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Midal Cables International Pty Limited

Report for Tomago Cable Manufacturing Facility

Noise Impact Assessment

February 2012

Revision 2

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Glossary

Term	Description
Sound Pressure Level	20 times the logarithm to the base 10 of the ratio of the RMS sound pressure to the reference sound pressure of 20 micropascals.
dB	Decibel, which is 10 times the logarithm (base 10) of the ratio of a given sound pressure to a reference pressure; used as a unit of sound.
dB(A)	Unit used to measure 'A-weighted' sound pressure levels.
$L_{A10\ (Time)}$	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
$L_{A90\ (Time)}$	The A-weighted sound pressure level that is exceeded for 90% of the time over which a given sound is measured. This is considered to represent the background noise eg $L_{A90(15\ min)}$.
$L_{Aeq\ (Time)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
Rating Background Level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period. This is the level used for assessment purposes.
Noise Sensitive Receiver	An area or place potentially affected by noise which includes: ◗ A residential dwelling. ◗ An educational institution, library, childcare centre or kindergarten. ◗ A hospital, surgery or other medical institution. ◗ An active (eg sports field, golf course) or passive (eg national park) recreational area. ◗ Commercial or industrial premises. ◗ A place of worship.

1. Introduction

1.1 Overview

GHD Pty Ltd (GHD) was commissioned by Midal Cables International Pty Limited (Midal) to conduct a noise assessment of the proposed Cables Manufacturing Facility to be located at Tomago, NSW. This noise impact assessment forms part of an Environmental Assessment for the project.

1.2 Scope of Work

The scope of work for this noise assessment involved the following tasks:

- Undertake unattended noise monitoring for a period of one week at one location in the vicinity of the site. The monitoring was conducted using one noise logger and one weather station at a noise receiver location indicative of the local ambient noise environment that can potentially be affected by the project.
- Undertake attended noise measurements at two locations to supplement the unattended measurements.
- Noise data was assessed and filtered to remove invalid data due to extraneous noise or adverse weather conditions.
- Based on monitoring results, project specific noise goals were established for construction and operation of the project with consideration to the NSW Office of Environment & Heritage (OEH) publications:
  - Industrial Noise Policy (INP), 2000.
  - Environmental Criteria for Road Traffic Noise (ECRTN), 1999.
  - Interim Construction Noise Guidelines (ICNG), 2009.
- Review of client provided information detailing proposed equipment to be used during operation of the facility, including any building or shed materials, to identify key sources of noise pollution that may impact upon the noise sensitive receptors.
- Undertake an assessment of construction noise and vibration impacts with consideration to the Interim Construction Noise Guidelines (ICNG).
- Undertake one noise modelling scenario using Computer Aided Noise Abatement (CadnaA) software to predict sound pressure levels emanating from the plant operations.
- Assess the predicted noise levels against the adopted noise limits. Provide in-principle noise mitigation recommendations, if the noise levels are predicted to exceed the noise limits.

2. Project Description

The project involves construction and operation of an aluminium rod and conductor manufacturing facility in Tomago, NSW. The site will be located on a 2.8 ha parcel of land adjacent to the existing Tomago Aluminium Company (TAC) Smelter.

The facility will produce aluminium rods and conductor from molten aluminium sourced from the aluminium smelter, which will be delivered in crucible trucks. The primary production process will involve natural gas fired holding furnaces, tilting furnaces, casting machines, rolling mills, wire coilers, ovens and packaging units. Secondary processes include wire drawing, wire stranding, packing and cooling. The facility will process 50,000 tonnes of aluminium per year.

The following buildings and structures are proposed:

- Casting and Coil Storage Shed of approximately 35 m wide by 98 m.
- Wire Drawing and Stranding Shed of approximately 46 m wide by 124 m long.
- Administration Building.
- Workshop and Stores Building.
- Compressor House.
- Electrical Substation/MCC.
- In ground storage tanks.
- General earthworks will include building and infrastructure works, such as:
  - Site preparation and levelling.
  - Construction of access roads and infrastructure, including a haul road from Tomago Aluminium to the north of the Midal site.
  - Construction of site buildings.
  - Construction of car parking areas.

3. Existing Environment

3.1 Study Area

The site of the project is on industrial land within the Tomago Industrial Area, approximately 6 km from the Port of Newcastle and immediately adjacent to the Tomago Smelter. This land comprises lots 5 and 6 in DP 270328 and has an area of approximately 2.8 ha.

The site has been subject to previous industrial usage as a manufacturing facility and parts of the site have been subject to sand mining activities. The existing building on the site, located in the southern half of the site, will be demolished as part of the construction activities.

Access to the south of the site is provided by a sealed road off School Drive and the existing gravel road leading up to the current building will be reformed and sealed as part of the project. The haul road will be constructed from the smelter and enter the site on its northern boundary. This haul road will be constructed on land owned by the Tomago Aluminium Corporation (TAC) but maintained by Midal. The existing industrial buildings to the west are similar in size to those proposed on the Midal site.

The site is generally flat with a slight incline in the northern edge towards the northern boundary. Grass and occasional small trees and shrubs exist across the site with a majority of the trees located along the northern boundary.

The site lies within the industrial buffer area surrounding the TAC smelter.

3.2 Sensitive Receivers

Noise sensitive receivers in the vicinity of the site include residential dwellings located along School Drive, Tomago Road and Graham Road. The nearest residential dwelling is located approximately 230 metres south and southeast of the site.

The Port Stephens Council Local Environment Plan (LEP) 2000[1] indicates the areas immediately surrounding the site are predominantly industrial with some residential receivers located on land zoned as 'industrial 4a' and 'residential agriculture 1a' as shown below in Table 3-1.

Details of nearby sensitive receivers are given in Table 3-1. These identified receivers have been chosen to represent those with the greatest potential for adverse impact in the area. Locations of the sensitive receivers and the noise logging location are shown in Figure 3.1.

Table 3-1 Sensitive Receivers Surrounding the Subject Site

Receiver	Receiver Type (Zoning)	Description	Coordinates (Easting, Northing)
R1	Residence (Rural agriculture 1a)	5 Graham Drive. 1800 metres ENE of the site.	E 382724, N 6367829

[1] Port Stephens Council LEP available at http://portstephens-new.local-e.nsw.gov.au/

Receiver	Receiver Type (Zoning)	Description	Coordinates (Easting, Northing)
R2	Residence (Industrial 4a)	41 School Drive. 250 metres east of the site.	E 381369, N 6367140
R3	Residence (Industrial 4a)	29 School Drive. 230 metres south of the site.	E 381199, N 6366860
R4	Residence (Rural agriculture 1a)	423 Tomago Road. TAC monitoring station. 350 metres South-southeast of the site.	E 381338, N 6366782
R5	Residence (Industrial 4a)	Tomago Detention Centre, 585-591 Tomago Road. 1100 metres west-southwest of the site.	E 379977, N 6366683
R6	Industrial	TAC Smelter. 500 metres west of the site.	E 380350, N 6367355
R7	Industrial	Varley Power Services, 10 McIntyre Road. 70 metres west of the site.	E 380925, N 6367175
R8	Commercial	Compass Pools, 21 School Drive. 300 metres south of the site	E 380988, N 6366838

Figure 3.1 Midal Site, Sensitive Receivers and Noise Monitoring Locations

3.3 Noise Monitoring Methodology

3.3.1 Unattended Noise Monitoring

Unattended noise monitoring took place at one location between 29/03/2011 and 10/04/2011. This was considered to be a good representation of the existing ambient noise environment. The monitoring location was also chosen as it was identified by GHD as being a safe and secure place for unattended equipment.

The noise monitoring was undertaken using one RION NL-22 environmental noise logger. This logger is capable of measuring continuous sound pressure levels and is able to record LA90, LA10, LAeq and LAmax noise descriptors. The instrument was programmed to accumulate environmental noise data continuously over sampling periods of 15 minutes for the entire monitoring period.

Prior to deployment and at monitoring completion, the logger was calibrated with a sound pressure level of 94dB at 1kHz using a Bruel & Kjaer Type 4231 sound level Calibrator (serial number 2542101). The data collected by the logger was downloaded and analysed, and any invalid data removed. Invalid data generally refers to periods of time where average wind speeds were greater than 5 m/s, or when rainfall occurred (Source: INP). Concurrent weather data every 10 minutes for the entire monitoring period was provided by Tomago Aluminium Company (TAC)'s automatic weather station.

Details of the noise logger and location are provided in Table 3-2. Site observations and discussions with the land owner indicated that the swimming pool was not in use and therefore the pool pump not operational during the monitoring period. In any case, alternate noise data was required as discussed in Section 3.4.1.

All sampling activities were undertaken with consideration to the specifications outlined in AS 1055 (1997) '*Description and Measurement of Environmental Noise*' and the NSW INP.

Table 3-2 Unattended Noise Logger Details

Noise Logger	Details
Monitoring Location	5 Graham Drive, Tomago NSW
Logger Type / Serial No.	RION NL-22 / 852196
Measurement Started	18:15 29/03/2011
Measurement Ceased	18:00 10/04/2011
Pre Calibration	93.7 dB(A)
Post Calibration	93.7 dB(A)
Freq. Weighting	A
Time response	Fast

Noise Logger	Details
Photograph	

3.3.2 Attended Noise Monitoring

Attended noise measurements were taken at two locations for a period of 15 minutes during the daytime, evening-time and night-time period to supplement the unattended monitoring.

Attended measurements were taken using a Bruel & Kjaer Sound Level Meter (SLM) (serial number 2506887). This is a Type 1 instrument which is capable of measuring continuous sound pressure levels and able to record L_{Amin}, L_{A90}, L_{A10}, L_{Amax} and L_{Aeq} noise descriptors.

Field calibration was checked by GHD immediately before and after the measurement using a Bruel & Kjaer 4231 sound level calibrator (serial number 2542101).

Details of attended noise monitoring locations are provided in Table 3-3.

Table 3-3 Attended Noise Monitoring Locations

Noise Monitoring	Location	Direction from the Subject Site
L1 (R1)	5 Graham Drive, Tomago NSW	Northeast
L2 (R3)	29 School Drive, Tomago NSW	Southeast

3.4 Summary of Noise Monitoring Results

3.4.1 Unattended Noise Monitoring Results

A summary of the calculated background L_{A90} (day, evening and night) noise levels and ambient L_{Aeq} (day, evening and night) noise levels for the monitoring period at the unattended logger location are provided in Table 3-4 and Table 3-5 respectively. Noise monitoring charts are presented in Appendix A.

Table 3-4 Unattended Noise Results – Background L_{A90} Noise Levels, dB(A)

Date	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
Tuesday-29-Mar-11	–	39	39
Wednesday-30-Mar-11	39	39	39
Thursday-31-Mar-11	44	39	39
Friday-1-Apr-11	43	40	39
Saturday-2-Apr-11	42	43	–
Sunday-3-Apr-11	–	–	–
Monday-4-Apr-11	48	40	39
Tuesday-5-Apr-11	43	40	39
Wednesday-6-Apr-11	41	40	39
Thursday-7-Apr-11	41	39	39
Friday-8-Apr-11	41	40	39
Saturday-9-Apr-11	40	39	39
Sunday-10-Apr-11	40	–	–
Rating Background Level (RBL)	41	40	39

Note: '-' Indicates that insufficient data measurements were taken during this period or excluded due to wind or rain influence.

Table 3-5 Unattended Noise Results – Ambient L_{Aeq} Noise Levels, dB(A)

Date	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
Tuesday-29-Mar-11	–	50	46
Wednesday-30-Mar-11	52	45	47
Thursday-31-Mar-11	61	48	46
Friday-1-Apr-11	53	48	44
Saturday-2-Apr-11	51	51	–
Sunday-3-Apr-11	–	–	–
Monday-4-Apr-11	54	50	50
Tuesday-5-Apr-11	52	53	47
Wednesday-6-Apr-11	53	50	46
Thursday-7-Apr-11	53	50	50
Friday-8-Apr-11	49	49	44
Saturday-9-Apr-11	48	48	44
Sunday-10-Apr-11	48	–	–
Overall L_{Aeq}	54	50	47

Note: '-' Indicates that insufficient data measurements were taken during this period or excluded due to wind or rain influence

The results shown in Table 3-4 and the graphs in Appendix A indicate the night-time background noise levels were consistently 39 dB(A) for each night period. Later inspection of the noise logger instrumentation revealed an electronic fault whereby the noise floor of the instrument was found to be approximately 39 dB(A). As such, the noise data is considered invalid, especially during night-time periods when background noise levels were potentially less than 39 dB(A).

Given the unattended noise logger data is considered invalid, data was obtained from the *Newcastle Gas Storage Facility Project (NGSFP) Environmental Assessment (Coffey)*[2], May 2011.

For this assessment, Atkins Acoustics (Report reference: 41.6592.R1:CFCD5 Rev 5) conducted unattended background noise monitoring at the same location as the GHD monitoring, at 5 Graham Drive, Tomago and also an additional location at 45 School Drive. The monitoring results are shown below in Table 3-6. The two monitoring locations are shown in Figure 3.1.

A comparison between the GHD and Atkins Acoustics data sets is provided below in Table 3-7.

[2] Volume 4: Appendices 8-13 (Major Project Application Number 10-0133) http://majorprojects.planning.nsw.gov.au/

Table 3-6 Unattended Noise Results–Background L_{A90} and Ambient Noise Levels – Sourced from AGL NGSFP Environmental Assessment Report, dB(A)

	Background Noise Levels L_{A90} dB(A)			Ambient Noise Levels L_{Aeq} dB(A)		
Monitoring Location	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
5 Graham Drive	41	40	39	54	50	47
45 School Drive	46	44	44	54	52	49

Table 3-7 Unattended Noise Results Comparison at 5 Graham Drive, Tomago – Background L_{A90} and Ambient Noise Levels, dB(A)

	Background Noise Levels L_{A90} dB(A)			Ambient Noise Levels L_{Aeq} dB(A)		
Data	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
GHD Monitoring	41	40	39	54	50	47
NGSFP EIS Monitoring	42	39	37	56	51	49
Variance	-1	+1	+2	-2	-1	-2

The comparison between the two data sets indicate relatively close agreement with a variance ranging between 1-2 dB(A). As such, it is reasonable to assume that the existing noise levels at the monitoring location does not fall below 39 dB(A) for sufficient lengths of time to influence the overall results significantly.

Nonetheless, the NGSFP noise monitoring data is considered representative of the existing acoustic environment and therefore is used for setting the project specific noise goals for this assessment.

3.4.2 Attended Noise Monitoring Results

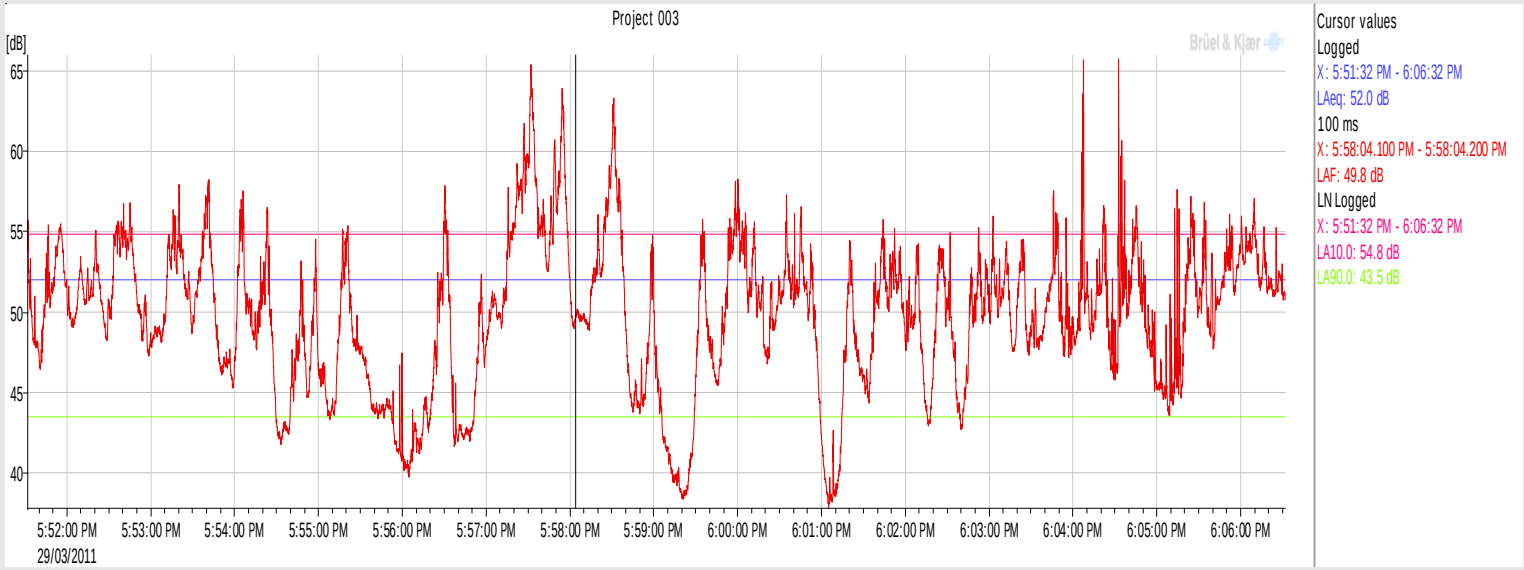
A summary of the attended noise monitoring results are given in Table 3-8. The attended noise measurements indicate the following:

- Traffic noise on Tomago Road generally dominates the acoustic environment in the area.
- Existing industrial noise at R1 (5 Graham Road) was generally inaudible during the daytime, however it was barely audible between traffic passbys as a distant hum being less than the background noise level during attended evening and night-time periods.

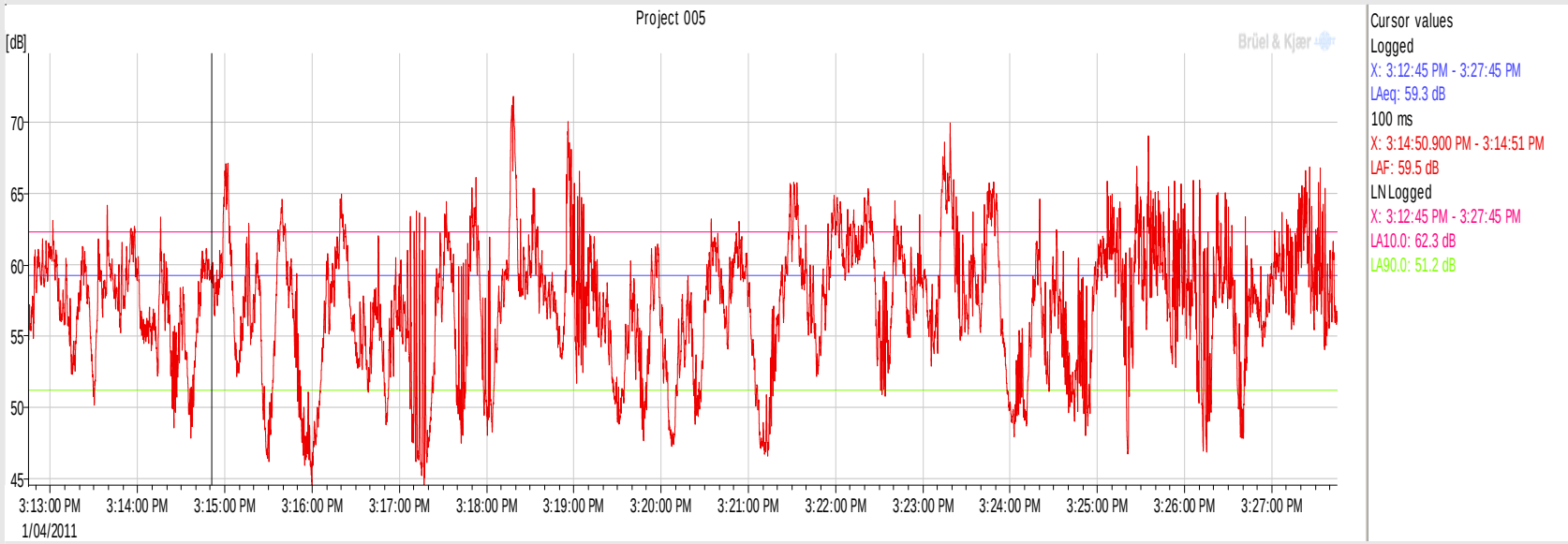
- Existing industrial noise hum at R3 (29 School Drive) was audible during the daytime. However, a chemical manufacturing facility located at 25 School Drive was clearly audible during the attended evening and night periods.
- Insect noise was audible at both locations during attended evening and night periods.

Table 3-8 Attended Noise Results, dB(A)

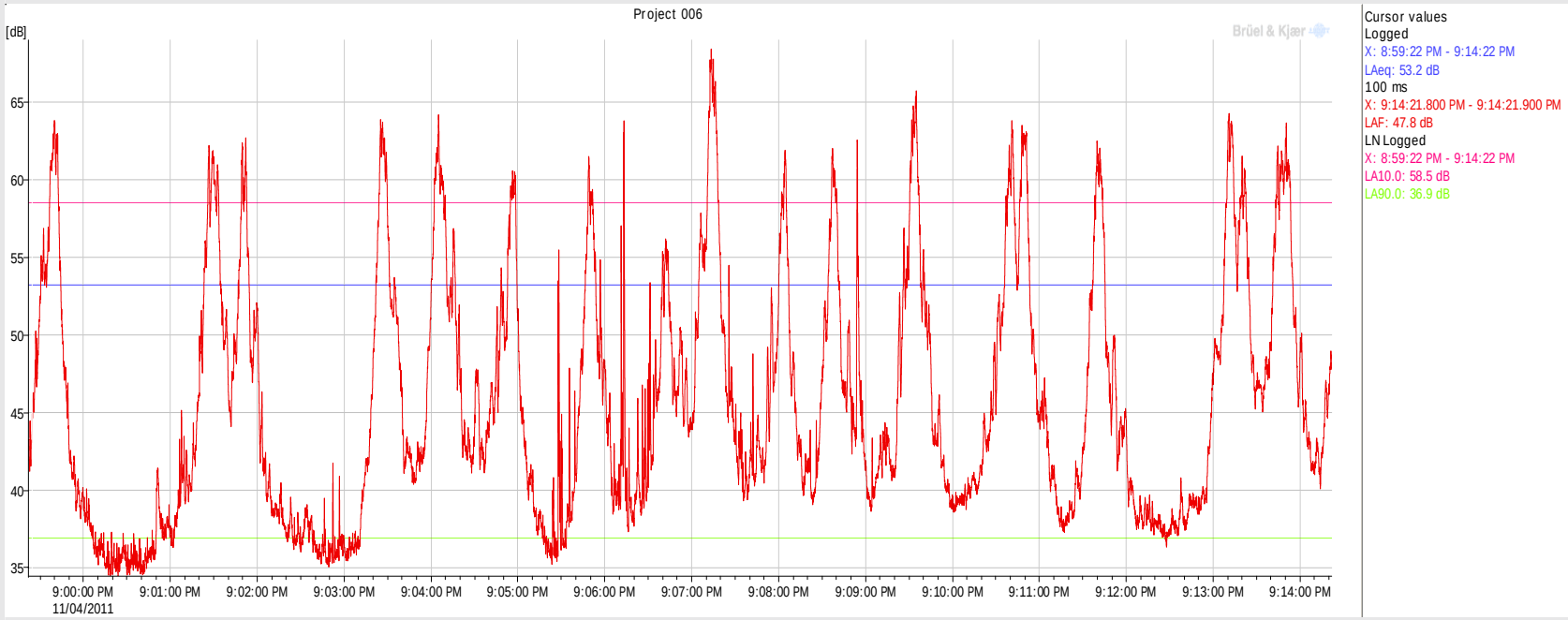
Monitoring Location	Date	Time	L_{A90}	L_{Aeq}	L_{A10}	Observations and Noise Levels dB(A)
L1 (R1) 5 Graham Rd	Tuesday-29-Mar-11	17.52	44	52	55	◗ Traffic noise on Tomago Rd (44-65). ◗ Wind in foliage (42-48). ◗ Industrial noise not audible.



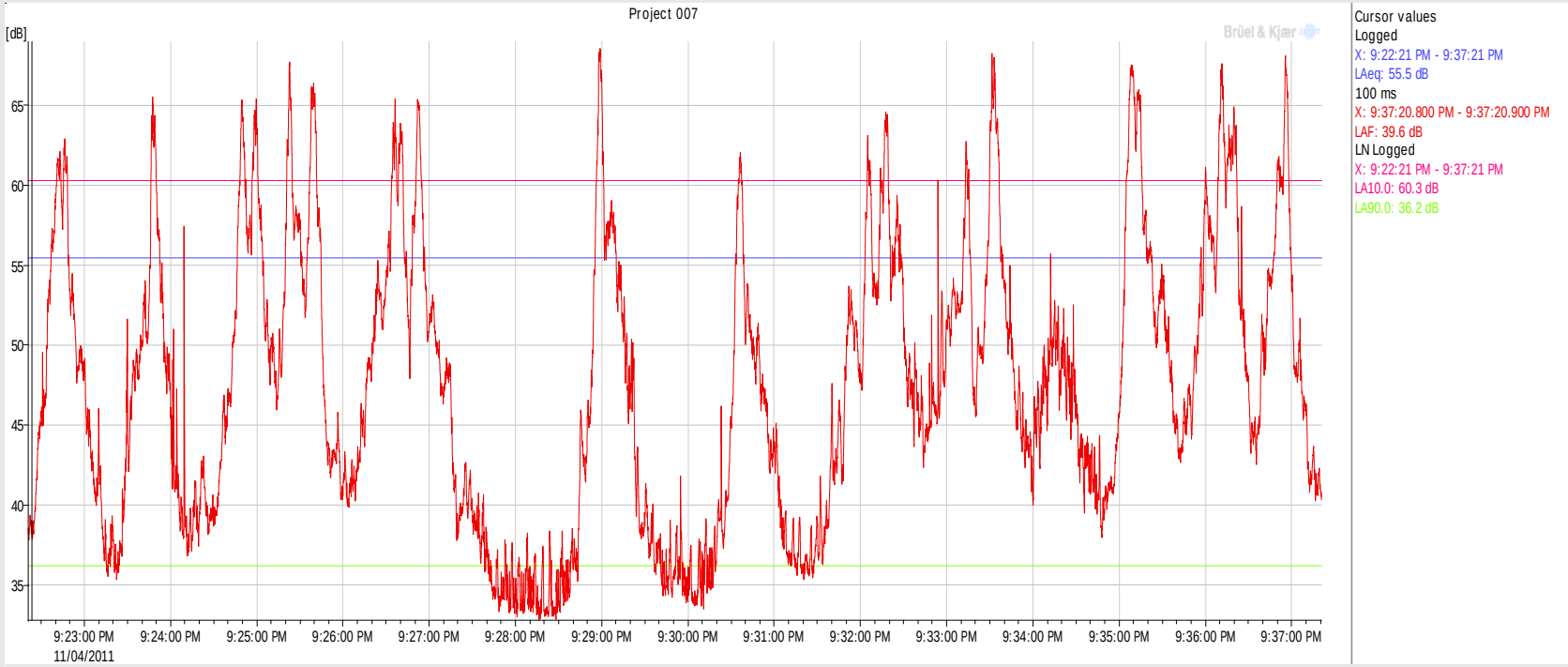
Monitoring Location	Date	Time	L_{A90}	L_{Aeq}	L_{A10}	Observations and Noise Levels dB(A)
L1 (R1) 5 Graham Rd	Friday-1-Apr-11	15.13	51	59	62	◗ Traffic noise on Tomago Rd (heavy vehicles) – (60-72). ◗ Construction activity across Tomago Rd audible (50-55). ◗ Some bird noise towards end of measurement (54-62). ◗ TAC not audible.



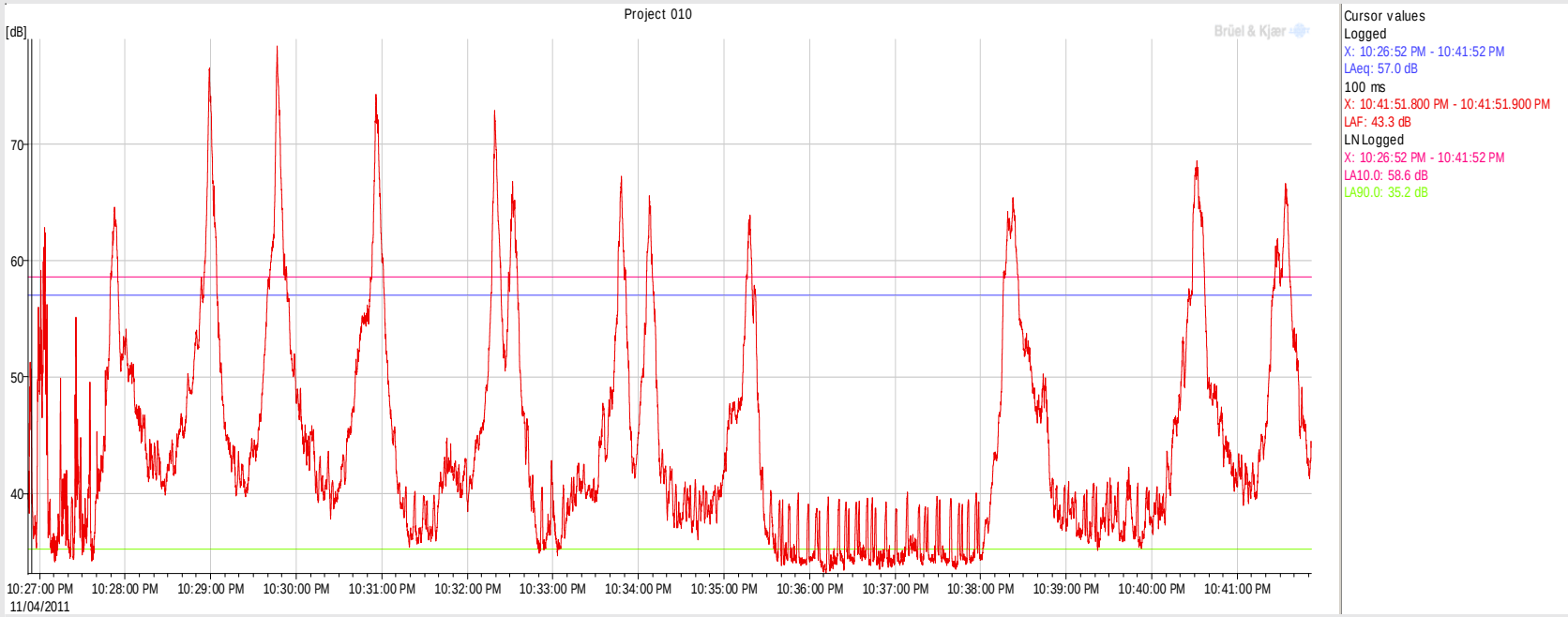
Monitoring Location	Date	Time	L_{A90}	L_{Aeq}	L_{A10}	Observations and Noise Levels dB(A)
L1 (R1) 5 Graham Rd	Monday-11-Apr-11	21.00	37	53	59	◗ Intermittent traffic (no heavy vehicle; approx. 1 car per 20 seconds) – (40-67). ◗ Consistent insect/frog noise (35-38). ◗ Distant hum of industry less than background (<35).



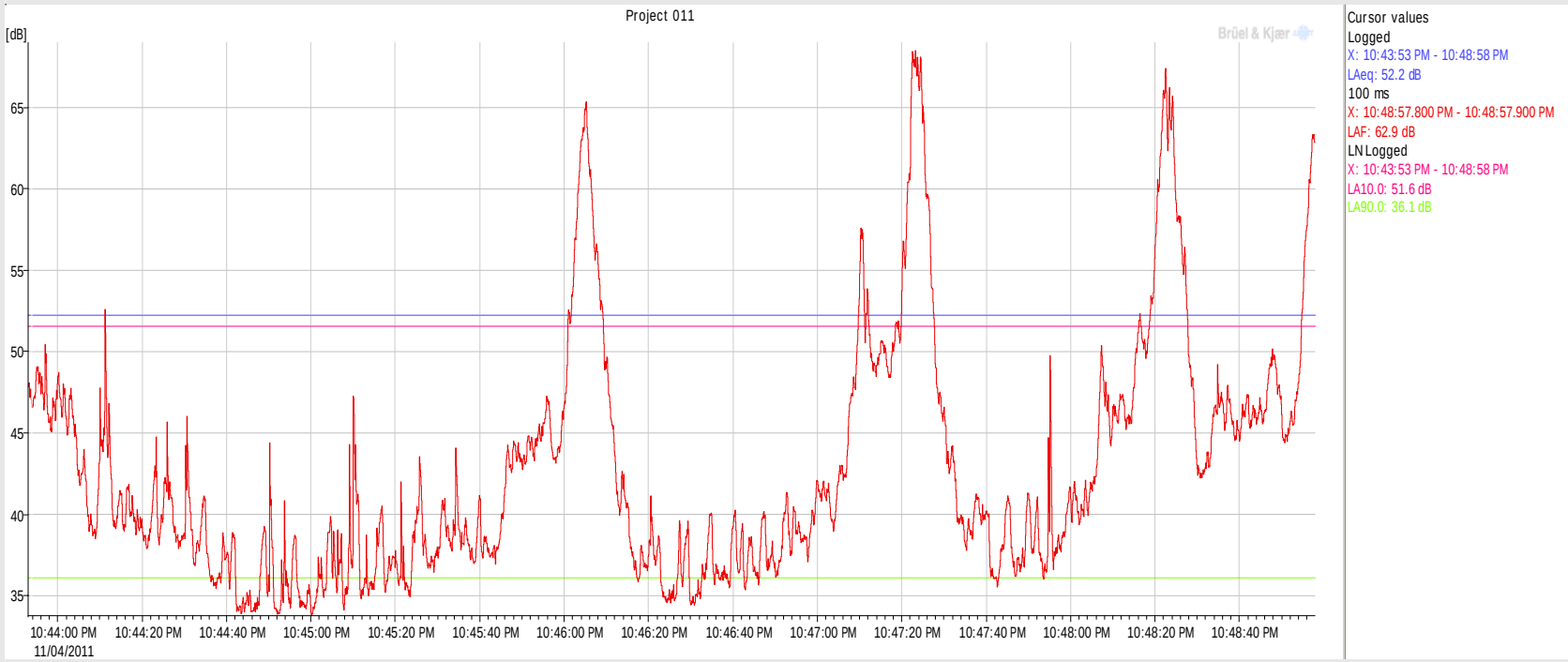
Monitoring Location	Date	Time	L_{A90}	L_{Aeq}	L_{A10}	Observations and Noise Levels dB(A)
L1 (R1) 5 Graham Rd	Monday-11-Apr-11	21.23	36	56	60	◗ Recorded approx. 26 cars pass-bys (38-68). ◗ Insects/frogs (<35-38). ◗ Industrial noise not audible.



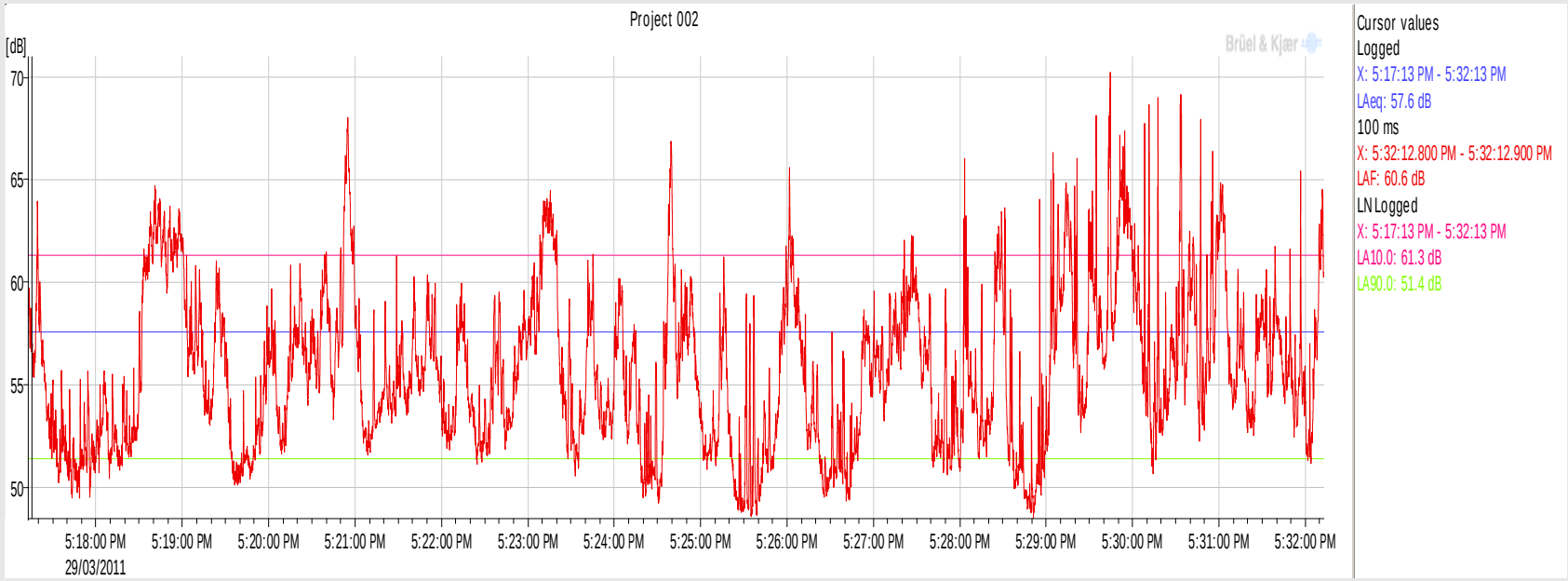
Monitoring Location	Date	Time	L_{A90}	L_{Aeq}	L_{A10}	Observations and Noise Levels dB(A)
L1 (R1) 5 Graham Rd	Monday-11-Apr-11	22.27	35	57	59	◗ Tomago Rd traffic (35-75). ◗ Insects/frogs audible between traffic pass-bys (34-40). ◗ Distant hum of industry less than background (<35).



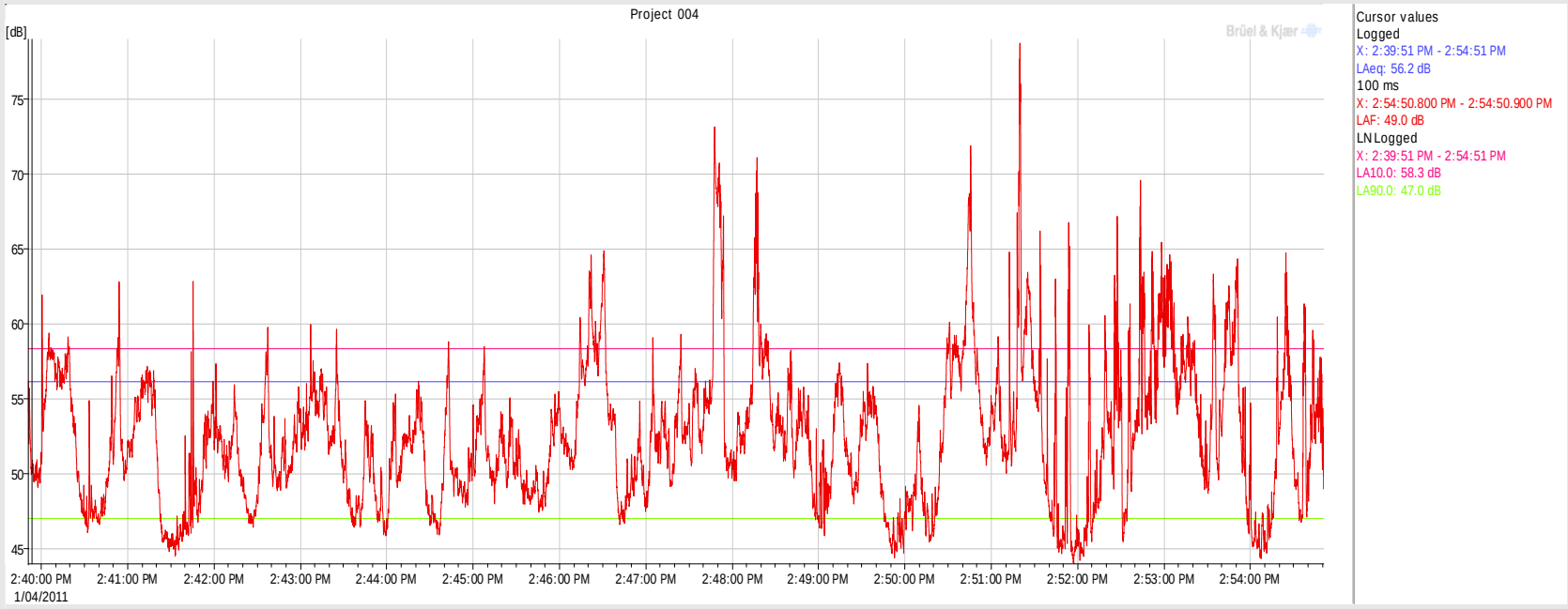
Monitoring Location	Date	Time	L_{A90}	L_{Aeq}	L_{A10}	Observations and Noise Levels dB(A)
L1 (R1) 5 Graham Rd	Monday-11-Apr-11	22.44	36	52	52	◗ Tomago Rd traffic (37-68). ◗ Insects/frogs audible between traffic pass-bys (35-52). ◗ Distant hum of industry less than background (<35).



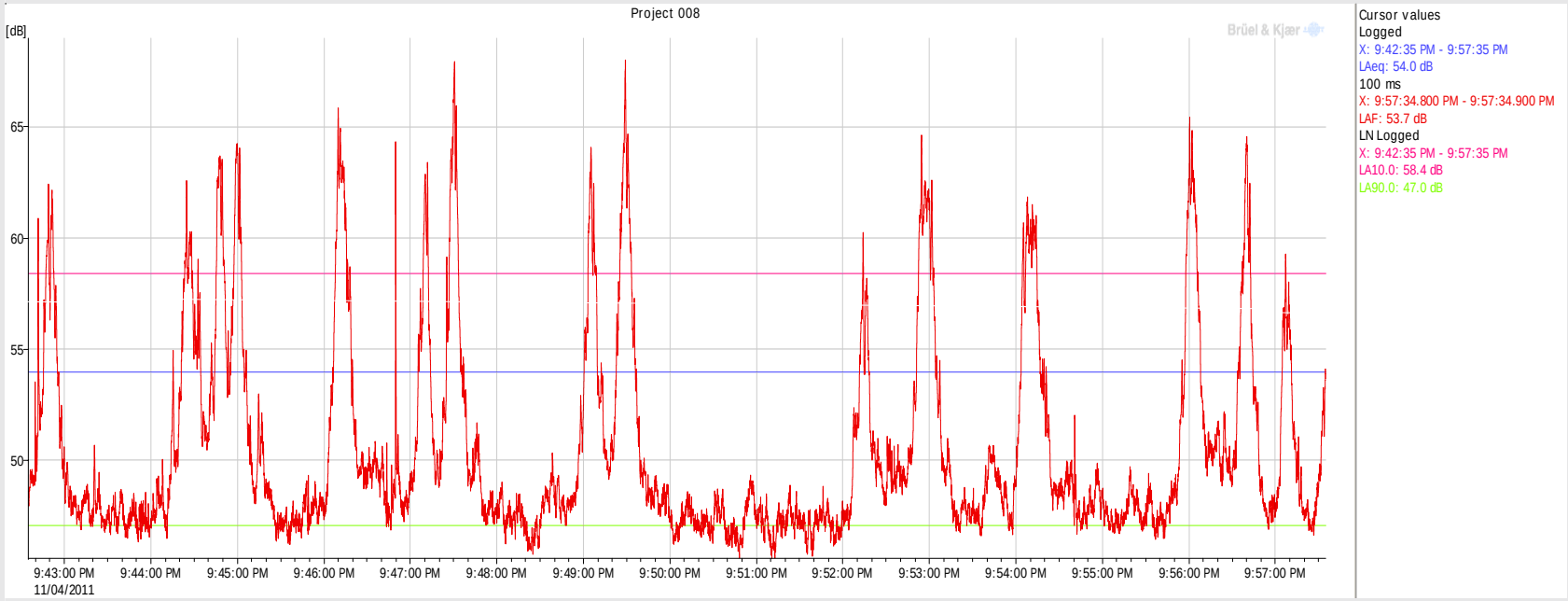
Monitoring Location	Date	Time	L_{A90}	L_{Aeq}	L_{A10}	Observations and Noise Levels dB(A)
L2 (R3) 29 School Drive	Tuesday-29-Mar-11	17.17	51	58	61	◗ Road traffic noise (52-70). ◗ Wind/ insect noise (50-57). ◗ TAC barely audible (<45).

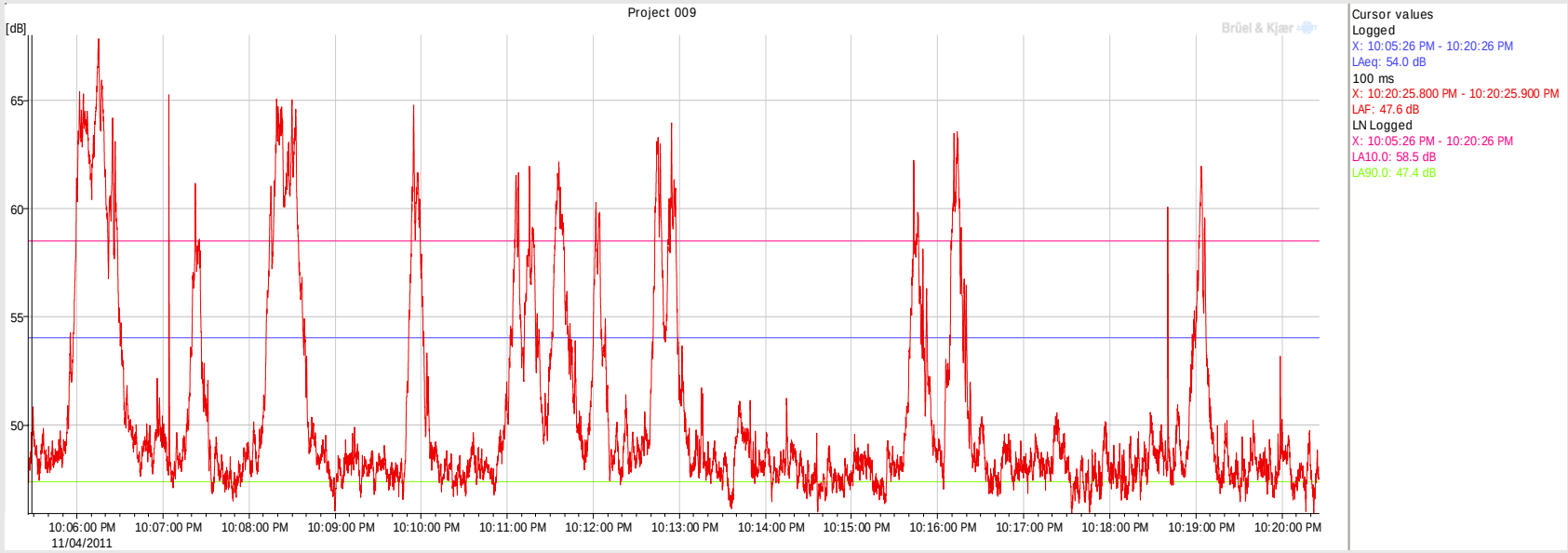


Monitoring Location	Date	Time	L_{A90}	L_{Aeq}	L_{A10}	Observations and Noise Levels dB(A)
L2 (R3) 29 School Drive	Friday-1-Apr-11	14.40	47	56	58	◗ Dominant noise from traffic on Tomago Rd (50-77). ◗ Low hum from nearby industry (HydroMet - 25 School Drive) – (<47). ◗ TAC not audible.



Monitoring Location	Date	Time	L_{A90}	L_{Aeq}	L_{A10}	Observations and Noise Levels dB(A)
L2 (R3) 29 School Drive	Monday-11-Apr-11	21.43	47	54	58	◗ Intermittent traffic noise (49-68). ◗ Industry noise (HydroMet – 25 School Drive) - (<47-50). ◗ TAC noise less than background (<47). ◗ Insect noise (45-51).



Monitoring Location	Date	Time	L_{A90}	L_{Aeq}	L_{A10}	Observations and Noise Levels dB(A)
	Monday-11-Apr-11	22.05	47	54	59	◗ Intermittent traffic noise (49-68). ◗ Industry noise (HydroMet – 25 School Drive) - (<47-50). ◗ TAC noise less than background (<47). ◗ Insect noise (45-52).
L2 (R3) 29 School Drive						

3.5 Local Meteorology

Meteorological data was obtained from a synthesised data set centred at Tomago for the calendar year 1986. This dataset was produced by GHD for a previous assessment in the area and is considered to remain representative of meteorological conditions in the study area. The wind rose charts for each season in each time period (day, evening and night) and the Pasquill / Gifford scale of atmospheric stability winter season in the night-time period are presented in Appendix B.

3.5.1 Choice of Meteorological Data Set

The chosen data set was a synthesised data set centred at Tomago for the calendar year 1986. This dataset was produced by GHD based on instrument measured data and is considered to remain representative of meteorological conditions in the study area.

The Tomago data was validated against meteorological data obtained from the TAC automatic weather station, located within 1 km from the site. Three years' worth of TAC data was obtained, with the most complete year being 2008.

Figure 3.2 shows an annual wind rose of each of the data sets. The TAC measured data is shown to include more occurrences of lower wind speeds, however the data is seen to compare well. It was considered that the use of the Tomago data set is acceptable for this project.

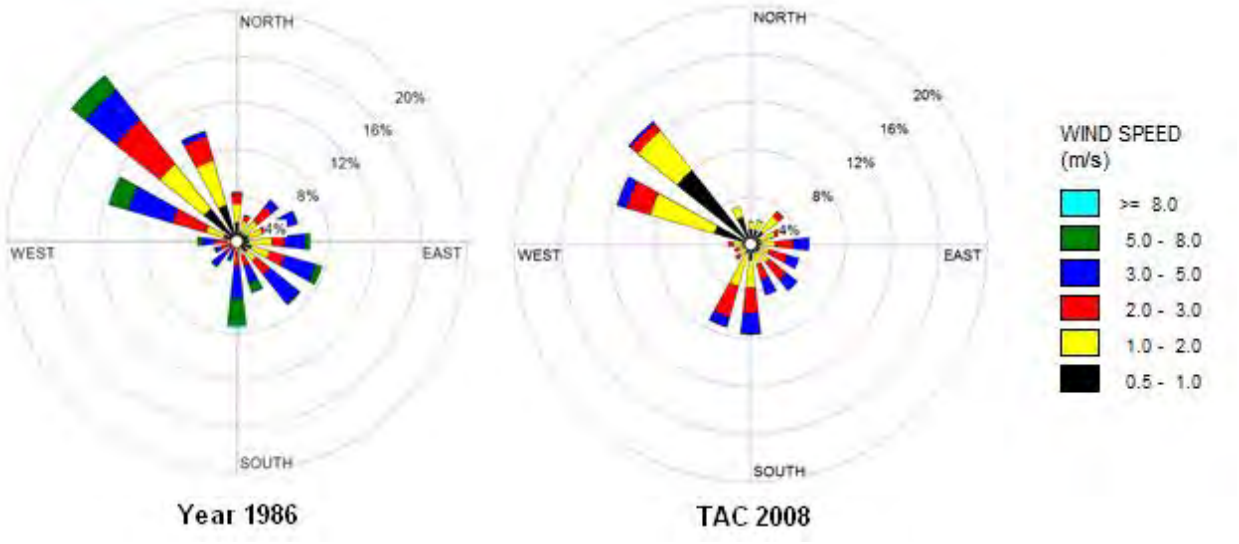


Figure 3.2 GHD Year 1986 and TAC 2008 Annual Wind Roses

3.5.2 Temperature Inversions

The project would operate during the night-time period when temperature inversions are likely to occur. Analysis of the meteorological data (refer to Figure 3.3) indicates that class F temperature inversions occur more than 30% of the time during night-time in the winter season, therefore moderate temperature inversion will be considered in the assessment (as per the requirements of the INP).

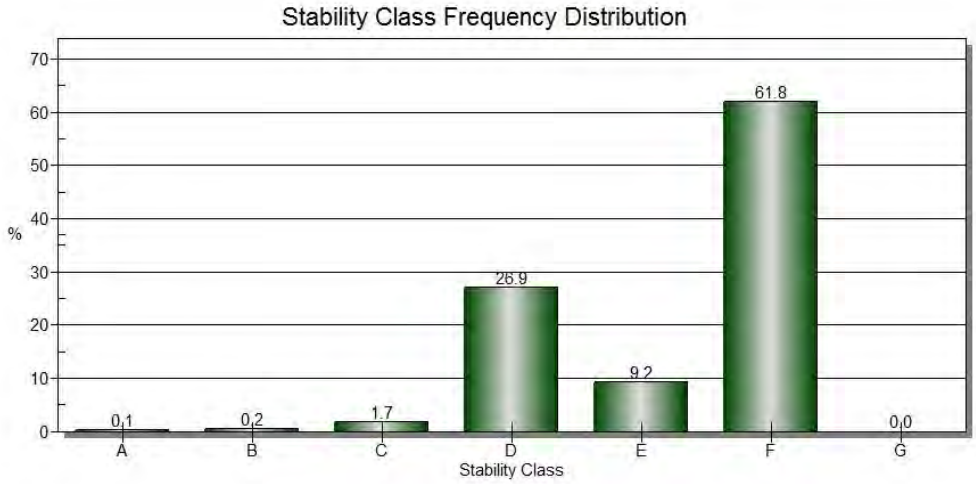


Figure 3.3 Stability Class Frequency Distribution (Winter Night-time)

3.5.3 Wind Effects

Noise propagation can be increased by wind conditions. The INP states that when there is greater than a 30% occurrence of wind of up to 3 m/s, in any period (day, evening, night) in any season, from source to receiver, wind should be considered in noise prediction calculations. Analysis of the seasonal wind rose data (refer to Appendix B) indicates that winds up to 3 m/s occur more than 30% of the time in winter season at night-time, therefore wind is considered a feature of the area and the noise model will include a 3 m/s north-westerly wind (as per requirements of the INP).

4. Noise Criteria

4.1 Construction Noise Criteria

Construction noise criteria are sourced from the *Interim Construction Noise Guideline (ICNG)* (2009).

The recommended standard construction hours are as follows:

- Monday to Friday: 7 am to 6 pm.
- Saturday: 8 am to 1 pm.
- No work on Sundays or Public Holidays.

The proposed construction activities are expected to generally occur during the standard construction hours. However, The ICNG acknowledges that the following activities have justification to be undertaken outside the recommended construction hours:

- The delivery of oversized plant or structure.
- Emergency work.
- Works for which it can be demonstrated that there is a need to operate outside the recommended standard hours.

Based on the noise logging data, the construction noise criteria for the recommended standard hours at each receiver are shown in Table 4-1. The ICNG construction noise criteria for commercial or industrial land use are independent of the RBL.

Table 4-1 Construction Noise Criteria at Identified Receivers

Receiver Area	Receiver Type	Background Level, $L_{A90\ (15min)}$ dB(A)	ICNG Management Level, $L_{Aeq\ (15min)}$ dB(A)
R1	Residence	42	Noise Affected – 52 Highly noise affected – 75
R2 to R5	Residence	44	Noise Affected – 54 Highly noise affected – 75
R6 and R7	Industrial	Not Applicable	75
R8	Commercial	Not Applicable	70

The *noise affected level* represents the point above which there may be some community reaction to noise. Where the *noise affected level* is exceeded all feasible and reasonable work practices to minimise noise should be applied and all potentially impacted residents should be informed of the nature of the works, expected noise levels, duration of works and a method of contact. For residential premises, the *noise affected level* is the background noise level plus 10 dB(A) during recommended standard hours and the background noise level plus 5 dB(A) outside of recommended standard hours.

For residential premises, the *highly noise affected level* represents the point above which there may be strong community reaction to noise and is set at 75 dB(A). Where noise is above this level, any feasible and reasonable ways to reduce noise below this level should be carefully considered. If no quieter work method is feasible and reasonable, the impacted residence should be clearly explained the duration and anticipated noise levels of the works and any respite periods that will be provided.

4.2 Operational Noise Criteria

The NSW Department of Environment, Climate Change and Water *Industrial Noise Policy* (2000) (INP) provides guidance on the assessment of operational noise impacts. The guideline includes both intrusive and amenity criteria that are designed to protect receivers from noise significantly louder than the background level, and to limit the total noise level from all sources near a receiver.

The INP noise criteria are planning levels and are not mandatory limits required by legislation, however the noise criteria assist the regulatory authorities to establish licensing conditions. Where noise criteria are predicted to be exceeded, feasible and reasonable noise mitigation strategies should be considered. In circumstances where noise criteria cannot be achieved, negotiation is required between the regulatory authority to evaluate the economic, social and environmental costs and benefits of the development against the noise impacts. The regulatory authority then sets statutory compliance levels that reflect the achievable and agreed noise limits from the development.

4.2.1 Intrusive Criteria

The intrusive noise criteria controls the relative audibility of operational noise compared to the background level at residential receivers. The intrusive criteria are determined by a 5 dB addition to the measured (or adopted) background level with a minimum of 35 dB(A). The INP recommends that the intrusive noise criteria for the evening period should not exceed the daytime period and the night-time period should not exceed the evening period. The intrusive noise criteria are only applicable to residential receivers.

For receiver R1, this assessment has adopted background noise level (RBL) from the unattended noise monitoring location at 5 Graham Drive, where industrial noise was not influencing the existing background noise levels.

As stated earlier, unattended noise measurement data from the monitoring location at 5 Graham Drive was obtained from the AGL *Newcastle Gas Storage Facility Noise Assessment* due to a fault with the GHD logger.

4.2.2 Amenity Criteria

The amenity criteria limit the total level of extraneous noise for all receiver types. The amenity criteria are determined based on the overall acoustic characteristics of the receiver area and the existing level of noise, excluding other noises that are uncharacteristic of the usual noise environment.

Residential receiver areas are characterised into 'urban', 'suburban', 'rural' or other categories based on land uses and the existing level of noise from industry, commerce, and road traffic. With consideration to the INP 'Noise Amenity Area' classification, the residential receivers identified in this assessment have been classified as 'Urban' given the proximity to industrial areas and road traffic noise.

4.2.3 Cumulative Noise Impacts

To account for cumulative industrial noise impacts at sensitive receivers in close proximity to existing industry, this assessment has adopted background noise level (RBL) and ambient noise level (L_{Aeq}) from the unattended noise monitoring location at 45 School Drive (refer to Figure 3.1). The unattended noise measurement data from the monitoring location at 45 School Drive was obtained from the AGL *Newcastle Gas Storage Facility Noise Assessment (NGSFNA).*

A stated in the NGSFA, Atkins Acoustics reviewed *Tomago Aluminium Company (TAC) – Production Capacity Increase Statement of Environmental Effects* prepared by ENSR/Aecom, May 2009, to assist in establishing existing industrial noise levels and determining amenity noise goals in accordance with the INP Section 2. – Table 2.2. Industrial contributions of Laeq 38dBA at Graham Drive (R2) and 43dBA at School Drive (R3) were utilised based on noise contributions from the Tomago Aluminium Smelter (ENSR/Aecom, May 2009).

4.2.4 Project Specific Noise Criteria

The project specific noise criteria reflect the most stringent noise level requirements derived from the intrusive and amenity criteria.

For residential receivers, the noise criteria are provided in Table 4-2 and Table 4-3.

For commercial or industrial receivers, the amenity noise criteria are $L_{Aeq(Period)}$ 65 dB(A) and $L_{Aeq(Period)}$ 70 dB(A) respectively. This should aim to be achieved when the land is in use.

Table 4-2 Operational Noise Criteria – Residential Receiver R1, dB(A)

	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
Rating background level, $L_{A90(Period)}$	42	39	37
Intrusiveness criteria, $L_{Aeq(15min)}$	47	44	42
Existing Industrial Noise Contribution $L_{Aeq(Period)}$		38	
Amenity criteria (urban), $L_{Aeq(Period)}$ INP Table 2.2 Adjusted	60	50	45*
Project Specific Criteria	**47**	**44**	**42**

* Note: INP Table 2.2 adjustment included

Table 4-3 Operational Noise Criteria – Residential Receivers R2 to R5, dB(A)

	Day 7 am to 6 pm	Evening 6 pm to 10 pm	Night 10 pm to 7 am
Rating background level, $L_{A90(Period)}$	46	44	44
Intrusiveness criteria, $L_{Aeq(15min)}$	51	49	49
Existing $L_{Aeq(Period)}$		43	
Amenity criteria (urban), $L_{Aeq(Period)}$ INP Table 2.2 Adjusted	60	50	41*
Project Specific Criteria	**51**	**49**	**41**

* Note: INP Table 2.2 adjustment included

Since the project would operate 24 hours per day, the most stringent night-time criteria would apply.

4.3 Sleep Disturbance

The OEH, Noise Guide for Local Government (NGLG) provides guidelines for assessing sleep disturbance from short-term noise events. To assess potential disturbance during night-time hours (10.00 pm to 7.00 am), Section 2.4.5 of the NGLG recommends that $L_{A1,1min}$ levels outside a bedroom window should not exceed the background level by more than 15dB.

Table 4-4 presents the sleep disturbance assessment goals developed from night RBL in Table 3-6.

Table 4-4 Sleep Disturbance Criteria – Residential Receivers R1 to R5, dB(A)

Receiver ID	Description	Existing Night RBL	Sleep Disturbance Criteria, $L_{A1,1min}$
R1	5 Graham Drive	37	52
R2	41 School Drive	44	59
R3	29 School Drive		
R4	423 Tomago Road.		
R5	Tomago Detention Centre		

4.4 Operational Traffic Noise Criteria

The *Environmental Criteria for Road Traffic Noise (ECRTN)* (1999) provides traffic noise levels for land use developments with potential to create additional traffic on collector and local roads. Tomago Road has been considered as a collector road. School Drive and McIntyre Road have been considered as local roads. The road traffic noise criteria are presented in Table 4-5. Where the criteria are already exceeded, the road traffic noise from the development should not lead to an increase of more than 2 dB(A) to the existing noise levels.

Table 4-5 ECRTN Traffic Noise Criteria at Residential Receivers, dB(A)

Roads	Type of Development	Day (7 am - 10 pm)	Night (10 pm - 7 am)
Tomago Road	Land use developments with potential to create additional traffic on collector road	60 $L_{Aeq(1hr)}$	55 $L_{Aeq\ (1hr)}$
McIntyre Road	Land use developments with potential to create additional traffic on local road	55 $L_{Aeq(1hr)}$ Peak Hour	50 $L_{Aeq(1hr)}$ Peak Hour
School Drive	Land use developments with potential to create additional traffic on local road	55 $L_{Aeq(1hr)}$ Peak Hour	50 $L_{Aeq(1hr)}$ Peak Hour

5. Construction Noise Assessment

5.1 Construction Noise Impacts

A detailed construction schedule is not available at this stage. The equipment expected to be required for typical construction activities are provided in Table 5-1. The adopted sound power levels and predicted sound pressure levels at various distances have also been provided.

It should be noted that the magnitude of off-site noise impact associated with construction would be dependent upon a number of factors:

- The intensity and location of construction activities.
- The type of equipment used.
- Existing local noise sources.
- Intervening terrain.
- The prevailing weather conditions.

Acoustic modelling was undertaken using Computer Aided Noise Abatement (CadnaA) to predict the effects of site related construction noise from the project.

CadnaA is a computer program for the calculation, assessment and prognosis of noise propagation. CadnaA calculates environmental noise propagation according to the Concawe algorithm. Ground absorption, reflection and relevant shielding objects are taken into account in the calculations.

For the purposes of noise level predictions, it has been assumed that all construction equipment listed in Table 5-1 will be operating at maximum levels at the same time.

In fact, construction machinery will likely move about the site altering noise impacts with respect to individual receivers. During any given period, the machinery items to be used at the site will operate at maximum sound power levels for only brief stages. At other times, the machinery may produce lower sound levels while carrying out activities not requiring full power. It is highly unlikely that all construction equipment would be operating at maximum sound power levels at any one time and certain types of construction machinery will be present at the site for only brief periods during construction. Therefore the predictions are considered to be conservative estimates.

Table 5-1 Construction Equipment and Predicted Noise Levels

Construction Phase	Equipment	Sound Power Level dB(A)	Sound Pressure Level dB(A) L_{Aeq}				
			R1	R2	R3	R4	R5
Contractor Mobilisation	Delivery truck	104	11	33	41	32	17
Earth Works	Excavator 20T	102	10	33	37	29	15
	Roller	100	9	30	34	26	14
	Truck	104	11	31	36	28	16

Construction Phase	Equipment	Sound Power Level dB(A)	Sound Pressure Level dB(A) L_{Aeq}				
			R1	R2	R3	R4	R5
Civil Works	Concrete truck	107	14	34	37	30	19
	Concrete pump	90	0	16	16	12	2
Building Works	Mobile crane	99	6	24	23	20	4
	Truck	104	12	34	36	29	13
	Hand tools	100	7	25	25	22	5
	Welder	95	7	25	24	21	5
Total	**All**	**112**	20	41	45	38	24

Table 5-1 indicates the predicted noise level at all nearest sensitive receivers are expected to comply with the highly noise affected level of 75 dB(A). Furthermore, model results suggest compliance with the most stringent *noise affected level* of 52 dB(A) at all residential receivers. Although construction noise is not expected to be an issue, it is recommended that the mitigation measures detailed in Section 5.3 be considered and implemented where feasible and reasonable to reduce noise impacts.

5.2 Truck Movements

The proposed truck route to the construction site, via the Tomago Road / McIntyre Road intersection and School Drive, is adjacent to receivers that are generally commercial or industrial.

The existing volumes of heavy vehicles using Tomago road is 72 vehicles per hour during AM peak hour. The generated heavy vehicle movements due to the development during the construction phase is expected to be 4 vehicles during AM peak hour, therefore the increase in traffic noise levels due to construction truck movements is predicted to be less than 0.5 dB(A). As such, construction related truck movements are not expected to be noticeable to receivers and meet the requirements of the ECRTN.

5.3 Construction Mitigation Measures

5.3.1 Noise Mitigating Measures

Although construction noise predictions indicate compliance with the ICNG criteria and is not expected to be an issue, the following construction noise mitigation measures would be implemented to reduce the impact on the surrounding residents:

- Where feasible and reasonable, construction activities would be scheduled during the recommended construction hours.
- Generators would have acoustic enclosures and be located as far away from residences as possible.

- To reduce the annoyance associated with reversing alarms, broadband reversing alarms (audible movement alarms) would be used for all site equipment. Satisfactory compliance with occupational health and safety requirements would need to be achieved and a safety risk assessment may need to be undertaken to determine that safety is not compromised. Refer to Appendix C of the ICNG (2009) for more information.
- All equipment would be selected to minimise noise emissions. Equipment would be fitted with appropriate silencers and be in good working order. Machines found to produce excessive noise compared to normal industry expectations would be removed from the site or stood down until repairs or modifications can be made. Table 5-2 below presents noise control methods and expected noise reductions according to Australian Standard AS 2436 – 2010 *Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites.*

Table 5-2 Relative Effectiveness of Various Forms of Noise Control dB(A)

Noise Control Method	Typical noise reduction dB(A)	Maximum noise reduction dB(A)
Distance	Approximately 6 per doubling of distance	
Screening	5 to 10	15
Acoustic Enclosures	15 to 25	50
Engine Silencing	5 to 10	20

5.3.2 Work Ethics

All site workers would be sensitised to the potential for noise impacts on local residents and encouraged to take practical and reasonable measures to minimise the impact during the course of their activities. This would include:

- Avoid the use of loud radios.
- Avoid shouting and slamming doors.
- Where practical, machines would be operated at low speed or power and switched off when not being used rather than left idling for prolonged periods.
- Keep truck drivers informed of designated vehicle routes, parking locations and delivery hours.
- Minimise reversing.
- Avoid dropping materials from height and avoid metal to metal contact on material.
- All engine covers would be kept closed while equipment is operating.

5.3.3 Community Relations

Consultation and cooperation with the neighbours to the site will assist in minimising uncertainty, misconceptions and adverse reactions to noise. The following community relation measures would be implemented:

- The contractor would establish contact with residents affected by construction noise and communicate the construction program and progress on a regular basis, particularly when noisy or vibration generating activities are planned. Communication with the local community would be maintained throughout the construction period.
- The constructor would provide a community liaison phone number and permanent site contact so that noise complaints can be received and addressed in a timely manner.
- Upon receipt of a noise complaint, monitoring would be undertaken and reported as soon as possible. If exceedances are detected, the situation would be reviewed in order to identify means to attempt to reduce the impact to acceptable levels.

6. Operational Noise Assessment

6.1 Noise Modelling Approach

Acoustic modelling was undertaken using Computer Aided Noise Abatement (CadnaA) to predict the effects of site related noise from the proposed development.

CadnaA is a computer program for the calculation, assessment and prognosis of noise propagation. CadnaA calculates environmental noise propagation according to the Concawe algorithm. Ground absorption, reflection and relevant shielding objects are taken into account in the calculations.

Atmospheric effects due to wind and temperature inversion are calculated using the Concawe[3] algorithm.

The project has been modelled based on available data at the time of assessment and, as such, should be used for guidance purposes only.

6.2 Noise Generating Equipment

Noise source emissions included in the noise model were based on information provided by Midal and the GHD noise source database. Table 6-1 details the main items of noisy plant used in the model.

Figure 6.1 shows a plan view of the noise source locations based on information provided by Midal.

The model configuration for the noise sources was as follows:

- The sound power levels for the equipment located within the buildings were used to generate an internal reverberant sound pressure level based on the volume and absorption coefficient of the internal surfaces of the building.
- The building materials were based on 0.48 mm steel cladding with sound reduction index R_w 20. Doorways as indicated on the drawings were considered open to provide a measure of conservatism.
- Heights of Building 1 and 2 were both considered as 8.5 m on the lowest point of the roof to 10.8 m for the central ridge of the roof.
- Cooling towers height was assumed as 10 m above ground level.
- Given the facility will process 50,000 tonnes of aluminium per year and each crucible holds approximately 7 tonnes, it is estimated that 20 crucibles per day would be required. To provide a measure of conservatism, the crucible carrier volume was assumed to be 2 vehicles per hour.

[3] The CONCAWE method is a research paper especially designed for the requirements of large facilities. It was published in 1981 under the title, "The propagation of noise from petroleum and petrochemical complexes to neighbouring communities." This method is the only one dealing explicitly with the influence of wind and the stability of the atmosphere. Source: SoundPlan

- The crucible carrier was assumed to operate along the internal haul road between TAC and Midal at a speed of 10 km/hr. The sound power level was based on the vehicle operating at maximum engine RPM to provide a measure of conservatism.
- Light and heavy vehicle volumes were based on peak hour data provided in the GHD traffic impact assessment.
- Light vehicles were modelled as moving point sources and assumed to be travelling at 30 km/hr.
- Heavy vehicles manoeuvring around the site were modelled as moving point sources and assumed to be running at low engine RPM and vehicle speed of 30 km/hr.

Table 6-1 Site Noise Source Sound Power Levels[4] L_W (re: 20μPa) dB(A)

Noise Source	Octave Centre Frequency (Hz) (A-weighted)									L_W dB(A)
	31.5	63	125	250	500	1k	2k	4k	8k	
Crucible Carrier	74	79	93	94	99	103	103	98	92	108
Crucible crane	27	41	54	63	72	75	75	70	60	80
Holding furnace	48	53	63	75	86	84	80	75	73	89
Tilt furnace	48	53	63	75	86	84	80	75	73	89
Cooling tower 1 side	53	69	80	84	85	85	83	79	69	91
Cooling tower 1 top	56	72	83	87	88	88	86	82	72	94
Cooling tower 2 side	51	67	78	82	83	83	81	77	67	89
Cooling tower 2 top	54	70	81	85	86	86	84	80	70	92
Cast rolling mill	51	56	66	78	89	87	83	78	76	92
Rolling mill crane	27	41	54	63	72	75	75	70	60	80
Wire drawing	58	63	73	80	86	94	90	85	83	97
Heat Oven	51	56	66	73	79	87	83	78	76	90
Strand machine	51	56	66	73	79	87	83	78	76	90
Forklift	54	67	71	83	84	85	87	81	72	92
Car (low speed)	49	63	69	73	79	81	77	72	64	85
Car start	64	69	78	76	83	93	94	92	85	98
Car door shut	56	61	73	83	90	93	90	88	81	97

[4] Sound Power Levels based on Safety, Health and Environmental Information (Source: Midal Cables Ltd - QSSHE Department)

Noise Source	Octave Centre Frequency (Hz) (A-weighted)									L_W dB(A)
	31.5	63	125	250	500	1k	2k	4k	8k	
Truck (low RPM)	69	74	77	83	90	93	89	82	80	96
Truck 2000 rpm	73	78	92	93	98	102	102	97	91	107
Compressors	51	60	66	69	71	73	74	59	43	79
Dryers	47	56	62	65	67	69	70	55	39	75

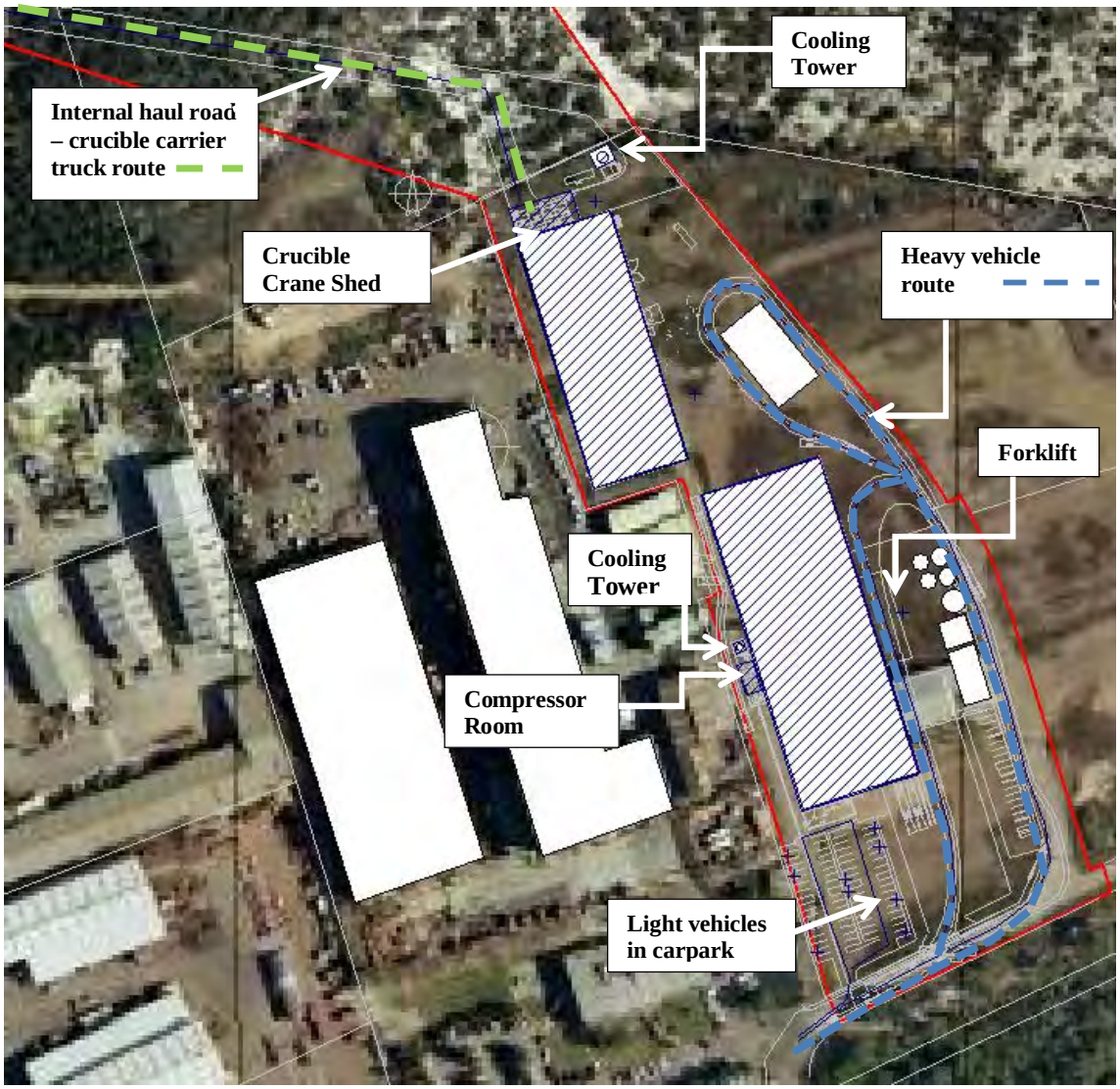


Figure 6.1 Plan View of Modelled Noise Sources and Buildings

6.3 Model Configuration

The following assumptions were made with regard to the model configuration:

- Terrain topography at 2 m resolution has been included in the calculations.

- A general ground absorption coefficient of 0.5 was used throughout the model.
- Modelling is based on atmospheric conditions of 10°C and 70% humidity.
- Two weather scenarios representing neutral and worst case conditions were included in the noise model. These were:
  - Scenario 1: Neutral meteorological conditions.
  - Scenario 2: Night-time temperature inversion (F-Class Stability Class) combined with 3 m/s north-westerly wind

Figure 6.2 below shows a three-dimensional view generated from the noise model. The figure indicates the project in the foreground with Tomago Aluminium and other industrial premises in the background.

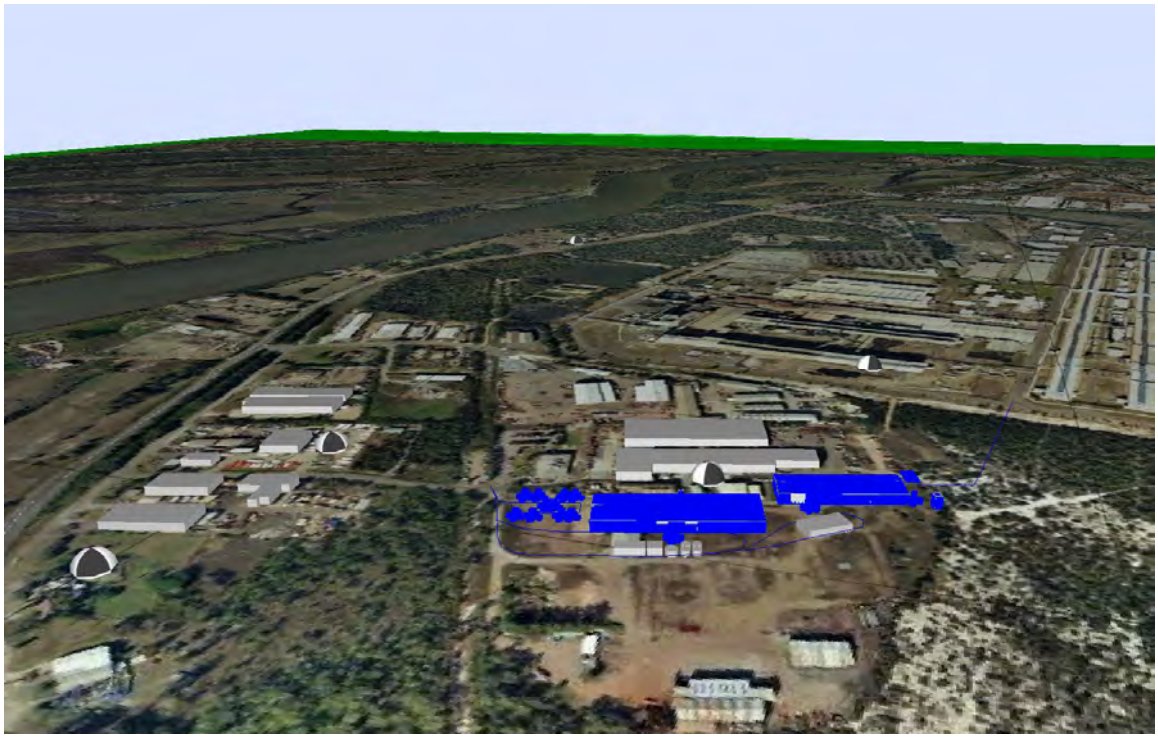


Figure 6.2 3D View of Noise Model Showing Blue Area Sources and Point Sources

6.4 Noise Model Results

A summary of the predicted sound pressure levels at the nearest identified receivers due to the proposed development is shown in Table 6-2. Where model results suggest an exceedance of the criteria, the values are shown in bold text.

Since the night-time criterion is the most stringent criteria, it has been shown in the following table of results for comparative purposes.

Table 6-2 Modelled Receiver Sound Pressure Levels - [dB(A) (Leq)]

Receiver		Criteria	Predicted Sound Pressure Levels dB(A)	
		Night-time	Neutral	F Class Inversion + 3m/s NW wind
R1	Residence	42	13	18
R2	Residence	41	36	38
R3	Residence	41	33	36
R4	Residence	41	29	32
R5	Residence	41	21	21
R6	Industrial	70	38	40
R7	Industrial	70	57	57
R8	Commercial	65	40	40

Modelling results shown in Table 6-2 indicate received noise levels are expected to comply with the project specific criteria at all receivers under neutral and adverse weather conditions.

Figure 6.3 and Figure 6.4 show the predicted sound pressure level contours for neutral and adverse weather conditions (3m/s north westerly wind combined with F Class temperature inversion).

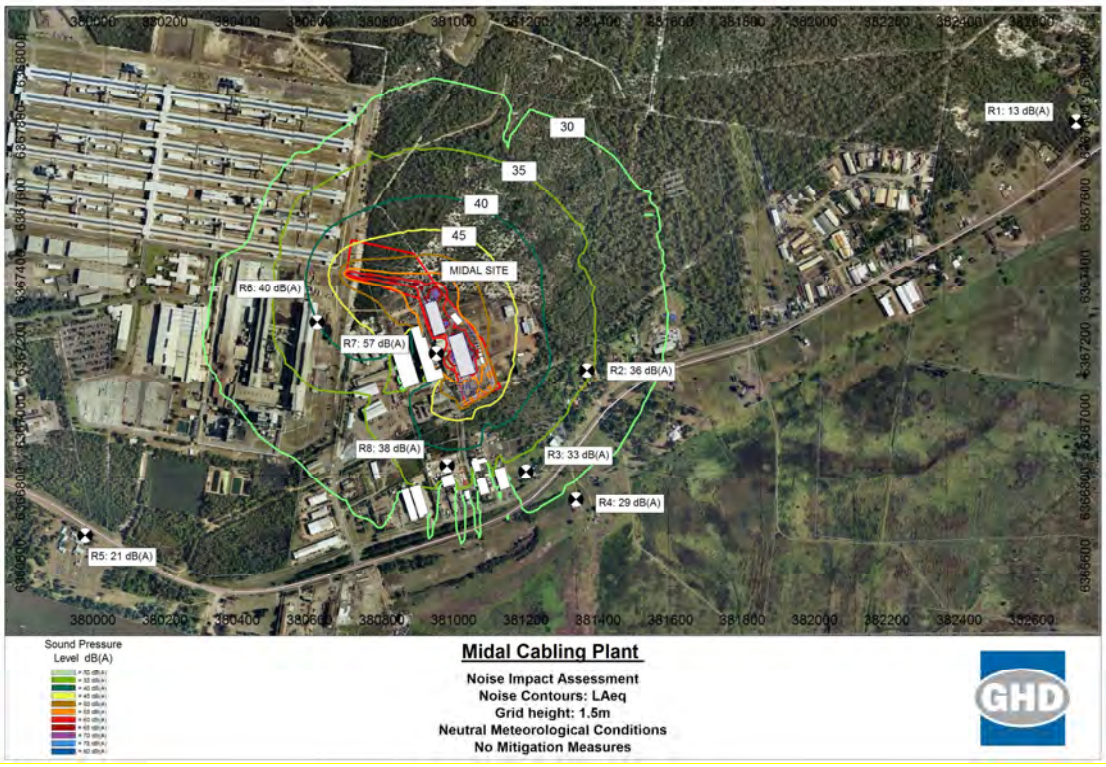


Figure 6.3 Predicted Sound Pressure Levels dB(A)Leq – Neutral Weather

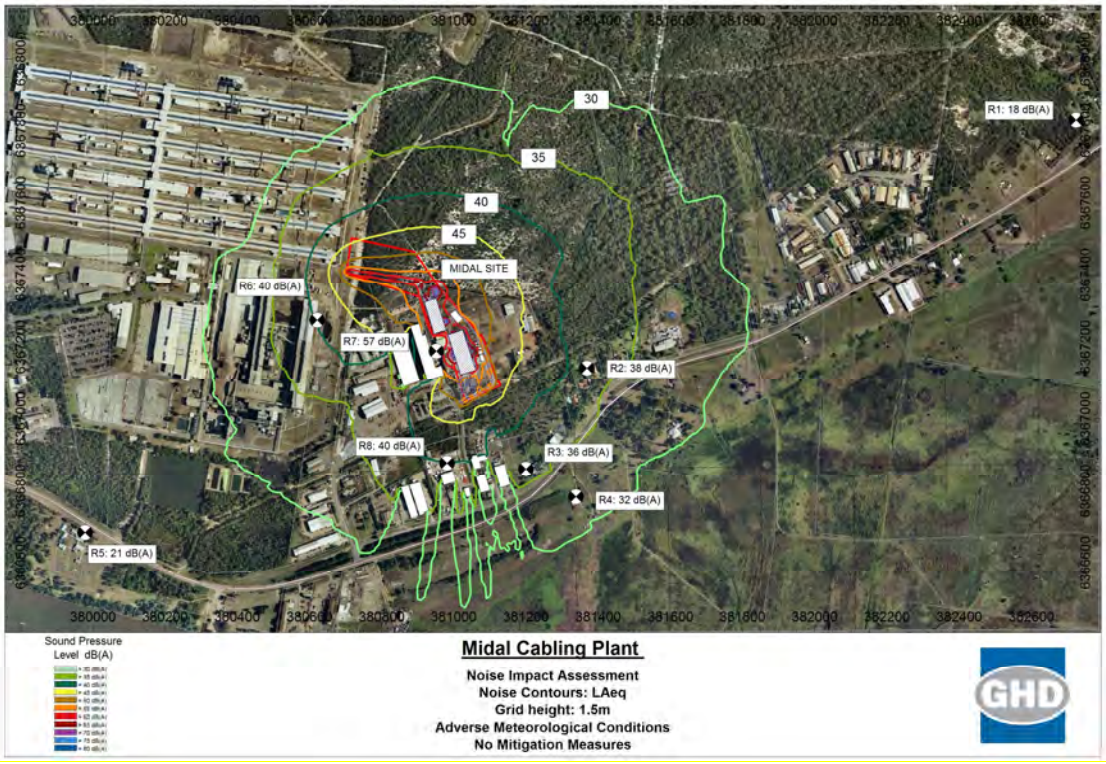


Figure 6.4 Predicted Sound Pressure Levels dB(A)Leq – Adverse Weather

6.5 Sleep Disturbance

As the project would operate 24 hours per day, there is potential for sleep disturbance at the nearest sensitive receivers. The most likely dominant noise source to potentially cause sleep disturbance is delivery trucks occurring after hours (between 10:00 pm to 7:00 am).

Maximum noise levels due to truck operation at the site were predicted at the nearest sensitive receivers using Cadna-A noise modelling software. The maximum passby sound power level was derived from British Standard BS5228:2009 *Code of Practice for noise and vibration control on construction and open sites – Part 1 Noise.* The truck delivery activity was modelled as a moving point source at a height of 2.5 metres above ground level.

Table 6-3 Truck Source Sound Power Levels L_W (re: 20μPa) dB(A)Lmax

Noise Source	Octave Centre Frequency (Hz) (linear)								L_W dB(A)Lmax
	63	125	250	500	1k	2k	4k	8k	
Truck delivery	110	108	106	103	104	106	103	97	111

A summary of the predicted maximum sound pressure levels at the nearest identified receivers due to the operation of a delivery truck is shown in Table 6-4. The results are assessed against the sleep disturbance criteria. Where model results suggest an exceedance of the criteria, the values are shown in bold text.

Table 6-4 Modelled Sensitive Receiver Sound Pressure Levels - [dB(A) (Lmax)]

Receiver	Type	Criteria	Predicted Sound Pressure Levels dB(A)Lmax	
		Sleep Disturbance Night-time	Neutral	F Class Inversion + 3m/s NW wind
R1	Residence	52	16	21
R2	Residence	59	46	49
R3	Residence	59	47	51
R4	Residence	59	41	45
R5	Residence	59	20	20
R6	Industrial	-	-	-
R7	Industrial	-	-	-
R8	Commercial	-	-	-

(-) denotes sleep disturbance not applicable for industrial and commercial receivers

Modelling results shown in Table 6-4 indicate received noise levels are expected to comply with the sleep disturbance criteria at all receivers under neutral and adverse weather conditions.

7. Operational Traffic Noise Assessment

7.1 Traffic Volume Data

Possible access routes to the Midal site during operation are anticipated to be along Tomago Road, McIntyre Road and School Drive.

Table 7-3 presents the existing and predicted generated traffic volumes for each road as result of the proposed operation in a worst case scenario. Traffic data has been obtained from the Traffic impact Assessment.

Table 7-1 Predicted Traffic Volume Generation for Each Road

Road	Peak Hour[1]	2011 Existing Volume[2]		Generated Volume[2]	
		LV	HV	LV	HV
Tomago Road (west of McIntyre Road)	AM	681	72	82	5
	PM	744	57	82	5
McIntyre Road (turning into School Drive)	AM	198	29	82	5
	PM	176	13	82	5
School Drive[3] (toward McIntyre Road)	AM	114	10	82	5
	PM	75	5	82	5
School Drive[3] (toward Tomago Road east)	AM	31	1	82	0
	PM	65	1	82	0

Notes:

1. 'AM' represents peak hour from 6 am to 7 am, therefore the night-time traffic noise criteria apply. 'PM' represents peak hour between 3 pm and 5 pm, therefore the day-time traffic noise criteria apply.
2. 'LV' denotes 'Light Vehicles' and 'HV' denotes 'Heavy Vehicles'. Traffic volumes are given in vehicles/hour.
3. Due to the adjacent traffic noise from Tomago Road, the predicted increase in noise emission level is calculated with consideration to the existing traffic volume on Tomago Road.

7.2 Traffic Noise Model and Validation

Acoustic modelling was undertaken using Computer Aided Noise Abatement (CadnaA) to predict the effects of traffic noise due to the proposed development.

Ground absorption, reflection, terrain and relevant shielding objects are taken into account in the calculations.

Traffic noise modelling was conducted using the CadnaA program and The United Kingdom Department of Environment's *Calculation of Road Traffic Noise* (CoRTN).

Outputs of the traffic noise model were validated against the $L_{A10, 1hr}$ noise levels measured during the monitoring period. A comparison of the measured and predicted free-field noise levels is presented in Table 7-2.

Table 7-2 Comparison of Monitoring Results and Prediction Results $L_{A10, 18hr}$ dB(A)

Location	Measured Results	Modelled Results	Difference
	LA10, 1hr	LA10, 1 hr	
R1 – 5 Graham Drive Noise Logger	56.8	58.7	- 1.9

These results show a close correlation between the measured and modelled results, with variations of less than 2 dB(A). Therefore the traffic noise model is considered to be a valid approximation of the measured acoustic environment.

Table 7-3 presents the predicted increase in traffic noise emission for each road as result of the proposed operation in a worst case scenario. The results represent the predicted noise level at 1 metre in front of the most exposed façade of the building. The results do not include the 2.5 dB(A) façade reflection.

Table 7-3 Predicted Traffic Noise Emission Increase for Each Road

Receiver	Relevant Road	ECRTN Criteria dB(A) Leq,1hr (peak hour)	Existing Traffic Noise Level dB(A) Leq,1hr	Predicted Traffic Noise Level (with development) dB(A) Leq,1hr	Noise Emission Level Increase, dB(A)
R1	Tomago Rd	60	57.9	58.2	0.3
R2	Tomago Rd	60	58.8	59.1	0.3
R3*	School Drive	55	48.0	51.7	3.7
	Tomago Rd	60	**64.4**	**64.4**	-
	School Drive and Tomago Rd	60	**64.5**	**64.7**	0.2
R4	Tomago Rd	60	57.7	57.8	0.1
R5	Tomago Rd	60	**66.3**	**66.5**	0.2

* Since receiver R3 is exposed to changes in volume on School Drive (local road) and Tomago Road (arterial road), noise contributions from each road is provided. Although R2 is exposed to School Drive, the proposed traffic route for additional traffic is not directly exposed to R2.

From Table 7-3, the following are concluded:

- Existing traffic noise levels at R1, R2, R3 (School Drive) and R4 are all under the ECRTN noise criteria.

- Existing traffic noise levels at R3 (Tomago Rd) and R5 currently exceed the ECRTN criteria. However, model predictions indicate the additional operational traffic generation on Tomago Road is expected to increase noise emission level by less than 2 dB(A). Therefore, the operational traffic noise impact is considered acceptable with consideration to the ECRTN.
- No residential receiver has been identified as exposed to traffic noise from McIntyre Road.

8. Conclusions

This construction and operational noise assessment leads to the following conclusions, subject to the limitations outlined in Section 9:

- Baseline noise monitoring was conducted at a selected location in the vicinity of the site. The unattended noise logging location at 5 Graham Drive was selected due to its proximity to the site which was considered representative of the acoustic environment for the nearest sensitive receivers whilst being sufficient distance away from existing industrial noise sources.
- Unattended noise logger data was considered invalid due to an equipment fault which elevated the noise floor of the instrument. As such, alternate noise logger data for the same location was obtained from the AGL *Newcastle Gas Storage Facility Project Environmental Assessment*. The two noise logger data sets were compared and observed to be in close agreement and therefore considered valid for use in this assessment.
- Based on the background noise monitoring results, construction and operational noise criteria have been determined and are given in Section 4.
- Model results indicate the predicted construction noise levels at all sensitive receivers are expected to comply with the highly noise affected level of 75 dB(A). Furthermore, model results predict compliance with the most stringent *noise affected level* of 52 dB(A) at all residential receivers. Although construction noise is not expected to be an issue, the mitigation measures detailed in Section 5.3 would be implemented where feasible and reasonable to reduce noise impacts.
- Construction noise relating to truck movements on Tomago Road are not expected to be noticeable to sensitive receivers with a predicted increase in traffic noise level of less than 0.5 dB(A).
- Operational noise modelling results indicate that received noise levels are expected to comply with the project specific criteria at all receivers under all assessed weather conditions.
- Modelling results indicate received noise levels are expected to comply with the sleep disturbance criteria at all receivers under neutral and adverse weather conditions.
- Existing traffic noise levels at R1, R2, R3 (School Drive) and R4 are all under the ECRTN noise criteria.
- Existing traffic noise levels at R3 (Tomago Rd) and R5 currently exceed the ECRTN criteria. However, model predictions indicate the additional operational traffic generation on Tomago Road is expected to increase noise emission level by less than 2 dB(A). Therefore, the operational traffic noise impact is considered acceptable with consideration to the ECRTN.

9. Limitations

This Noise Impact Assessment ("Report"):

- Has been prepared by GHD Pty Ltd ("GHD") for Midal Cable International Pty Ltd ("MCI").
- May only be used and relied on by MCI.
- Must not be copied to, used by, or relied on by any person other than MCI without the prior written consent of GHD.
- May only be used for the purpose of the scope of work outlined in Section 1.2 of this report (and must not be used for any other purpose).

GHD and its servants, employees and officers otherwise expressly disclaim responsibility to any person other than MCI arising from or in connection with this Report.

To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the Report are excluded unless they are expressly stated to apply in this Report.

The services undertaken by GHD in connection with preparing this Report were limited to those specifically detailed in Section 1.2 of this Report.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report ("Assumptions"), including (but not limited to):

- Measurement methodology assumptions detailed in Section 3.3 of this report.
- Noise prediction modelling assumptions detailed in Section 6.2, 6.3 and 7.2 of this report.

GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with any of the Assumptions being incorrect.

Subject to the paragraphs in this section of the Report, the opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the time of preparation of this Report.

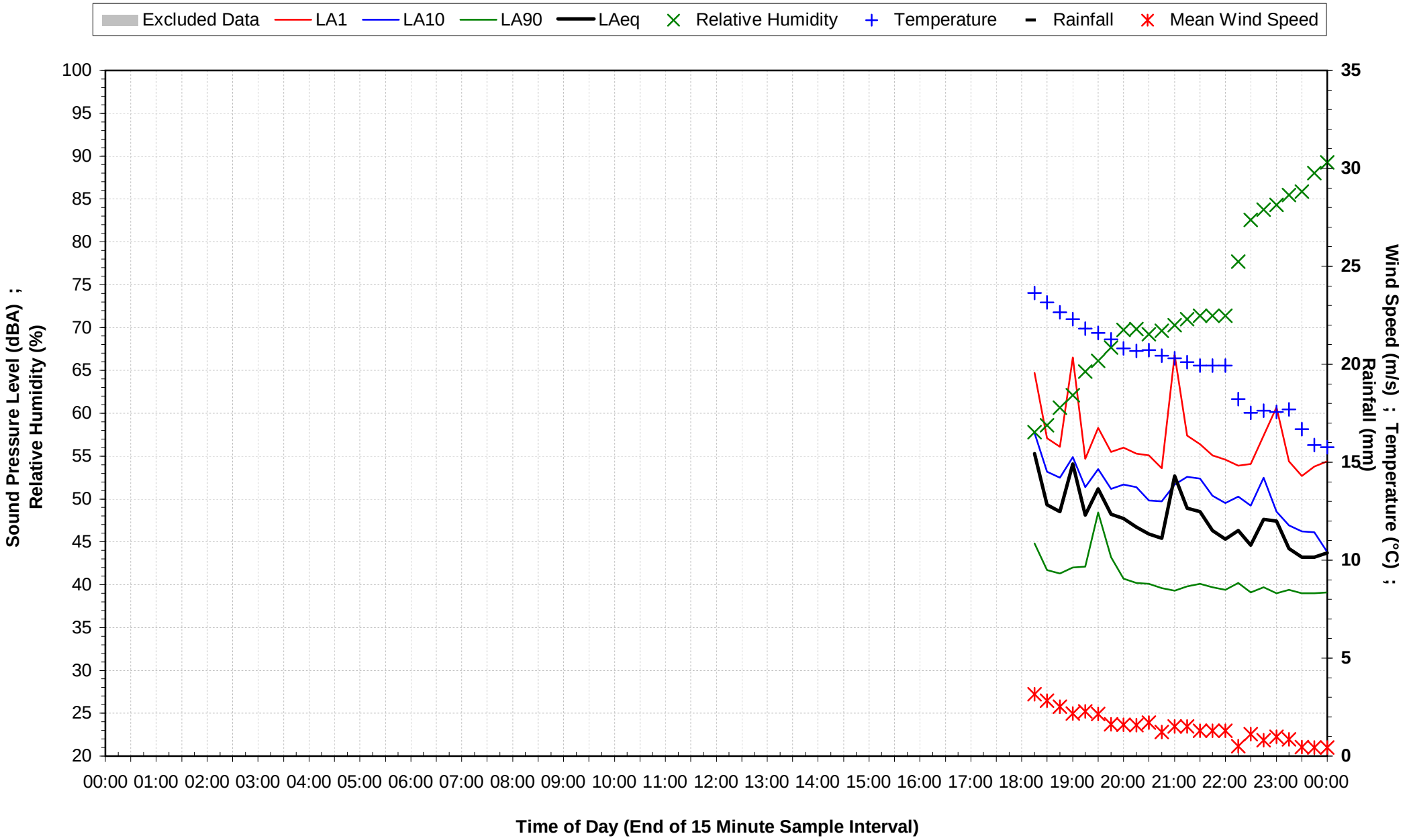
GHD has prepared this Report on the basis of information provided by MCI, which GHD has not independently verified or checked ("Unverified Information") beyond the agreed scope of work.

GHD expressly disclaims responsibility in connection with the Unverified Information, including (but not limited to) errors in, or omissions from, the Report, which were caused or contributed to by errors in, or omissions from, the Unverified Information.

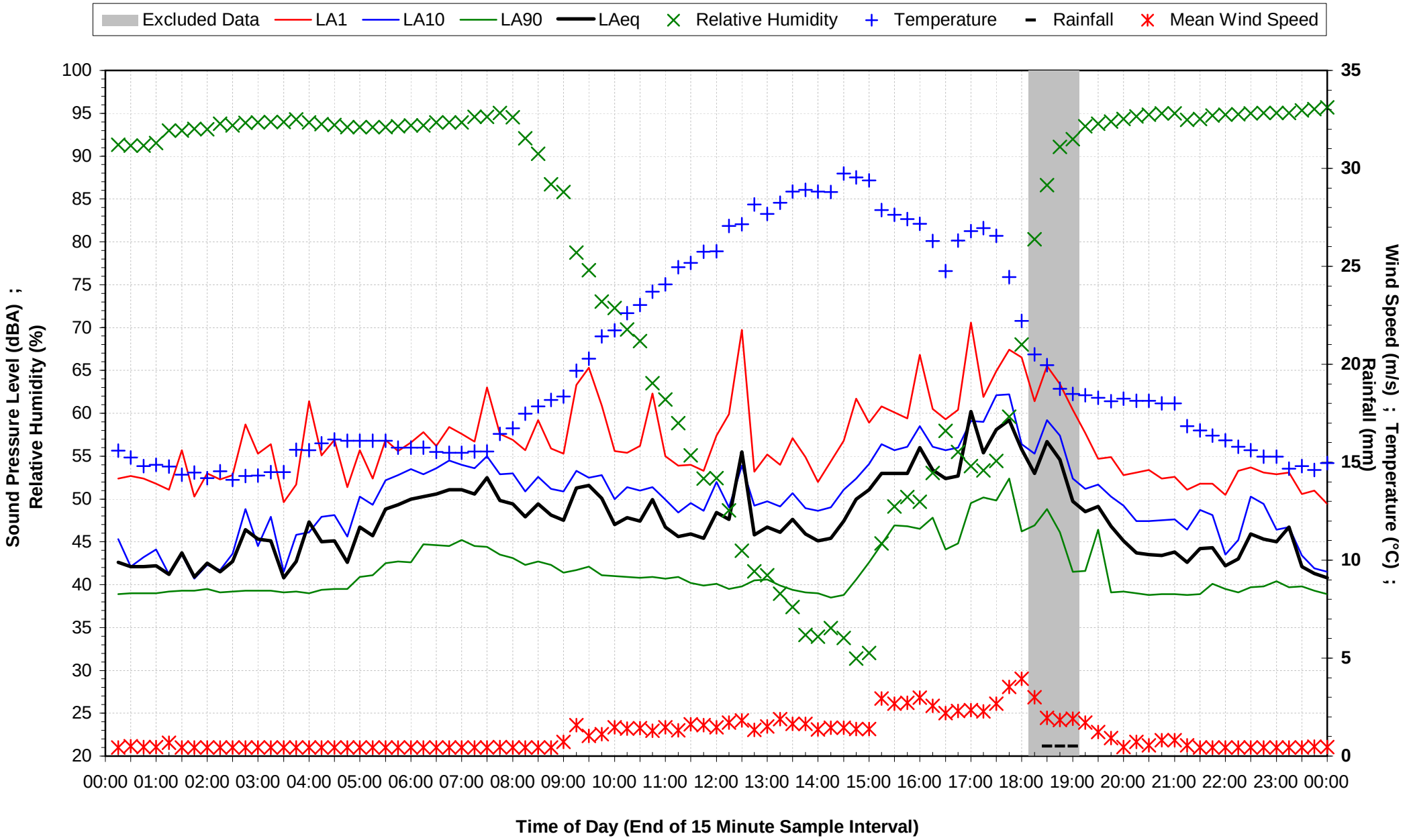
Appendix A

Unattended Noise Monitoring Charts

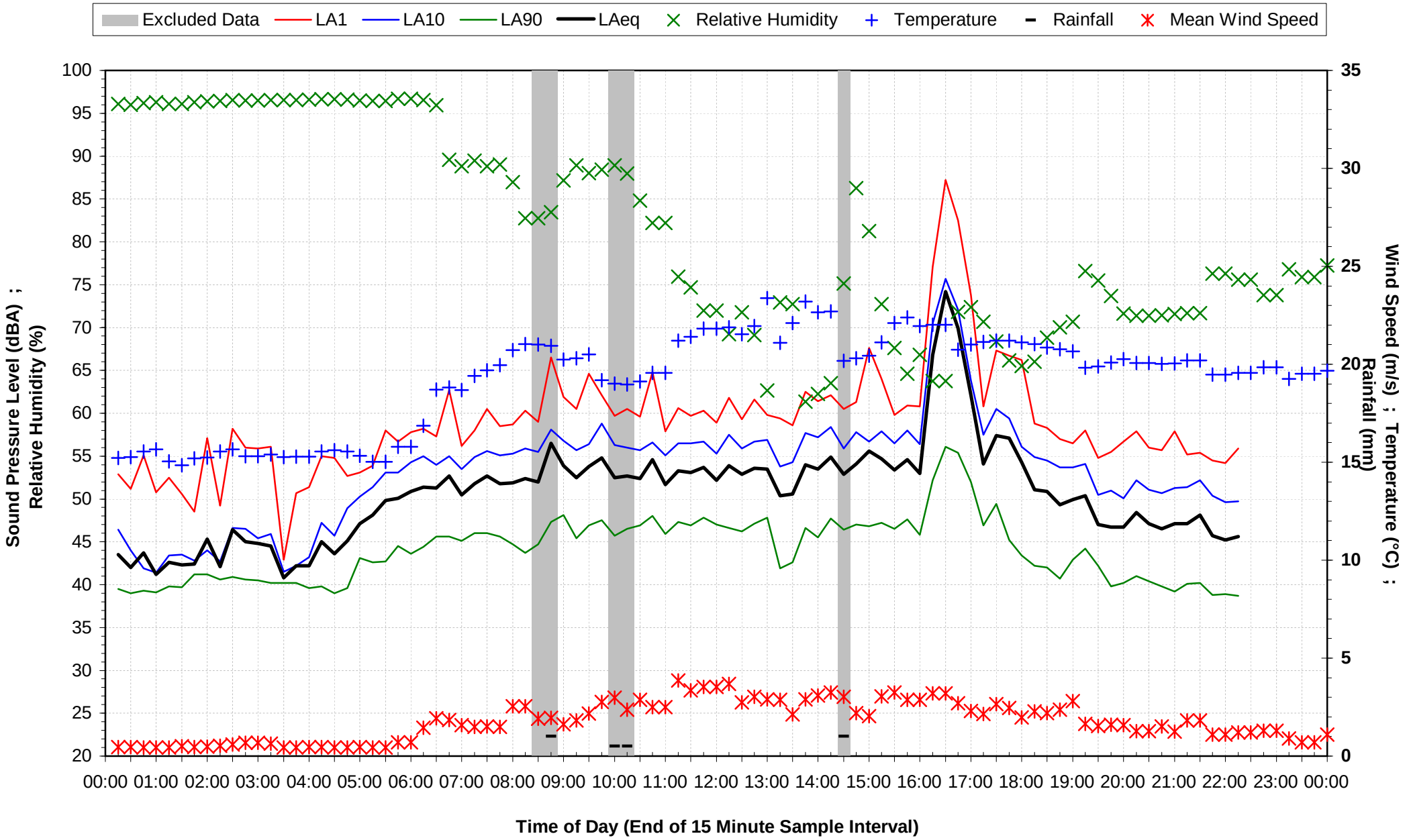
Statistical Ambient Noise Levels
- Tuesday 29 March 2011



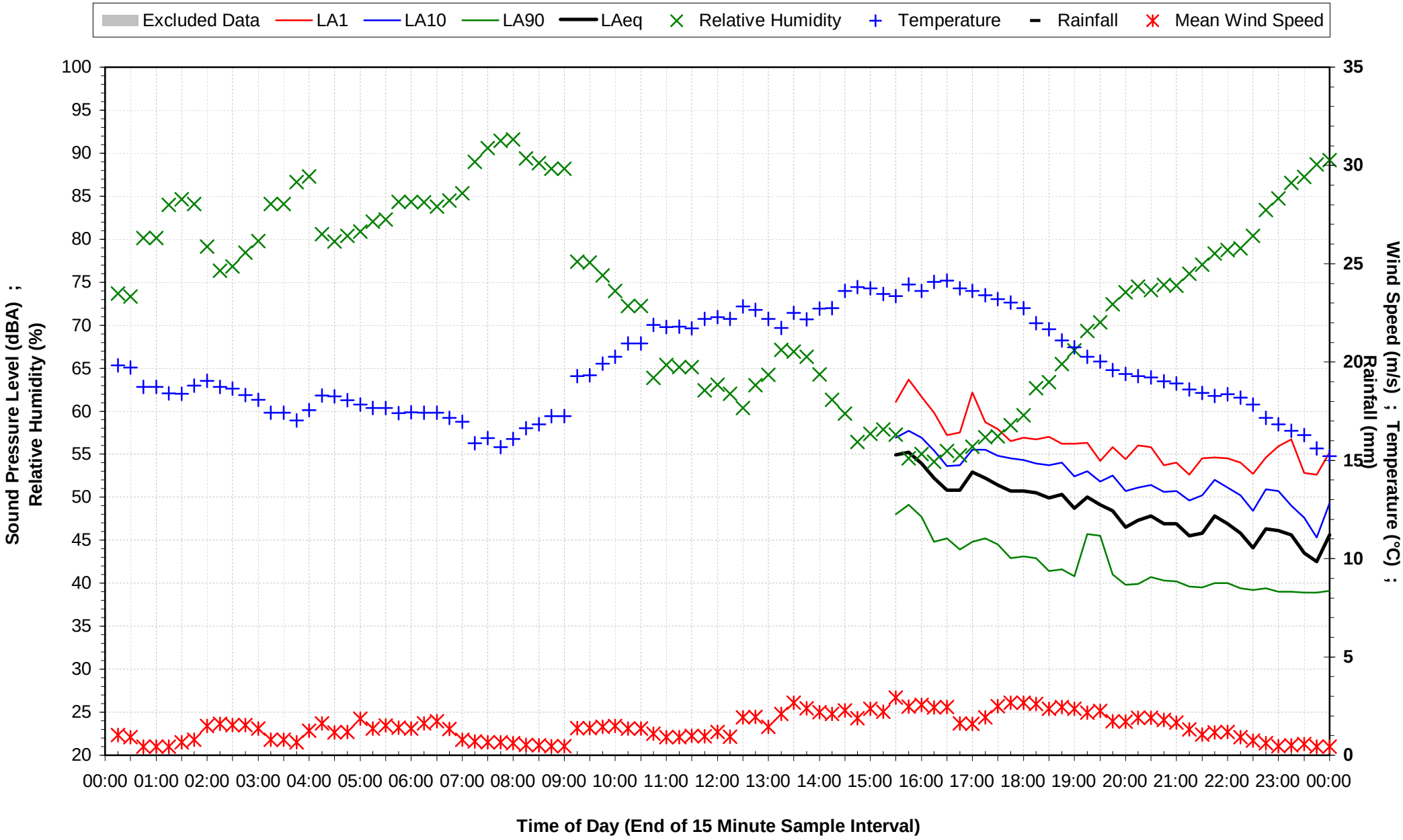
Statistical Ambient Noise Levels
- Wednesday 30 March 2011



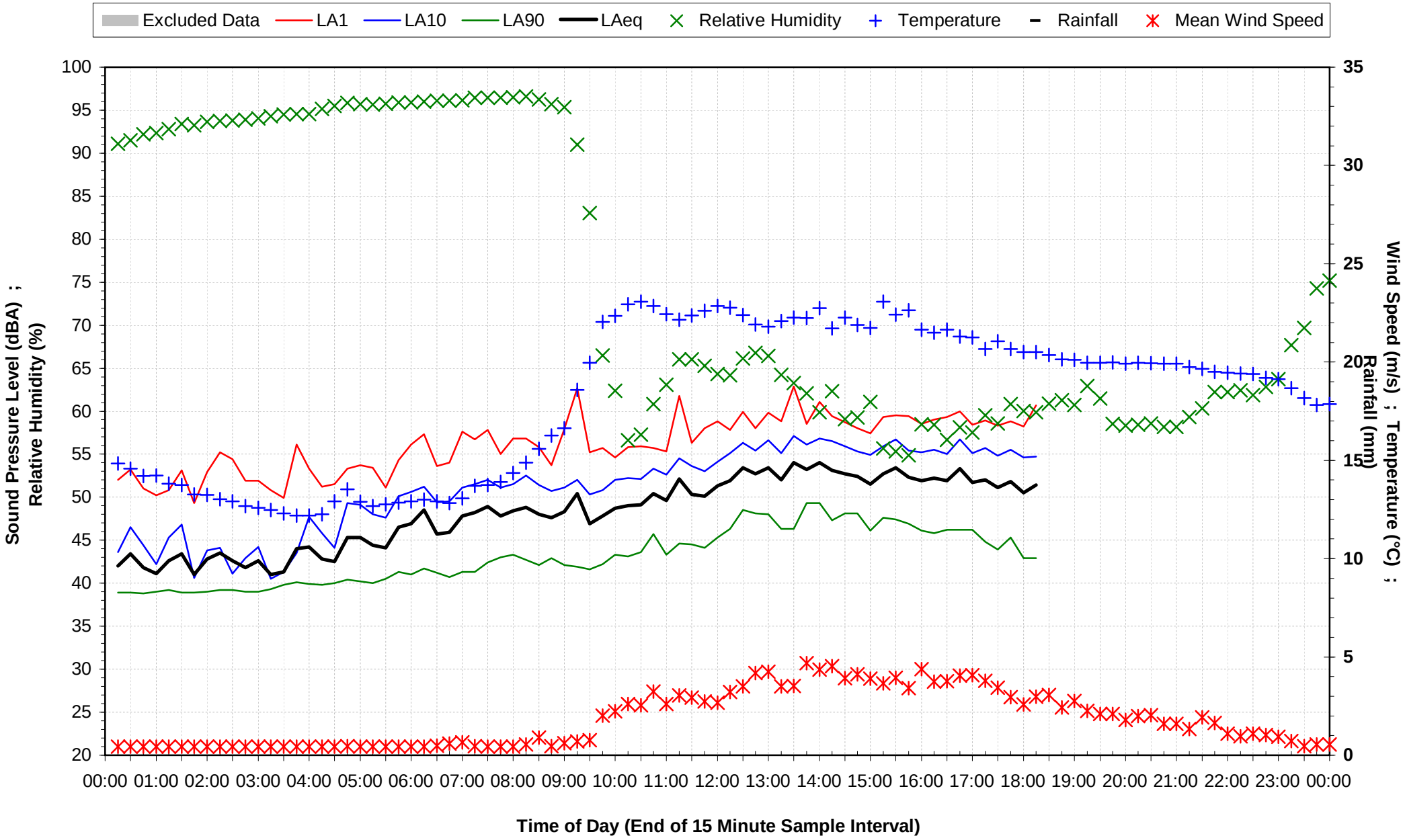
Statistical Ambient Noise Levels
- Thursday 31 March 2011



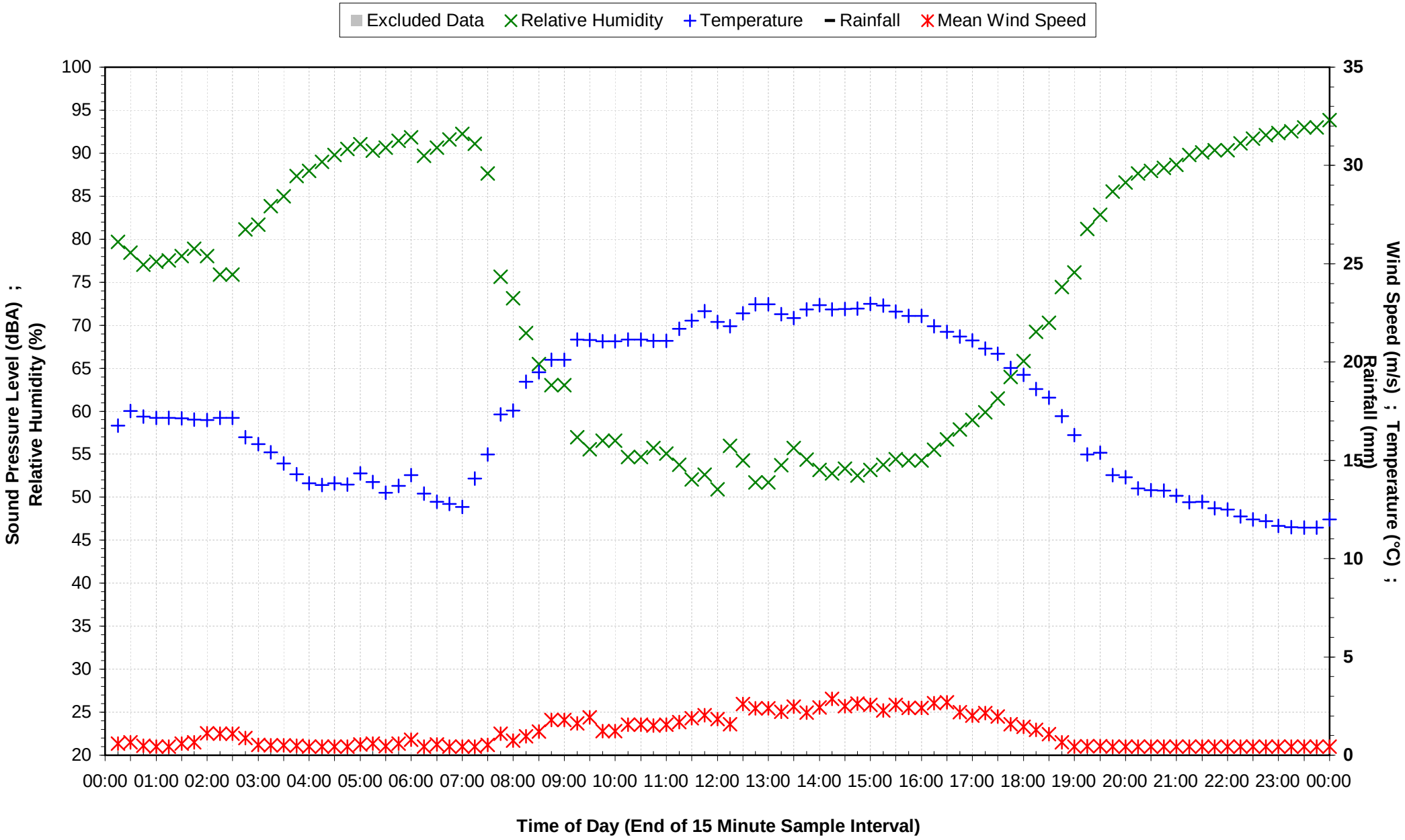
Statistical Ambient Noise Levels
- Friday 1 April 2011



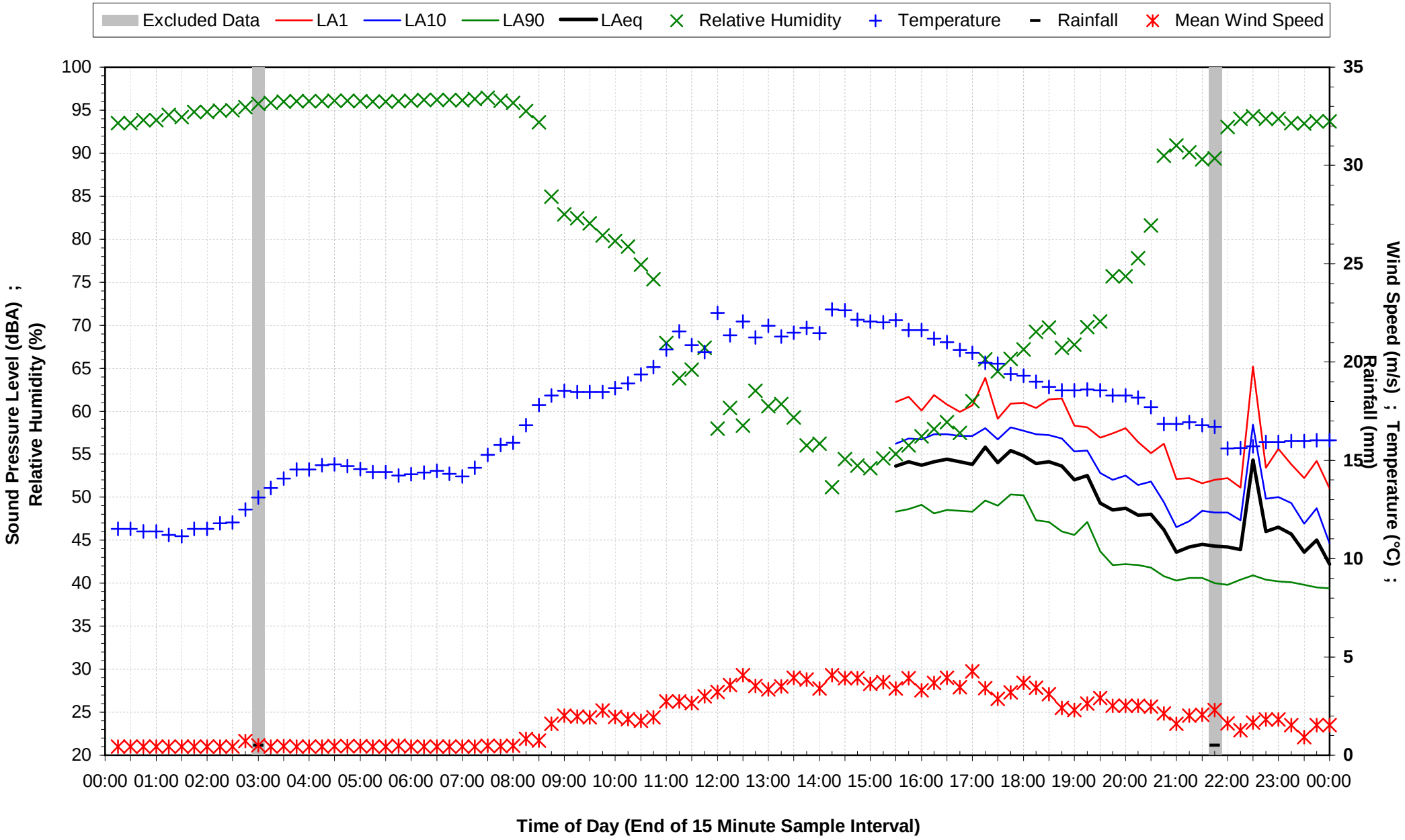
Statistical Ambient Noise Levels
- Saturday 2 April 2011



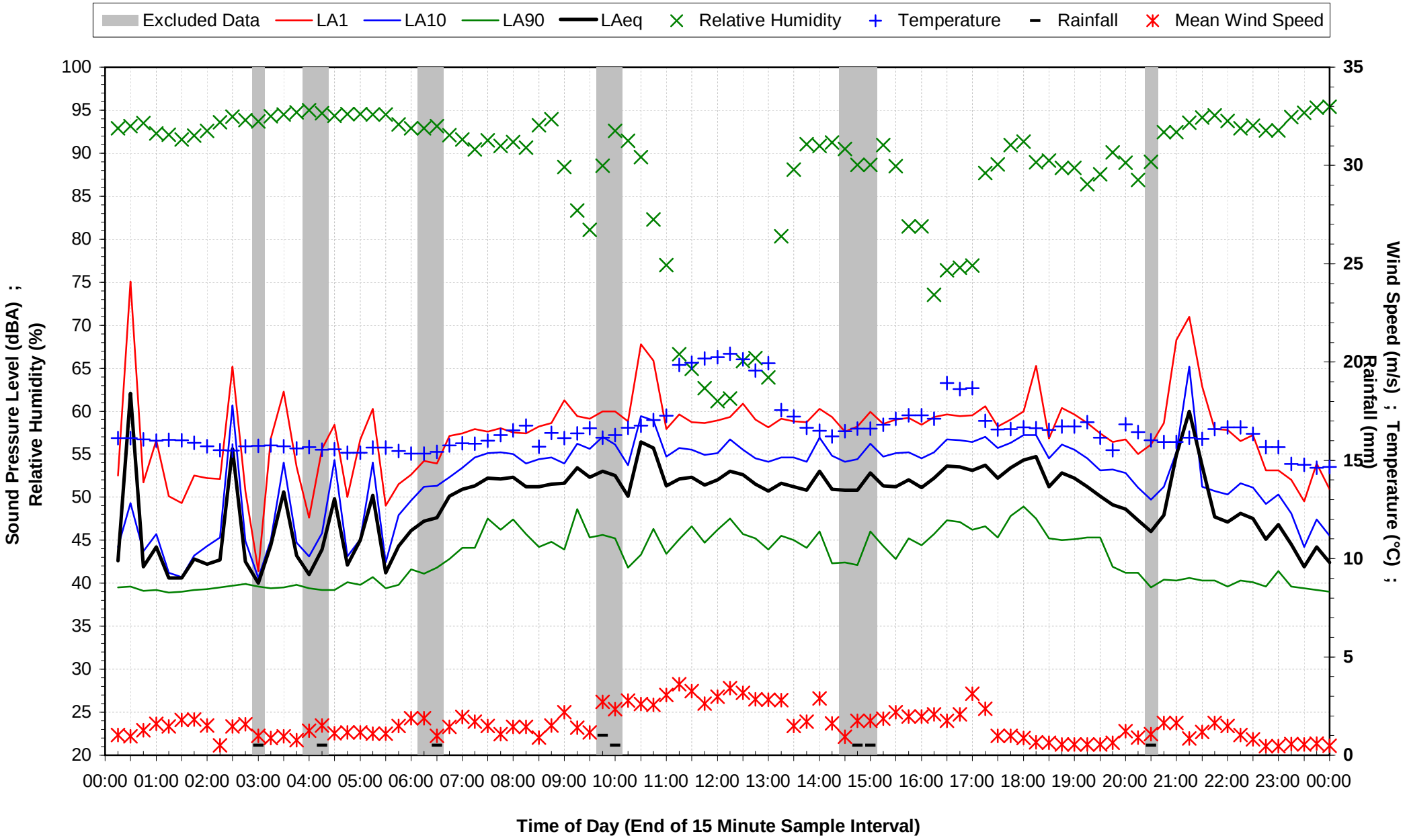
Statistical Ambient Noise Levels
- Sunday 3 April 2011



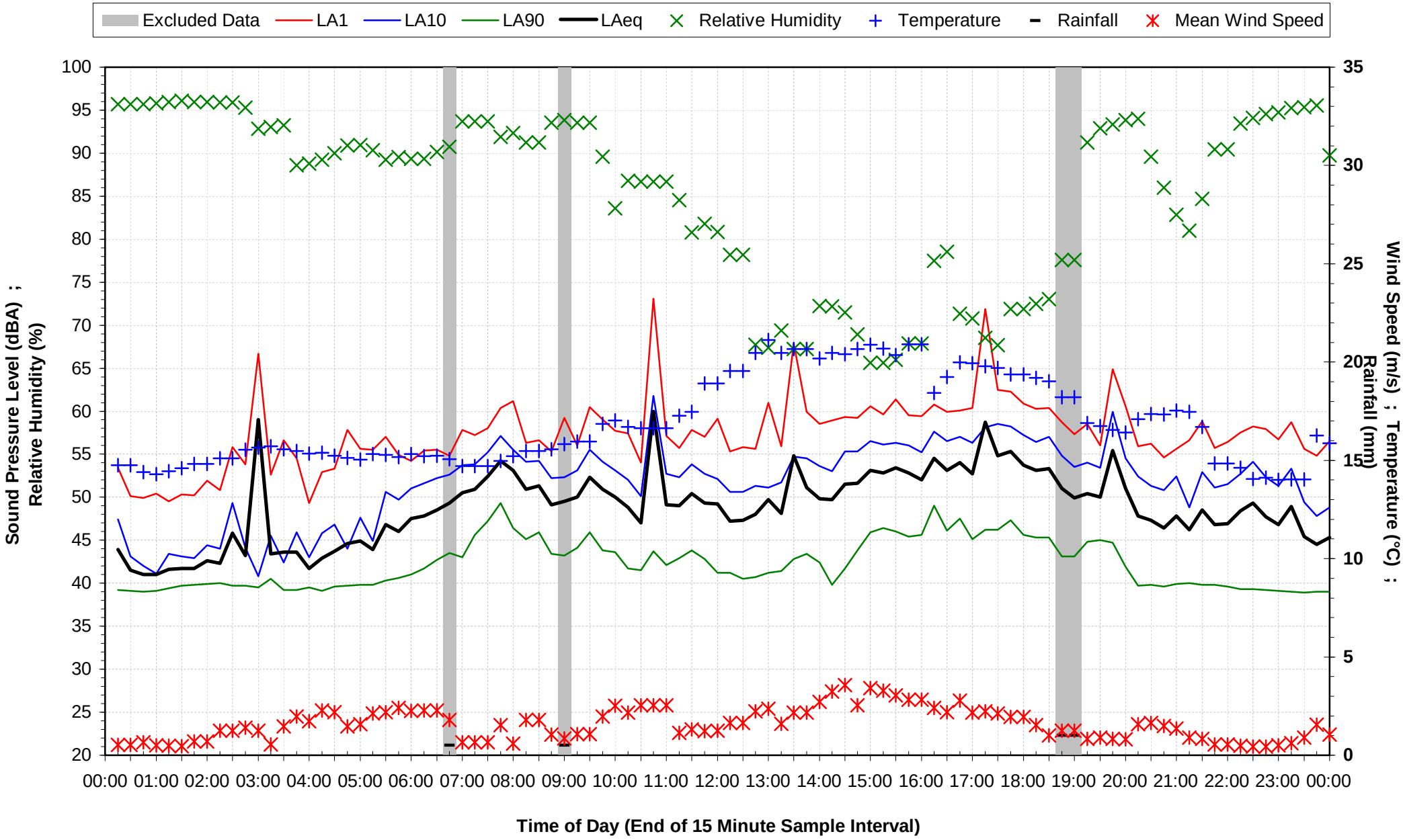
Statistical Ambient Noise Levels
- Monday 4 April 2011



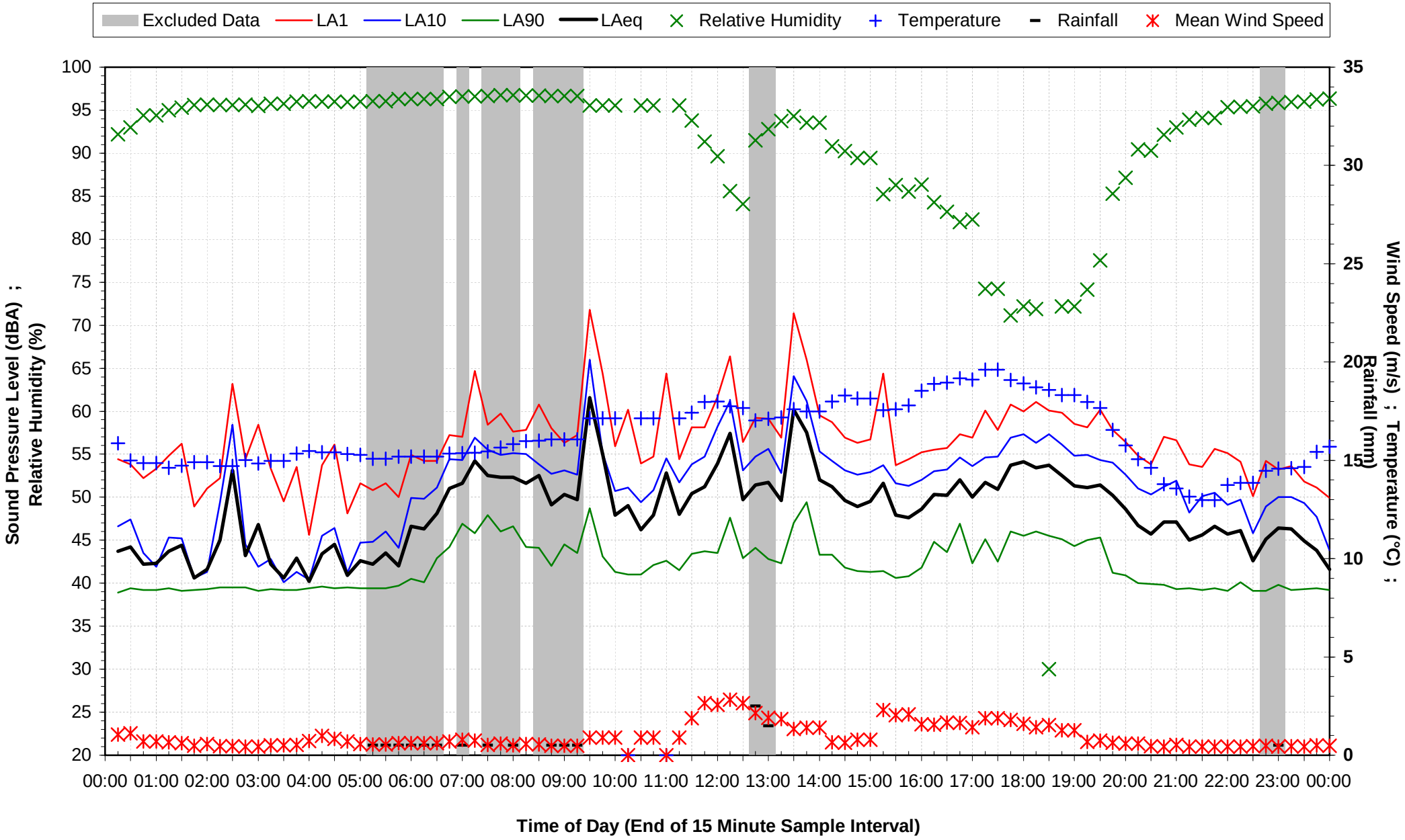
Statistical Ambient Noise Levels
- Tuesday 5 April 2011



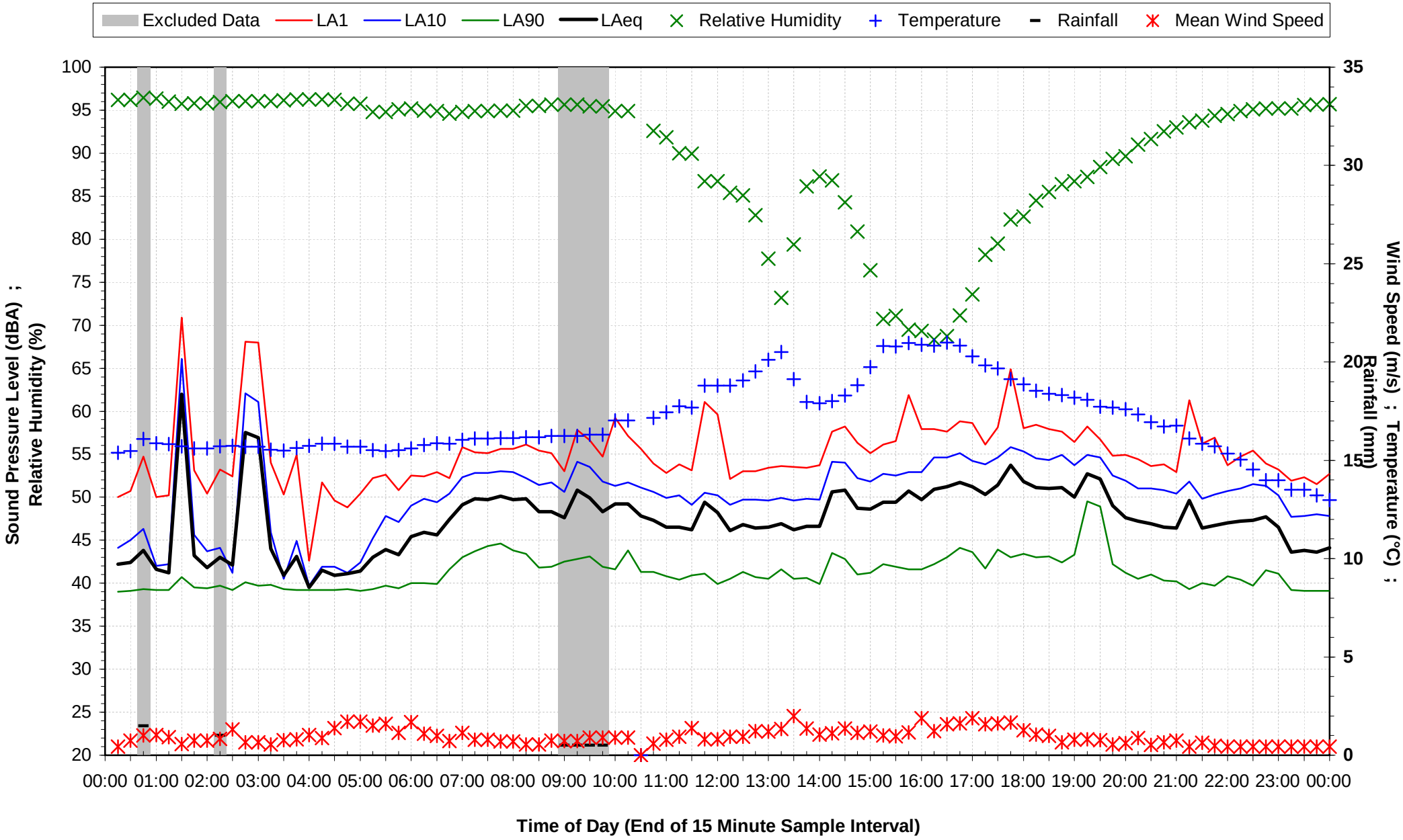
Statistical Ambient Noise Levels
- Wednesday 6 April 2011



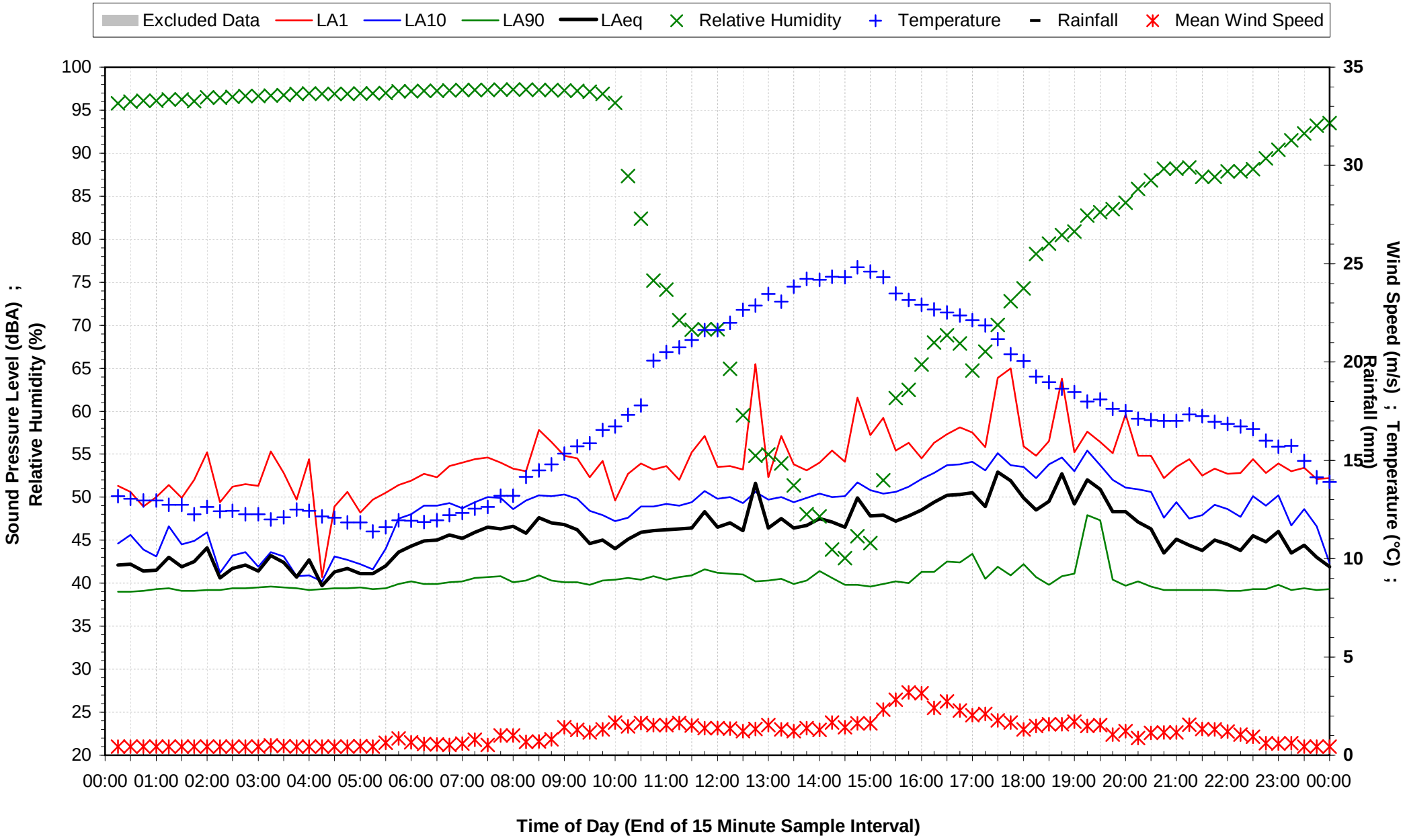
Statistical Ambient Noise Levels
- Thursday 7 April 2011



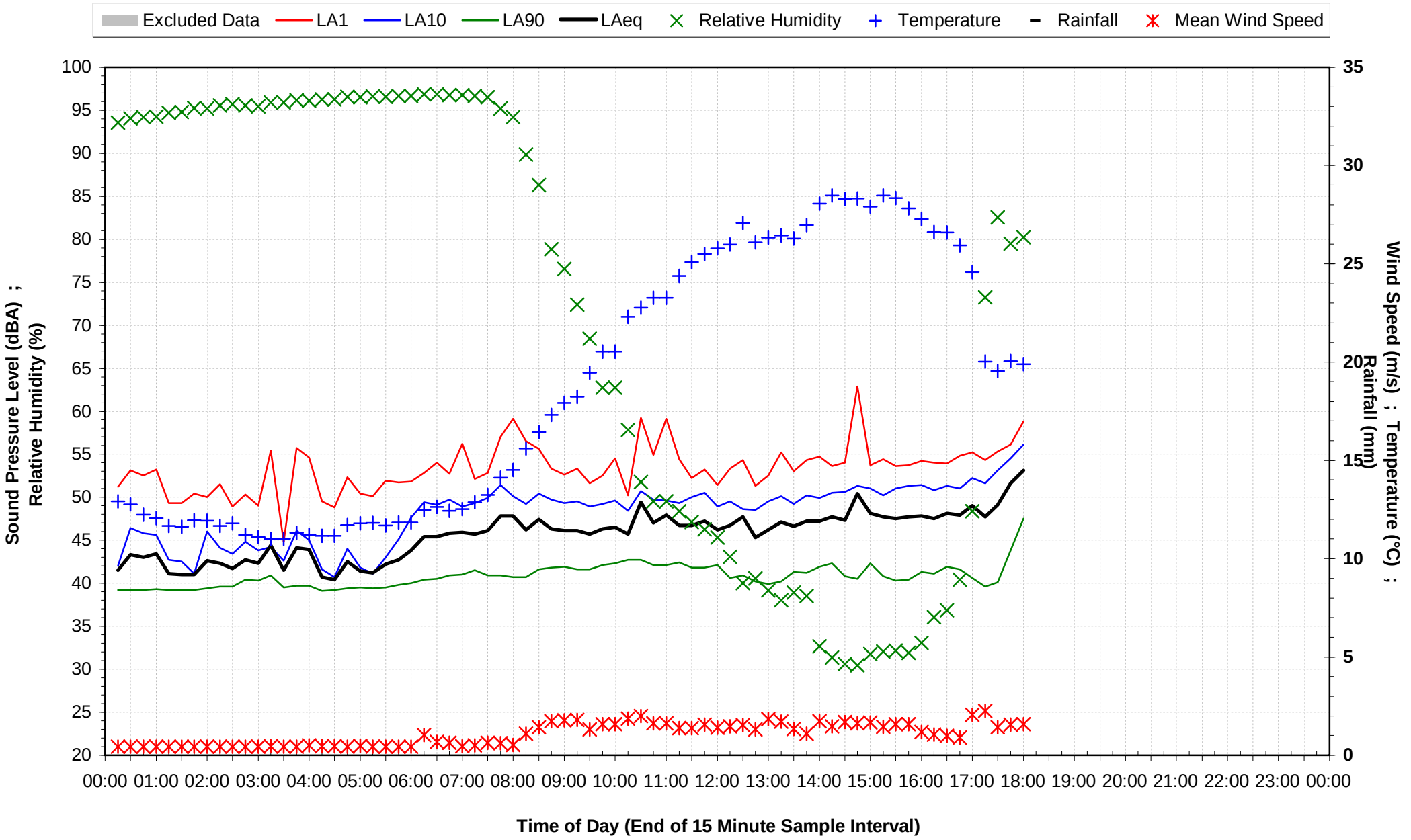
Statistical Ambient Noise Levels
- Friday 8 April 2011



Statistical Ambient Noise Levels
- Saturday 9 April 2011

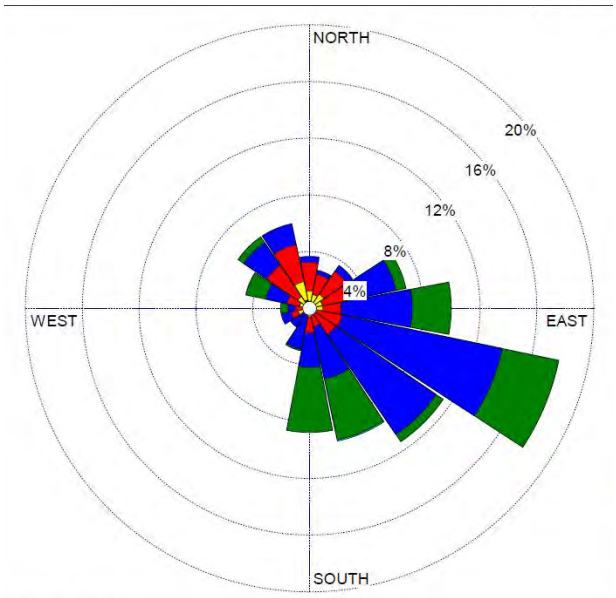


Statistical Ambient Noise Levels
- Sunday 10 April 2011

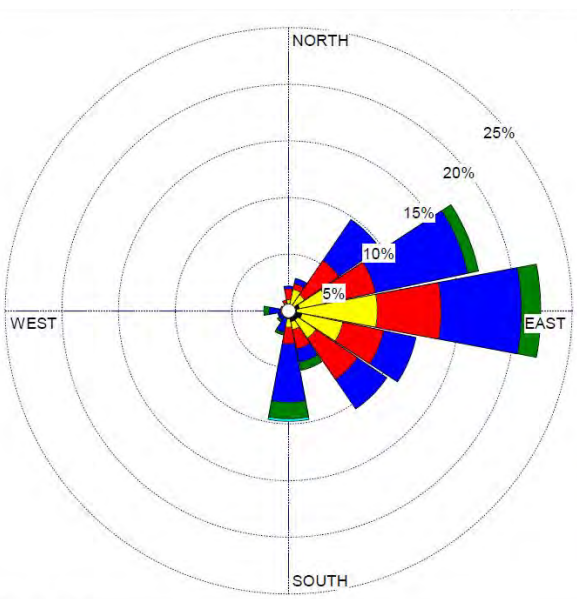


Appendix B

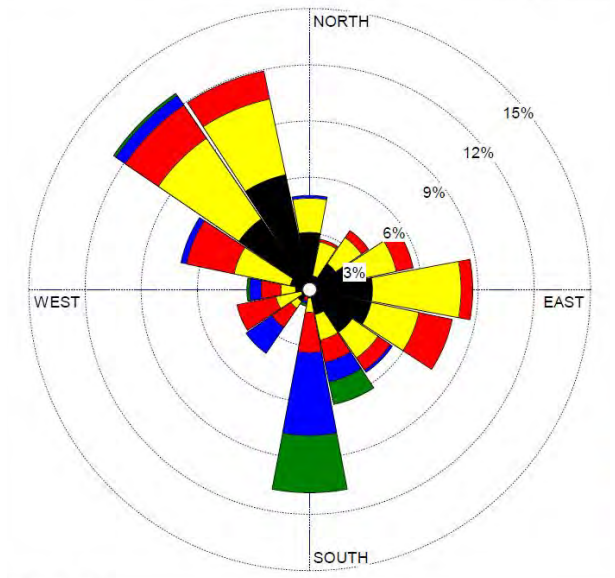
Meteorological Charts



Summer (Day)



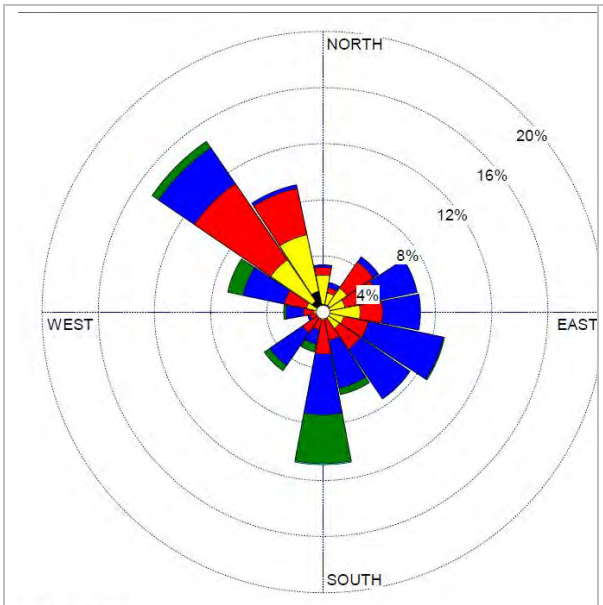
Summer (Evening)



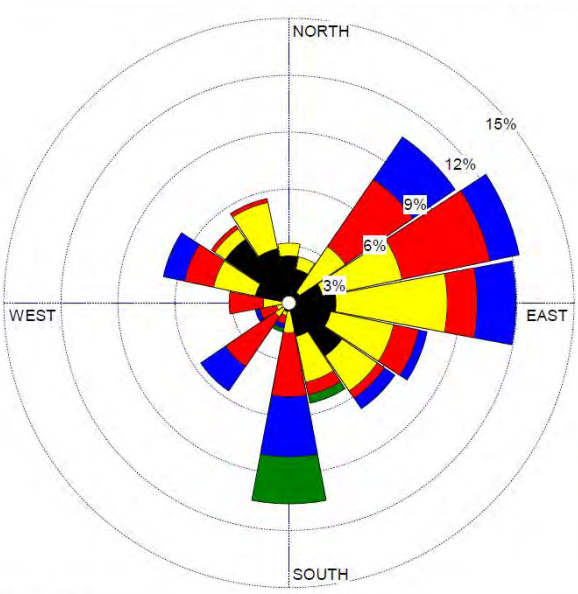
Summer (Night)

Note: In these charts, night-time period is from 12 am to 7 am.

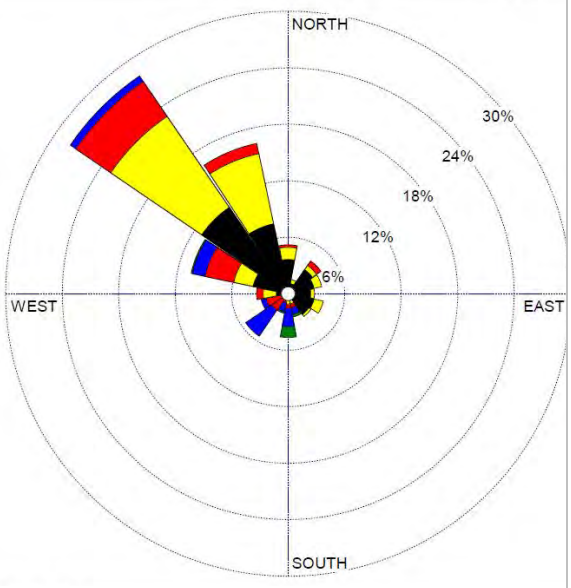
Figure B-1 Tomago 1986 Wind Rose Charts – Summer (Day, Evening and Night)



Autumn (Day)



Aut umn (Evening)



Autumn (Night)

Note: In these charts, night-time period is from 12 am to 7 am.

Figure B-2 Tomago 1986 Wind Rose Charts – Autumn (Day, Evening and Night)

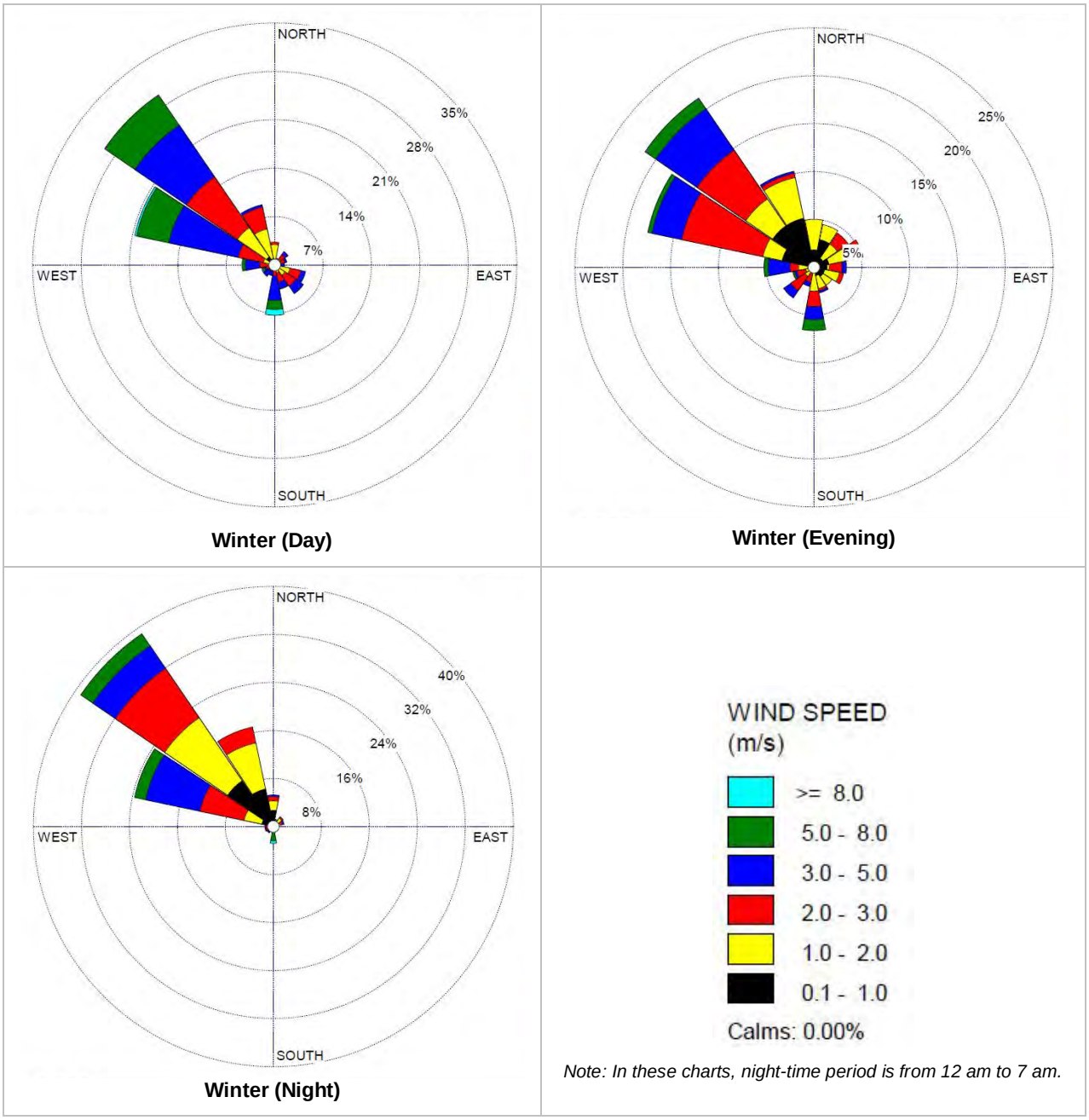
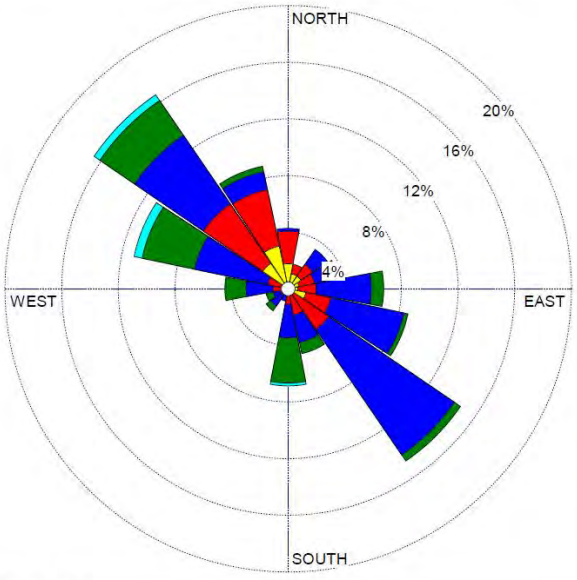
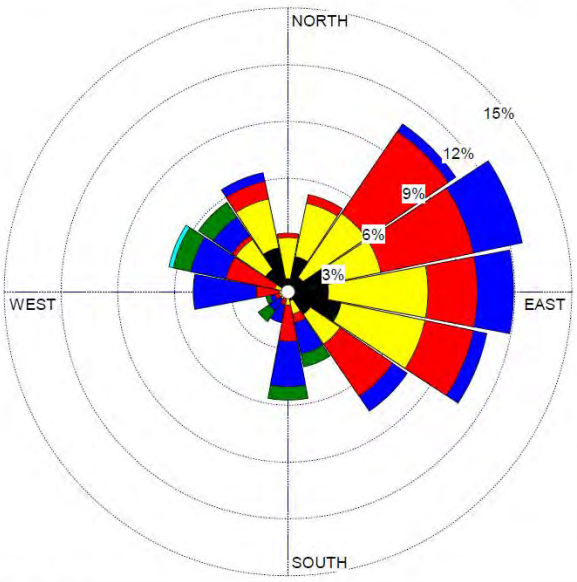


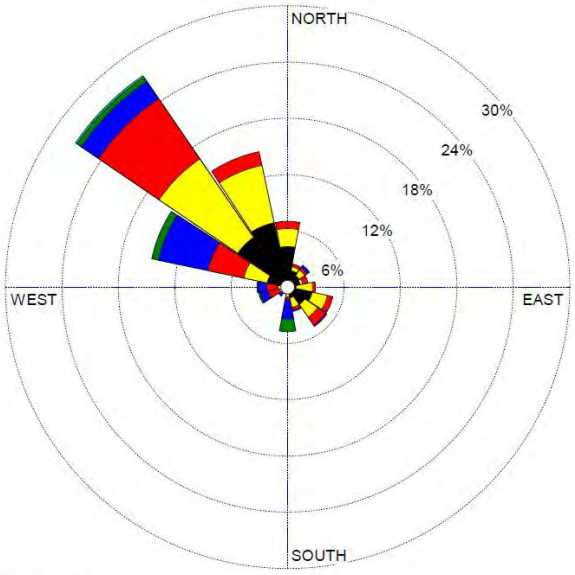
Figure B-3 Tomago 1986 Wind Rose Charts – Winter (Day, Evening and Night)



Spring (Day)



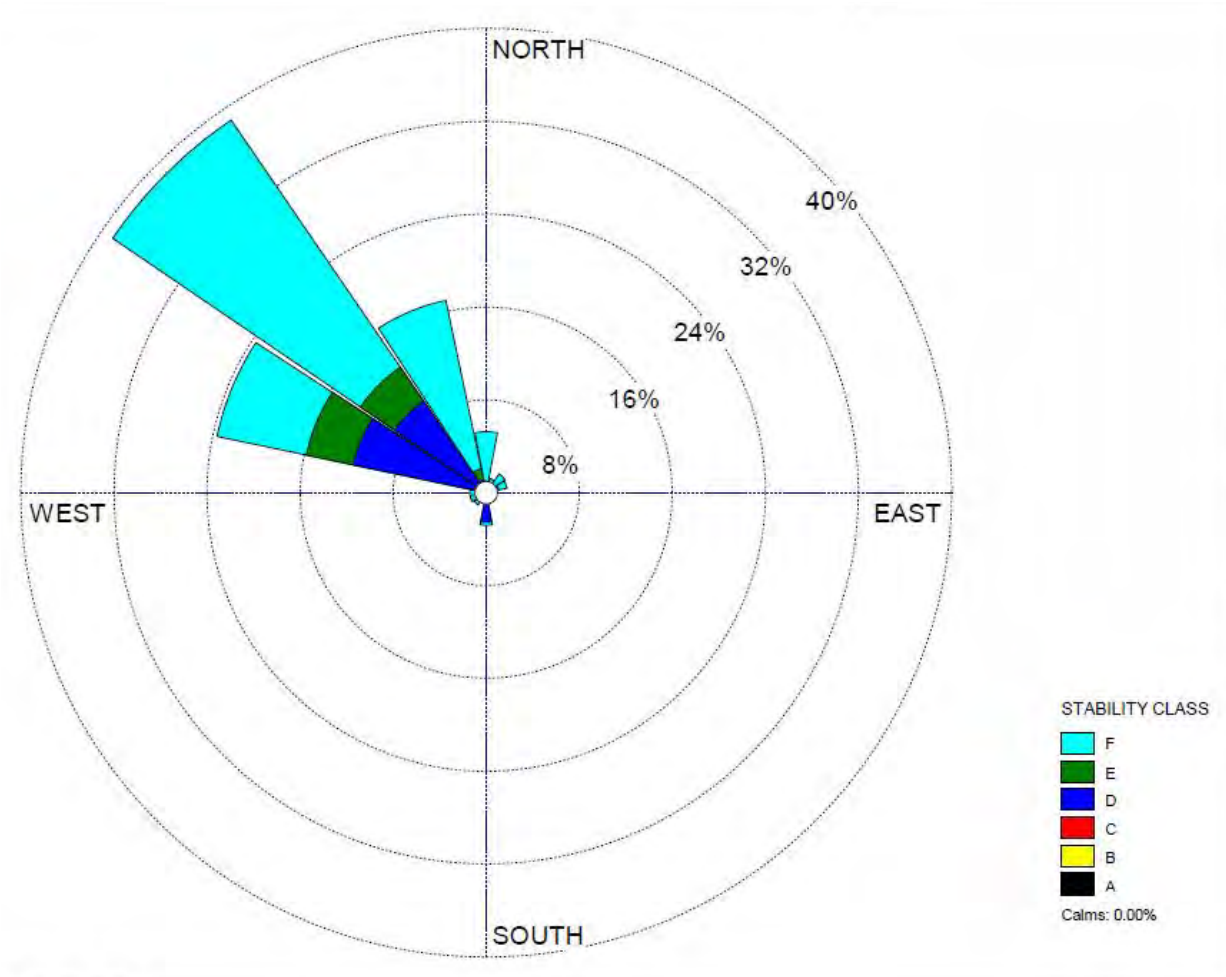
Spring (Evening)



Spring (Night)

Note: In these charts, night-time period is from 12 am to 7 am.

Figure B-4 Tomago 1986 Wind Rose Charts – Spring (Day, Evening and Night)



Note: In this chart, night-time period is from 12 am to 7 am

Figure B-5 Tomago 1986 Stability Rose Chart – Winter Season, Night-time

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2	C Evenden	V Chavand		V Chavand		08/02/2012