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HEGGIES

REPORT 30-2090-R1

Revision 2

Proposed Salt Ash Sand Quarry
Noise Impact Assessment

PREPARED FOR

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PO Box 186
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Proposed Salt Ash Sand Quarry

Noise Impact Assessment

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1 INTRODUCTION

Heggies Pty Ltd (Heggies) has been commissioned to conduct a noise impact assessment to accompany the development application for the proposed Salt Ash Sand Quarry located off Nelson Bay Road, Salt Ash NSW. The proposed extraction footprint is located within a heavily vegetated coastal dune environment and is zoned 1(a) Rural Agricultural under the Port Stephens Local Environmental Plan, 2000. The extraction footprint has an area of approximately 28 hectares. It is understood that this report forms part of an application made to the NSW Department of Planning pursuant to Part 3A of the Environmental Planning & Assessment Act, 1979.

This report has been prepared with reference to the following:

- NSW Industrial Noise Policy (INP)
- Environmental Criteria for Road Traffic Noise (ECRTN)
- Interim Construction Noise Guideline (CNG)

Broadly, the objective of the noise assessment was to identify the potential impacts of noise from the proposed development, including construction and operation of the facility and associated road traffic movements, and to provide advice with regard to effective mitigation strategies where necessary.

2 PROJECT DESCRIPTION AND SITE DETAILS

The mining process will involve the removal of vegetation from the site, and the stripping of soil to expose the sand resource underneath. The resource will then be removed via front-end loader and truck and relocated to the sand washing plant. The unwashed sand will consist of useable product and a small amount of organic matter.

The unwashed sand will then proceed through a 'grizzly' and vibrating screen to remove organic matter before being washed and stockpiled.

Overburden soil and vegetation removed from the mining area, as well as all organic matter separated from the sand will be stock-piled and used for progressive rehabilitation of the site as the mining sequence progresses.

The washed sand will be transported via Janet Parade north to Nelson Bay Road. Haulage vehicles will then continue in a westerly direction.

The mining process will be undertaken in stages, with small areas being affected at any one time. Following the mining process, progressive rehabilitation will occur in each of the stages. As such, the entire process (over a period of around 18-20 years) will see progressive staged vegetation stripping, extraction and subsequent rehabilitation throughout a relatively short timeframe.

The proposed development site is located on a number of parcels of land off Janet Parade, which intersects with Nelson Bay Road at Salt Ash. The properties are known as Lot 4042 DP 1090633, Lot 632 DP 609506 and Lot 633 DP 609506.

It has been assumed that proposed operational activities on the subject site would occur from 7.00 am to 5.00 pm Monday to Friday and from 7.00 am to 1.00 pm on Saturdays.

Acoustically significant plant and equipment assumed to operate at the site, and the relevant sound power levels, are provided in **Table 1**.

Table 1 Acoustically Significant Plant and Equipment

Equipment	Sound Power Level (dBA)
Sand processing plant	102
Vibrating Screen	113
Front end loader	108
Haul truck	102
Dozer	104
Delivery truck	96
Water Cart	107

Access to the proposed site will be via a new concrete access road off Janet Parade which is an existing sealed road. The main haulage route for the extracted sand will be south west along Nelson Bay Road.

A proposed construction program for the development is provided in **Table 2**.

Table 2 Proposed Construction Program

Construction Activity	Approximate Duration
Establish noise mitigation measures (precast wall panels and/or earth mounds)	1-2 weeks
Road set out and bulk earthworks	2-3 weeks
Drainage infrastructure (culverts, etc)	1 week
Pavement construction and surfacing (concrete)	6-8 weeks
Assembly of plant*	1-2 weeks

*Majority of the plant will be assembled off-site and delivered. A crane will be required in the final assembly process.

The overall construction period is expected to take approximately 9-12 weeks. Upgrade of the intersection at Nelson Bay Road and Janet Parade will also be required. This is expected to take approximately 4 weeks and would be undertaken in accordance with requirements of the NSW RTA.

The nearest potentially affected receivers of noise from construction and operation of the proposed development are residents located off Janet Parade (north and east of the site) and those located along Nelson Bay Road (north and west of the site).

The nearest non-project related residential receivers that have been considered are shown in the site location map provided in **Figure 1**.

Figure 1 Site Location Map and Nearest Noise-Sensitive Receivers

3 NOISE IMPACT ASSESSMENT PROCEDURES

3.1 Operational Noise - Industrial Noise Policy

Responsibility for the control of noise emission in New South Wales is vested in Local Government and the Department of Environment, Climate Change and Water (DECCW). The DECCW released the Industrial Noise Policy (INP) in December 1999 that provides a framework and process for deriving noise criteria for consents and licences that will enable the DECCW to regulate premises that are scheduled under the Protection of the Environment Operations Act 1997.

The INP provides two forms of noise criteria with the aim of achieving environmental noise objectives; one to account for intrusive noise which involves setting a noise goal relative to the existing acoustic environment and the other to protect the amenity of particular land uses.

For assessing intrusiveness, the background noise needs to be measured. The intrusiveness criterion essentially means that the equivalent continuous noise level (L_{Aeq}) of the source should not be more than five (5) decibels above the measured background level (L_{A90}).

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include road, rail or community noise. The existing noise level from industry is measured. If it approaches the criterion value, then noise levels from new industries need to be designed so that the cumulative effect does not produce noise levels that would significantly exceed the criterion.

An extract from the INP that relates to the amenity criteria is given in **Table 3** and **Table 4**.

Table 3 Amenity Criteria - Recommended LAeq Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended $L_{Aeq(Period)}$ Noise Level (dBA)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
	Urban	Day	60	65
		Evening	50	55
		Night	45	50
	Urban/Industrial Interface (for existing situations only)	Day	65	70
		Evening	55	60
		Night	50	55
School classrooms - internal	All	Noisiest 1 hour period when in use	35	40
Hospital wards	All	Noisiest 1 hour period		
- internal			35	40
- external			50	55
Place of worship - internal	All	When in use	40	45
Area specifically reserved for passive recreation (eg National Park)	All	When in use	50	55
Active recreation area (eg school playground, golf course)	All	When in use	55	60
Commercial premises	All	When in use	65	70
Industrial premises	All	When in use	70	75

Note: Day 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am, On Sundays and Public Holidays, Daytime 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night-time 10.00 pm - 8.00 am. The L_{Aeq} index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

Table 4 Modification to Acceptable Noise Level (ANL)* to Account for Existing Levels of Industrial Noise

Total Existing L_{Aeq} noise level from Industrial Noise Sources	Maximum L_{Aeq} Noise Level for Noise from New Sources Alone, dBA
≥ Acceptable noise level plus 2 dBA	If existing noise level is *likely to decrease* in future acceptable noise level minus 10 dBA If existing noise level is *unlikely to decrease* in future existing noise level minus 10 dBA
Acceptable noise level plus 1 dBA	Acceptable noise level minus 8 dBA
Acceptable noise level	Acceptable noise level minus 8 dBA
Acceptable noise level minus 1 dBA	Acceptable noise level minus 6 dBA
Acceptable noise level minus 2 dBA	Acceptable noise level minus 4 dBA
Acceptable noise level minus 3 dBA	Acceptable noise level minus 3 dBA
Acceptable noise level minus 4 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 5 dBA	Acceptable noise level minus 2 dBA
Acceptable noise level minus 6 dBA	Acceptable noise level minus 1 dBA
< Acceptable noise level minus 6 dBA	Acceptable noise level

* ANL = recommended acceptable L_{Aeq} noise level for the specific receiver, area and time of day from **Table 3**

3.2 Road Traffic Noise

The proposed development presents a distinctive situation in that the private access road to the quarry passes directly adjacent to residences (ie Janet Parade 2). Generally, such an access road would be considered as an industrial noise source and assessed in accordance with operational noise criteria determined in accordance with the INP.

The relative impact from operational plant and equipment noise at the subject Janet Parade residences will be low compared to that from the truck pass-bys. Furthermore, being in close proximity to Janet Parade, these residences are currently exposed to existing traffic movements including that from neighbouring industrial developments.

Road traffic noise is typically assessed in accordance with the DECCW Environmental Criteria for Road Traffic Noise (ECRTN). The policy sets out noise criteria applicable to different road classifications for the purpose of defining traffic noise impacts.

For the purpose of this assessment, predicted noise emission levels from trucks passing on the quarry access road at the residents on Janet Parade have been compared to both the operational noise design criteria (INP) and the road traffic noise criteria set out in the ECRTN.

3.3 Construction Noise

The DECCW released the Interim Construction Noise Guideline in July 2009. The guideline provides two assessment methods depending on the duration of the proposed works; quantitative and qualitative. It is expected that a quantitative assessment is required for the subject development given that the proposed construction period will be greater than three (3) weeks.

The guideline sets out noise management levels, in relation to construction type activities, for residential receivers and how they are to be applied. The guideline suggests restriction to the hours of construction that apply to activities that generate noise at residences above the 'highly affected' noise management level. A summary of the noise management levels is contained in **Table 5**.

Table 5 Construction Noise Management Levels

Time of day	Management level $L_{Aeq(15minute)}$	How to apply
Recommended Standard Hours Monday to Friday 7am to 6pm Saturday 8am to 1pm No work Sundays or public holidays	Noise Affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq(15minute)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly Noise Affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. 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. 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside Recommended Standard Hours	Noise Affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.

4 EXISTING ACOUSTICAL AND METEOROLOGICAL ENVIRONMENT

4.1 Methodology

During the course of the Salt Ash Sand Quarry noise investigation Heggies has developed a comprehensive understanding of the acoustic environment across the study area. Operator-attended and unattended noise surveys have been conducted.

Site inspections were conducted during the noise study. The purpose of the site visits was to gain an appreciation of the subject site and to conduct the noise monitoring program. Noise surveys were conducted at locations representative of the nearest potentially affected residential locations on Janet Parade and Nelson Bay Road.

All acoustic instrumentation employed by Heggies throughout the monitoring programme has been designed to comply with the requirements of AS 1259.2-1990, "*Sound Level Meters*" and carries current NATA or manufacturer calibration certificates. Instrument calibration was checked before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

4.2 Unattended Noise Monitoring

Environmental noise loggers were positioned at the subject site during September and October 2008. Details of the locations of the noise monitoring equipment are provided in **Table 6**. The purpose of the unattended noise survey was to gain an understanding of the ambient acoustic environment in order to establish relevant noise goals for the subject development.

Table 6 Noise Monitoring Details

Location	Address	Logger Serial Number	Date
JP3	Janet Parade, Salt Ash	16-004-038	26/09/08 - 02/10/08
NB2	Nelson Bay Road, Salt Ash	16-203-509	16/10/08 - 27/10/08

Weather data for the survey period was obtained from the nearest Bureau of Meteorology weather station located at Williamtown, approximately 9 km west of the monitoring locations. Unattended noise data corresponding with periods of rainfall and/or wind speeds in excess of 5 m/s (approximately 18km/hr) were discarded in accordance with Industrial Noise Policy (INP) data exclusion methodology.

Results of the unattended noise survey are summarised in **Table 7**. Noise levels measured during the unattended noise survey are also shown graphically in **Appendix A**.

Table 7 Unattended Noise Monitoring Results Summary

Location	Period	Background L_{A90} Noise Level	Measured $L_{Aeq(Period)}$	Estimated Existing Industrial Contribution L_{Aeq}
		Rating Background Level		
Janet Parade	Day	35 dBA	66 dBA	< 49 dBA
	Evening	42 dBA	53 dBA	< 39 dBA
	Night	30 dBA	47 dBA	< 34 dBA
Nelson Bay Road	Day	48 dBA	63 dBA	< 49 dBA
	Evening	40 dBA	58 dBA	< 39 dBA
	Night	30 dBA	55 dBA	< 34 dBA

Note: Day 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am
On Sundays/Public Holidays Day 8.00 am - 6.00 pm; Evening 6.00 pm - 10.00 pm; Night 10.00 pm - 8.00 am
The L_{A90} represents the level exceeded for 90% of the interval period and is referred to as the average minimum or background noise level
L_{Aeq} - The equivalent continuous noise level is defined as the level of noise equivalent to the energy average of noise levels occurring over a measurement period

4.3 Operator-Attended Noise Monitoring

The purpose of the operator-attended noise surveys was to determine the character and duration of various noise sources to the total ambient noise level, in particular road traffic noise, at the logger locations. The results of the operator-attended noise surveys are provided in **Table 8**.

Table 8 Operator Attended Noise Survey Results

Noise Logger Location	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 μPa)					Description of Noise Emission, Typical Maximum Noise Levels L_{Amax} (dBA)
		L_{Amax}	LA1	LA10	LAeq	LA90	
Janet Parade	03/10/2008 12.15 pm Wind: 1 m/s Temp: 28°C Cloud cover: 7/8	78	55	51	50	46	Cars (Nelson Bay Rd) 43-57 Some insects Birds 50-63 Dog Barking 67-78 Traffic main contributor from Nelson Bay Road
Nelson Bay Road	16/10/2008 14.00 pm Wind: 1-2m/s Temp: 25°C Cloud cover: 0/8	91	82	72	69	49	Cars (Nelson Bay Rd) 53-58, Trucks 62 Plane 80-91 Birds 53-56 Wind in trees 55 Dog Barking 63 Traffic main contributor from Nelson Bay Road

The operator-attended noise survey results have indicated that the main contributor to ambient noise levels at both considered locations is traffic from Nelson Bay Road.

4.4 Effects of Meteorology on Noise Levels

4.4.1 Wind

Wind has the potential to increase noise at a receiver when it is light and stable and blows from the direction of the source of the noise. As the strength of the wind increases the noise produced by the wind will obscure noise from most industrial and transport sources.

Wind effects need to be considered when wind is a feature of the area under consideration. Where wind blows from the source to the receiver at speeds up to 3 m/s for more than 30% of the time in any season, then wind is considered to be a feature of the area and noise level predictions must be made under these conditions.

Weather data was obtained, for a period of 12 months, from a Bureau of Meteorology weather station located at Williamtown. This data was analysed to determine the frequency of occurrence of winds up to speeds of 3 m/s for the daytime period in each season. A summary of the most frequently occurring winds for each period is contained within **Table 9**.

Table 9 Seasonal Frequency of Occurrence Wind Speed Intervals - Daytime

Period	Calm	Wind Direction	0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	1.4%	NNW±45°	1.4%	4.5%	5.9%
Autumn	2.0%	WNW±45°	2.5%	7.6%	10.1%
Winter	2.6%	NW±45°	3.0%	5.9%	8.9%
Spring	1.1%	NNW±45°	1.9%	5.8%	7.7%

Seasonal wind records indicate that winds of up to 3 m/s are not a feature of the area, as the frequency of such wind is below the 30% threshold. Modelling under prevailing wind was therefore not conducted as part of this investigation.

4.4.2 Temperature Inversion

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions occur predominantly at night during the winter months. For a temperature inversion to be a significant characteristic of the area it needs to occur for approximately 30% of the total night-time during winter, or about two nights per week.

The proposal is for operations to be undertaken during the daytime only. Hence, the occurrence of temperature inversion has not been considered as part of this noise assessment.

5 PROJECT SPECIFIC NOISE CRITERIA

5.1 Operational Noise Design Criteria

The noise emission design criteria for the proposed development have been established with reference to the INP outlined in **Section 3.1** of this report.

The intrusiveness criteria have been set from measurements at the nearest residences to the site. The existing L_{Aeq} noise levels in the vicinity of the subject site are dominated by local traffic and natural sources. The amenity criteria have been established using the results of ambient noise measurements.

The acoustical environment typifies a suburban environment that is dominated by local traffic with characteristically intermittent traffic flows and with some limited industry. Therefore, the residences in the general area have been assessed as "suburban" receiver types.

The resulting operational project specific noise criteria for the proposed development are shown in **Table 10**.

Table 10 Proposed Salt Ash Sand Quarry Project Specific Noise Criteria

Location	Period	Intrusiveness Criteria $L_{Aeq(15minute)}$	Amenity Criteria $L_{Aeq(Period)}$	Project Specific Noise Criteria $L_{Aeq(15minute)}$
Janet Parade	Day	40 dBA	55 dBA	**40 dBA**
Nelson Bay Road	Day	53 dBA	55 dBA	**53 dBA**

The INP states that these criteria have been selected to protect at least 90% of the population, living in the vicinity of industrial noise sources, from the adverse effects of noise for at least 90% of the time. Provided the criteria in the INP are achieved, it is unlikely that most people would consider the resultant noise levels excessive.

5.2 Road Traffic Noise Goals

Road traffic noise criteria are set out in the ECRTN. The criteria recommended in the policy are based on the functional categories of the subject roads, as applied by the NSW RTA. All traffic to and from the quarry will utilise Janet Parade. The main haulage route for the extracted sand will then be south west along Nelson Bay Road to Tomago Road at Williamtown and then west along Tomago Road to the Tomago concrete batching plant. Movements supplying the Cameron Park and Berkley Vale batching plants will continue south along the Pacific Highway and F3 Freeway.

The nearest residential receivers potentially affected by an increase in traffic are situated on Janet Parade. This road is classified as a local road which, by definition, provides access to individual allotments and carries low volumes; typically less than 2000 vehicles per day.

The relevant road traffic noise criteria for the subject development are provided in **Table 11**.

Table 11 Road Traffic Noise Criteria

Type of Development	Criteria		
	Day 7 am - 10 pm	**Night 10 pm - 7 am**	**Where Criteria are Already Exceeded**
Land use developments with potential to create additional traffic on a local road	$L_{Aeq(1hour)}$ 55 dBA	$L_{Aeq(1hour)}$ 50 dBA	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 2 dB.

5.3 Construction Noise Goals

The daytime background noise level (L_{A90}) has been determined at two potentially affected residential locations. A daytime background noise level of 35 dBA was measured at Location 1 (Janet Parade) and 48 dBA at Location 2 (Nelson Bay Road). This infers the project specific construction noise goals presented in **Table 12** for the nearest potentially affected residential locations.

Table 12 Project Specific Construction Noise Goals

Time of day	Management level $L_{Aeq(15minute)}$	Janet Parade	Nelson Bay Road
Recommended Standard Hours Monday to Friday 7am to 6pm Saturday 8am to 1pm No work Sundays or public holidays	Noise Affected RBL + 10 dB	45 dBA	58 dBA
	Highly Noise Affected 75 dBA	75 dBA	75 dBA
Outside Recommended Standard Hours	Noise Affected RBL + 5 dB	40 dBA	53 dBA

It should be noted that the proponent does not intend to conduct construction activities outside standard recommended hours where possible. There may be circumstances where this will be necessary for safety reasons, particularly with regard to the Janet Parade / Nelson Bay Road intersection upgrade, and this will be assessed as required.

6 OPERATIONAL NOISE ASSESSMENT

6.1 Noise Modelling Methodology

A computer model was used to predict representative noise emissions from the proposed development. The Environmental Noise Model (ENM) used has been produced in conjunction with the DECCW. A map giving all relevant topographic information was digitised. The model used this map, together with noise source data, ground cover, shielding by barriers and/or adjacent buildings and meteorological information to predict noise levels. Weather conditions under which noise level predictions were made are given in **Table 13**.

Table 13 Weather Conditions for Noise Predictions

	Temperature	Humidity	Wind Speed	Wind Direction	Temperature Gradient
Calm	20°C	65%	n/a	n/a	n/a

Fixed and mobile plant and equipment were considered in the noise model as described in **Table 14**.

Table 14 Noise Modelling - Location of Acoustically Significant Plant and Equipment

Fixed Plant Location	Extraction Location - Mobile Equipment
Sand Processing Plant	Haul truck
Vibrating Screen	Front end loader
Front end loader	Water cart
Haul truck	Dozer
Water cart	

Three operational scenarios were considered with regard to proposed mobile equipment given that likely noise impacts will vary greatly depending on the location of the extraction activities:

- Western - proposed extraction location at the western side of the project site.
- Central - proposed extraction location in the centre of the project site.
- Eastern - proposed extraction location at the eastern side of the project site.

All acoustically significant plant and equipment has been assumed to operate continuously and simultaneously.

6.2 Noise Mitigation

The following noise mitigation measures have been included in the noise model:

- Earth bunds around the fixed plant location providing acoustic shielding in the direction of the nearest residences on Janet Parade. The earth bunds have been assumed to be approximately 6m in height.
- It has been assumed that extraction will occur in a direction towards residences and that the extraction equipment will be predominately operating behind the 6m working face providing acoustic shielding to nearest residences.
- A 3m noise wall adjacent to the residences at the intersection of the proposed quarry access road and Janet Parade to shield these locations from noise from passing trucks. This noise wall, if approved by the resident, should be constructed along the northern and western boundary of the residential property.

6.3 Operational Noise Modelling Results and Discussion

Noise emission levels were predicted from the proposed development for the typical operational scenarios described in **Section 6.1** including the noise mitigation measures described in **Section 6.2**. Noise levels predicted at the nearest noise-sensitive receiver locations are provided in **Table 15**, **Table 16** and **Table 17**. Noise emission levels predicted to be above the relevant project specific noise criteria are shown in bold type.

Table 15 Predicted Noise Emission Levels - Western Operational Scenario

Location	No.	Predicted Noise Level $L_{Aeq(15minute)}$ (dBA) - Calm				Project Specific Noise Criteria $L_{Aeq(15minute)}$
		Fixed Plant Only	Extraction - west only	Road Truck Passby[1]	TOTAL	
Janet Pde	JP1	40	40	<30	**43**	40
	JP2	**42**	**43**	<30	**45**	40
	JP3	34	35	36	40	40
Nelson Bay Rd	NB1	30	31	35	37	53
	NB2	30	31	30	35	53
	NB3	31	32	<30	35	53
	NB4	30	32	<30	35	53
	NB5	<30	<30	<30	30	53

1. Refers to road truck pass-by adjacent to intersection of quarry access road and Janet Parade.

Table 16 Predicted Noise Emission Levels - Central Operational Scenario

Location	No.	Predicted Noise Level $L_{Aeq(15minute)}$ (dBA) - Calm				Project Specific Noise Criteria $L_{Aeq(15minute)}$
		Fixed Plant Only	Extraction - central only	Road Truck Passby[1]	TOTAL	
Janet Pde	JP1	40	40	<30	**43**	40
	JP2	**42**	**42**	<30	**45**	40
	JP3	34	35	36	40	40
Nelson Bay Rd	NB1	30	31	35	37	53
	NB2	30	31	30	35	53
	NB3	31	32	<30	35	53
	NB4	30	32	<30	35	53
	NB5	<30	30	<30	31	53

1. Refers to road truck pass-by adjacent to intersection of quarry access road and Janet Parade.

Table 17 Predicted Noise Emission Levels - Eastern Operational Scenario

Location	No.	Predicted Noise Level $L_{Aeq(15minute)}$ (dBA) - Calm				Project Specific Noise Criteria $L_{Aeq(15minute)}$
		Fixed Plant Only	Extraction - east only	Road Truck Passby[1]	TOTAL	
Janet Pde	JP1	40	40	<30	**43**	40
	JP2	**42**	**42**	<30	**45**	40
	JP3	34	34	36	40	40
Nelson Bay Rd	NB1	30	30	35	37	53
	NB2	30	30	30	35	53
	NB3	31	32	<30	35	53
	NB4	30	31	<30	34	53
	NB5	<30	33	<30	34	53

1. Refers to road truck pass-by adjacent to intersection of quarry access road and Janet Parade.

Noise emission levels are predicted to be below the relevant project specific noise criteria at all assessed residential locations on Nelson Bay Road. At the Janet Parade residences, noise emission levels are predicted to be up to 5 dBA above the project specific noise criteria. The predicted exceedance is due predominantly to the mobile extraction equipment and the fixed plant.

It should be noted that the predicted noise emission from the road truck pass-bys is significantly below the road traffic noise criteria specified in the ECRTN for a local road of 50 dBA.

It should also be noted that the noise modelling scenario assumes all equipment operating simultaneously and thus represents an acoustically worst-case scenario. It is likely that noise emissions from typical operations will be lower than those provided here.

Depending on the degree of exceedance of the project specific criteria (up to 5 dBA) noise impacts could range from negligible to moderate. It is recommended that management procedures be implemented including:

- Prompt response to any community issues of concern.
- Noise monitoring on site and within the community.
- Refinement of on site noise mitigation measures and plant operating procedures where practical.
- Consideration of acoustical mitigation at receivers.
- Consideration of negotiated agreements with property holders.

6.4 Cumulative Noise Assessment

Potential cumulative operational noise impacts from existing and successive developments are embraced by the INP procedures by ensuring that the appropriate noise emission criteria (and consent limits) are established with a view to maintaining acceptable noise *amenity* levels for residences. Therefore, the cumulative impact of the proposed development with existing industrial noise sources has been assessed in the determination of the acceptable amenity levels at surrounding potentially noise sensitive areas.

6.5 Road Traffic Noise Assessment

The noise emission from road-truck pass-bys has been shown to meet the relevant road traffic noise criteria at the nearest potentially affected residential locations on Janet Parade.

Existing road traffic volumes on Nelson Bay Road are estimated to exceed 12000 vehicles per day (refer Traffic Impact Assessment Report prepared by Insite Planning Engineering Environmental dated January 2008). The proposed increase in vehicle movements of up to 60 per day as a result of the quarry operation would result in a negligible (<1%) increase in total traffic movements on Nelson Bay Road. Consequently, the increase in road traffic noise from Nelson Bay Road would not be perceptible to residents.

6.6 Construction Noise Assessment

Plant and equipment typically utilised for the type of construction activity required for the proposed development include items such as dozers, graders, excavators, vibratory rollers, cranes, concrete delivery trucks, etc. The sound power levels associated with these types of equipment typically range from 103 - 112 dBA.

Construction activity within the extraction area (ie assembly of the fixed plant) will have a relatively low noise impact at the nearest residential locations. The highest impact from construction noise is likely to occur during road construction adjacent to the residences at the intersection of the proposed quarry access road and Janet Parade.

Assuming a sound power level range of 103-112 dBA noise levels in the order of 62-71 dBA may be experienced at the Janet Parade residences and 45-54 dBA at the nearest residences on Nelson Bay Road. Noise levels of this order are likely to be relatively short in duration however, are above the Noise Affected noise management level of 45 dBA at the Janet Parade residences. For this reason the following construction noise mitigation / management measures are recommended:

- Construction of the recommended noise wall adjacent to the Janet Parade residences should be constructed prior to major earthworks for the quarry access road construction.
- Examine different types of machinery that perform the same function and compare the noise level data to select the least noisy machinery.
- Place as much distance as possible between the plant or equipment and residences.
- Regularly train and communicate with workers and / or contractors regarding the use of equipment in ways to minimise noise. This could include, but not be limited to, the following:
    - Avoid the use of radios/stereos outside.
    - Avoid shouting and slamming doors.
    - Keep truck drivers informed of designated routes and parking areas, etc.
- Periodically check the site and neighbouring residences for noise problems so that solutions can be quickly applied.
- Consult with affected neighbours about scheduling activities to minimise noise impacts.
- Schedule noise activities around times of high background noise (eg local road traffic) where possible to provide masking or to reduce the amount that the construction noise intrudes above the background.
- Nominate an off-site truck parking area, away from residences, for trucks arriving prior to gates opening.
- Examine and implement, where feasible and reasonable, the option of acoustical treatment to residences affected by construction noise, such as to windows at the building façade. However, alternative means of ventilation may be required where windows are closed and airflow into a building does not meet building requirements. Note also that the effectiveness of closing existing windows may be limited by the performance of the window seals and/or building façade construction.

7 CONCLUSION

Heggies Pty Ltd (Heggies) has conducted a noise impact assessment to accompany the development application for the proposed Salt Ash Sand Quarry located off Nelson Bay Road, Salt Ash NSW. Broadly, the objective of the noise assessment was to identify the potential impacts of noise from the proposed development, including construction and operation of the facility and associated road traffic movements, and to provide advice with regard to effective mitigation strategies where necessary.

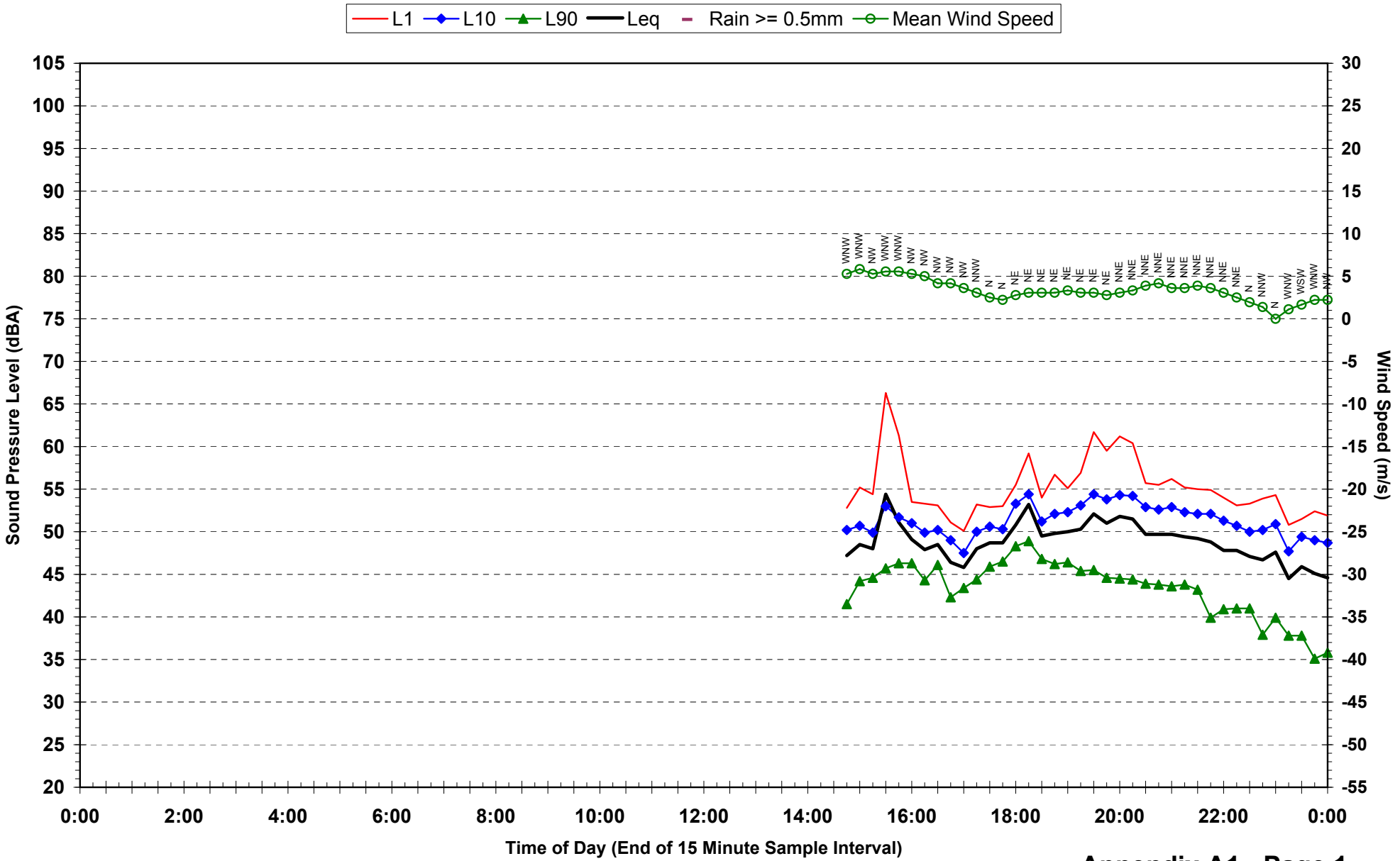
Computer noise modelling was undertaken to predict the potential impacts of operational noise from the proposed quarry at the nearest residential locations. The computer model considered topographical information, together with noise source data, ground cover, shielding by barriers and/or adjacent buildings, meteorological information and the noise mitigation measures described in **Section 6.2** to predict noise levels.

Operational noise emission levels were predicted to comply with the relevant project specific noise criteria at all assessed residential locations on Nelson Bay Road. At the Janet Parade residences, noise emission levels were predicted to be up to 5 dBA above the project specific noise criteria. The predicted exceedance is due predominantly to the mobile extraction equipment and the fixed plant. It is recommended that the management procedures described in **Section 6.3** be implemented.

Noise generated from additional road traffic as a result of operation of the proposed quarry is predicted to comply with the relevant road traffic noise design goals.

Noise from construction activity associated with construction of the proposed quarry access road is predicted to exceed the relevant noise management levels at Janet Parade residences. Recommendations with regard to construction noise mitigation and management measures are provided in **Section 6.6**.

Statistical Ambient Noise Levels
Janet Parade, Salt Ash - Friday 26 September 2008



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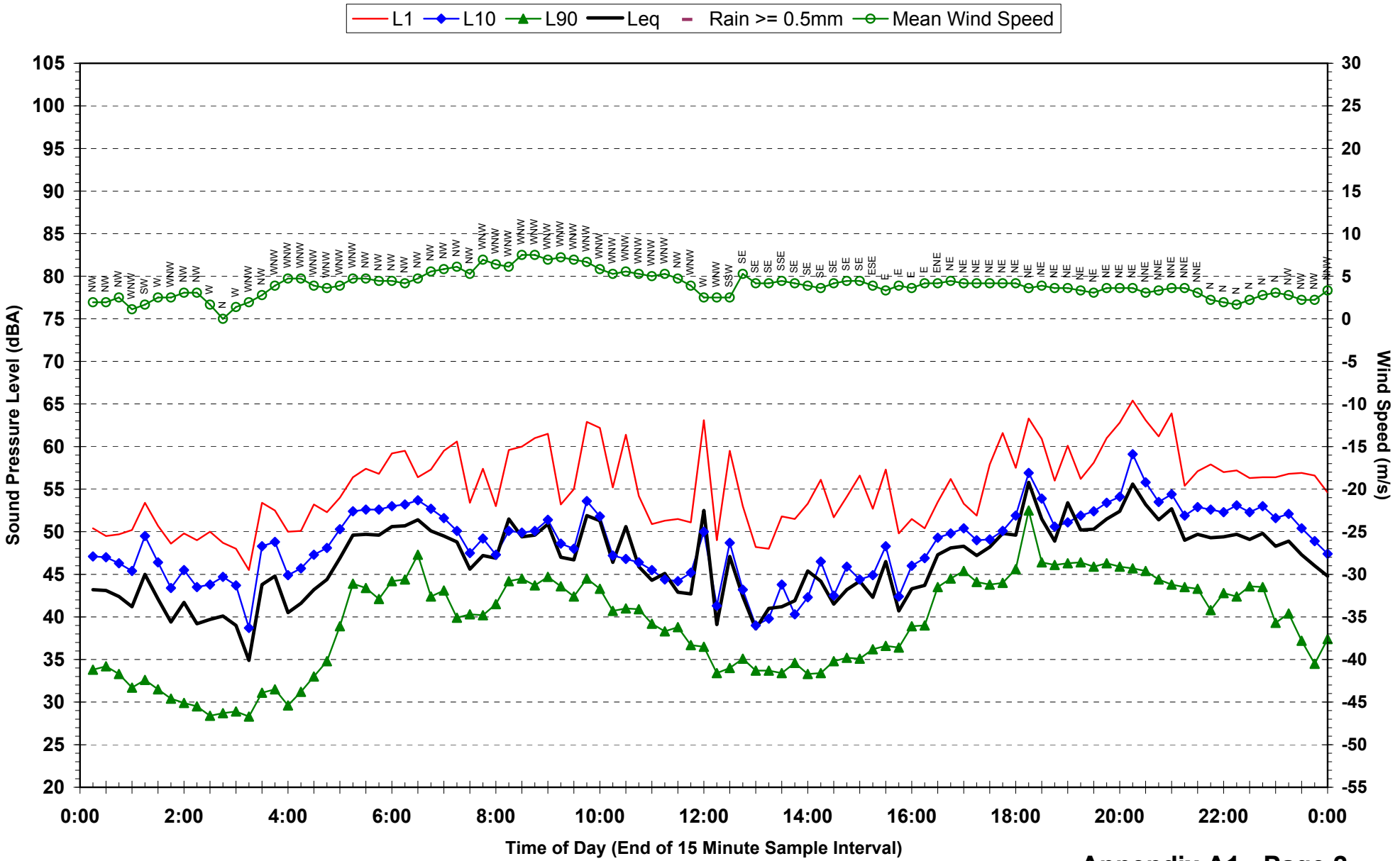
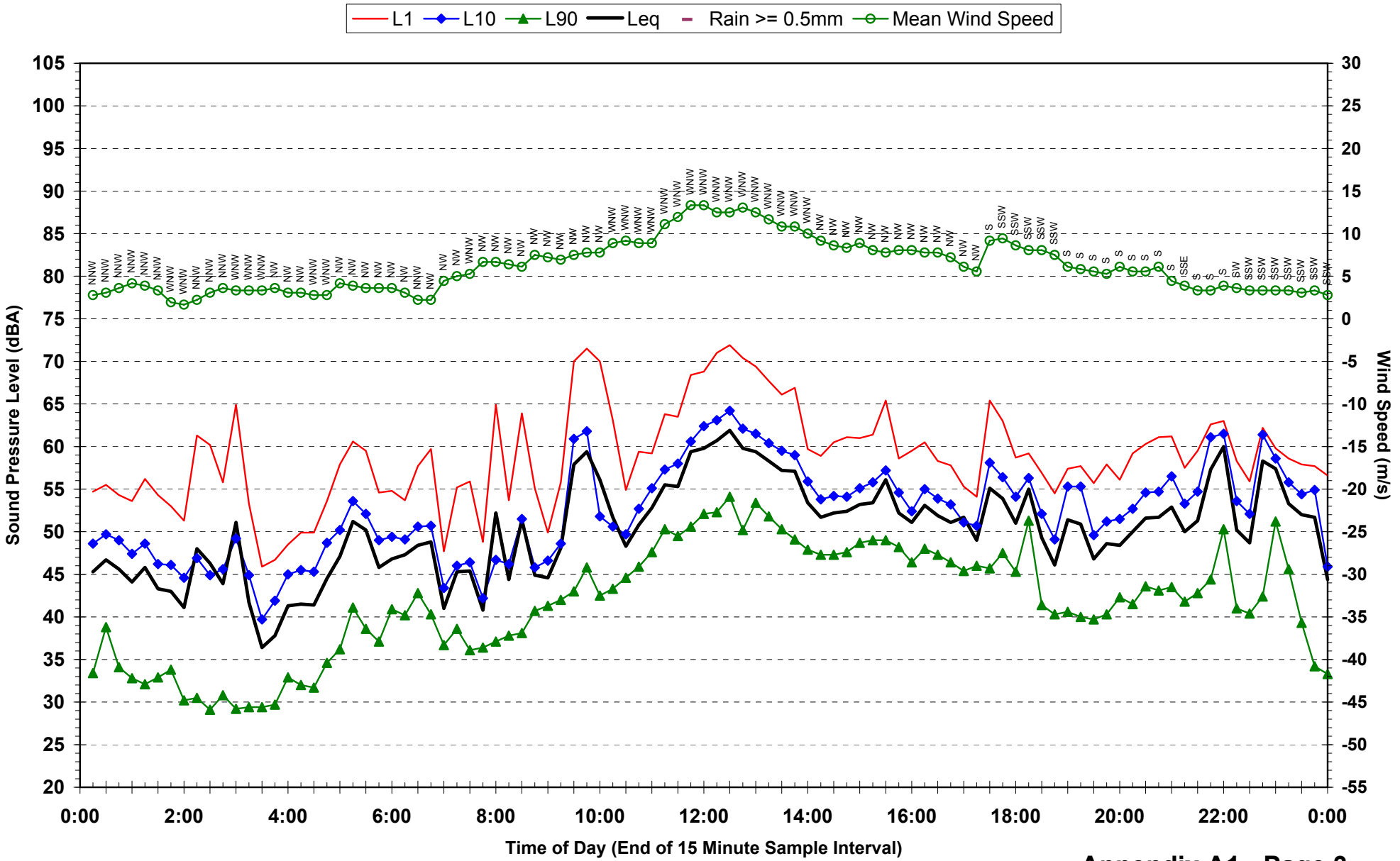
Statistical Noise Levels
Heggies Report 30-2090

Statistical Ambient Noise Levels
Janet Parade, Salt Ash - Saturday 27 September 2008



Appendix A1 - Page 2
Statistical Noise Levels
Heggies Report 30-2090

Statistical Ambient Noise Levels
Janet Parade, Salt Ash - Sunday 28 September 2008



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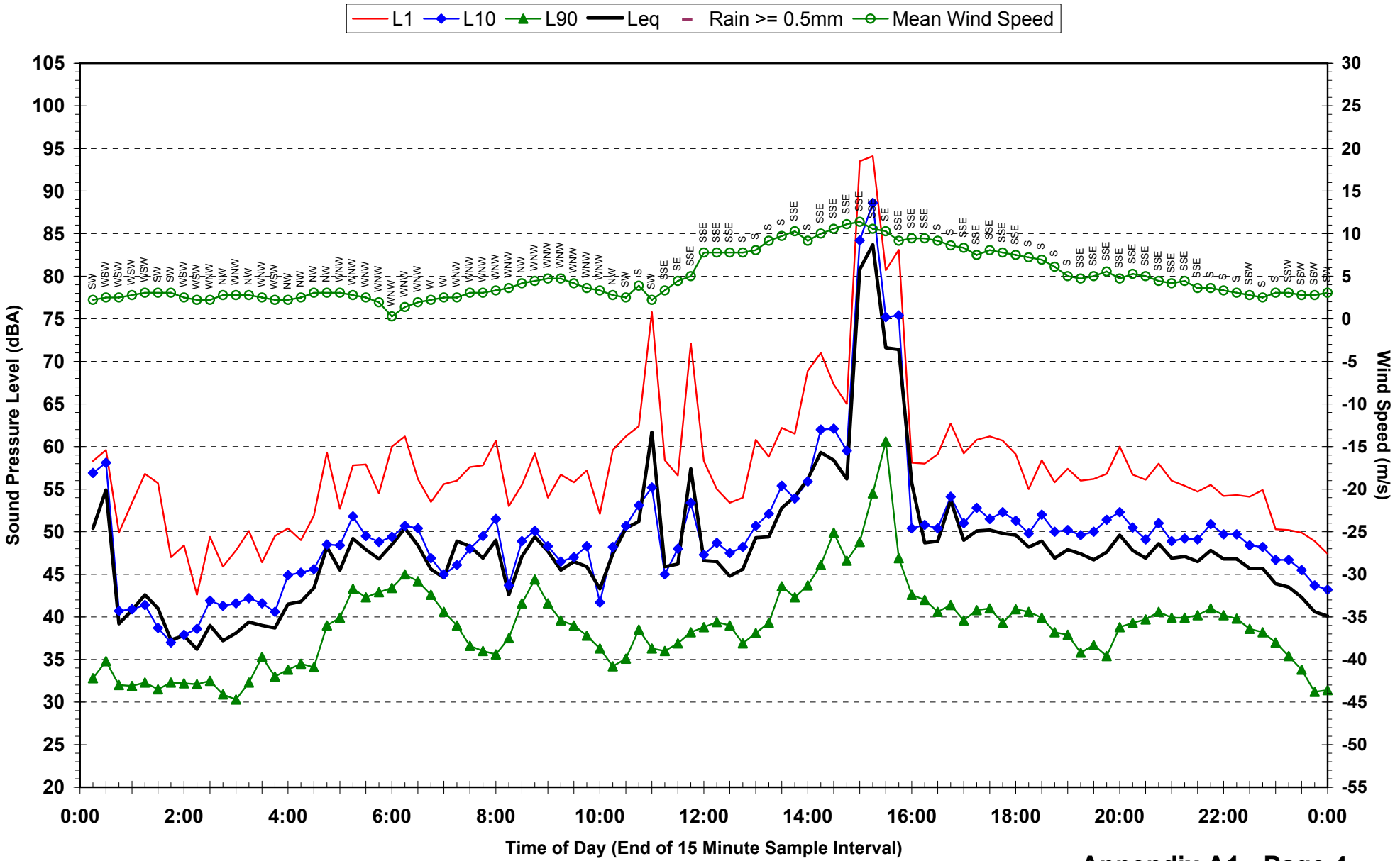
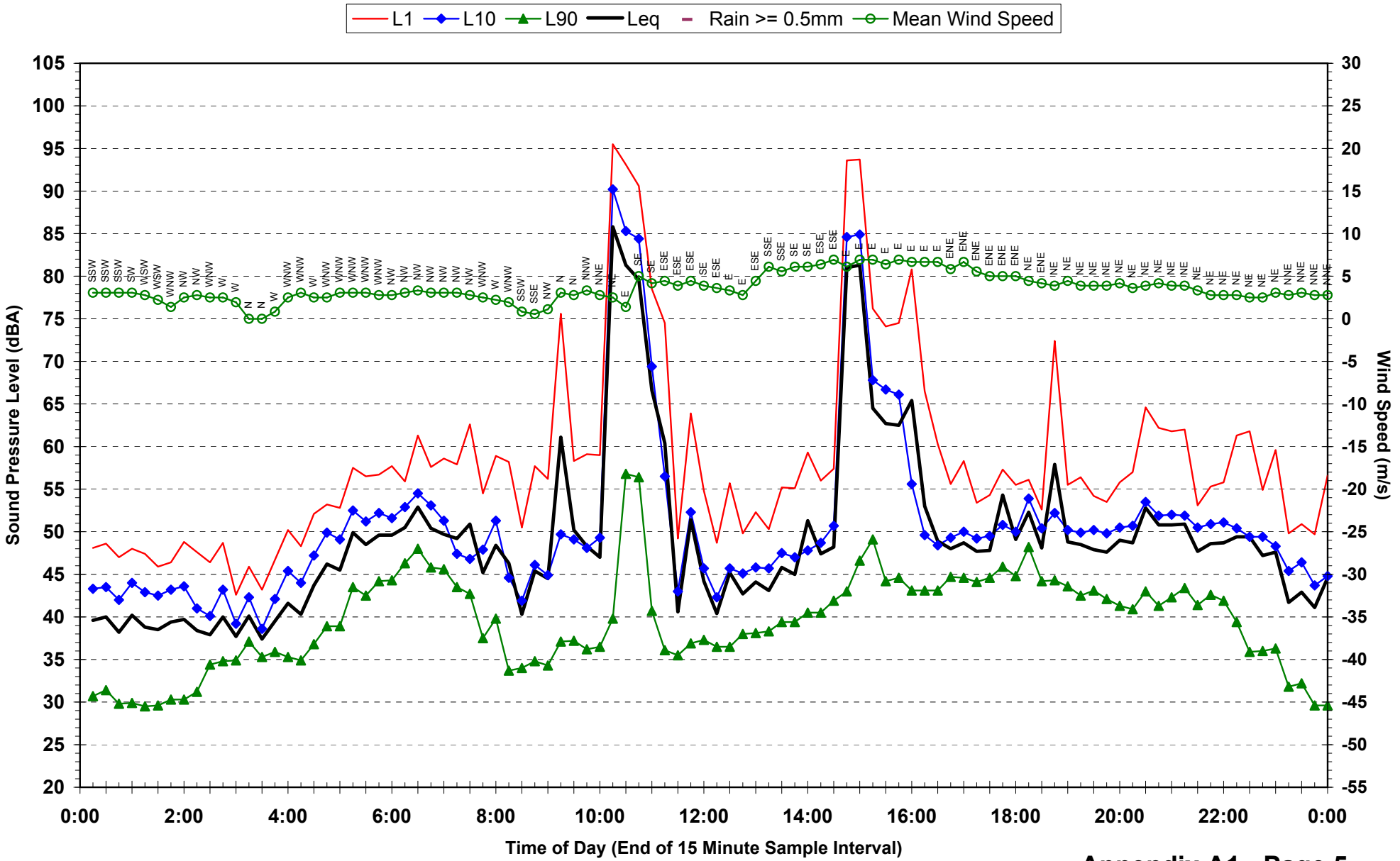
Statistical Noise Levels
Heggies Report 30-2090

Statistical Ambient Noise Levels
Janet Parade, Salt Ash - Monday 29 September 2008

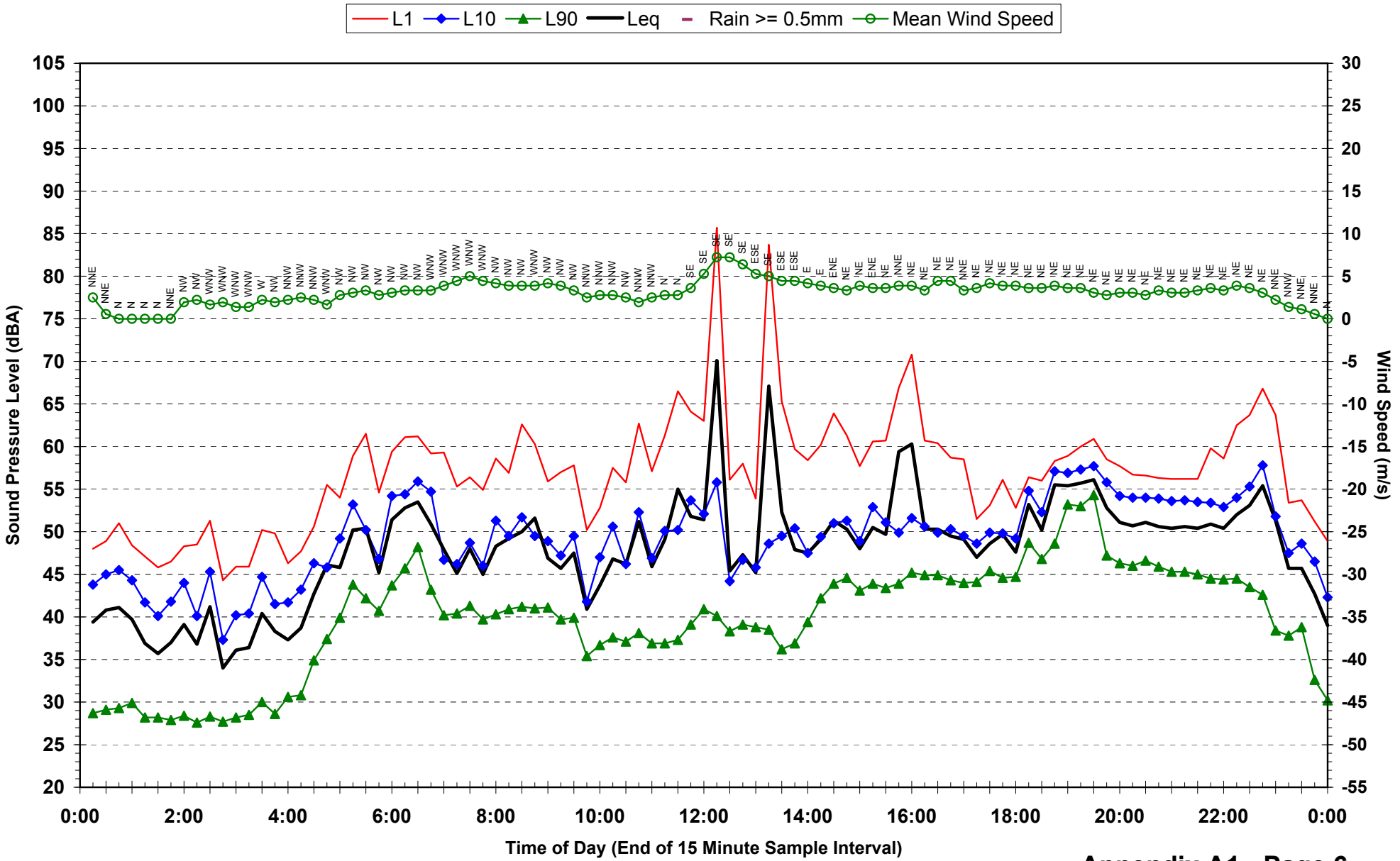


Appendix A1 - Page 4
Statistical Noise Levels
Heggies Report 30-2090

Statistical Ambient Noise Levels
Janet Parade, Salt Ash - Tuesday 30 September 2008



Statistical Ambient Noise Levels
Janet Parade, Salt Ash - Wednesday 1 October 2008



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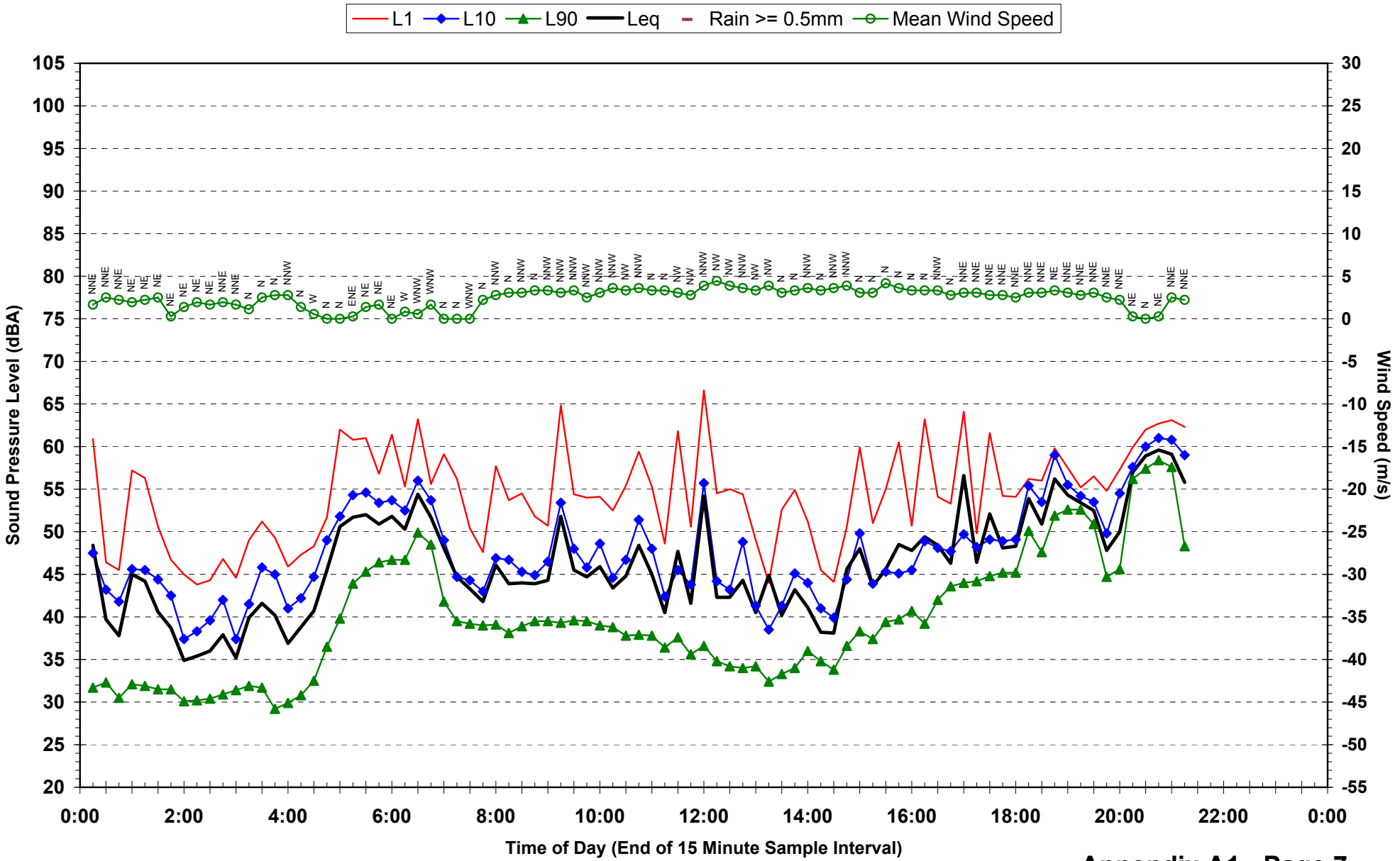
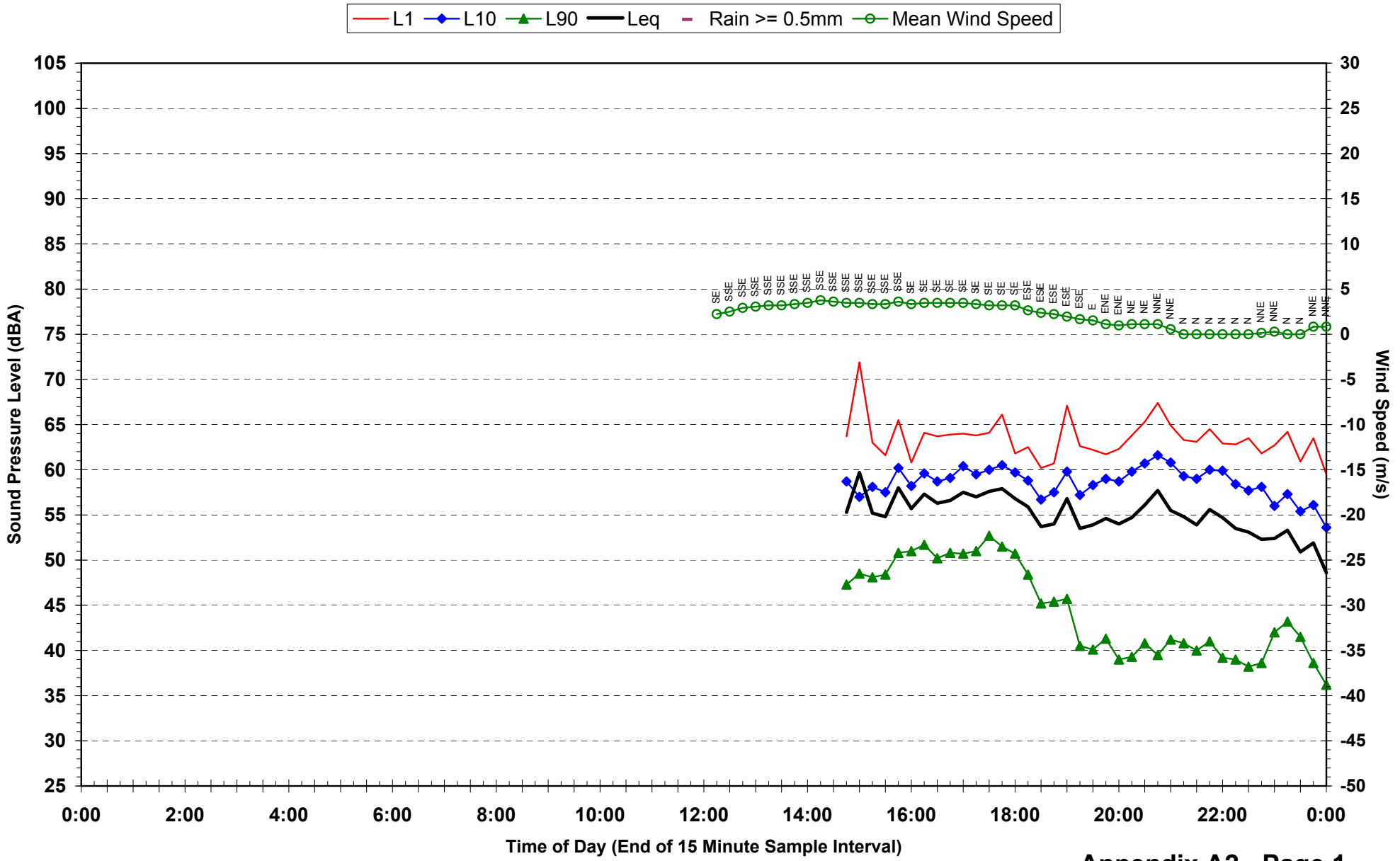
Statistical Noise Levels
Heggies Report 30-2090

Statistical Ambient Noise Levels
Janet Parade, Salt Ash - Thursday 2 October 2008



Statistical Ambient Noise Levels
Nelson Bay Road, Salt Ash - Thursday 16 October 2008



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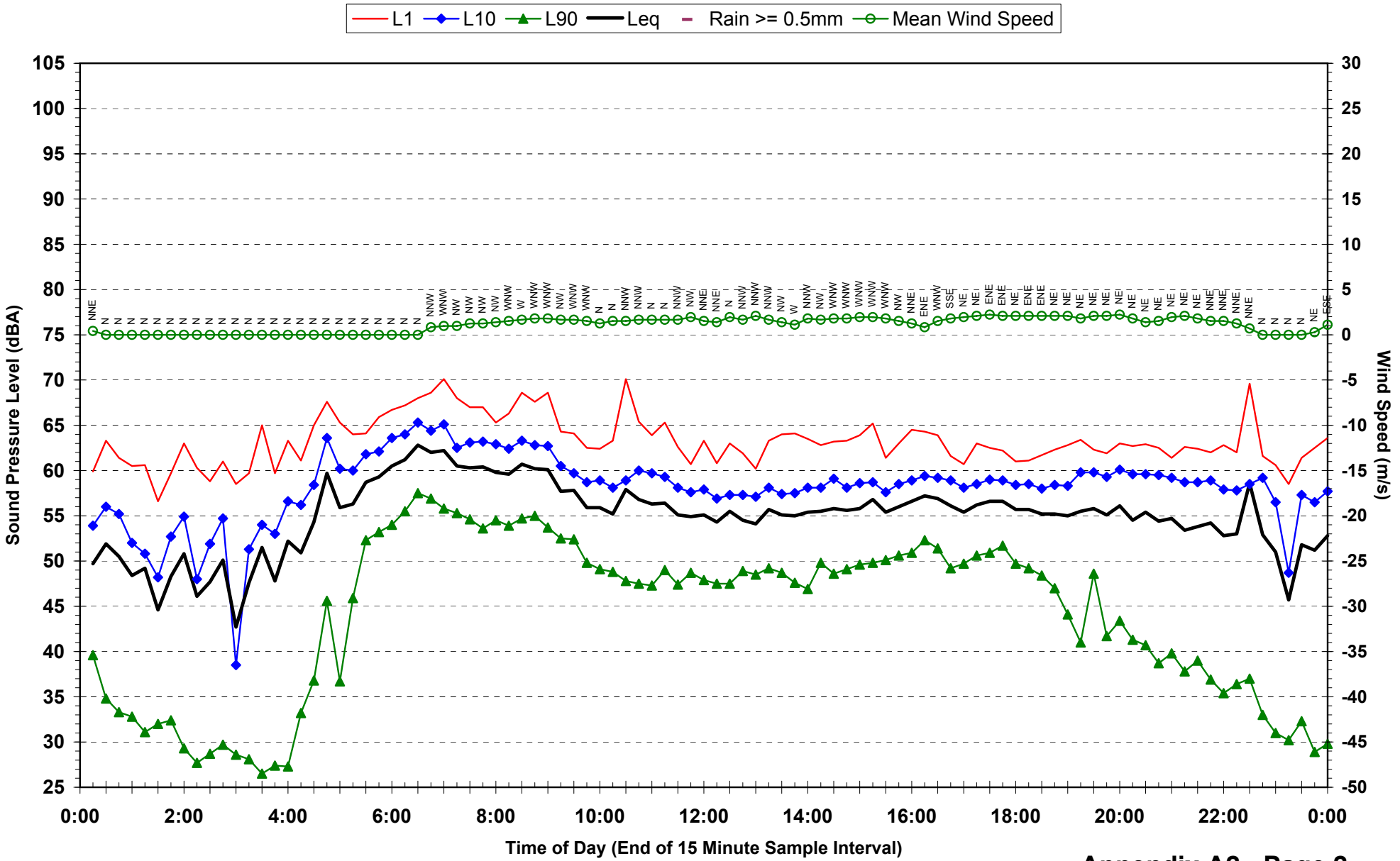
Statistical Noise Levels
Heggies Report 30-2090

Statistical Ambient Noise Levels
Nelson Bay Road, Salt Ash - Friday 17 October 2008



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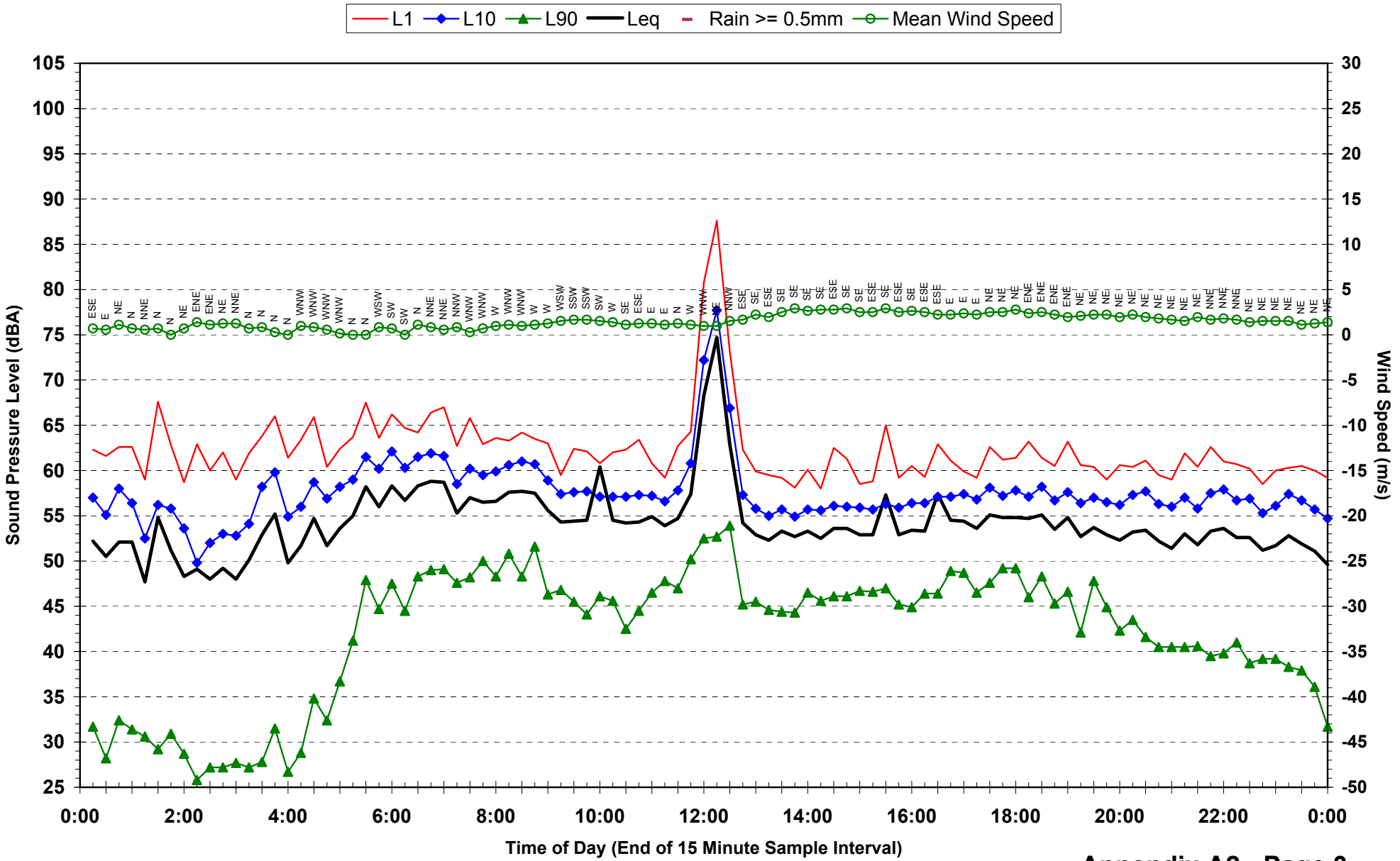
Statistical Noise Levels
Heggies Report 30-2090

Statistical Ambient Noise Levels
Nelson Bay Road, Salt Ash - Saturday 18 October 2008



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Statistical Noise Levels
Heggies Report 30-2090

Statistical Ambient Noise Levels
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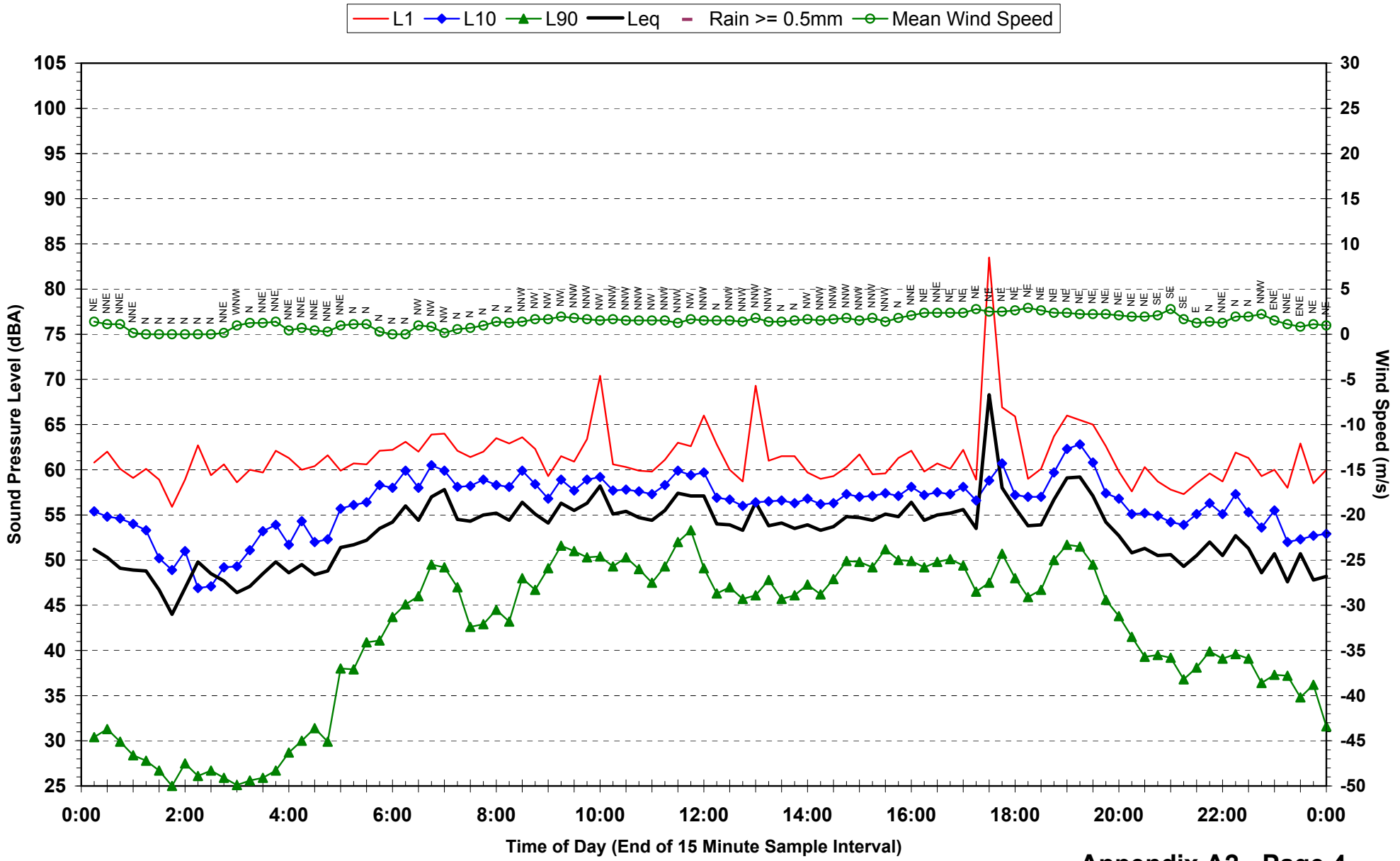

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Statistical Noise Levels
Heggies Report 30-2090

Statistical Ambient Noise Levels
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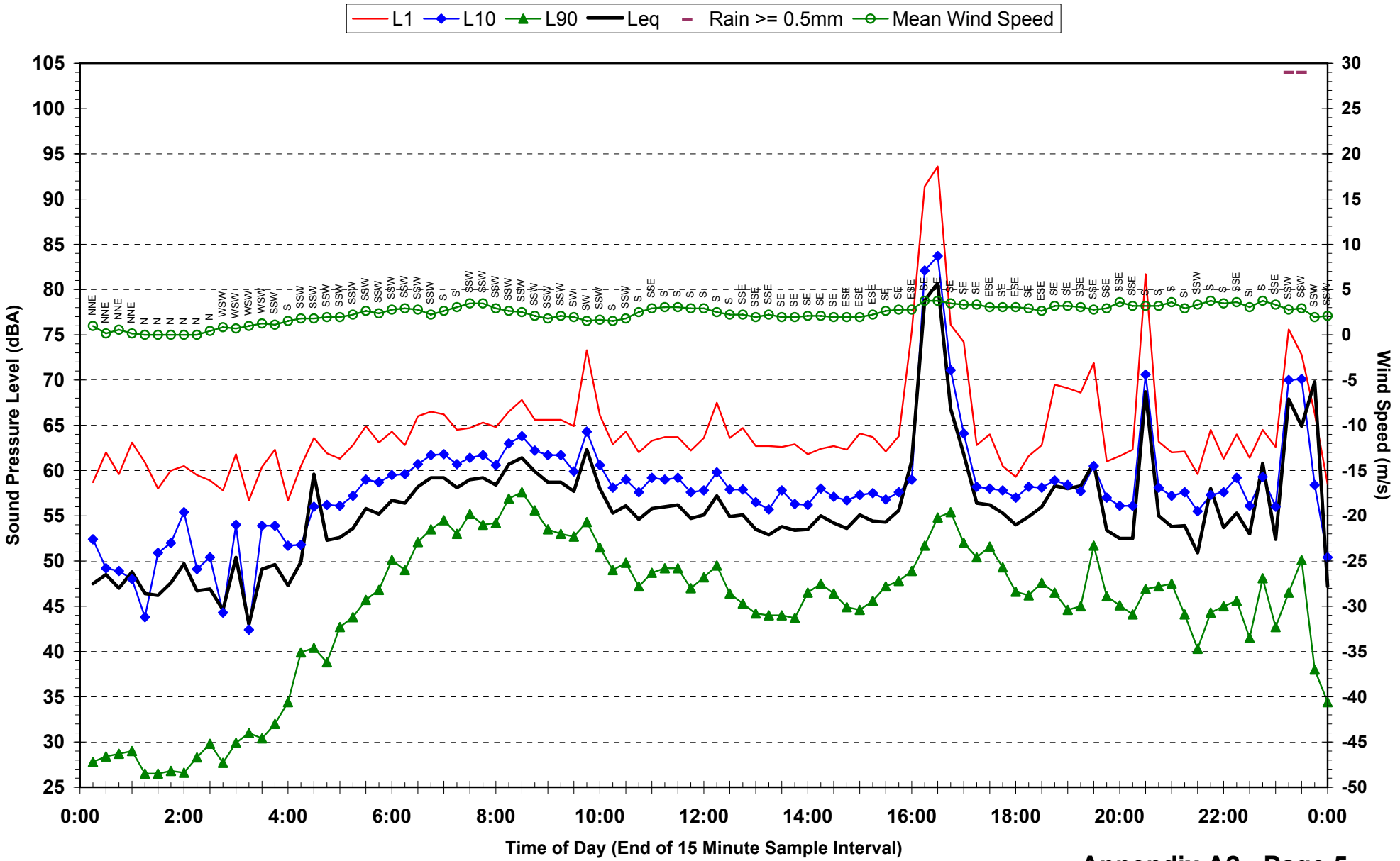
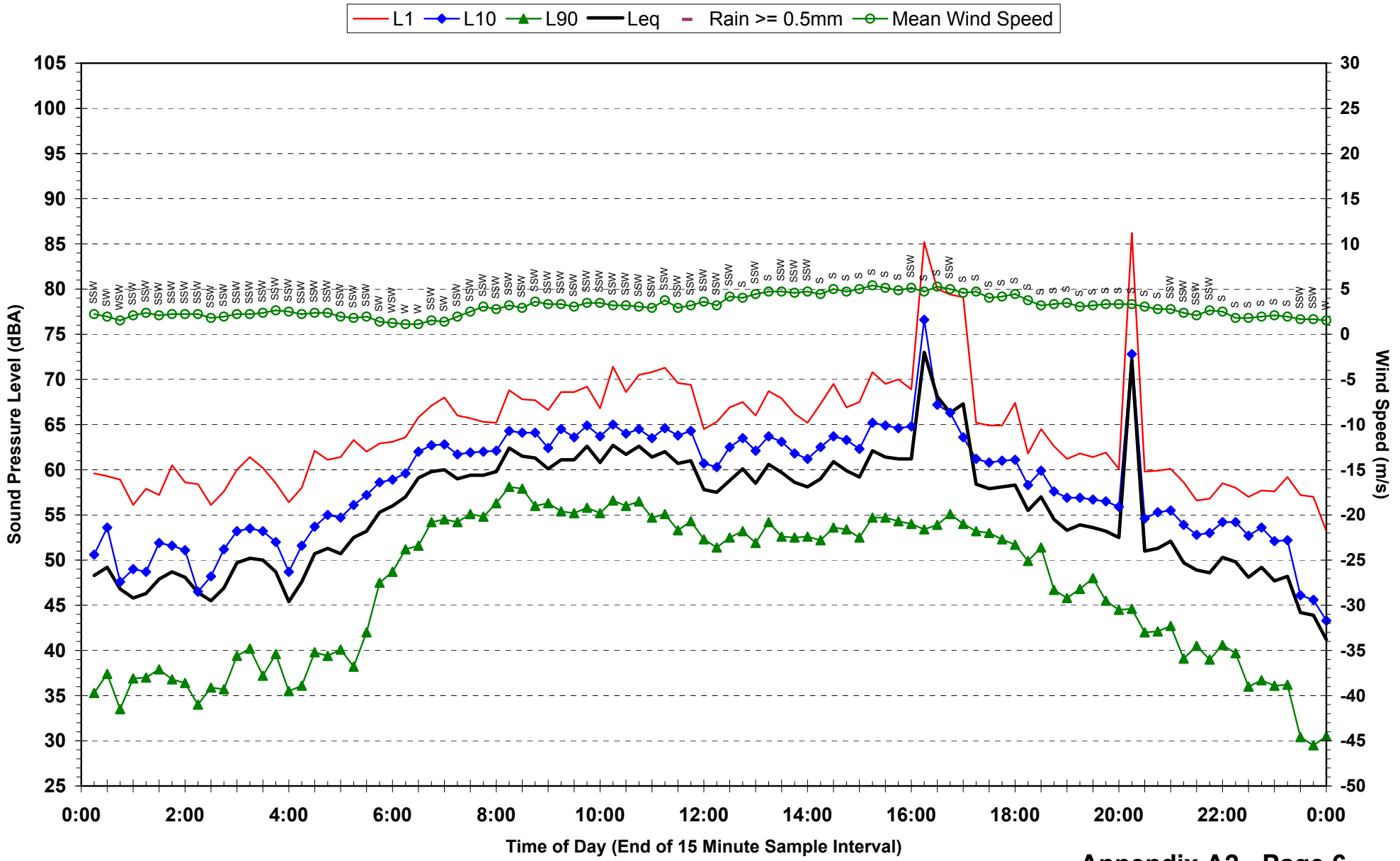


Statistical Ambient Noise Levels
Nelson Bay Road, Salt Ash - Tuesday 21 October 2008



Statistical Ambient Noise Levels
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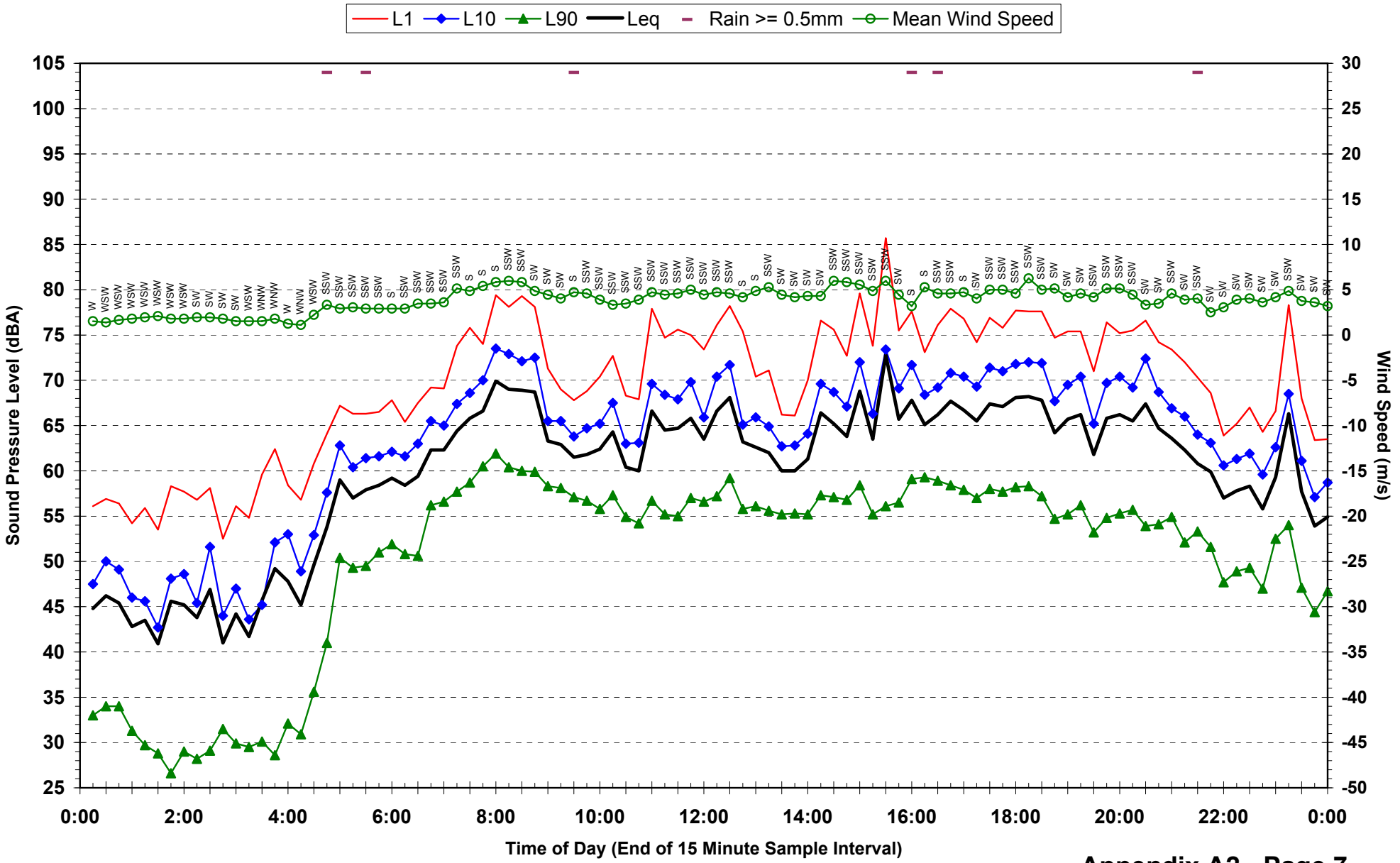
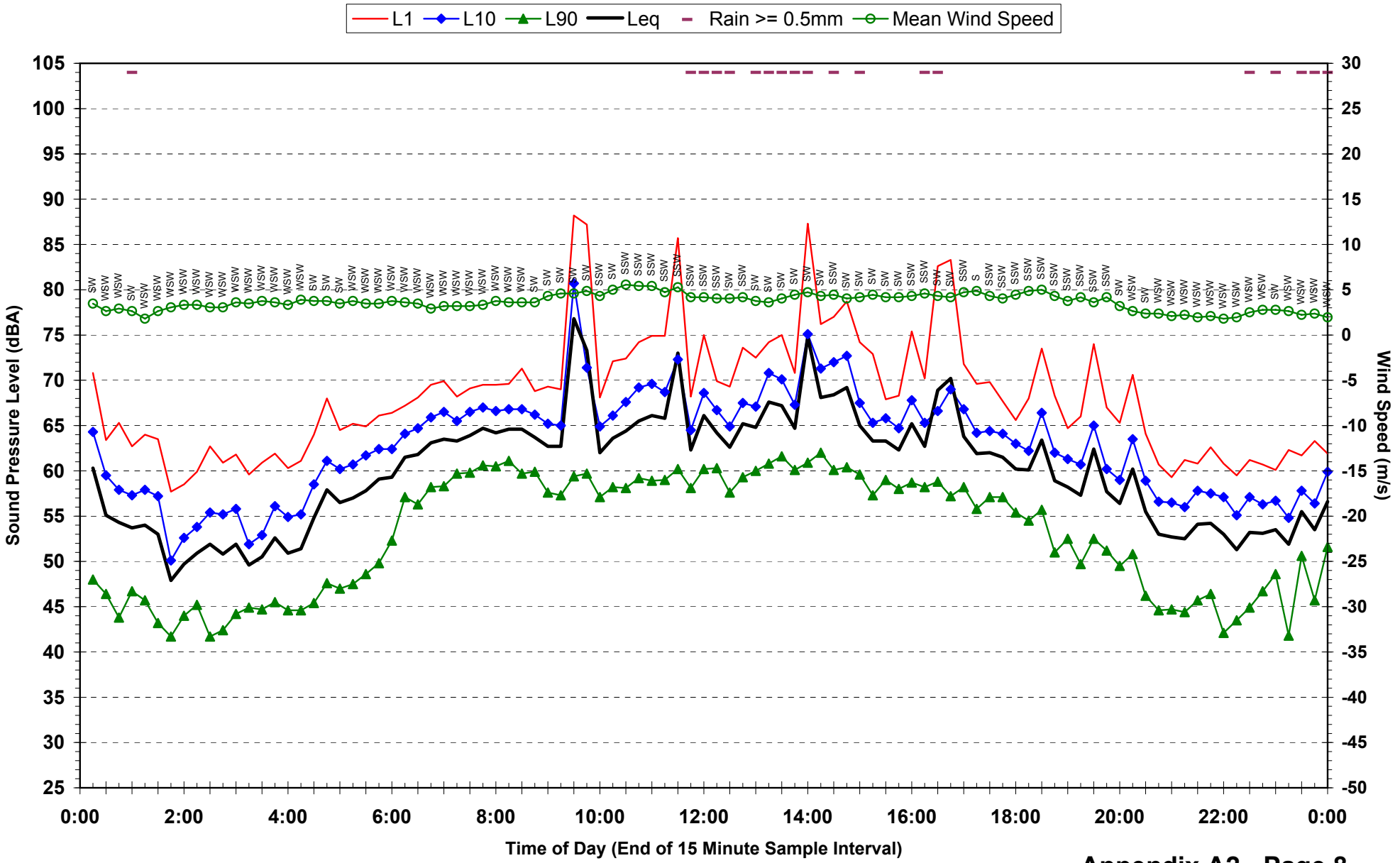
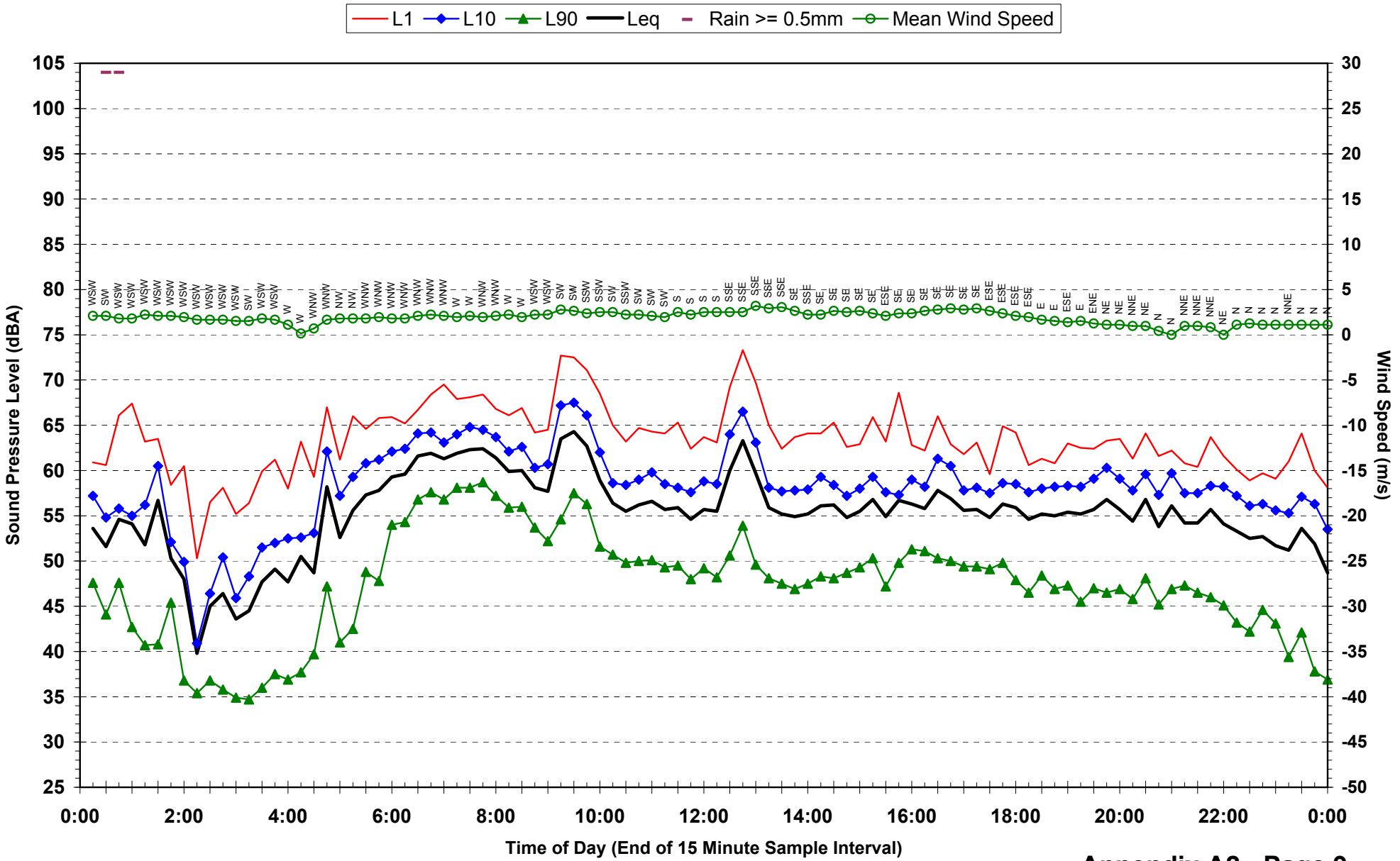


Statistical Ambient Noise Levels
Nelson Bay Road, Salt Ash - Thursday 23 October 2008



Statistical Ambient Noise Levels
Nelson Bay Road, Salt Ash - Friday 24 October 2008



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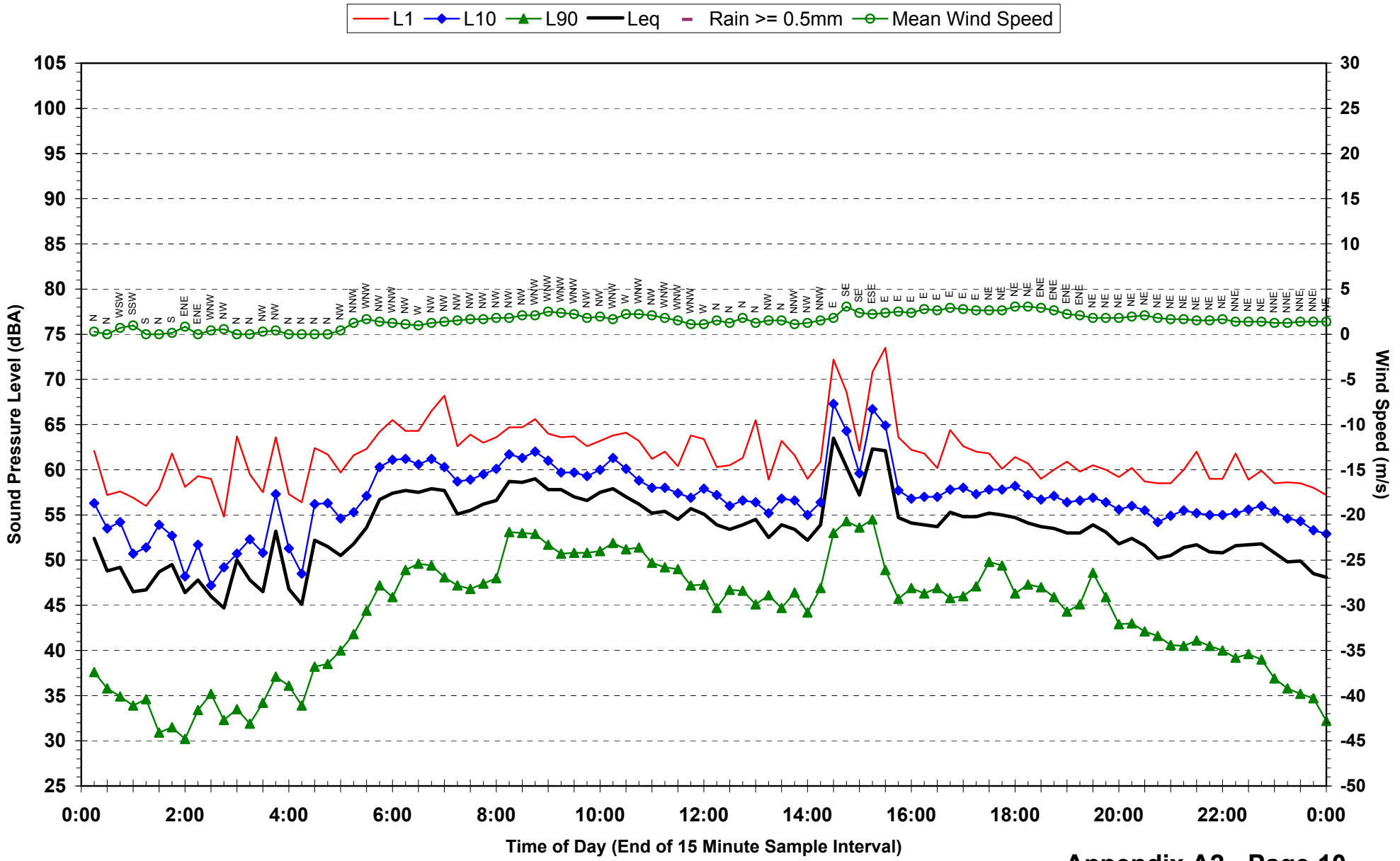
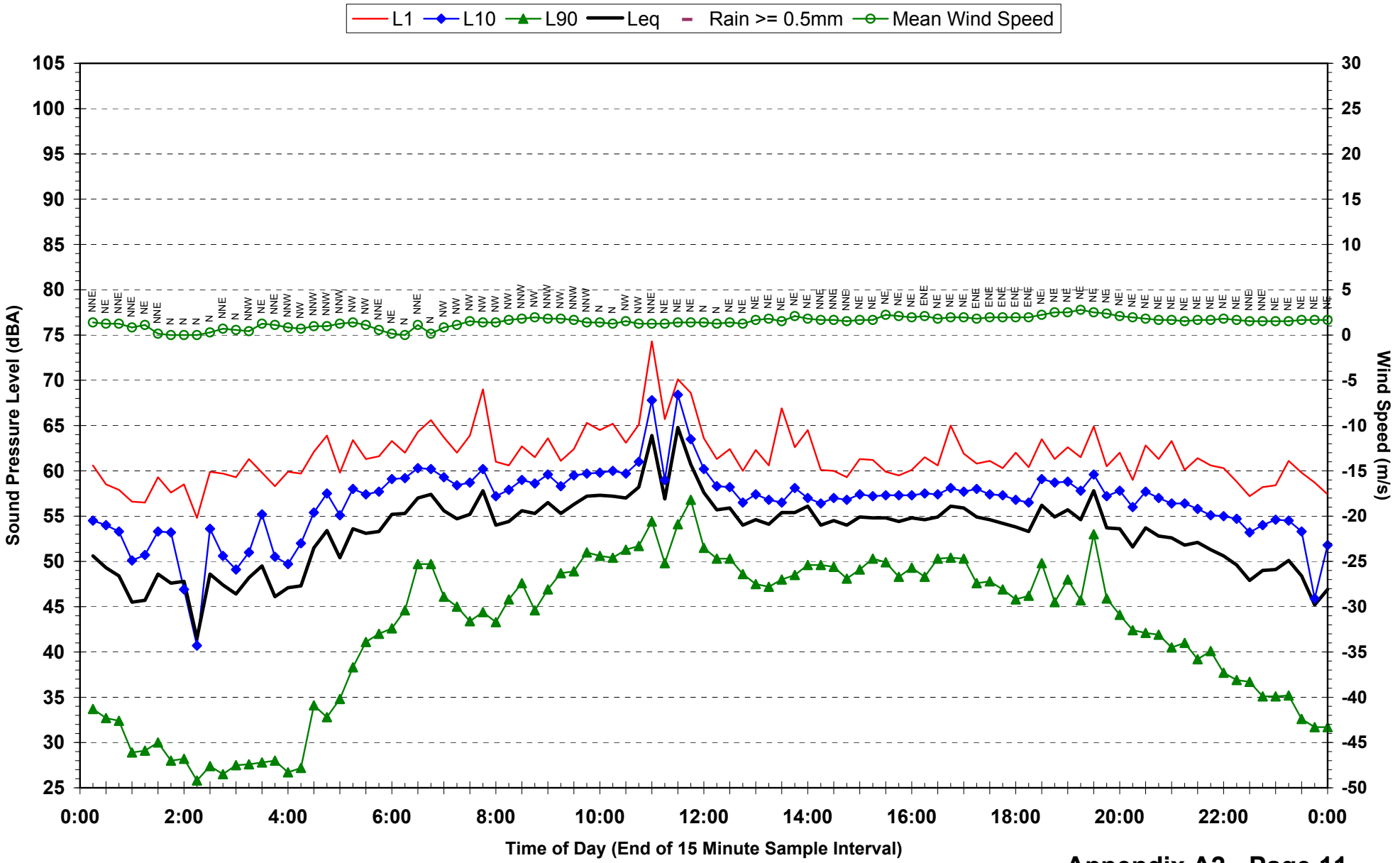
Nelson Bay Road, Salt Ash - Saturday 25 October 2008



Statistical Ambient Noise Levels
Nelson Bay Road, Salt Ash - Sunday 26 October 2008



Statistical Ambient Noise Levels
Nelson Bay Road, Salt Ash - Monday 27 October 2008