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ELG130-C2.01.3-002

28 March 2014

Mr Ashley Cheong
Planning Officer
Major Projects Assessment
NSW Department of Planning and Infrastructure
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SYDNEY NSW 2000
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ELGAS LIQUID PETROLEUM GAS STORAGE CAVERNS FACILITY – PROPOSED MODIFICATION – LIQUID PETROLEUM GAS PIPELINE (DA NO. 463/93 MOD 1) – RESPONSE TO SUBMISSIONS

Dear Ashley,

On behalf of Elgas Ltd (Elgas), the proponent, we provide the following response to the matters raised the submissions responses received from the various agencies and stakeholders contacted by yourself at the NSW Department of Planning and Infrastructure (DPI) with regard to DA No. 463/93 MOD 1.

Our response relates specifically to the issues raised by the NSW Environment Protection Authority (EPA) dated 25 February 2014, Randwick City Council (Council) dated 4 March 2014 and WorkCover Authority of NSW (Workcover) dated 19 March 2014. The issues raised by the EPA, Council and WorkCover are shown in italics and addressed below. Additionally, in response to the issues raised, an updated Statement of Commitments (Table 6.1 of the Environmental Assessment (EA) is provided in Attachment 1.

It is acknowledged that responses were also received from Roads and Maritime and NSW Ports and no issues or concerns were raised by either party which require a response from the proponent.

NSW EPA

SUMMARY ISSUE

Additionally, the EPA notes that the Environmental Assessment includes Appendix D entitled Proposed LPG Pipeline from Elgas Cavern to Qenos Hydrocarbons Terminal, Port Botany' prepared by Arriscar Pty limited dated 13 January 2014 ('Arriscar Report'). Section 3.2 of the Arriscar Report identifies 'Proposed control Measures' for the construction and operation of the pipeline. Proposed control measures include 'Gas detection and Alarm' and Leak Detection System'.

It is not clear in the Environmental Assessment whether and how the control measures in the Arriscar Report will be adopted.

RESPONSE

Further assessment and design progressed since the preparation of the Arriscar Report with regard to the Gas Detection and Alarm system has concluded that Elgas will install a gas detector in the culvert under Friendship Road which will alarm at the control rooms of Elgas and NSW Ports. The procedure would then result in the alarm being investigated and the pipeline shutdown if required. It should be noted that the assessment noted as 'under review' in the Arriscar Report, concluded that the gas detector in the pit on Charlotte Road was not required.

With regard to the leak detection system, this will operate by monitoring the pressure in the pipeline via the pressure transmitters at the Cavern and Qenos ends of the pipeline. Any reduction to system pressure will alarm via the PAL at both control rooms, which will be immediately investigated and the pipeline shutdown if required. A low low pressure detection (PALL) will result in Emergency Shutdown and the closure of the emergency isolation valves.

The impending detailed design phase of the project will entail updating the design drawings provided in the EA to show detail of the Gas Detection and Alarm and Leak Detection System to be installed by the construction contractor. Elgas is committed to ensuring these safety mechanisms will be installed as part of the standard pipeline operation to achieve the required safety standards in accordance with the Arriscar Report (dated 13 January 2014, as attached to the EA, Appendix D).

RANDWICK CITY COUNCIL

SUMMARY ISSUE

Construction Noise Management – Construction operation during the early morning period

Council acknowledges that certain construction activities will require works to be undertaken at 6am Monday to Saturday. Council raises concerns that early morning construction noise activities in conjunction with general port related activities may have a significant impact on residential receivers within the area.

Council therefore recommends that a condition is included in the development consent to ensure a Construction Noise Management Plan is developed and addresses the following criteria prior to any early morning construction operations;

- ***Confirm acoustic measurements from the proposed construction operations (specific construction activities including vehicle movements on site) in conjunction with other related early morning port activities, at the nearest affected residential dwellings meet the requirements of the NSW Industrial Noise Policy. Should quieter activities be undertaken during this early morning period, the activities should be outlined in the Construction Noise Management Plan.***

- ***Confirmation of compliance with DECCW Interim Construction Noise Guidelines and the NSW EPA Industrial Noise Policy Requirements.***

Monthly acoustic measurements should be undertaken when early morning construction activities are being conducted. Considering noise from construction activities varies, depending on the type of activity being undertaken, an acoustic assessment should be undertaken at commencement of each new construction activity proposed during the early morning activities.

RESPONSE

Section 5.5.1 of the EA notes there is a distance which separates the proposed works from the nearest sensitive receptors. The distance from the nearest sensitive noise receptors is 1.4 km away at the Botany Cemetery and to the south-east residential properties in Yarra Road and Elaroo Avenue, Philip Bay, approximately 1.8 km away from the proposed works. Section 5.5.2 of the EA addresses the potential for low significance noise and vibration impacts upon these sensitive receptors during construction, acknowledging the short construction period requiring a limited number of potentially noise-generating construction activities. Section 5.9.2 of the EA also addresses the very small number of vehicle movements which are anticipated for the duration of the proposal, including very limited heavy vehicle movements (an estimated four per week).

The Statement of Commitments in the EA commits to scheduling the nosiest activities during recommended standard construction hours as per the EPA's Interim Construction Noise guideline. The proponent also commits to ensuring that works using noise-generating machinery is operated in the shortest possible timeframe, to be scheduled during the day time on week days. These commitments are to form part of the CEMP prepared by the construction contractor.

The proponent acknowledges that Council's concern is particularly relating to the potential impact of construction noise activities in the early morning. It is also noted that this concern relates to noise generated in conjunction with other Port related activity. The proponent requests that DPI considers that Elgas has very limited influence upon the noise generated by other Port-related activities, however, are committed to limiting the impacts of their proposed works upon the local environment during the short-timeframe.

The proponent believes that the updated Statement of Commitments made in Attachment 1 (inclusive of revised construction hours) are adequate to mitigate any potential noise impacts generated by the construction of the proposal upon the local community during early morning given the minor nature of the proposed works. Furthermore, the project would comply with DECCW Interim Construction Noise Guidelines and the NSW EPA Industrial Noise Policy Requirements and as such monthly acoustic measurements and further acoustic assessments are not warranted during construction.

SUMMARY ISSUE

Noise emanating from the operations of the development

The Environmental Assessment advises that a Noise Impact Assessment was undertaken by EMS Pty Ltd in May 2013. This assessment confirmed that noise and vibration from the current operations complies with the requirements of the NSW Industrial Noise Policy and the proposed development is likely to comply with the noise criteria of the Industrial Noise Policy. However, Council remains concerned about the cumulative noise emissions from NSW Port activities which is significantly impacting the neighbouring residents.

The proposed development may conclude that the noise from this specific operations will comply with the relevant noise criteria however when it is assessed in conjunction with other port activities, noise levels may exceed the relevant amenity noise criteria outline in the Industrial Noise Policy and may have a significant impact on the local residents especially during the night time period. It is therefore recommended that the consent includes a condition of consent to ensure an acoustic assessment is undertaken prior to operation of the proposed development.

RESPONSE

The proponent acknowledges Council's concern regarding the cumulative impacts of noise with other Port operations, particularly in the night-time period, however, as noted in Section 5.5.2 of the EA, the proposed operation would not require any mitigation due to the pipeline design and would comply with the Industrial Noise Policy Criteria.

The proposed pipeline design is described in Section 2 of the EA and in the attached drawings in Appendix B. The proposed pipeline design has been engineered such that it would not require any additional noise-generating equipment once in operation. Furthermore, once the pipeline is filled with LPG, it will be under pressure and loaded suitable for use at all times (24 hours, 7 days). It can therefore be assumed there would be limited, if any, cumulative effect upon the noise accumulated from all other developments in the Ports during day time or night time periods.

Furthermore, the proponent currently undertakes biennial acoustic assessments of the existing Cavern Facility, which are supplied to Council, following the Noise Impact Assessment undertaken under the original Development consent conditions (DA No. 463/93, Schedule B, Condition 33), which recommended that ongoing surveys are undertaken every two years. The Noise Impact Assessment undertaken by EMS (2013) (refer to Attachment 2) demonstrates that the existing noise generated by the Elgas site is minimal given the distance to sensitive receptors and thus complies with the noise criteria in the Industrial Noise Policy. The Noise Impact Assessment also recommends management measures which have been adopted by Elgas during the operation of the Cavern facility that will continue with the modification. The Noise Impact Assessment has been included as Attachment 2 to this letter for Council / DPI's reference.

In light of this information, the proponent does not agree that an additional acoustic assessment for the pipeline prior to operation is warranted. The proponent requests that DPI consider the minimal impact of the pipeline design during operation and compliance of the existing Cavern facility in developing the consent conditions for the proposed modification.

SUMMARY ISSUE

Council recommends that a Groundwater Management Plan considers and complies with the requirements of the Australia New Zealand Environmental Conservation Council Guidelines (ANZECC 2000) and the National Environment Protection (assessment of contaminated sites) Measures 2013, prior to the discharge of site stormwater or ground water into Botany Bay.

It is also recommended that all soil and water quality monitoring results and reports for the dewatering discharge are provided to the relevant authorities for information and review.

RESPONSE

The proponent supports a condition of consent that addresses this issue. Elgas commits to ensuring the requirements set in the ANZECC guidelines and *National Environment Protection (assessment of contaminated sites) Measures 2013* would be met in the event that the discharge of water into Botany Bay is required. The updated Statement of Commitments in Attachment 1 reflects this commitment.

SUMMARY ISSUE

Contaminated Land SEPP 55

Under the provision of SEPP55 contaminated land must be considered and the land made suitable for the intended use prior to the commencement of any works. Consideration should be given if contaminated soils are to be removed as part of the undergrounding of pipelines.

RESPONSE

Appendix F, Section 3.4.3 and Section 5.2 of the EA acknowledge that no sites of deemed contamination have been identified in the proposed works area, however, a small risk potential exists for contaminated soils to be encountered due to the industrial nature of the land. Compliance with the requirements of State Environmental Planning Policy (SEPP) 55 contaminated land has been committed in the Statement of Commitments in the EA, which include provisions for a contingency plan to provide guidance in the event that contaminated soils are encountered.

The final CEMP prepared by the construction contractor will include measures to address the removal of contaminated soils as part of the undergrounding of the pipeline.

WORKCOVER AUTHORITY OF NSW

SUMMARY ISSUE

Should the proposal be approved the suggested conditions of approval are:

1. ***Prior to the commencement of detailed design and hazard/risk related studies, the proponent must consult with WorkCover with regard to complying with the regulations applicable to Major Hazard Facilities (clauses 534 and 569 of the Work Health and Safety Regulations 2011) and agree on the extent of revision of the site Safety Case associated with the MHF conditional licence granted by WorkCover on 4 March 2014. The proponent must comply with all requirements provided by WorkCover.***

2. ***Prior to the completion of detailed design, of the LPG Pipeline, the proponent must provide an outline to WorkCover with regard to following the Management of Change procedure as described in the Elgas Safety Management System.***

RESPONSE

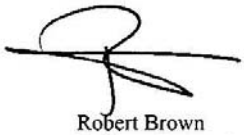
A follow up phone call was made to WorkCover on 21 March 2014 to discuss the abovementioned comments and the proponent has no issue with this request.

The proponent supports the abovementioned conditions of consent recommended by WorkCover.

However, the proponent has progressed a number of health and safety studies as per in Section 3.4.2 and Appendix D of the EA, which may partially meet the requirements of these two conditions.
We trust that this response provides sufficient information and enables DPI to proceed with their assessment of the modifications proposed under DA No. 463/93 MOD 1.

Should yourself or others require any further clarifications on the response provided please do not hesitate to contact our Environmental Scientist, Lara Mottee (02 8284 2030 or lara.mottee@kbr.com).

Yours sincerely



Robert Brown
Kellogg Brown & Root
Senior Project Manager

Attachment 1: Updated Statement of Commitments
Attachment 2: EMS 2013, Impact Noise Assessment

Attachment 1 – Updated Statement of Commitments

In response to the submissions, an updated Statement of Commitment has been prepared in this attachment where indicated by an asterix (*).

Other commitments detailed below made in the EA remain unchanged and have been included for completeness.

Table 6.1 Statement of Commitments

Objective	Action	Timing

Minimise Impacts to Soil	• A soil management strategy to be prepared that details how excavated spoil will be managed on the site, including contaminated soil. The plan is to include stockpile locations as well as stormwater management measures.
	• A contingency plan to provide guidance should either acid sulphate soils or contaminated soils are encountered during works. This should make reference to the following guidelines:
	  • Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC & NHMRC)
	  • National Environment Protection (Assessment of Site Contamination) Measures 1999 (NEPC)
	  • Managing Land Contamination – Planning Guidelines SEPP 55 – Remediation of Land (DOP)
	  • Acid Sulphate Soils Assessment Guidelines 1998 (ASSMAC).
	• A frac-out contingency plan should be developed for use during the drilling works.
		Prior to and During Construction

Objective	Action	Timing

* Avoid and minimise impacts to Groundwater	• A groundwater management plan (as part of the CEMP) is to be developed to manage any dewatering works. The plan is to include suitable control measures for the collection, treatment (as necessary) and disposal of contaminated groundwater that may be pumped from excavations during construction.
	  • In the event that groundwater or site stormwater collected requiring dewatering is discharged into Botany Bay, the water discharged must meet the requirements of the *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC & NHMRC)* and *the National Environment Protection (Assessment of Site Contamination) Measures 1999 (NEPC)*.
	• The CEMP is to include measures for managing spills or potential release of contaminated materials during the drilling works (e.g. frac-out situations).
	• A frac-out contingency plan to be developed for use during the drilling works
	• If the works encounter groundwater, it is unlikely to be of a sufficient volume to require an aquifer interference licence (as per the correspondence received from DPI (Office of Water) – Appendix C), however, monitoring during works should be undertaken to ensure this is the case.
	  • In the event that groundwater monitoring shows the works would intercept or extract 3 ML or more of water, the Office of Water is to be contacted and a licence must be obtained for the works.
		Prior to and During Construction

Minimise impacts to Surface Water	• The contractor is to ensure systems are in place to prevent pollution of waters from handling, transport and storage of liquids and to ensure that activities are undertaken in accordance with the *Contaminated Land Management Act 1997* (CLM Act), EPA guidelines and the POEO Act. Creating site specific tailored actions for staged construction activities would be the responsibility of the contractor and be portrayed in the CEMP.
	• Development of a frac-out contingency plan to protect nearby aquatic habitats
	• Use of the *Botany Bay Precinct Emergency Sub Plan 2011 (Major Hazard Facility – Port Botany South)*
	• Appropriate stockpile locations to be notified in the CEMP and development of stormwater management plan following relevant guidelines:
	  • *Managing Urban Stormwater: Soils & Construction (Landcom)*
	  • *Managing Urban Stormwater: Treatment Techniques (DECC)*
		During Construction and Operation

Objective	Action	Timing
	• *Managing Urban Stormwater: Source Control (DECC).* • Development of contingency plan for spill management: • *Technical Guidelines: Bunding and Spill Management (DECC).* • All machinery and equipment to be checked daily and maintained to ensure there are no oil, fuel or other liquids leaking. • A spill kit to be kept on site to manage any unexpected spills. • Update the Pollution Incident Response Management (PIRMP to include the LPG pipeline as part of the ELGAS Port Botany facilities.	
* Minimise impacts of noise and vibration	• The NSW EPA *Interim Construction Noise Guideline* (DECC, 2009) to be used to inform CEMP and management of construction noise. • Construction to take place between 7:00am and 6.00pm (Monday to Friday) and 7:00am to 4:00pm on Saturday, with the noisiest activities (such as horizontal drilling, truck and supply movements, use of generators, pumps, compressors and excavators and hand digging machinery) to be scheduled during recommended standard hours (DECC, 2009) of 7:00am to 6:00pm Monday to Friday and 8:00am to 1:00pm on Saturday. • Nearby commercial and industrial properties to be notified of works. • Noise generated by work equipment to comply with noise control standard AS 1055. • Works involving noise-generating machinery should be undertaken within the shortest possible timeframe, with minimum delays. All efforts should be made to schedule noisier work activities during the daytime on week days.	During Construction
Minimise air quality impacts through dust and Greenhouse gas emissions	• Best practice dust management practices to be included in the CEMP. These should include procedures for stockpile management, particularly during dry and windy weather conditions. • Vehicles to be maintained and operated efficiently, be serviced according to the manufacturer's specifications and be fitted with emission control devices complying with Australian Design Standards so as to minimise air emissions (including greenhouse gases). • Work machinery to be turned off when not in use and not left running or idling	During Construction

Objective	Action	Timing
Minimise impacts to flora and fauna	• Potential impacts from the works centre on the potential for run-off from the site, or contaminated groundwater to affect water quality in the adjacent Botany Bay. Therefore mitigation measures focus on managing storm-water run-off as well as reducing the potential for works to contaminate groundwater. Whilst it is unlikely that there would be a significant impact, management of site run-off and protection of groundwater will be subject to standard mitigation measures as detailed in Sections 5.3.3 and 5.4.3.	During Construction
Minimise impacts to unidentified items of heritage significance	• In the event that Aboriginal or European artefacts are discovered during works, all works should cease and the Contractor should notify ELGAS for further advice.	During Construction and Operation
Minimise impacts to traffic and access within Port and the surrounding road network.	• Consultation should be undertaken with NSW Ports in regards to the Traffic management requirements prior to the commencement of construction. Any requirements should be implemented into the CEMP or a Traffic Management Control Plan, if deemed required by NSW Ports. • Where possible, roads and pedestrian paths should not be obstructed during the construction works. The appropriate alternative access pathways and Traffic Controls should be enforced prior to the commencement of construction if obstructions cannot be avoided. • Signage should be placed on Friendship Road and Charlotte Road indicating the presence of construction works as per Australian Standards. • All vehicles should be parked off Charlotte Road and Friendship Road within the ELGAS property as far as practicable. • All work sites and any compound established should be secured when not in use to ensure the safety of landholders and the public and maintain security of materials and equipment.	During Construction

Objective	Action	Timing
* Encourage waste minimisation and management in accordance with the WARR Act	• The *Protection of the Environment Operations Act 1997* (POEO Act) defines waste for regulatory purposes and established management and licensing requirements. The *Protection of the Environment Operations (Waste) Regulation 2005* sets out the provisions covering the way waste is managed in terms of storage and transportation. • Waste management should consider the hierarchy of resource management in the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act). • Contractor waste management arrangements to include waste minimisation, containment, segregation and appropriate reuse, recycling, treatment and disposal. • Classification of waste as per the Environment Protection Authority (EPA) (DECC 2009a) guidelines • Adherence to the measures proposed for the management of potentially contaminated soil in this EA when determining the appropriate waste disposal methods.	During Construction, Post-Construction and Operation.

IMPACT NOISE ASSESSMENT

ELGAS
30 FRIENDSHIP ROAD, PORT BOTANY

PREPARED FOR

Mr Neil Tarin

ELGAS
Sydney LPG Cavern Site
30 Friendship Road
Port Botany 2036

MONITORING PERIOD

24 - 29 May 2013

CONTRACT NO C13 6139
REPORT NO EMS 13 1665

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1 Introduction

1.1 Project Description

EMS Pty Ltd was employed by ELGAS to provide a Noise Impact Assessment for the Sydney LPG Cavern site located on 30 Friendship Road, Port Botany. The noise impact assessment will monitor noise emitted from the unloading operation of the large tanker ships for the duration of the assessment, including night time.

The Sydney LPG Cavern is a subterranean rock cavern and is used to store up to 65,000 tonnes of Liquefied Petroleum Gas (LPG). LPG is received into the terminal from refrigerated LPG ships with the product being heated on site prior to entry into the LPG cavern. The Cavern has the capacity to load vessels with pressured storage tanks and load road tankers.

The purpose of this noise report is to provide the noise measurement of the large tanker ships loading operation and ensure the noise emitted from the site does not affect nearby noise sensitive areas. The report will also provide noise prediction from the site to the assessed noise sensitive areas and will recommend noise mitigation strategies if noise levels exceed the appropriate noise criteria.

The Impact Noise Assessment will be conducted in accordance with the OEH's Industrial Noise Policy NSW. This Policy provides procedure guidelines for noise measurements, establishing the appropriate noise criteria on site and noise mitigation strategies.

1.2 Site Location

The ELGAS site is located on the north-western edge of Point Molineux at Port Botany, NSW. The ELGAS site is located in an industrial zoned area with container loading docks to the north, and bulk liquid storage tank areas to the east of the site. The western edge of the site is bound by Botany Bay, with a sea wall and Fishburn Road separating the site from the water's edge. The site is surrounded by industries and distantly separated from residential areas or commercial operations.

The ELGAS site has a total area of 7.1 hectares with storage caverns consisting of 4 by 230 metre long galleries each with 11 metres high by 14 metres wide caverns stored 135 meters below ground. The loading equipment consists of three road tanker loading bays and operates 24 hours a day, seven days a week.

The operations conducted at the ELGAS site include:

- Conducting and supervising the loading of the Sydney LPG Cavern from sea-going LPG tankers. This includes importing gas from the bulk liquid birth via ELGAS pipelines, booster pumps and LPG heater.

- Conducting and supervising the transfer of LPG from the Sydney LPG Cavern storage facility into pressure type sea-going LPG tankers of size usually around 2000 tonnes.

- Conducting and supervising the loading of LPG from the Sydney LPG Cavern into LPG road tankers at the Road Tanker Loading Facility.

- Drying and odourising of the LPG product during transfer to LPG Road Tankers.

- Auxiliary Equipment operation includes:

    - Marine Unloading Arm
    - Propane Booster Pumps
    - Propane Heater
    - Submerged Seepage Water Pumps
    - Submerged Propane Pumps
    - Water Stripping Plant
    - Propane Dryers and Regenerators
    - Propane Odourising Facility
    - Fire Water System
    - Gas Detection System
    - Water Deluge System
    - Cold Vent Stack
    - Computer Control Systems
    - Vapour Recovery

The nearest residential premises are located at the caretaker's residence at the Botany cemetery which is located approximately 1.4 km in distance from the ELGAS Site. The unattended noise monitoring was conducted on Military Rd, Matraville adjacent to the cemetery boundary.

The closest residential properties to the south-east are located in Yarra Road and Elaroo Avenue, Phillip Bay and are approximately 1.8 km in distance from the ELGAS site across Yarra Bay. The unattended noise monitoring was conducted on the balcony of the Yarra Bay Sailing Club, Kooringai Avenue, Yarra Bay.

The Map below displays the ELGAS site labelled red and the two unattended noise monitored sites labelled blue

Map was provided by Google Maps

2 Noise Monitoring

2.1 Unattended Noise Monitoring

Unattended noise monitoring was conducted continuously between 24th and 29th of May 2013 using two ARL 215 noise loggers. The units were calibrated prior to and after monitoring, and no significant drift was found.

The noise loggers were set to record 'A' weighted statistical sound pressure levels (SPL) with 15 minute intervals using a 'fast response.' The microphones of the noise logger were located approximately 1.2 meters from the ground.

The noise monitoring was conducted in accordance with AS 2659.1 (1988) Guide to the Use of Sound Measuring Equipment.

The noise loggers collected the L_{Aeq}; this represents the level of noise equivalent to the energy average of noise levels occurring over a measurement period. The L_{A10} was also obtained; this is the sound pressure level that is exceeded for 10% of the measurement period.

2.2 Hand Held Noise Monitoring

Attended noise measurements were undertaken on Monday 27 May 2013 while the supply ship was berthed and was unloading gas into the cavern. Attended noise measurements were conducted during that day as it is during these monthly operations when most of the onsite plant and machinery is generating the most amount of noise.

Attended noise measurements were carried out using a Bruel & Kjaer 2260 Investigator – Modular Precision Sound Analyser. The measurements were conducted with the meter set to "fast" response. The meter was calibrated before and after the measurement period using a Bruel & Kjaer Type 4231 calibrator. No significant drift in calibration occurred during the measurement period.

3 Noise Criteria

3.1 Policy and Guidelines

The impact noise assessment was conducted in accordance with the 'Industrial Noise Policy NSW' to assess the noise level from the unloading activities at the ELGAS site. This Standard provides guidelines for the assessment and noise mitigation strategies if the level exceeds the noise threshold. The main aims for this policy are:

- To establish noise criteria that will protect the community from excessive intrusive noise and preserve amenity for specific land uses.
- To use the criteria as the basis for deriving project specific noise levels.
- To outline a range of mitigation measures that could be used to minimise noise impacts.

3.2 Relevant Noise Criteria

The establishment of a noise criterion for the noise sensitive locations is outlined in the Industrial Noise Policy. The Standard states an additional 5dB is to be applied to the Rating Background Level collected from the each noise sensitive site.

The background noise level is defined as the underlying level of noise present in ambient noise when all unusual extraneous noise is removed. The background noise is represented by the L_{A90} noise measurement. This statistical measurement is the sound pressure level that exceeds 90% of the measurement period.

The Rating Background Level (RBL) is the overall single-figure background level representing each assessment period (day/evening/night) for the site.

4 Results

4.1 Unattended Noise Monitoring Results

Table 4.1 and 4.2 outlines the L_{Aeq} unattended noise measurement results of the unloading activities at ELGAS between 24 and 29 May 2013. Table 4.1 outlines the noise results monitored on the balcony of the Yarra Bay Sailing Club and Table 4.2 outlines the noise results monitored on Military Rd, Matraville adjacent to the cemetery boundary.

The noise results are categorised by the time of each day. Day time period is represented as 07:00am to 18:00pm, evening time is 18:00pm to 22:00pm and night time is 22:00pm to 07:00am. The noise results are compared against the noise criteria of each site.

The weather conditions during the monitoring period may have affected the noise measurement (see Table 4.3). Noise can be increased due to strong winds over 18km/h and may generate more noise through mechanical interaction with trees and other obstructions.

Strong wind conditions are found on the 24th and 27-28th May 2013. These results are marked with grey boxes below and are to be excluded when comparing to a criteria.

Table 4.1 – L_{Aeq} Impact Noise Assessment Yarra Bay Sailing Club (on the balcony)

	24 May	25 May	26 May	27 May	28 May	29 May	Criteria
Day (7am-6pm) L_{Aeq}	54.6	56.1	**63.6**	64.3	53.4	46.4	57
Evening (6pm – 10pm) L_{Aeq}	59.7	57.6	**72.4**	64.8	52.6	-	59
Night (10pm – 7am) L_{Aeq}	56.5	53.5	**61.1**	59.8	51.7	-	56

Table 4.2 – L_{Aeq} Impact Noise Assessment Military Road, Matraville (adjacent to cemetery boundary)

	24 May	25 May	26 May	27 May	28 May	29 May	Criteria
Day (7am-6pm) L_{Aeq}	53.1	55.2	55.4	60.9	60.2	57.2	57
Evening (6pm – 10pm) L_{Aeq}	58.2	56.1	55.3	57.7	57.7	-	56
Night (10pm – 7am) L_{Aeq}	56.9	54.8	56.5	57.7	58.5	-	56

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Table 4.3 outlines the rain and wind measurements taken at the closest weather monitor found at the Sydney Airport AMO NSW from the Bureau of Meteorology.

Table 4.3 – Relevant Weather Conditions during Monitoring Period

Date	Rainfall mm (24 hr to 9 AM next day)	Wind Speed km/h (9 AM)	Wind Speed km/h (3 PM)
24/05/2013	8.8	30	31
25/05/2013	8.8	15	17
26/05/2013	0	15	7
27/05/2013	0.2	13	30
28/05/2013	6.0	9	26
29/05/2013	0.2	13	13

4.2 Impact Noise Results

Noise measurements near the operating machinery at the ELGAS site were conducted to assist in the noise prediction assessment. The impact noise assessment was conducted on 27 May 2013 and was carried out for several minutes at each location.

Table 4.4 outlines the noise results collected from the machinery at the ELGAS site.

Table 4.4 – Hand-held measurement of Site Machinery

Equipment Item	Measurement distance	Noise Level dB(A)
Supply Ship Unloading	80	62.1
Single Road Tanker Loading (Rotor Gauge audible)	7	68.1
3 Road Tankers Loading	7	66.5
Booster Pump – P201A	7	77
Kaldair Heater	7	75.3
Compressor House (electrical supply)	7	64.2
Main Supply Pipe	7	63.3

4.3 Noise Prediction

The predicted noise levels generated by the operations of the LPG facility to the nearest residential premises are detailed in Table 4.5 below. The predicted noise levels were calculated by taking the worst case scenario noise on site i.e. 77 dB (A) and then taking distance attenuation of noise into consideration to the nearest residential occupancies.

Table 4.5 - Predicted noise levels to the nearest sensitive receivers

Nearest Sensitive Receiver (NSR)	Distance to ELGAS site	Distance attenuation dB(A)	Predicted Noise Level at NSR dB(A)
Residents in Yarra Road and Elaroo Avenue, Phillip Bay	1.8 km	48	< 30
Caretakers house Botany Cemetery	1.4 km	46	31

As shown from the above calculations, the noise levels generated from the ELGAS site to the nearest sensitive receivers will comply with the noise criteria because of the long distances between the ELGAS site and the nearest sensitive receivers.

5 Discussion

5.1 Noise Analysis

The noise levels occurring at the Yarra Bay Sailing Club are generally higher than they have been on previous occasions, in particular Sunday 26 May 2013. This is most likely due to a function being underway, as well as possible nearby social activities near to the monitor. The balcony may have likely been used, as there was no rain and would have been a factor in where people chose to locate themselves as compared with the previous days.

Noise from strong winds on 24 May and 27-28 May 2013 may have impacted on the noise results by increasing the noise level and these excluded results are marked by shaded grey columns in Tables 4.1 - 4.3.

The impact noise assessment was conducted in accordance with the Industrial Noise Policy NSW. Based on the noise measurement results and the noise prediction, the noise level emitted from the ELGAS site is within the noise criteria of each monitored site.

5.2 Noise Management

Noise mitigation to reduce noise impacts on the community surrounding the ELGAS site are not required as there is adequate distance for noise attenuation between the site and the nearest sensitive receivers. The above noise impact assessment has shown that the activities on site will have minimal impact on the nearest sensitive receivers.

The following noise management measures should be adopted as best practice and to minimise noise generation from the facility:

No noisy maintenance works which may be heard at the nearest residential properties should be conducted on the site between the hours of 10pm and 7am.

All night time deliveries should travel to and from the site via Friendship Road, Bumborah Point Road and Botany Road.

The machinery on site, especially the booster pumps and the heater pumps, should be regularly serviced to ensure that the noise levels generated by the machinery do not increase.

Any new fixed plant and machinery proposed to be installed on the site should be acoustically assessed prior to installation on site to ensure that the noise generated by it will comply with Noise Criterion.

All night time employees, especially those on the LPG ocean tankers should be informed of the requirements of noise minimisation. They should be instructed not to carry out noisy maintenance works during their shifts and they should also be instructed not to shout or carry out any other noisy activities which may be heard at the nearest sensitive receivers. The supervisor should be responsible for ensuring the night time staff minimise the generation of noise.

Noise monitoring should be carried out every two years to ensure that the noise levels generated by the on site activities comply with the requirements of Industrial Noise Policy NSW.

On-site noise due to the operation of the ELGAS site should also be kept to an acceptable level. Mitigation measures for minimising noise output and noise impacts on-site include:

- Employee protection such as the wearing of ear protection whilst conducting booster pump operation.

- General maintenance of effective OH&S standards especially during LPG transfers operations.

6 Conclusion

The noise impact assessment of the ELGAS Sydney LPG Cavern has been carried out by EMS between 24 and 29 May 2013. The operational noise from the ELGAS site was assessed during the unloading of LPG from a supply ship from 25-28 May 2013 onwards.

The purpose of the assessment was to determine the noise level emitted from the ELGAS facility and its impact on nearby sensitive receivers. Recommendations have been provided as a plan of management for maintaining low noise levels and not receiving complaints.

The assessment was carried out in terms of the ambient noise levels in the environment surrounding the ELGAS site, and predicted noise levels generated by the operations of the ELGAS site to the boundary of the nearest affected residential premises. Daytime, evening and night time noise levels were considered for this assessment because the facility operates non-stop when LPG is being transferred from and to the ocean gas tankers.

Results of the unattended noise monitoring and the attended noise measurements have been presented in this report. The results showed that the impact on the nearest sensitive receivers are minimal and will comply with the noise criteria established in accordance with Industrial Noise Policy NSW.

We recommend that a noise impact assessment is conducted every two years including measurements during the transfer of the LPG from the large ocean tankers to the LPG cavern to ensure continual compliance with the Industrial Noise Policy Criteria.

References

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F. Alton Everest – Master Handbooks of Acoustics (fourth Edition)

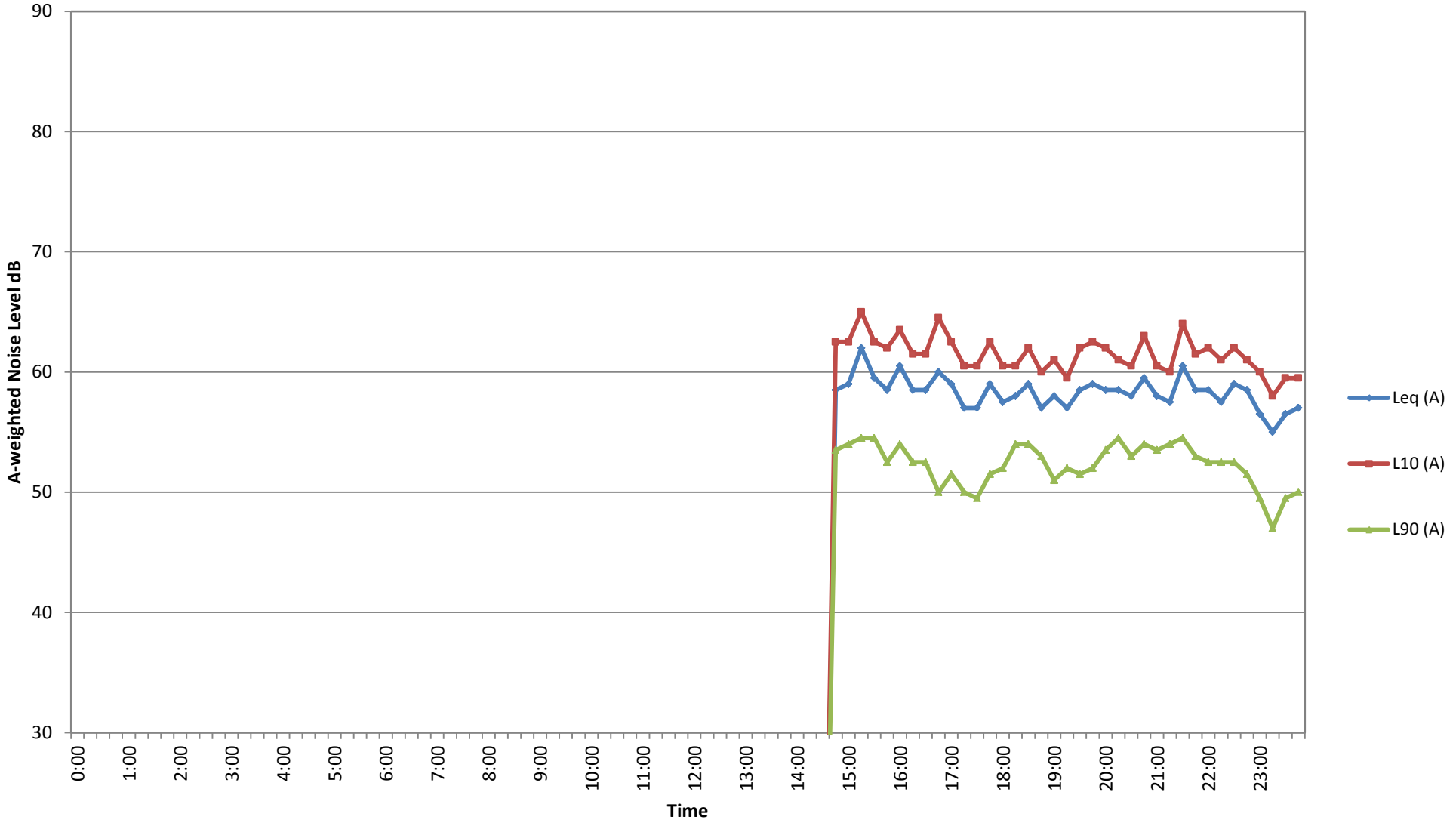
D.A. Bies & C.H Hansen. *Engineering Noise Control*. Unwin Hyman

Appendix A – Daily Monitoring Results

Level 1, 4B Lord Street, Botany, NSW 2019 Telephone: (02) 9355 3300 Facsimile: (02) 9316 7160 ABN 13 050 039 177

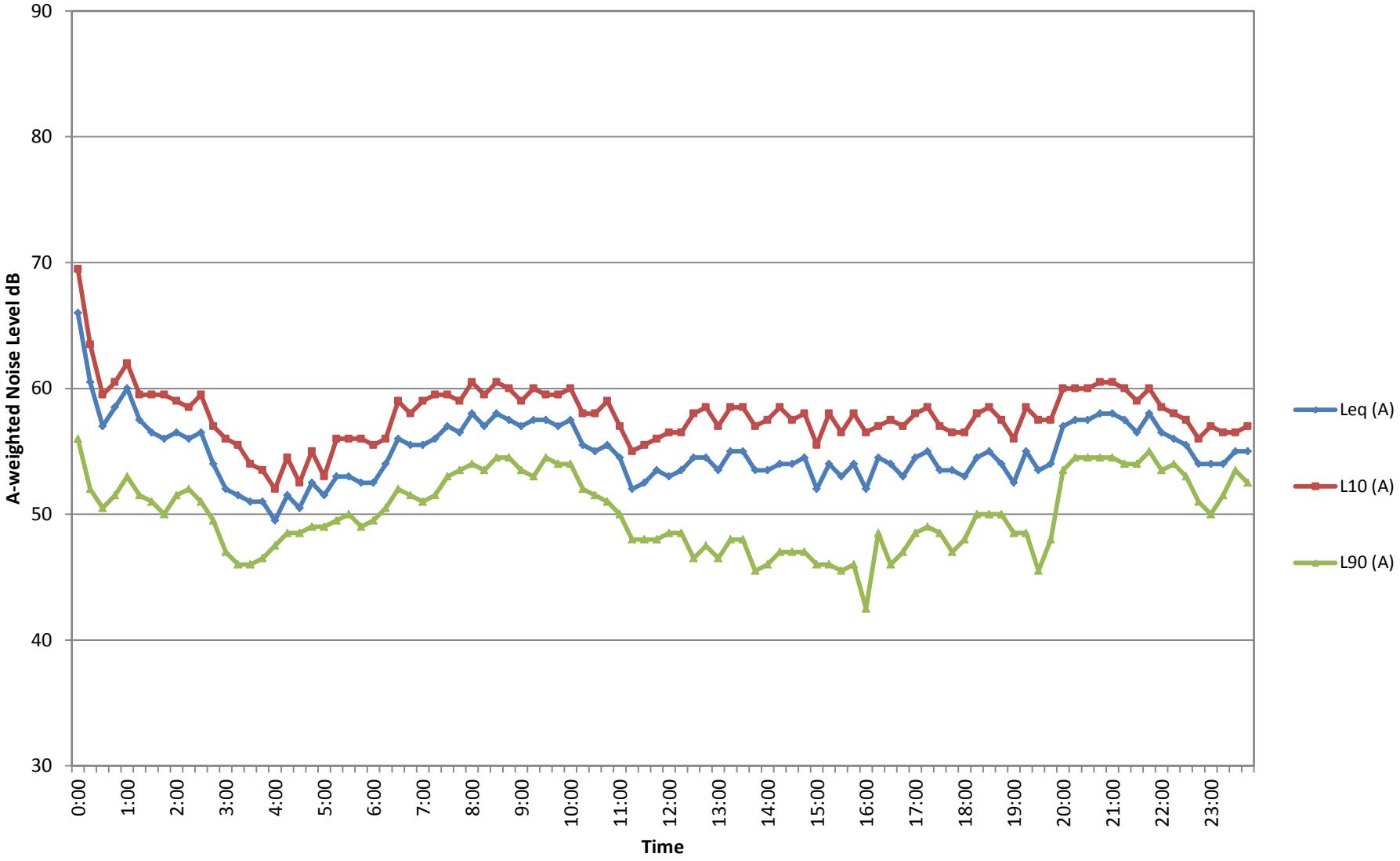
Noise Level Measurements

Monitor Location: Military Rd, Matraville Date: 24-May-2013



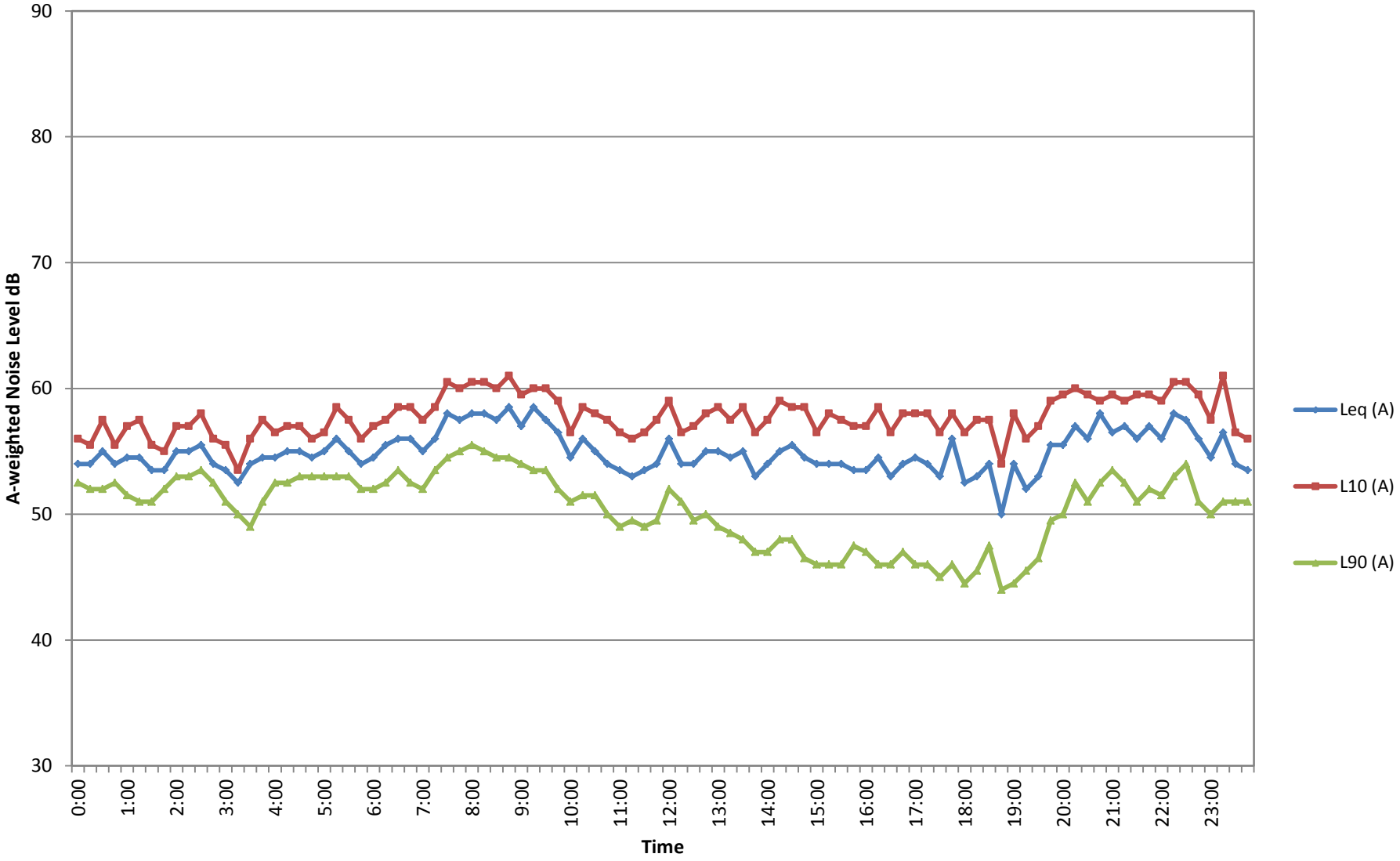
Noise Level Measurements

Monitor Location: Military Rd, Matraville Date: 25-May-2013



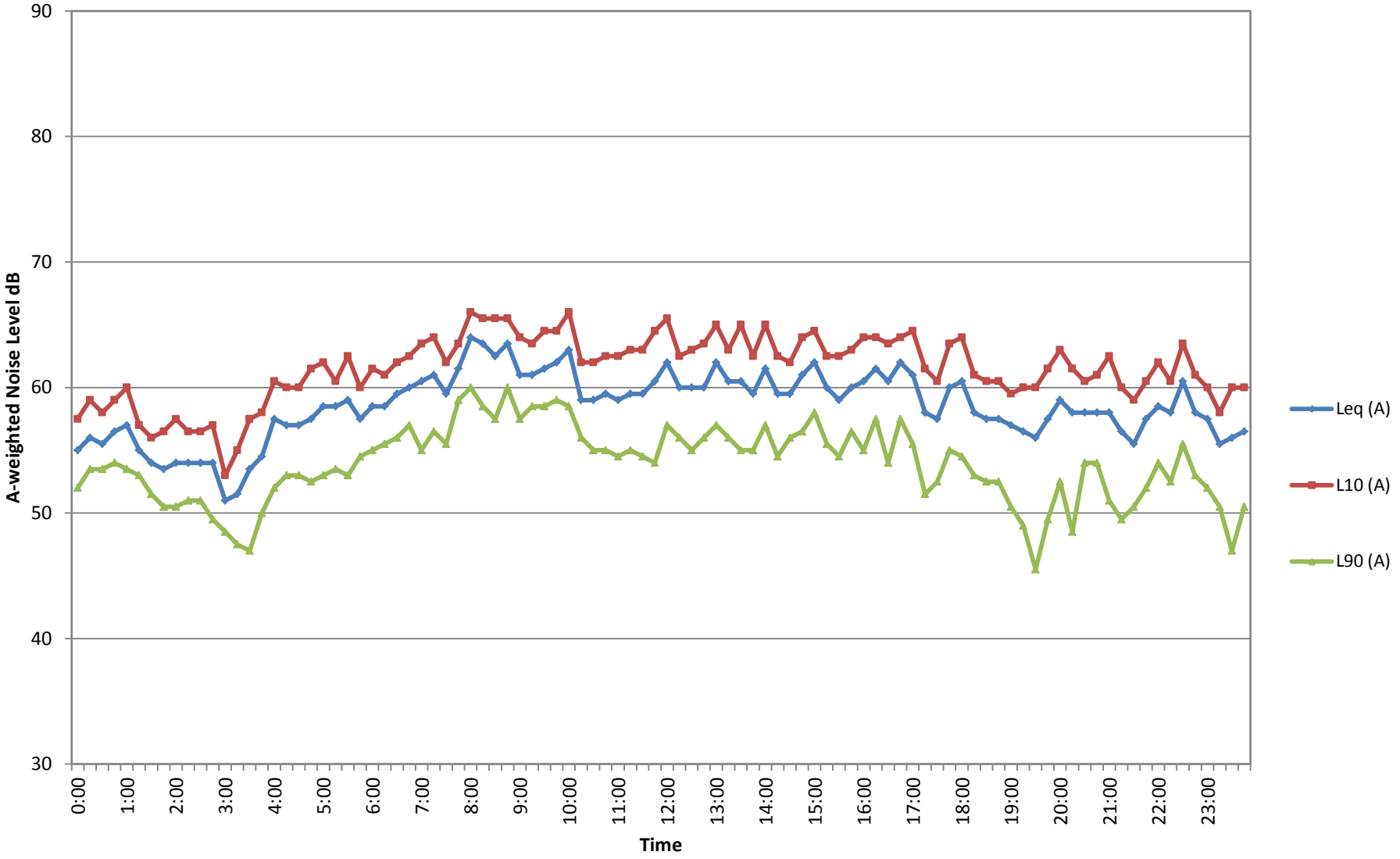
Noise Level Measurements

Monitor Location: Military Rd, Matraville Date: 26-May-2013



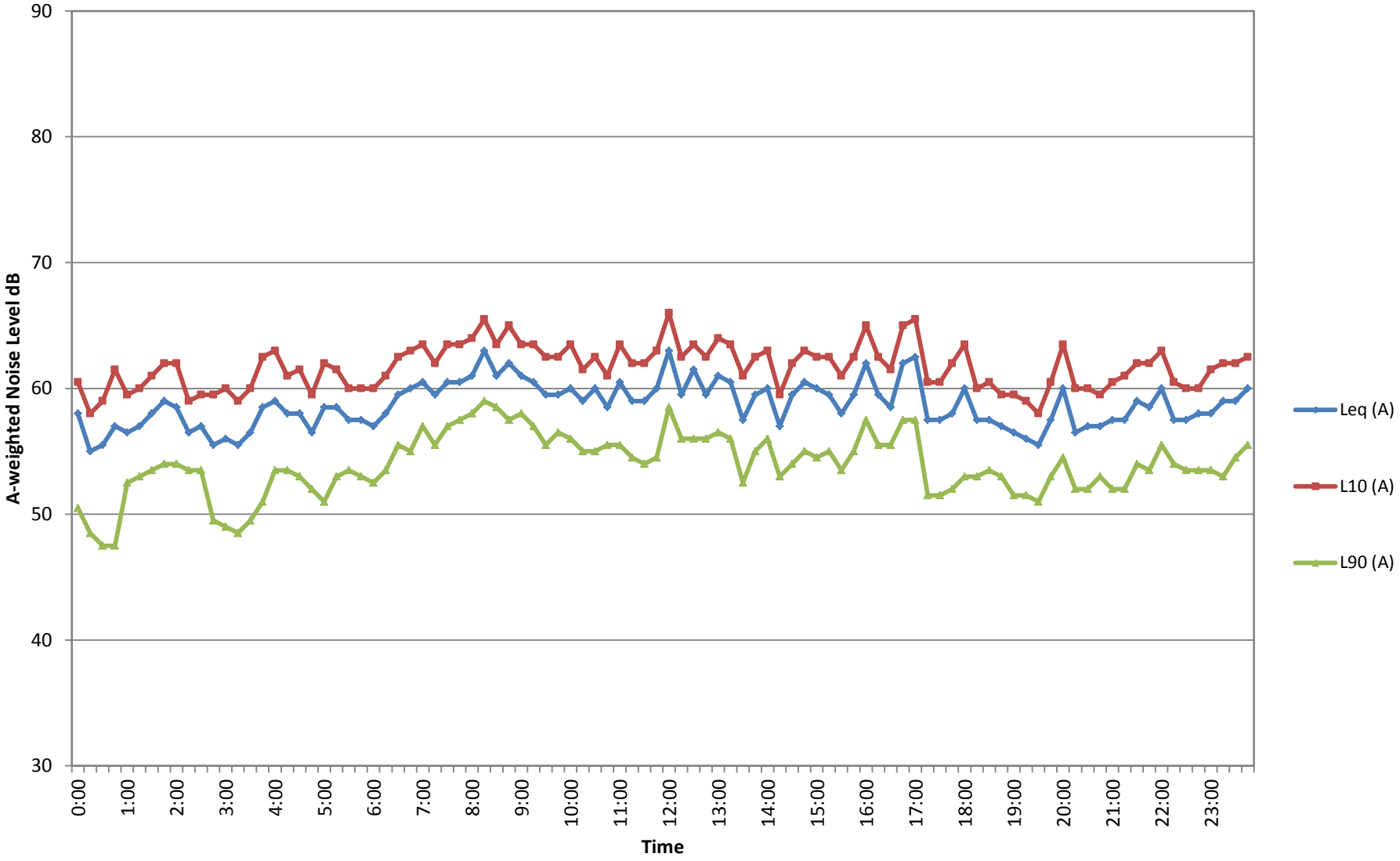
Noise Level Measurements

Monitor Location: Military Rd, Matraville Date: 27-May-2013



Noise Level Measurements

Monitor Location: Military Rd, Matraville Date: 28-May-2013

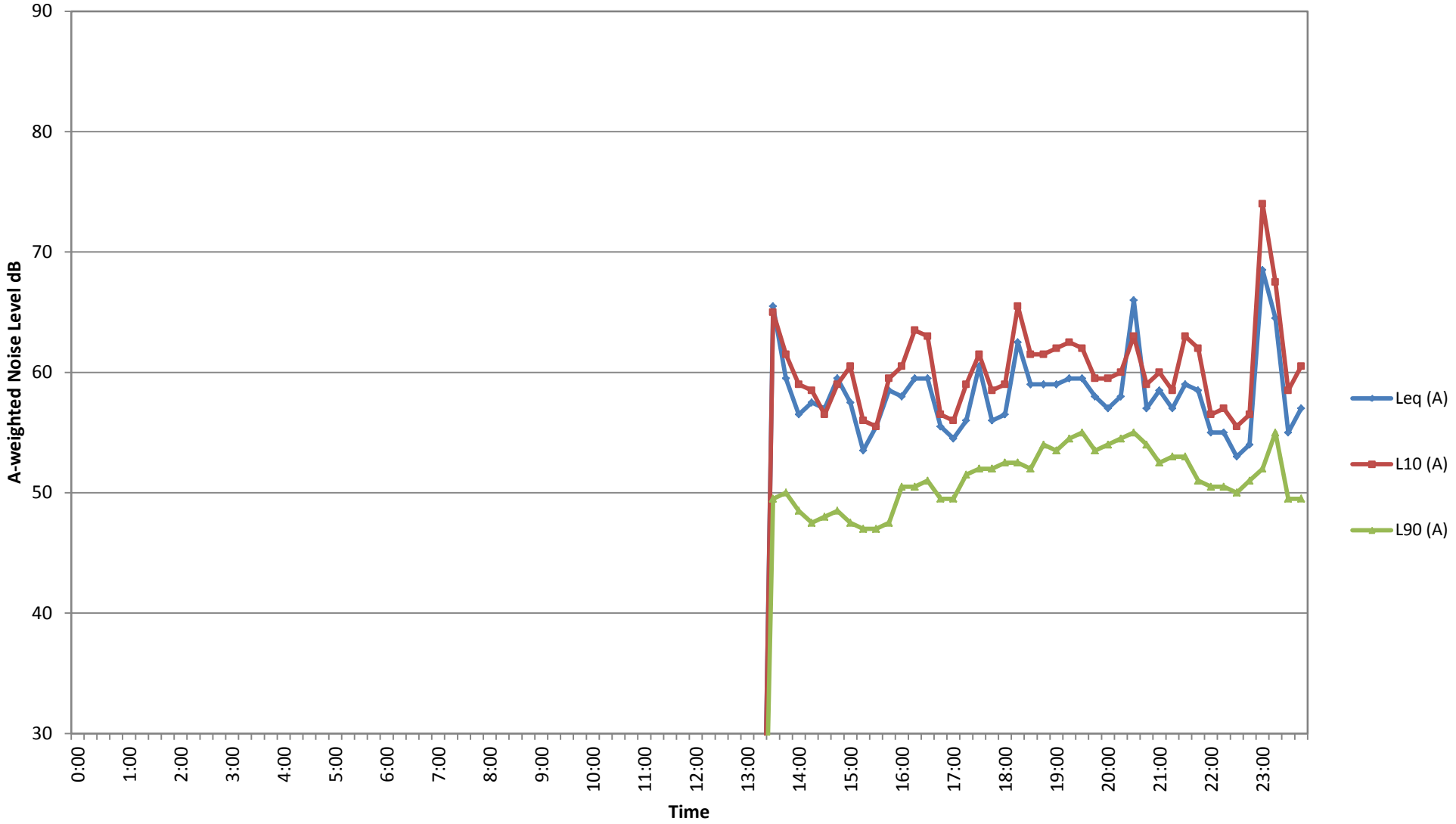


Noise Level Measurements

Monitor Location: Military Rd, Matraville Date: 29-May-2013

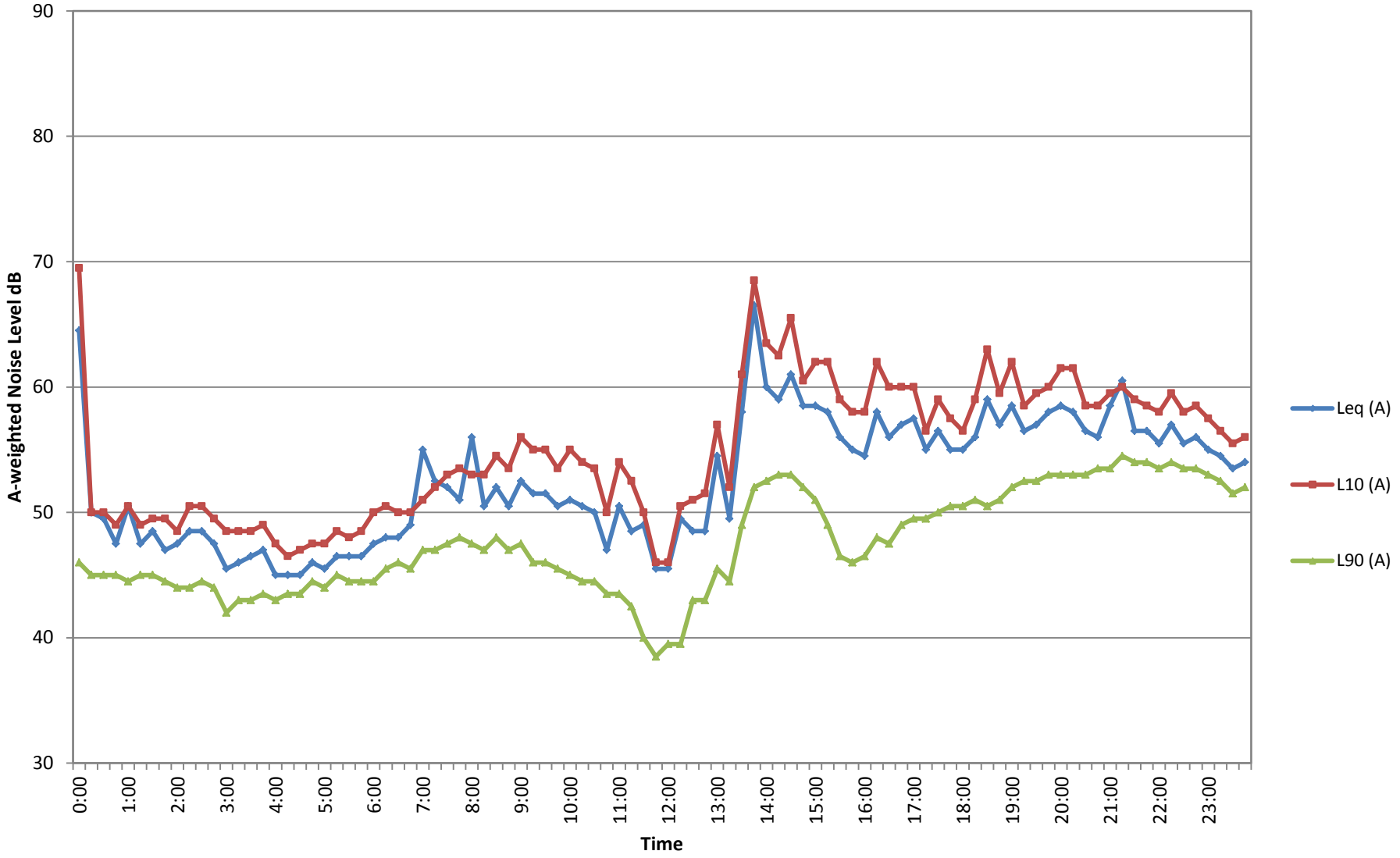
Noise Level Measurements

Monitor Location: Yarra Bay Sailing Club Date: 24-May-2013



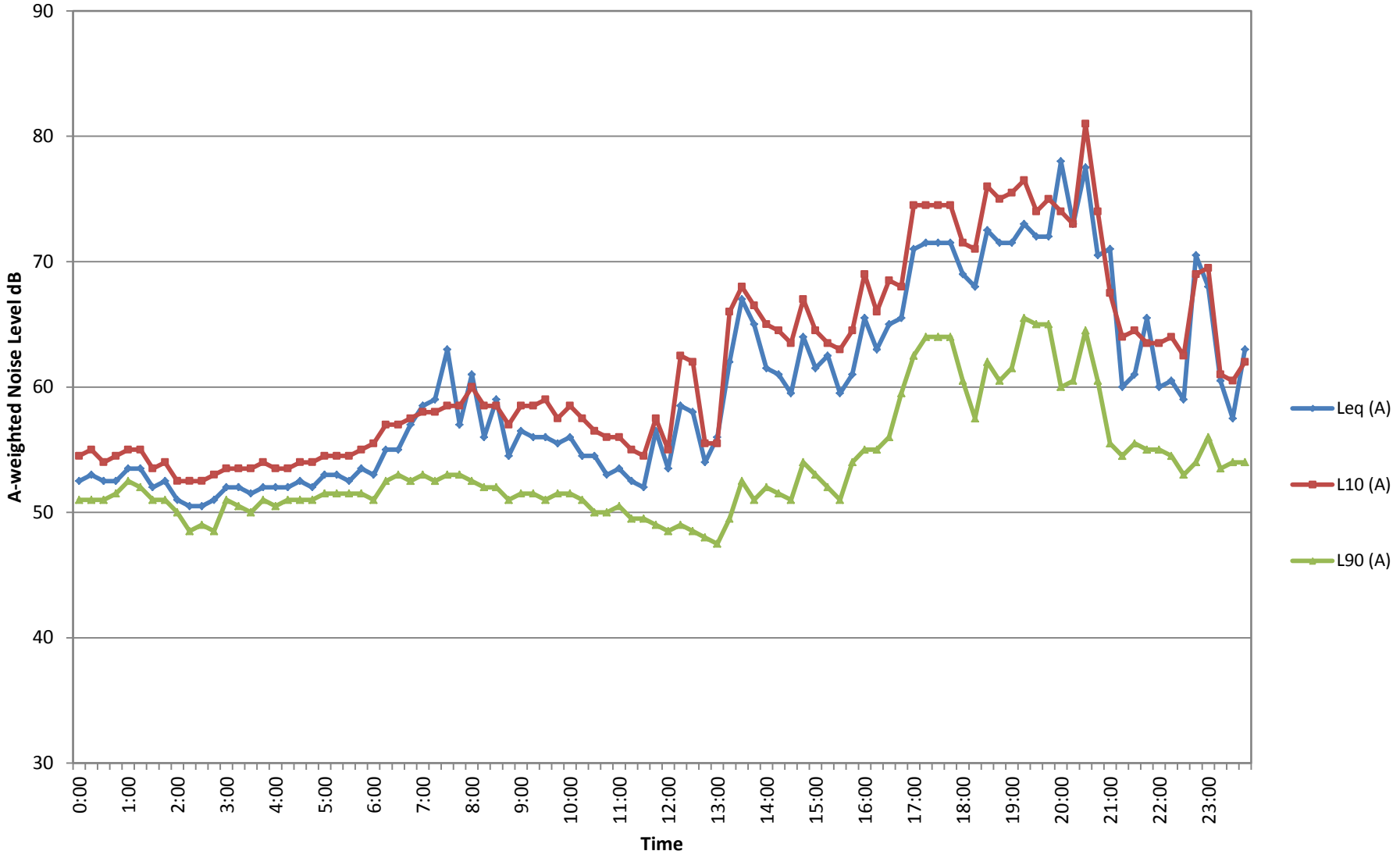
Noise Level Measurements

Monitor Location: Yarra Bay Sailing Club Date: 25-May-2013



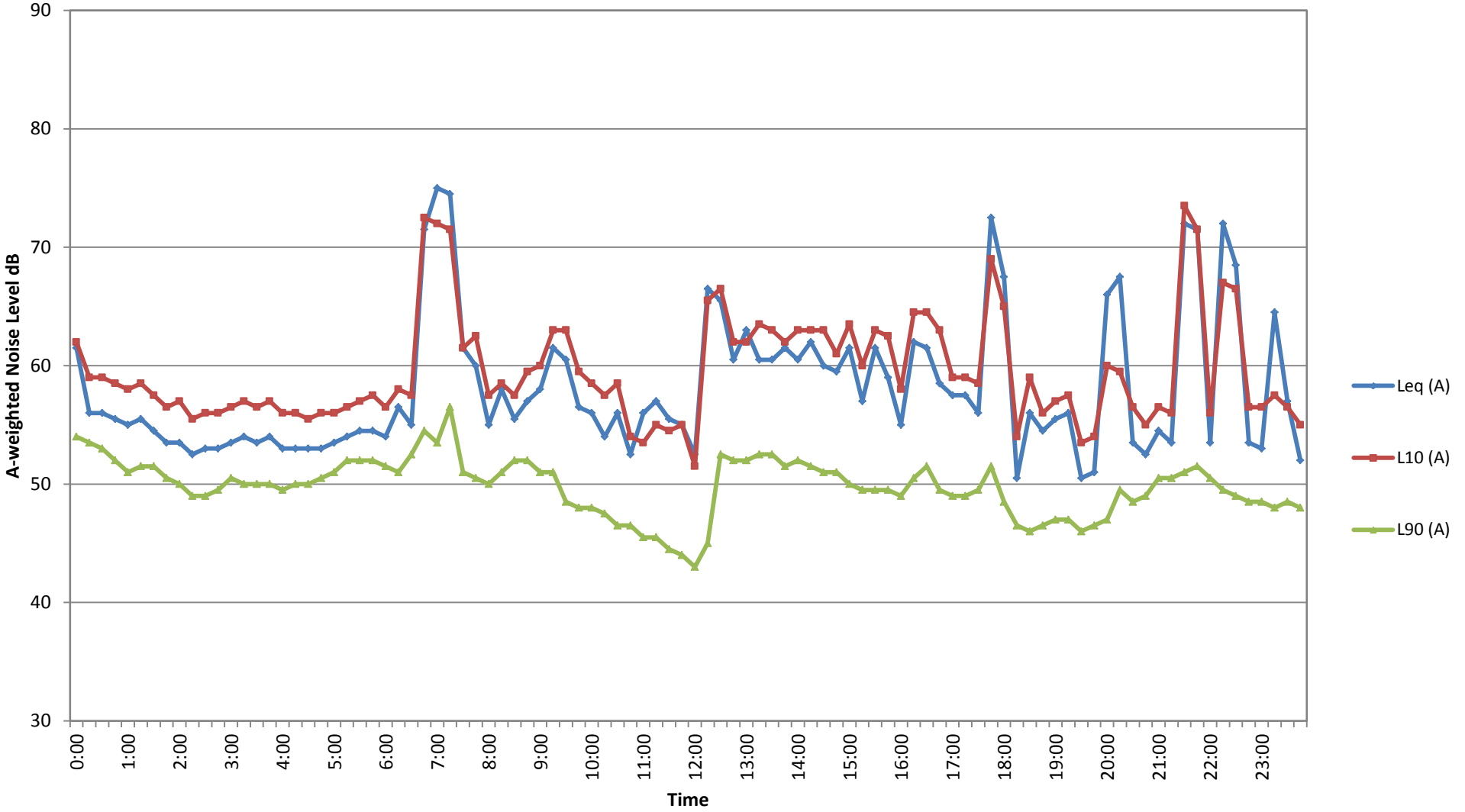
Noise Level Measurements

Monitor Location: Yarra Bay Sailing Club Date: 26-May-2013



Noise Level Measurements

Monitor Location: Yarra Bay Sailing Club Date: 27-May-2013



Noise Level Measurements

Monitor Location: Yarra Bay Sailing Club Date: 28-May-2013

Noise Level Measurements

Monitor Location: Yarra Bay Sailing Club Date: 29-May-2013