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FORMER HOXTON PARK AIRPORT REDEVELOPMENT

ACOUSTIC ASSESSMENT REPORT FOR PART 3A APPLICATION

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EXECUTIVE SUMMARY

A noise investigation of construction, operational and road traffic noise impacts from the proposed warehouse/distribution facilities at the former Hoxton Park Airport site has been undertaken. The assessment was carried out in accordance with the Director Generals requirements and assessed against the Department of Environment, Climate Change and Water's (DECCW) 'Interim Construction Noise Guideline', 'Industrial Noise Policy' (INP) document and 'Environmental Criteria for Road Traffic Noise' (ECRTN).

Long-term noise monitoring was undertaken at the nearest most potentially affected receiver locations in order to establish the appropriate noise goals from the development.

A noise model was prepared to predict noise emission from the proposed development to the surrounding residential areas. The noise modelling focussed on the night time period of operation, being the most stringent period given the required 24 hour operations.

The operational noise emission sources identified for the development were as follows;

- Use of container handlers and small forklifts during loading and unloading of trucks on site;
- General operations including automated conveying and sorting systems and use of small forklifts inside the buildings;
- Vehicle movements on site; and
- Vehicle traffic generation on the local road network.

Industrial Noise Policy

Operational noise modelling includes truck movements in and out of the site (to dispatch and receiving areas), small forklift operations, container loading and unloading and internal warehouse activities.

In accordance with the DECCW's INP, the assessment also addresses potential adverse meteorological conditions characteristic of the site. The assessment of meteorological data revealed both temperature inversions and wind effects were characteristic of the area. Both meteorological conditions were considered in the noise modelling predictions for the site.

A 3D noise model was used for the assessment utilising 2m contours topographical information provided by the NSW Land & Property Management Authority.

Operational noise from the development will comply with the relevant day time and evening noise goals. The proposed development was predicted to comply with the night time intrusiveness noise criteria at all locations under neutral and adverse meteorological conditions. The exception is a negligible 1dB(A) exceedance at Rottnest Avenue, Hinchinbrook under adverse meteorological conditions.

With respect to the amenity noise goals, predictions under a conservative operational scenario revealed a maximum exceedance of 2dB(A). The conservative modelling assumptions were of peak continuous operation of the container handler, continuous occupation of the BIG W site by refrigerated trucks and all trucks being semi-trailers and b-doubles. The operations of the subject development were therefore considered to accord with the requirements of the Industrial Noise Policy.

Environmental Criteria for Road Traffic Noise

Utilising the average two-way traffic volumes forecast for the development, the predicted traffic levels from truck movements is $L_{eq,9hour}$ 46dB(A) significantly below the night time road traffic noise criteria of $L_{eq,9hour}$ 55dB(A). On this basis, noise from the site will satisfy the requirements of the Environmental Criteria for Road Traffic Noise.

Construction Noise

In accordance with the Interim Construction Noise Guideline, noise emission from construction activities during the standard hours were predicted to generally comply with the noise affected trigger levels. Whilst no specific noise mitigation and management measures have been recommended for operations during the standard hours, a Construction Noise Management Plan has been prepared for the site to address any potential noise impacts. On the basis of the assessment, noise emission will not exceed the 'highly affected' level of 75dB(A).

With respect to the proposed construction activities to occur outside standard hours (7am - 8am and 1pm - 4pm Saturday) noise control treatment and management options have been recommended which should be incorporated for the specific activities where they occur during the 'outside hours' period.

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1 INTRODUCTION

Renzo Tonin & Associates was engaged to carry out an acoustic impact assessment for the proposed distribution facilities at the former Hoxton Park Airport site. The noise assessment has been undertaken to address the following Director General's Requirements;

Director General's Requirements

- Noise — Including construction, operational and traffic noise;

  Reference Documents:

  - Interim Construction Noise Guideline (DECC)

  - NSW Industrial Noise Policy (DECC)

  - Environmental Criteria for Road Traffic Noise (NSW EPA)

It is confirmed that assessment in accordance with the aforementioned reference will satisfy the requirements of Liverpool City Council as requested in their letter dated 2nd February 2010.

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 PROJECT BACKGROUND

The subject application seeks approval for the concept plan of four warehouse buildings and includes a project application for the Big W and DSE warehouses. The facilities are as follows;

- Lot 1 – 8260m^2 warehouse area plus 500m^2 office space
- Lot 2 – 14000m^2 warehouse area plus 500m^2 office space
- BIG W – Floor area 89,000m^2
- DSE – Floor area 50,000m^2

The facilities are to operate 24 hours a day, 7 days a week. As part of the development a new access road is to be constructed off Cowpasture Road for access to the future sites and existing industrial premises in the area.

2.1 Noise Issues

The operational noise sources were identified as;

- Use of container handlers during loading and unloading of trucks on site;
- General operations including use of small forklifts inside the buildings;
- Loading and unloading of trucks on site;
- Heavy vehicle movements on site; and
- Heavy vehicle traffic generation on the local road network.

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

2.2 Assessment Methodology

In order to assess the potential noise impact from subject proposal the following methodology was used;

- Identify nearest most potentially affected receiver locations to the subject site.
- Determine existing background and ambient noise levels at the receiver locations.
- Use ambient noise and background levels to establish noise goals in accordance with the NSW Department of Environment Climate Change and Water (DECCW)'s Industrial Noise Policy (INP), Environmental Criteria for Road Traffic Noise (ECRTN) and Interim Construction Noise Guideline requirements.
- Using predictive noise modelling, determine the extent of noise impact from the proposed usage on nearby residential premises for the construction and operation of the site.
- Identify where noise emission from the site may exceed the relevant criteria.
- Where noise emission from the site exceeds the relevant criteria provide noise amelioration methods and recommendations to reduce noise impacts from the site.

3 EXISTING AMBIENT ENVIRONMENT

Construction and operational 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 INP 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*'. For the subject assessment long-term measurements were undertaken to establish the existing acoustic environment.

Background noise varies over the course of any 24 hour period, typically from a minimum at 3am in the morning to a maximum during morning and afternoon traffic peak hours. Therefore, the NSW *Industrial Noise Policy* (INP, Environment Protection Authority 2000) requires that the level of background and ambient noise be assessed separately for the daytime, evening and night-time periods. The INP defines these periods as follows:

- **Day** is defined as 7:00am to 6:00pm, Monday to Saturday and 8:00am to 6:00pm Sundays & Public Holidays.
- **Evening** is defined as 6:00pm to 10:00pm, Monday to Sunday & Public Holidays.
- **Night** is defined as 10:00pm to 7:00am, Monday to Saturday and 10:00pm to 8:00am Sundays & Public Holidays.

3.1 Noise Monitoring Locations

Noise measurements are to be taken at the nearest or potentially most affected residential locations. In this case the nearest and potentially most affected locations were:

- 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.

- Location L3 Hoxton Park Airport Site (future residential development site)

  The noise logger was located in the free field (i.e. away from reflecting surfaces), 1.5m above ground level, and 380m north of the end of the existing runway. The location is approximately the centre of the future residential area.

- Location L4 34 Truscott Avenue, Middleton Grange

  The noise logger was located in the front yard of the site (southern side) approximately 1.5m from the dwelling facade.

Long-term (unattended) noise monitoring at locations L1 to L4 was conducted between Wednesday 18th and Friday 27th November 2009.

Appendix B presents a location map showing the site location and monitoring locations. Appendix C details the noise monitoring methodology and the graphical recorded output from long term noise monitoring is included in Appendix D. The graphs in Appendix D were analysed to determine a single assessment background level (ABL) for each day, evening and night period, in accordance with the INP.

3.1.1 Future Background and Ambient Noise Levels in Proximity to Cowpasture Road

The noise levels recorded at locations L1 and L2 are not considered representative of the typical environment at the receiver locations due to the Cowpasture Road upgrade construction activities occurring during the monitoring period. As a result of the works, the traffic speed along Cowpasture Road was limited from 70km/h to 40km/h along the existing single carriageway between the M7 and North Liverpool Road. The measured levels were considered to be lower than would typically occur.

Due to these factors we have referred to noise level measurements undertaken by Day Design Pty Ltd for the original Hoxton Park Airport rezoning proposal, for assessment of the Hinchinbrook area. Location "A" measured by Day Design Pty Ltd between 18th September and 25th September 2006, was located at 31 Keppel Circuit, Hinchinbrook [ref: Environmental Noise Impact report 3628 dated 2 March 2007]. These were utilised in establishing criteria for the Hinchinbrook Area.

In addition, for the determination of amenity criteria for the Hinchinbrook area, consideration is given to the future traffic noise levels expected after completion of the Cowpasture Road upgrade as it is due for completion prior to the operation of the subject development. In accordance with the Industrial Noise Policy, the amenity noise goals are adjusted in areas that experience high traffic noise levels. This has been discussed in the determination of the amenity criteria in Section 4.1.1.1 of this report.

3.2 Existing Background & Ambient Noise Levels

Existing background and ambient noise levels are presented in Table 3 below.

TableT 3 – 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	41	39	36	52	51	50
"A" - 31 Keppel Cct Hinchinbrook#	*42*	*43*	*39*	-	-	-
L2 - 4 Wardang Rd, Hinchinbrook	46*	47	44	54	55	52
L3 - Hoxton Park Airport	41	41	39	48	47	49
L4 - 34 Truscott Ave, Middleton Grange	47	43	38	59^	51	47

Notes: ** - Potentially affected by Cowpasture Road construction noise.*

^ - Potentially affected by Middleton Grange residential construction noise.

4 OPERATIONAL NOISE ASSESSMENT

4.1 Noise Criteria

4.1.1 NSW DECCW Industrial Noise Policy

All noise emission resulting from site operations is assessed in accordance with the DECCW's 'Industrial Noise Policy' (INP). The assessment procedure of the INP has two components:

- Controlling intrusive noise impacts in the short term for residences;
- Maintaining noise level amenity for particular land uses for residences and other land uses.

In accordance with the INP, noise impact should be assessed in terms of both intrusiveness and amenity. Table 4 sets out the intrusiveness and amenity criteria applicable at the nearest most potentially affected residential receiver locations.

Table 4 – DECCW's Industrial Noise Criteria, dB(A)

Location	Intrusiveness Criteria $L_{Aeq,15min}$			Amenity Criteria $L_{Aeq,period}$		
	Day	Evening	Night	Day	Evening	Night
A1 – Hinchinbrook	47	48	44	55	45	40
A2 - Hoxton Park Airport	46	46	44	55	45	40
A3 - Middleton Grange	52	48	43	55	45	40

Notes: *All residential locations have been categorised as 'Suburban'.*

Future traffic noise levels from Cowpasture Road have not been considered in the determination of amenity noise goals.

4.1.1.1 Future Ambient Noise Levels

The amenity noise goals for the Hinchinbrook area have not been adjusted for the predicted future road traffic noise levels from Cowpasture Road. In accordance with INP Section 2.2.3 where the $L_{Aeq,\ period(traffic)}$ is more than 10dB above the amenity noise goal established through INP Tables 2.1 and 2.2, the amenity criterion becomes $L_{Aeq,\ period(traffic)}$ minus 10dB.

For the subject development, this assessment report identifies a critical receiver location at Rottnest Avenue, Hinchinbrook. For this location we have referenced the detailed design acoustic assessment report prepared for the Cowpasture Road Upgrade [ref: Heggies Report 10-6156 Revision 2 '*Upgrade of Cowpasture Road - North Liverpool Road to Westlink M7*' dated 6th June 2008] in order to establish whether the amenity noise goals would be adjusted due to high traffic noise exposure.

The 'Heggies' report presents predicted road traffic noise levels for representative receiver locations' (*Table 7, pg 15*) for which 31A Rottnest Avenue, Hinchinbrook has been identified. 31A Rottnest Avenue, Hinchinbrook is located at the north-western most corner of Rottnest Avenue and is the most critical receiver location for this subject assessment. Whilst night time predictions are not presented in the report we have established the night time traffic noise

levels from the predicted day time noise levels and difference in traffic volume and composition. The table of traffic volume and composition has been reproduced from the 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 predicted day time noise level for 2016 (10 years after opening), as presented in the Heggies Report, is $L_{Aeq\ 15hour}$ 68dB(A) at the upper floor of 31A Rottnest Avenue with no noise mitigation measures. Whilst the road design incorporates a 3m noise wall, resultant traffic noise levels with the inclusion of the noise wall are not presented in the report. However the report confirms that with inclusion of the 3m wall, all premises comply with the 'acute' goals of 65dB(A) in the daytime. Discussion in the Heggies Report also identifies that a 2.5m noise wall would not achieve the acute levels at upper levels. As an increase in wall height of 0.5m (between 2.5m and 3m) would not achieve more than a 2dB(A) reduction in traffic noise, it is reasonably considered that the resultant daytime $L_{Aeq\ 15\ hour}$ would be 63dB(A).

In regard to the night time $L_{Aeq\ 9\ hour}$ noise levels, the 2006 and 2016 levels would be 54.5dB(A) and 56dB(A) respectively. This has been calculated as follows;

- $L_{Aeq\ daytime}$ 63dB minus 4.6dB (difference between the year 2016 day and year 2016 night traffic volumes) minus 2.5dB (for facade reflection)
- For the nigh time period the 2016 traffic volumes and heavy vehicle composition result in a 1.5dB(A) increase from 2006

Based on the future ambient traffic noise levels the night time amenity goals for the Rottnest Avenue assessment locations would be L_{eq} 44.5dB(A) and L_{eq} 46dB(A) for years 2006 and 2016 respectively.

4.1.2 Sleep Disturbance Criteria

The DECCW has issued the following policy statement with respect to sleep disturbance:

> *"Peak noise level events, such as reversing beepers, noise from heavy items being dropped or other high noise level events, have the potential to cause sleep disturbance. The potential for high noise level events at night and effects on sleep should be addressed in noise assessments for both the construction and operational phases of a development. The INP does not specifically address sleep disturbance from high noise level events.*
>
> *DEC reviewed research on sleep disturbance in the NSW Environmental Criteria for Road Traffic Noise (ECRTN) (EPA, 1999). 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, DEC recognised that current sleep disturbance criterion of an LA1, (1 minute) not exceeding the LA90, (15 minute) by more than 15 dB(A) is not ideal. Nevertheless, as there is insufficient evidence to determine what should replace it, DEC 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 detailed analysis should cover the maximum noise level or LA1, (1 minute), that is, the extent to which the maximum noise level exceeds the background level and the number of times this happens during the night-time period. Some guidance on possible impact is contained in the review of research results in the appendices to the ECRTN. Other factors that may be important in assessing the extent of impacts on sleep include:*
>
> - *how often high noise events will occur*
> - *time of day (normally between 10pm and 7am)*
> - *whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods).*
>
> *The LA1, (1 minute) descriptor is meant to represent a maximum noise level measured under 'fast' time response. DEC will accept analysis based on either LA1, (1 minute) or LA, (Max)."*

The policy confirms that a sleep disturbance criterion of $L_{A1(1min)} \leq L_{A90(15min)} + 15dB(A)$, should only be used as a first step 'guide' as it is 'not ideal' and 'where it is not met, a more detailed analysis is required'. That detailed analysis includes a reference to the research material contained in the ECRTN in the assessment of the subject proposal. In reviewing that material and more recent research, notwithstanding DECCW's policy, noise levels less than "background + 15dB(A)" may have the capacity to disturb sleep.

The DECCW policy includes in the background $L_{A90(15minute)}$ noise from the subject premises.

The sleep disturbance criteria described in the DECCW's policy indicated above is used for the purpose of noise impact assessment for this report and is summarised in the following table.

Table 5 – DECCW's Sleep Disturbance Noise Criteria

Location	$L_{1,\ 1\ minute}$ dB(A)
A1 – Hinchinbrook	54
A2 - Hoxton Park Airport	54
A3 - Middleton Grange	53

4.2 Noise Sources

The noise sources identified within the development are the container handler, truck movements, external forklift operations and internal warehouse operations. Noise levels from the Renzo Tonin & Associates database have been utilised for sound power levels of specific equipment and operations. Table 6 presents the sound power levels of the individual equipment. It is noted that for refrigerated and non-refrigerated trucks, the noise level whilst the truck is moving is dominated by the engine and exhaust of large trucks and therefore the same noise levels have been used for modelling purposes.

Table 6 – $L_{eq\ (15minute)}$ Source Noise Levels

Noise Source	Overall dB(A)/dB(C)	Octave Band Centre Frequency - Hz (dBZ)								
		31.5	63	125	250	500	1k	2k	4k	8k
Container Handler (moving, raising and lowering containers and reversing beeper) - Lw	104/112	108	110	105	101	102	99	96	91	84
Container Handler (Crate Drop)*^ - Lw	91/104	102	101	97	92	88	86	82	77	67
Small Forklift (LPG)	91/100	94	96	92	90	88	85	81	77	68
Internal Warehouse Activities - Lp	70/73	62	65	67	64	65	65	63	62	59
Semi/B-double Truck Movement per/m - Average speed of 10km/h on site - Lw	67/78	68	78	69	66	64	62	58	54	48
Truck Idle for Refrigerated Trucks	94/103	102	98	94	91	90	92	87	84	83

Notes: ** A 5dB correction has added to the Container Handler Crate Drop in calculations to account for intermittency in accordance with Table 4.1 of the NSW INP*

^ - Average 4 drops per 15-minute period based on 15 container movements per hour during peak hour

Table 7 – L_{Max} Source Sound Power Levels

Noise Source	Overall dB(A)/dB(C)	Octave Band Centre Frequency - Hz (dBZ)								
		31.5	63	125	250	500	1k	2k	4k	8k
Truck L_{Max}	106/118	110	115	109	105	103	101	97	93	87
Container Drop L_{Max}	113/126	124	123	119	114	110	108	104	99	89

4.2.1 Modifying Corrections

Further, to the above, where the character of the noise in question is assessed as particularly annoying (i.e. if it has an inherently tonal, low frequency, impulsive or intermittent character), then an adjustment of 5dB(A) for each annoyance aspect, up to a total of 10dB(A), is to be added to the measured value to penalise the noise for its potential increase in annoyance.

Table 4.1 of Chapter 4 of the DECCW's INP provides definitive procedures for determining whether a penalty or adjustment should be applied from increased annoyance.

4.3 Adverse Weather Conditions

Certain meteorological conditions may increase noise levels by focusing sound-wave propagation paths at a single point. Such refraction of sound waves will occur during temperature inversions (atmospheric conditions where temperatures increase with height above ground level) and where there is a wind gradient (that is, wind velocities increasing with height) with wind direction from the source to the receiver. These meteorological effects typically increase noise levels by 5 to 10dB, and have been known to increase noise levels by as much as 20dB in extreme conditions, thereby causing a significant noise impact on residents living in areas prone to these effects.

Temperature inversions occurring within the lowest 50 to 100 m of atmosphere can affect noise levels measured on the ground. Temperature inversions are most commonly caused by radiative cooling of the ground at night leading to the cooling of the air in contact with the ground. This is especially prevalent on cloudless nights with little wind. Air that is somewhat removed from contact with the ground will not cool as much, resulting in warmer air aloft than nearer the ground.

Similarly, when significant wind exists, the conditions can significantly affect noise levels at receptor points downwind of a noise source. This would depend however, on the particular direction and the velocity of the wind at that time. It should also be borne in mind that although wind can raise noise emission levels as perceived from a downstream assessment point, background noise also tends to increase as a result of increased wind activity. This often causes masking of potential increases in intrusive noise.

The NSW DECCW's INP recommends that project noise criteria are to apply under weather conditions characteristic of an area. These conditions may include calm, wind and temperature inversions. In this regard, the increase in noise that results from atmospheric temperature inversions and wind effects may need to be assessed. The noise levels predicted under

characteristic meteorological conditions for each receiver are then compared with the criteria, to establish whether the meteorological effect will cause a significant impact.

The INP permits two approaches for assessing these effects: use of default parameters and use of site-specific parameters.

- With using default parameters, general meteorological values are used to predict noise levels, foregoing detailed analyses of site-specific meteorological data. This approach assumes that meteorological effects are conservative, in that it is likely to predict the upper range of increases in noise levels. Actual noise levels may be less than predicted.
- The use of site-specific parameters is a more detailed approach, which involves analysing site meteorological data to determine whether inversion and/or wind effects are significant features warranting assessment. Where assessment is warranted, default parameters are available for use in predicting noise or, where preferred, measured values may be used instead. The use of site-specific parameters provides a more accurate prediction of noise increases due to meteorological factors, however, is more costly especially if suitable site data is unavailable and long-term meteorological monitoring is required. Existing weather data may be used provided the site is within a radius of 30km of the collection point and in the same topographical basin.

4.3.1 Temperature Inversions

Appendix C of the INP describes the following procedure for assessing the increase in noise caused by temperature inversions. Weather data between 6pm - 7am (1 hour before sunset to 1 hour after sunrise period) during winter (June, July and August) is analysed. For the assessment, the direct method from 1-minute standard deviation wind data and Pasquill-Gifford interpretation was utilised.

Analysis of weather data obtained from the Horsley Park Equestrian Centre Automatic Weather Station [ref: Station 067119] was carried out for the years 2008 and 2009 and revealed F-Class inversions for more than 30% of the time (43% and 53% F+G Class inversions for the years 2008 and 2009 respectively). These are considered to be significant and have been accounted for in the noise assessment. A 2m/s at 10m height drainage-flow wind from source to receiver has also been included.

4.3.2 Wind Effects

Gradient wind differs from the drainage-flow wind associated with temperature inversions. Drainage-flow wind is the localised drainage of cold air under the influence of the local topography, and travels in one direction only (direction of decreasing altitude). Gradient wind is the regional wind determined by synoptic factors (high and low-pressure systems), and may originate from any direction. Unlike temperature inversions, gradient winds may cause impacts during any assessment period, (day, evening, night), and not just the night period.

The INP specifies a procedure for assessing the significance of wind effects, and a default wind speed to be used in the assessment where these effects are found to be significant. The procedure requires that wind effects be assessed where wind is a feature of the area. Wind is considered to be a feature where source-to-receiver wind speeds (at 10m height) of 1 to 3m/s occur for 30% of the time or more in any assessment period (day, evening, night) in any season. According to advice from the NSW DECCW and their 'NSW Industrial Noise Policy – Industry and Consultants Training Manual', winds with velocities less than 1m/s (calm conditions) and greater than 3m/s, are not included in the calculations of wind occurrence.

Therefore, there are two ways to assess wind effects:

- Use available wind data or wind roses to determine the frequency of occurrence and wind speed, taking into account the various components of wind that are relevant.
- Simply assume that wind is a feature of the area (foregoing the need to use wind data or wind roses) and apply a 'maximum impact' scenario by using the default 3m/s wind at 10m height.

Where there is 30% or more occurrence of wind speeds between 1m/s and 3m/s (source-to-receiver component), then the highest wind speed is used (below 3m/s) instead of the default. Where there is less than a 30% occurrence of wind between 1m/s and 3m/s (source-to-receiver component), wind is not included in the noise-prediction calculations.

Detailed analysis of weather data obtained from the Horsley Park Equestrian Centre Automatic Weather Station [ref: Station 067119] for the year 2008 has been undertaken. Table 8 sets out the angles (receiver from noise source) at which the occurrence of wind was greater than the 30% criteria.

Table 8 – Wind Analysis Results

Day Period	Season	Angles Affected (inclusive) North = 0°
Day	Summer	-
	Autumn	80° - 170°
	Winter	100° - 160°
	Spring	-
Evening	Summer	-
	Autumn	310° - 70°
	Winter	350° - 140°
	Spring	-
Night	Summer	310° - 110°
	Autumn	340° - 130°
	Winter	20° - 160°
	Spring	340° - 150°

For the purpose of noise modelling, a source to receiver wind of 3m/s has been utilised.

4.4 Noise Modelling Scenario

Noise modelling and assessment has been isolated to the night time period as it has been identified as the worst case period for operations and potential noise impacts on the following basis;

- Peak operation of the container handler could occur during the day and night time period;
- The background noise levels and amenity criteria are lower during the night time period;
- Whilst truck movements on site are proposed to be higher during the day time period the modelled truck movements are two in and two out for each site equating to less than a 2dB(A) difference with the daytime truck movements. Daytime background noise levels were at least 2dB(A) higher than night time levels.

Of note is that the increased trucks movements presented in Tables 1 and 2 commence at 6am which would be part of the night time period. However it would be considered that assessment of this period could be addressed as a shoulder period during which the background noise levels are higher than the night time period and at times higher than the daytime RBLs presumably due to traffic noise.

The operational scenario in **Table 9** is based upon the indicative traffic movements provided by the client. Whilst traffic data for Dick Smith indicates only one truck in and one truck out overall, we have modelled for one truck in and out for both the dispatch and receiving areas.

The operational scenario has been used to assess both the INP 'intrusiveness' and 'amenity' goals. However, the operational scenario would represent a conservative amenity assessment due to the following inclusions;

- Assumes refrigerated trucks every 15 minute period;
- Assumes peak continuous operation of the container handler during the entire 9 hour night time period; and
- All trucks are large semis/b-doubles rather than small rigid vehicles.

Table 9 – Night time Site Operations for Noise Modelling (Each 15-minute Period)

Operation	Modelling Details
1 Container Handler	1 located in Receiving area of Dick Smith Include drops of containers during the 15-minute period to account for receiving and manoeuvring of containers.
7 Small forklifts	1 in DSE Receiving Dock 1 in DSE despatch dock 1 under DSE awning area 1 in BIG W B-Double Dock 1 in BIG W pallet sorting area 1 in Lot 1 Loading Area 1 in Lot 2 Loading Area
8 Truck Movements	Big W Receiving - 1 truck in refrigerated and parked in receiving area, 1 truck out non-refrigerated Big W Dispatch - 1 truck in refrigerated and parked in receiving area, 1 truck out non-refrigerated Dick Smith Receiving - 1 truck in and 1 truck out (both non-refrigerated) Dick Smith Dispatch - 1 truck in and 1 truck out (both non-refrigerated) Lot 1 - Two trucks in and two trucks out (non-refrigerated) Lot 2 - Two trucks in and two trucks out (non-refrigerated)
Internal Warehouse Operations	General operations and includes use of small forklifts

Noise predictions have been undertaken using SoundPLAN Version 6.2 implementing Concawe algorithms. Ground elevation data at 2m contours has been obtained for the study area from the NSW Land & Property Management Authority.

For assessment to the future residential area within the Hoxton Park Airport site, evaluation of any development provided by the commercial precinct (that is to be located between the industrial and future residential area) has not been accounted for in the noise modelling. Furthermore, the effect of the dense vegetation along the Hinchinbrook Creek (between the site and Cowpasture Road) has not been evaluated in the noise model.

Noise walls along the Hinchinbrook area in proximity to Rottnest Avenue and noise walls along the western side of the M7 have been included in the noise model. Noise walls near Rottnest Avenue are part of the Cowpasture Road upgrade works and will be completed prior to operation of the subject site. The noise wall is to be 3m and built upon the existing earth mounding of approximate 1.2 to 1.5m. As the 2m ground contours did not accurately reflect the existing earth mounding a 4m noise wall has been included in the noise model. With respect to the Middleton Grange noise wall, a 4.5m noise wall has already been constructed for part of the residential development and is understood to be continued for the future development to the south.

4.5 Noise Prediction Results and Discussion

4.5.1 NSW DECCW's INP Intrusive and Amenity Assessment

Graphical representation of noise predictions are set out in Appendix G for the following scenarios;

- Figure 1 - Neutral Weather Conditions - Ground Floor Receivers;
- Figure 2 - Neutral Weather Conditions - First Floor Receivers;
- Figure 3 - 3m/s^{-1} Wind from source to receiver - Ground Floor Receivers;
- Figure 4 - 3m/s^{-1} Wind from source to receiver - First Floor Receivers;
- Figure 5 - F-Class Temperature Inversion with 2m/s^{-1} drainage flow - Ground Floor Receiver;
- Figure 6 - F-Class Temperature Inversion with 2m/s^{-1} drainage flow - First Floor Receiver.

Modelling has been undertaken at 1.5m above the ground for ground floor receivers and at 4.5m above the ground for second storey receiver locations. As individual residential dwellings have not been included in the model the noise levels presented for residential houses beyond the first row of dwellings will be conservatively high. It is noted that the contours have been rounded to the nearest decibel as would be consistent with tabulated results.

The primary residential suburbs of Middleton Grange, Hinchinbrook, Green Valley and future residents to the north of the airport have been represented by hatched areas. The residential areas of Middleton Grange have been based upon Liverpool City Council Local Environment Plan 2008.

4.5.1.1 Neutral Weather Conditions

The predictions reveal compliance with the intrusiveness and amenity noise goals at all locations.

4.5.1.2 Adverse Meteorological Conditions

The noise predictions for both adverse meteorological conditions reveal near identical noise emission levels and therefore are discussed together. Noise emission from the site is found to comply with intrusiveness noise goals at all locations with the exception of the northern end corner of Rottnest Avenue, Hinchinbrook where an exceedance of 1dB(A) is predicted. This exceedance is considered to be negligible.

A further consideration to the assessment under adverse meteorological conditions is how the background noise level may also change under the adverse meteorological conditions. As the background noise level a the nearest residential areas is controlled predominately by distant road traffic from either the M7, Cowpasture Road or combination of the two, it is expected that the resultant noise from these sources would also increase (along with the site noise) under the adverse meteorological conditions.

In order to estimate the enhancements that may be experienced, we modelled a simple point source using the Concawe algorithms. The predictions revealed enhancements between 3dB(A) (from the nearest road way) and 5dB(A) (from the furthest road way). For example, at the Rottnest Avenue, Hinchinbrook location, the increase from Cowpasture Road was 3dB(A) and from the M7, 5dB(A). With this consideration, it is expected that the marginal non-compliances with the intrusiveness goals would not occur.

With respect to the amenity noise goals, marginal exceedance of 2dB(A) is predicted in areas of Middleton Grange and Hinchinbrook south. With respect to Rottnest Avenue, Hinchinbrook location the noise level predictions reveal a 0.5dB(A) exceedance of the adjusted year 2006 amenity noise criteria but would comply by 1dB(A) in year 2016. The marginal exceedances of up to 2dB(A) of the amenity criteria are considered negligible on the basis of the conservative assumptions set out in Section 4.4.

4.5.2 Sleep Disturbance Assessment

The assessment of sleep disturbance has been undertaken for the worst case scenario of second storey receiver locations under the adverse meteorological condition of a Class F temperature inversion and 2m/s drainage flow. The results of modelling are presented in a graphical format in Figure 7 in Appendix F. We note that L_{AMax} source noise levels, rather than $L_{1\text{-}1minute}$ noise levels have been used for a conservative assessment of impacts.

On the basis of the noise modelling, compliance was revealed at all locations

4.6 Recommendations

4.6.1 Additional Plant and Equipment

Assessment and design of mechanical ventilation to spaces, along with specific refrigeration equipment for the Big W and DSE facility and waste disposal equipment will occur as part of the detailed design and specification process to ensure that the cumulative noise impact from the site does not exceed the noise criteria established in Section 4.1. If deemed to be required following a detailed acoustic assessment, mechanical services equipment can readily be treated to meet required noise goals through appropriate selection of plant location, procurement of 'quiet' plant, and additional acoustic attenuation which may include plant room enclosures, localised barriers and acoustic attenuators etc.

4.6.2 Operational Management

It is recommended that the operators of the container handlers be appropriately trained to understand incorrect operations of container handling.

5 ROAD TRAFFIC NOISE ASSESSMENT

5.1 NSW DECCW's Environmental Criteria for Road Traffic Noise

Noise impact from the increased traffic on Cowpasture Road and combined with the new access road at the nearest residential receivers 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 'collector road', as it connects sub-arterial roads with the local road system. For "Land use developments with potential to create additional traffic on collector roads" the following road traffic noise criteria applies:

- Day (7am to 10pm) $L_{Aeq, 1hour}$ **60dB(A)**
- Night (10pm to 7am) $L_{Aeq, 1hour}$ **55dB(A)**

In addition consideration is given to the arterial road noise criteria given the nearest residential premise, likely to be affected are those facing Cowpasture Road. With consideration of the road works currently being undertaken for Cowpasture Road, the road traffic noise criteria applicable for cumulative road traffic noise impacts would be that for redeveloped arterial roads, as follows;

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

As the predicted traffic volumes are daily flows, and that hourly flows have been calculated as averages, both criteria are equivalent.

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.

5.2 Prediction Methodology

The United States Federal Highways Administration's (US FHWA) road traffic noise prediction model was used to predict traffic noise at the facade of the nearest affected residences. Like other prediction models, the FHWA method arrives at a predicted noise level through a series of adjustments to a reference sound level. The source sound levels used in this project to model traffic noise levels are contained within the calculation algorithms of the US FHWA noise model. This model is commonly used for traffic noise predictions, especially in areas where other

models are not suited due to intermittent or non-free flowing traffic conditions, such as the new access road.

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; and
- relative levels and angles of view of the road from the receiver's position.

5.3 Assessment Locations

The nearest most potentially affected receiver locations in proximity to the night time heavy vehicle movements are located in Wardang Road Hinchinbrook, facing Cowpasture Road. These residential premises are approximately 200m from the new access road intersection with Cowpasture Road.

5.4 Noise Predictions and Results

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 242 trucks would be expected during the nine-hour night time period from the DSE and BIG W operations. Assuming Lot 1 and Lot 2 are to operate at similar capacities, these figures would double.

An average speed of 50km/h has been assumed and an angle of view to the access road and Cowpasture Road from the residential locations would be 90 degrees. It is expected that the majority of trucks will originate from and are destined towards the M7. It is noted that all trucks would not traverse the entire length of the access road due to the individual site access points. Traffic movements have assumed half to be semi-trailers/b-doubles, and the remainder to be rigid vehicles.

The predicted traffic noise levels from the truck movements over the night time period is L_{eq} 46dB(A). The resultant noise levels should not affect compliance with the overall night time traffic noise criteria of L_{eq} 55dB(A).

6 CONSTRUCTION NOISE ASSESSMENT

6.1 Construction Plan

The following Plan has been developed by Mirvac to outline proposed phases of the construction work on site, outline the order of works.

6.1.1 Construction Phases

The works can be broadly divided into six (6) major phases:

- Earthworks
- Building structure works
- Cladding works
- Services Trades (electrical, mechanical, fire and hydraulic)
- Internal concrete and fit out (racks) works
- External hardstand and landscaping works

6.1.2 Program of Works

The project is programmed to commence June 2010 with an estimated duration of 18 months.

In terms of proposed hours of operation, weekday operations are proposed during the recommended standard hours of 7am to 6pm however divergence from the Saturday standard hours are sought by extending hours to 7am - 4pm. The extend hours constitutes four additional hours, however fall within the standard daytime period.

6.1.3 Construction Staging Plans

The following provides an indication of the duration for each construction stage. It is noted that stages will overlap throughout the construction phase.

1. Big W: Approximate floor area 89,000m^2
2. DSE: Approximate floor area 50,000m^2

- **Earthworks - Staged Duration 5 months**

  - Bulk excavation cut to fill
  - Trimming of sub grades and installation of road base

- **Building Structure Works - Staged Duration 6 months**

  - Steel portal frame
  - Roof and wall profiled metal cladding including precast concrete walls
  - Internal Concrete Slabs

- **Internal Finishes - Staged Duration 8 months**

  - Electrical, mechanical, hydraulic & fire services

- Office construction and fit out

- **Woolworths Fitout - Duration 10 months**

  - Materials handling racking & conveyor system
  - Installation of operation equipment

- **External Works - Staged Duration 6 months**

  - Rigid concrete
  - Asphalt to carpark areas
  - Soft landscaping

6.2 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 10 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 10 - 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 LAeq (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.

Time of Day	Management Level $L_{Aeq\ (15\ min)}$*	How to Apply
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.*

Table 11 below sets out the construction noise goals, above which residential receivers may be noise affected. Future residential receivers to the north of the site have not been considered as the distribution facility should be constructed prior to the development of the area. In addition, it is noted that much of Middleton Grange is still under construction.

Table 11 – DECCW's Construction Noise Criteria, dB(A)

Location	During Recommended Hours		Outside Hours
	Noise Affected	Highly Noise Affected	(7am -8am and 1pm - 4pm Saturday)
A1 – Hinchinbrook	52	75	47
A3 - Middleton Grange	57	75	52

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

6.3 Construction Equipment Noise Levels

Table 12 lists construction plant and equipment likely to be used by the contractor to carry out the necessary construction work for this project.

Table 12 - 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)
1	Jack Hammers	110 – 120	115	112
2	Concrete Saw	118	118	115
3	Bulldozer	105 – 118	112	109
4	Concrete Leveller	115	115	112
5	Mobile Crane	110 – 115	113	110
6	Scraper	110 – 115	113	110

Plant Item	Plant Description	Sound Power Levels (re: 10-12 Watts)		
		Range	Typical L10 (Mid-Point)	Typical Leq (Mid-Point)
7	Front End Loader	110 – 115	113	110
8	Pneumatic Hand Tools (general)	110 – 115	113	110
8	Compactor	110 – 115	113	110
9	Tracked Excavator	105 – 115	110	107
10	Dump Trucks	102 – 113	108	105
11	Concrete Truck	108 – 110	109	106
12	Welders	100 – 110	105	102
13	Concrete Pump	100 – 109	105	102
14	Truck (>20tonne)	103 – 108	106	103
15	Concrete Vibrator	101 – 105	103	100
16	Silenced Air Compressor	90 – 105	98	95
17	Light commercial vehicles (e.g. 4WD)	-	103	100
	TOTAL SOUND POWER FOR INDICATIVE PURPOSES			121

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.

6.4 Construction Noise Predictions

Construction noise will vary dependant upon the number of items of equipment on site and their locations. Over such a large site, typical construction activities are difficult to define and as such noise predictions have been based on both individual operation of equipment (quietest being the compressor and noisiest being concrete sawing) and the total of all plant listed in Table 12 operating concurrently. The noise level predictions are based on the closest distance from the site to the respective residential areas. As such, noise impacts would be reduced where construction activities are spread out over the site.

Table 13 - Construction Noise Predictions, dB(A)

Location	Predicted L_{Aeq} Noise Levels		Criteria	
	Individual Equipment	All Plant	Standard Hours	Out of Hours
A1 – Hinchinbrook	31 - 48	54	52	47
A3 - Middleton Grange	32 - 49	55	57	52

The noise level predictions indicate that during standard hours of operation, construction activities can generally comply with the guideline requirements before premises are considered 'noise affected' even where numerous items of plant are operating concurrently. Nonetheless works during the standard hours should not reach the 'highly noise affected' levels of 75dB(A).

For proposed construction activities outside of standard hours (7am - 8am and 1pm - 4pm Saturday), noise emission has the potential to exceed the requirements of 'noise affected' for the Middleton Grange by 3dB(A) and by up to 7dB(A) at the Hinchinbrook location.

6.5 Recommendations

With respect to the standard operating hours, construction activities were predicted to generally comply with the ICNG, however for the proposed activities outside standard hours (7am - 8am and 1pm - 4pm Saturday) noise emission has the potential to exceed the 'noise affected' criteria by up to 7dB(A). It is therefore recommended that the during the non-standard hours of operation, equipment activities above L_{Aeq} 110dB(A) be minimised or be acoustically treated having regard to the recommendations provided below.

The following recommendations provide in-principle noise control solutions to reduce noise impacts to residential receivers during the non-standard hours. Where actual construction activities differ from those assessed in this report, more detailed design of noise control measures may be required once specific items of plant and construction methods have been chosen and assessed on site. The advice provided here is in respect of acoustics only.

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 14 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 14– 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

The Renzo Tonin & Associates' listed noise reductions are conservatively low and should be referred to in preference to those of AS2436, for this assessment. Table 15 below identifies possible noise control measures, which are applicable on the construction plant likely to be used on site.

Table 15 – Noise Control Measures for Likely Construction Plant

Plant Description	Screening	Acoustic Enclosures	Silencing	Alternative Process
Mobile Crane	✔	✔	✔	x
Dump Trucks	✔	x	✔	x
Concrete Truck	✔	x	✔	x
Water Cart	✔	x	✔	x
Truck (> 20 tonne)	✔	x	✔	x
Power Generator	✔	✔	✔	x
Silenced Air Compressor	✔	✔	✔	✔
Excavator (30 tonne)	✔	x	✔	x
Bulldozer	✔	x	✔	x

Table 16 below also outlines a number of techniques and options for controlling construction noise and vibration, where considered reasonable and feasible.

Table 16 – 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.

7 CONCLUSION

Renzo Tonin & Associates has completed a noise investigation of construction, operational and road traffic noise impacts from the proposed warehouse/distribution facilities at the Hoxton Park Airport site. The assessment was carried out in accordance with the requirements of the Department of Environment, Climate Change and Water (DECCW) as required by the Department of Planning. The specific documents are the 'Interim Construction Noise Guideline', 'Industrial Noise Policy' (INP) document and 'Environmental Criteria for Road Traffic Noise' (ECRTN).

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.

The findings of the study were as follows;

Industrial Noise Policy

Operational noise from the development will comply with the relevant day time and evening noise goals. The proposed development was predicted to comply with the night time intrusiveness noise criteria at all locations under neutral and adverse meteorological conditions. The exception is a negligible 1dB(A) exceedance at Rottnest Avenue, Hinchinbrook under adverse meteorological conditions.

With respect to the amenity noise goals, predictions under a conservative operational scenario revealed a maximum exceedance of 2dB(A). The conservative modelling assumptions were of peak continuous operation of the container handler, continuous occupation of the BIG W site by refrigerated trucks and all trucks being semi-trailers and b-doubles. The operations of the subject development were therefore considered to accord with the requirements of the Industrial Noise Policy.

Environmental Criteria for Road Traffic Noise

Utilising the average two-way traffic volumes forecast for the development, the predicted traffic levels from truck movements is $L_{eq,9hour}$ 46dB(A) significantly below the night time road traffic noise criteria of $L_{eq,9hour}$ 55dB(A). On this basis, noise from the site will satisfy the requirements of the Environmental Criteria for Road Traffic Noise.

Construction Noise

In accordance with the Interim Construction Noise Guideline, noise emission from construction activities during the standard hours (7am - 6pm weekdays and 8am - 1pm Saturdays) were predicted to generally comply with the noise affected trigger levels. Whilst no specific noise mitigation and management measures have been recommended for operations during the standard hours it is confirmed that a Construction Noise Management Plan has been developed

by the client to address any potential noise impacts. On the basis of the assessment, noise emission will not exceed the 'highly affected' level of 75dB(A).

With respect to the proposed construction activities to occur outside standard hours (7am - 8am and 1pm - 4pm Saturday) noise control treatment and management options have been recommended which should be incorporated for the specific activities where they occur during the 'outside hours' period.

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 - LONG TERM MONITORING METHODOLOGY

C.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.

C.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*.

C.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 $\mathbf{L_{10}}$, $\mathbf{L_{90}}$, and $\mathbf{L_{eq}}$ levels. The statistical descriptors $\mathbf{L_{10}}$ and $\mathbf{L_{90}}$ measure the noise level exceeded for 10% and 90% of the sample measurement time. The $\mathbf{L_{eq}}$ 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 $\mathbf{L_{90}}$ noise level.

APPENDIX D - LONG-TERM MONITORING RESULTS

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 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

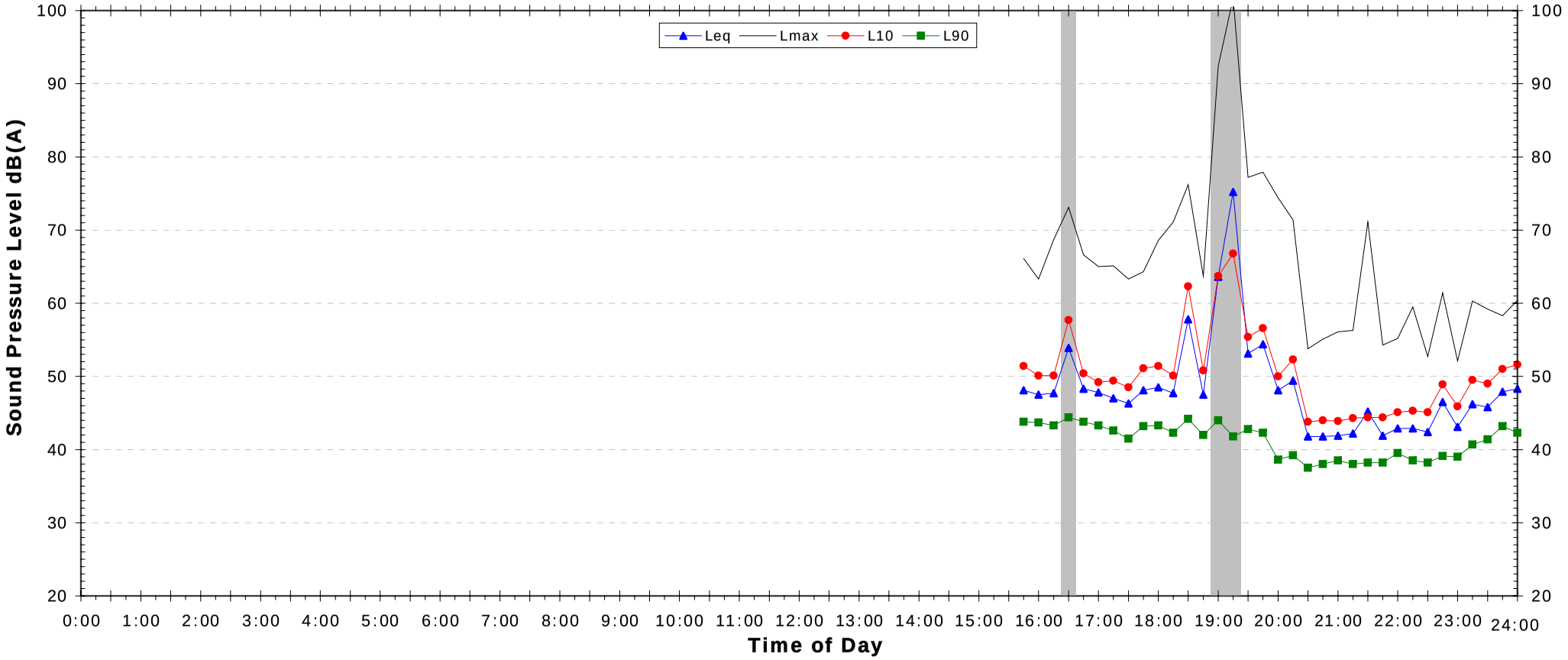
TRAFFIC NOISE MONITORING RESULTS
NSW DEC 'ENVIRONMENTAL CRITERIA FOR ROAD TRAFFIC NOISE', 1999

	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

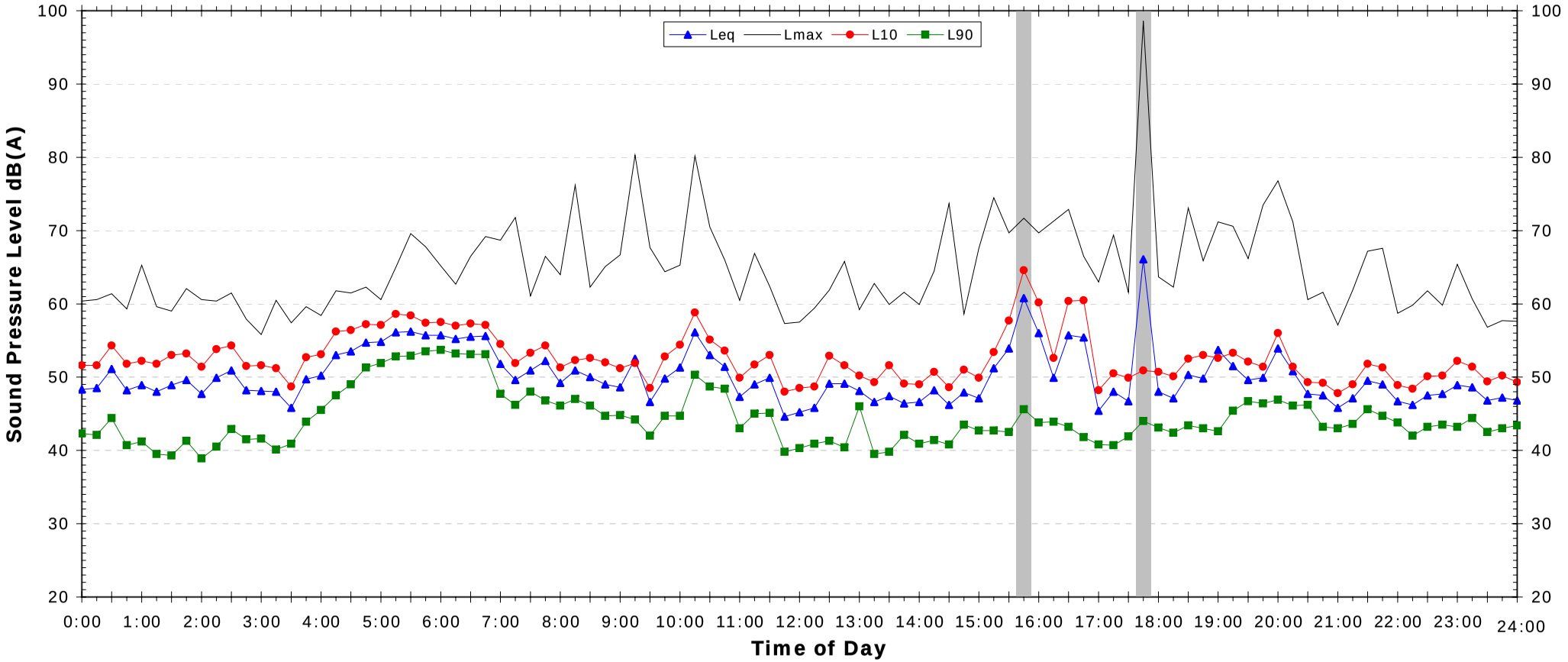
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

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

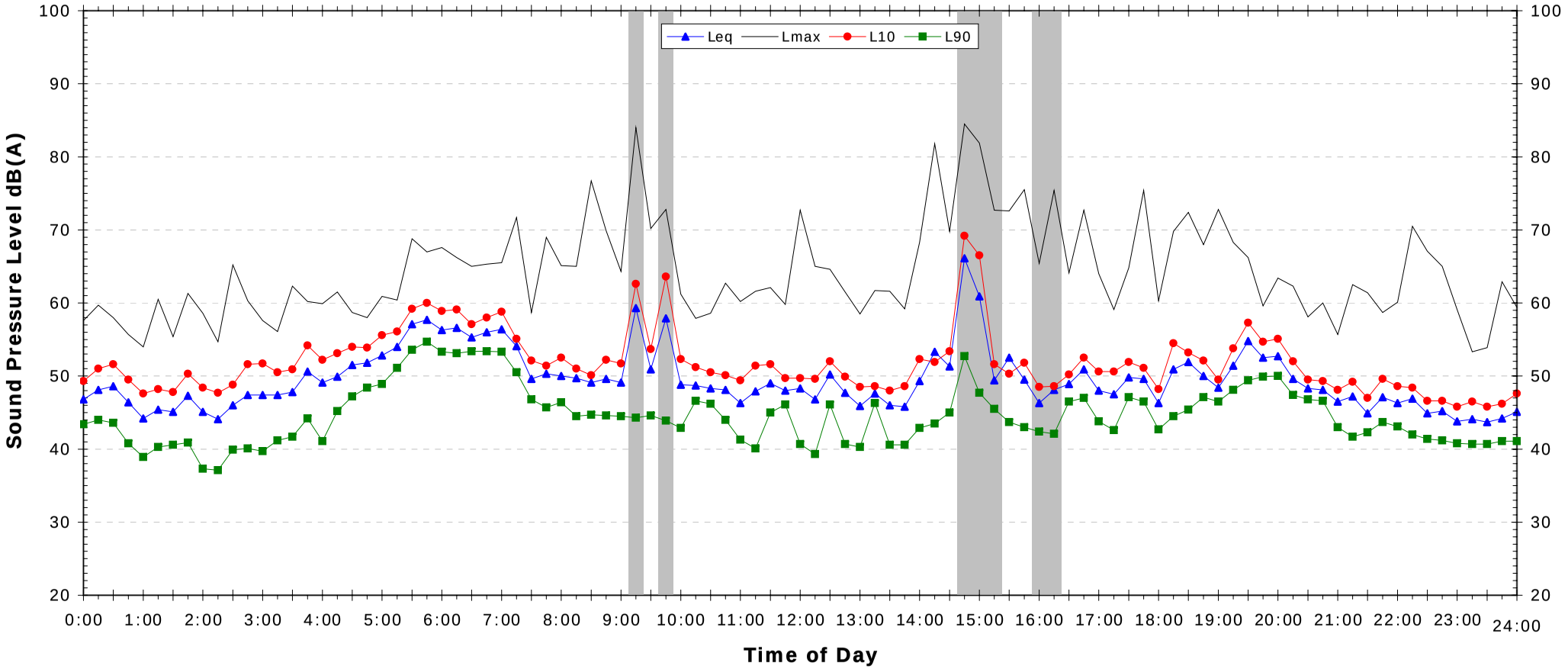
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

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

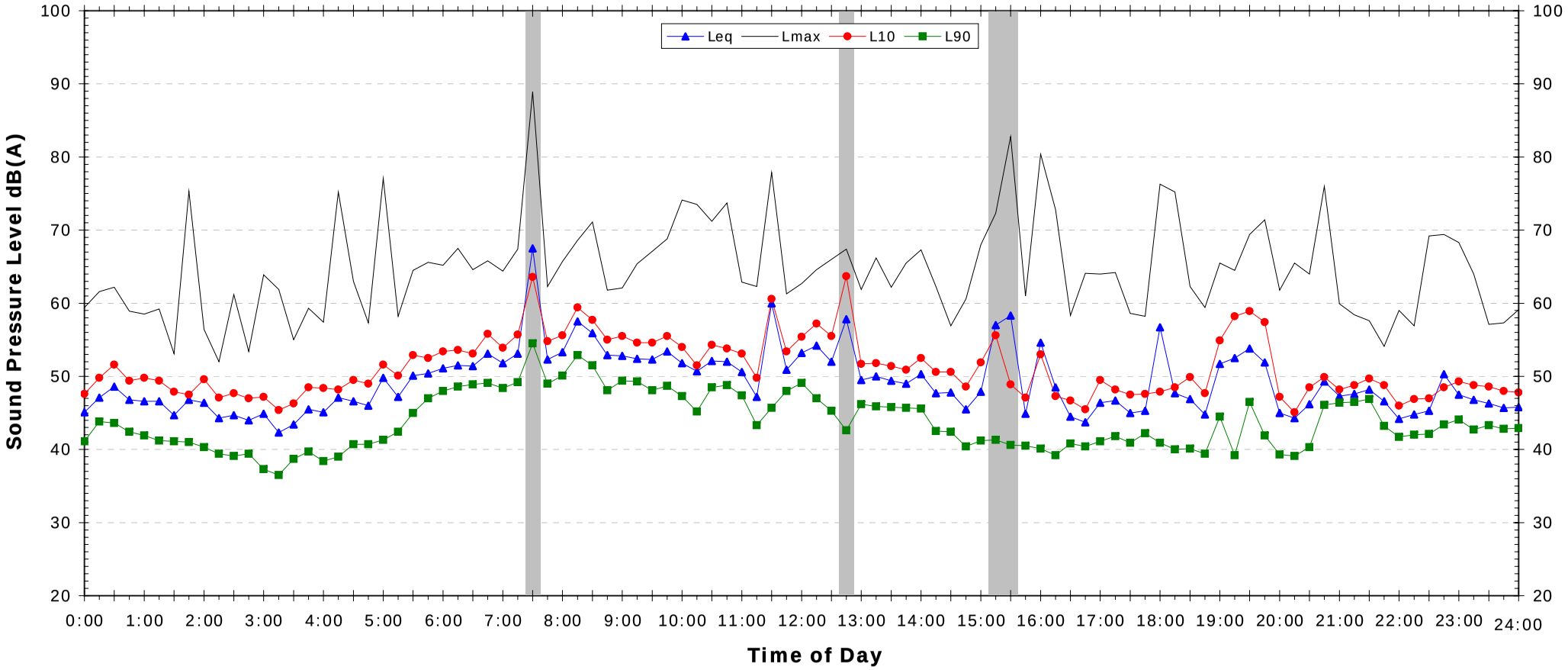
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

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

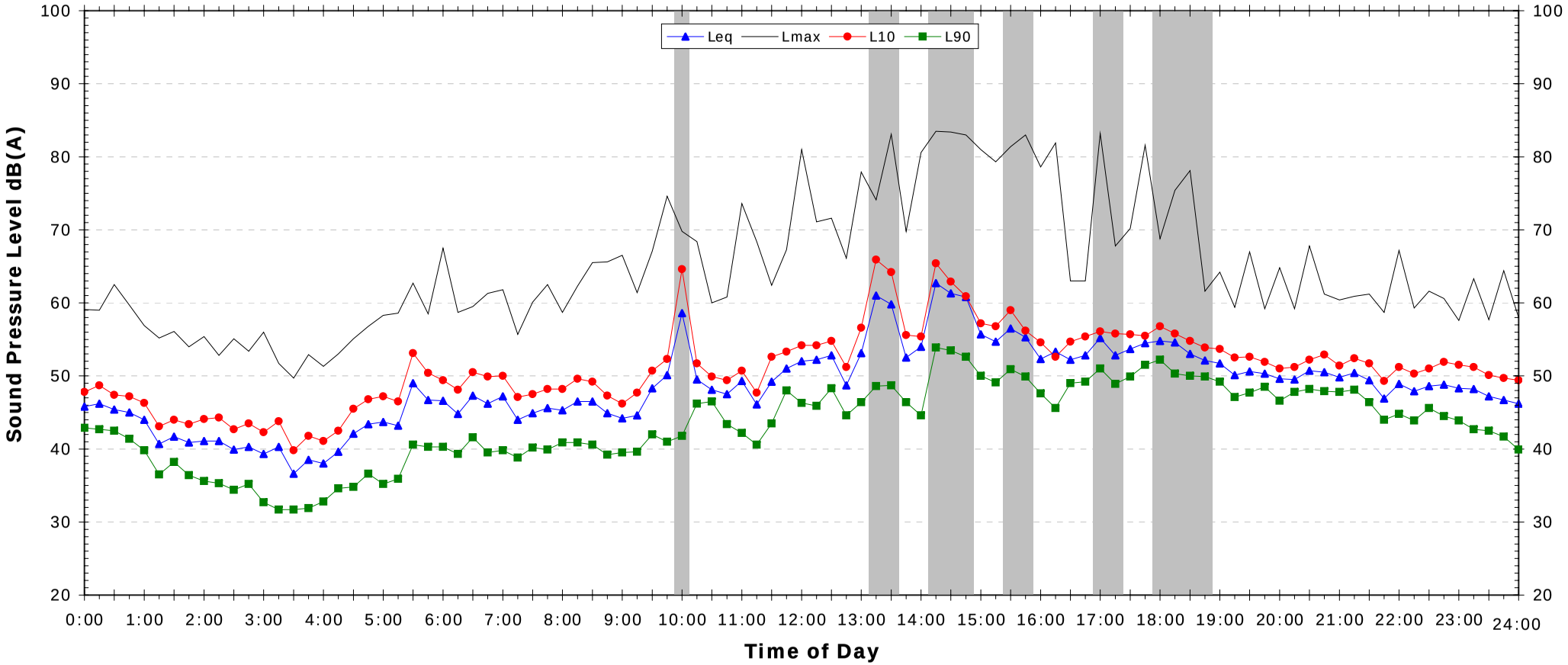
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

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

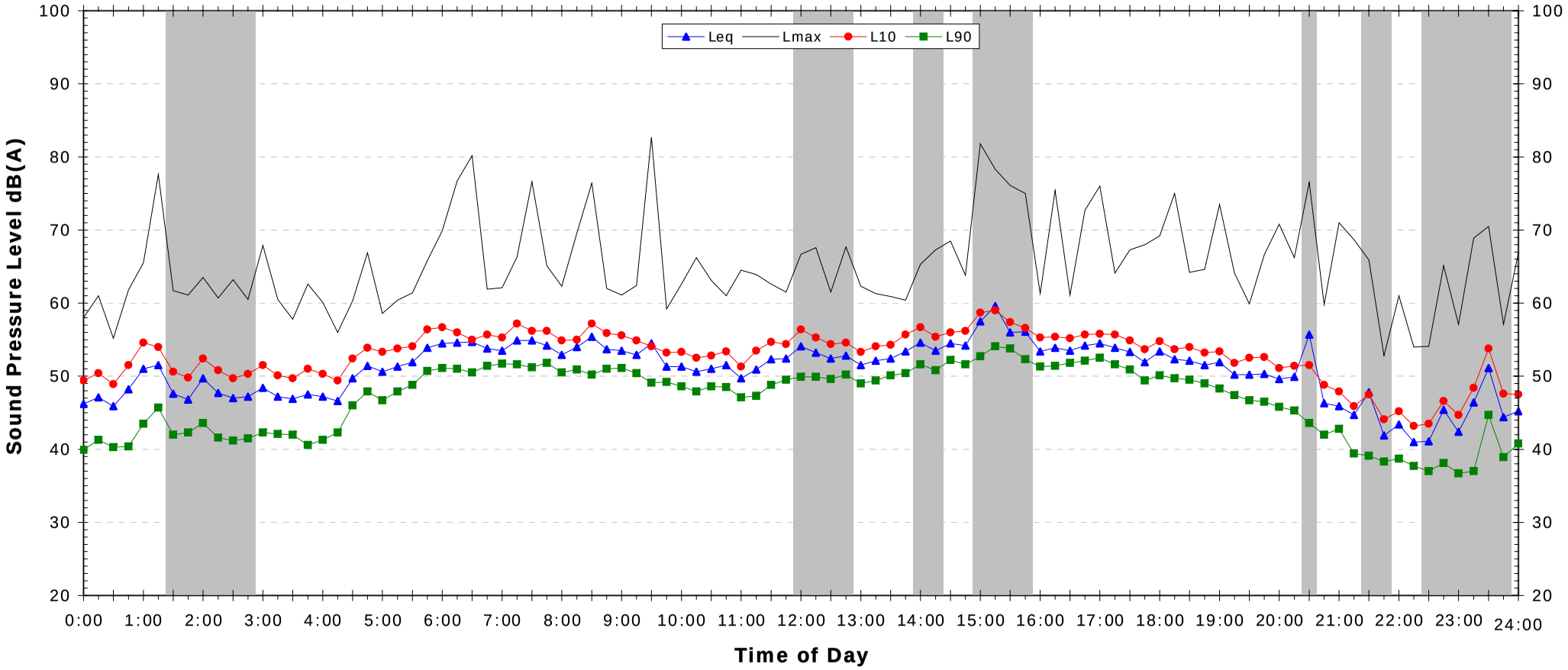
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

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

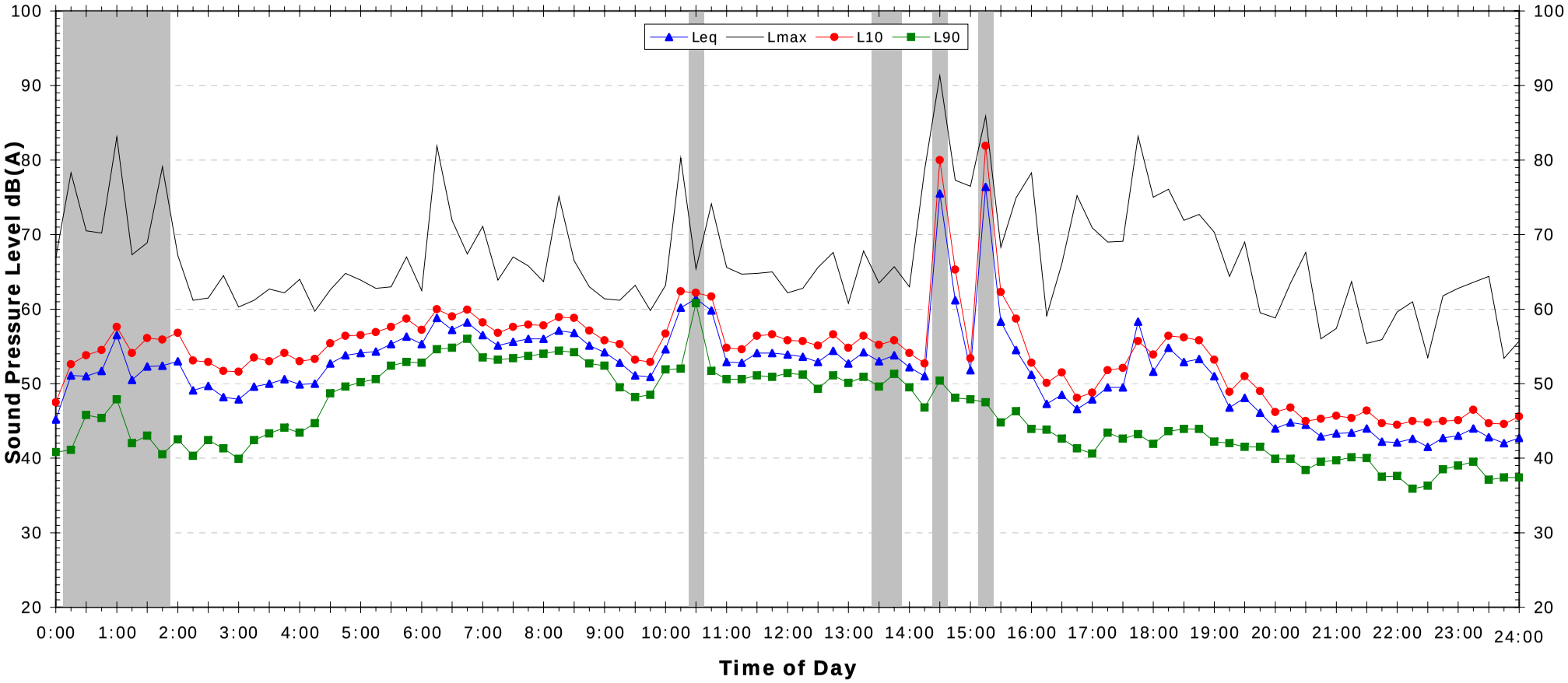
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

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

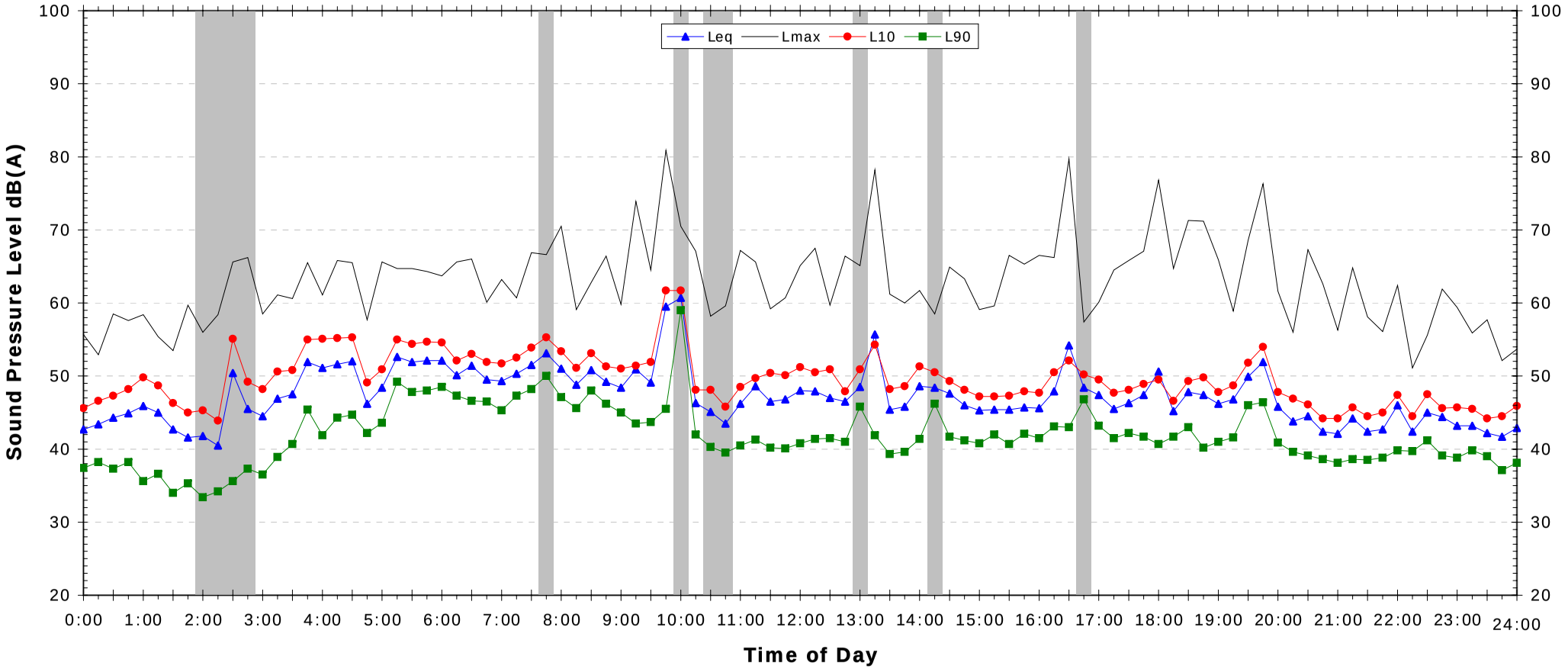
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

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

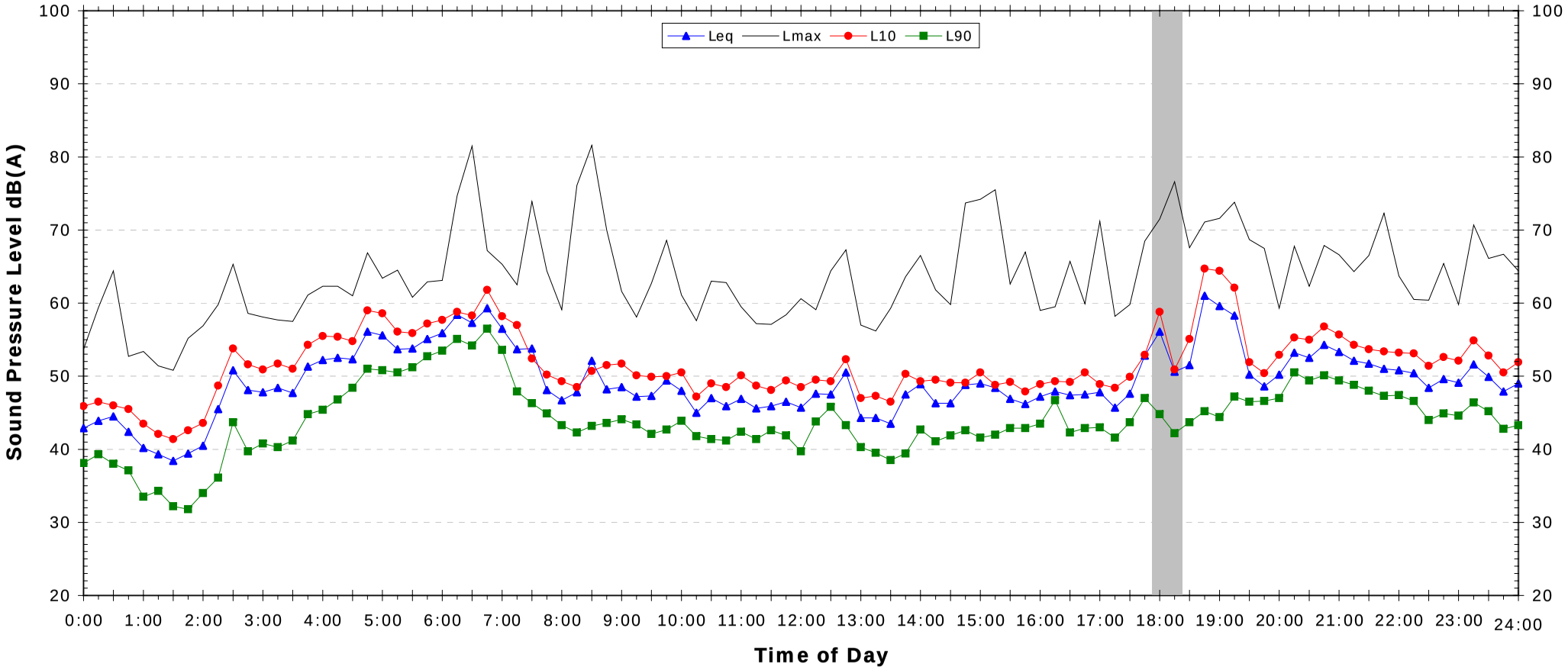
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

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

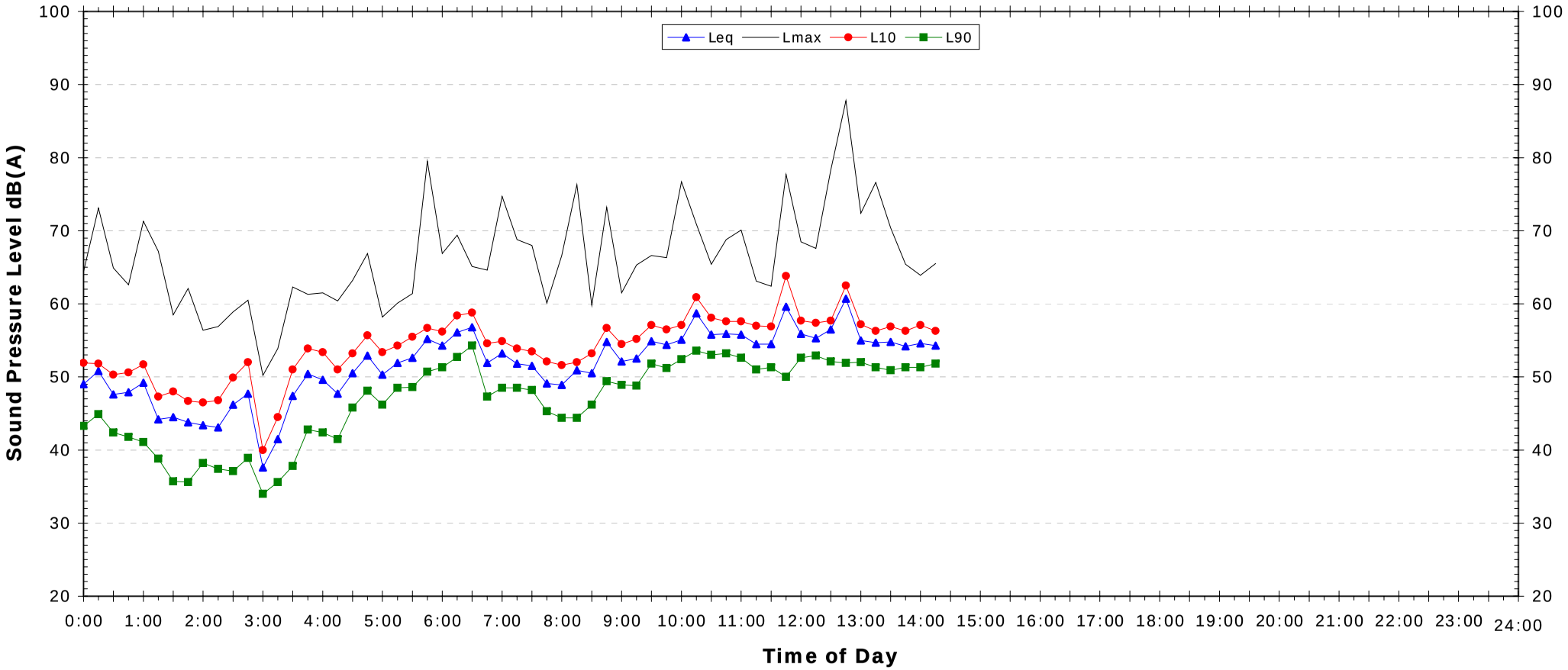
Data File: TE715-01L01 (rev 0) Logger RTA01-017.xls TE715-01L01 (rev 1) Front Yard of 8 Nicol Place, Hinchinbrook.xls

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

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email: acoustics@rtagroup.com.au
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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

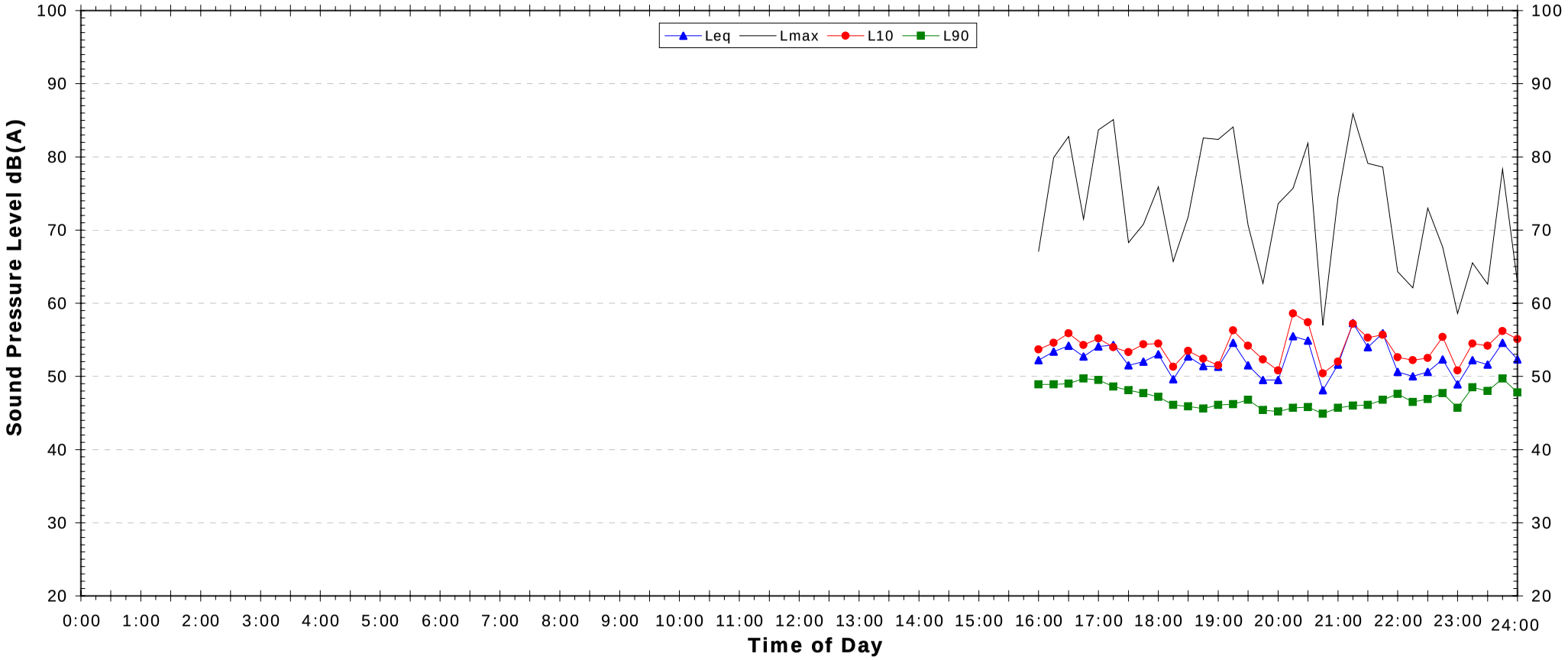
TRAFFIC NOISE MONITORING RESULTS
NSW DEC 'ENVIRONMENTAL CRITERIA FOR ROAD TRAFFIC NOISE', 1999

	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

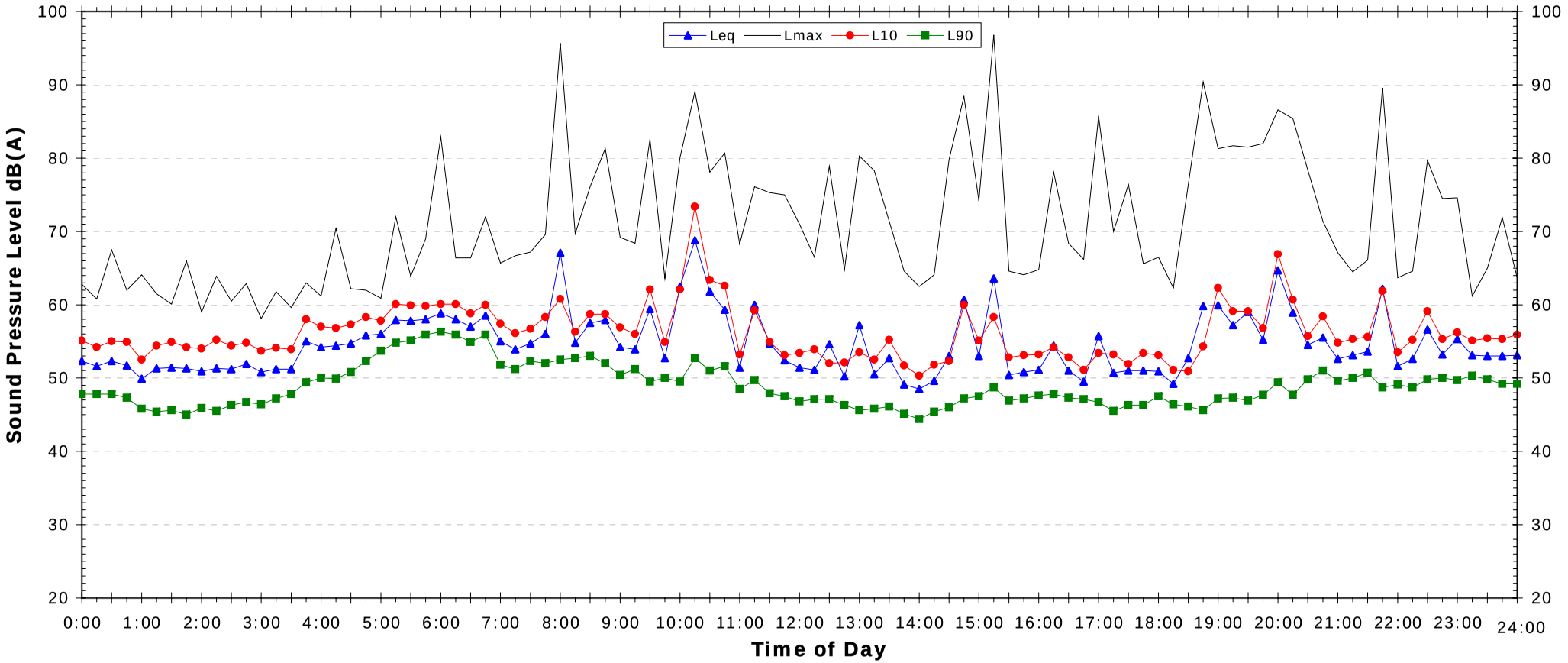
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

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

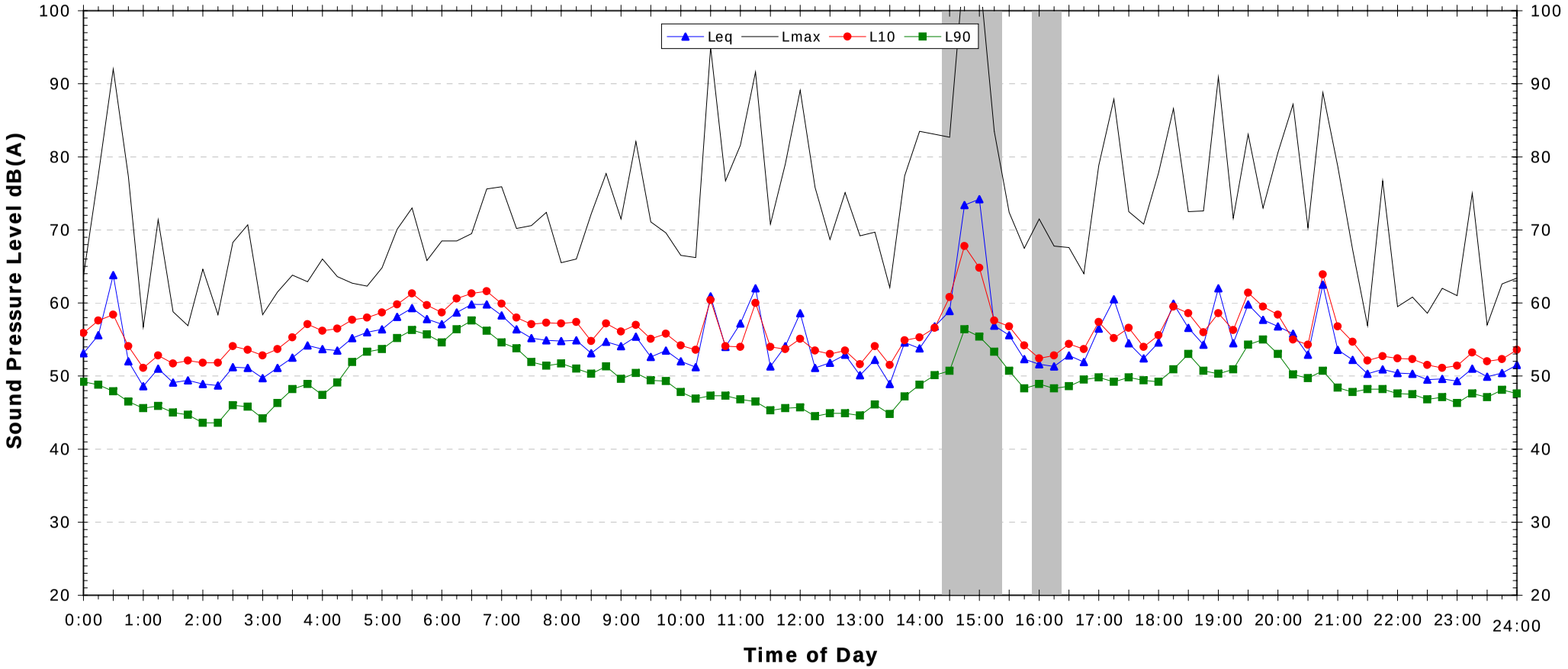
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

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

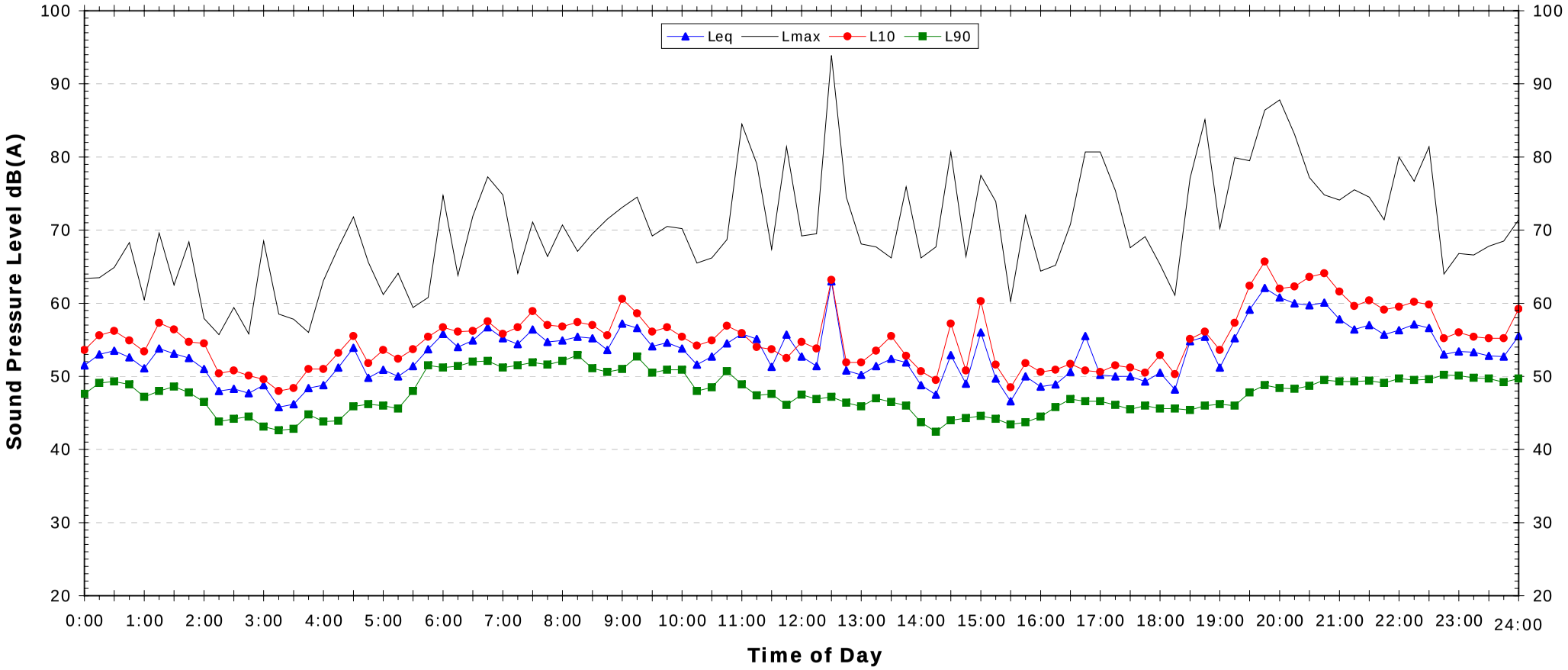
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

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

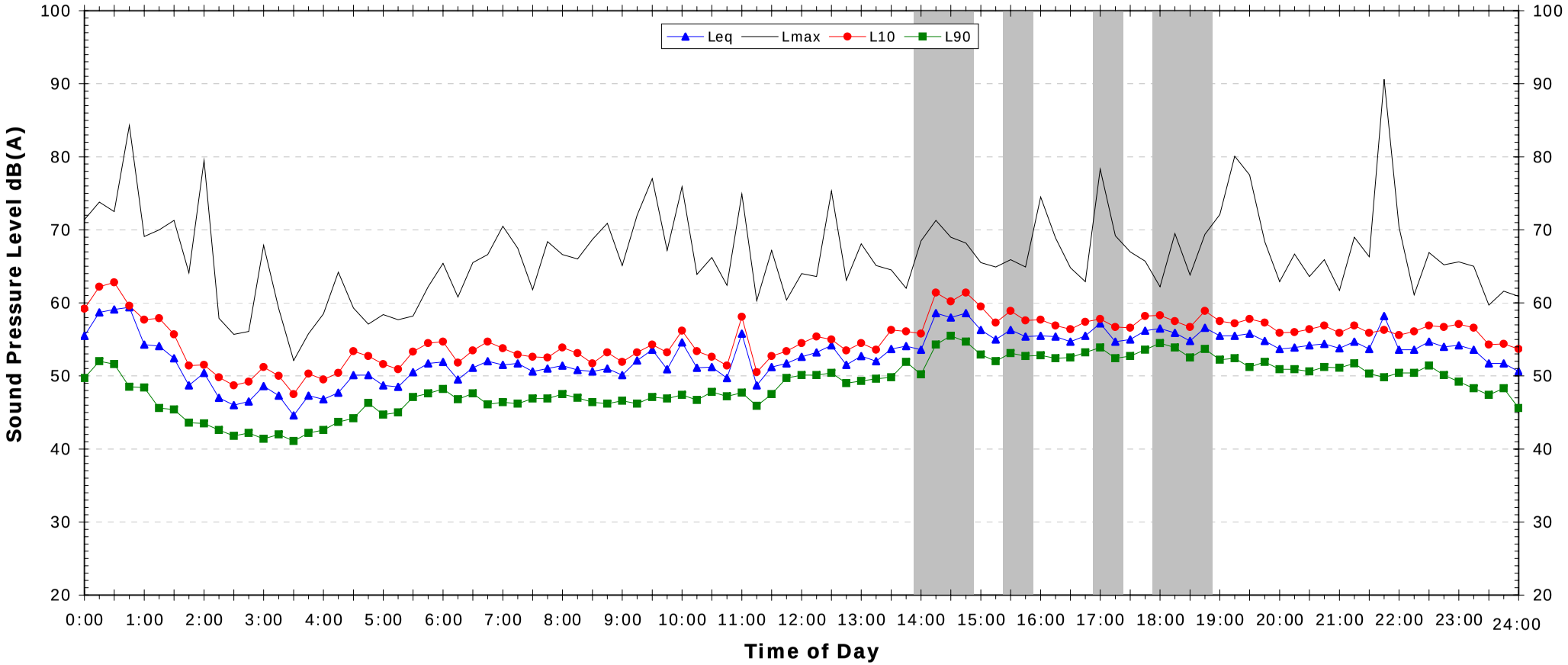
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

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

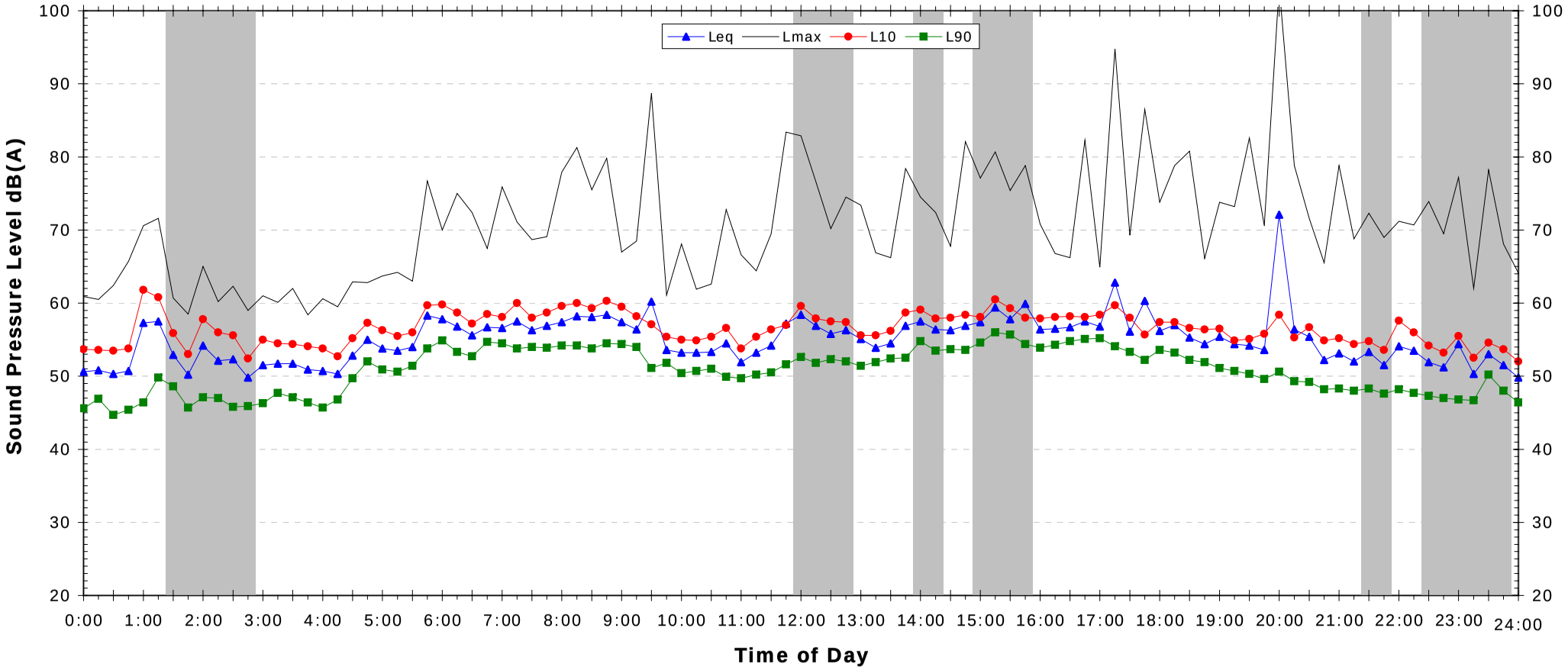
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

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

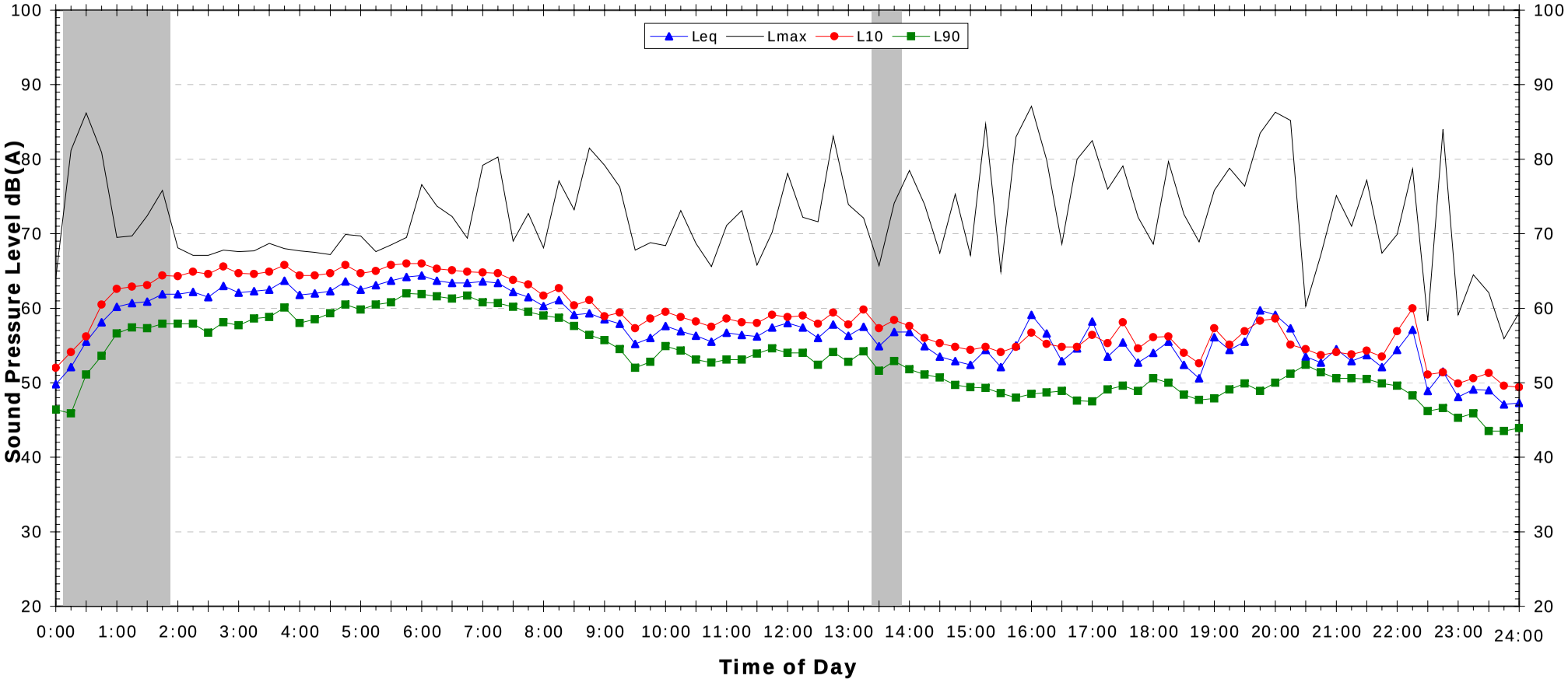
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

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

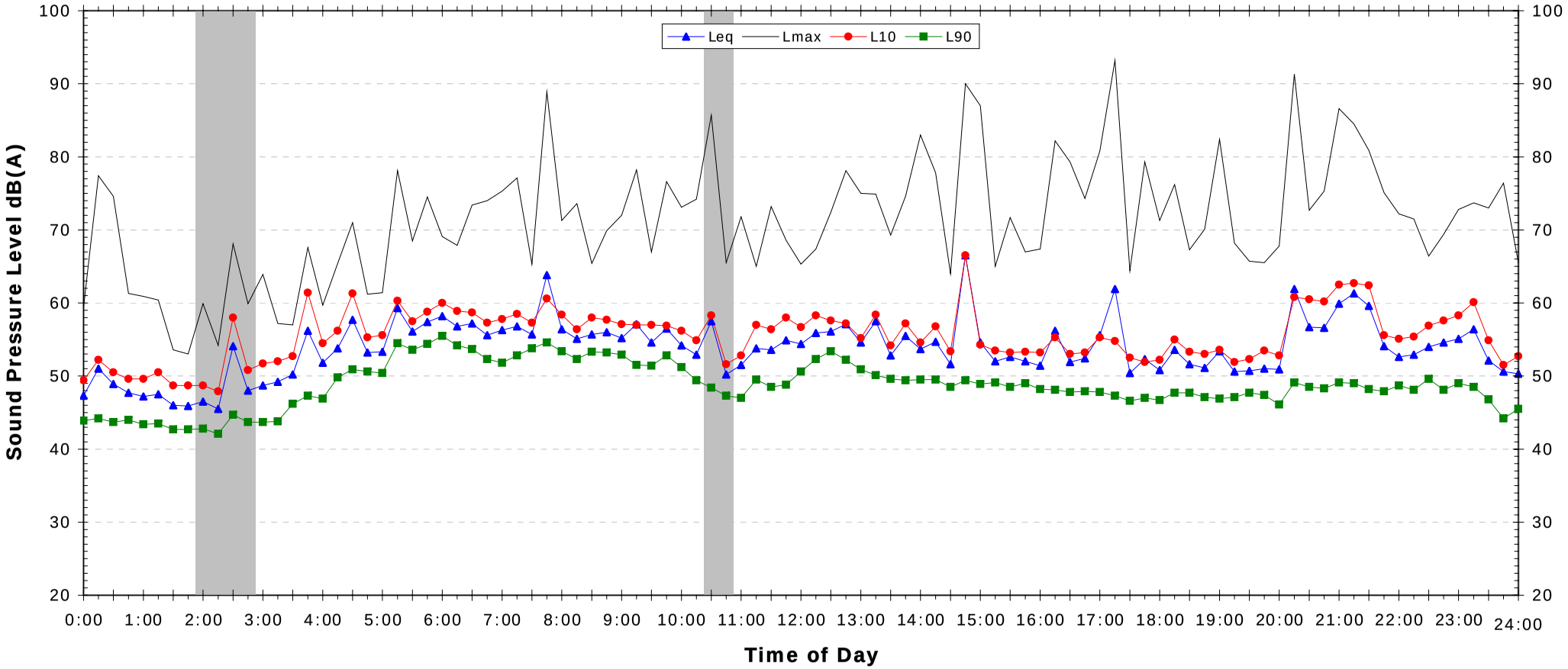
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

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

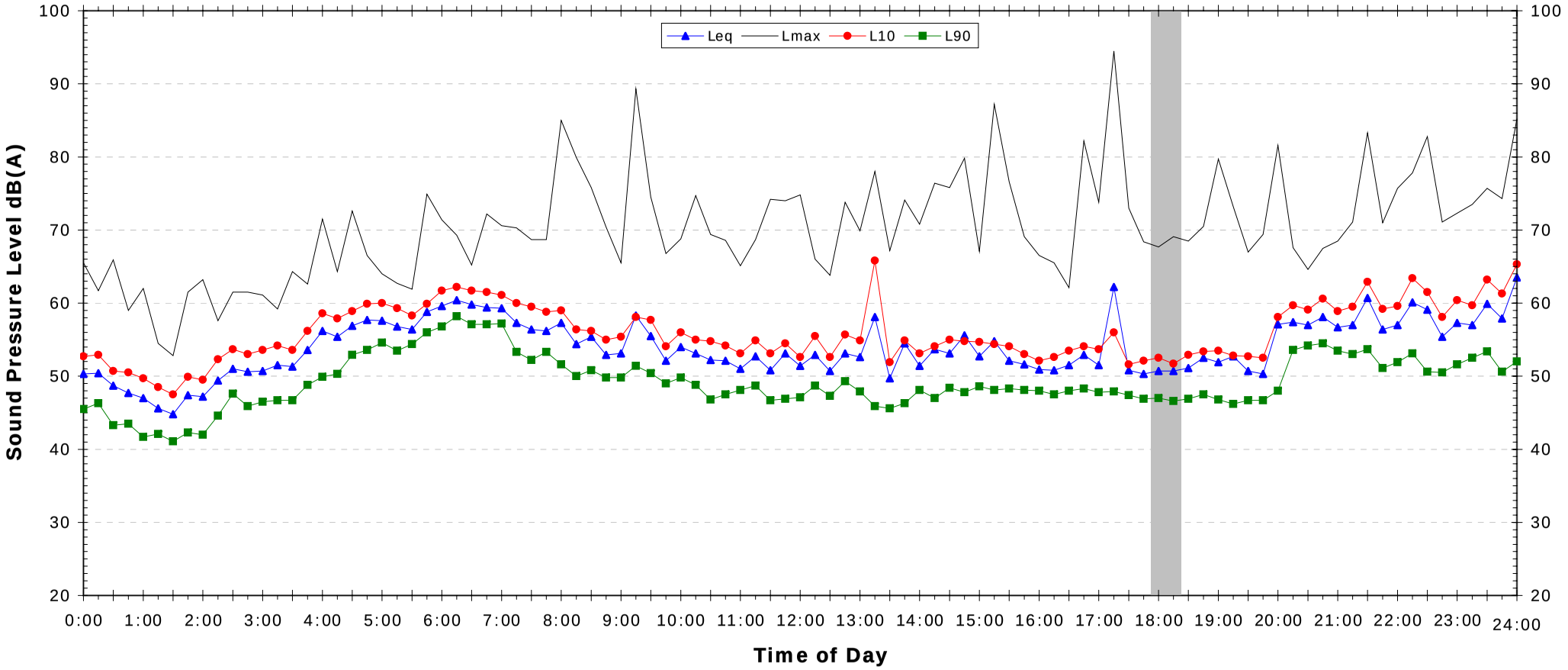
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

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

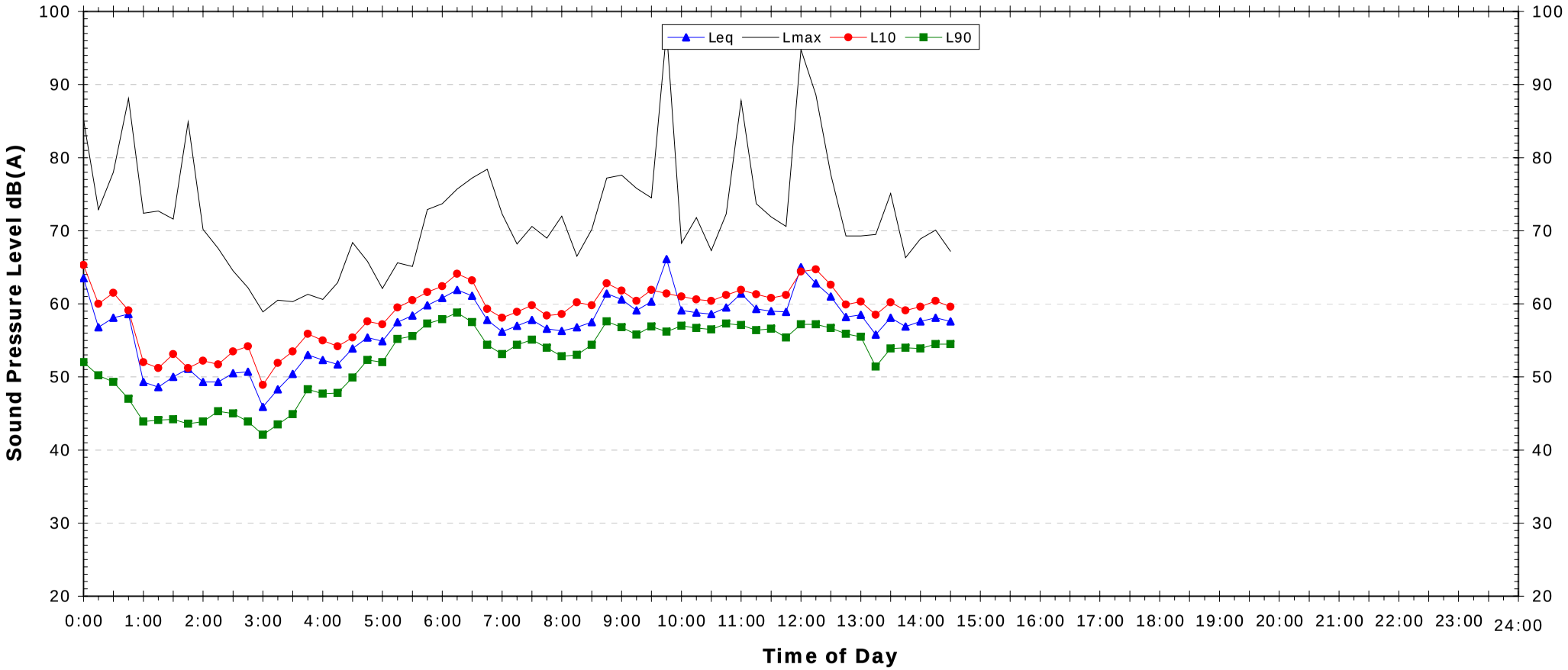
Data File: TE715-01L02 (rev 0) Logger RTA01-008.xls TE715-01L02 (rev 1) Front Yard of 4 Wardang Rd, Hinchinbrook.xls

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

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inspired to achieve

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email: acoustics@rtagroup.com.au
website: www.renzotonin.com.au

noise logger results

Location L3 - Future Residential at Existing Hoxton Park Airport

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	-	42	42	-	48	50
Thursday-19-November-2009	41	42	42	47	47	50
Friday-20-November-2009	-	-	-	-	-	-
Saturday-21-November-2009	38	40	38	46	46	47
Sunday-22-November-2009	-	-	-	-	-	-
Monday-23-November-2009	-	41	-	-	49	-
Tuesday-24-November-2009	42	39	38	50	44	46
Wednesday-25-November-2009	-	-	39	-	-	49
Thursday-26-November-2009	-	-	-	-	-	-
Friday-27-November-2009	-	-	-	-	-	-
Representative Level	**41**	**41**	**39**	**48**	**47**	**49**

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

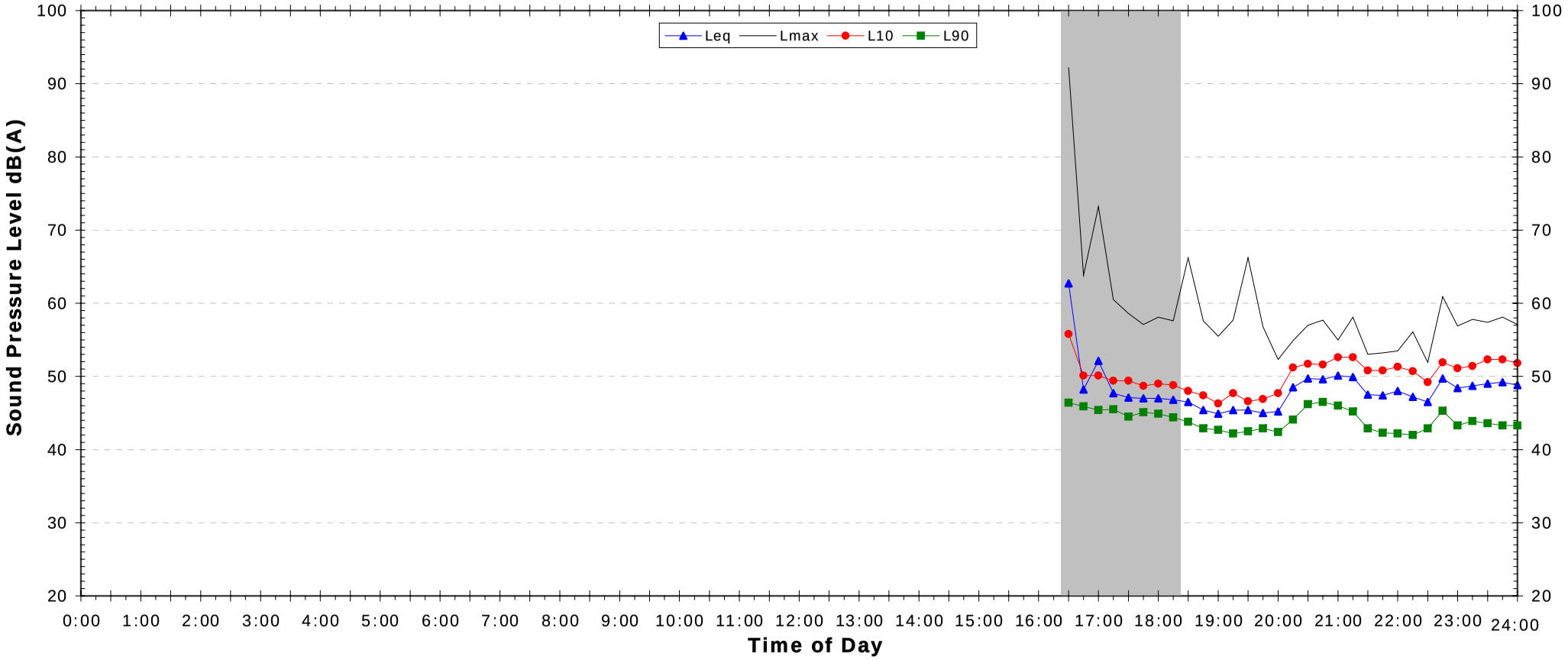
TRAFFIC NOISE MONITORING RESULTS
NSW DEC 'ENVIRONMENTAL CRITERIA FOR ROAD TRAFFIC NOISE', 1999

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

EXISTING AMBIENT NOISE LEVELS

Location L3 - Future Residential at Existing Hoxton Park Airport

Wednesday, 18 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	-	42.2	42.0
Leq (see note 3)	-	47.7	49.8

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 $L_{eq\ 9\ hr}$	50.2	52.3
$L_{eq\ 1hr}$ upper 10 percentile	52.0	54.9
$L_{eq\ 1hr}$ lower 10 percentile	47.8	49.9

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

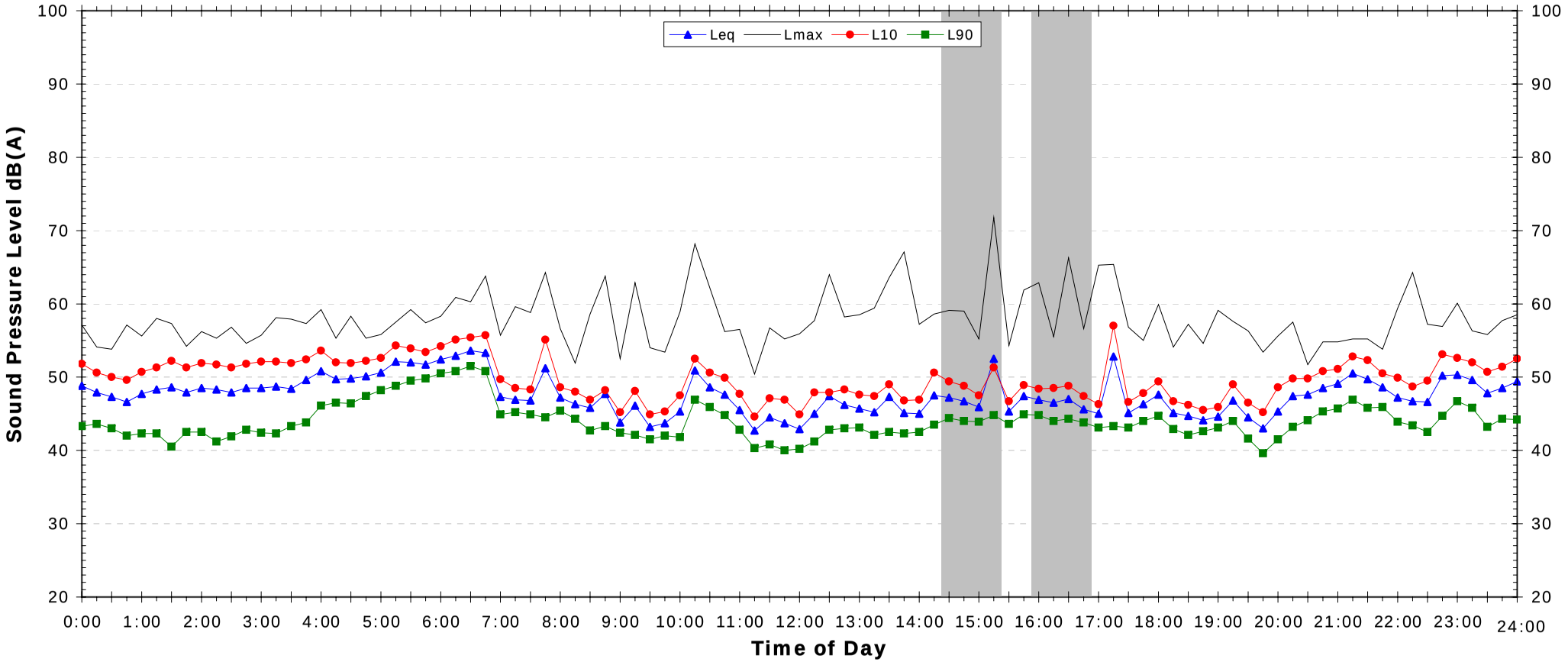
Data File: TE715-01L03 (rev 0) Logger RTA01-005.xls TE715-01L03 (rev 1) Future Residential at Existing Hoxton Park Airport.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L3 - Future Residential at Existing Hoxton Park Airport

Thursday, 19 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	40.8	41.5	41.9
Leq (see note 3)	46.9	47.2	50.3

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 $L_{eq\ 9\ hr}$	49.5	52.8
$L_{eq\ 1hr}$ upper 10 percentile	51.6	56.2
$L_{eq\ 1hr}$ lower 10 percentile	46.6	50.0

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	67.2	to	76.8
Lmax - Leq (Range)	15.5	to	23.7

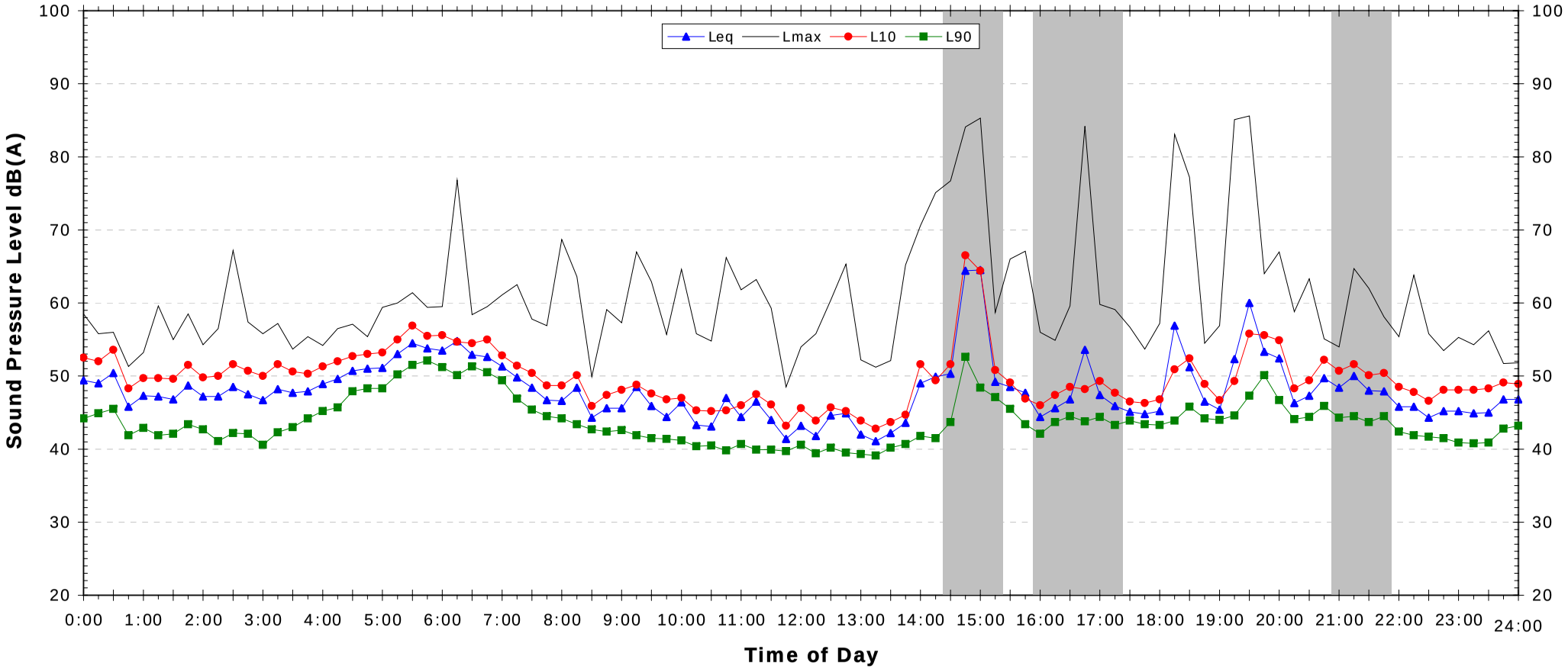
Data File: TE715-01L03 (rev 0) Logger RTA01-005.xls TE715-01L03 (rev 1) Future Residential at Existing Hoxton Park Airport.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L3 - Future Residential at Existing Hoxton Park Airport

Friday, 20 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 $L_{eq\ 9\ hr}$	51.7	50.8
$L_{eq\ 1hr}$ upper 10 percentile	57.3	53.5
$L_{eq\ 1hr}$ lower 10 percentile	46.3	47.7

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	-	to	-
Lmax - Leq (Range)	18.6	to	18.6

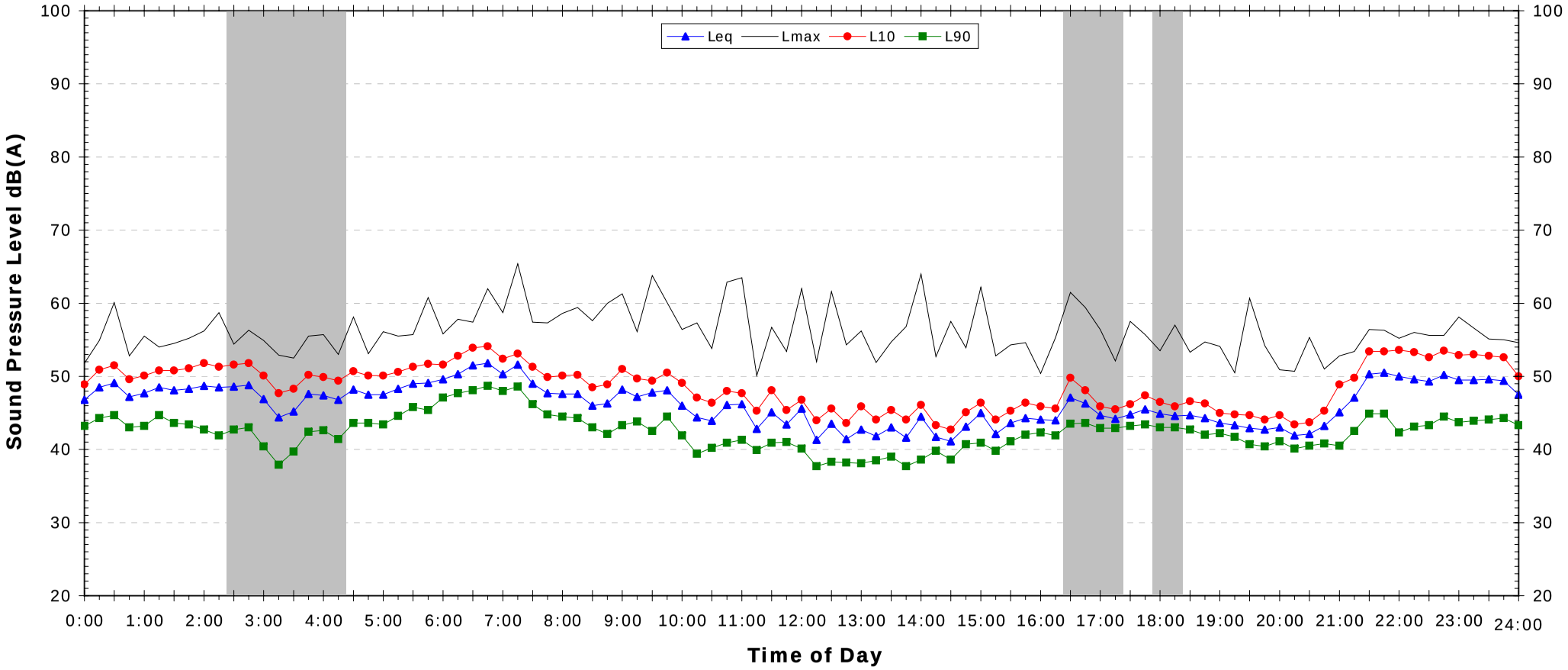
Data File: TE715-01L03 (rev 0) Logger RTA01-005.xls TE715-01L03 (rev 1) Future Residential at Existing Hoxton Park Airport.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L3 - Future Residential at Existing Hoxton Park Airport

Saturday, 21 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	38.2	40.4	38.4
Leq (see note 3)	45.6	46.1	47.4

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 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 $L_{eq\ 9\ hr}$	48.3	49.9
$L_{eq\ 1hr}$ upper 10 percentile	52.0	52.2
$L_{eq\ 1hr}$ lower 10 percentile	45.1	46.9

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

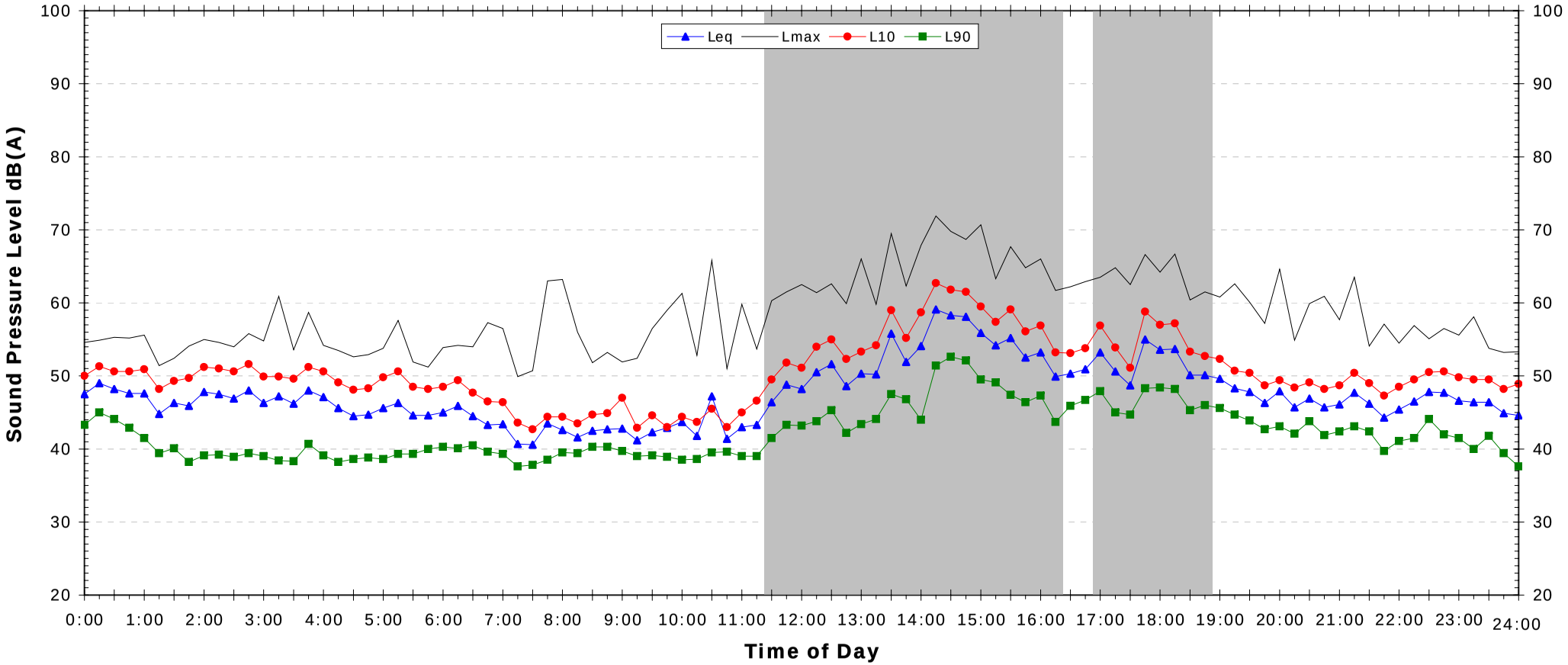
Data File: TE715-01L03 (rev 0) Logger RTA01-005.xls TE715-01L03 (rev 1) Future Residential at Existing Hoxton Park Airport.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L3 - Future Residential at Existing Hoxton Park Airport

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 $L_{eq\ 9\ hr}$	48.3	51.7
$L_{eq\ 1hr}$ upper 10 percentile	53.1	54.5
$L_{eq\ 1hr}$ lower 10 percentile	44.5	48.2

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	71.1	to	71.1
Lmax - Leq (Range)	20.1	to	20.1

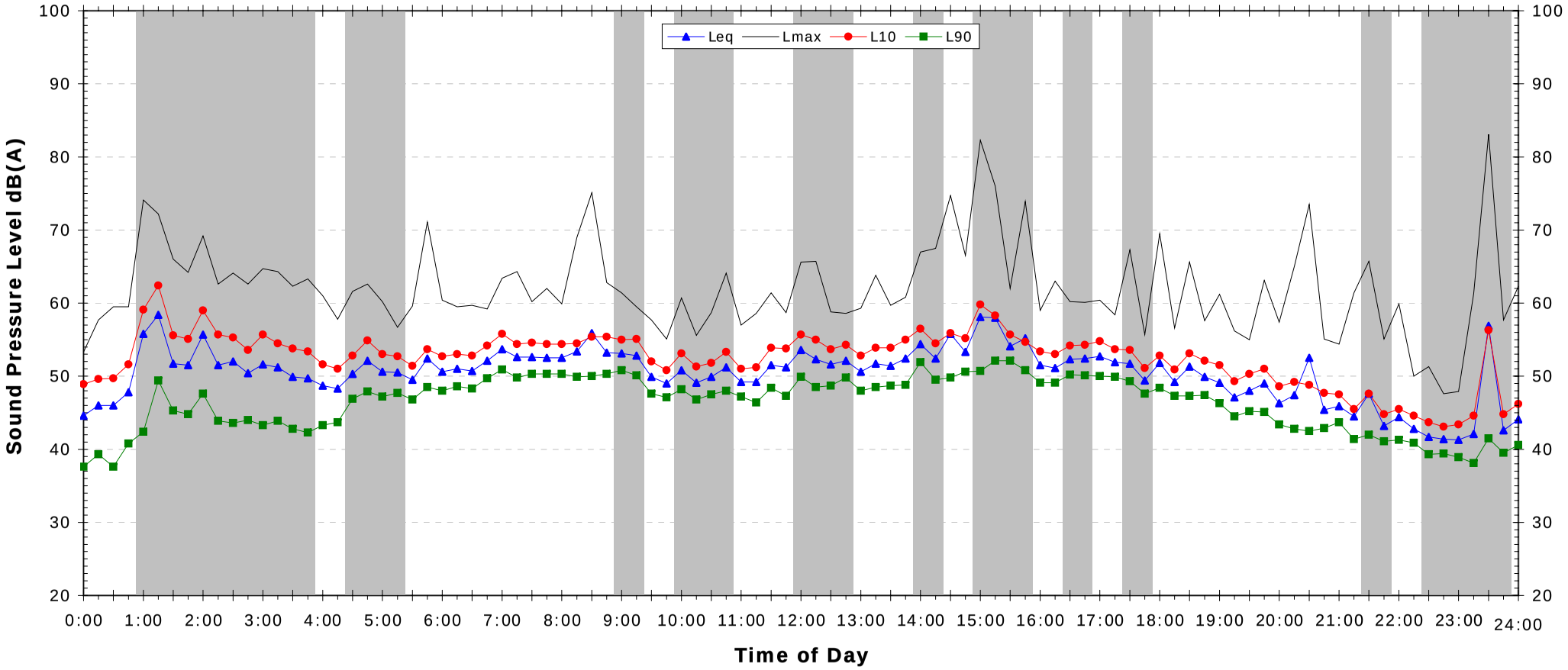
Data File: TE715-01L03 (rev 0) Logger RTA01-005.xls TE715-01L03 (rev 1) Future Residential at Existing Hoxton Park Airport.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L3 - Future Residential at Existing Hoxton Park Airport

Monday, 23 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	-	41.4	-
Leq (see note 3)	-	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 $L_{eq\ 9\ hr}$	53.8	53.9
$L_{eq\ 1hr}$ upper 10 percentile	57.0	57.0
$L_{eq\ 1hr}$ lower 10 percentile	48.9	45.3

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	-	to	-
Lmax - Leq (Range)	18.2	to	18.2

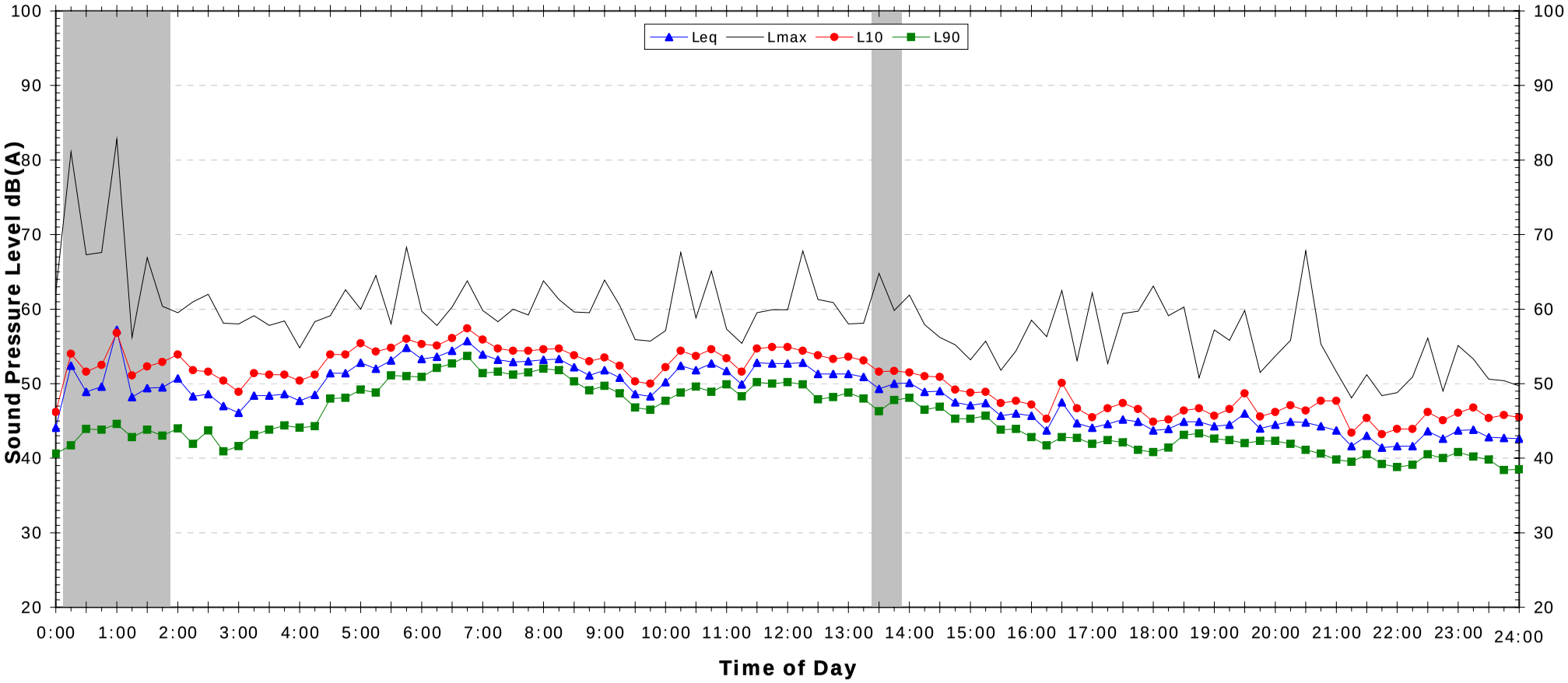
Data File: TE715-01L03 (rev 0) Logger RTA01-005.xls TE715-01L03 (rev 1) Future Residential at Existing Hoxton Park Airport.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L3 - Future Residential at Existing Hoxton Park Airport

Tuesday, 24 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	42.1	39.2	38.1
Leq (see note 3)	50.5	44.1	46.0

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	48.5
$L_{eq\ 1hr}$ upper 10 percentile	55.2	51.1
$L_{eq\ 1hr}$ lower 10 percentile	45.9	45.5

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	-	to	-
Lmax - Leq (Range)	15.4	to	16.4

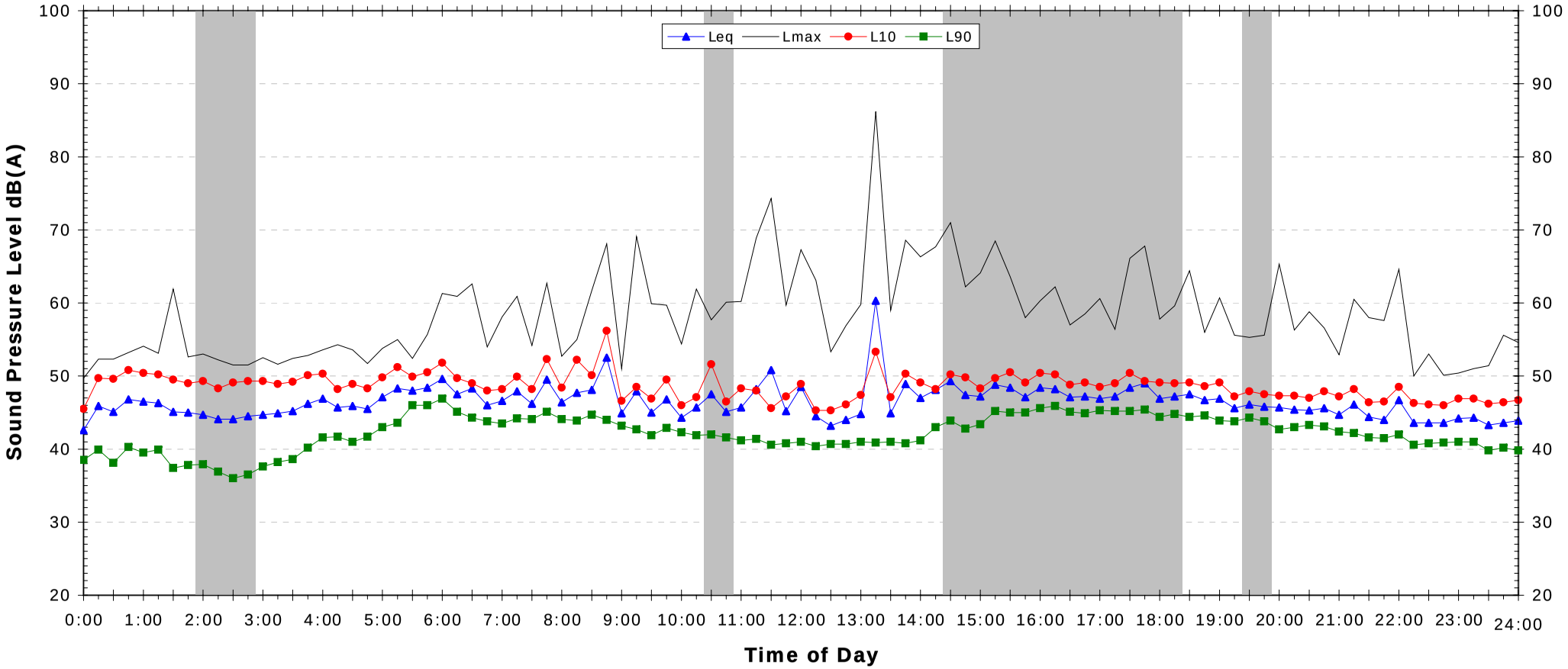
Data File: TE715-01L03 (rev 0) Logger RTA01-005.xls TE715-01L03 (rev 1) Future Residential at Existing Hoxton Park Airport.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L3 - Future Residential at Existing Hoxton Park Airport

Wednesday, 25 November 2009



NSW Industrial Noise Policy (Free Field)			
Descriptor	Day	Evening	Night[2]
	7am-6pm	6pm-10pm	10pm-7am
L_{90}	-	-	38.7
Leq (see note 3)	-	-	49.3

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 $L_{eq\ 9\ hr}$	51.3	51.8
$L_{eq\ 1hr}$ upper 10 percentile	56.7	56.3
$L_{eq\ 1hr}$ lower 10 percentile	46.9	46.3

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

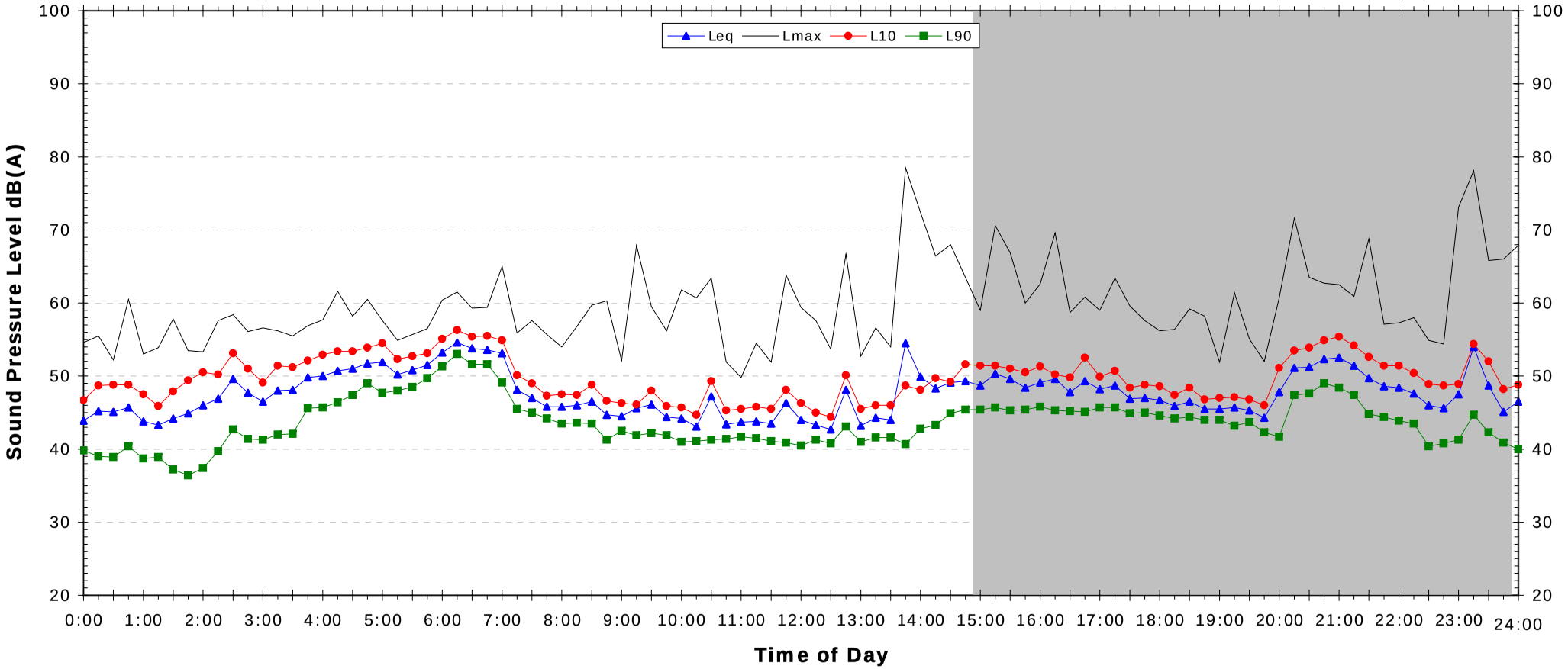
Data File: TE715-01L03 (rev 0) Logger RTA01-005.xls TE715-01L03 (rev 1) Future Residential at Existing Hoxton Park Airport.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L3 - Future Residential at Existing Hoxton Park Airport

Thursday, 26 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 $L_{eq\ 9\ hr}$	49.3	49.0
$L_{eq\ 1hr}$ upper 10 percentile	52.8	49.0
$L_{eq\ 1hr}$ lower 10 percentile	47.1	49.0

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	67.9	to	67.9
Lmax - Leq (Range)	21.4	to	21.4

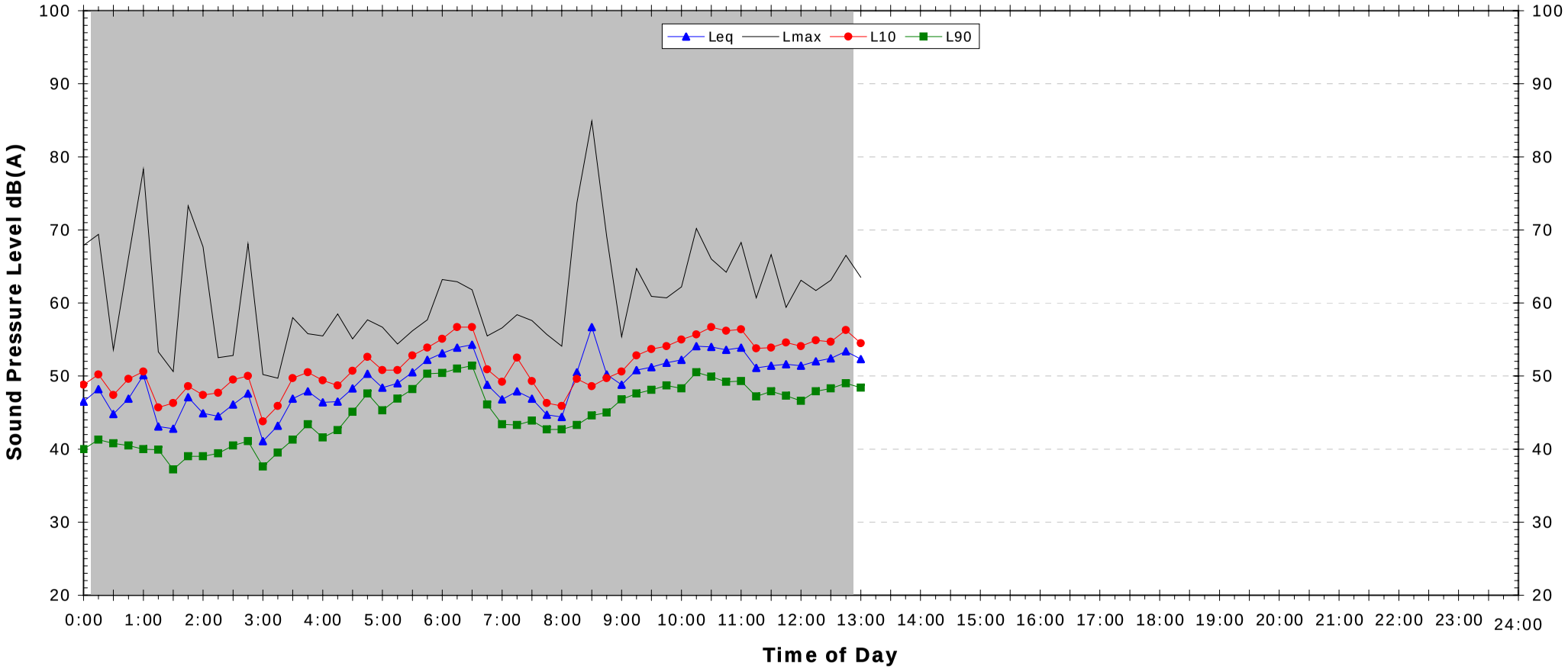
Data File: TE715-01L03 (rev 0) Logger RTA01-005.xls TE715-01L03 (rev 1) Future Residential at Existing Hoxton Park Airport.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L3 - Future Residential at Existing Hoxton Park Airport

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 $L_{eq\ 9\ hr}$	54.8	-
$L_{eq\ 1hr}$ upper 10 percentile	54.8	-
$L_{eq\ 1hr}$ lower 10 percentile	54.8	-

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

Data File: TE715-01L03 (rev 0) Logger RTA01-005.xls TE715-01L03 (rev 1) Future Residential at Existing Hoxton Park Airport.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 L4 - 34 Truscott Avenue, Middleton Grange (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	-	44	40	-	49	47
Thursday-19-November-2009	47	43	40	62	50	50
Friday-20-November-2009	46	43	38	58	53	45
Saturday-21-November-2009	43	42	36	55	48	41
Sunday-22-November-2009	-	-	-	-	-	-
Monday-23-November-2009	-	45	-	-	50	-
Tuesday-24-November-2009	48	44	37	58	52	45
Wednesday-25-November-2009	47	44	39	56	51	46
Thursday-26-November-2009	47	43	37	59	51	49
Friday-27-November-2009	-	-	-	-	-	-
Representative Level	**47**	**43**	**38**	**59**	**51**	**47**

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

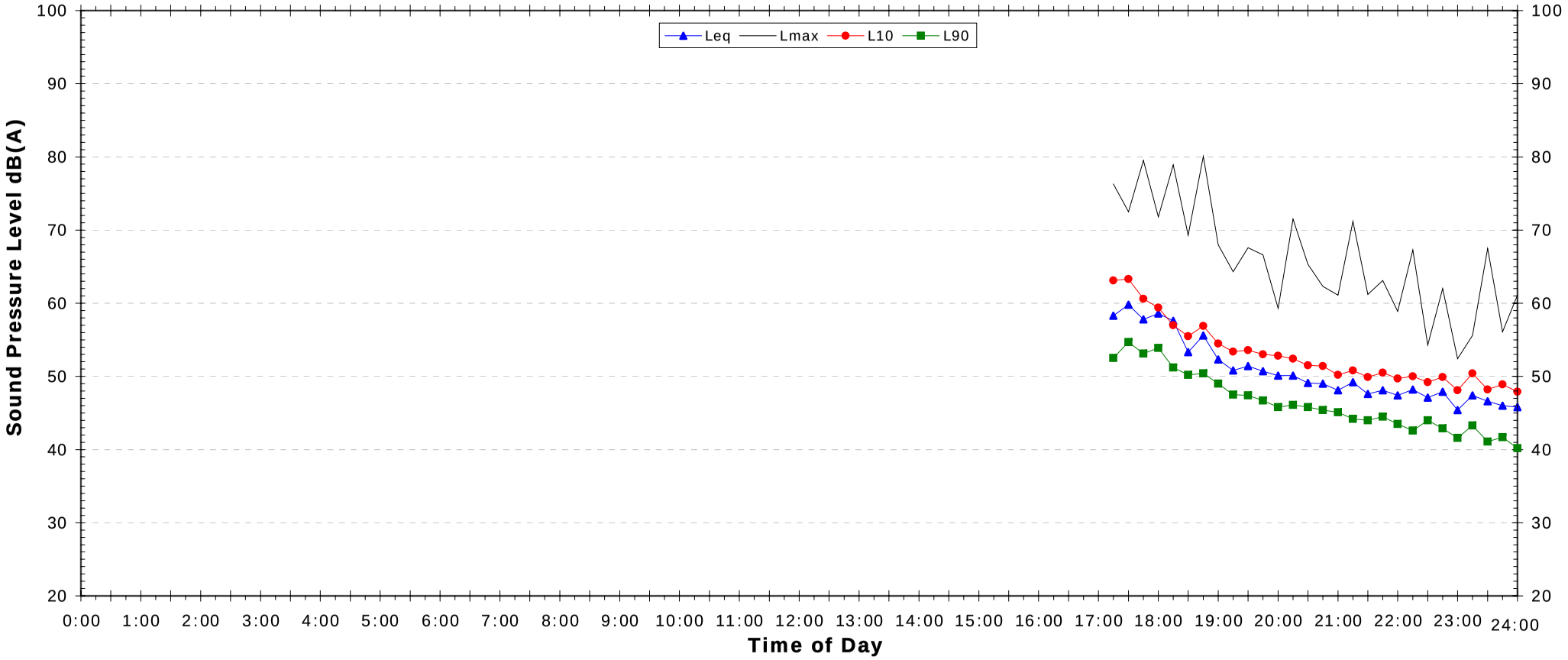
TRAFFIC NOISE MONITORING RESULTS
NSW DEC 'ENVIRONMENTAL CRITERIA FOR ROAD TRAFFIC NOISE', 1999

	L_{Aeq} Noise Levels		$L_{Aeq\ 1hr}$ Noise Levels			
Day	Day	Night	Day - Up	Day - Low	Night - Up	Night - Low
Wednesday-18-November-2009	54	49	59	48	56	46
Thursday-19-November-2009	63	52	69	48	60	44
Friday-20-November-2009	60	47	65	50	52	43
Saturday-21-November-2009	57	43	63	48	47	39
Sunday-22-November-2009	60	51	67	44	55	44
Monday-23-November-2009	56	51	60	51	56	45
Tuesday-24-November-2009	59	48	65	49	53	41
Wednesday-25-November-2009	57	49	61	51	54	45
Thursday-26-November-2009	61	52	68	51	57	41
Friday-27-November-2009	58	-	61	53	-	-
Representative Weekday	**59**	**50**	**65**	**50**	**56**	**44**
Representative Weekend	**58**	**48**	**65**	**47**	**53**	**42**
Representative Week	**59**	**50**	**65**	**50**	**56**	**44**

EXISTING AMBIENT NOISE LEVELS

Location L4 - 34 Truscott Avenue, Middleton Grange (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}	-	44.0	39.6
Leq (see note 3)	-	49.2	46.9

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 $L_{eq\ 9\ hr}$	54.3	49.4
$L_{eq\ 1hr}$ upper 10 percentile	58.7	56.1
$L_{eq\ 1hr}$ lower 10 percentile	48.1	45.6

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	66.4	to	76.7
Lmax - Leq (Range)	20.0	to	21.0

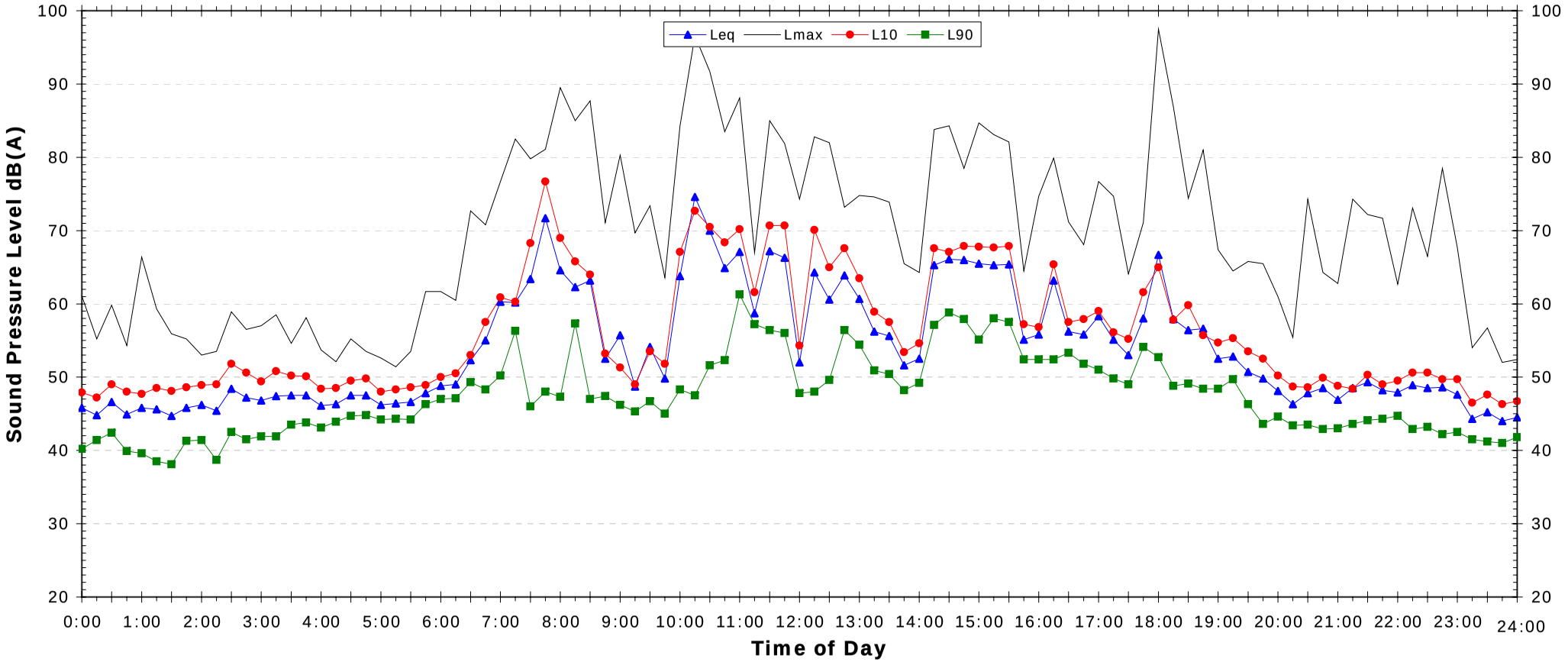
Data File: TE715-01L04 (rev 0) Logger RTA01-001.xls TE715-01L04 (rev 1) Front Yard of 34 Truscott Ave, Middleton Grange.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L4 - 34 Truscott Avenue, Middleton Grange (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}	46.7	43.0	40.1
Leq (see note 3)	62.1	49.7	49.8

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 $L_{eq\ 9\ hr}$	63.3	52.3
$L_{eq\ 1hr}$ upper 10 percentile	69.3	59.7
$L_{eq\ 1hr}$ lower 10 percentile	48.0	44.5

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	75.6	to	84.1
Lmax - Leq (Range)	17.1	to	30.1

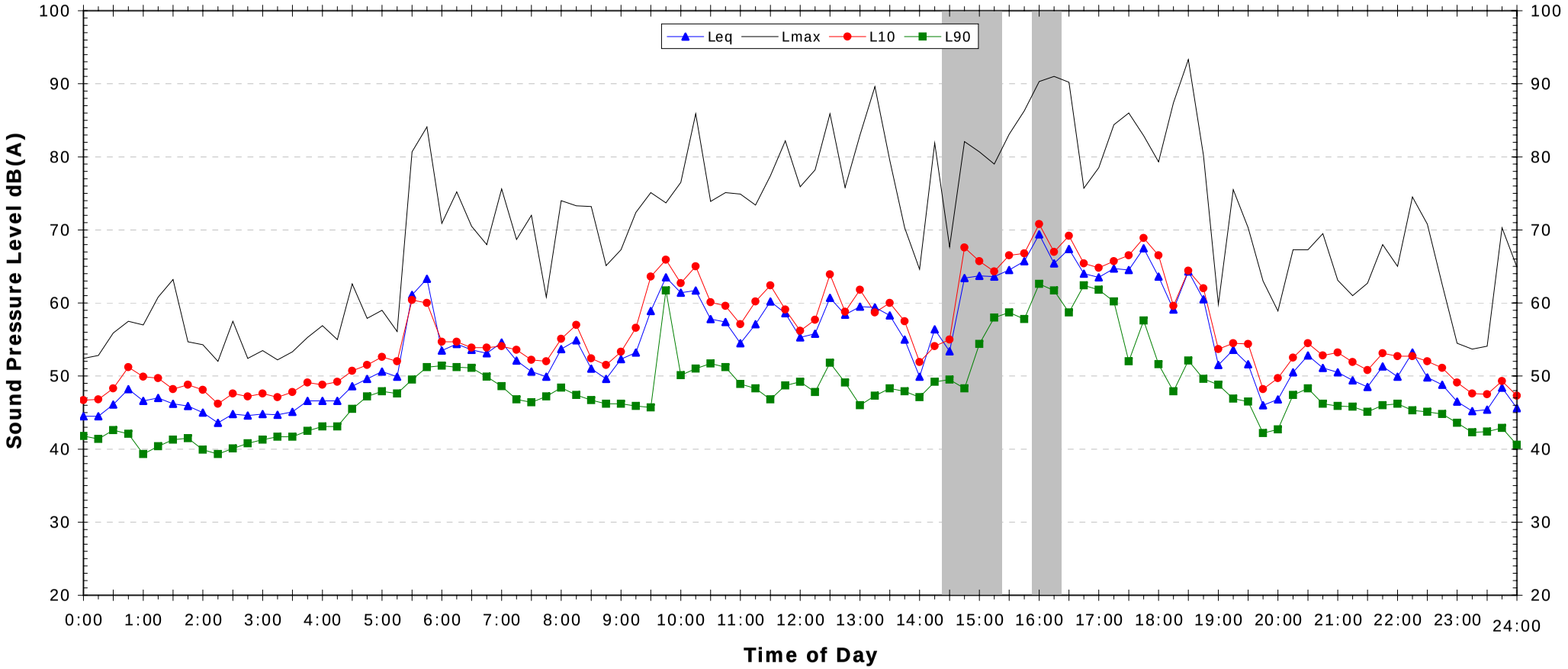
Data File: TE715-01L04 (rev 0) Logger RTA01-001.xls TE715-01L04 (rev 1) Front Yard of 34 Truscott Ave, Middleton Grange.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L4 - 34 Truscott Avenue, Middleton Grange (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}	46.2	42.7	38.3
Leq (see note 3)	58.5	53.4	44.9

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 $L_{eq\ 9\ hr}$	60.0	47.4
$L_{eq\ 1hr}$ upper 10 percentile	65.3	51.8
$L_{eq\ 1hr}$ lower 10 percentile	50.3	43.4

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	67.0	to	78.4
Lmax - Leq (Range)	18.4	to	26.6

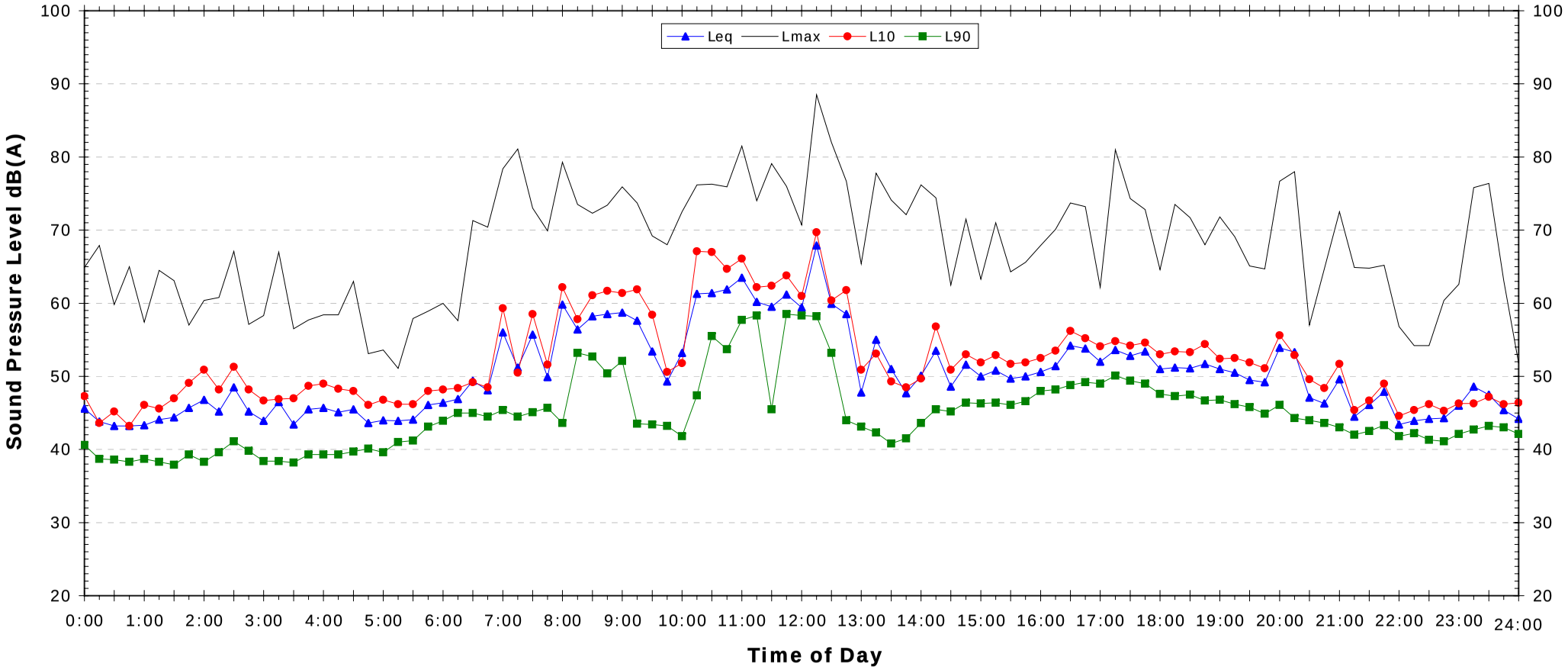
Data File: TE715-01L04 (rev 0) Logger RTA01-001.xls TE715-01L04 (rev 1) Front Yard of 34 Truscott Ave, Middleton Grange.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L4 - 34 Truscott Avenue, Middleton Grange (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}	43.1	42.0	35.6
Leq (see note 3)	55.4	47.5	40.9

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 $L_{eq\ 9\ hr}$	56.8	43.4
$L_{eq\ 1hr}$ upper 10 percentile	62.6	46.8
$L_{eq\ 1hr}$ lower 10 percentile	48.4	38.9

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	72.2	to	76.4
Lmax - Leq (Range)	16.2	to	30.3

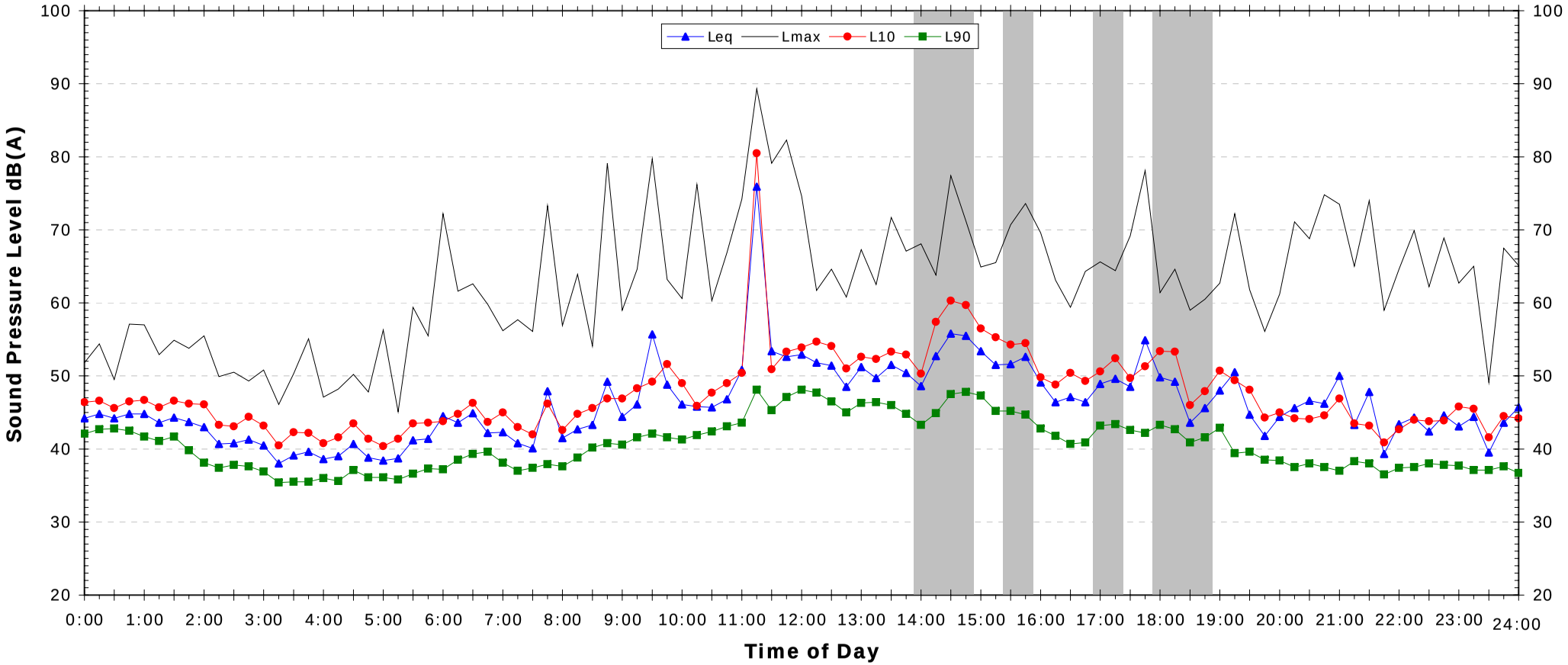
Data File: TE715-01L04 (rev 0) Logger RTA01-001.xls TE715-01L04 (rev 1) Front Yard of 34 Truscott Ave, Middleton Grange.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L4 - 34 Truscott Avenue, Middleton Grange (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 $L_{eq\ 9\ hr}$	59.5	50.6
$L_{eq\ 1hr}$ upper 10 percentile	67.0	55.0
$L_{eq\ 1hr}$ lower 10 percentile	44.2	43.7

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	67.5	to	74.3
Lmax - Leq (Range)	17.7	to	26.2

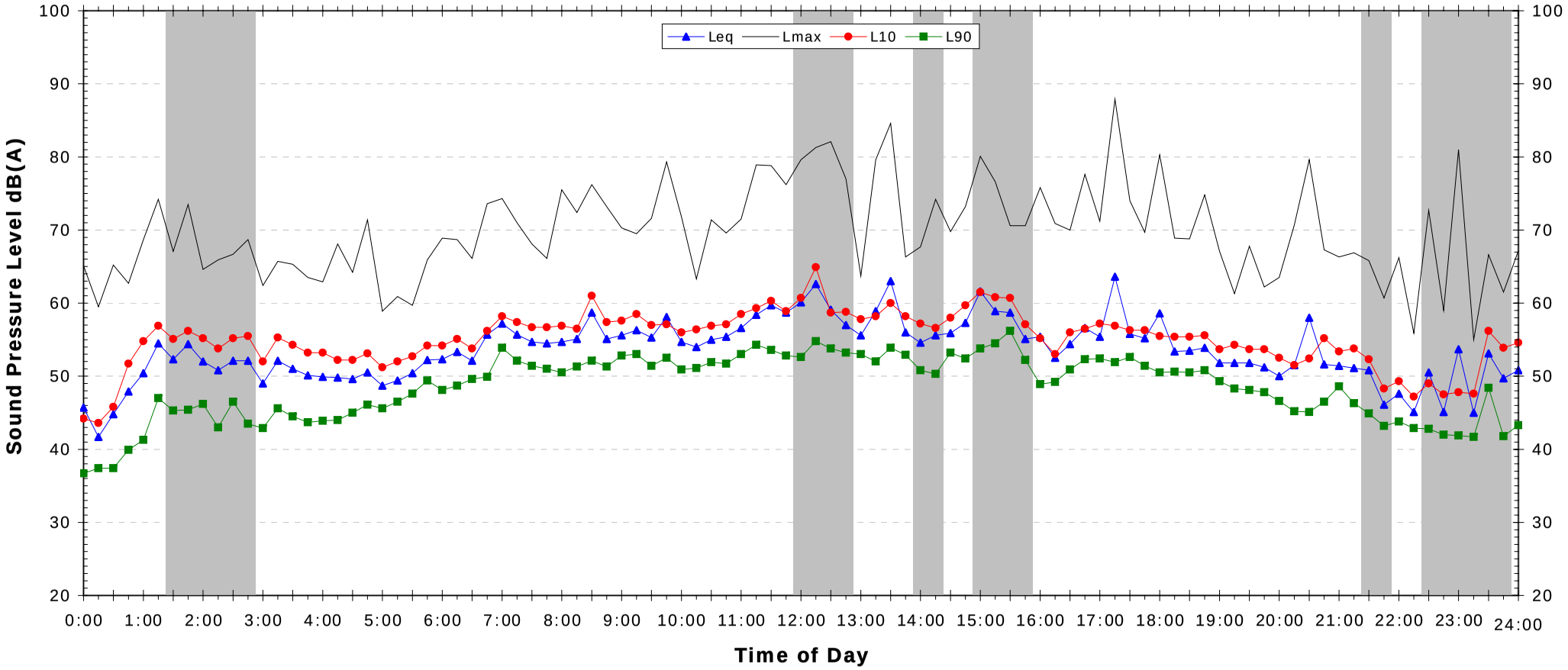
Data File: TE715-01L04 (rev 0) Logger RTA01-001.xls TE715-01L04 (rev 1) Front Yard of 34 Truscott Ave, Middleton Grange.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L4 - 34 Truscott Avenue, Middleton Grange (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}	-	45.1	-
Leq (see note 3)	-	50.2	-

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 $L_{eq\ 9\ hr}$	56.4	51.0
$L_{eq\ 1hr}$ upper 10 percentile	60.0	56.4
$L_{eq\ 1hr}$ lower 10 percentile	50.5	45.1

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	67.2	to	79.1
Lmax - Leq (Range)	16.4	to	22.7

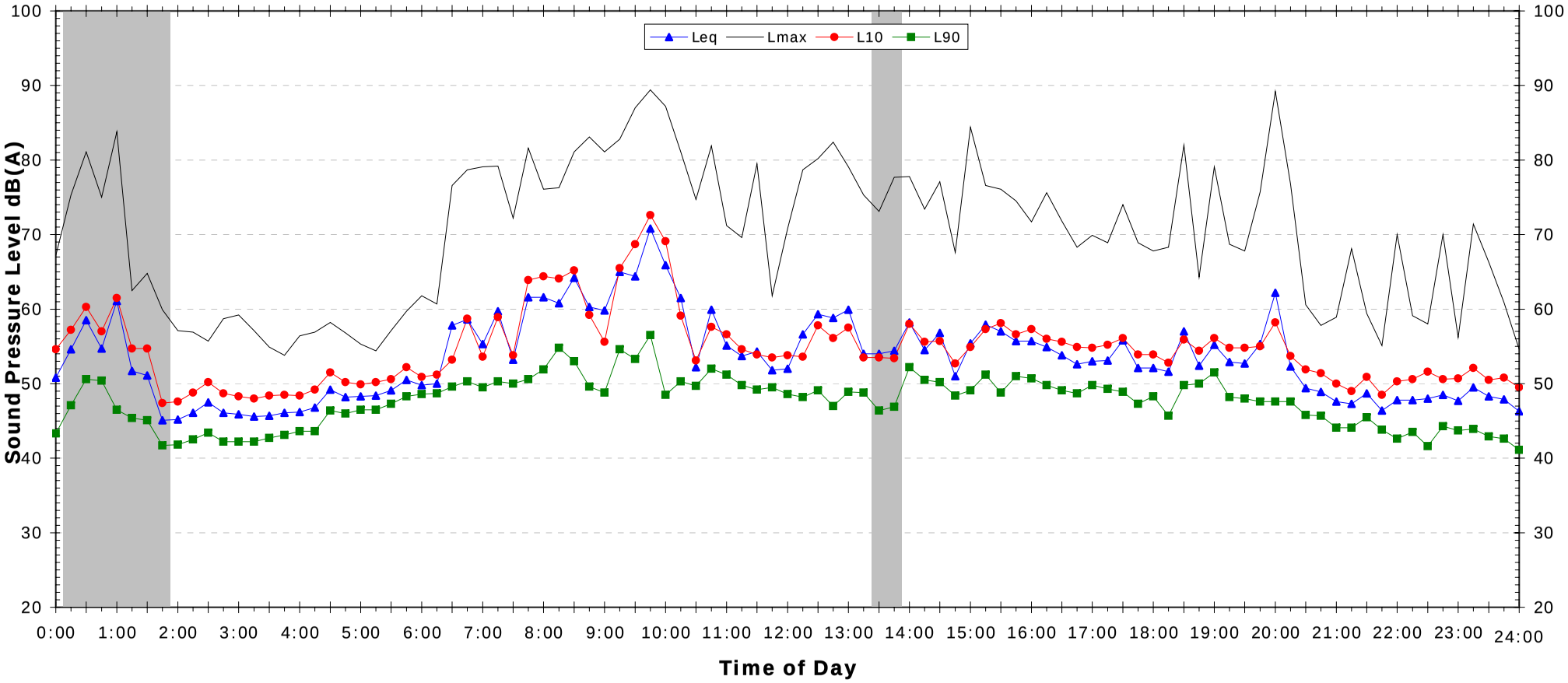
Data File: TE715-01L04 (rev 0) Logger RTA01-001.xls TE715-01L04 (rev 1) Front Yard of 34 Truscott Ave, Middleton Grange.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L4 - 34 Truscott Avenue, Middleton Grange (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}	48.4	43.8	36.8
Leq (see note 3)	57.7	51.6	45.3

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 $L_{eq\ 9\ hr}$	59.2	47.8
$L_{eq\ 1hr}$ upper 10 percentile	65.4	53.2
$L_{eq\ 1hr}$ lower 10 percentile	48.9	40.8

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	65.3	to	75.5
Lmax - Leq (Range)	15.8	to	23.3

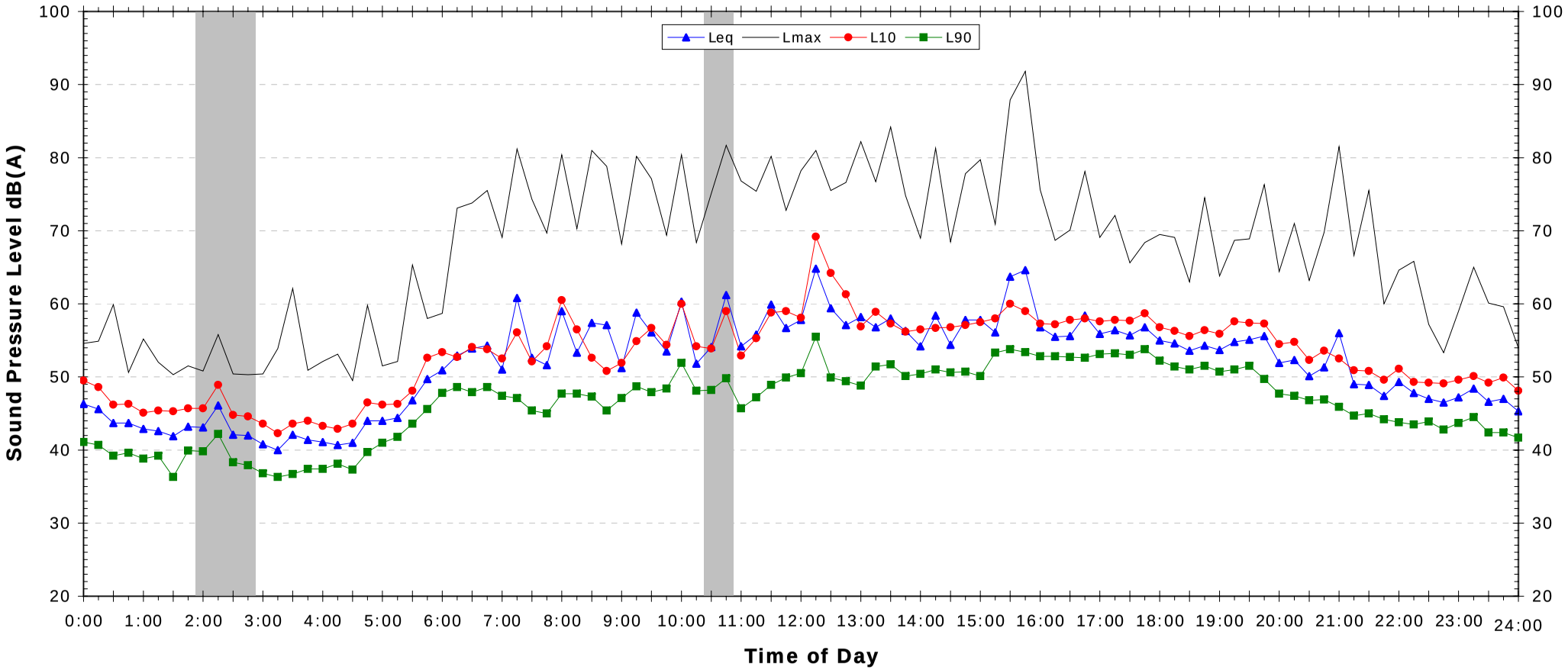
Data File: TE715-01L04 (rev 0) Logger RTA01-001.xls TE715-01L04 (rev 1) Front Yard of 34 Truscott Ave, Middleton Grange.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L4 - 34 Truscott Avenue, Middleton Grange (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}	47.1	44.2	38.9
Leq (see note 3)	55.7	50.6	46.3

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 $L_{eq\ 9\ hr}$	57.3	48.8
$L_{eq\ 1hr}$ upper 10 percentile	61.5	53.9
$L_{eq\ 1hr}$ lower 10 percentile	51.4	44.7

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	65.0	to	82.8
Lmax - Leq (Range)	18.0	to	28.9

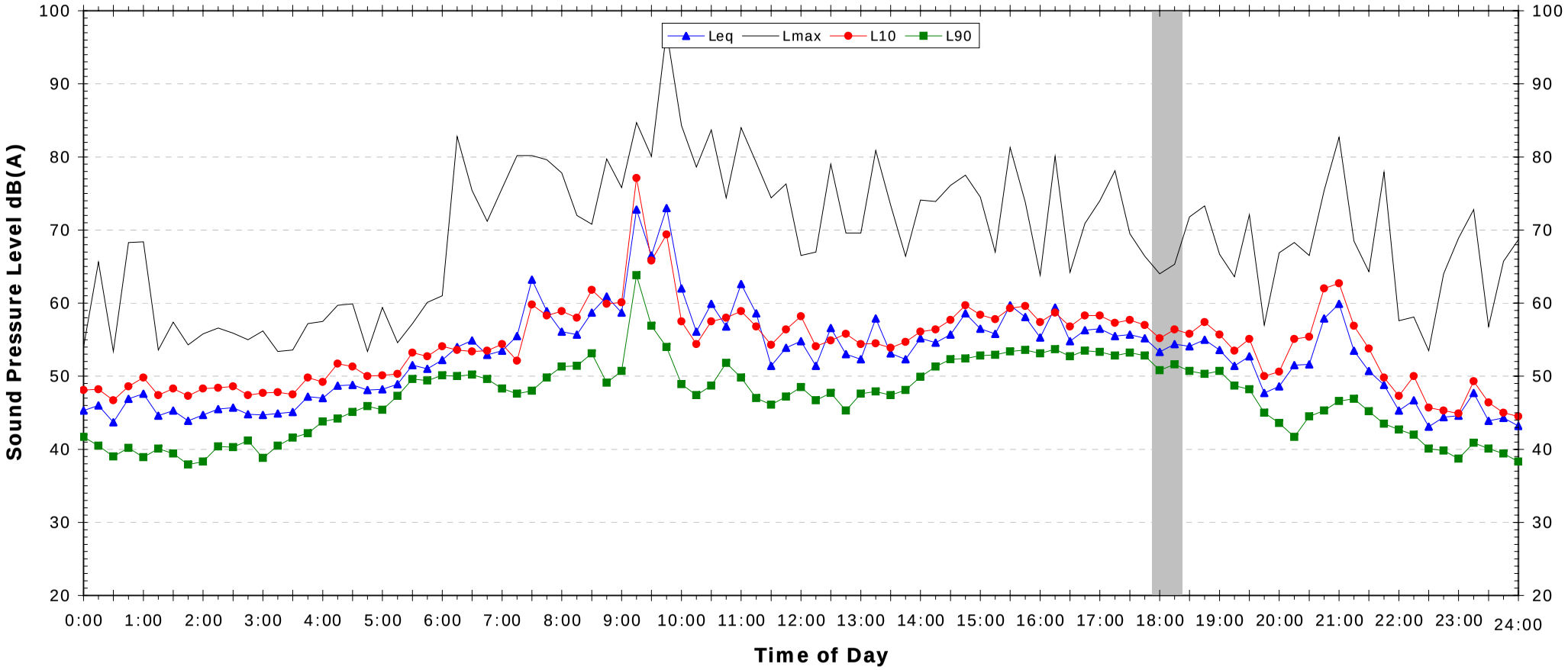
Data File: TE715-01L04 (rev 0) Logger RTA01-001.xls TE715-01L04 (rev 1) Front Yard of 34 Truscott Ave, Middleton Grange.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L4 - 34 Truscott Avenue, Middleton Grange (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}	47.2	42.7	37.2
Leq (see note 3)	59.4	51.3	49.0

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 $L_{eq\ 9\ hr}$	60.8	51.5
$L_{eq\ 1hr}$ upper 10 percentile	67.8	57.4
$L_{eq\ 1hr}$ lower 10 percentile	50.5	41.1

Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	66.0	to	81.1
Lmax - Leq (Range)	20.0	to	29.4

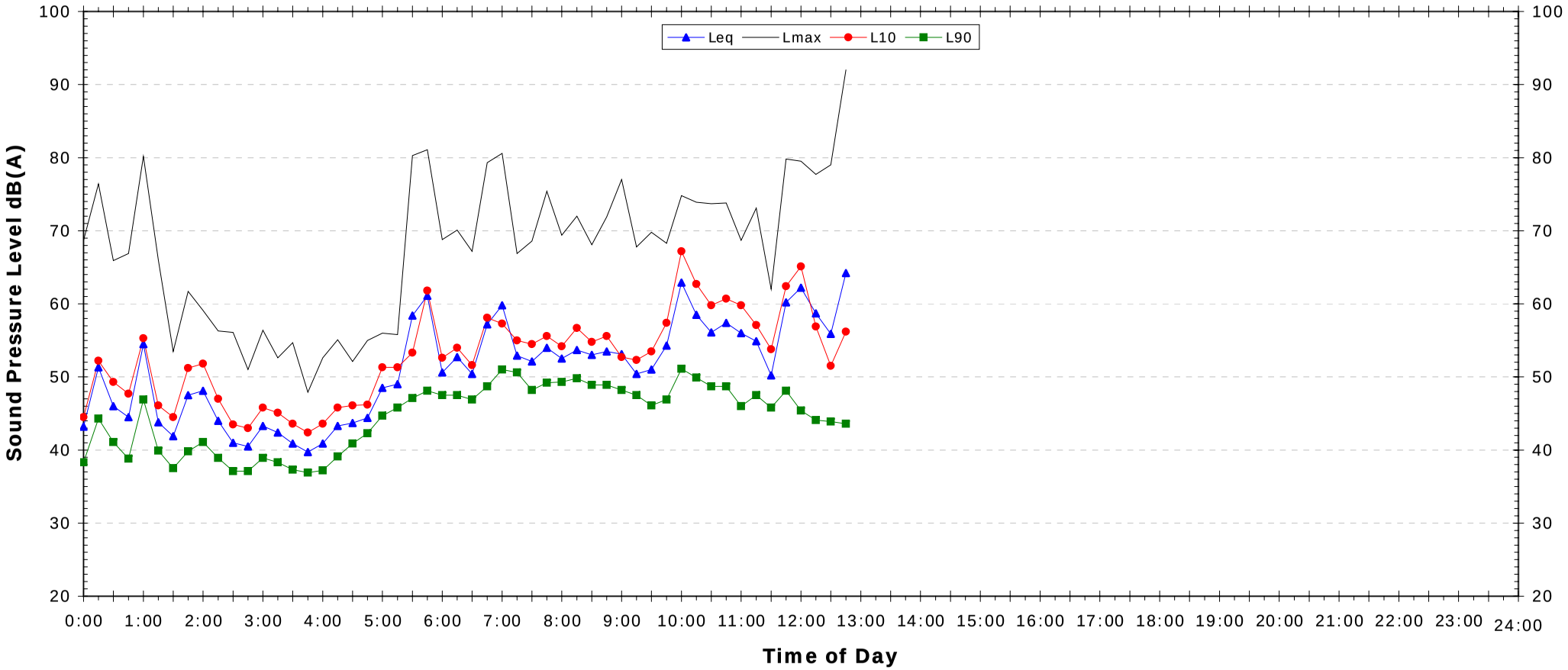
Data File: TE715-01L04 (rev 0) Logger RTA01-001.xls TE715-01L04 (rev 1) Front Yard of 34 Truscott Ave, Middleton Grange.xls

Template QTT-01 (rev 55) Logger Graphs

EXISTING AMBIENT NOISE LEVELS

Location L4 - 34 Truscott Avenue, Middleton Grange (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 $L_{eq\ 9\ hr}$	57.5	-
$L_{eq\ 1hr}$ upper 10 percentile	61.0	-
$L_{eq\ 1hr}$ lower 10 percentile	52.9	-

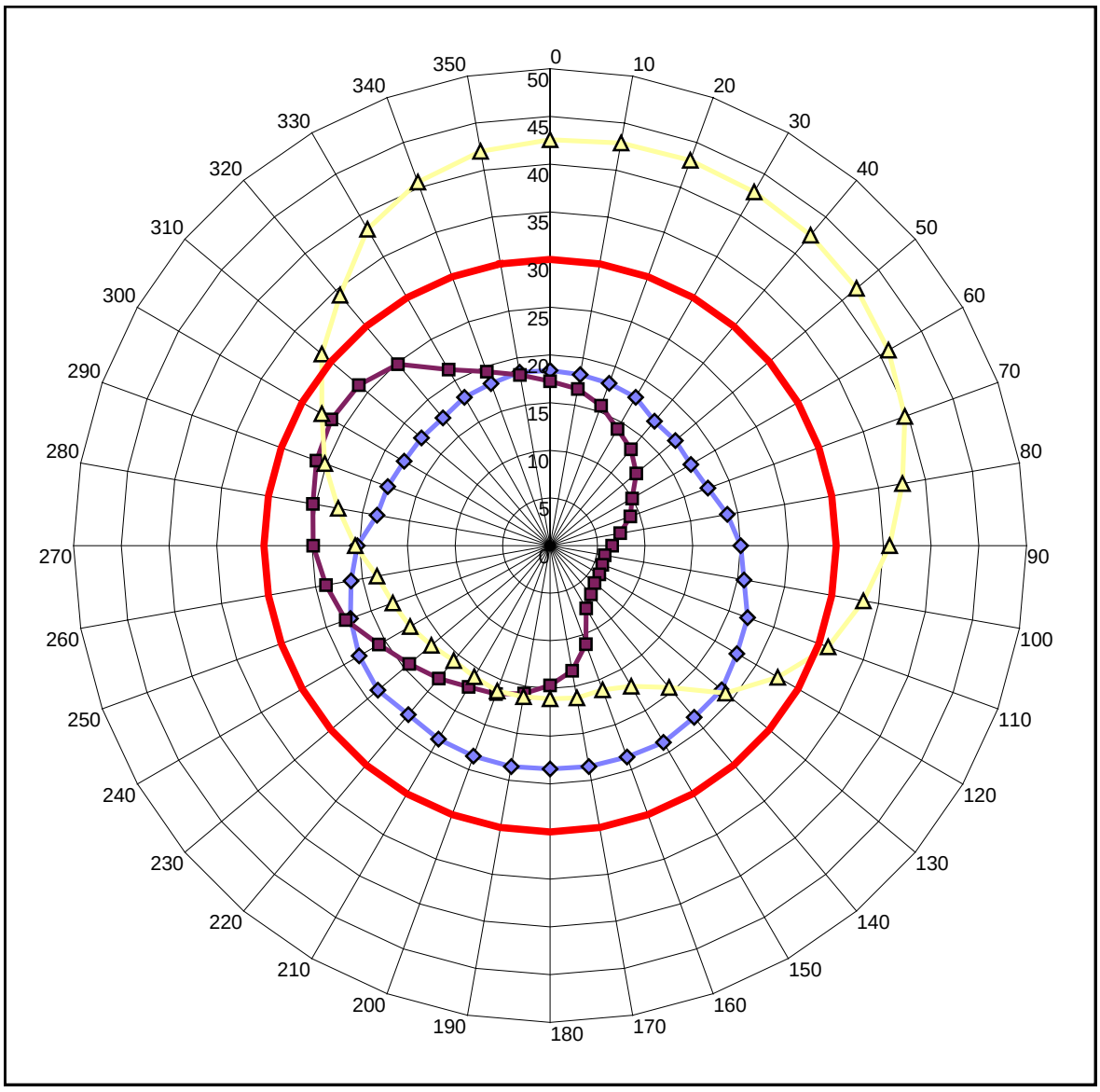
Night Time Maximum Noise Levels			(see note 4)
Lmax (Range)	-	to	-
Lmax - Leq (Range)	-	to	-

Data File: TE715-01L04 (rev 0) Logger RTA01-001.xls TE715-01L04 (rev 1) Front Yard of 34 Truscott Ave, Middleton Grange.xls

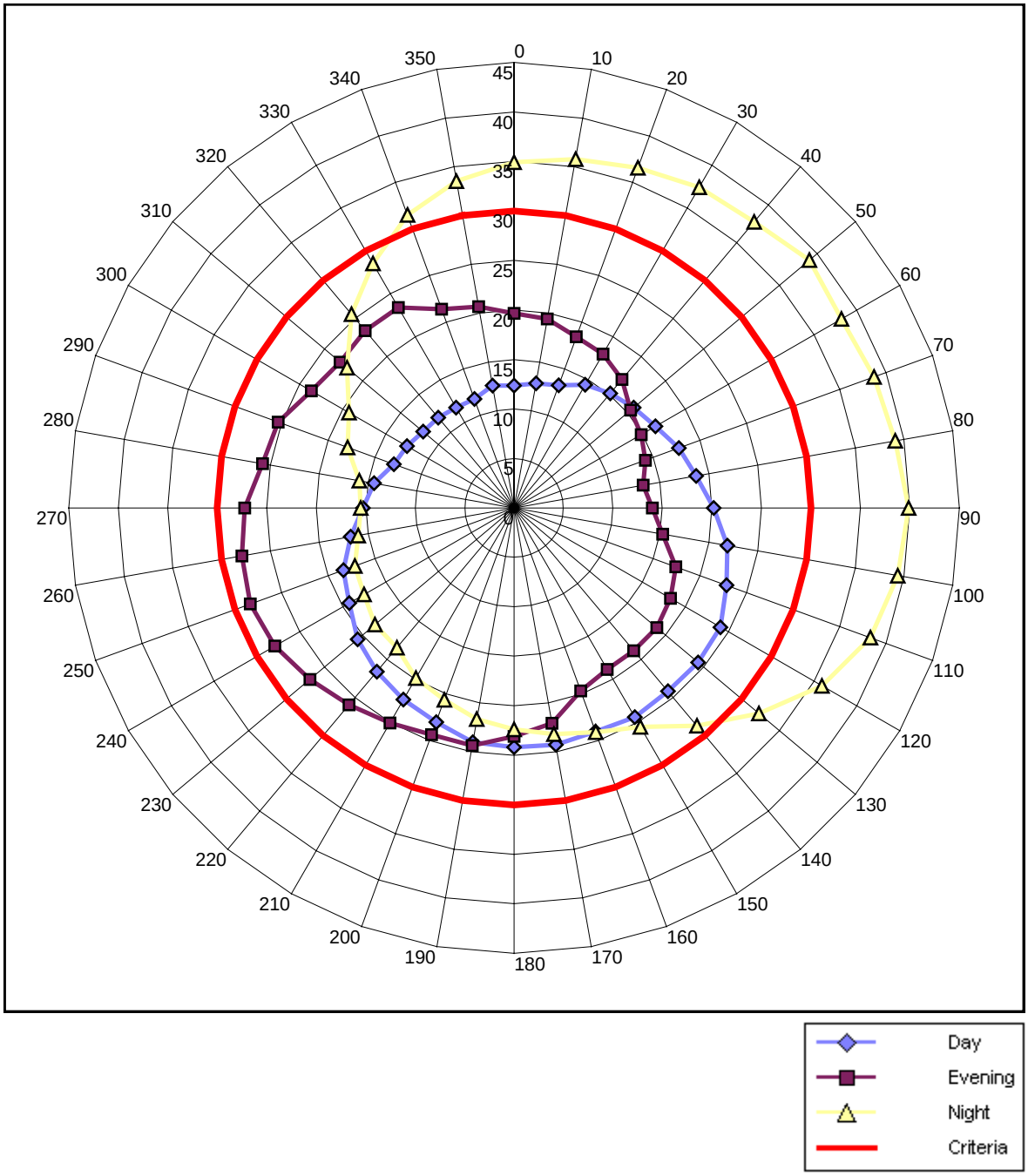
Template QTT-01 (rev 55) Logger Graphs

APPENDIX E - WIND EFFECTS ANALYSIS

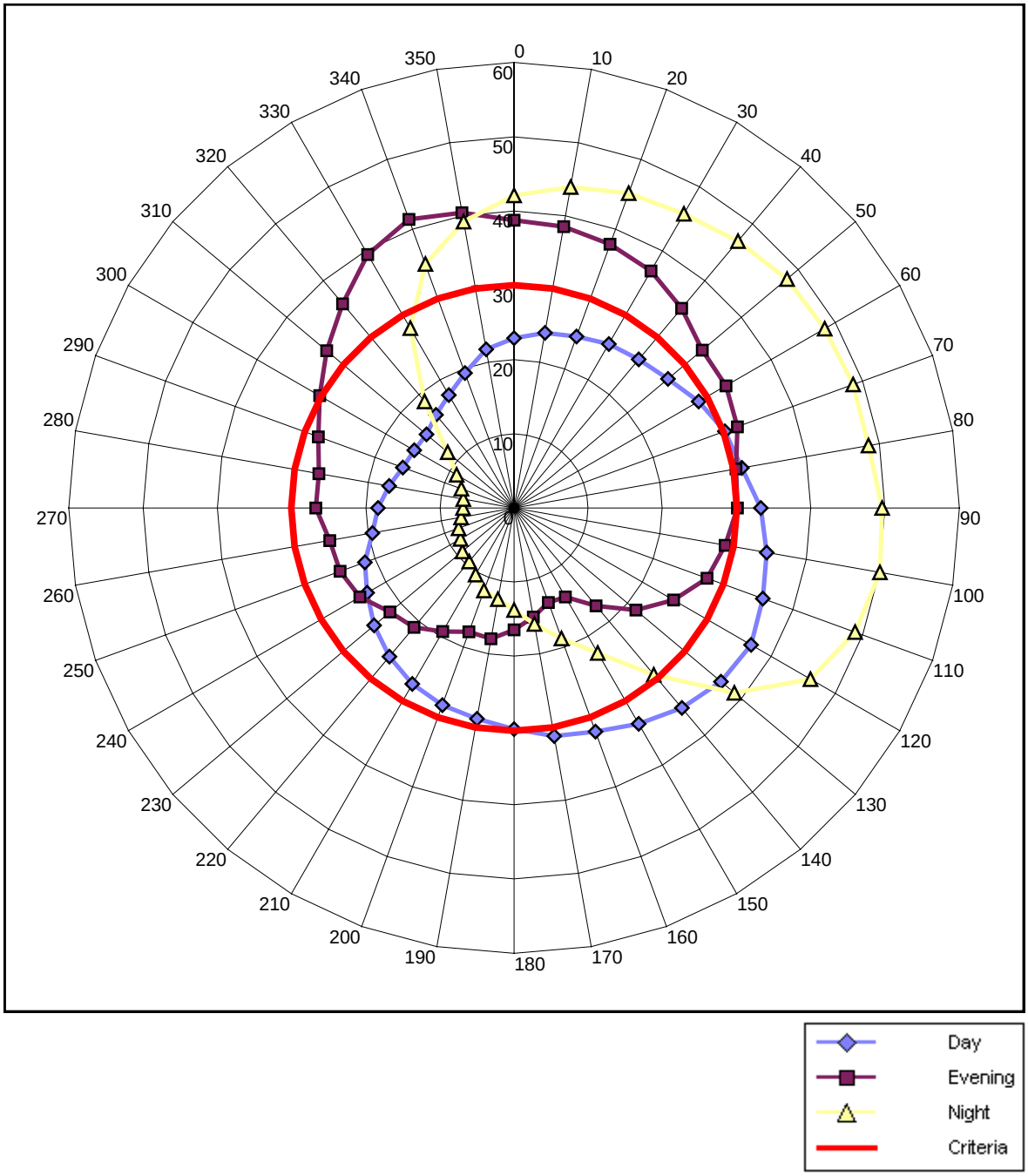
Wind Analysis Results - Summer



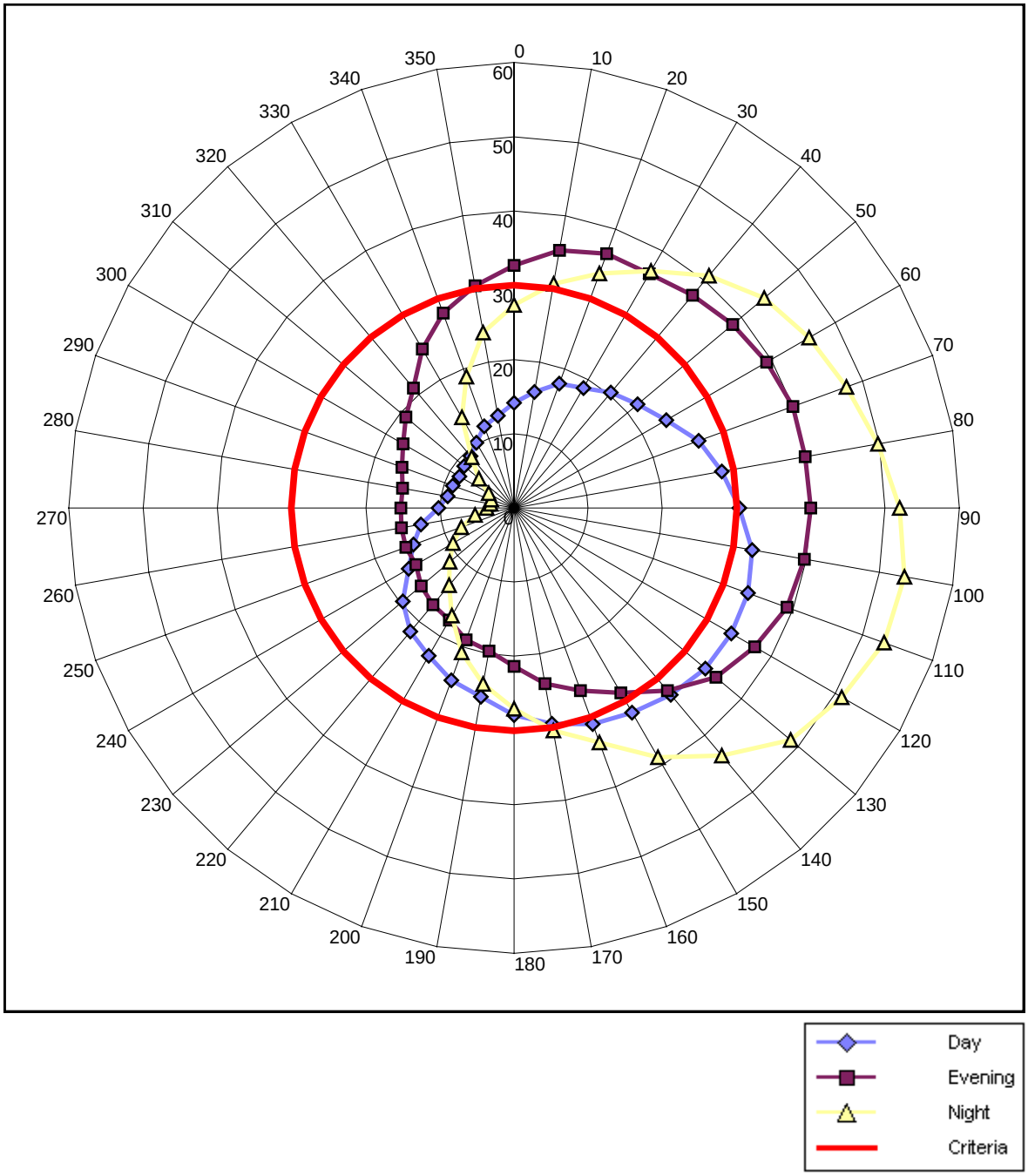
Wind Analysis Results - Spring



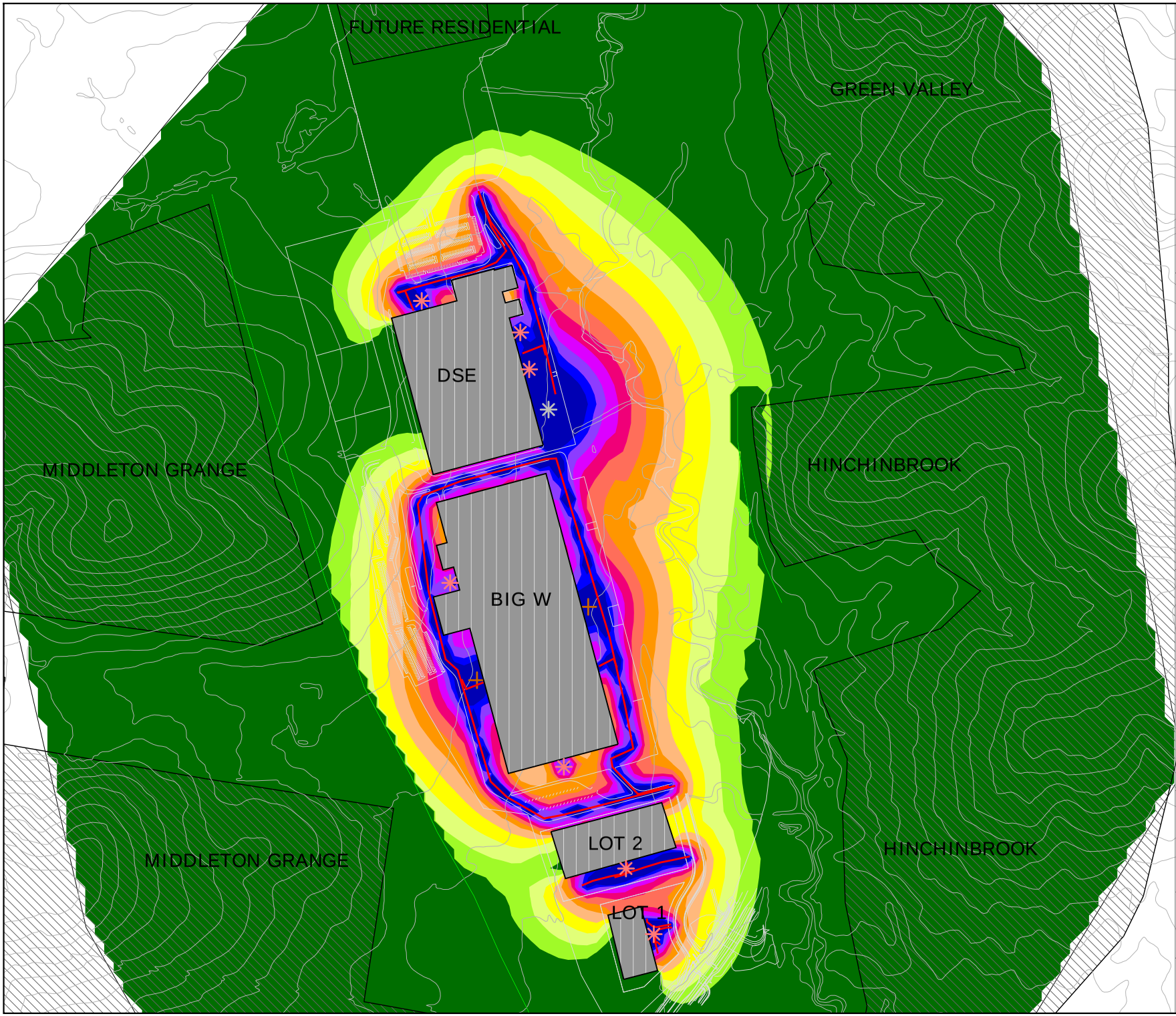
Wind Analysis Results - Autumn



Wind Analysis Results - Winter



APPENDIX F - SOUNDPLAN NOISE MODELLING OUTPUTS



Noise Levels - dB(A)

60 <	<= 60
58 <	<= 58
56 <	<= 56
54 <	<= 54
52 <	<= 52
50 <	<= 50
48 <	<= 48
46 <	<= 46
44 <	<= 44
42 <	<= 42
40 <	<= 40

Legend:

- Distribution Centre
- Residential Area
- Container Handler
- Forklift
- Refrigerated Truck

N

Scale: 1:8000

0 37.5 75 150 225 300 m

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 Airport Redevelopment

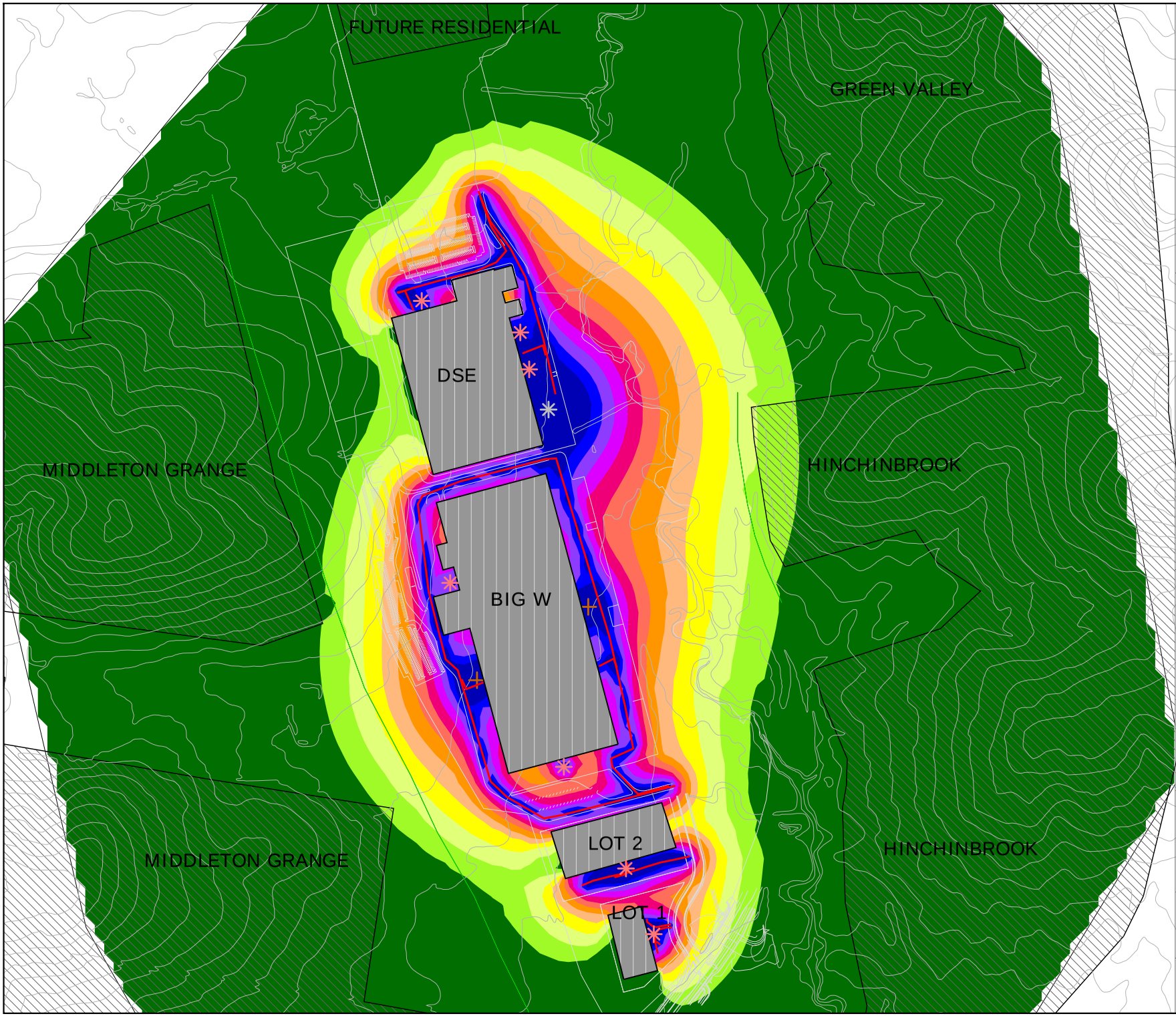
Description:

LAeq Nighttime
1.5m Above Ground
Neutral Weather

Date:

16/02/2010

Description:	Figure:	Rev:
TE715-01	P01	2



Noise Levels - dB(A)

60 <	<= 60
58 <	<= 58
56 <	<= 56
54 <	<= 54
52 <	<= 52
50 <	<= 50
48 <	<= 48
46 <	<= 46
44 <	<= 44
42 <	<= 42
40 <	<= 40

Legend:

- Distribution Centre
- Residential Area
- Container Handler
- Forklift
- Refrigerated Truck

N

Scale: 1:8000

0 37.5 75 150 225 300 m

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 Airport Redevelopment

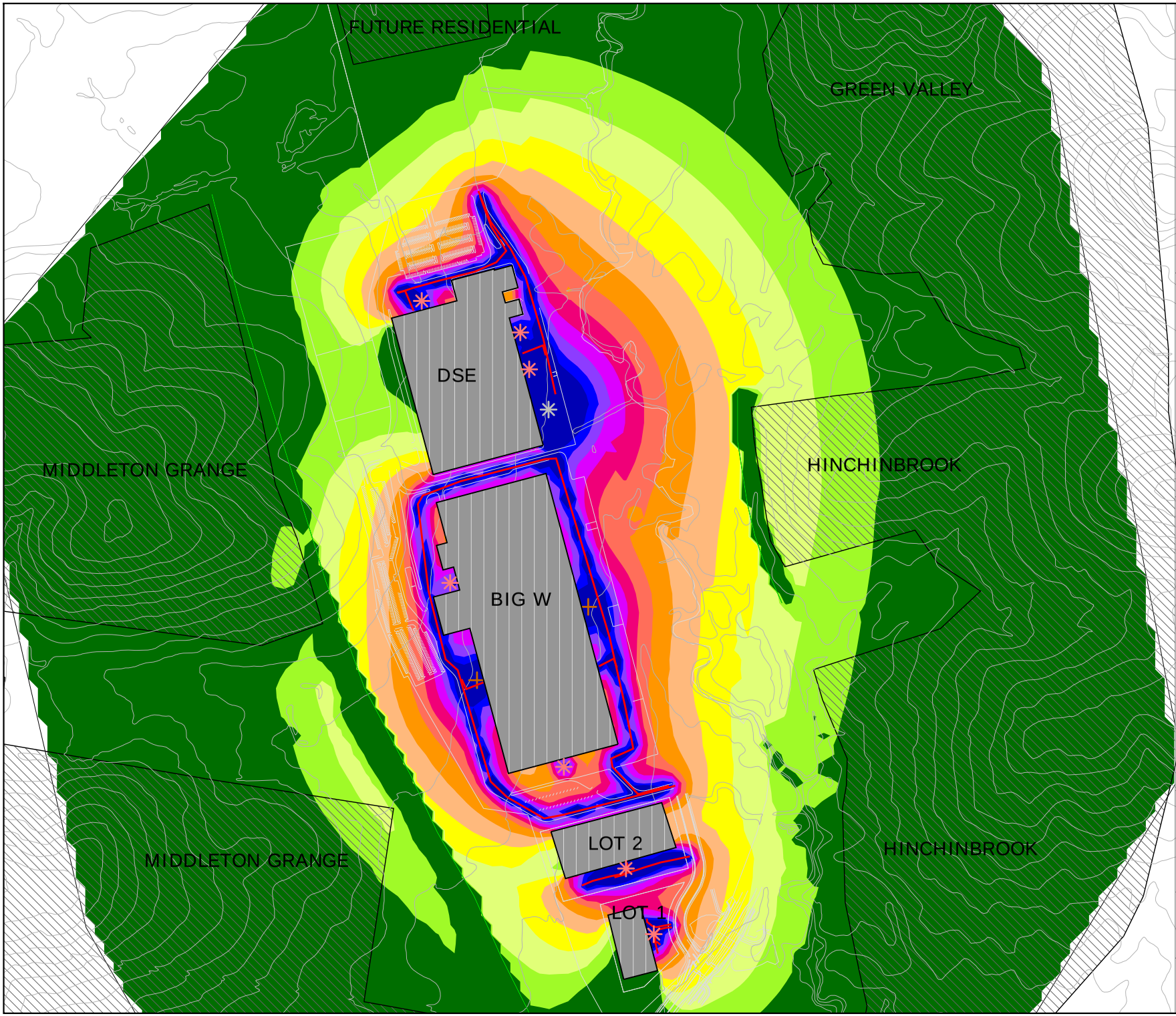
Description:

LAeq Nighttime
4.5m Above Ground
Neutral Weather

Date:

16/02/2010

Description:	Figure:	Rev:
TE715-01	P02	2



Noise Levels - dB(A)

60 <	<= 60
58 <	<= 58
56 <	<= 56
54 <	<= 54
52 <	<= 52
50 <	<= 50
48 <	<= 48
46 <	<= 46
44 <	<= 44
42 <	<= 42
40 <	<= 40

Legend:

- Distribution Centre
- Residential Area
- Container Handler
- Forklift
- Refrigerated Truck

N

Scale: 1:8000

0 37.5 75 150 225 300 m

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 Airport Redevelopment

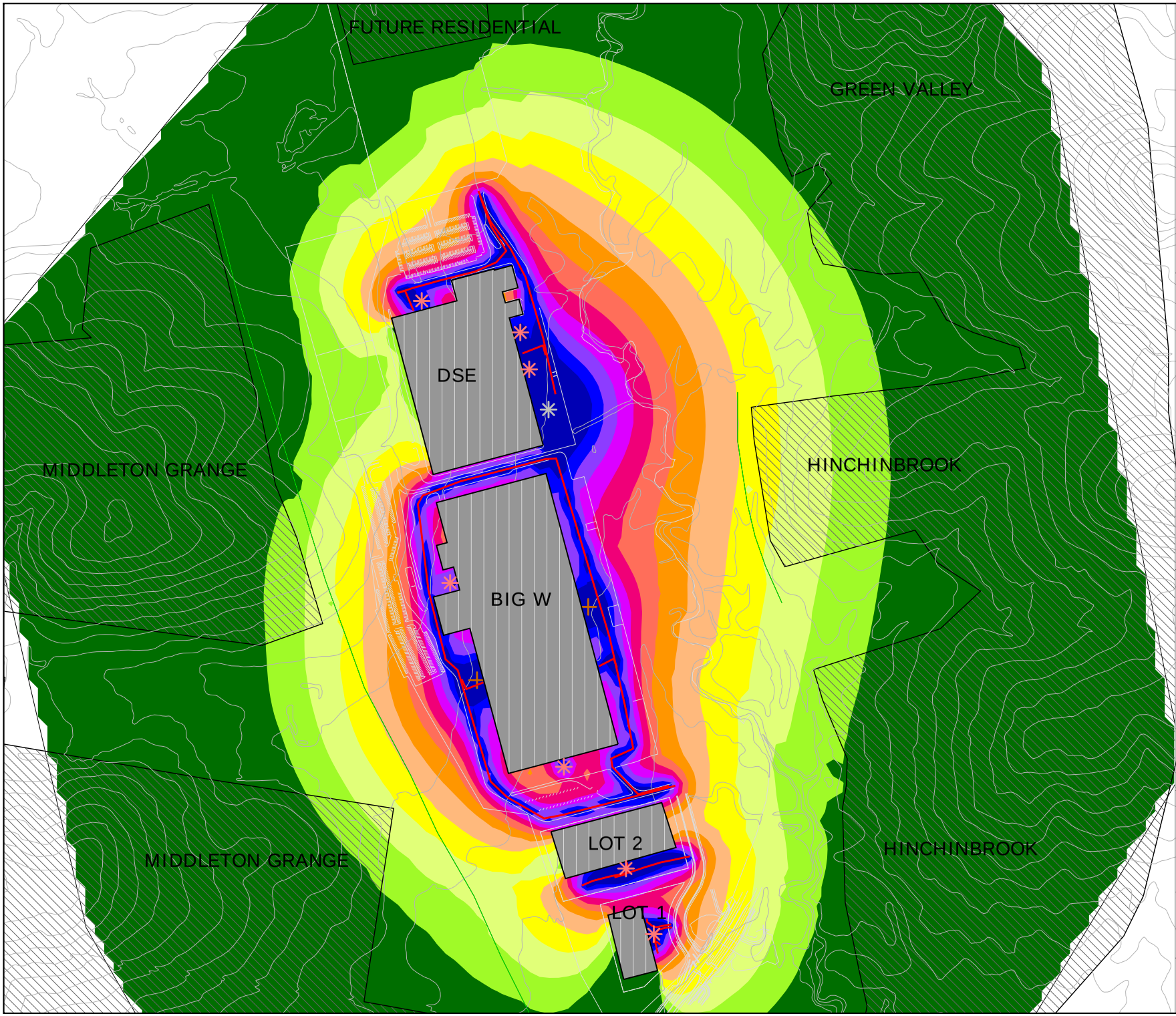
Description:

LAeq Nighttime
1.5m Above Ground
3m/s Wind

Date:

16/02/2010

Description:	Figure:	Rev:
TE715-01	P03	2



Noise Levels - dB(A)

60 <	<= 60
58 <	<= 58
56 <	<= 56
54 <	<= 54
52 <	<= 52
50 <	<= 50
48 <	<= 48
46 <	<= 46
44 <	<= 44
42 <	<= 42
40 <	<= 40

Legend:

- Distribution Centre
- Residential Area
- Container Handler
- Forklift
- Refrigerated Truck

N

Scale: 1:8000

0 37.5 75 150 225 300 m

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 Airport Redevelopment

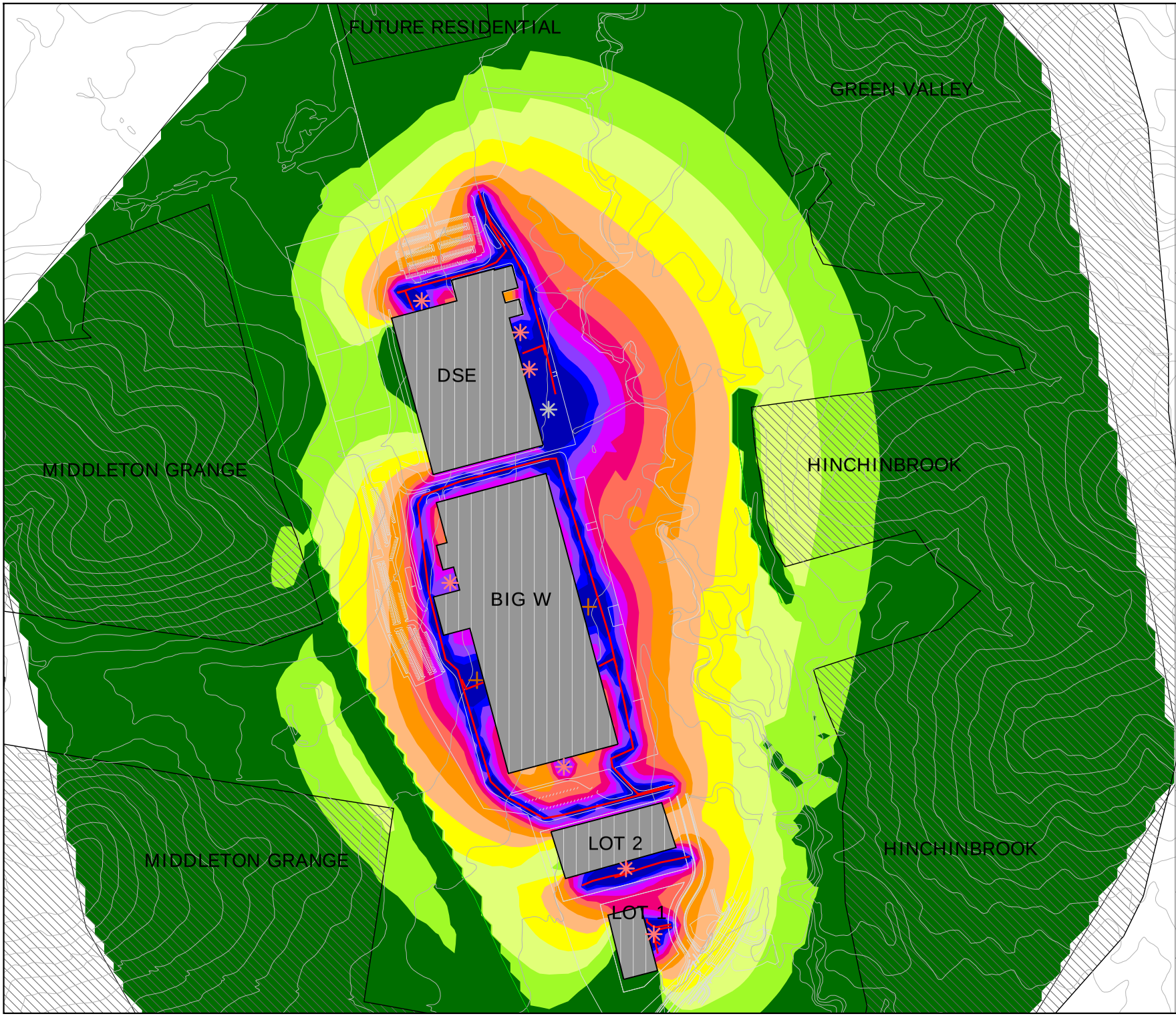
Description:

LAeq Nighttime
4.5m Above Ground
3m/s Wind

Date:

16/02/2010

Description:	Figure:	Rev:
TE715-01	P04	2



Noise Levels - dB(A)

60 <	<= 60
58 <	<= 58
56 <	<= 56
54 <	<= 54
52 <	<= 52
50 <	<= 50
48 <	<= 48
46 <	<= 46
44 <	<= 44
42 <	<= 42
40 <	<= 40

Legend:

- Distribution Centre
- Residential Area
- Container Handler
- Forklift
- Refrigerated Truck

N

Scale: 1:8000

0 37.5 75 150 225 300 m

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 Airport Redevelopment

Description:

LAeq Nighttime
1.5m Above Ground
Temperature Inversion

Date:

16/02/2010

Description:	Figure:	Rev:
TE715-01	P05	2

RENZO TONIN & ASSOCIATES
inspired to achieve

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

TE715-01F07 (rev 1) Table of Predictions and Criteria.doc

1 March 2010

Mr Adrian Checchin

Mirvac

Level 26, 60 Margaret Street

Sydney NSW 2000

Dear Sir

RE: FORMER HOXTON PARK AIRPORT – NOISE PREDICTION RESULTS

Renzo Tonin & Associates was requested by the Department of Planning to provide additonal information (with reference to acoustic report TE715-01F06 (rev 0) Acoustic Assessment Report) to assist in the assessment of the proposed distribution facilities at the former Hoxton Park Airport site. It was requested to provide a summary table of operational noise predictions for three of the critical receiver locations identified in the aforementioned report. These were confirmed by the Department of Planning to be two in Hinchinbrook and one in Middleton Grange. Table 1 below sets out the noise prediction results for the adverse weather conditions only (as requested) being comparable for the 3m/s source to receiver wind and F-Class Temperature Inversion with 2m/s drainage flow.

Table 1 - Noise Prediction and Assessment Results

Location	Predicted Noise Levels Under Adverse Met Conditions^		Noise Criteria					
			Intrusiveness Criteria# $L_{Aeq,15min}$			Amenity Criteria $L_{Aeq,period}$		
	Day	Evening / Night	Day	Evening	Night	Day	Evening	Night
Level 1 - 31A Rottnest Avenue, Hinchinbrook	46	45	47	48	44	55	45	45*
Ground Level - 23 Ward Place, Hinchinbrook	43	41	47	48	44	55	45	45*
Hemsworth Avenue, Middleton Grange	44	42	52	48	43	55	45	40

Notes: *- All residential locations have been categorised as 'Suburban'.*
** - Corrected for 2016 traffic noise levels*
^ - Predictions for both $L_{Aeq,15minute}$ and $L_{Aeq,Period}$
 # - Intrusive noise criteria established from background noise levels under neutral weather conditions

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We trust that the information in Table 1 satisfies the requirements of the Department of Planning, however should any further information be required please do not hesitate to contact the under signed.

Yours faithfully,

RENZO TONIN & ASSOCIATES (NSW) PTY LTD

Glenn Wheatley

Team Leader / Supervising Engineer

Environmental Acoustics Team