpose of assessment. In each case, it has been assumed that all plant would operate simultaneously and continuously, which is considered to be conservatively representative of the typical worst case conditions.

Table 6-3 Indicative Sound Power Levels – Construction Equipment

Activity	Equipment	Quantity	Sound Power Level per Item ($L_{Aeq, 15min}$)	Sound Power Level per Activity ($L_{Aeq, 15min}$)
Pavement and Hardstand Construction	Backhoes or small excavators	1	108	115
	Static and vibratory rollers	1	108	
	20 tonne tip / trucks (road)	4	105	
	Delivery trucks	2	105	
	Concrete agitators	1	105	
Construction of Building Slab	Concrete agitator trucks	2	108	117
	Concrete pumping equipment	1	108	
	Air compressor	1	100	
	Concrete vibrators	1	103	
	Concrete saws	1	114	
Construction of Transfer Terminal	Mobile cranes	1	106	112
	Air compressor	1	100	
	Welder	1	105	
	Delivery trucks and low loaders	2	105	

6.5.2 Predicted Construction Noise Levels at Nearby Receivers

The noise levels generated by the indicative construction activities listed above have been predicted at each of the identified receiver locations, conservatively assuming a worst case scenario whereby all sources would operate continuously and simultaneously for a full 15 minute period.

Noise emissions would vary as construction progresses. The upper predicted $L_{Aeq,15min}$ construction noise levels are provided in Table 6-4 with those exceeding the noise affected management level shown in bold font. As the modelled scenarios would be unlikely to occur often, the noise levels at receivers would typically be lower than identified.

Table 6-4 Predicted $L_{Aeq, 15min}$ Construction Noise Levels at Nearby Receivers

Receiver	Construction Stage			Noise Affected Management Level ($L_{Aeq, 15min}$)
	Pavement and Hardstand Construction	Construction of Building Slab	Construction of Transfer Terminal	
R1	48	50	45	57
R2	47	49	44	57
R3	50	52	47	57
I1	57	59	54	75

Review of Table 6-4 indicates that predicted construction noise levels comply with the established noise management levels at all receivers.

7 CONCLUSION

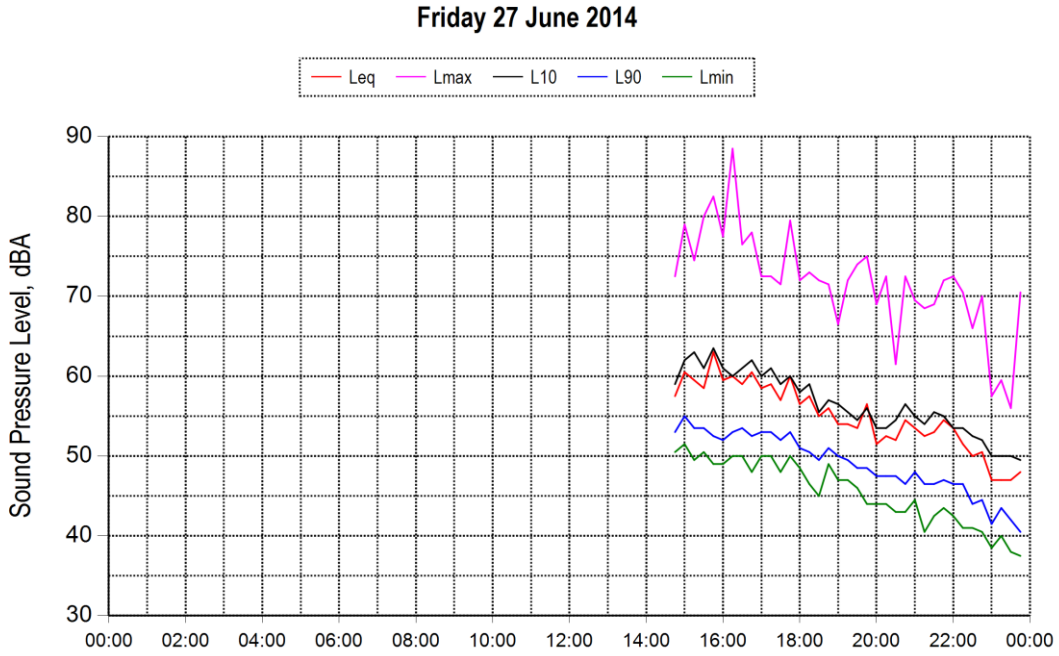
The establishment of a Resource Recovery Facility has been proposed on a parcel of land at 184 Gilmore Road, Queanbeyan West.

Wilkinson Murray (WM) has conducted a Noise Impact Assessment (NIA) for the proposed development in accordance with the Director General's Requirements (DGR) and relevant NSW EPA guidelines.

The predicted operational, traffic and construction noise impacts from the proposed development comply with all relevant criteria.

APPENDIX A

NOISE MEASUREMENT RESULTS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L90
Lmin
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30
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16:00
18:00
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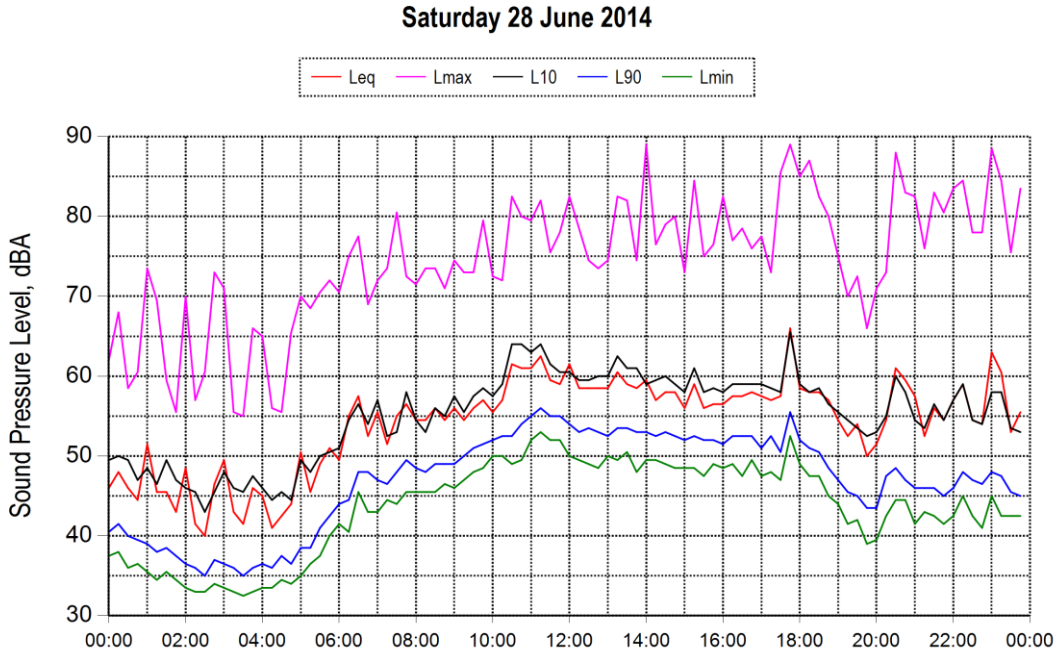
22:00
00:00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30
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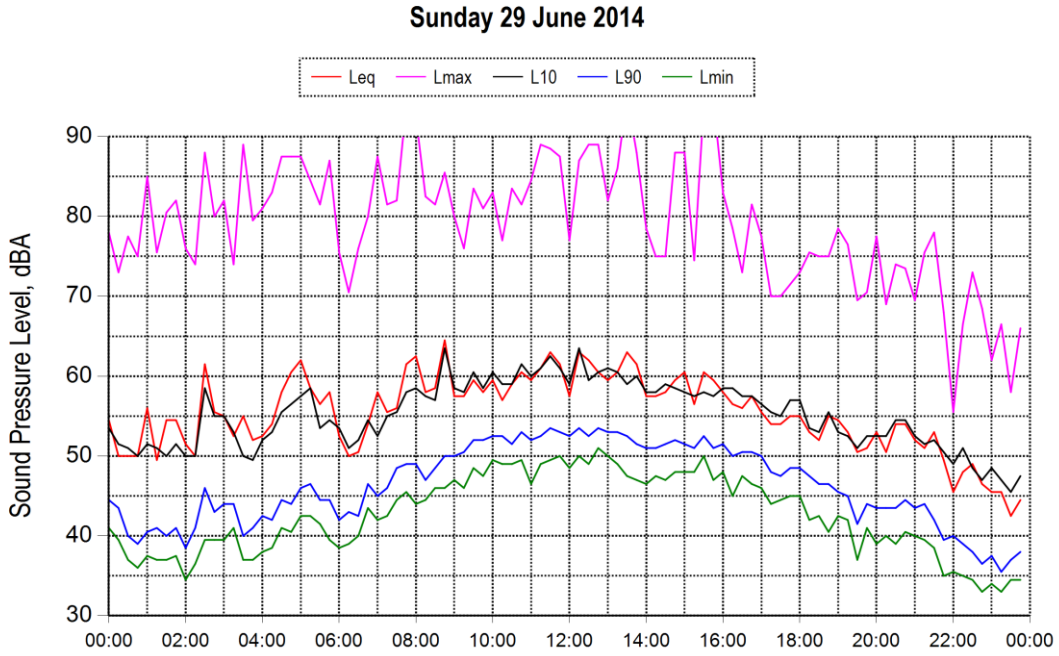
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L10
L90
Lmin
Sound Pressure Level, dBA
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80
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60
50
40
30
00:00
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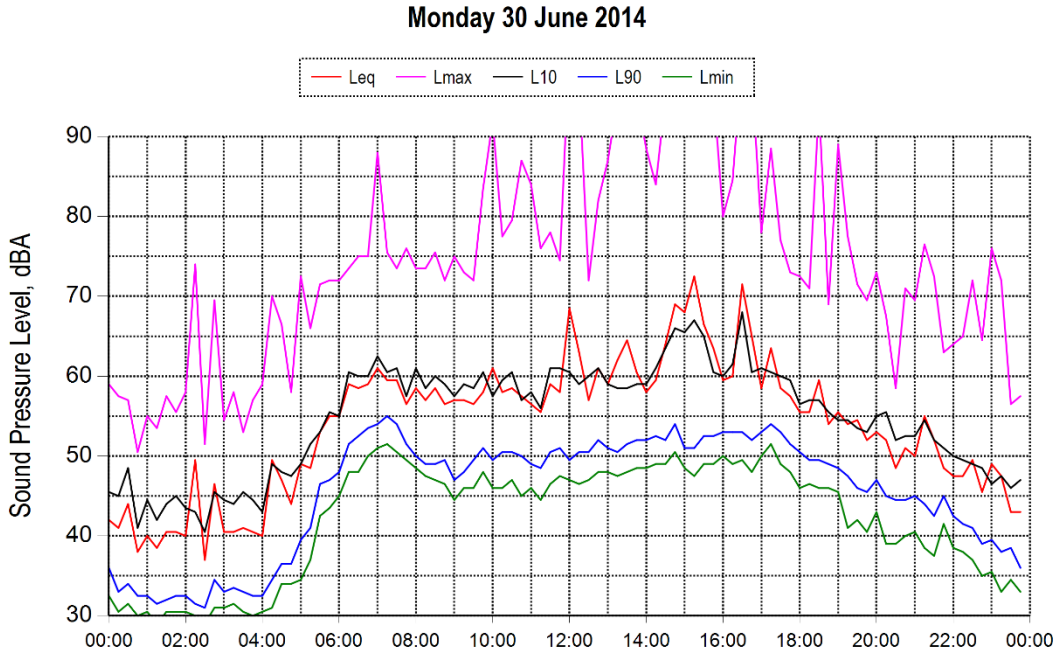
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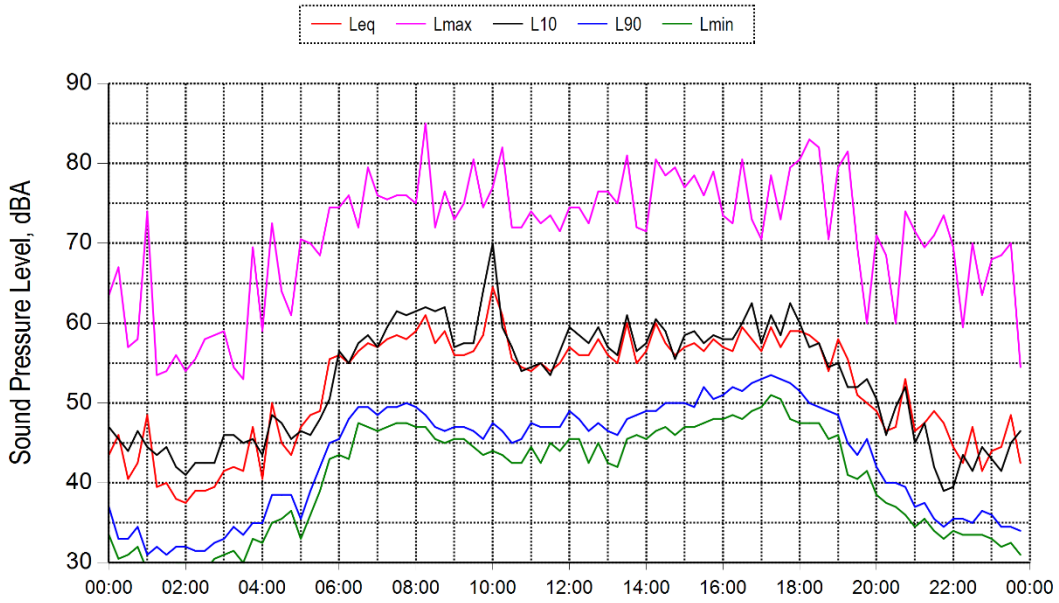
Tuesday 1 July 2014



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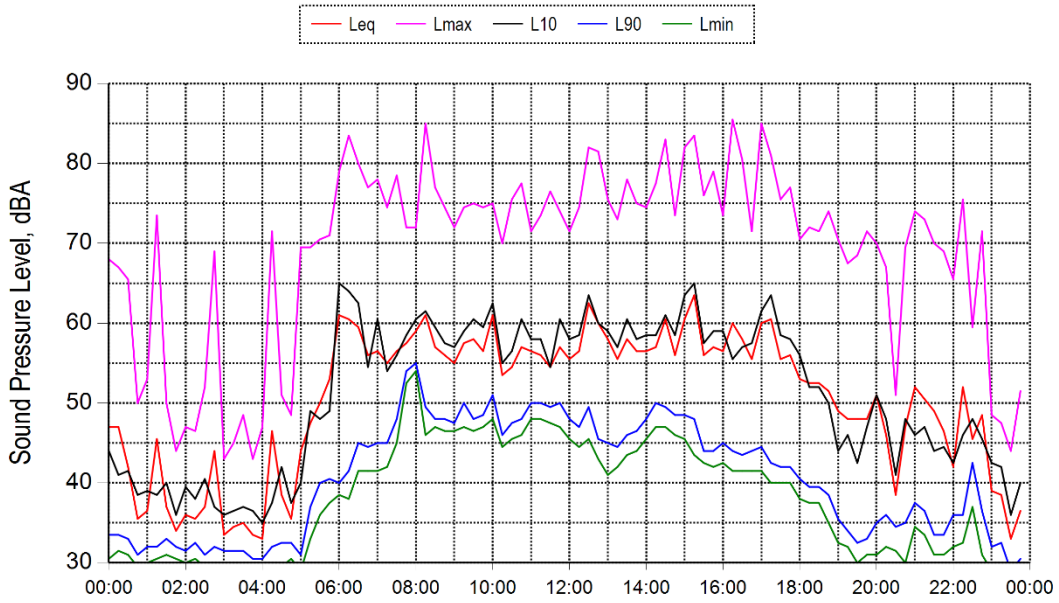

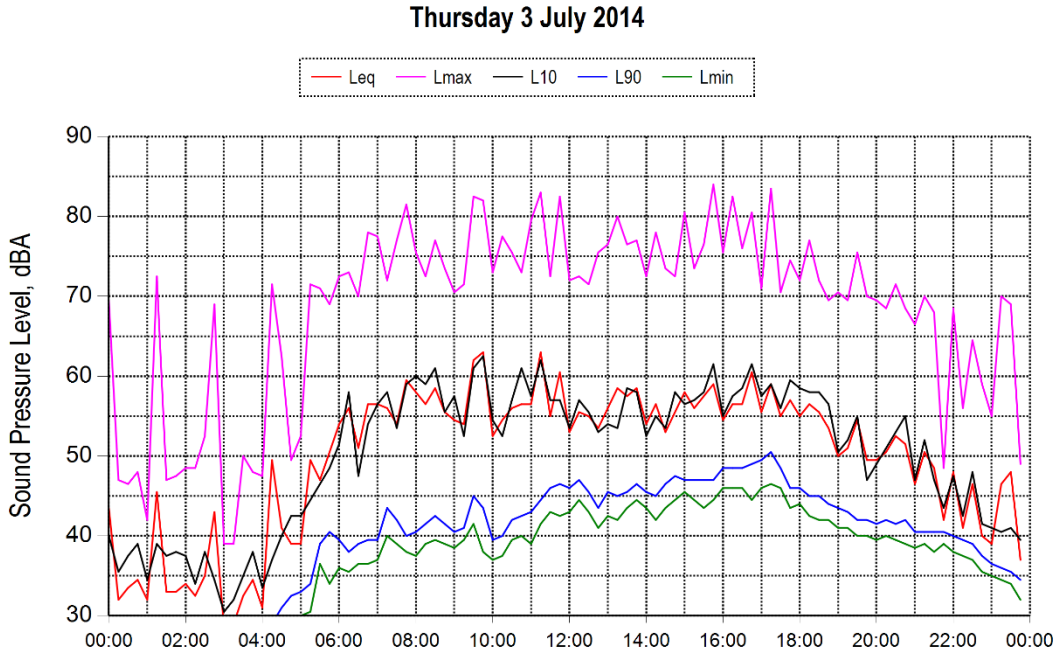
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