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ACCESS ROAD ACOUSTIC ASSESSMENT

HINCHINBROOK CREEK, HOXTON PARK

TE715-02F02 (REV 3) ACCESS ROAD ACOUSTIC ASSESSMENT.DOC

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Prepared for:

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1 INTRODUCTION

Renzo Tonin & Associates was engaged to undertake an acoustic assessment for the proposed construction and operation of an access road, identified as the Hinchinbrook Creek Link Rd (see figure in Appendix B), into the recently approved Hoxton Park Warehouse Project [ref: Application No 10_007]. This report is to address the requirements of Application No 10_007 Concept Plan Approval Condition 8 f) which is a follows;

"A noise assessment, demonstrating that;

- *The noise generated from the construction of the second access would comply with the relevant criteria in DECCW's Interim Construction Noise Guideline;*
- *The traffic noise generated by the project would comply with the relevant criteria in DECCW's Environmental Criteria for Road Traffic Noise"*

The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001.

2 ROAD TRAFFIC NOISE ASSESSMENT

2.1 NSW DECCW's Environmental Criteria for Road Traffic Noise

Noise impact from the proposed Hinchinbrook Creek access road, including its cumulative impact with Cowpasture Road, is assessed against the *NSW Environmental Criteria for Road Traffic Noise* (ECRTN, Environment Protection Authority 1999). Assessment of impacts on the M7 is considered inconsequential due to the current volumes of traffic.

The ECRTN sets out criteria to be applied to particular types of road and land uses. These noise criteria are to be applied when assessing noise impact and determining mitigation measures for developments that are potentially affected by road traffic noise, with the aim of preserving the amenity appropriate to the land use.

The functional use category of new access road would be a 'collector road'. However the overall traffic noise impacts at the nearest residential receivers is dominated by Cowpasture Road traffic. Furthermore, the assessment is also required to consider the cumulative impact of additional traffic on Cowpasture Road. Therefore, assessment of the access road, has been made against the noise criteria for arterial roads, as follows;

- Day (7am to 10pm) $L_{Aeq,\ 15hour}$ **60dB(A)**
- Night (10pm to 7am) $L_{Aeq,\ 9hour}$ **55dB(A)**

Should the criteria already be exceeded, existing noise levels should be reduced to meet the noise criteria, where feasible and reasonable. The ECRTN also states that in all cases where the criteria are already exceeded, traffic arising from the development should not lead to an increase in existing noise levels of more than 2dB.

2.2 Traffic Flows

The following heavy vehicle movements for the Dick Smith and Big W sites have been reproduced from the original application acoustic report [ref: Renzo Tonin & Associates report TE715-01F06 (rev 0)].

Table 1 - Dick Smith Indicative Truck Movements

Description	Daily Movements	6am - 2pm*		2pm-6am	
		Total	Ave 15-min	Total	Ave 15-min
DS Inbound (Receiving)	120	72	2.2	48	0.8
DS Outbound (Dispatch)	60	36	1.1	24	0.4
DS total In	180	108	3.4	72	1.1
DS total Out	180	108	3.4	72	1.1

Note: 60% of total truck movements to occur between 6am - 2pm

Table 2 - Big W Indicative Truck Movements

Description	Daily Movements	6am - 6pm*		6pm-6am	
		Total	Ave 15-min	Total	Ave 15-min
BIGW Inbound (Receiving)	110	66	1.4	44	0.9
BIGW Outbound (Dispatch)	120	72	1.5	48	1.0
BIGW total In	230	138	2.9	92	1.9
BIGW total Out	230	138	2.9	92	1.9

Note: 60% of total truck movements to occur between 6am - 6pm

Utilising the average two-way traffic volumes derived from Table 1 and Table 2, the night time truck movements would be on average 24 per hour two-way between 10pm and 6am and 50 per hour two-way between 6am and 7am. On this basis a two-way traffic flow of approximately 750 during the 15-hour day time and 242 trucks during nine-hour night time period would be expected. Assuming the two residual lots (referred to herein as Lots 1 and 2, located to the south of Big W and DSE - see figure in Appendix B) are to operate at similar capacities, these figures would double. These heavy vehicle movements would be distributed between the southern intersection to Cowpasture Road as well as the proposed intersection to the north (the subject of this application).

Heavy vehicle percentages for Cowpasture Road have been sourced from the Detailed Design acoustic report prepared for the Cowpasture Road upgrade [ref: Report 10-6156, Rev 2 dated 6th June 2008,- referred to herein as 'Heggies Report'].

'Heggies Report' Table 3 – Traffic Volume Details for Noise Modelling Scenarios

Noise Modeling Scenario	*Weekday Traffic Volumes and Heavy Vehicle (HV) Percentages*			
	Northbound	*% HV*	*Southbound*	*% HV*
Year 2006 Future Existing (without upgrade and Westlink M7 Motorway)				
Daytime (7am to 10pm)	12,711	18	13,219	17
Night-time (10pm to 7am)	3,208	24	2,210	19
Peak 1-hour period (8.30am to 3.30pm)	1,321	11	1027	21
Year 2006 After Opening (with upgrade and Westlink M7 Motorway)				
Daytime (7am to 10pm)	12,528	12	12,528	12
Night-time (10pm to 7am)	2,618	12	2,618	12
Peak 1-hour period (8.30am to 3.30pm)	1,134	12	1,134	12
Year 2016 10 Years After Opening (with upgrade and Westlink M7 Motorway)				
Daytime (7am to 10pm)	17,771	12	17,771	12
Night-time (10pm to 7am)	3,713	12	3,713	12
Peak 1-hour period (8.30am to 3.30pm)	1,609	12	1,609	12

The traffic flows presented in Table 3 below have been provided by Colston Budd Hunt & Kafes Pty Ltd [ref: CBHK Report 7675/3 dated August 2010] for the Hinchinbrook Creek Link Rd. It is noted that the traffic flows for the access road include all industrial and future residential development. Therefore with respect to assessment of the subject concept plan, they provide a worst-case assessment of noise impacts. On this basis, only the daytime period has been assessed. It is also noted that the acoustic assessment for the Cowpasture Road upgrade identified the daytime period as the most critical assessment period.

Table 3 – Peak Hour Two-Way (sum of both directions) Traffic Flows with Access Rd

Road		2026		
		Morning	Afternoon	% HV
Cowpasture Rd	north of site access	3620	3580	-
	south of site access	3440	3780	-
Hinchinbrook Creek Link Rd	west of Cowpasture Rd	360	800	20

As the data was provided as peak hour with heavy vehicle percentages only the daytime 15-hour data (in accordance with the ECRTN) has been based on the assumed relationship of 10 times the peak hour flow. In this instance the average of the two peak hours has been used. The data presented Table 4 have been established from the Colston Budd Hunt & Kafes Pty Ltd.

Table 4 – Traffic Flows up for Acoustic Assessment

Road		2026	
		Daytime 15-hour	% HV
Cowpasture Rd	North of site access	36000	13
	South of site access	36100	13
Hinchinbrook Creek Link Rd	West of Cowpasture Road	5800	20
Cowpasture Rd	North of site access Excluding Access Road	33150	12
	Access Rd Contribution	2850	20
	South of site access Excluding Access Road	33150	12
	Access Rd Contribution	2950	20

Source: Extrapolated from CBH&K Report 7675/3 dated August 2010

2.3 Assessment Locations

The nearest most potentially affected receiver locations in proximity to the new access road are Croker Place, Green Valley where the assessment locations would be at the western facade of the residential premises.

2.4 Prediction Methodology

Noise predictions and assessment of the access road has been undertaken in two parts, being;

- Additional road traffic on Cowpasture Road; and
- Direct noise from use of the access road;

2.4.1 Additional Road Traffic on Cowpasture Road

With respect to additional noise on Cowpasture Road, the potential increase in noise has been established using the CORTN 88 algorithms. As details of the overall Cowpasture Rd design and barrier heights were not available at the detail required to undertake a complete noise model for the length of Cowpastrue Rd, the traffic figures presented in Table 4 have been analysed using the CORTN 88 algorithms to establish a noise level difference. As the change in heavy vehicle percentage is negligible, this methodology can be utilised irrespective of site specific conditions.

The section of Cowpasture Road south of the access road is the most potentially affected as it is forecast to carry the most additional road traffic. For the southern section of Cowpasture Road, the forecast traffic volumes correspond to a 0.5dB(A) increase in road traffic noise in accordance with the CORTN 88 algorithms. Such an increase is considered acceptable by the DECCW's ECRTN. It is also noted that the increase is not directly a result of vehicle movements from the subject development but includes future traffic from residential and other industrial uses.

2.4.2 Direct Noise from the Access Road

The CORTN 88 algorithms were also utilised for assessment of the access road for consistency with the other noise modelling. In this case, a 3D noise model was constructed in SoundPLAN Version 6.2. The noise prediction model takes into account:

- traffic volume and heavy vehicle forecasts;
- vehicle speed;
- location of the noise sources on the roads;
- the differing source heights of cars and trucks;
- ground topography;
- receiver height of 4.5m above ground (second storey);
- facade correction of +2.5dB(A); and
- relative levels and angles of view of the road from the receiver's position.

With regard to the affect of an intersection on road traffic noise levels noise, studies undertaken by Renzo Tonin and Associates have revealed that whilst the character of noise may change due to the slowing and accelerating of vehicles, in terms of the L_{Aeq} descriptor no noise level correction is warranted to be applied in the noise modelling.

The noise level predictions are presented in a graphical format in Appendix C. The predicted noise levels indicate levels of **51-52dB(A)** at the nearest most potentially affected receiver

locations in Croker Pl, Green Valley. On the basis of the future predicted noise levels of 63dB(A), as presented in the 'Heggies' Report, noise from the access road will be compliant with the requirements of the ECRTN. No noise mitigation measures are therefore required as a result of the Hinchinbrook Creek Link Road.

3 CONSTRUCTION NOISE ASSESSMENT

Construction noise impacts at residential premises are assessed against noise goals established from the existing noise environment of the area without the subject premise in operation. Appendix B of the DECCW's 'Industrial Noise Policy' (INP) document presents two methods of determining the background noise levels of an area being '*B1 – Long-term background noise method*' and '*B2 – Short-term background noise method*'. The long-term noise measurements undertaken as part of the project application have been relied upon for the subject assessment [ref: Renzo Tonin & Associates report 'TE715-01F06 (rev 0) Acoustic Assessment'].

3.1 Noise Monitoring Locations

The most representative noise monitoring locations to the subject access road, as assessed in the aforementioned report are as follows:

- Location L1 8 Nicol Place, Hinchinbrook

  The noise logger was located in the front yard of the site (western side) approximately 2m from the dwelling facade.

- Location L2 4 Wardang Road, Hinchinbrook

  The noise logger was located in the front yard of the residential premise approximately 2m from the dwelling facade.

Long-term (unattended) noise monitoring at locations L1 and L2 was conducted between Wednesday 18th and Friday 27th November 2009. Appendix B presents a location map showing the site location and monitoring location. Appendix D details the noise monitoring methodology and the graphical recorded output from long term noise monitoring is included in Appendix E. The graphs in Appendix E were analysed to determine a single assessment background level (ABL) for each day, evening and night period, in accordance with the INP.

3.2 Existing Background & Ambient Noise Levels

Existing background and ambient noise levels are presented in Table 5 below.

Table 5 – Measured Existing Background (L_{A90}) & Ambient (L_{Aeq}) Noise Levels

Monitoring Location	L_{90} Background Noise Levels			L_{eq} Ambient Noise Levels		
	Day	Evening	Night	Day	Evening	Night
L1 – 8 Nicol Pl, Hinchinbrook	40	39	36	52	51	50
L2 - 4 Wardang Rd, Hinchinbrook	46*	47	44	54	55	52

Notes: ** - Potentially affected by Cowpasture Road construction noise.*
^ - Potentially affected by Middleton Grange residential construction noise.

3.3 Construction Noise Guidelines

Chapter 171 of the NSW *Environmental Noise Control Manual* (ENCM, Environment Protection Authority 1994) provides guidelines for assessing noise generated during the construction phase. However, the Department of Environment Climate Change (DECC – now DECCW) recently released its *Interim Construction Noise Guideline* (ICNG) in July 2009. This document is currently only issued as an interim guideline, although it is being referred to as DECCW's standard policy for assessing construction noise on new projects. It is intended for this new guideline to supersede Chapter 171 of the ENCM.

The key components of the ICNG that can be incorporated into this assessment include:

1. Use of L_{Aeq} as the descriptor for measuring and assessing construction noise.

In recent years NSW noise policies including DECCW's NSW Industrial Noise Policy (INP) and the NSW Environmental Criteria for Road Traffic Noise (ECRTN) have moved to the primary use of L_{Aeq} over any other descriptor. As an energy average, L_{Aeq} provides ease of use when measuring or calculating noise levels since a full statistical analysis is not required as when using, for example, the L_{A10} descriptor.

Consistent with the latest guideline (ICNG) the use of L_{Aeq} as the key descriptor for measuring and assessing construction noise may follow a 'best practice' approach.

2. Application of feasible and reasonable noise mitigation measures

As stated in the ICNG, a noise mitigation measure is feasible if it is capable of being put into practice, and is practical to build given the project constraints.

Selecting reasonable mitigation measures from those that are feasible involves making a judgement to determine whether the overall noise benefit outweighs the overall social, economic and environmental effects, including the cost of the measure.

3. Quantitative and qualitative assessment

The ICNG provides two methods for assessment of construction noise, being either a quantitative or a qualitative assessment.

A quantitative assessment is recommended for major construction projects of significant duration, and involves the measurement and prediction of noise levels, and assessment against set criteria.

A qualitative assessment is recommended for small projects with a short-term duration where works are not likely to affect an individual or sensitive land use for more than three weeks in total. It focuses on minimising noise disturbance through the implementation of feasible and reasonable work practices, and community notification.

Given the significant scale of the construction works proposed for this Project, a quantitative assessment is carried out herein, consistent with the ICNG's requirements.

4. Management Levels

Residences

Table 6 below (reproduced from Table 2 of the ICNG) sets out the noise management levels and how they are to be applied. The guideline intends to provide respite for residents exposed to excessive construction noise outside the recommended standard hours whilst allowing construction during the recommended standard hours without undue constraints. The rating background level (RBL) is used when determining the management level and is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours).

Table 6 - Noise at Residences Using Quantitative Assessment

Time of Day	Management Level $L_{Aeq\ (15\ min)}$*	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 + 10dB(A)	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 75dB(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: 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 + 5dB(A)	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.

** Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m 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.*

We note that Mirvac has received consent to build its adjoining Hoxton Park Project development between 7am - 6pm Monday to Friday, 7am - 4pm Saturdays and no work on Sunday and public holidays. The same hours are proposed for this application.

Table 7 below sets out the construction noise goals, above which residential receivers may be noise affected. Future residential receivers to the north of the site (within the Hoxton Park Airport site) have not been considered as the distribution facility will be constructed prior to the development of that area. In addition, Middleton Grange has been excluded as it is further removed from the location of the Link Road construction works.

With regards to the noise affected noise criteria, whilst the DECCW's goal is based on RBL + 10dB(A). However in this case the traffic noise exposure at residential receivers is above this target, and therefore it is considered reasonable to apply a higher target for the assessment of 'noise affected'. As our noise monitoring of road traffic was compromised by due to the reduced speed on traffic during Cowpasture Rd construction works (discussed in detail in the Concept Plan application report), predicted noise levels presented in the Heggies Report have been used for guidance. The year of opening (Year 2006) road traffic noise levels for Croker Place were 62dB(A). Road traffic noise levels include a facade reflection of +2.5dB(A), whilst construction noise is assessed in the free-field (i.e away from reflecting surfaces). The cnoise affected construction targets have been set to the equivalent free-field traffic nose level 59dB(A).

Table 7 – DECCW's Construction Noise Criteria, dB(A)

Location	During Recommended Hours	
	Noise Affected	Highly Noise Affected
A1 – Croker Place, Green Valley - Rear yard of western most premises.	59*	75

Note: Noise affected criteria equalling free field road traffic noise levels.

It is noted that the outside hours noise goals are below the measured ambient L_{Aeq} noise levels recorded during our long-term noise monitoring.

3.4 Construction Equipment Noise Levels

Table 8 lists construction plant and equipment likely to be used by the contractor to carry out the necessary construction work for this project.

Table 8 - Typical Construction Equipment & Sound Power Levels, dB(A)

Plant Item	Plant Description	Sound Power Levels (re: 10-12 Watts)		
		Range	Typical L10 (Mid-Point)	Typical Leq (Mid-Point)
	Bridgeworks			
1	Excavator	105 – 115	110	107
2	Dump Trucks	102 – 113	108	105
3	Truck (>20tonne)	103 – 108	106	103
4	Concrete Truck	108 – 110	109	106

Plant Item	Plant Description	Sound Power Levels (re: 10-12 Watts)		
		Range	Typical L10 (Mid-Point)	Typical Leq (Mid-Point)
5	Piling	105 – 130	118	115
6	Road Milling Machine	111	111	108
7	Concrete Pump	100 – 109	105	102
8	Water Cart	106 – 108	107	104
9	Mobile Crane	110 – 115	113	110
10	Jack Hammers	110 – 120	115	112
11	Power Generator	100 – 106	103	100
12	Vibratory Roller	108 – 110	109	106
13	Welders	100 – 110	105	102
	TOTAL SOUND POWER FOR INDICATIVE PURPOSES			119
	Concrete Works			
14	Concrete Pump	100 – 109	105	102
15	Concrete Leveller	115	115	112
16	Compactor	110 – 115	113	110
17	Concrete Saw	118	118	115
18	Silenced Air Compressor	90 – 105	98	95
19	Power Generator	100 – 106	103	100
	TOTAL SOUND POWER FOR INDICATIVE PURPOSES			118
	Road Surface Paving			
20	Asphalt Truck	106	106	103
21	Profiler	110 – 115	113	109
22	Pavement Laying Machine	110 – 114	112	109
23	Rollers	100 – 113	107	104
24	Concrete Saw	118	118	115
	TOTAL SOUND POWER FOR INDICATIVE PURPOSES			117

Note: The sound power data within the column marked "Typical (Mid-Point)" has been used in this study to calculate typical noise levels at the nominated assessment locations.

The sound power levels for the majority of activities presented in the above table are based on maximum levels given in Table D2 of Australian Standard 2436 - 1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites", DECC's Draft 'NSW Construction Noise Guideline', information from past projects and information held in our library files.

3.5 Construction Noise Predictions

Construction noise will vary dependant upon the number of items of equipment on site and their locations. Noise predictions have been based on one of each unit for each scenario in operation concurrently (being the sound power level totals listed in Table 8). The noise level predictions are based on the average distance of approximately 140m to the rear yard of residential premises located in Croker Pl Green Valley. The noise predictions account for ground absorption however no acoustic shielding has been included for the residential boundary fences.

Table 9 - Construction Noise Predictions, dB(A)

Location	Scenario	Predicted L_{Aeq} Noise Level	Criteria	
			'Noise Affected'	Highly Noise Affected
A1 – Croker Pl, Green Valley	Bridgeworks	64	59	75
	Concrete works	62	59	75
	Paving	62	59	75

3.5.1 Assessment Discussion

The noise level predictions indicate that construction activities may exceed the 'noise affected' targets however works should not reach the 'highly noise affected' levels of 75dB(A). It is noted that the predictions are based on all equipment listed in Table 8 operating at the same time. The major source during the bridgeworks is during piling which is to occur for approximately 3-4 weeks. With regard to the Concrete Works and Paving, cumulative noise levels are dominated by the concrete saw. When the concrete saw is not in operation, noise levels are predicted to comply.

Nonetheless, in accordance with the ICNG it is recommended that the proponent 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.

3.6 Recommendations

The following recommendations provide in-principle noise control solutions to reduce noise impacts to residential receivers. However, prior to the implementation of any significant physical and/or management measures, noise monitoring of initial construction activities may be the most appropriate action to establish the extent of any noise impacts at specific receiver locations.

Implementation of noise control measures, such as those suggested in Australian Standard 2436-1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites", are expected to reduce predicted construction noise levels. Reference to Australian Standard 2436-1981, Appendix E, Table E1 suggests possible remedies and alternatives to reduce noise emission levels from typical construction equipment. Table E2 in Appendix E presents typical examples of noise reductions achievable after treatment of various noise sources. Table E3 in Appendix E presents the relative effectiveness of various forms of noise control treatment.

Table 10 below presents the noise control methods, practical examples and expected noise reductions according to AS2436 and according to Renzo Tonin & Associates' opinion based on experience with past projects.

Table 10– Relative Effectiveness of Various Forms of Noise Control, dB(A)

Noise Control Method	Practical Examples	Typical noise reduction possible in practice		Maximum noise reduction possible in practice	
		AS 2436	Renzo Tonin & Assoc.	AS 2436	Renzo Tonin & Assoc.
Screening	Acoustic barriers such as earth mounds, temporary or permanent noise barriers	7 to 10	5 to 10	15	15
Acoustic Enclosures	Engine casing lagged with acoustic insulation and plywood	15 to 30	10 to 20	50	30
Engine Silencing	Residential class mufflers	5 to 10	5 to 10	20	20
Substitution by alternative process	Use electric motors in preference to diesel or petrol	15 to 25	15 to 25	60	40

Table 11 below also outlines a number of techniques and options for controlling construction noise and vibration, where considered reasonable and feasible.

Table 11 – Construction Noise and Vibration Management Options

Construction Noise and Vibration Management Options	
Source controls	
Time constraints	Limit work to daylight hours. Consider implementing respite periods with low noise/vibration-producing construction activities.
Scheduling	Perform noisy work during less sensitive time periods.
Equipment restrictions	Select low-noise plant and equipment. Ensure equipment has quality mufflers installed.
Emission restrictions	Establish stringent noise emission limits for specified plant and equipment. Implement noise monitoring audit program to ensure equipment remains within specified limits.
Limit equipment on site	Only have necessary equipment on site.
Limit activity duration	Where possible, concentrate noisy activities at one location and move to another as quickly as possible. Any equipment not in use for extended periods during construction work should be switched off.
Equipment Location	Noisy plant and equipment should be located as far as possible from noise sensitive areas, optimising attenuation effects from topography, natural and purpose built barriers and materials stockpiles.
Site access	Vehicle movements outside construction hours, including loading and unloading operations, should be minimised and avoided where possible.
Equipment maintenance	Ensure equipment is well maintained and fitted with adequately maintained silencers which meet the design specifications.
Reduced equipment power	Use only necessary size and power.
Quieter work practices	For example, implement worksite induction training, educating staff on noise sensitive issues and the need to make as little noise as possible.
Reversing alarms	Consider alternatives, such as manually adjustable or ambient noise sensitive types (“smart” reversing alarms) and closed circuit TV systems. Alternative site management strategies can be developed, in accordance with the *Occupational Health and Safety Plan*, with the concurrence of the Occupational Health and Safety Officer.

Path controls	
Noise barriers	Consider installing temporary construction noise barriers. Install any permanent noise barriers or structures as early as possible in the construction process.
Enclosures	Install noise-control kits for noisy mobile equipment and shrouds around stationary plant, as necessary.
Increased distance	Locate noisy plant as far away from noise-sensitive receptors as possible.
Site access	Select and locate site access roads as far away as possible from noise-sensitive areas.
Receptor controls	
Noise / Vibration Monitoring	Noise and vibration compliance monitoring for all major equipment and activities on site should be undertaken.

4 CONCLUSION

Renzo Tonin & Associates has completed a noise investigation of construction and operational road traffic noise impacts from the proposed access road to be located to the north of the Hoxton Park Warehouse Development. The assessment was carried out in accordance with the requirements of the Department of Environment, Climate Change and Water (DECCW) as required by Application No 10_007 Concept Plan Approval Condition 8 f).

The study has relied upon existing ambient noise levels in the surrounding area, established through long-term noise monitoring undertaken at the nearest most potentially affected residential receiver locations. It has also relied upon future predicted traffic noise levels in relation to the Cowpasture Road upgrade.

The findings of the study were as follows;

Environmental Criteria for Road Traffic Noise

Assessment of noise impacts in accordance with the DECCW's 'Environmental Criteria for Road Traffic Noise' (ECRTN) relied upon traffic forecasts that included vehicle traffic from all future development (including residential) from within the Hoxton Park Airport Precinct. Therefore the assessment has provided a worst case assessment of impacts with regard to the Hoxton Park Warehouse Development.

Utilising the traffic volume forecasts provided by Colston Budd Hunt & Kafes Pty Ltd, the predicted noise levels from the access road were found not to contribute to road traffic noise along Cowpasture Road. With regard to the increased road traffic along Cowpasture Road, the noise assessment revealed a 0.5dB(A) increase in noise level could result from the proposed access road. This potential increase is compliant with the requirements of the ECRTN and it is not considered reasonable or feasible to provide noise mitigation measures for such impacts.

Construction Noise

In accordance with the Interim Construction Noise Guideline, noise emission from construction activities during the proposed hours (7am - 6pm weekdays and 7am - 4pm Saturdays) may exceed the established noise affected targets if all plant were to operate concurrently, however will comply with the highly affected target levels within the DECCW's Interim Construction Noise Guideline (ICNG). Undertaking of piling and use of the concrete saw, which are unlikely to operate for extend periods, were highlighted as the dominating noise sources resulting in the exceedances. It is not considered that significant noise impacts would result from the construction activities. Nonetheless, it is recommended that the proponent apply feasible and reasonable work practices to reduce noise impacts, in particular during the use of the dominant noise sources.

APPENDIX A - GLOSSARY OF ACOUSTIC TERMS

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse Weather — Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).

Ambient Noise — The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.

Assessment Period — The period in a day over which assessments are made.

Assessment Point — A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated.

Background Noise — Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the $\mathbf{L_{90}}$ noise level (see below).

Decibel [dB] — The units that sound is measured in. The following are examples of the decibel readings of every day sounds:

0dB The faintest sound we can hear

30dB A quiet library or in a quiet location in the country

45dB Typical office space. Ambience in the city at night

60dB Martin Place at lunch time

70dB The sound of a car passing on the street

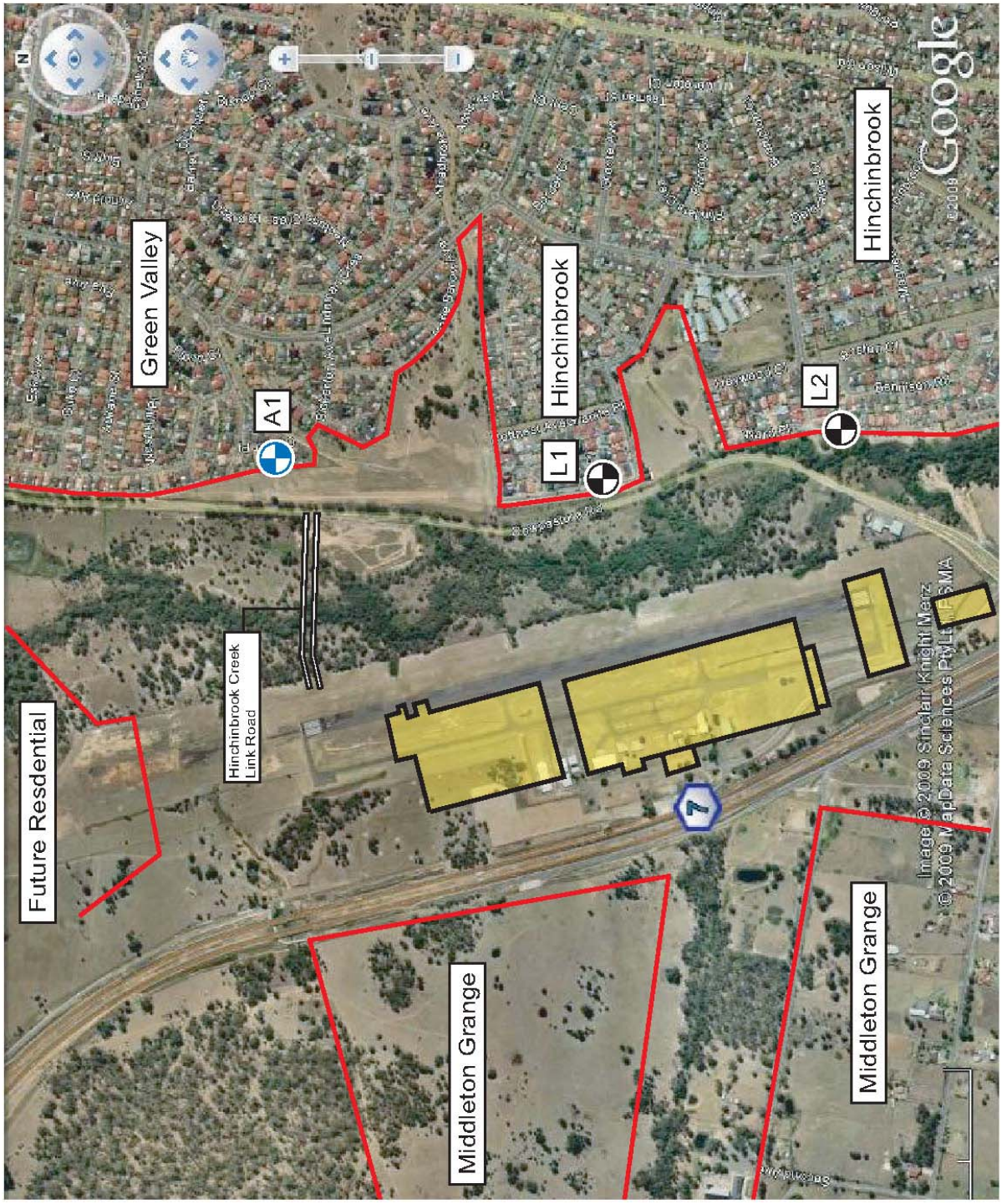
80dB Loud music played at home

90dB The sound of a truck passing on the street

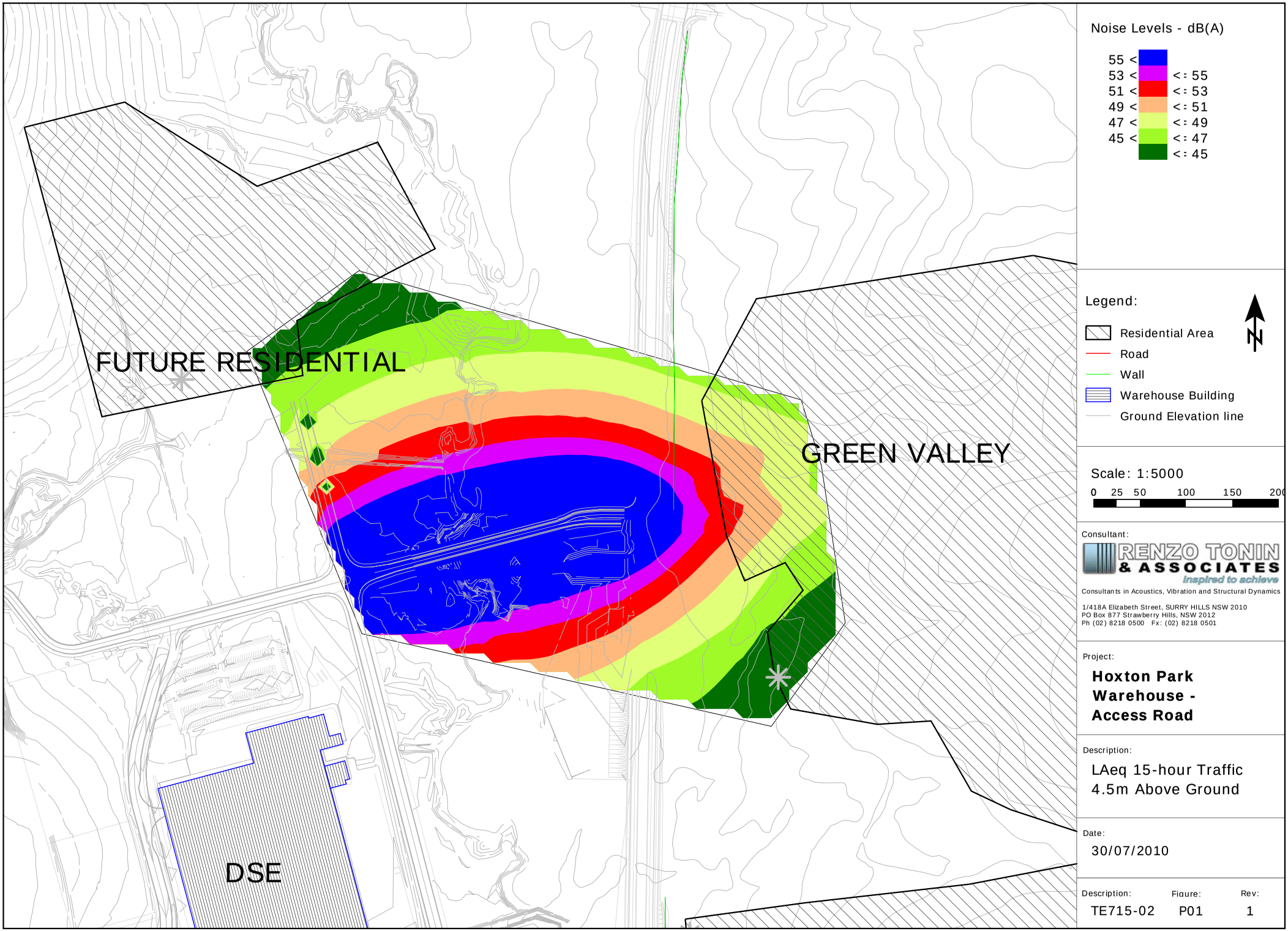
	100dB The sound of a rock band
	115dB Limit of sound permitted in industry
	120dB Deafening
dB(A):	A-weighted decibels The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Impulsive noise	Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more.
L_{max}	The maximum sound pressure level measured over a given period.
L_{min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and

	integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
SEL	Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound Absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound Level Meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound Pressure Level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.
Sound Power Level	Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Tonal noise	Containing a prominent frequency and characterised by a definite pitch.

APPENDIX B - SITE, MEASUREMENT AND ASSESSMENT LOCATIONS



APPENDIX C - ACCESS ROAD TRAFFIC NOISE PREDICTIONS



Noise Levels - dB(A)

55 <	
53 <	<= 55
51 <	<= 53
49 <	<= 51
47 <	<= 49
45 <	<= 47
	<= 45

Legend:

- Residential Area
- Road
- Wall
- Warehouse Building
- Ground Elevation line

N

Scale: 1:5000

0 25 50 100 150 200

Consultant:

RENZO TONIN & ASSOCIATES
inspired to achieve

Consultants in Acoustics, Vibration and Structural Dynamics

1/418A Elizabeth Street, SURRY HILLS NSW 2010
PO Box 877 Strawberry Hills, NSW 2012
Ph (02) 8218 0500 Fx: (02) 8218 0501

Project:

Hoxton Park Warehouse - Access Road

Description:

LAeq 15-hour Traffic
4.5m Above Ground

Date:

30/07/2010

Description:	Figure:	Rev:
TE715-02	P01	1

APPENDIX D - LONG TERM MONITORING METHODOLOGY

D.1 Noise Monitoring Equipment

Long term noise monitoring was conducted using RTA Technology noise loggers. The noise monitoring equipment complies with AS IEC 61672.1 2004 “Electroacoustics - Sound Level Meters” and are designated as Type 2 instrument.

A noise monitor consists of a sound level meter and a computer housed in a weather resistant enclosure. Ambient noise levels were recorded at a rate of 10 samples per second. Every 15 minutes, the data is processed statistically and stored in memory. The equipment was calibrated prior and subsequent to the measurement period using a Bruel & Kjaer Type 4230 calibrator. No significant drift in calibration was observed.

D.2 Meteorology during Monitoring

Measurements affected by extraneous noise, wind (greater than 5m/s) or rain were excluded from the recorded data in accordance with the INP. The Bureau of Meteorology (BOM) provided meteorological data, which is considered representative of the site, for the duration of the noise monitoring period. The data was modified to allow for the height difference between the BOM weather station, where wind speed and direction is recorded at a height of 10m above ground level, and the microphone location, which is at 1.5m above ground level. The correction factor applied to the data was taken from *Australian Standard AS1170.2 1989 Section 4.2.5.1*.

D.3 Noise vs Time Graphs

Noise almost always varies with time. Noise environments can be described using various descriptors to show how a noise ranges about a level. In this report, noise values measured or referred to include the L_{10}, L_{90}, and L_{eq} levels. The statistical descriptors L_{10} and L_{90} measure the noise level exceeded for 10% and 90% of the sample measurement time. The L_{eq} level is the equivalent continuous noise level or the level averaged on an equal energy basis. Measurement sample periods are usually ten to fifteen minutes. The Noise -vs- Time graphs representing measured noise levels at the noise monitoring location in Appendix D illustrate these concepts.

Noise levels are commonly measured in units of A-weighted decibels or dB(A). The "A-weighting" refers to a standardised amplitude versus frequency curve used to "weight" sound measurements to represent the response of the human ear. The human ear is less sensitive to low pitch sound than it is to high pitch sound. Overall A-weighted measurements quantify sound with a single number to represent how people subjectively hear different frequencies at different levels.

Background noise is the term used to describe the noise measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample time period. This is represented as the L_{90} noise level.

APPENDIX E - LONG-TERM MONITORING RESULTS

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noise logger results

Location L1 - 8 Nicol Place, Hinchinbrook (front yard)

BACKGROUND & AMBIENT NOISE MONITORING RESULTS
NSW DECCW's 'INDUSTRIAL NOISE POLICY', 2000

	L_{A90} Background Noise Levels[5]			L_{Aeq} Ambient Noise Levels		
Day	Day	Evening	Night	Day	Evening	Night
Wednesday-18-November-2009	-	38	39	-	50	52
Thursday-19-November-2009	40	43	40	51	50	52
Friday-20-November-2009	41	42	39	49	50	48
Saturday-21-November-2009	40	39	33	52	49	45
Sunday-22-November-2009	-	-	-	-	-	-
Monday-23-November-2009	-	-	-	-	-	-
Tuesday-24-November-2009	43	38	36	55	49	48
Wednesday-25-November-2009	40	39	34	50	47	52
Thursday-26-November-2009	40	44	36	48	55	51
Friday-27-November-2009	-	-	-	-	-	-
Representative Level	**40**	**39**	**36**	**52**	**51**	**50**

Notes:

1. Day is taken to be 7:00am to 6:00pm
2. Evening is taken to be 6:00pm to 10:00pm.
3. Night is taken to be the remaining periods.
4. Partial day's monitoring
5. Assessment Background Level (ABL)
6. Rating Background Level (RBL) for L90 and logarithmic average for Leq

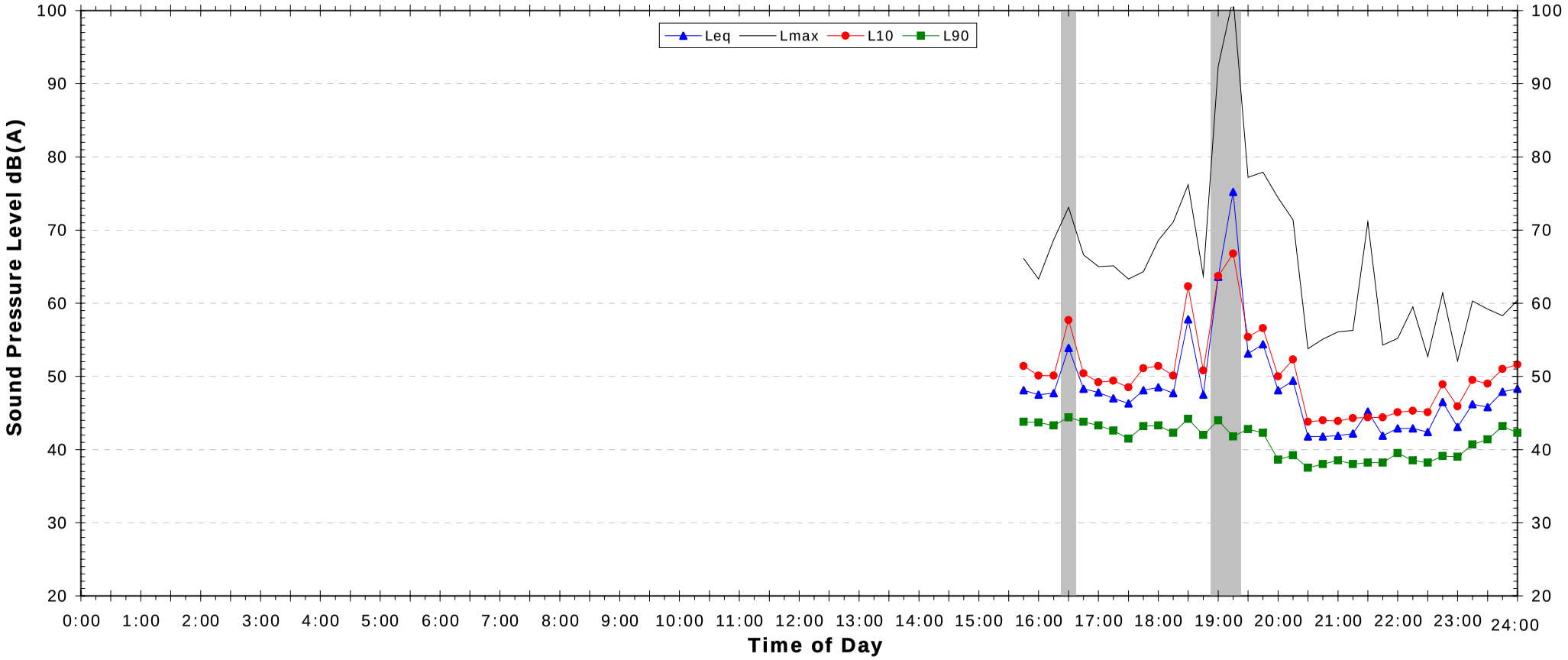
TRAFFIC NOISE MONITORING RESULTS
NSW DEC 'ENVIRONMENTAL CRITERIA FOR ROAD TRAFFIC NOISE', 1999

	L_{Aeq} Noise Levels		$L_{Aeq\ 1hr}$ Noise Levels			
Day	Day	Night	Day - Up	Day - Low	Night - Up	Night - Low
Wednesday-18-November-2009	52	54	56	46	58	47
Thursday-19-November-2009	53	54	56	50	59	48
Friday-20-November-2009	52	50	55	49	55	47
Saturday-21-November-2009	54	47	58	49	50	41
Sunday-22-November-2009	53	53	57	48	57	50
Monday-23-November-2009	55	56	57	49	60	44
Tuesday-24-November-2009	56	51	61	46	55	45
Wednesday-25-November-2009	52	55	56	46	61	42
Thursday-26-November-2009	54	53	60	49	57	46
Friday-27-November-2009	58	-	60	53	-	-
Representative Weekday	**54**	**54**	**58**	**49**	**58**	**46**
Representative Weekend	**54**	**51**	**58**	**48**	**55**	**47**
Representative Week	**54**	**53**	**58**	**49**	**58**	**46**

EXISTING AMBIENT NOISE LEVELS

Location L1 - 8 Nicol Place, Hinchinbrook (front yard)

Wednesday, 18 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	-	38.0	39.0
Leq (see note 3)	-	50.2	51.7

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured in free-field; tabulated results facade corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	51.9	54.2
$L_{eq\ 1hr}$ upper 10 percentile	56.3	58.4
$L_{eq\ 1hr}$ lower 10 percentile	45.8	46.6

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	65.3	to	65.3
Lmax - Leq (Range)	16.0	to	17.3

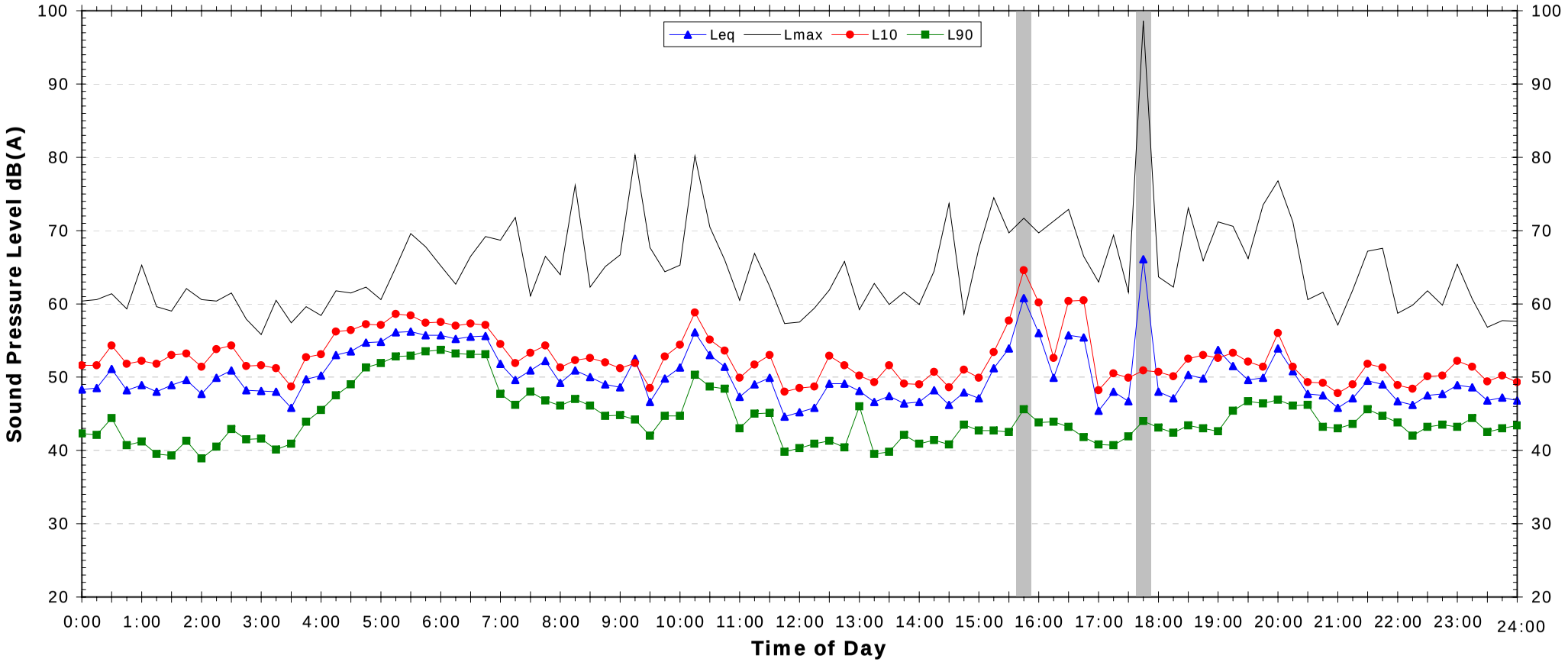
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L1 - 8 Nicol Place, Hinchinbrook (front yard)

Thursday, 19 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	40.4	42.6	39.7
Leq (see note 3)	50.6	50.0	51.7

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured in free-field; tabulated results facade corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	52.9	54.2
$L_{eq\ 1hr}$ upper 10 percentile	56.2	59.0
$L_{eq\ 1hr}$ lower 10 percentile	49.6	48.3

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	65.2	to	65.4
Lmax - Leq (Range)	15.5	to	18.8

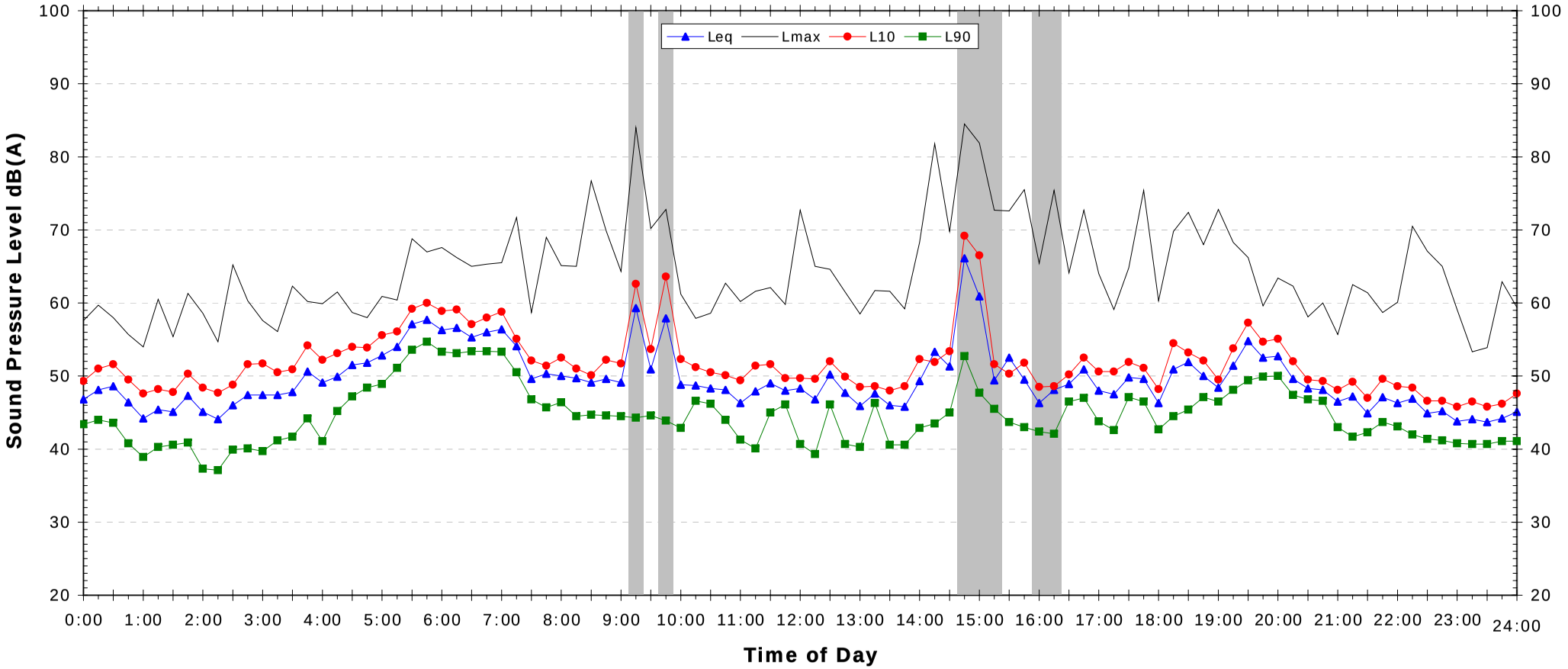
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L1 - 8 Nicol Place, Hinchinbrook (front yard)

Friday, 20 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	40.6	42.3	38.7
Leq (see note 3)	49.4	50.3	47.7

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured in free-field; tabulated results facade corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	52.2	50.2
$L_{eq\ 1hr}$ upper 10 percentile	55.2	54.5
$L_{eq\ 1hr}$ lower 10 percentile	49.5	46.8

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	65.6	to	77.1
Lmax - Leq (Range)	15.5	to	29.5

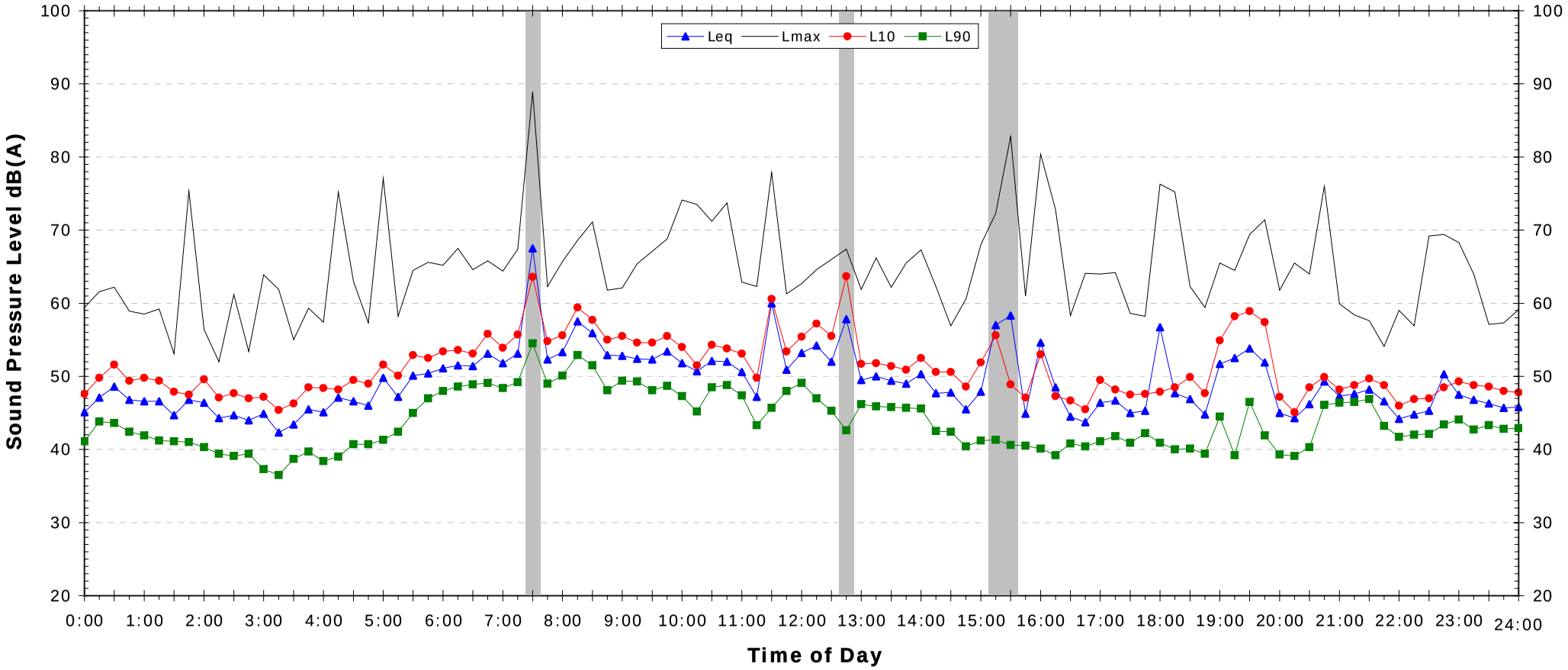
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L1 - 8 Nicol Place, Hinchinbrook (front yard)

Saturday, 21 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	40.5	39.2	32.7
Leq (see note 3)	52.3	49.1	44.8

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured in free-field; tabulated results facade corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	54.1	47.3
$L_{eq\ 1hr}$ upper 10 percentile	57.8	50.0
$L_{eq\ 1hr}$ lower 10 percentile	49.1	41.1

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	67.5	to	69.4
Lmax - Leq (Range)	15.3	to	21.9

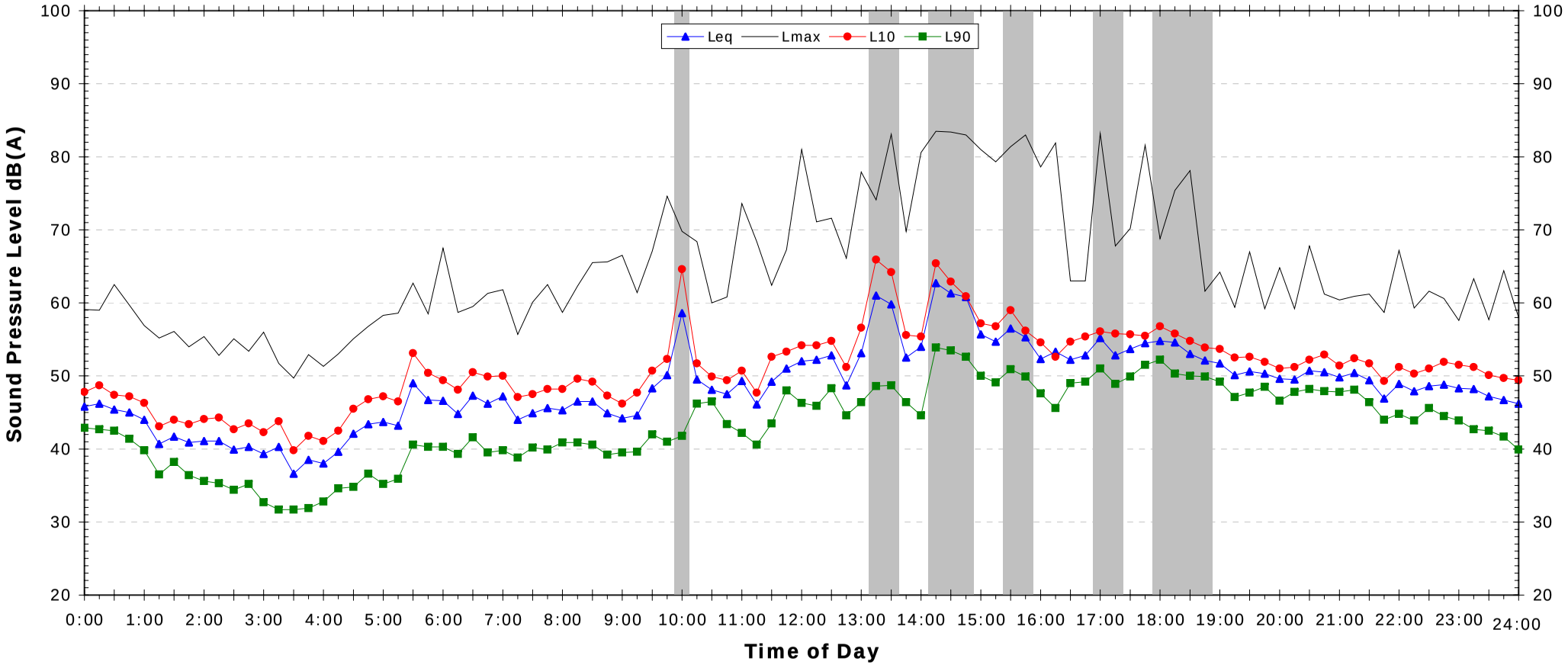
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L1 - 8 Nicol Place, Hinchinbrook (front yard)

Sunday, 22 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	-	-	-
Leq (see note 3)	-	-	-

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured in free-field; tabulated results facade corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	53.2	53.1
$L_{eq\ 1hr}$ upper 10 percentile	57.5	56.7
$L_{eq\ 1hr}$ lower 10 percentile	47.8	49.6

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	65.5	to	80.2
Lmax - Leq (Range)	15.4	to	26.1

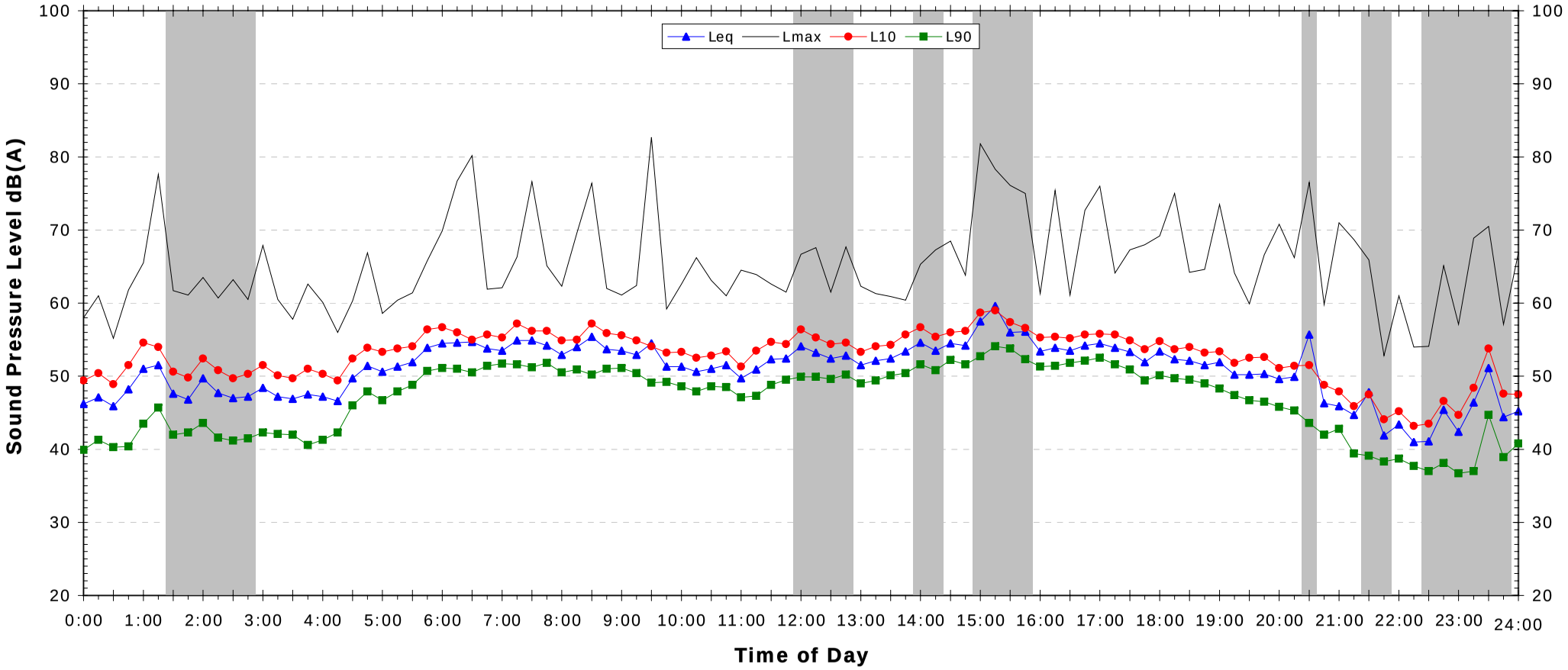
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L1 - 8 Nicol Place, Hinchinbrook (front yard)

Monday, 23 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	-	-	-
Leq (see note 3)	-	-	-

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured in free-field; tabulated results facade corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	55.0	56.3
$L_{eq\ 1hr}$ upper 10 percentile	56.8	60.3
$L_{eq\ 1hr}$ lower 10 percentile	48.8	43.5

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	66.9	to	81.9
Lmax - Leq (Range)	15.7	to	24.1

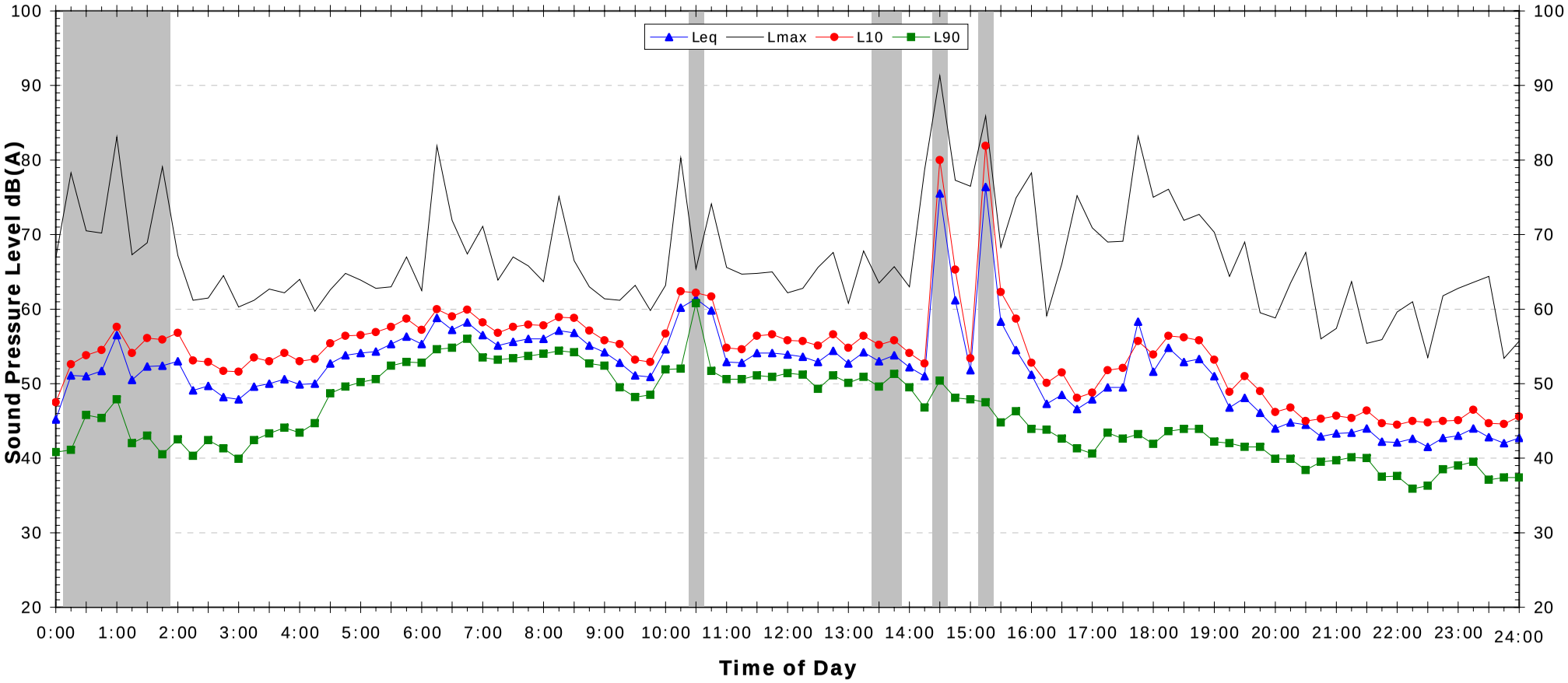
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L1 - 8 Nicol Place, Hinchinbrook (front yard)

Tuesday, 24 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	42.6	37.6	35.9
Leq (see note 3)	54.9	48.7	48.5

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured in free-field; tabulated results facade corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	56.4	51.0
$L_{eq\ 1hr}$ upper 10 percentile	60.5	54.7
$L_{eq\ 1hr}$ lower 10 percentile	46.0	45.0

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	65.5	to	66.0
Lmax - Leq (Range)	15.6	to	21.5

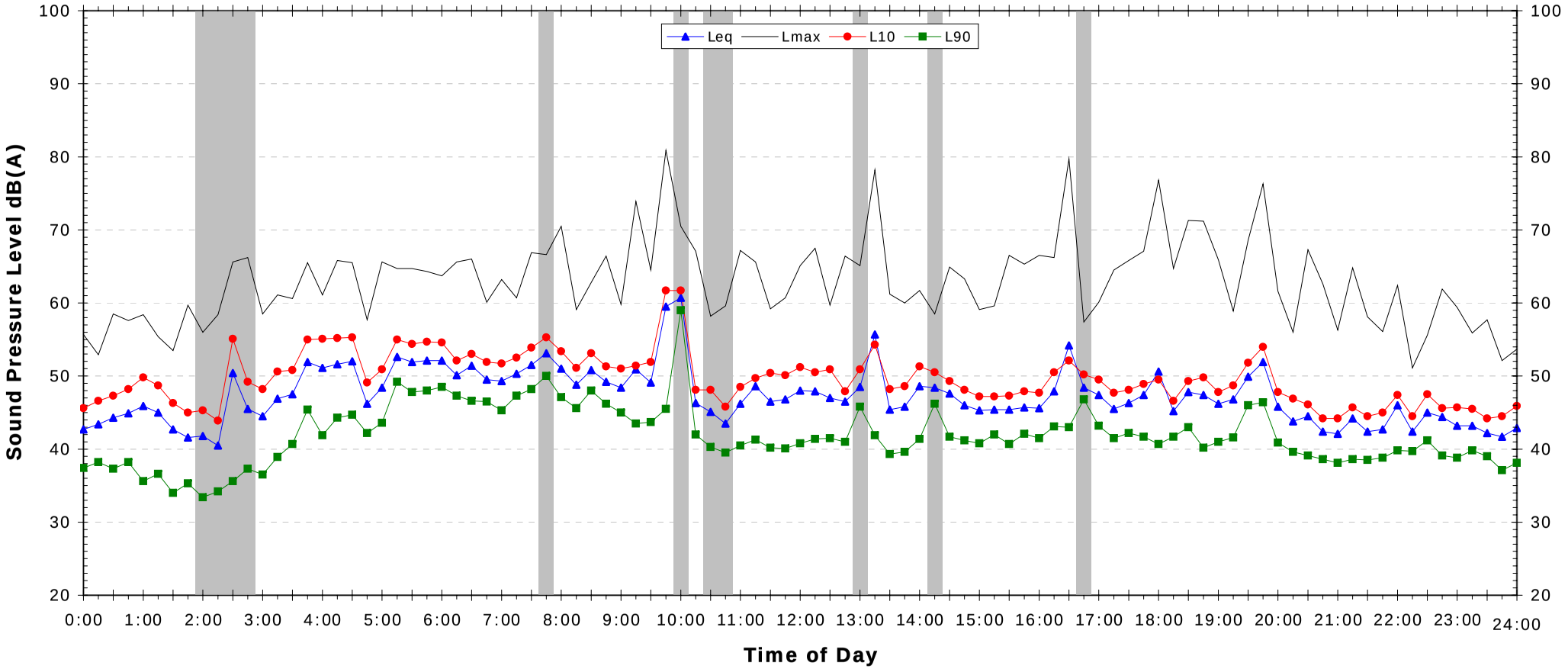
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L1 - 8 Nicol Place, Hinchinbrook (front yard)

Wednesday, 25 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	40.2	38.5	34.0
Leq (see note 3)	50.0	46.5	52.1

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured in free-field; tabulated results facade corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	51.7	54.6
$L_{eq\ 1hr}$ upper 10 percentile	56.4	60.5
$L_{eq\ 1hr}$ lower 10 percentile	46.2	42.0

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	65.3	to	81.5
Lmax - Leq (Range)	15.2	to	23.5

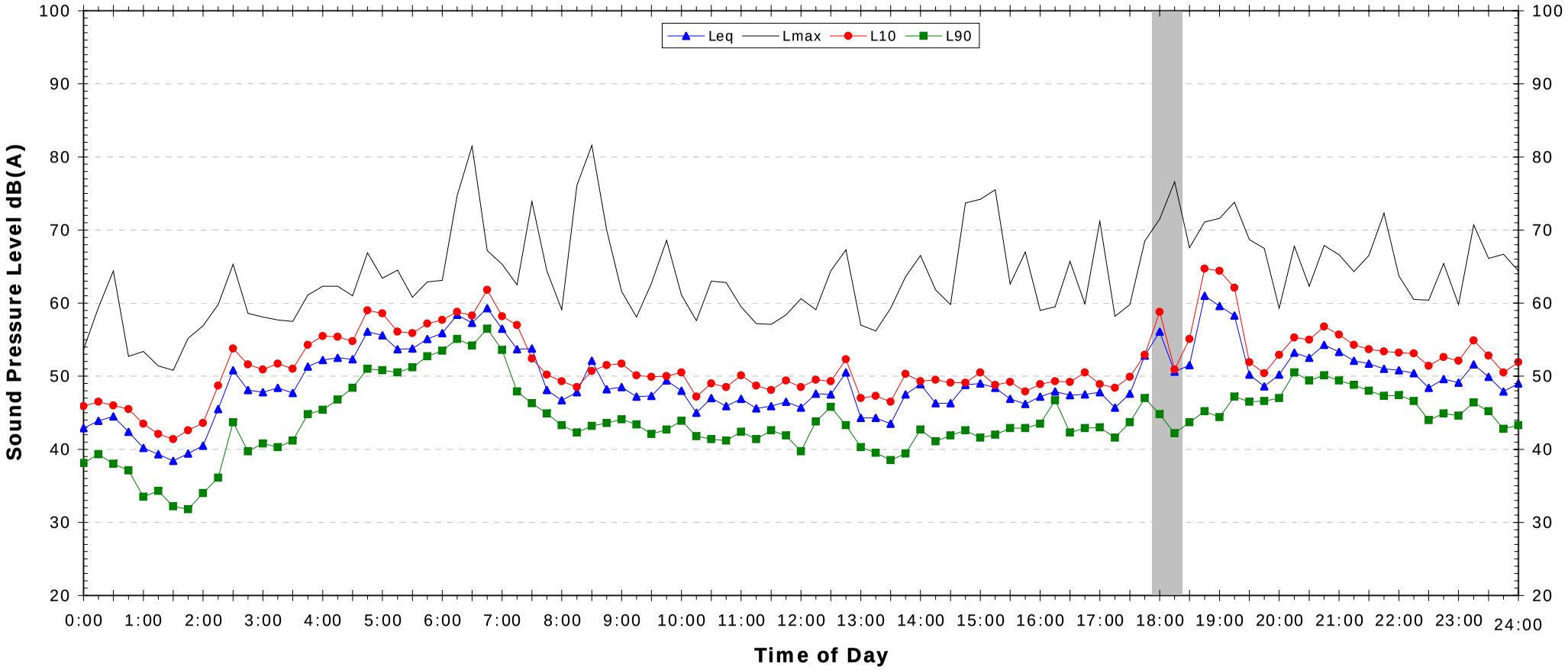
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L1 - 8 Nicol Place, Hinchinbrook (front yard)

Thursday, 26 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	40.3	44.4	35.7
Leq (see note 3)	48.3	55.0	50.7

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured in free-field; tabulated results facade corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	53.7	53.2
$L_{eq\ 1hr}$ upper 10 percentile	59.5	57.4
$L_{eq\ 1hr}$ lower 10 percentile	48.6	46.5

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	65.4	to	79.5
Lmax - Leq (Range)	15.5	to	25.8

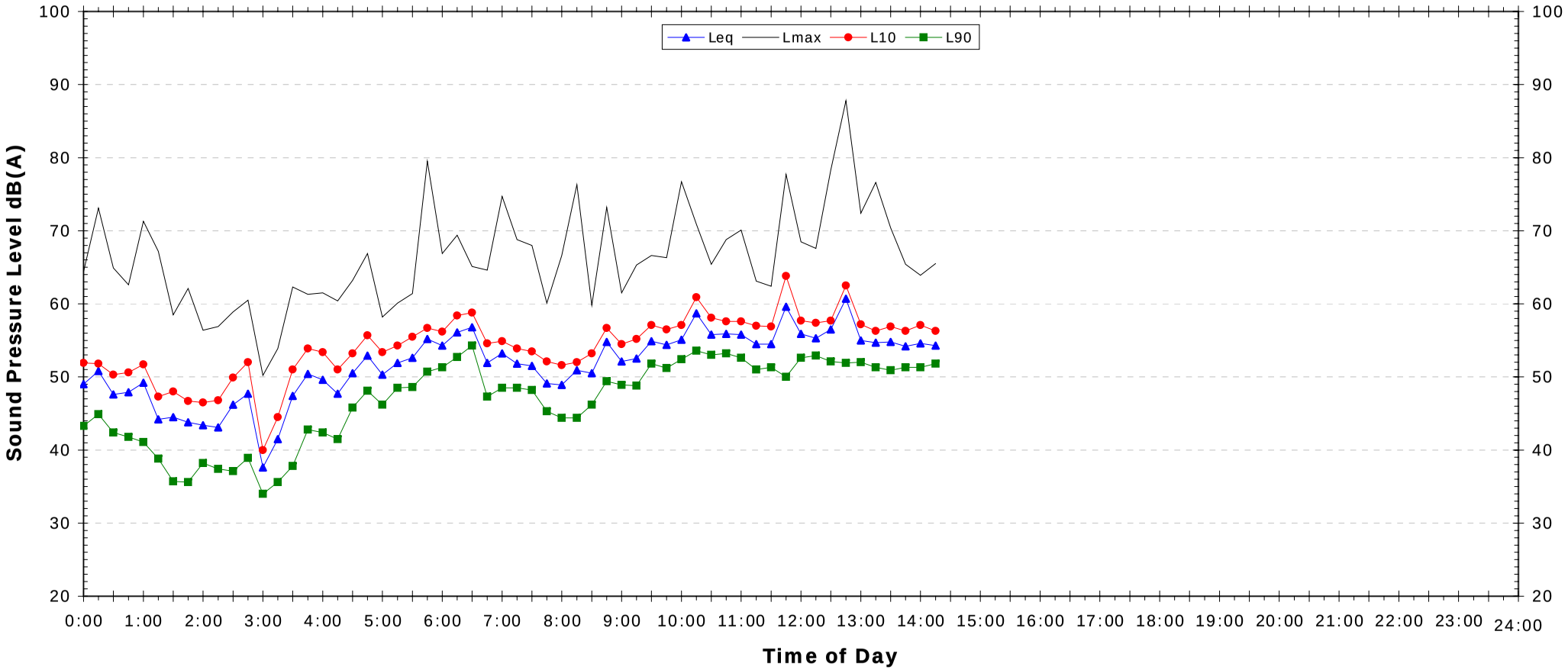
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L1 - 8 Nicol Place, Hinchinbrook (front yard)

Friday, 27 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	-	-	-
Leq (see note 3)	-	-	-

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured in free-field; tabulated results facade corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	57.7	-
$L_{eq\ 1hr}$ upper 10 percentile	60.1	-
$L_{eq\ 1hr}$ lower 10 percentile	53.0	-

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	-	to	-
Lmax - Leq (Range)	-	to	-

Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

RENZO TONIN & ASSOCIATES
inspired to achieve

Consultants in Acoustics, Vibration & Structural Dynamics
email: acoustics@rtagroup.com.au
website: www.renzotonin.com.au

noise logger results

Location L2 - 4 Wardang Rd, Hinchinbrook (front yard)

BACKGROUND & AMBIENT NOISE MONITORING RESULTS
NSW DEC's 'INDUSTRIAL NOISE POLICY', 2000

	L_{A90} Background Noise Levels[5]			L_{Aeq} Ambient Noise Levels		
Day	Day	Evening	Night	Day	Evening	Night
Wednesday-18-November-2009	-	45	46	-	51	52
Thursday-19-November-2009	46	46	45	56	56	53
Friday-20-November-2009	45	48	44	53	55	49
Saturday-21-November-2009	44	46	42	51	56	51
Sunday-22-November-2009	-	-	-	-	-	-
Monday-23-November-2009	-	48	-	-	59	-
Tuesday-24-November-2009	49	48	44	55	53	51
Wednesday-25-November-2009	47	47	42	54	54	53
Thursday-26-November-2009	47	47	44	52	54	55
Friday-27-November-2009	-	-	-	-	-	-
Representative Level	**46**	**47**	**44**	**54**	**55**	**52**

Notes:

1. Day is taken to be 7:00am to 6:00pm
2. Evening is taken to be 6:00pm to 10:00pm.
3. Night is taken to be the remaining periods.
4. Partial day's monitoring
5. Assessment Background Level (ABL)
6. Rating Background Level (RBL) for L90 and logarithmic average for Leq

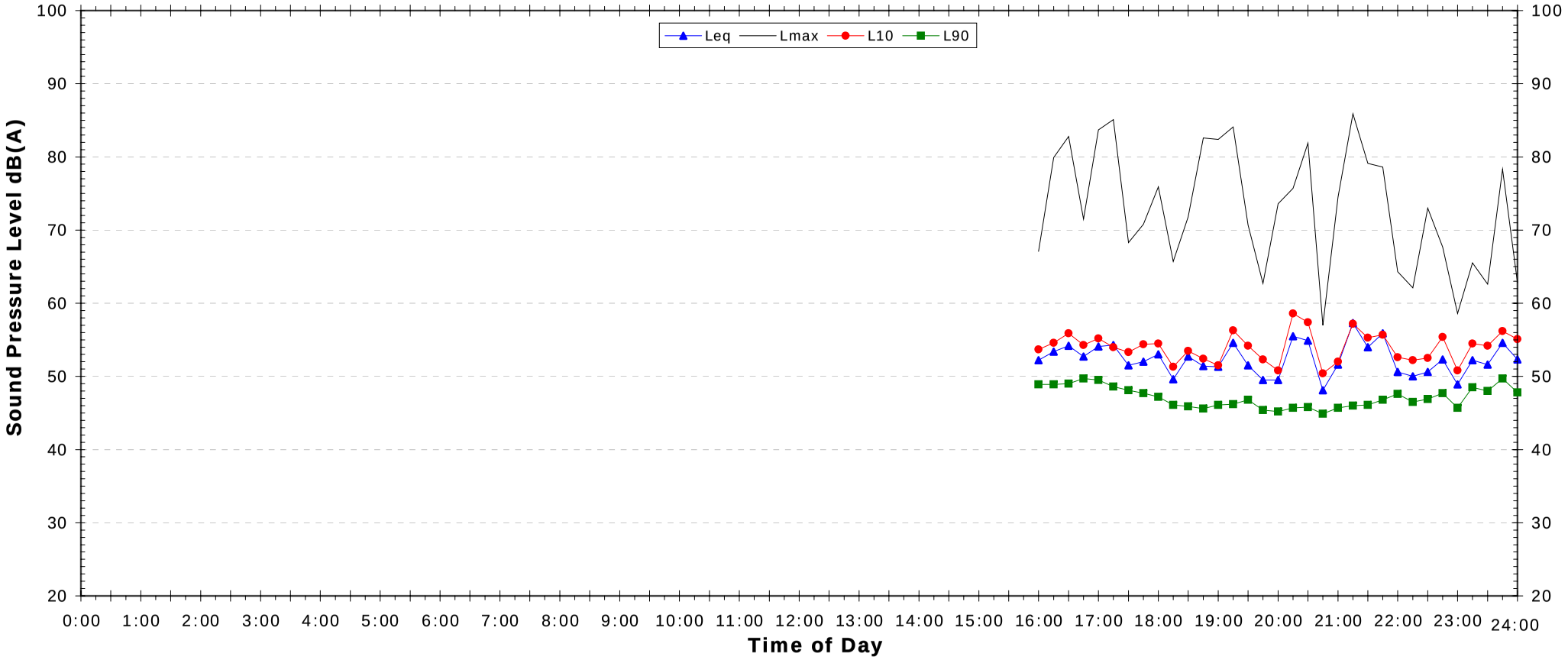
TRAFFIC NOISE MONITORING RESULTS
NSW DEC 'ENVIRONMENTAL CRITERIA FOR ROAD TRAFFIC NOISE', 1999

	L_{Aeq} Noise Levels		$L_{Aeq\ 1hr}$ Noise Levels			
Day	Day	Night	Day - Up	Day - Low	Night - Up	Night - Low
Wednesday-18-November-2009	53	54	55	51	58	51
Thursday-19-November-2009	58	56	63	51	59	50
Friday-20-November-2009	56	52	59	51	55	47
Saturday-21-November-2009	55	53	60	49	58	47
Sunday-22-November-2009	54	54	56	51	58	51
Monday-23-November-2009	59	63	64	53	64	50
Tuesday-24-November-2009	57	54	61	53	58	47
Wednesday-25-November-2009	57	55	60	51	60	46
Thursday-26-November-2009	55	57	58	52	60	49
Friday-27-November-2009	60	-	62	57	-	-
Representative Weekday	**57**	**57**	**61**	**53**	**60**	**49**
Representative Weekend	**55**	**54**	**58**	**50**	**58**	**50**
Representative Week	**57**	**57**	**61**	**53**	**60**	**49**

EXISTING AMBIENT NOISE LEVELS

Location L2 - 4 Wardang Rd, Hinchinbrook (front yard)

Wednesday, 18 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	-	45.2	45.6
Leq (see note 3)	-	50.7	51.9

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured 1m from facade; tabulated results free-field corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	53.2	54.4
$L_{eq\ 1hr}$ upper 10 percentile	55.1	58.1
$L_{eq\ 1hr}$ lower 10 percentile	51.4	50.6

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	67.5	to	82.9
Lmax - Leq (Range)	15.1	to	25.5

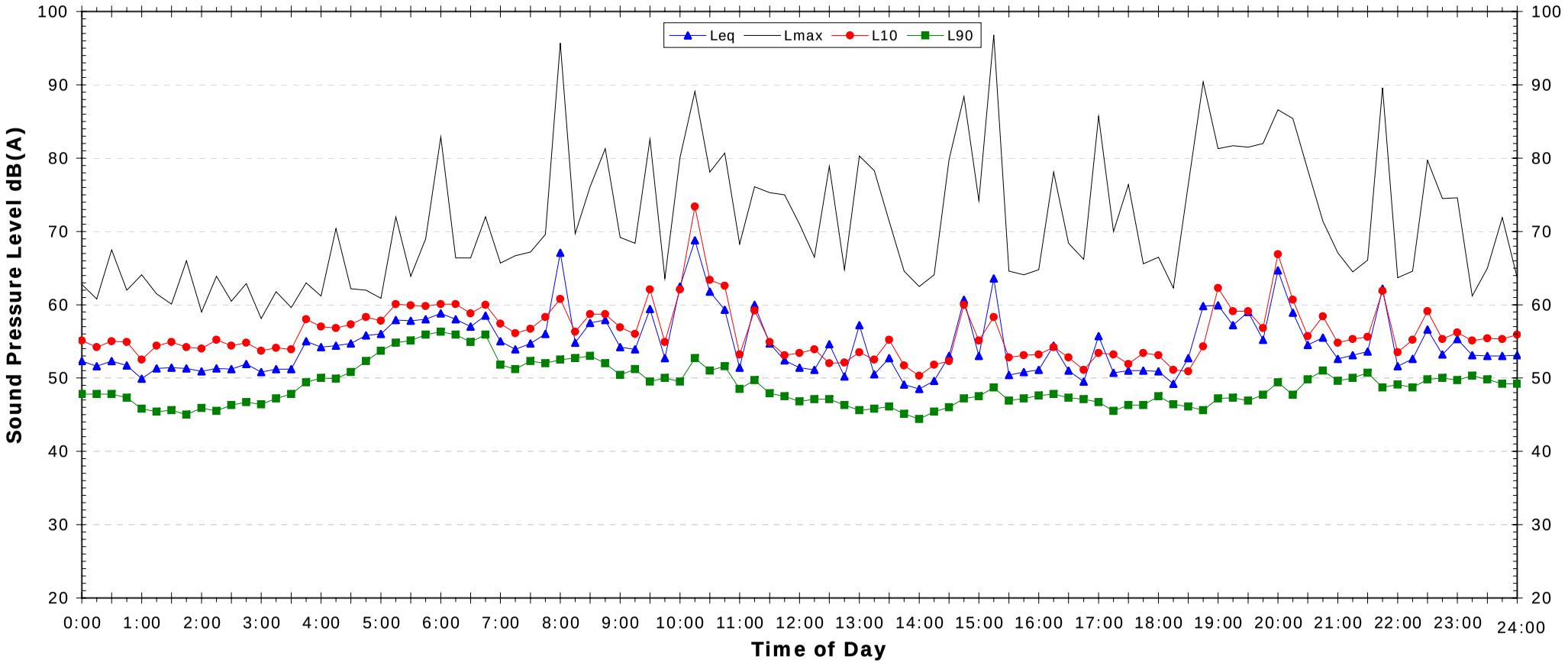
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L2 - 4 Wardang Rd, Hinchinbrook (front yard)

Thursday, 19 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	45.6	46.1	44.7
Leq (see note 3)	55.8	55.7	53.4

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured 1m from facade; tabulated results free-field corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	58.3	55.9
$L_{eq\ 1hr}$ upper 10 percentile	63.1	59.2
$L_{eq\ 1hr}$ lower 10 percentile	50.7	49.7

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	70.7	to	92.0
Lmax - Leq (Range)	16.7	to	33.3

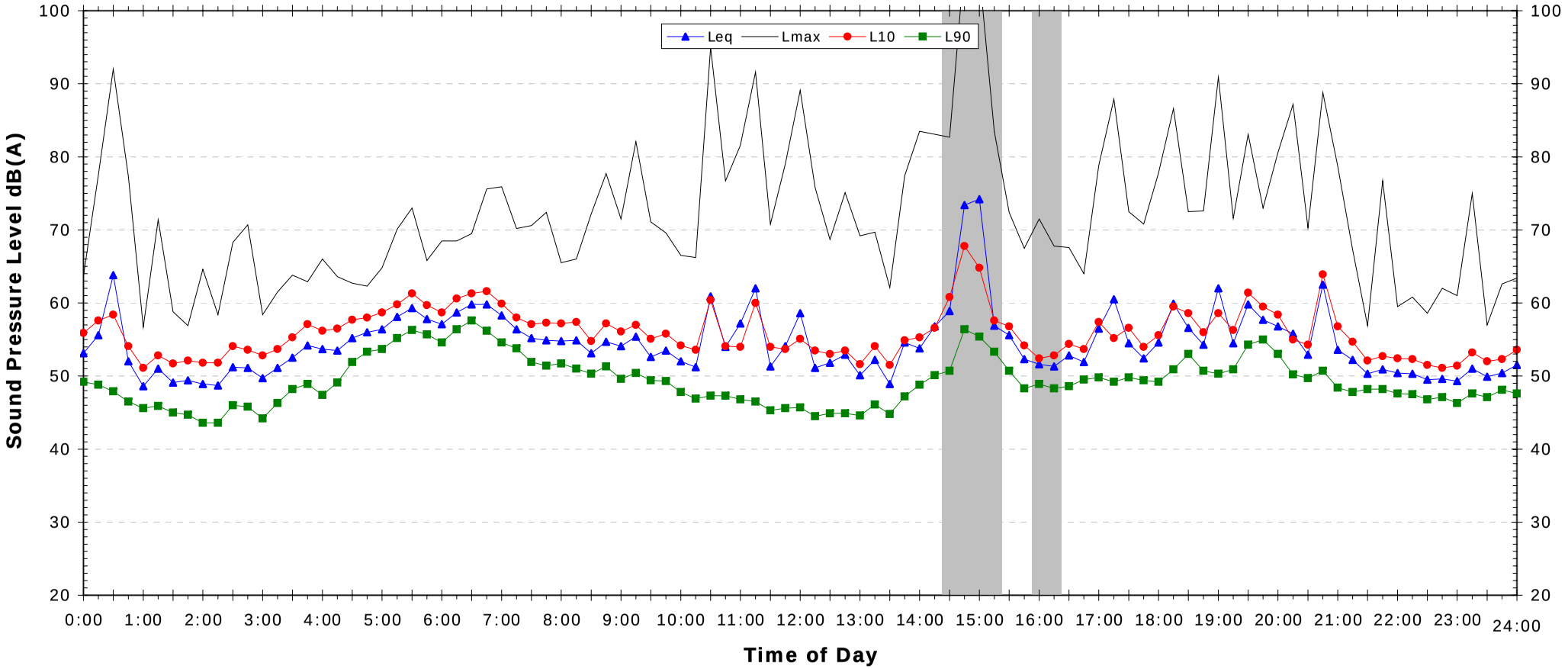
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L2 - 4 Wardang Rd, Hinchinbrook (front yard)

Friday, 20 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	44.9	47.8	43.8
Leq (see note 3)	52.9	54.8	49.4

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured 1m from facade; tabulated results free-field corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	56.1	51.9
$L_{eq\ 1hr}$ upper 10 percentile	58.7	55.3
$L_{eq\ 1hr}$ lower 10 percentile	51.3	47.5

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	68.3	to	77.3
Lmax - Leq (Range)	15.6	to	24.3

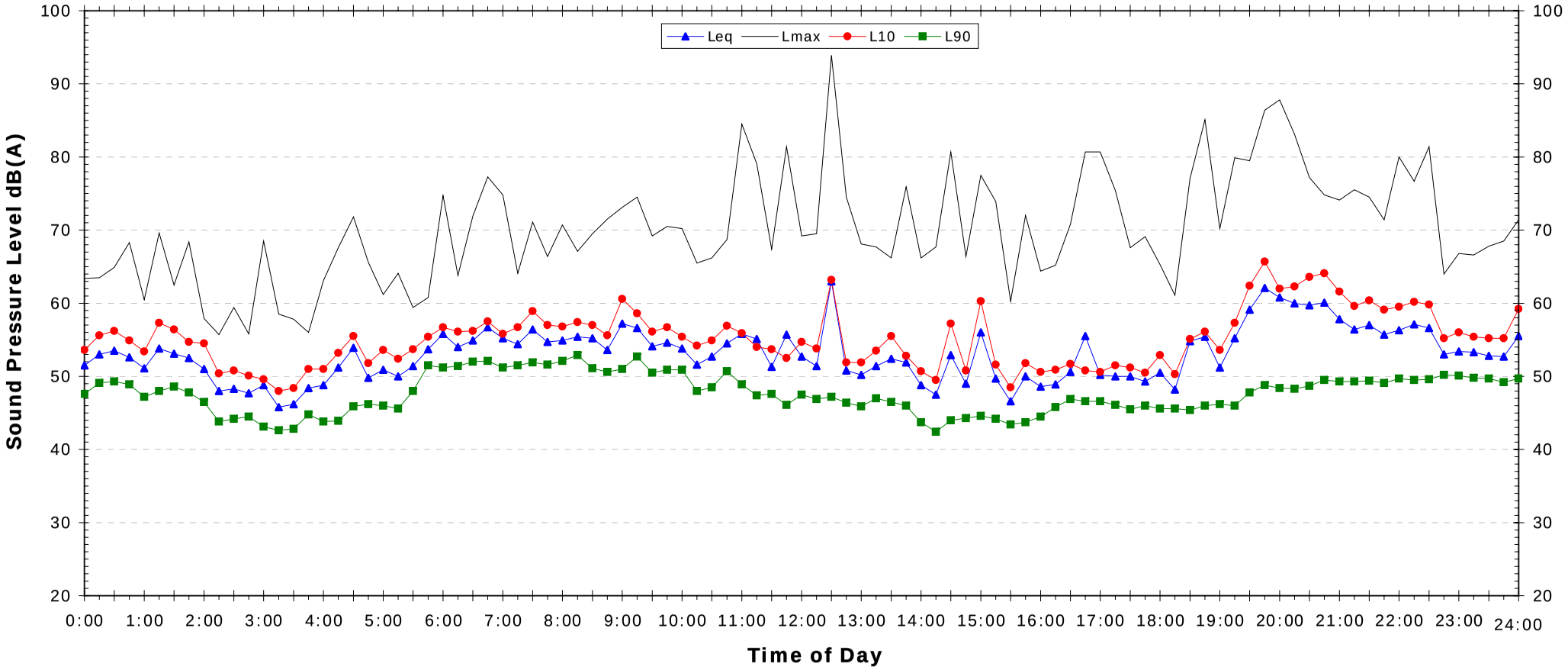
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L2 - 4 Wardang Rd, Hinchinbrook (front yard)

Saturday, 21 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	44.0	45.6	42.0
Leq (see note 3)	51.5	55.5	50.7

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured 1m from facade; tabulated results free-field corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	55.5	53.2
$L_{eq\ 1hr}$ upper 10 percentile	59.7	58.3
$L_{eq\ 1hr}$ lower 10 percentile	49.5	46.6

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	67.9	to	84.3
Lmax - Leq (Range)	17.7	to	27.6

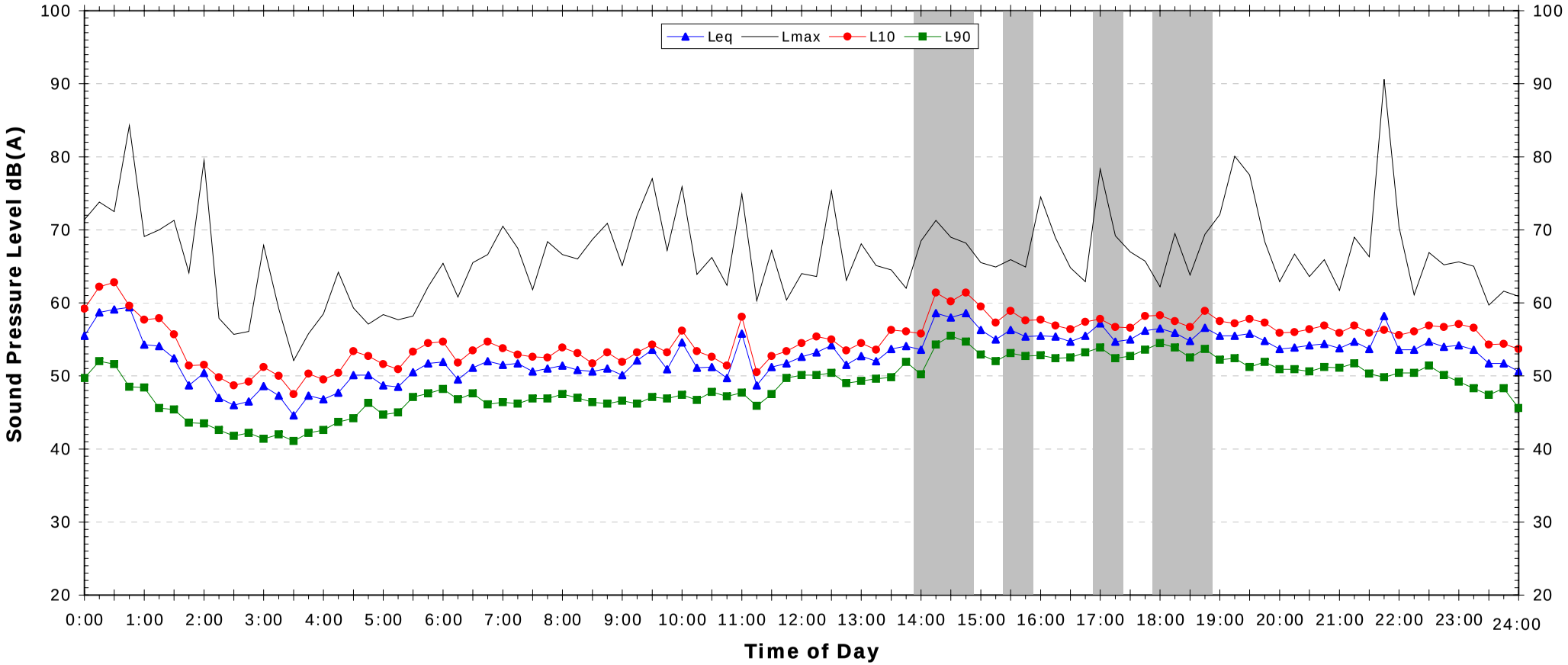
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L2 - 4 Wardang Rd, Hinchinbrook (front yard)

Sunday, 22 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	-	-	-
Leq (see note 3)	-	-	-

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured 1m from facade; tabulated results free-field corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	53.8	54.4
$L_{eq\ 1hr}$ upper 10 percentile	56.0	57.5
$L_{eq\ 1hr}$ lower 10 percentile	50.9	51.3

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	70.6	to	76.7
Lmax - Leq (Range)	17.2	to	20.3

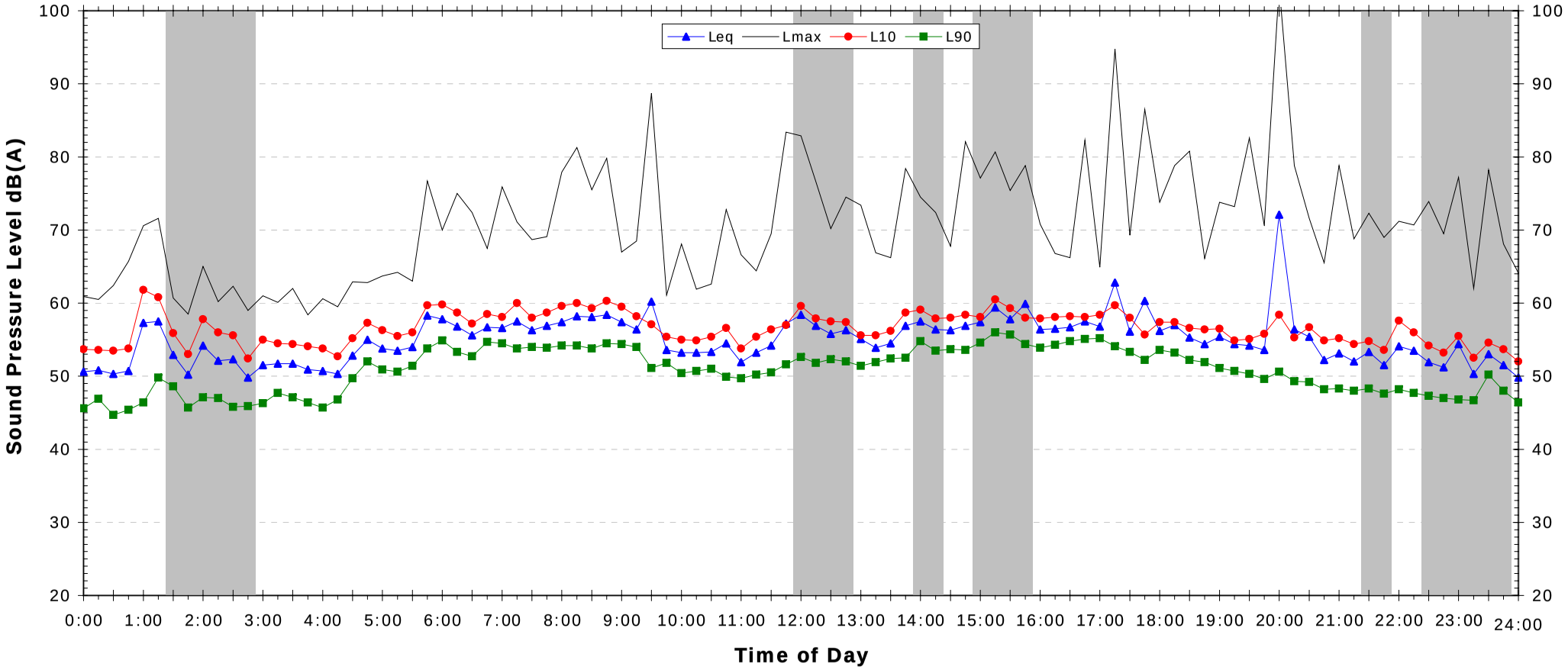
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L2 - 4 Wardang Rd, Hinchinbrook (front yard)

Monday, 23 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	-	48.2	-
Leq (see note 3)	-	59.1	-

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured 1m from facade; tabulated results free-field corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	58.8	62.6
$L_{eq\ 1hr}$ upper 10 percentile	64.1	63.9
$L_{eq\ 1hr}$ lower 10 percentile	53.2	49.8

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	70.7	to	79.2
Lmax - Leq (Range)	15.7	to	17.2

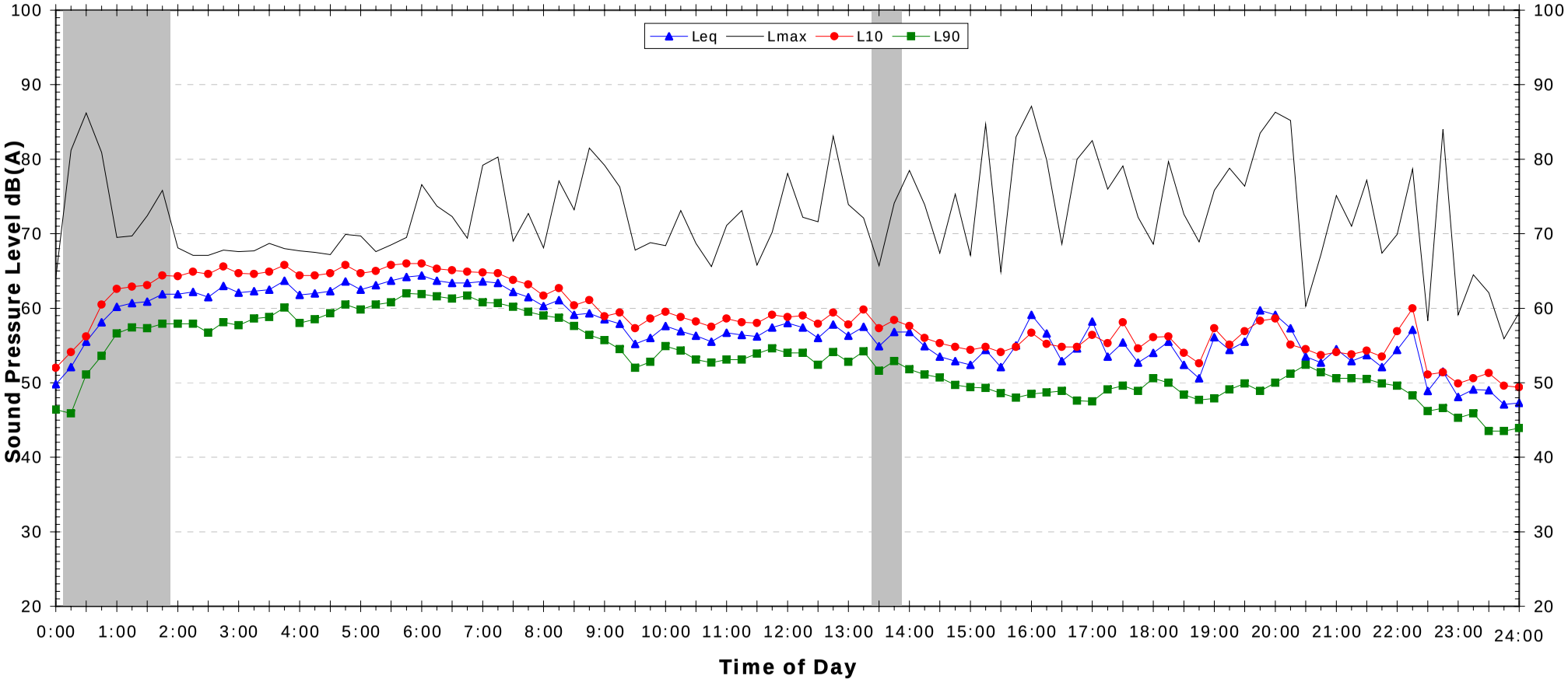
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L2 - 4 Wardang Rd, Hinchinbrook (front yard)

Tuesday, 24 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	48.6	47.9	43.5
Leq (see note 3)	55.0	52.9	51.4

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured 1m from facade; tabulated results free-field corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	57.0	53.9
$L_{eq\ 1hr}$ upper 10 percentile	61.0	57.9
$L_{eq\ 1hr}$ lower 10 percentile	53.4	46.5

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	71.0	to	84.0
Lmax - Leq (Range)	15.2	to	31.0

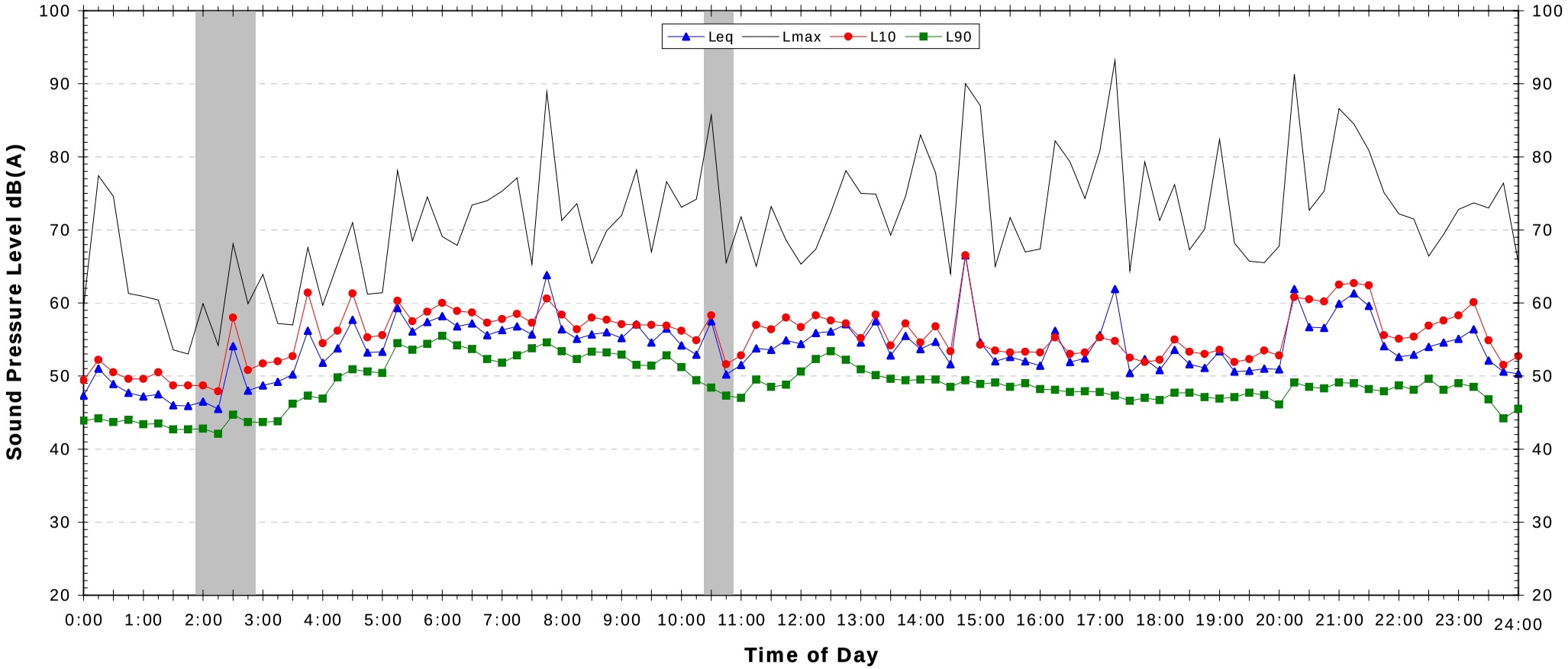
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L2 - 4 Wardang Rd, Hinchinbrook (front yard)

Wednesday, 25 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	47.3	46.9	42.1
Leq (see note 3)	54.2	54.1	52.8

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured 1m from facade; tabulated results free-field corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	56.7	55.3
$L_{eq\ 1hr}$ upper 10 percentile	60.5	59.7
$L_{eq\ 1hr}$ lower 10 percentile	51.5	46.4

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	65.9	to	76.4
Lmax - Leq (Range)	15.6	to	23.3

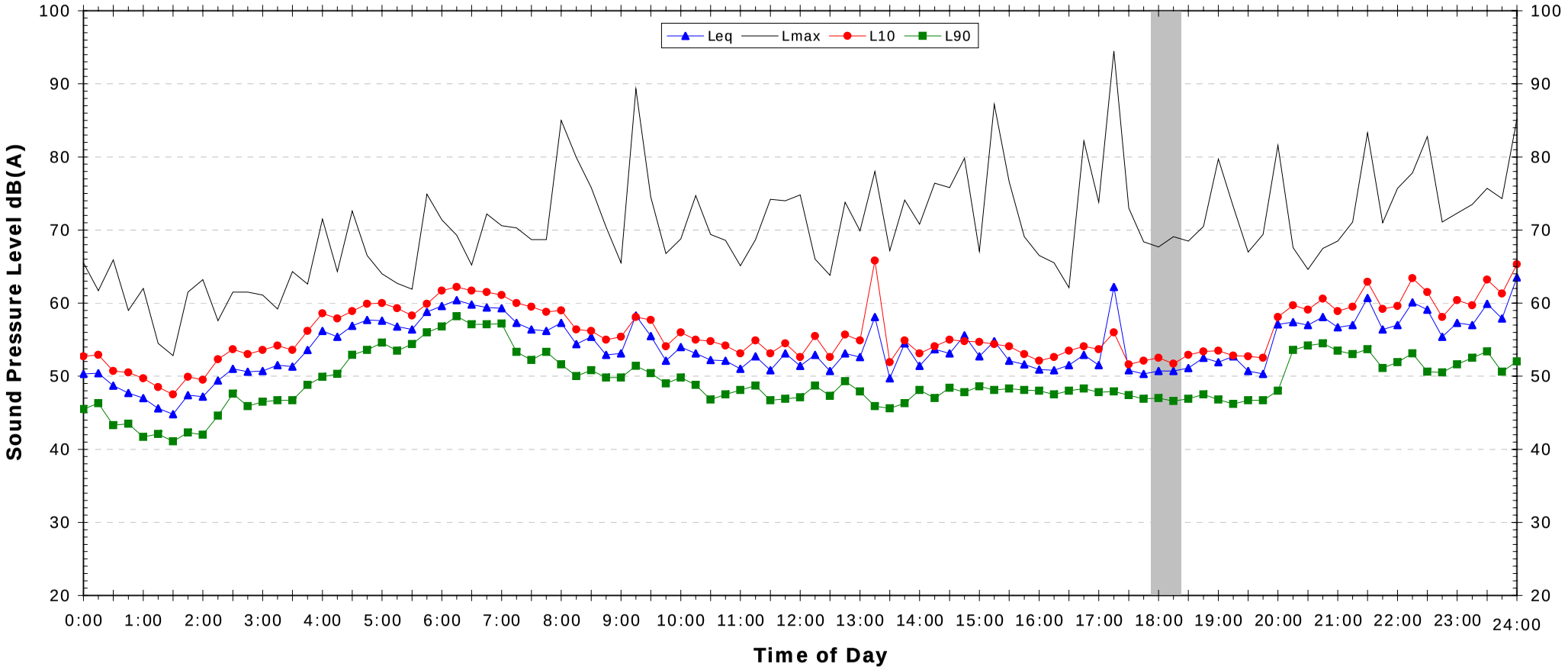
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L2 - 4 Wardang Rd, Hinchinbrook (front yard)

Thursday, 26 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	46.8	46.7	43.9
Leq (see note 3)	51.9	53.6	54.6

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured 1m from facade; tabulated results free-field corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	54.9	57.1
$L_{eq\ 1hr}$ upper 10 percentile	58.1	60.3
$L_{eq\ 1hr}$ lower 10 percentile	51.8	49.5

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	67.6	to	88.1
Lmax - Leq (Range)	18.1	to	35.1

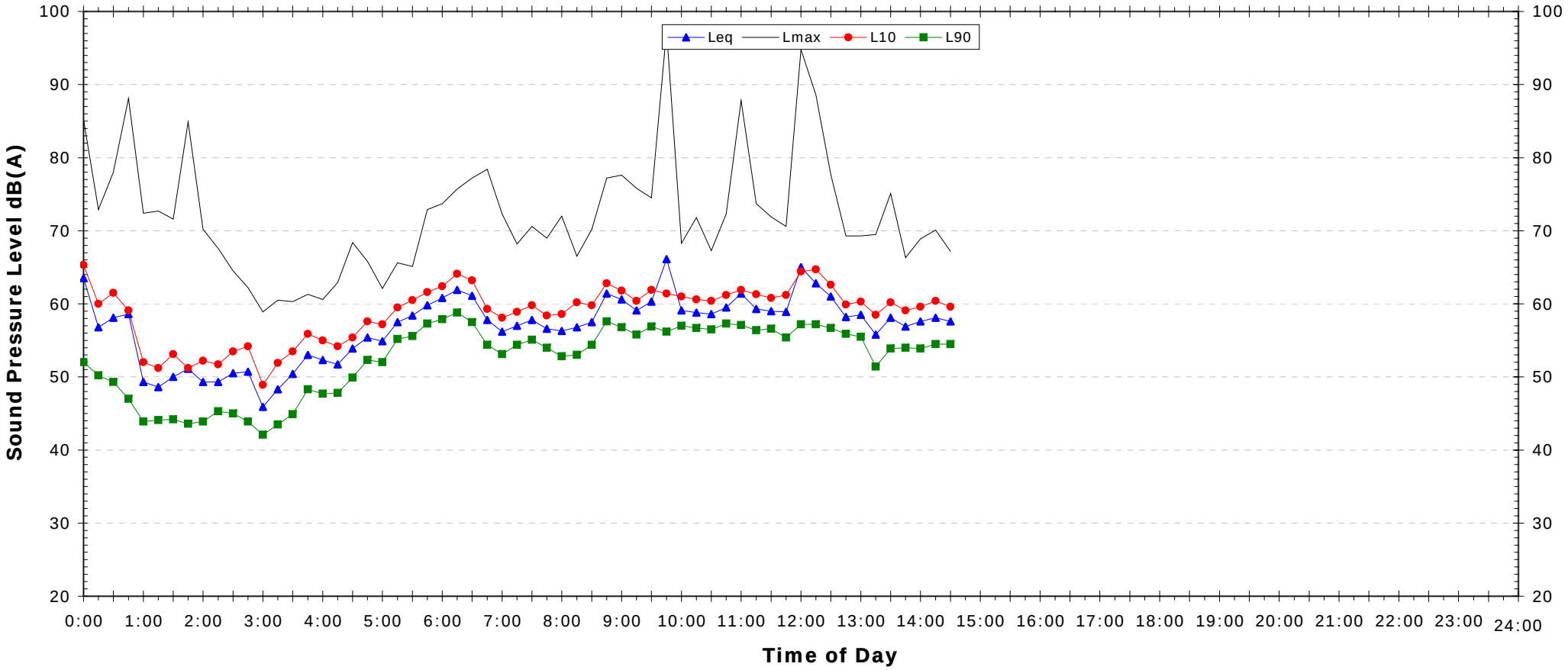
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L2 - 4 Wardang Rd, Hinchinbrook (front yard)

Friday, 27 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	-	-	-
Leq (see note 3)	-	-	-

NOTES:

1. Shaded periods denote measurements adversely affected by rain, wind or extraneous noise - data in these periods are excluded from calculations.

2. "Night" relates to period from 10pm on this graph to 7am on the following graph.

3. Graphed data measured 1m from facade; tabulated results free-field corrected

4. Night time Lmax values are shown only where Lmax > 65dB(A) and where Lmax-Leq ≥ 15dB(A)

NSW ECRTN Policy (1m from facade)		(see note3)
Descriptor	Day	Night[2]
	7am-10pm	10pm-7am
$L_{eq\ 15\ hr}$ and $L_{eq\ 9\ hr}$	59.9	-
$L_{eq\ 1hr}$ upper 10 percentile	62.3	-
$L_{eq\ 1hr}$ lower 10 percentile	57.0	-

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	-	to	-
Lmax - Leq (Range)	-	to	-

Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

Template QTT-01 (rev 55) Logger Graphs