Appendix 11

Acoustic Impact Assessment

ACOUSTICS AND AIR

MOOREBANK RECYCLING FACILITY

NOISE IMPACT ASSESSMENT

REPORT NO. 03124-DA
VERSION C

WILKINSON MURRAY

MOOREBANK RECYCLING FACILITY

NOISE IMPACT ASSESSMENT

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PREPARED FOR

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1 INTRODUCTION

Wilkinson Murray has been engaged by Moorebank Recyclers Pty Ltd to prepare an Environmental Assessment (EA) with regard to a proposed recycling facility at *Lot 6 DP 1065574 Newbridge Road, Moorebank*. The site is to be developed into a recycling facility which will cater for building and construction waste from the Sydney metropolitan area. It is intended that the proposed facility will cater for approximately 500,000 tonnes per annum of building and construction waste.

This report provides an assessment of potential noise impacts from the proposed establishment, associated haulage activities and construction of mitigation measures, using guidelines from the NSW Department of Environment, Climate Change & Water (DECCW) including the *Industrial Noise Policy (INP)*, *Environmental Criteria for Road Traffic Noise (ECRTN)* and *Environmental Noise Control Manual (ENCM)*. Ameliorative measures are recommended where necessary to ensure that appropriate noise criteria would be met.

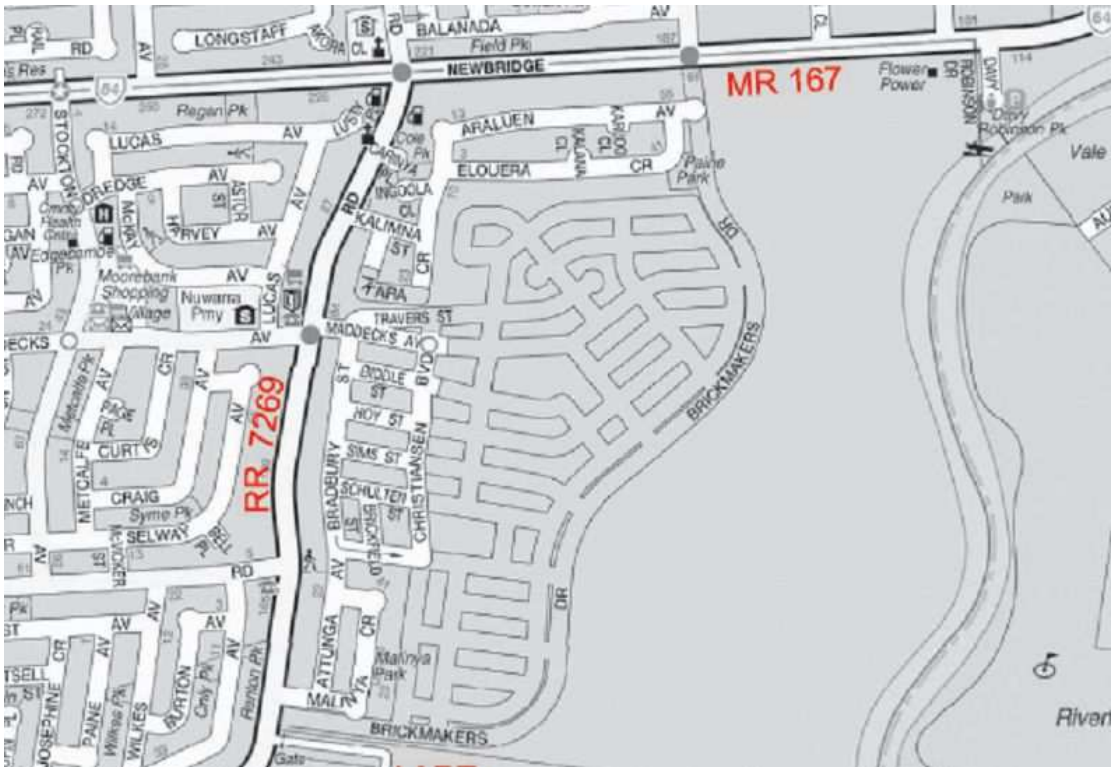
2 SITE DESCRIPTION & PROPOSED OPERATION

The site is bounded to the north by the current Benedict sand extraction and waste recycling operation (which is referred to as the Tanlane site in this report and is proposed for redevelopment, to the east by some bushland (owned by Moorebank Recyclers) then the Georges River with a passive recreation area (Vale of Ash Reserve) and the Riverland Golf Course across the river, to the south by New Brighton Golf Course and to the west by the "Boral" site which is currently being redeveloped with residential. Within the Boral site, it is proposed that the eastern part of the site will remain as vegetation/bush with Brickmakers Drive (recently completed) which extends from Governor Macquarie Drive at the intersection of Newbridge Road, through to Nuwarra Road. The new "Boral" residential development will be on the western side of Brickmakers Drive. Figure 2-1 presents a locality map and Figures 2-2 and 2-3 show the proposed residential developments.

Figure 2-1 Locality Map

Figure 2-2 Indicative Tanlane Site Layout

Figure 2-3 Indicative Boral Site Layout



The proposed site is large in comparison to the area required for recycling operations. It is proposed that recycling operations will occur in the northern portion. The operation typically includes the delivery of raw materials by trucks, loading of raw materials by excavator into the crusher, crushing, and loading of crushed material to trucks using a front end loader. Crushing activities will occur within a building with only mobile plant outside. In addition, a 4m high earth mound will be constructed around the perimeter of the site to provide shielding to residences for the entire operation. This part of the project is already approved pursuant to development consent No.1417/2005.

The proposed operating hours are 7.00am-6.00pm, Monday to Saturday.

3 EXISTING NOISE ENVIRONMENT

3.1 Unattended Noise Monitoring

Existing ambient noise levels were monitored at three residences, as shown in Figure 3-1, between Tuesday, 20 February and Monday, 5 March 2007. Although some time has lapsed this data is still considered relevant. The monitoring locations are as follows:

- Residence 1 37 Malinya Crescent, Moorebank;
- Residence 2 26 Elouera Crescent, Moorebank; and
- Residence 3 41 Martin Crescent, Milperra.

The unattended noise monitoring equipment used consisted of environmental noise loggers set to A-weighted, fast response, continuously monitoring over 15-minute sampling periods. This equipment is capable of remotely monitoring and storing noise level descriptors for later detailed analysis. The equipment calibration was checked before and after the survey and no significant drift occurred

Figure 3-1 Unattended Noise Monitoring Locations and Prediction Locations

The logger determines L_{A1}, L_{A10}, L_{A90} and L_{Aeq} levels of the ambient noise. L_{A1}, L_{A10} and L_{A90} are the levels exceeded for 1%, 10% and 90% of the sample time respectively. L_{Aeq} represents the average noise energy during a measurement period.

Times when there was rainfall or wind speeds above 5m/s were excluded in accordance with the *INP*. Detailed results of the noise monitoring are shown graphically in Appendix B.

Background noise levels may be expressed in terms of the Rating Background Level (RBL), a standard measure of background noise which is used in the *INP*.

Table 3-1 shows calculated RBL levels over all time periods relevant for this assessment.

Table 3-1 Measured RBL & $L_{Aeq,period}$ Values

Location	RBL (dBA)			$L_{Aeq,period}$ (dBA)		
	Day	Evening	Night	Day	Evening	Night
1 - Malinya	44	43	41	54	56	48
2 - Elouera	43	41	37	59	56	49
3 - Martin	43	39	36	56	59	47

Note: 1) Daytime 7.00am-6.00pm, Evening 6.00pm-10.00pm, Night 10.00pm-7.00am.

Noise levels were dominated by distant and local traffic, and typical suburban noise. There was little existing industrial noise during our site visits to install and collect the noise loggers.

At the proposed new residential receivers in the Boral and Tanlane (Benedict's) sites, future background noise levels will be affected by future traffic noise on Brickmakers Drive. Predicted traffic volumes on this road were provided by Lyle Marshall & Associates. The minimum future hourly daytime traffic volume is predicted to be 950 vehicles per hour, with 15% heavy vehicles and a speed of 60 km/h.

An empirical formula has been used to estimate future daytime background noise levels due to this traffic, in the absence of intervening shielding, and results are shown in Table 3-2.

Table 3-2 Estimated Minimum L_{A90} Noise Levels due to Traffic on Brickmakers Drive

Distance from Road	Estimated Minimum Daytime L_{A90} Noise Level
20	55
40	52
60	51
80	50
100	49
150	48
200	47
300	45

Values in Table 3-2 can be used to estimate future RBL values at residences that are not shielded from Brickmakers Drive. Estimated daytime RBL's for each of the prediction locations shown in Figure 3-1 are shown in Table 3-3.

Table 3-3 Estimated Future Daytime RBL Values

Location	RBL (dBA)
	Day
1 - Malinya	44
2 - Elouera	43
3 - Martin	43
4N - Boral (40-60m)*	51
4M - Boral (40-60m)*	51
4S - Boral (40-60m)*	51
5 - Tanlane (150m)*	48

** At residences not shielded from Brickmakers Drive*

4 OPERATIONAL NOISE CRITERIA

The *INP* seeks to control noise from newly introduced industrial noise sources by means of its "intrusiveness" and "amenity" noise criteria.

The "intrusiveness" criterion requires that the $L_{Aeq,15min}$ noise level from any new source should not exceed the existing Rating Background Level (RBL) for that period by more than 5dBA. Intrusiveness criterion values for potentially-affected residences follow directly from the RBL values in Table 3-3.

These criteria apply to $L_{Aeq,15min}$ noise levels measured under specific meteorological conditions, determined as outlined in the *INP*. However, in general it has been accepted that an appropriate, and conservative, assessment procedure is to compare the intrusiveness criterion with the $L_{Aeq,15min}$ noise level which is exceeded for 10% of 15-minute periods during any season. This procedure has been adopted for this assessment.

The "amenity" criterion applies to the $L_{Aeq,period}$ noise level due to all industrial sources affecting a location. It sets an upper limit to the total noise level ($L_{Aeq,Period}$) in an area from all industrial noise (existing and future). The criterion depends on the time of the day, area classifications and the relationship of the total measured L_{Aeq} (and contribution from existing industrial noise) to determine the Acceptable Noise Level (ANL) for the development.

The potentially affected areas are classified as *"Suburban"* by the *INP*. Given this, the acceptable and Maximum amenity levels ($L_{Aeq,Period}$) which apply over the whole day, evening and night period are as follows:

- Day (7.00am-6.00pm) 55-60dBA
- Evening (6.00pm-10.00pm) 45-50dBA
- Night (10.00pm-7.00am) 40-45dBA

Table 4-1 summarises the noise criteria adopted for assessment of this development. This also includes amenity criteria for active and passive recreation areas.

Table 4-1 Summary of Intrusive & Amenity Noise Criteria

Location	Intrusive Criterion	Amenity Criterion
	Day	
1 - Malinya	49	55-60
2 - Elouera	48	55-60
3 - Martin	48	55-60
4N Boral (40-60m)	56	55-60
4M Boral (40-60m)	56	55-60
4S Boral (40-60m)	56	55-60
5 Tanlane (150m)	53	55-60
Passive Recreation	-	50-55
Active Recreation	-	55-60

With the exception of the Boral site, the intrusive criterion is more stringent on a numerical basis. With respect to the Boral site, since the amenity criterion relates to a whole daytime

period and intrusive criterion relate to a typical worst case 15 minute period, meeting an intrusive criterion of 56dBA will ensure the amenity criterion of 55dBA is also achieved.

5 PREDICTION OF OPERATIONAL NOISE LEVELS

5.1 Meteorological Conditions

The *INP* requires that in predicting operational noise levels, wind speed and direction should be taken into account if wind speeds of up to 3m/s in the source to receiver direction occur more than 30% of the time in any season.

Records of wind speed and direction were obtained from the meteorological station at Bankstown Airport, approximately 3km east of the site, for a typical year (January 2006 to December 2006).

Table 5-1 indicates that during the daytime, winds at between 0.5 and 3m/s occur from the north-westerly direction for more than 30% of the time during autumn and winter. Although these winds will result in adverse effects only for a proportion of the surrounding receivers, to provide a conservative assessment, calculations will take account of adverse meteorological conditions for all receivers.

Table 5-1 Percentage Occurrence of Wind Speeds Between 0.5 to 3m/sec

Period	Season	N	NE	E	SE	S	SW	W	NW
Day	Autumn	10.7%	3.7%	6.3%	5.3%	6.0%	14.3%	21.3%	32.3%
	Spring	11.3%	7.4%	5.9%	3.9%	5.9%	8.4%	24.1%	5.4%
	Summer	13.6%	10.2%	8.7%	12.1%	6.3%	11.7%	13.6%	23.8%
	Winter	11.9%	5.0%	4.0%	5.2%	7.1%	11.4%	18.7%	36.8%
Evening	Autumn	6.5%	14.9%	14.9%	9.1%	7.1%	24.7%	14.9%	7.8%
	Spring	12.7%	22.9%	20.3%	7.6%	9.3%	15.3%	4.2%	7.6%
	Summer	5.4%	18.8%	25.9%	17.0%	14.3%	8.0%	5.4%	5.4%
	Winter	9.0%	4.8%	4.8%	5.4%	11.4%	17.4%	26.9%	20.4%
Night	Autumn	14.0%	1.6%	2.9%	1.8%	6.0%	23.6%	27.6%	22.7%
	Spring	16.2%	3.4%	2.7%	5.2%	8.6%	27.8%	15.8%	20.3%
	Summer	6.8%	10.5%	11.3%	10.2%	13.0%	20.4%	17.0%	10.8%
	Winter	19.7%	0.6%	0.4%	0.9%	3.0%	8.9%	25.9%	40.6%

5.2 Prediction Methodology

Table 5-2 shows all equipment included in noise modelling, and the assumed sound power levels. For activities which do not occur continuously over a 15-minute period, the L_{Aeq} is adjusted to account for the duration over which it occurs in any 15-minute period.

Calculations were performed using the CadnaA software implementing ISO algorithms with CONCAWE to model meteorological conditions. Topographical information for the project area was provided by Moorebank Recyclers Pty Ltd and BMD in relation to the proposed road and redevelopment of the Boral site.

For daytime calculations, the worst case noise levels are likely to be experienced with wind in the direction from source(s) to the receiver. These potentially worst case adverse conditions have been modelled using Meteorological Category 6 in the CONCAWE algorithm. This corresponds to wind speeds of up to 3m/s from the source to the receiver with Pasquill Stability D (stable atmosphere with no temperature inversion). Acoustically neutral conditions have also been modelled, using CONCAWE Meteorological Category 4, for wind speeds less than 0.5m/s and neutral meteorological conditions throughout a 24 hour time period.

Measurements of existing similar equipment to be used on site was measured at an existing facility in Camellia operated by the same Client. In response to clarification on SWL by EPA the measurements at Camelia were repeated and the data used previously was considered to be appropriate. The levels are summarised in Table 5-2.

Table 5-2 Modelled Equipment & Sound Power Levels

Equipment	Source Description	Number of Operations in 15 minutes	SWL $L_{Aeq,15min}$ (dBA)
Truck	Truck unloading recycling material	5	104
	Truck going over wash bay	10	93
	Truck on Private access road (25 km/hr)	10	105
Loading Crusher	Front End Loader and Excavator, including reversing beeper	Continuous	112
Crusher Buildings	Primary crusher	Continuous	110
	Secondary crusher	Continuous	111

Noise modelling included the following assumptions.

- All front end loaders used on site would have an L_{Aeq} sound power emission of 108dBA, equivalent to the front end loader currently in operation at Camellia;
- Ten truck movements within a 15 minute period (a truck entering and then leaving is counted as two single movements); and
- Trucks would have an average sound power emission level of not greater than 105dBA (in motion) equivalent to that of a similar truck measured at a similar facility. It is understood that trucks similar to that measured would be operating in the proposed development.

5.3 Operational Noise Sources

The following operational scenario was considered for this noise assessment.

- Recycling activities within site between 7.00am-6.00pm. Typical activities include trucks unloading recycling materials onto the stockpile and leaving the site, an FEL scooping recycling material, an excavator feeding recycling materials into the crusher and the processing of recycling materials by the crusher.

5.4 Predicted Operational Noise Levels

Table 5-3 indicates the operational noise levels predicted at potentially-affected residences, for the case where all equipment is working on the existing ground surface. Calculations include the effect of the noise barriers and processing plant shielding described above.

Table 5-3 Predicted L_{Aeq} Operational Noise Levels, dBA

Receiver No.	Operational Noise Criterion, $L_{Aeq,15min}$ (dBA)	Predicted Operational Noise Level $L_{Aeq,15min}$ (dBA)	
		Adverse Conditions	Neutral Conditions
1 - Malinya	49	43	40
2 - Elouera	48	45	43
3 - Martin	48	47	44
4N - Boral	56	52	50
4M - Boral	56	51	49
4S - Boral	56	49	47
5 - Tanlane	53	56	56
6 - Vale of Ash	50-55 $L_{Aeq,period}$	51 (49 $L_{Aeq,period}$)	49 (47 $L_{Aeq,period}$)
7 - New Brighton GC	55-60 $L_{Aeq,period}$	48 (46 $L_{Aeq,period}$)	46 (44 $L_{Aeq,period}$)

The predicted noise levels meet the relevant criteria at all receivers with the exception of proposed new residences within the Tanlane site, which are located near to the haul route and the link road to Brickmakers Drive. It is the close proximity to the haul route which results in no difference between the adverse and neutral meteorological conditions.

Although a marginal 3dBA non compliance is indicated, it is expected that traffic noise from Brickmakers Drive would result in similar L_{Aeq} noise levels of 55dBA. The impact of intermittent truck passbys during the daytime is not considered significant.

Nevertheless, it is proposed to consider construction of a short length of barrier on the eastern side of the haul road in the vicinity of the Tanlane site on the basis of a detailed review of noise levels, once the Tanlane site is occupied. At that time background noise levels could be measured, as well as noise levels from intermittent truck movements, to undertake a detailed barrier design.

For the present assessment (based on the assumed background noise levels and predicted truck noise levels) we have determined a 130m length of barrier (extending south from the intersection with the link road) 2m high would achieve the 53dBA criterion at this future residential development. The 2m height is sufficient to control engine noise to meet the criterion. It may be preferable to consider a higher barrier to also shield the truck exhaust.

Of course any barrier would not need to be constructed until the residential site is occupied.

At New Brighton Golf Course and the Vale of Ash reserve noise levels are predicted to comply with the criteria, since they relate to a $L_{Aeq,period}$ assessment and it is expected $L_{Aeq,period}$ would be 2-3dBA lower than the $L_{Aeq,15min}$ levels summarised in Table 5-3.

6 TRAFFIC NOISE ON PUBLIC ROADS

6.1 Noise Criteria for Traffic on Future Public Roads

The RMS will not allow access from the site directly onto Newbridge Road. Trucks will access via the Link Road onto Brickmakers Drive and then to Newbridge Road.

In accordance with the definitions outlined in the *ECRTN*, Brickmakers Drive would be classified as a collector road and Newbridge Road an arterial road.

Trucks movements would only occur during the daytime (7.00am-10.00pm) period. The relevant criterion for "land use developments with potential to create additional traffic on collector road" is that total traffic noise levels should not exceed 60dBA $L_{Aeq,1hr}$ during any daytime hour. Where existing traffic noise levels already exceed this value, the *ECRTN* states that:

> *"Where feasible and reasonable, existing noise levels should be mitigated to meet the noise criteria. Examples of applicable strategies include appropriate location of private access roads; regulating times of use; using clustering; using 'quiet' vehicles; and using barriers and acoustic treatments.*
>
> *In all cases, traffic arising from the development should not lead to an increase in existing noise levels of more than 2dB."*

6.2 Prediction of Traffic Noise Levels

A traffic study was prepared by Lyle Marshall & Associates Pty Ltd. This report predicted future traffic generation by the recycling facility based upon processing 500,000 tonnes of raw materials per annum and trucking the finished product and waste from the site. The assessment was based upon 292 working days per annum and an average truck load of 21.2 tonnes for raw materials coming into the site and finished product out. Table 6-1 presents the estimated number of truck movements daily.

Table 6-1 Summary of Estimated Number of Daily Truck Movements

	Direction	No. of Trucks Movements
Raw Materials	In	81 loaded trucks
	Out	81 empty trucks
Finished Product	In	81 empty trucks
	Out	81 loaded trucks
Total No. of Daily Movements:		**324**

Assuming a 12 hour day, this equates to an average of 27 movements per hour, however the traffic report indicates a range of hourly movements through a typical day.

For assessment purpose, it is considered that 38 movements would be representative of a typical busy hour in the daytime.

6.2.1 Brickmakers Drive

Brickmakers Drive has recently been constructed. The northern section includes a 2.5m blockwork noise barrier on the western edge adjacent to the existing single storey residences located on Araluan Avenue and Elouera Crescent in this area. There is a short 3m section of barrier nearer to the intersection where two 2 storey residences are located as shown in the photo below.

The shielded residences are set back typically 20-35m from the centre of Brickmakers Drive. There are some residences on Elouera Crescent set back approximately 95m which currently have line of sight across Paine Park to the road alignment with a small angle of view.

Traffic volumes on Brickmakers Drive are currently approximately 6,500 vehicles per day and 1,000 at night time and 5-6% heavy vehicles. These are expected to increase in the future as a result of further residential development.

The residences to the north of Araluen Avenue would be affected by traffic noise from Newbridge Road as well as Brickmakers Drive. The increase in traffic noise levels as a result of the additional trucks would be higher at those residences south of Araluen Avenue.

Existing daytime noise levels were predicted using the *Calculation of Road Traffic Noise (CORTN)* predictive procedure to be 54-57dBA $L_{Aeq,1hr}$ depending on the residence. The proposed extra trucks would result in a 1dBA increase. The predicted future noise levels comply with the daytime base criterion as well as the allowance criterion. Negligible impact is therefore expected.

6.2.2 Newbridge Road and Nuwarra Road

Residences front Newbridge Road to the west of the intersection with Brickmakers Drive. Many of these receivers are set back 10m from the edge of the closest lane. The existing peak hours along Newbridge Road are 7.00-9.00am and 4.00-6.00pm based upon information in the traffic report. The two way hourly volumes are typically 5,200-5,700 vehicles.

Given the existing high traffic volumes on Newbridge Road, existing noise levels are likely to exceed the ECRTN base criterion. The increased noise level due to traffic from the proposed recycling facility based on the 45% to the west and 55% to the east split at the intersection has been calculated to be less than 0.2dB, which meets the allowance criterion. Negligible impact is therefore expected.

Residences front Nuwarra Road to the south of the intersection with Brickmakers Drive. Most of these receivers are set back 15-20m from the edge of the closest lane. The existing peak hour volumes along Nuwarra Road are typically 1,000-1,500 vehicles.

Given the existing relatively high traffic volumes on Nuwarra Road, existing noise levels are likely to exceed the ECRTN base criterion. The increased noise level due to traffic from the proposed recycling facility based on the 20% of total movements using Nuwarra Road (64 per day and up to 8 per hour) has been calculated to be less than 0.3dB, which meets the allowance criterion. Negligible impact is therefore expected.

7 NOISE FROM CONSTRUCTION ACTIVITIES

7.1 Noise Criteria for Construction Activities

The *NSW Interim Construction Noise Guideline (ICNG)* presents the process to assess construction in NSW. The *ICNG* was developed by the Department of Environment Climate Change & Water (DECCW) taking into consideration that construction is temporary, noisy and difficult to ameliorate. As such, the *ICNG* was developed to focus on applying a range of work practices most suited to minimising construction noise impacts, rather than focusing only on achieving a numeric noise level.

The *ICNG* recommends that standard construction work hours should typically be as follows:

- Monday to Friday 7.00am to 6.00pm.
- Saturday 8.00am to 1.00pm.
- No work on Sundays or public holiday.

Additionally, it recommends quantitative management noise goals at residences as presented in Table 7-1.

Table 7-1 Construction Noise at Residences using Quantitative Assessment

Time of Day	Management Level $L_{Aeq\ (15\ min)}$	How to Apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or public holidays	Noise affected RBL + 10dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. 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 75dBA	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 proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected RBL + 5dBA	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 5dBA above the noise affected level, the proponent should negotiate with the community.

In addition to the above criteria, where any work is conducted during the night time period (10.00pm-7.00am), the DECCW recommends that to protect against sleep disturbance, $L_{A1,1min}$ noise levels should not exceed the background level by more than 15dBA at any residence. In practice, the $L_{A1,1min}$ level can be represented by the maximum noise level.

The *ICNG* presents the following noise management levels for non-residential premises:

- Active recreation areas (such as parks) external $L_{Aeq\ (15\ min)}$ 65dBA
- Passive Recreation areas external $L_{Aeq\ (15\ min)}$ 60dBA
- Industrial premises: external $L_{Aeq\ (15\ min)}$ 75dBA
- Offices, retail outlets external $L_{Aeq\ (15\ min)}$ 70dBA
- Classrooms, hospitals, places of worship internal $L_{Aeq\ (15\ min)}$ 45dBA

The construction noise criteria at all the existing residences surrounding the proposed development site are shown in Table 7-2. Future residences are also identified, although it is not clear at this stage which residences will be occupied at the time of construction.

Table 7-2 Construction Noise Criteria for Daytime Construction

Location	Construction Noise Criteria, L_{Aeq} (dBA)
Residence 1 - 37 Malinya Crescent, Moorebank	54
Residence 2 - 26 Elouera Crescent, Moorebank	53
Residence 3 - 41 Martin Crescent, Milperra	53
4 - Boral (not fully developed during construction)	61
5 - Tanlane's (unlikely to be developed during construction)	58
6 - Vale of Ash Reserve	60
7 – New Brighton GC	65

7.2 Predicted Construction Noise Levels

Construction of the earth mound (already approved under development consent No.1417/2005 but yet to be built) around the site's boundary would generate the highest noise levels from the main site area during the construction period, however short term higher noise levels are expected during the upgrade works required for the access driveway. It is expected that the material will come from within the site, so there is no need to import large quantities of fill during this stage. Most noise generation over the construction period will therefore occur from within the site itself.

Similar noise levels from the same construction plant would be generated during levelling of the site. Other construction is considered to be the delivery and construction of the "buildings" to house conveyers and crushing plant which will require the use of cranes and power tools.

Road works including drainage will mainly require the use of excavator / grader / compactor and delivery of road base, plus asphalting plant.

Construction plant assumed to be required for these works, and the total L_{Aeq} sound power level

for are presented in Table 7-3.

Table 7-3 Construction Plant Total Sound Power Level (SWL)

Activity	Typical Equipment Used	Total $L_{Aeq,15min}$ Sound Power Level (dBA)
Earthworks	Dozer, Front end loader, excavator and truck	115
Roadworks	Grader, trucks	113
Buildings and Conveyers	Cranes, delivery trucks and Power Tools	110

Table show the predicted construction noise levels for the main phases

Receiver No.	Construction Noise Criterion, $L_{Aeq,15min}$ (dBA)	Predicted Construction Noise Level $L_{Aeq,15min}$ (dBA)		
		Site Earthworks	Site Buildings	Roadworks & Drainage Works
1 - Malinya	54	49	43	47-53[1]
2 - Elouera	53	50	44	47-54[1]
3 - Martin	53	53	47	49
4N - Boral	61	54	49	52-68[1]
4M - Boral	61	56	51	54-65[1]
4S - Boral	61	55	49	53
5 - Tanlane	58	55	49	53-73[1]
6 - Vale of Ash	60	57	52	53
7 - New Brighton GC	65	55	47	51

Note :1 For the roadworks and drainage works, for certain receivers the noise levels will vary depending on the proximity of the works along the driveway to the receiver.

Predicted noise levels are expected to comply with criteria from works within the main site area, however some exceedances of criteria are expected from works on the driveway for the relatively short duration of time when they are closest to the "future" receivers in the northern part of the Boral site or in the Tanlane site. These potential impacts are only realised if the residences have been constructed and occupied.

It is recommended a further review of potential impacts can be conducted at the time the proposed construction commences. However the predicted noise levels do not exceed the highly noise affected limit of 75dBA and are proposed o only occur in standard daytime construction hours.

Beyond standard mitigation practices to use modern well maintained plant there are no further mitigation measures which are considered feasible and reasonable for the proposed works.

8 CONCLUSION

The proposed development of a concrete recycling facility by Moorebank Recyclers Pty Ltd at *Lot 6 DP 1065574* at Newbridge Road, Moorebank has been assessed against NSW government policies in relation to industrial noise, construction noise and traffic noise on the road network.

Industrial noise has been assessed in accordance with the NSW EPA *Industrial Noise Policy (INP)*.

A short section of noise barrier would be required along the eastern edge of the proposed driveway into the site near the corner with the link road to Brickmakers Drive. On this basis comparison of predicted noise levels with relevant intrusive and amenity criteria indicates compliance is achieved during the operation phase of the proposed recycling facility. It is recommended the need for this barrier (and its final design length and height) can be reviewed once the proposed residential development within the Tanlane site is occupied and background noise levels as a result of suburban activity and future traffic on Brickmakers Drive can be measured.

In addition, potential noise impact from traffic on Brickmakers Drive, Nuwarra Road and Newbridge Road arising from additional truck movements associated with the operation of the recycling facility would be well within relevant allowance criteria at all residences.

Noise levels associated with the construction of the facility, including the earth mound (already approved but yet to be constructed) around the perimeter of the site and works within the site, are predicted to be within the relevant criteria for construction noise at nearby existing and possible future residences.

Construction noise from the shorter term upgrade of the driveway is predicted to meet noise criteria at existing residences, but would exceed criteria at future residences within the Boral and Tanlane sites, especially when construction occurs at its closest point. The Highly annoyed construction noise limit of 75dBA is not predicted to be exceeded. Since construction is limited to standard daytime hours, these road works are short term, no further mitigation measures are considered feasible and reasonable.

Version	Status	Date	Prepared by	Checked by
A	Draft	19 February 2010	Jimi Ang	-
B	Final	13 April 2011	Simon Kean/Neil Gross	Rob Bullen
C	Final	27 November 2012	Irfan Mohammed	Neil Gross

APPENDIX A

GLOSSARY OF TERMS

GLOSSARY

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

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

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

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

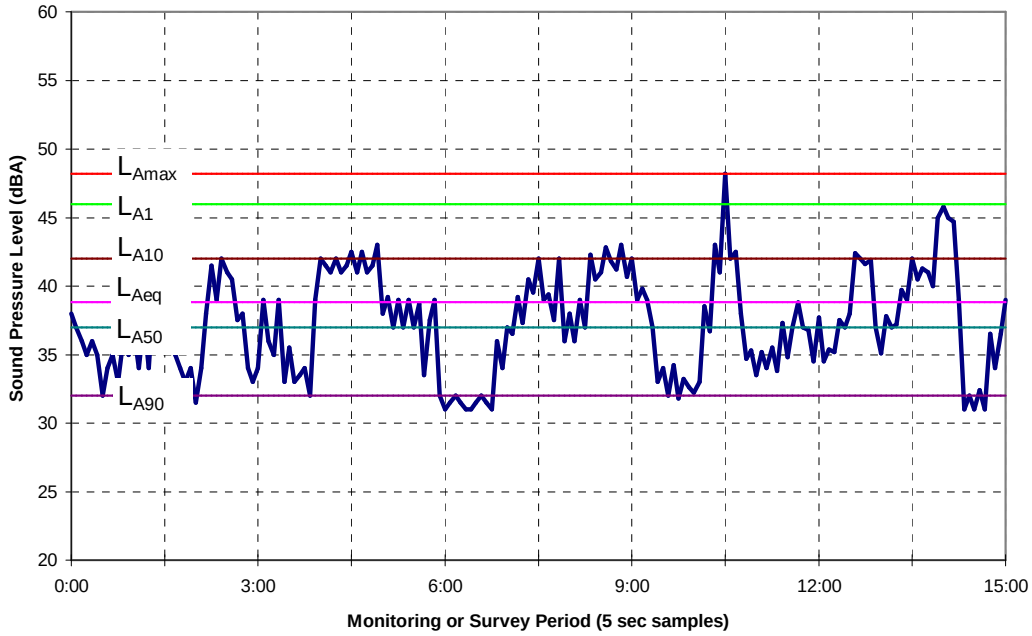
L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise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

L_{A50} – The L_{A50} level is the noise level which is exceeded for 50% of the sample period. During the sample period, the noise level is below the L_{A50} level for 50% of the time.

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

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

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


60
55
50
45
40
35
30
25
20
Sound Pressure Level (dBA)
LAmax
LA1
LA10
LAeq
LA50
LA90
0:00
3:00
6:00
9:00
12:00
15:00
Monitoring or Survey Period (5 sec samples)

APPENDIX B

NOISE MEASUREMENT RESULTS

Location: 37 Malinya Crescent, Moorebank
Data shaded: Extraneous Noise; Wind; Rain

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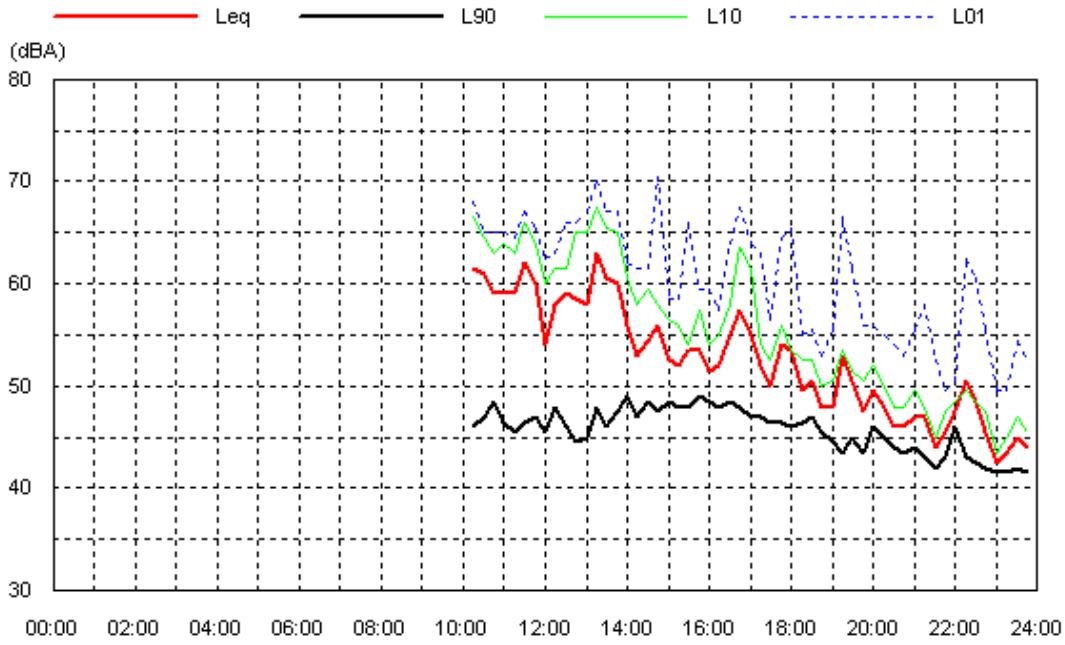

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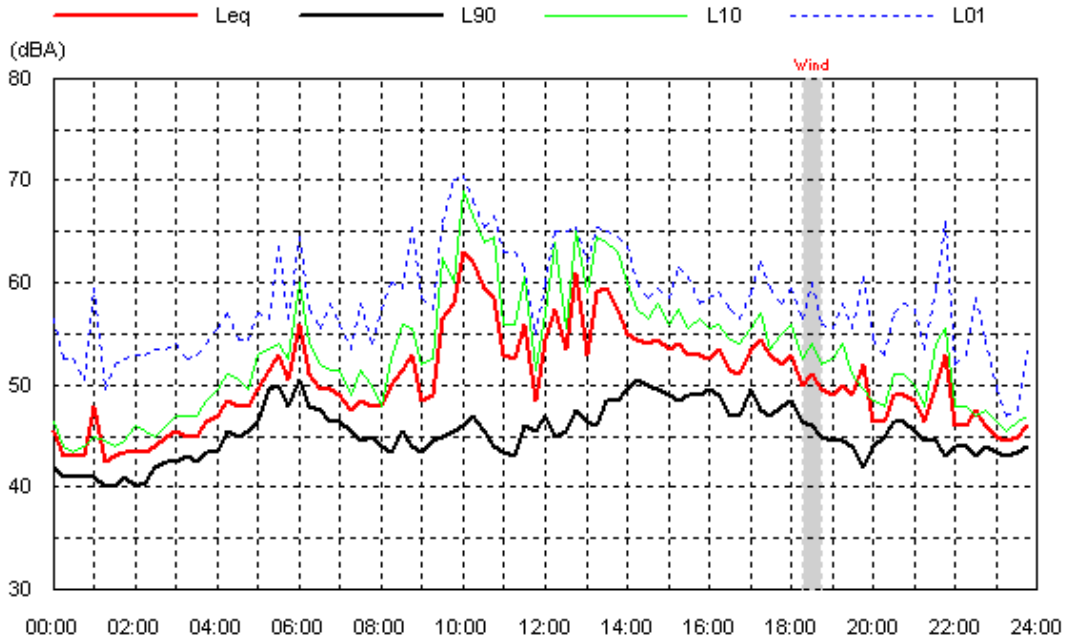

Location: 37 Malinya Crescent, Moorebank
Data shaded: Extraneous Noise; Wind; Rain

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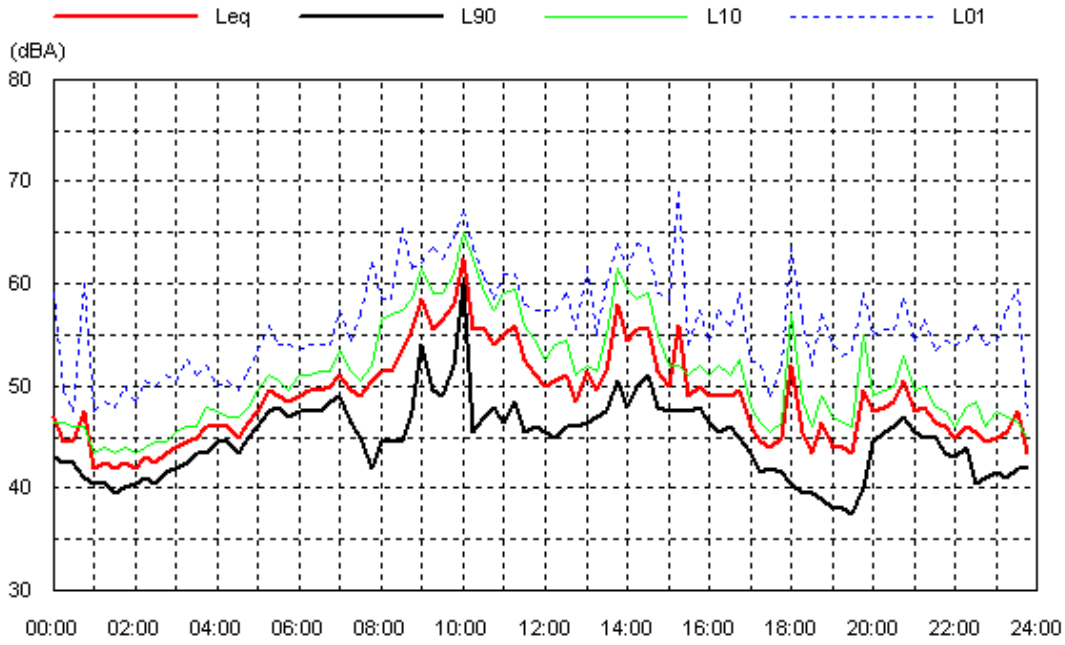

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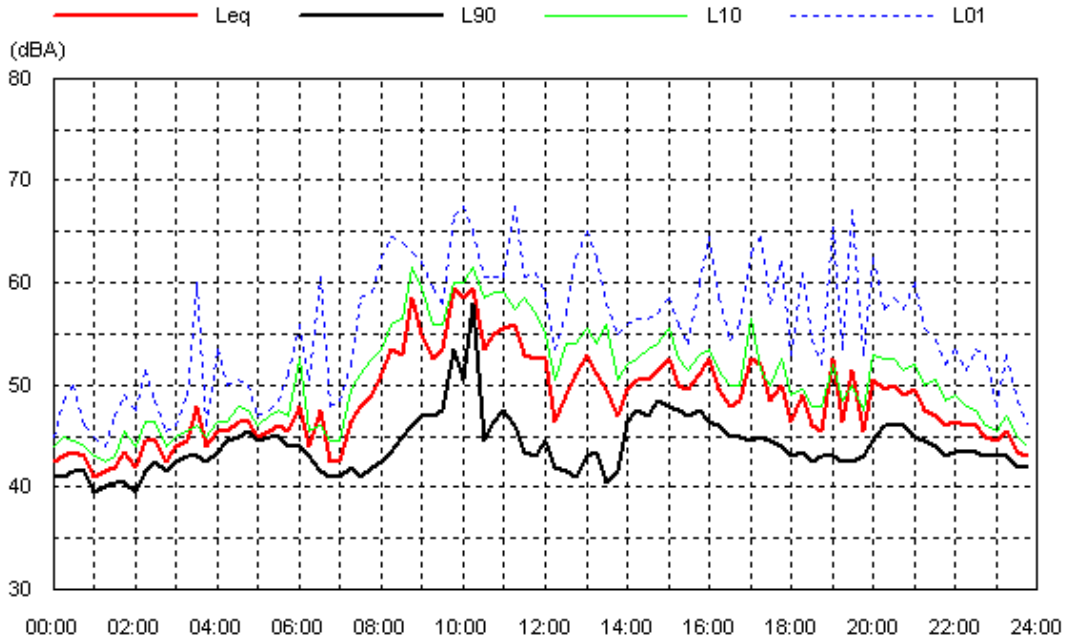

Location: 37 Malinya Crescent, Moorebank
Data shaded: Extraneous Noise; Wind; Rain

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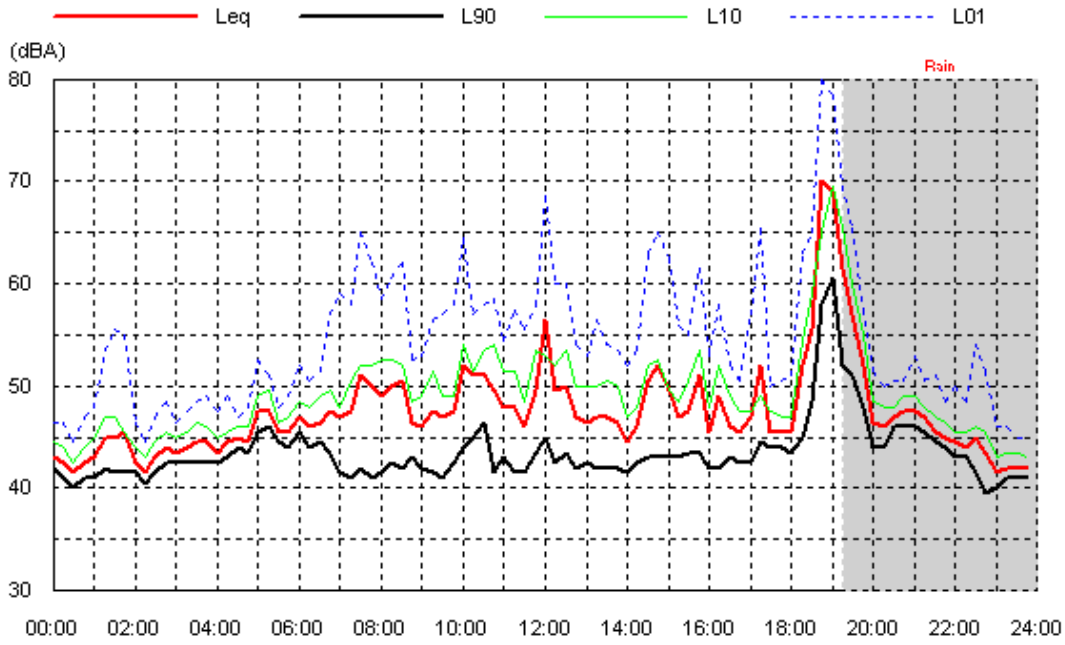

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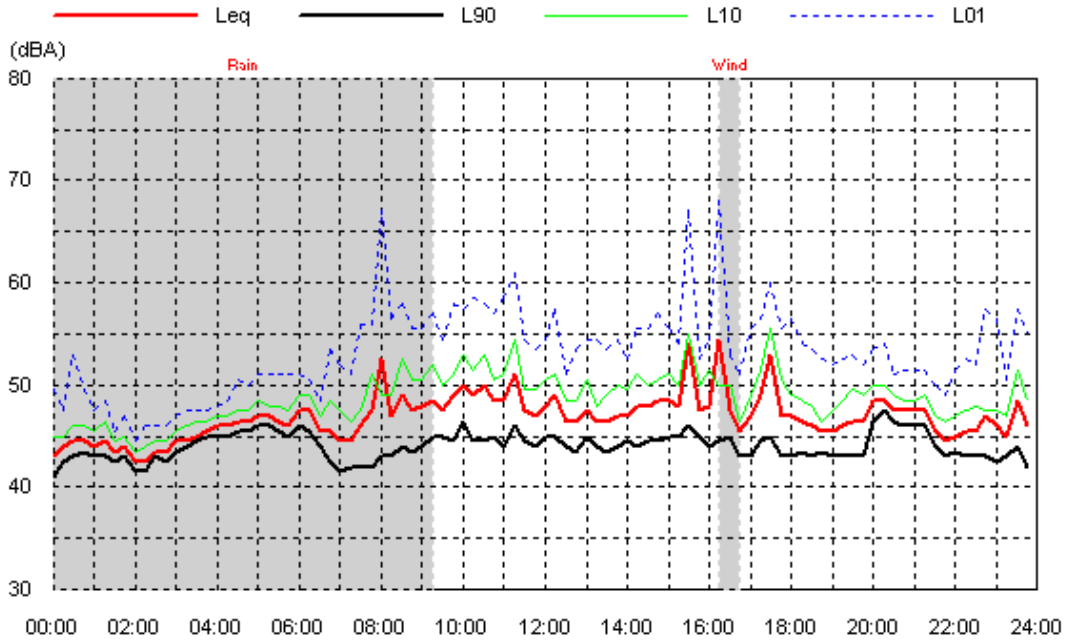

Location: 37 Malinya Crescent, Moorebank
Data shaded: Extraneous Noise; Wind; Rain

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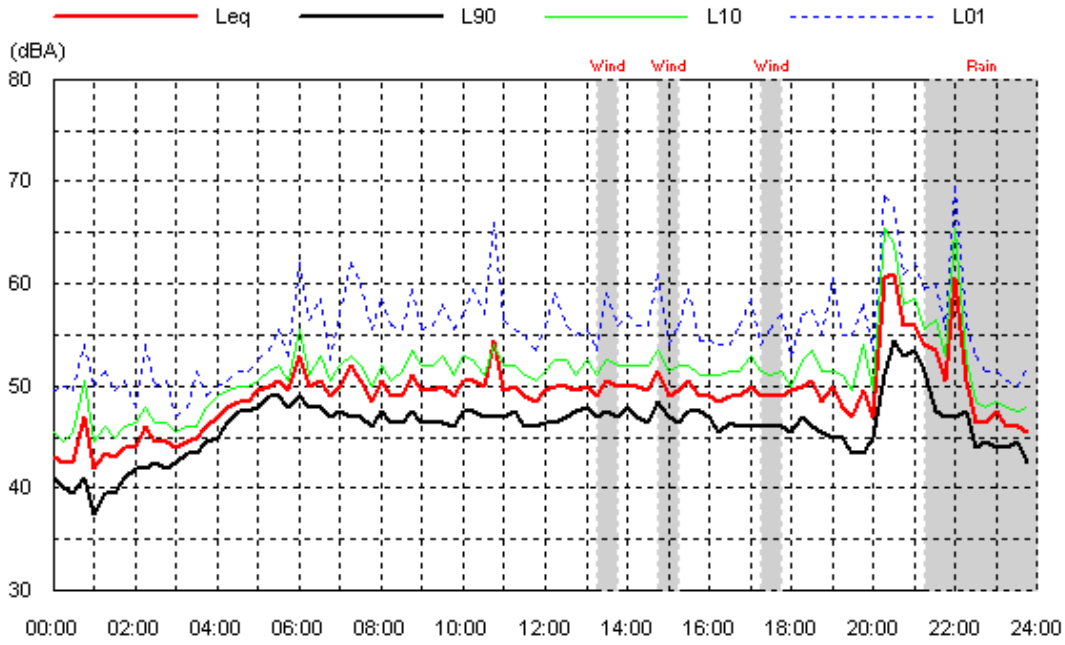

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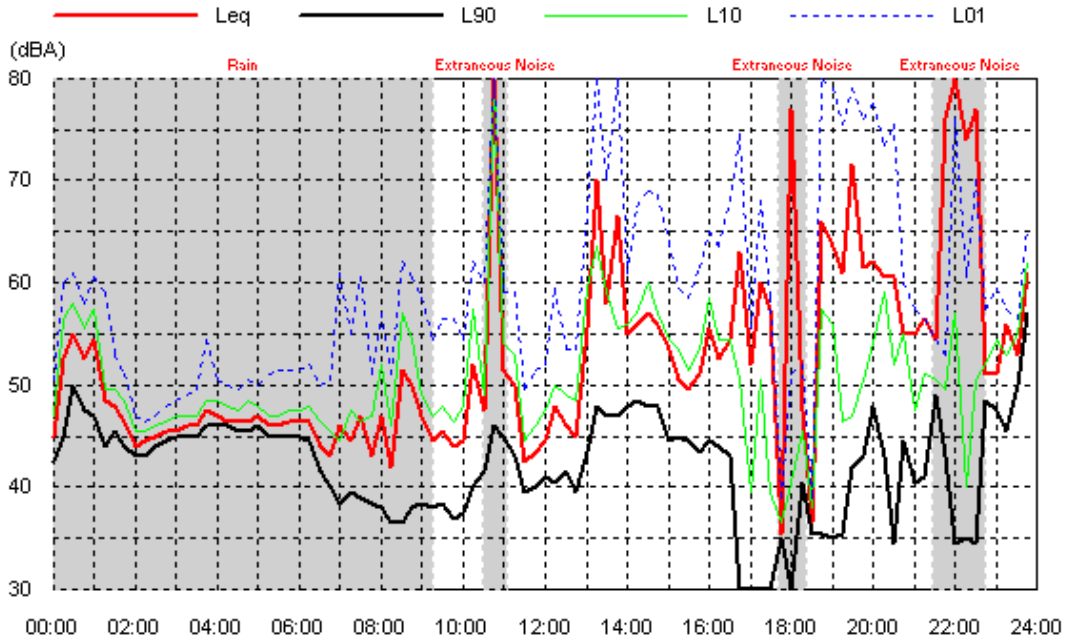

Location: 37 Malinya Crescent, Moorebank
Data shaded: Extraneous Noise; Wind; Rain

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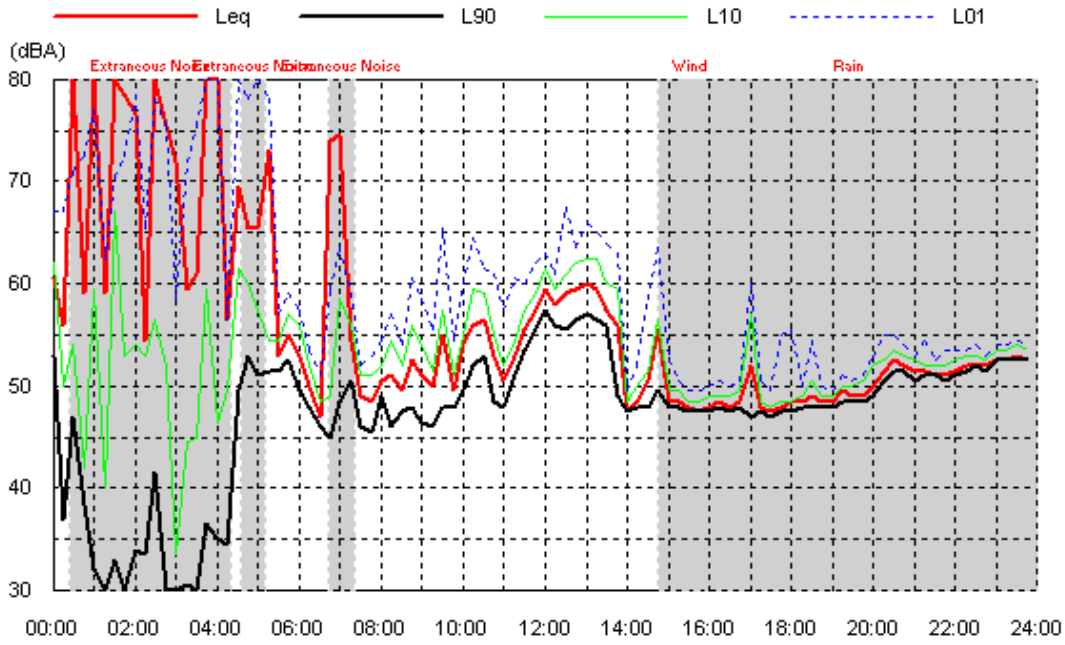

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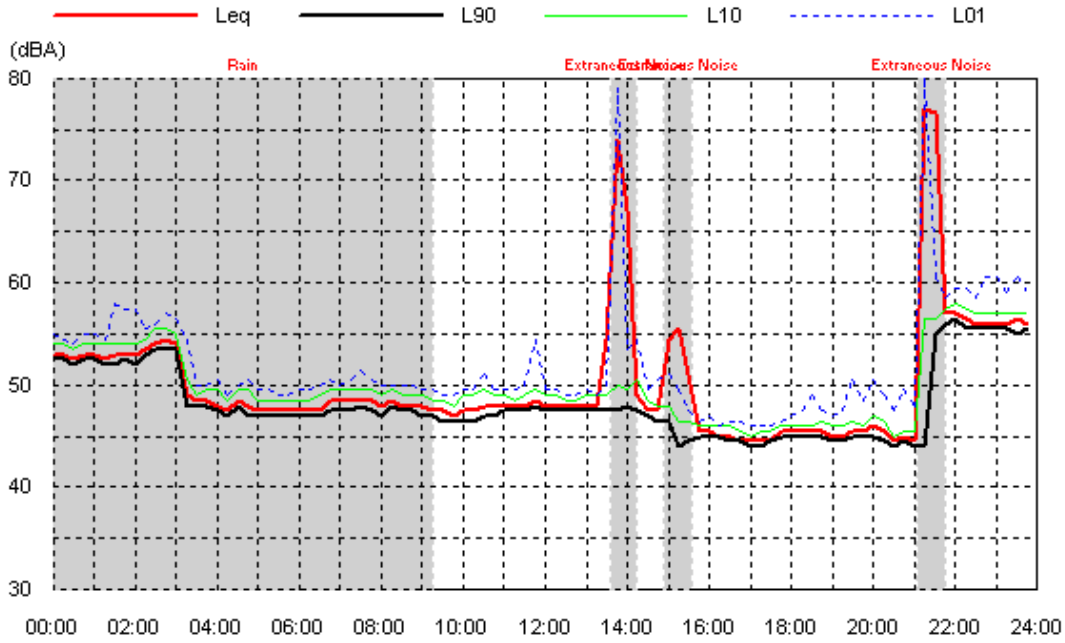

Location: 37 Malinya Crescent, Moorebank
Data shaded: Extraneous Noise; Wind; Rain

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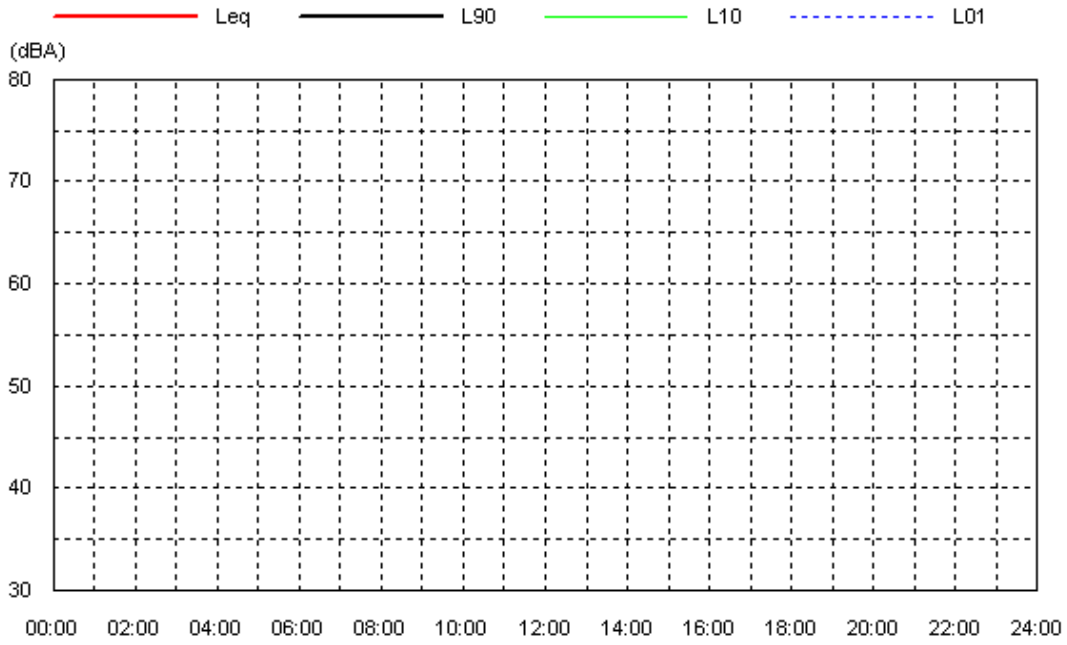

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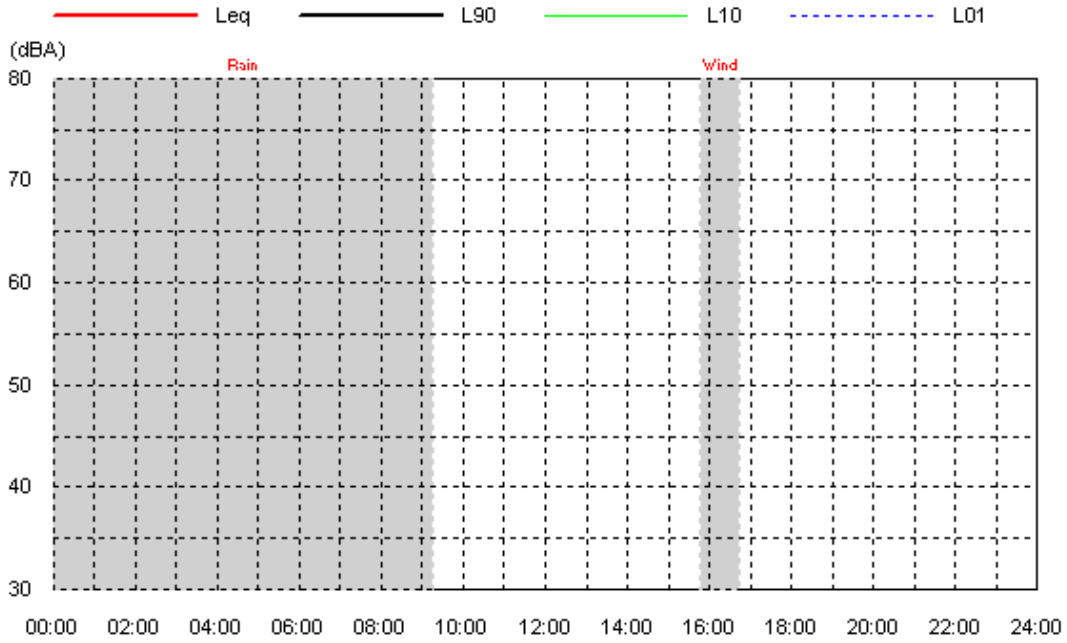

Location: 26 Elouera Crescent, Moorebank
Data shaded: Extraneous Noise; Wind; Rain

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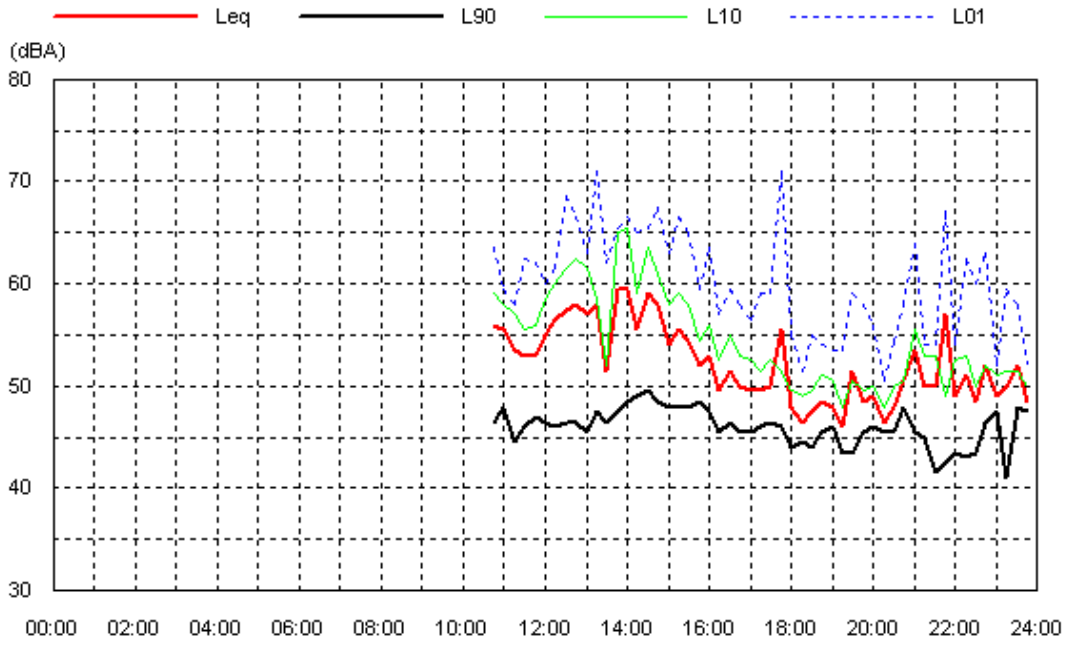

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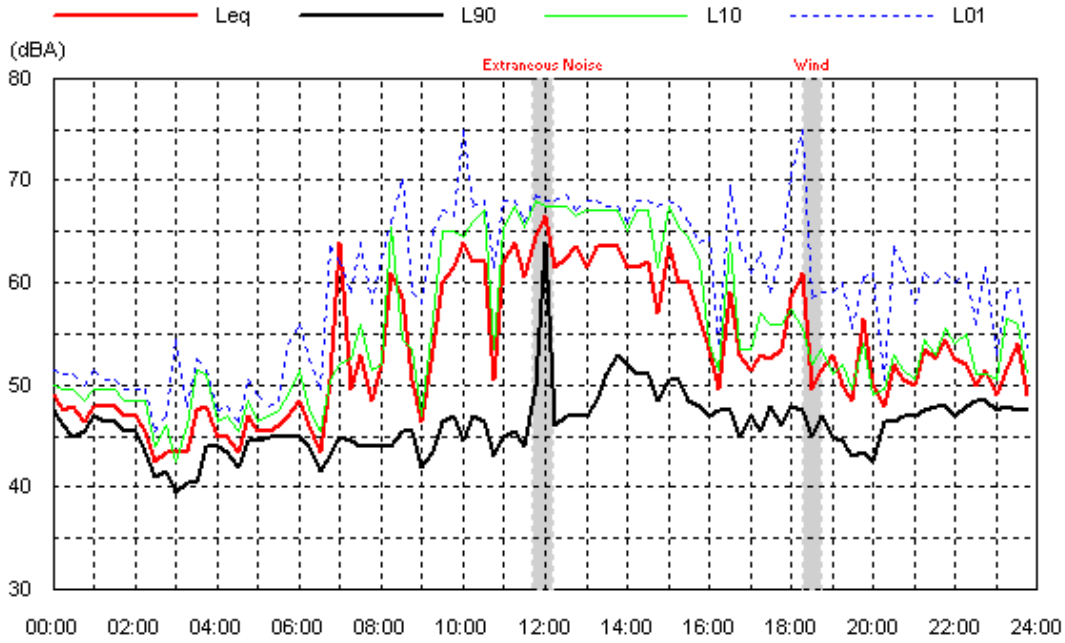

Location: 26 Elouera Crescent, Moorebank
Data shaded: Extraneous Noise; Wind; Rain

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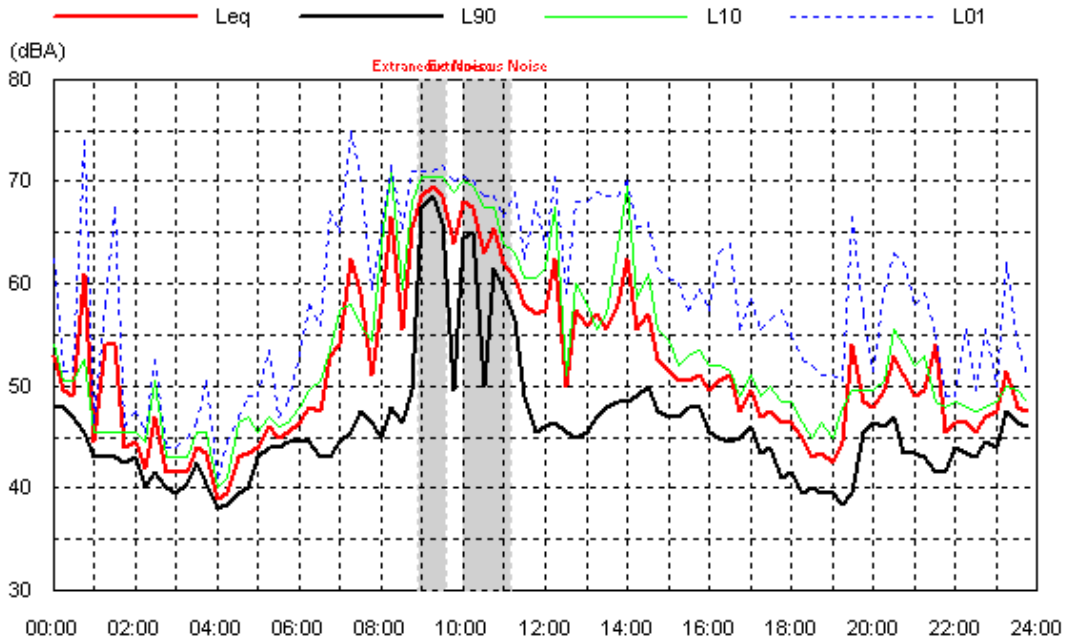

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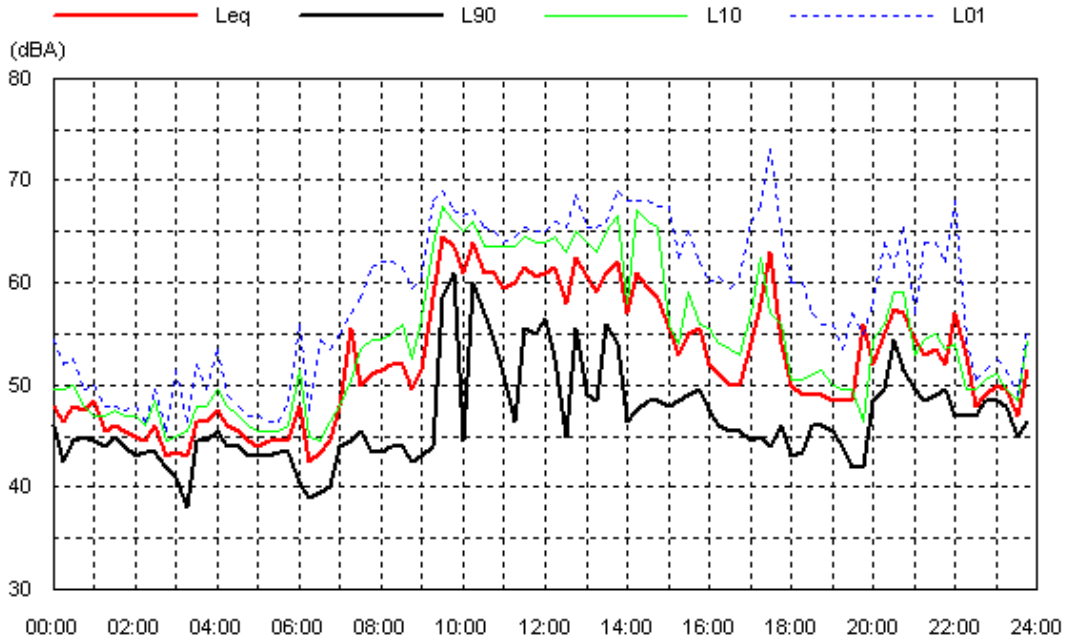

Location: 26 Elouera Crescent, Moorebank
Data shaded: Extraneous Noise; Wind; Rain

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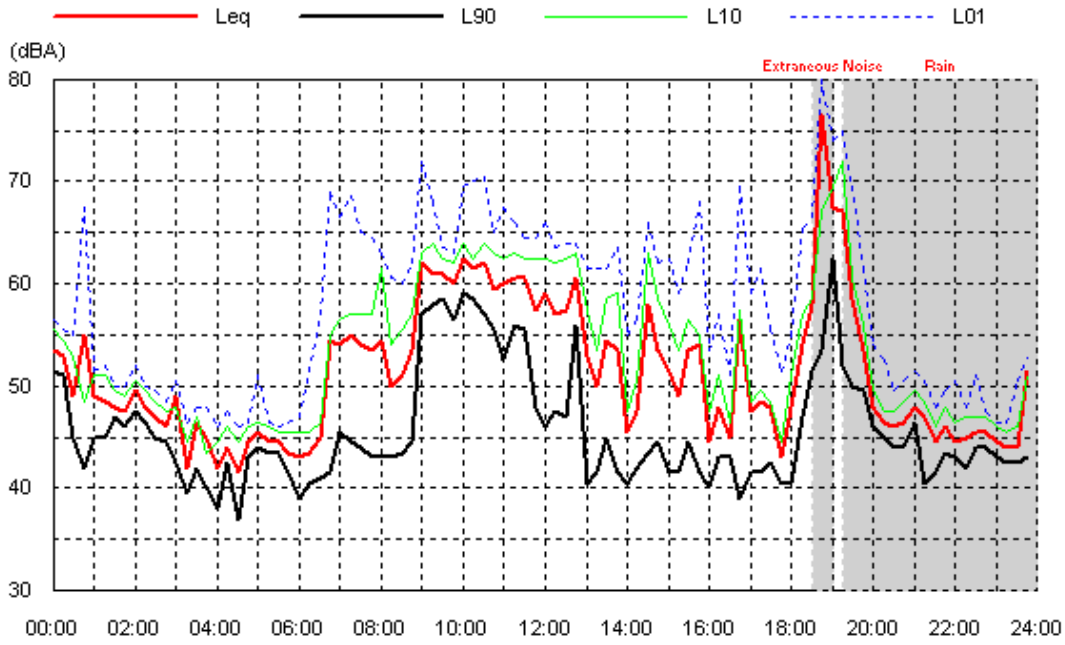

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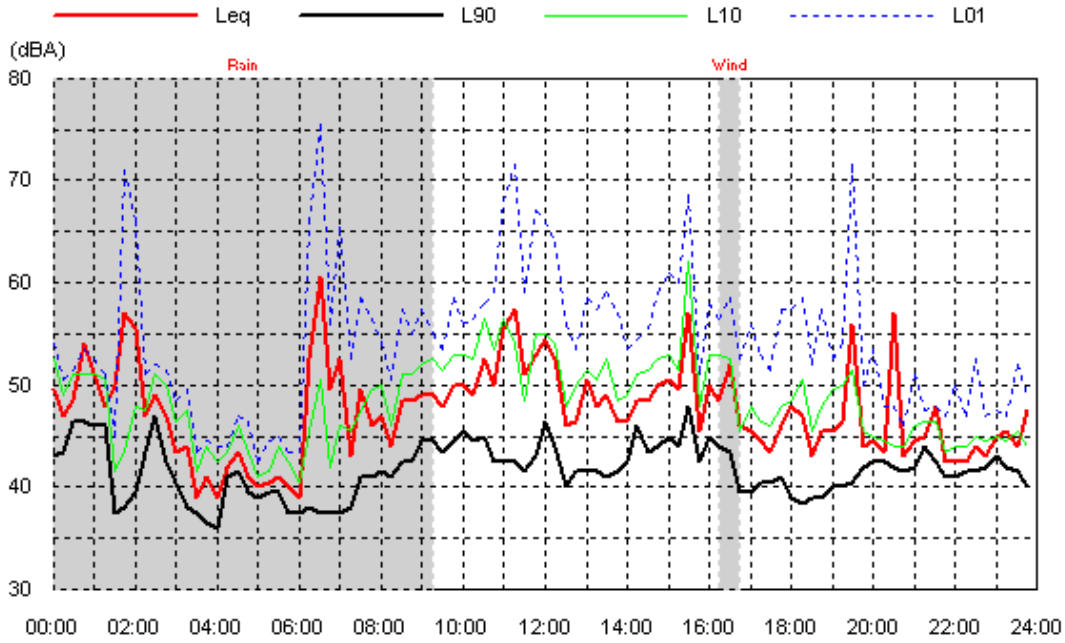

Location: 26 Elouera Crescent, Moorebank
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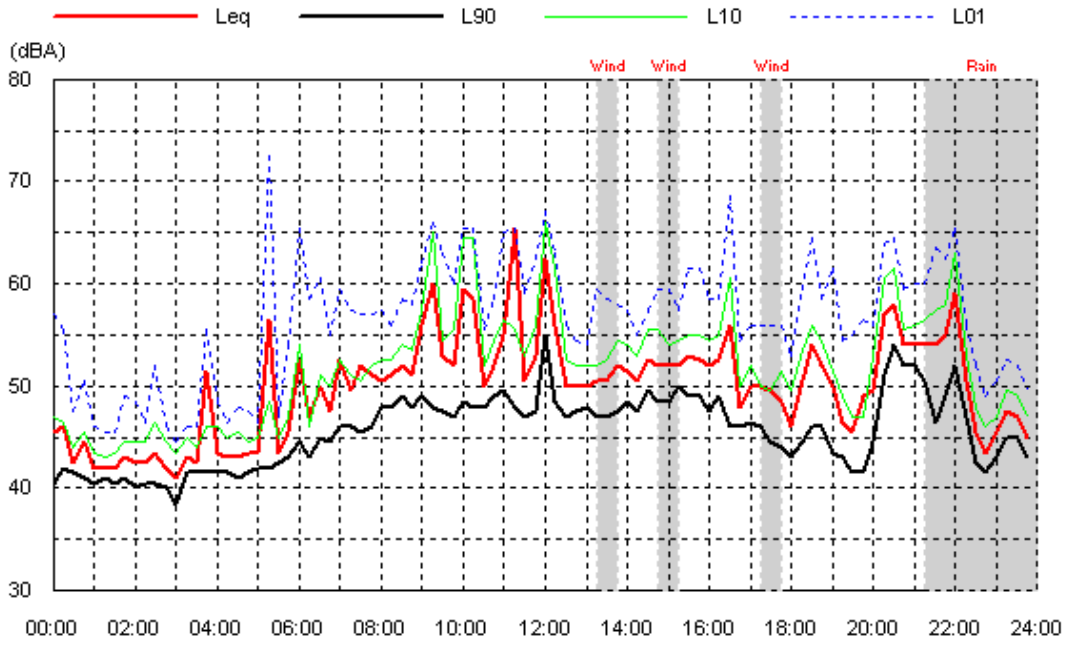

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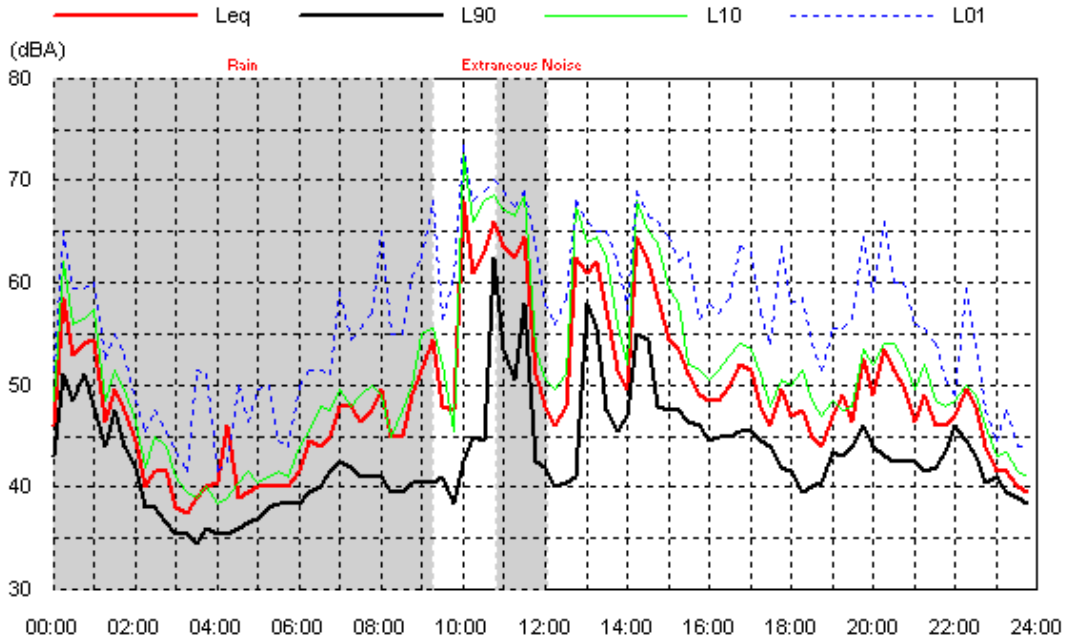

Location: 26 Elouera Crescent, Moorebank
Data shaded: Extraneous Noise; Wind; Rain

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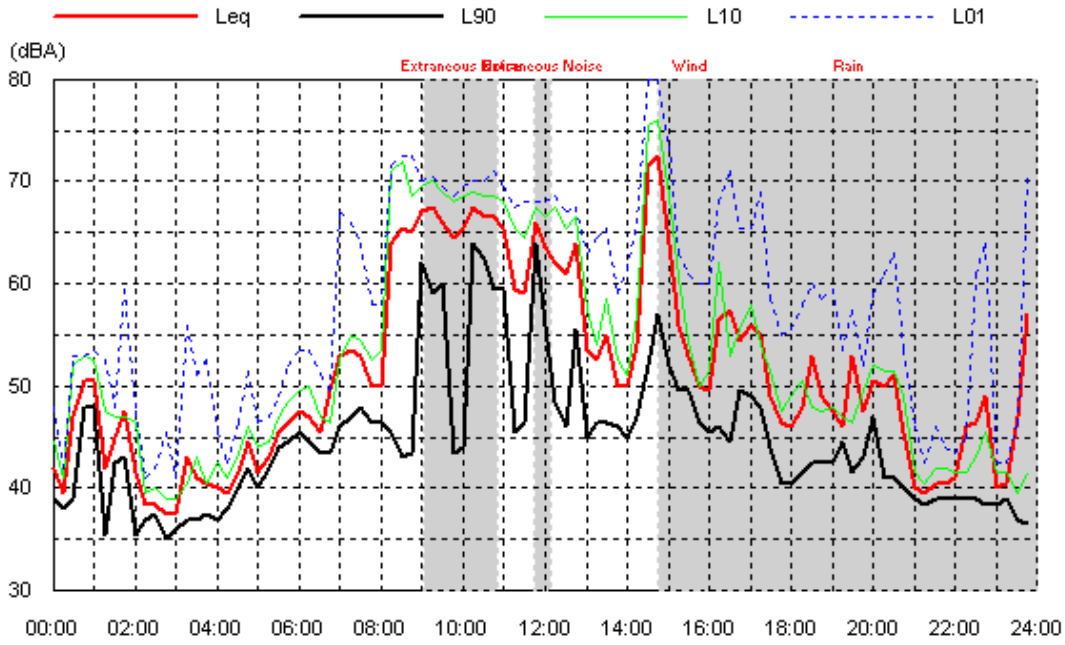

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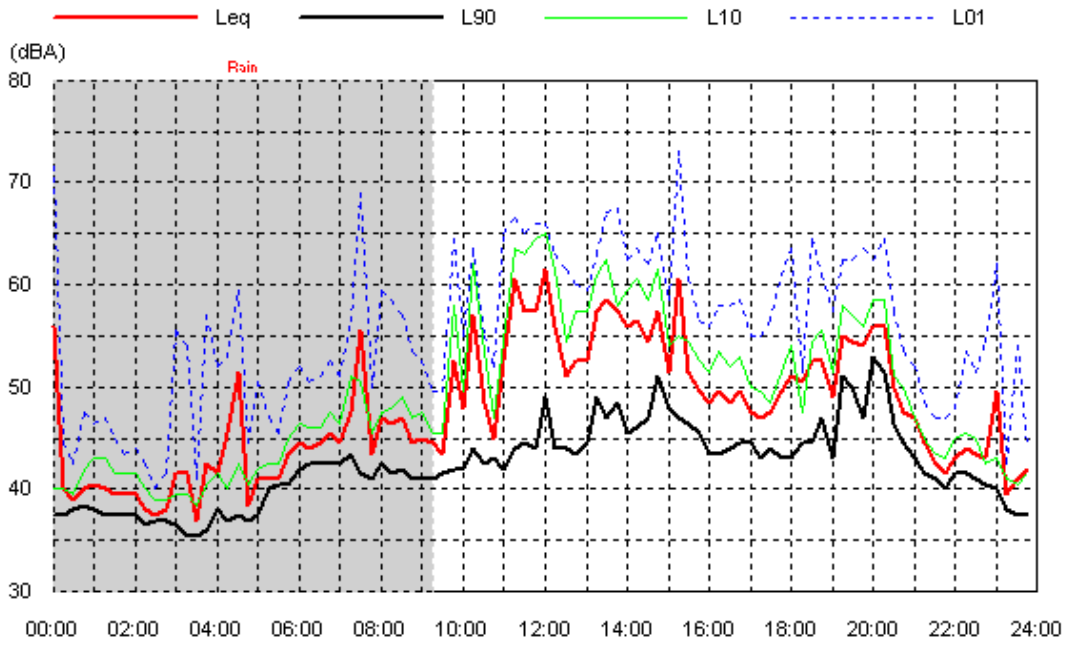

Location: 26 Elouera Crescent, Moorebank
Data shaded: Extraneous Noise; Wind; Rain

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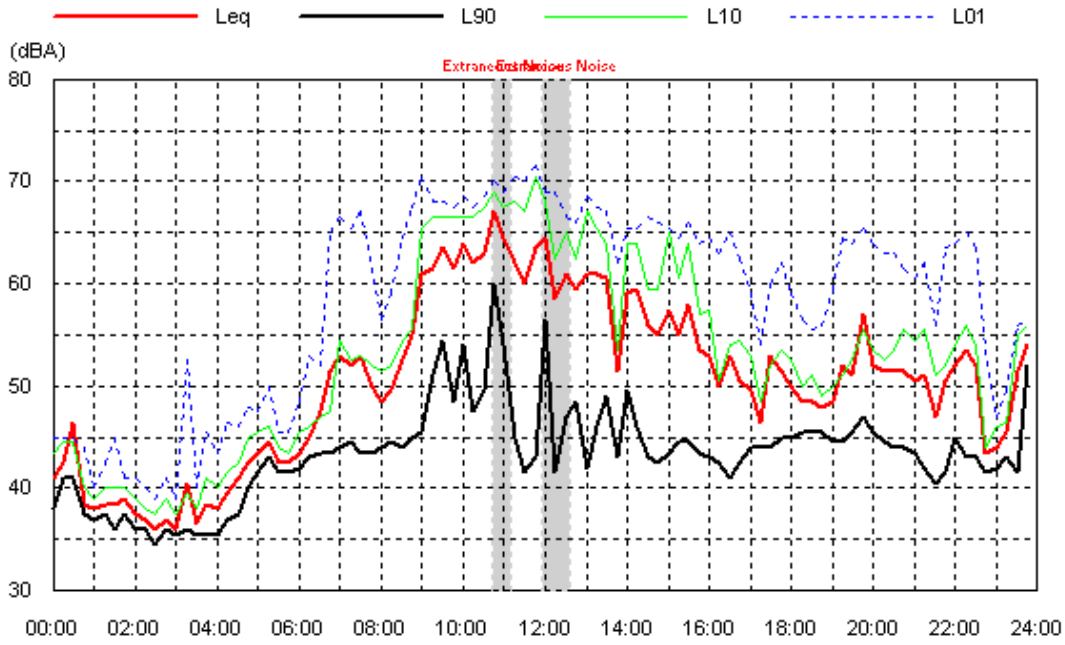

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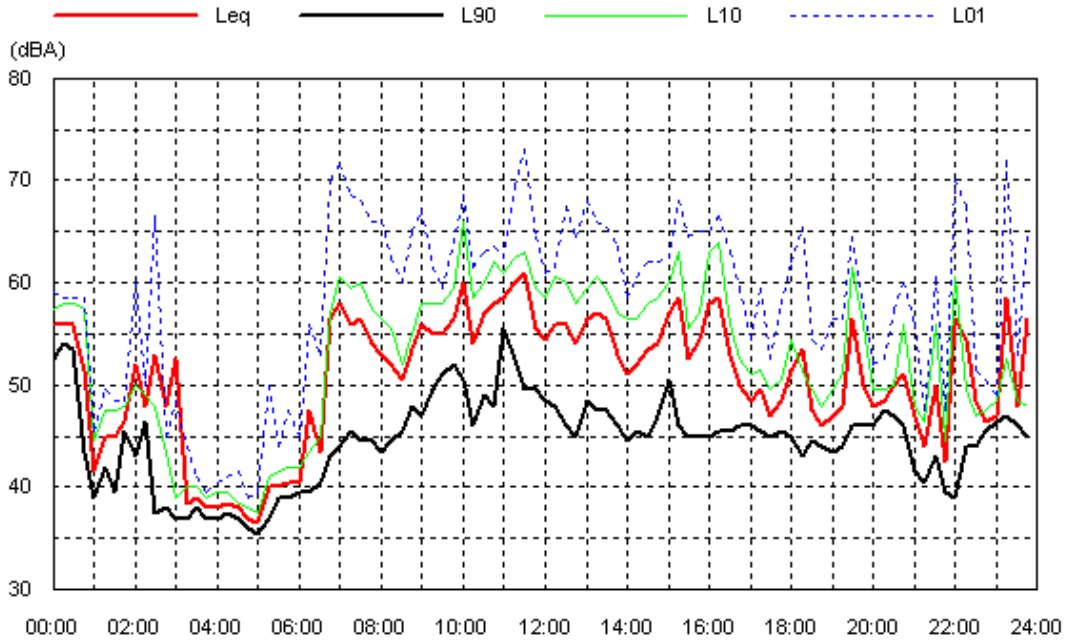

Location: 26 Elouera Crescent, Moorebank
Data shaded: Extraneous Noise; Wind; Rain

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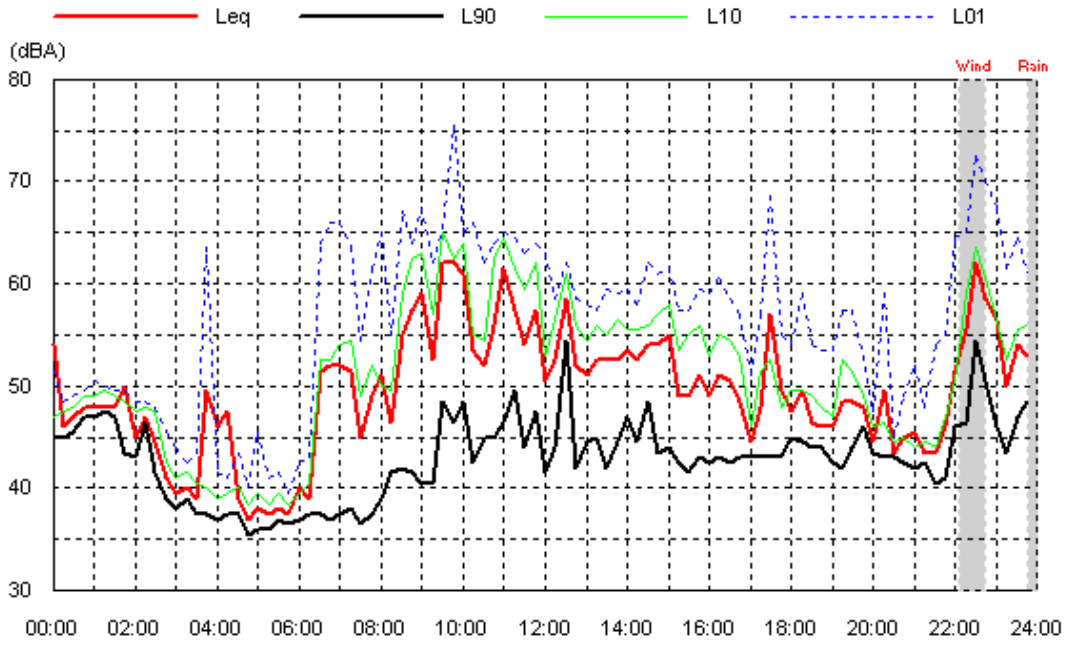

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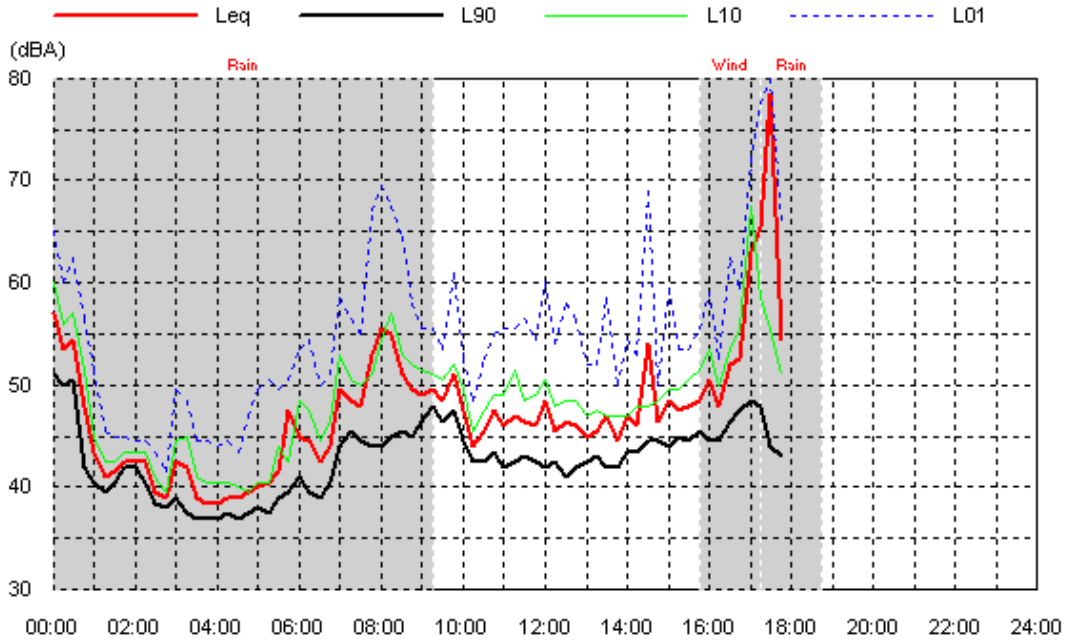

Location: 41 Martin Crescent, Milperra
Data shaded: Extraneous Noise; Wind; Rain

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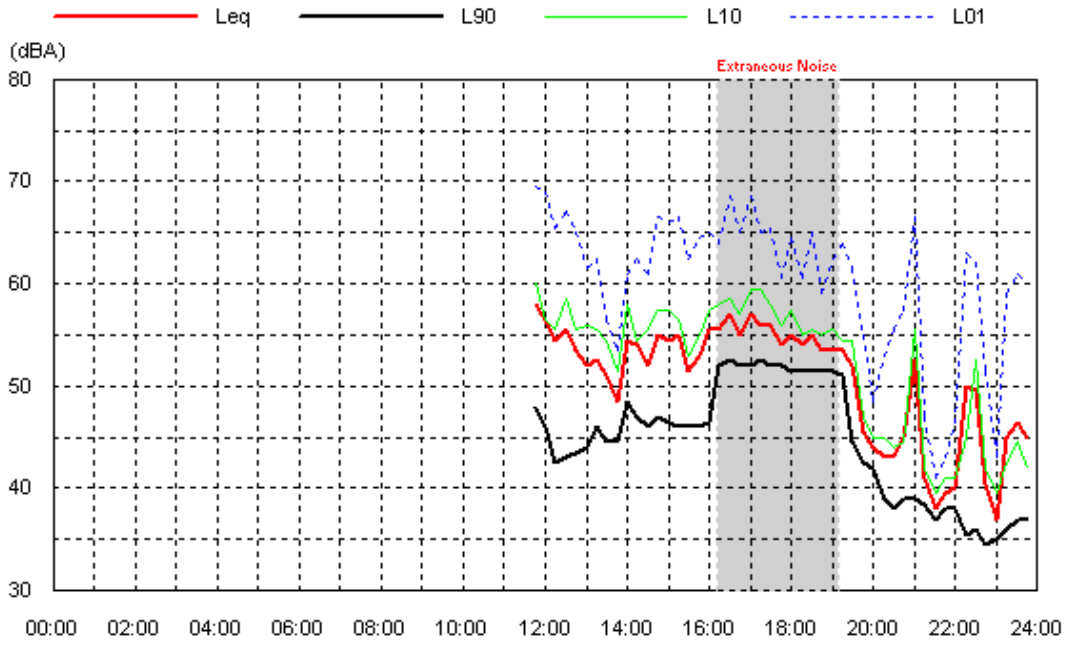

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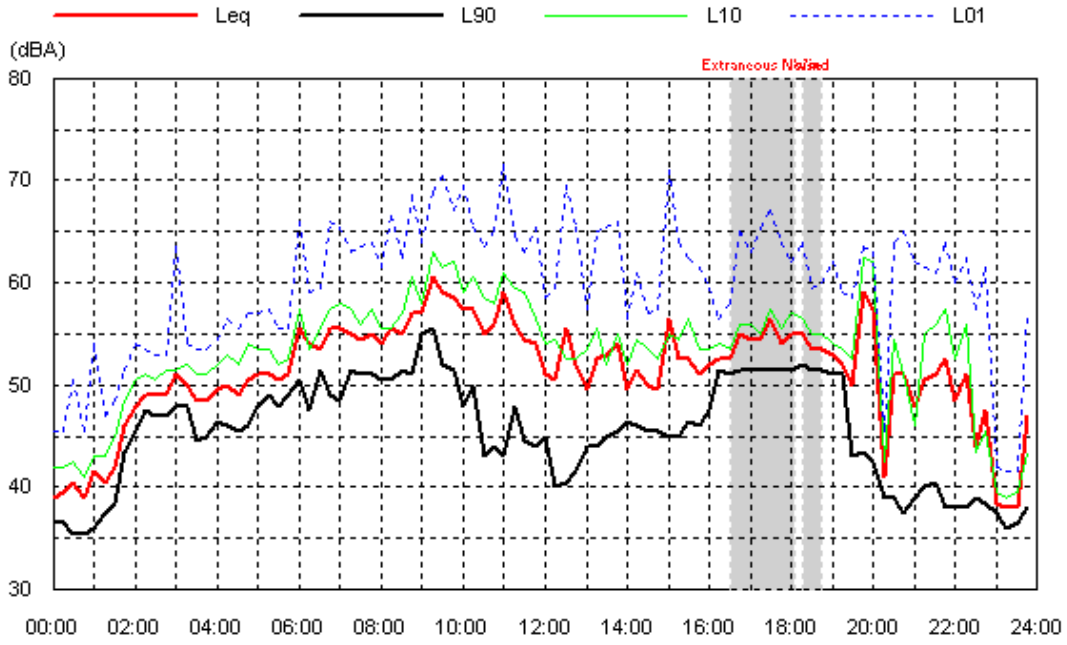

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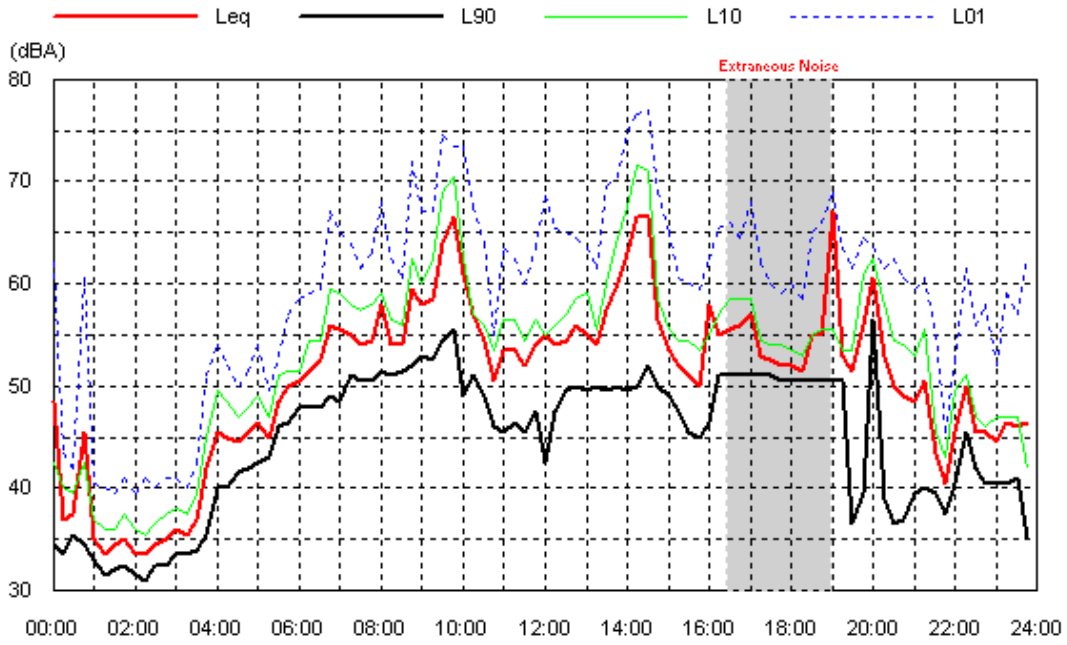

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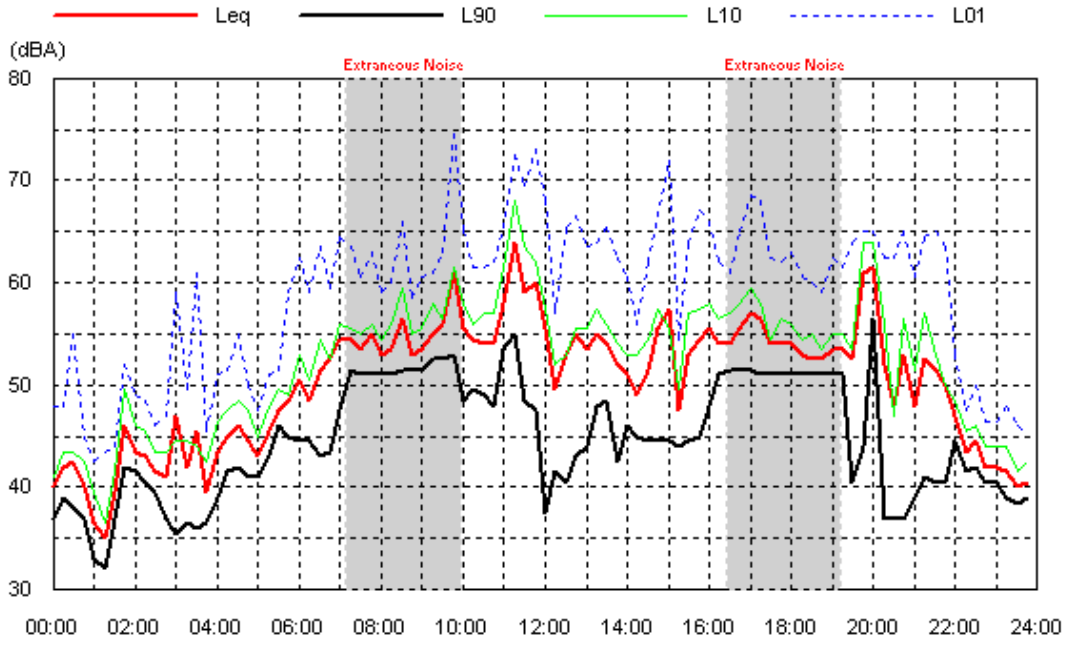

Location: 41 Martin Crescent, Milperra
Data shaded: Extraneous Noise; Wind; Rain

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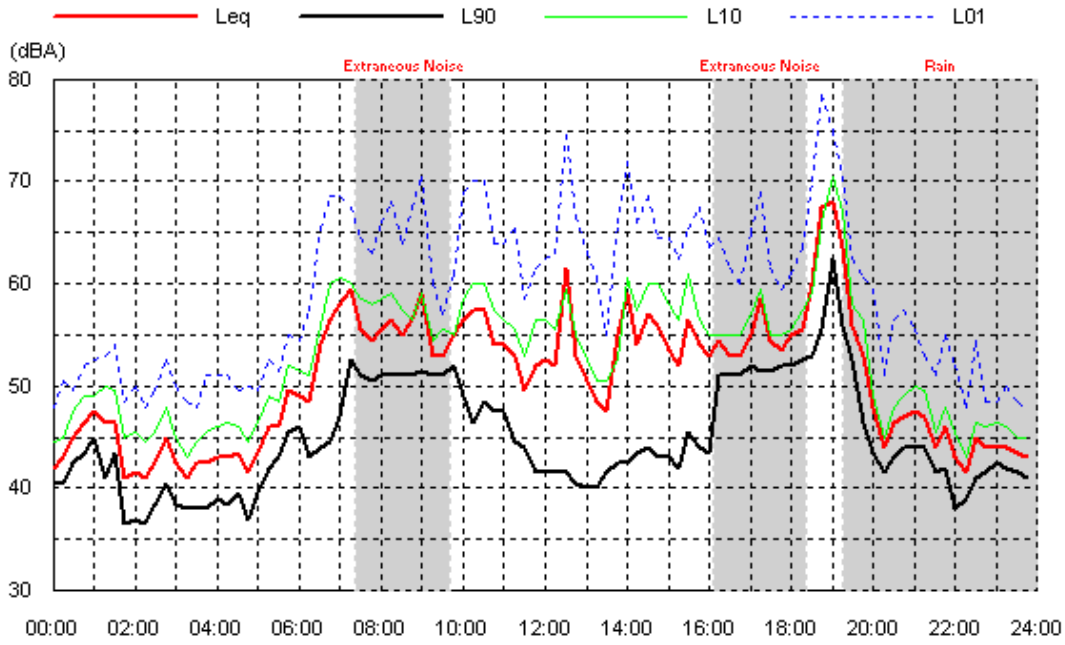

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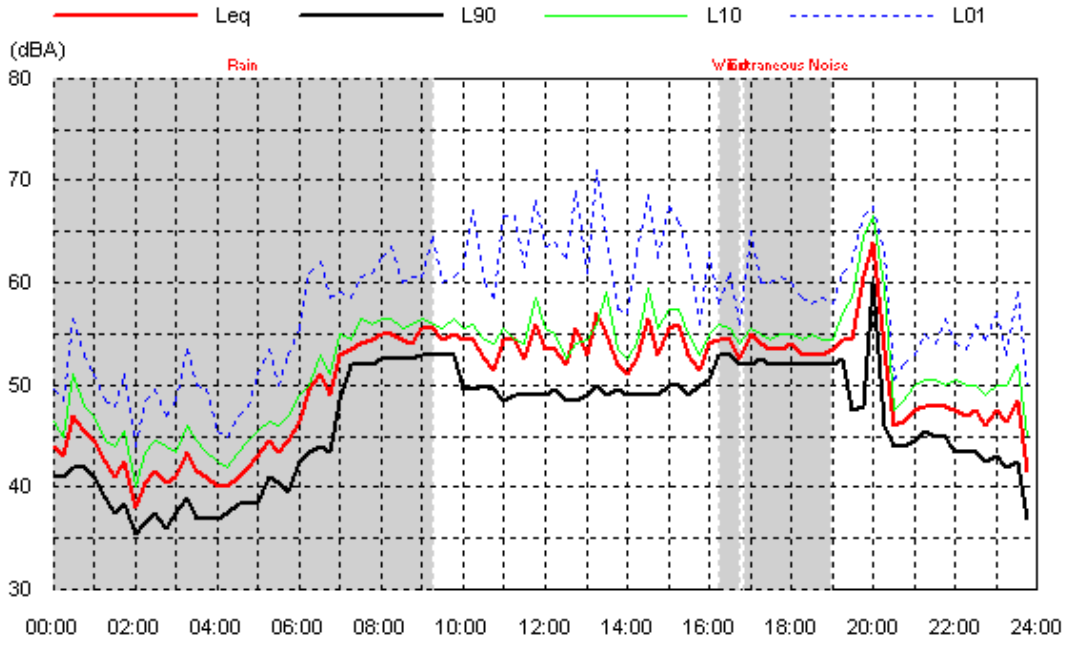

Location: 41 Martin Crescent, Milperra
Data shaded: Extraneous Noise; Wind; Rain

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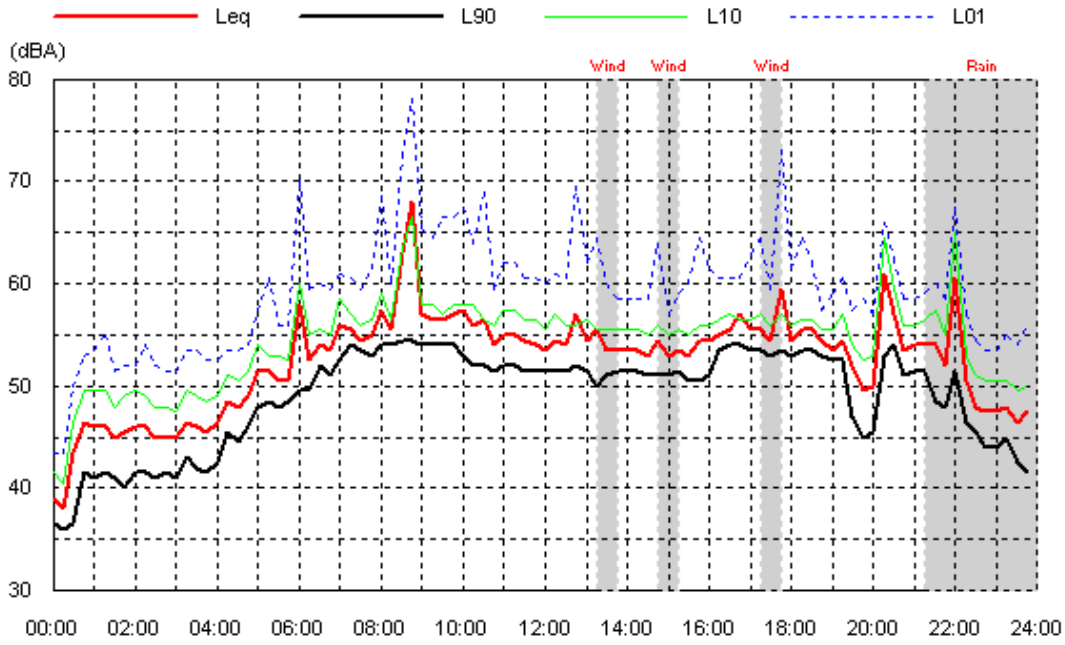

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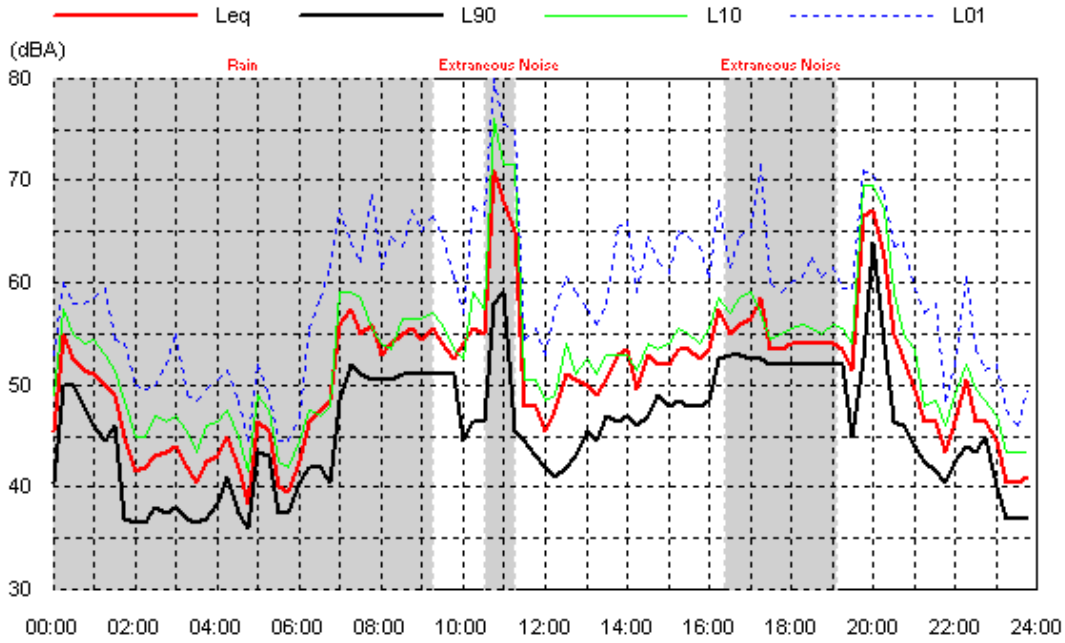

Location: 41 Martin Crescent, Milperra
Data shaded: Extraneous Noise; Wind; Rain

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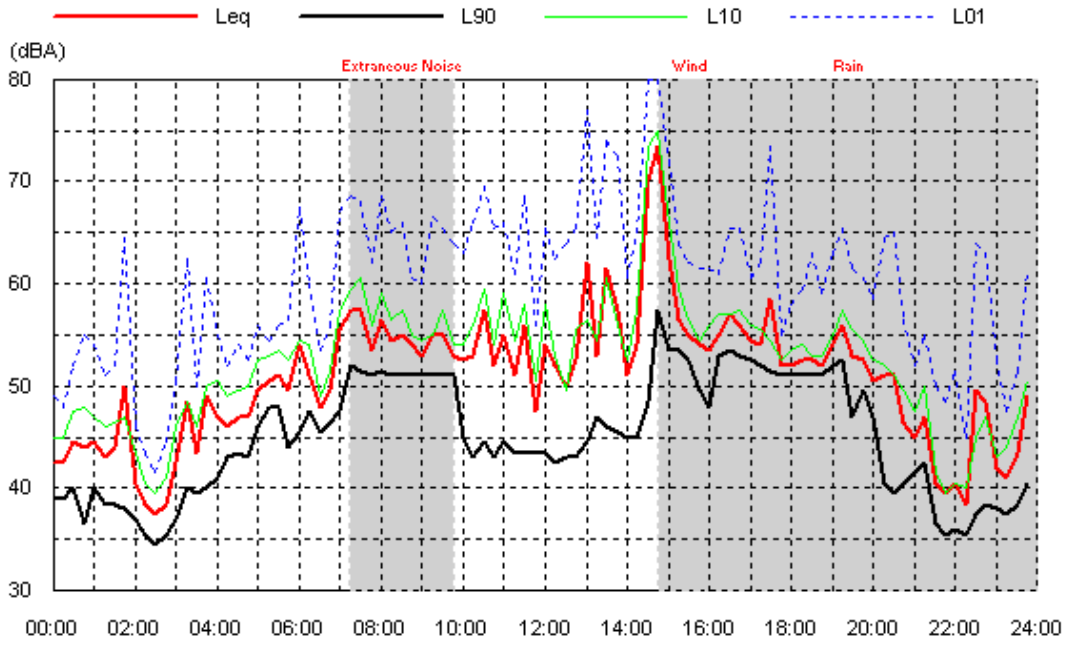

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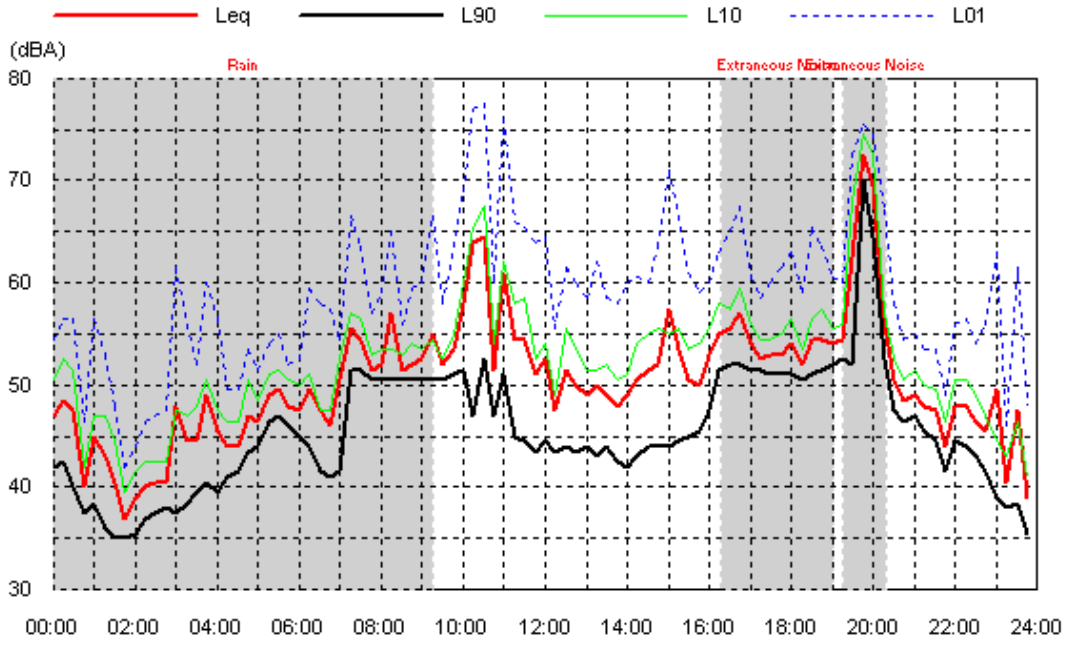

Location: 41 Martin Crescent, Milperra
Data shaded: Extraneous Noise; Wind; Rain

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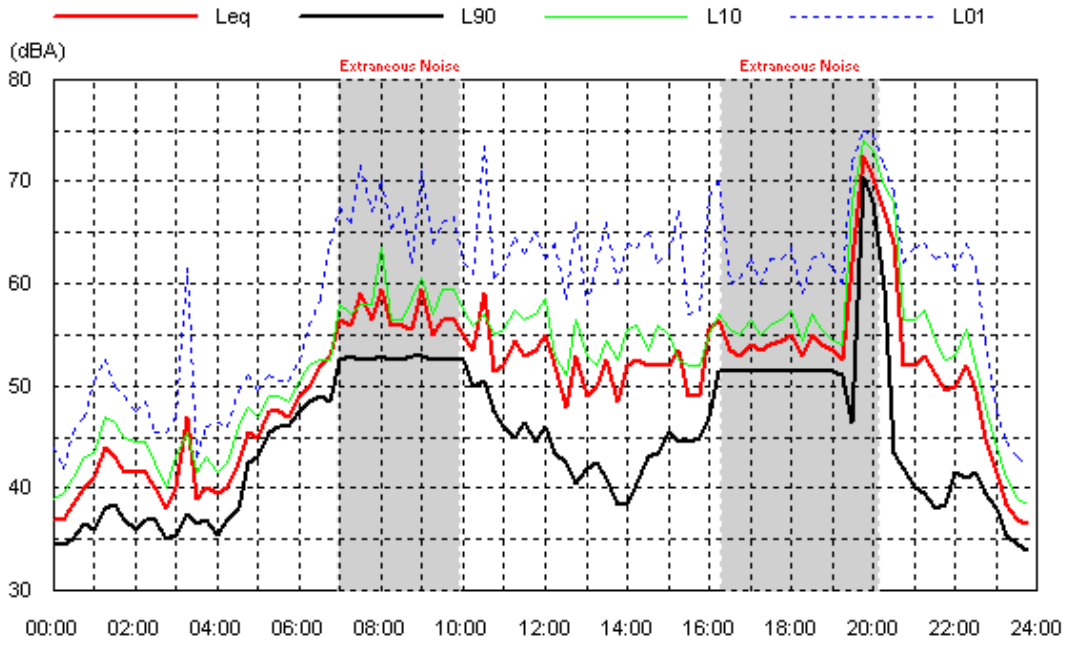

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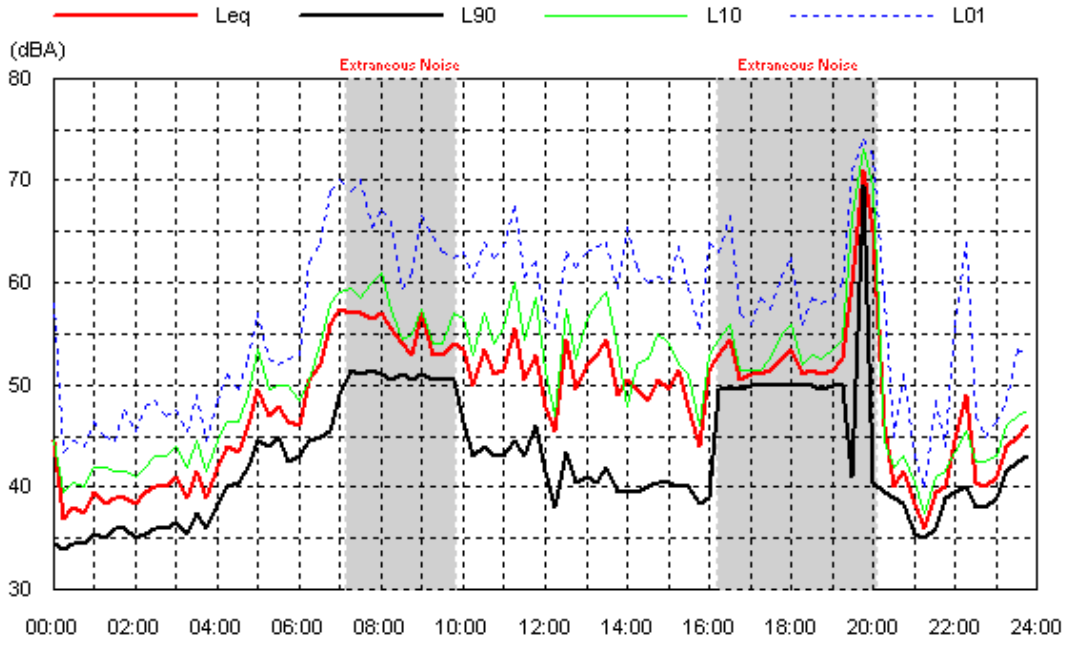

Location: 41 Martin Crescent, Milperra
Data shaded: Extraneous Noise; Wind; Rain

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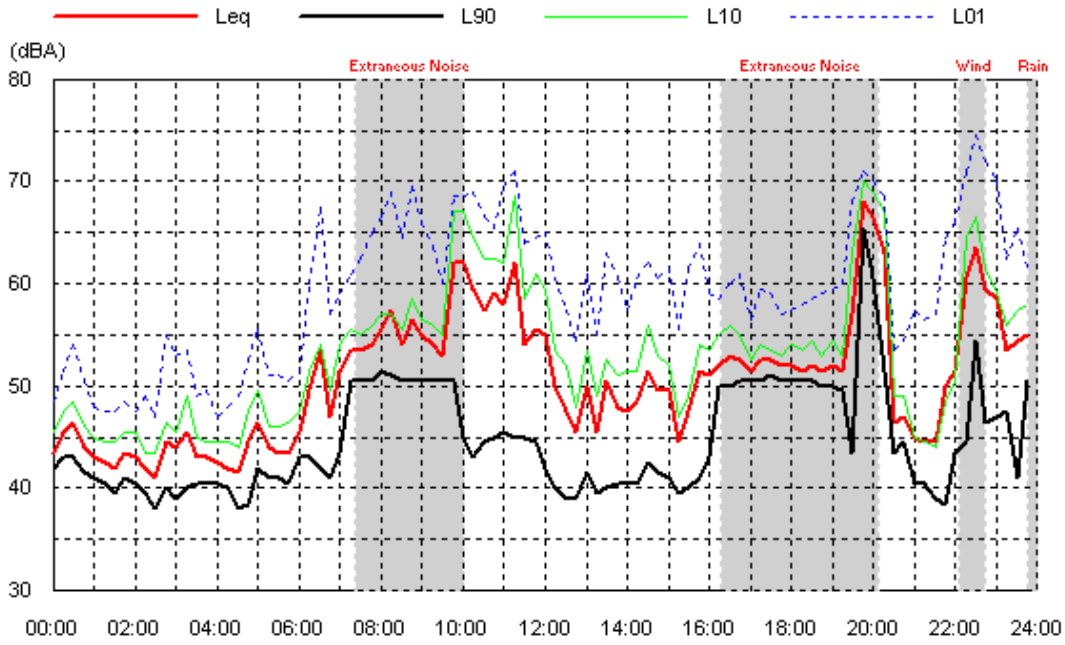

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