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Rezoning
Glenfield Waste Site
Noise Impact Assessment

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Rezoning

Glenfield Waste Site

Noise Impact Assessment

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DOCUMENT CONTROL

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630.10711-R1	Revision 1	1 April 2015	Martin Davenport	Nathan Archer	Nathan Archer
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Executive Summary

SLR has undertaken a noise assessment relating to the proposed rezoning of the southern parcel of the GWS site located at Cambridge Avenue, Glenfield NSW.

The aim of this assessment is to assess the potential noise impacts from land use changes associated with the rezoning on surrounding sensitive receptors.

The noise assessment has been prepared with reference to Australian Standard AS 1055:1997 *Description and Measurement of Environmental Noise* Parts 1, 2 and 3 and in general accordance with the Environment Protection Authority's (EPA) *NSW Industrial Noise Policy* (INP) (EPA, 2000) and the associated Application Notes (EPA, last updated July 2012).

Residences surrounding the development have been classified for the purposes of this noise assessment as 'suburban'. The 'suburban' classification is not determined in relation to the planning zone of these residences but is an acoustical classification. The ambient noise at these locations is influenced by road traffic noise and (to a lesser extent) noise from existing industrial facilities.

The operational amenity noise criteria (presented in **Table 6**) have been determined based on measured noise levels in the vicinity of the subject site and with reference to the INP.

For the purpose of this noise assessment the amenity noise criteria has been adopted to assess potential noise impacts for the proposed medium to long-term land use where multiple developments are proposed. The intrusive and sleep disturbance impacts of proposed developments for the medium to long-term land use would need to be assessed when more information is known about the developments that will occupy the site.

A computer model was used to predict noise emissions from the proposed development. Noise modelling was undertaken using SoundPLAN v7.3 software, developed by Braunstein and Berndt GmbH in Germany. Noise modelling methodology and assumptions are outlined in **Section 7.1**. The proposed land use strategy is for typically "low noise" industrial use with a focus on warehousing and logistics. Notwithstanding this a hypothetical industrial estate consisting of "low" and "medium" noise generating industrial sites distributed evenly across the subject site was utilised in the modelling process.

Predicted noise levels at neighbouring noise-sensitive locations representative of potential noise levels likely to be experienced once industrial developments are in use at the GWS site are provided in **Table 12**.

Predicted noise emission levels (shown in **Table 12**) for a hypothetical industrial estate are predicted to comply with the relevant noise goals during day, evening and night-time periods at all existing residential locations considered under calm and prevailing weather conditions. Furthermore, no specific noise mitigation measures, besides the existing mound and fence, have been included in the noise model. It is possible that actual noise emissions from the proposed industrial estate would be less than those predicted. Predicted noise levels could be greatly reduced with judicious planning along with the use of equipment incorporating 'quiet' engineering design, the addition of acoustically designed enclosures, noise barriers or using management techniques. Further discussion in this regard is provided in **Section 8**. It is also possible that considerable screening of acoustically significant activities would be provided by buildings once the site is developed.

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been commissioned by Environmental Property Services (EPS) on behalf of Glenfield Waste Services (GWS) to undertake a noise assessment relating to the proposed rezoning of the southern parcel of the GWS site located at Cambridge Avenue, Glenfield NSW.

The majority of the southern parcel of the GWS land located in the Campbelltown City Council's Local Government Area is *Zone 1(a) – Rural A Zone* in the Campbelltown (Urban area) Local Environmental Plan 2002 (LEP).

The site's rural zone reflects the historical rural land uses in the area. The local area is now an established urban area comprising residential, industrial, commercial, education, open space and major public infrastructure land uses.

The aim of this assessment is to assess the potential noise impacts from land use changes associated with the rezoning on surrounding sensitive receptors.

This report revision has been prepared in response to Campbelltown City Council comments.

The noise assessment has been prepared with reference to Australian Standard AS 1055:1997 *Description and Measurement of Environmental Noise* Parts 1, 2 and 3 and in general accordance with the Environment Protection Authority's (EPA) *NSW Industrial Noise Policy* (INP) (EPA, 2000) and the associated Application Notes (EPA, last updated July 2012).

2 PROJECT DESCRIPTION

2.1 Site Details

The GWS site is located at Cambridge Avenue Glenfield NSW. The GWS northern parcel of land is located in Liverpool City Council's Local Government Area. The GWS southern parcel of land is located in the Campbelltown City Council's Local Government Area. The current proposal is to demonstrate the potential impacts of rezoning the majority of the southern parcel of land.

The southern parcel of land (the Site) is approximately 60 hectares and is bounded by the East Hills Railway along its northern boundary, Georges River at the eastern boundary and to the south by the Glenfield residential area. The site locality and site location are shown in **Figure 1** and **Figure 2** respectively.

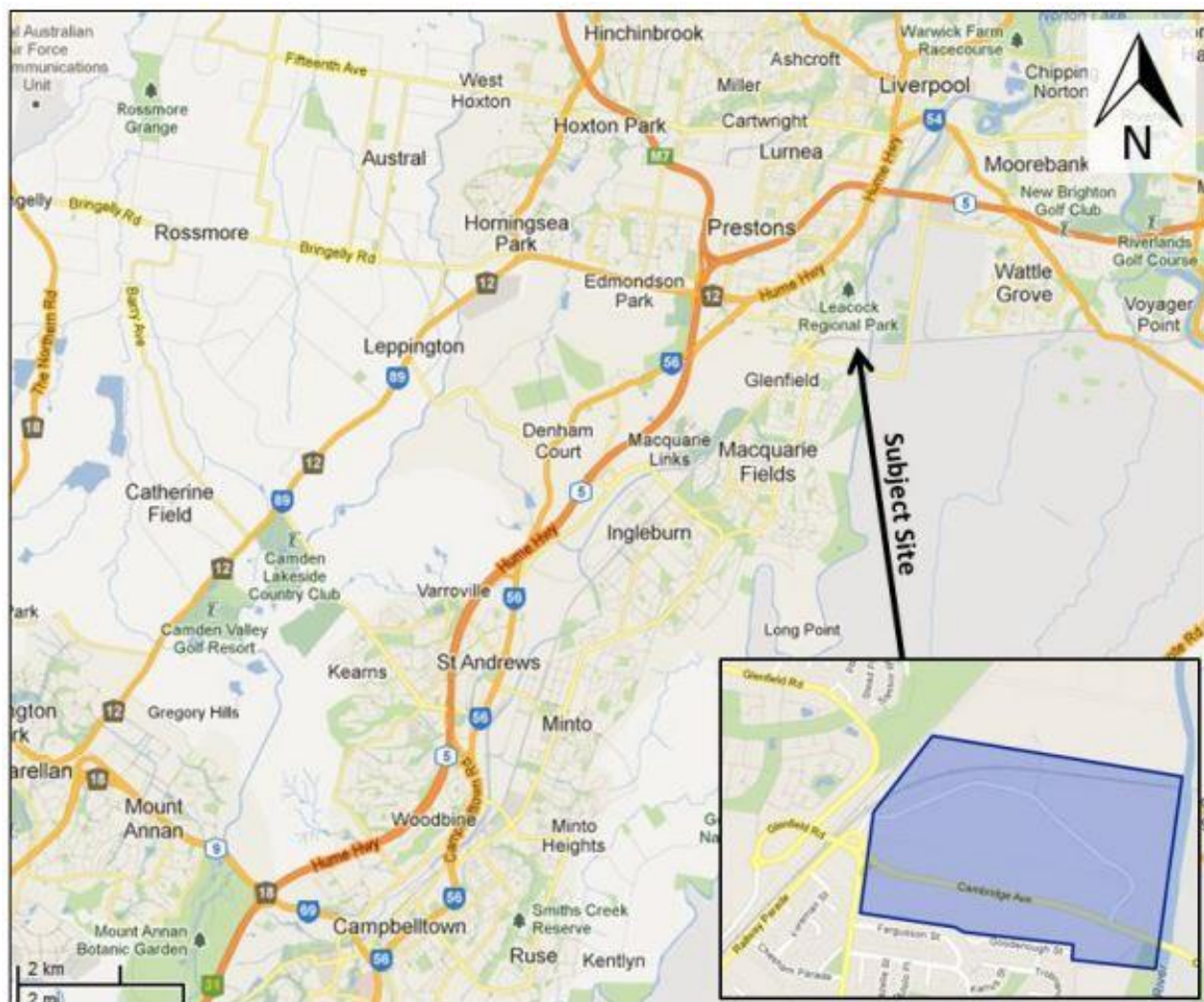
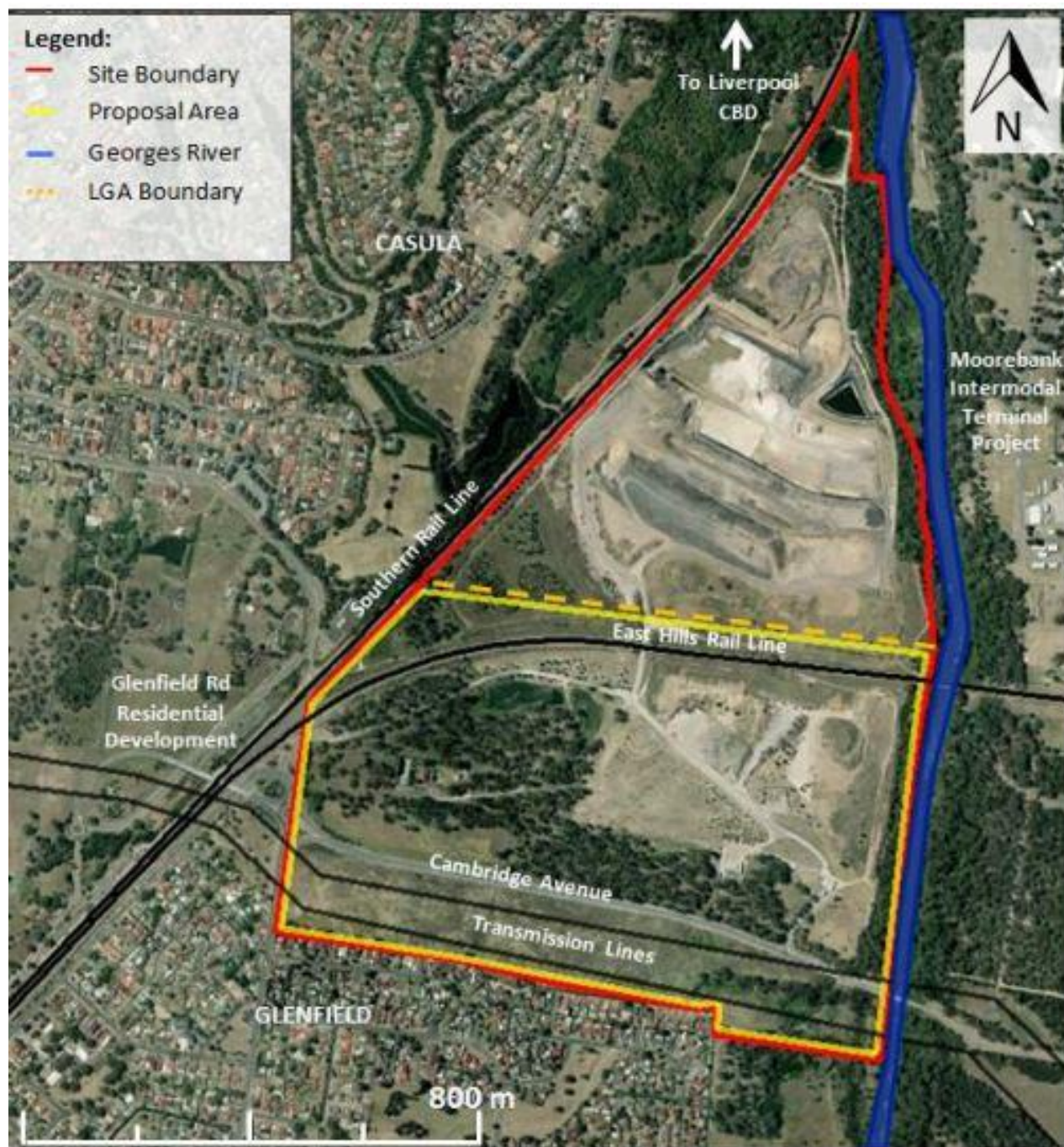


Figure 2 Site Location



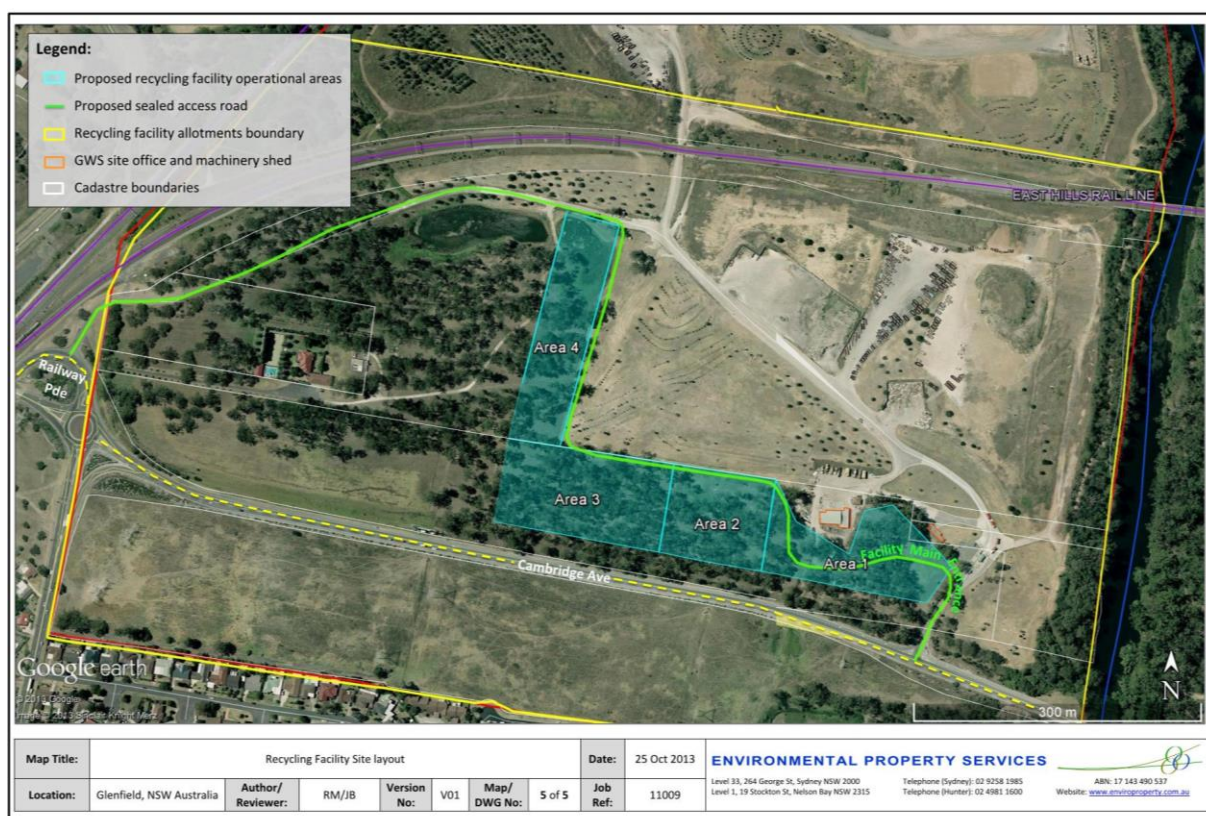
2.2 Short-term to Medium-term Land Use Activities

The GWS northern parcel of land will continue in the short term, to operate as landfill. As part of the owner's broader strategy to promote sustainable practices while improving the viability of the operation, GWS proposes to increase the Site's recycling operations in the southern parcel of land (refer **Figure 3**).

Subject to planning approval the expanded recycling operation will recycle a number of waste streams with the bulk of the waste being construction and demolition (C&D) waste. The C&D waste will consist of timber, green waste, concrete, brick and asphalt. Recycling will also include virgin excavated natural material (VENM) and excavated natural material (ENM).

The proposed short-term to medium-term land use activities, as described above, are subject of a development application currently being prepared by EPS.

Figure 3 Short-term to Medium-term Land Use Activity



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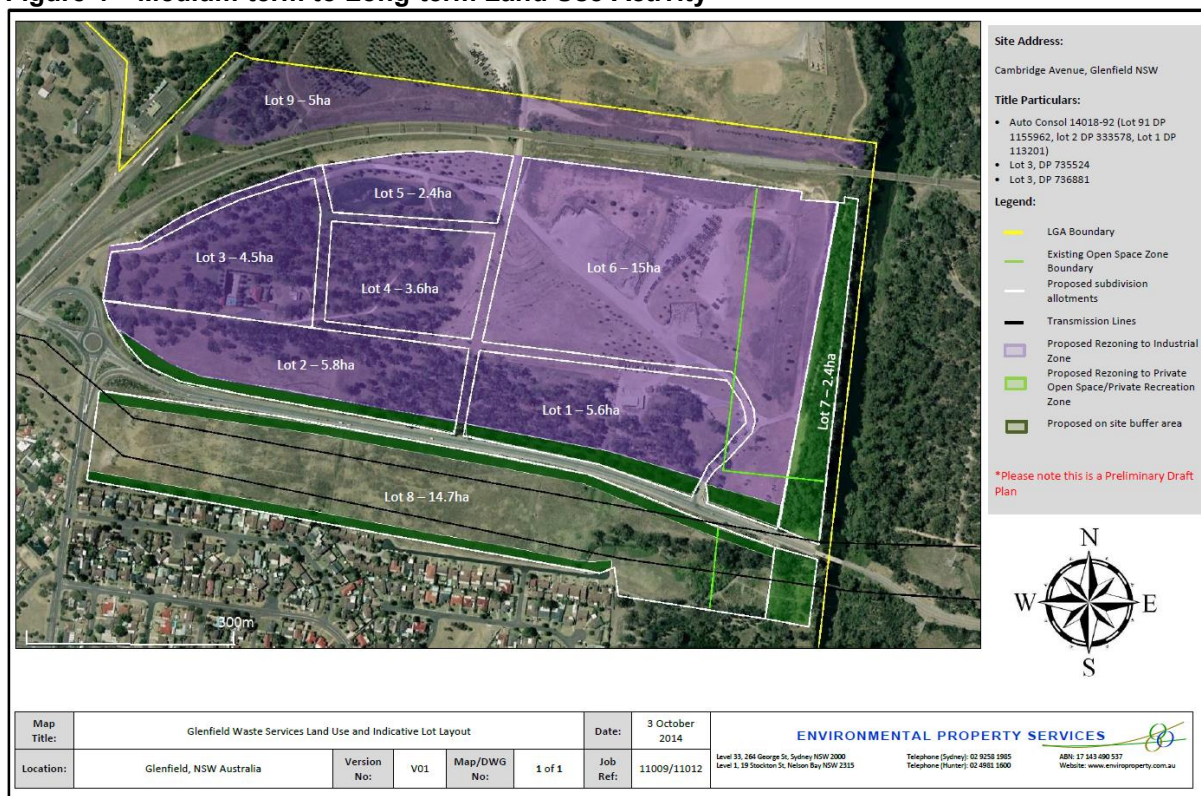
2.3 Medium-term to Long-term Land Use Activities

To facilitate industrial development on the site, amendments to the existing operation will be planned and implemented. A closure plan for the Site will be undertaken in accordance with the Protection of the Environment Operations Act 1997 (POEO Act) and the relevant Environment Protection Licence (EPL) conditions.

The closure plan describes the steps necessary to close the landfill in accordance with the statutory closure requirements and details the post-closure care activities that include monitoring and maintaining the waste containment systems and monitoring groundwater to ensure that waste is not escaping and polluting the surrounding environment.

Subject to planning approval the Site would then be developed for industrial uses with a focus on warehousing and logistics. An indicative lot layout of the medium-term to long-term land use activities is provided in **Figure 4**.

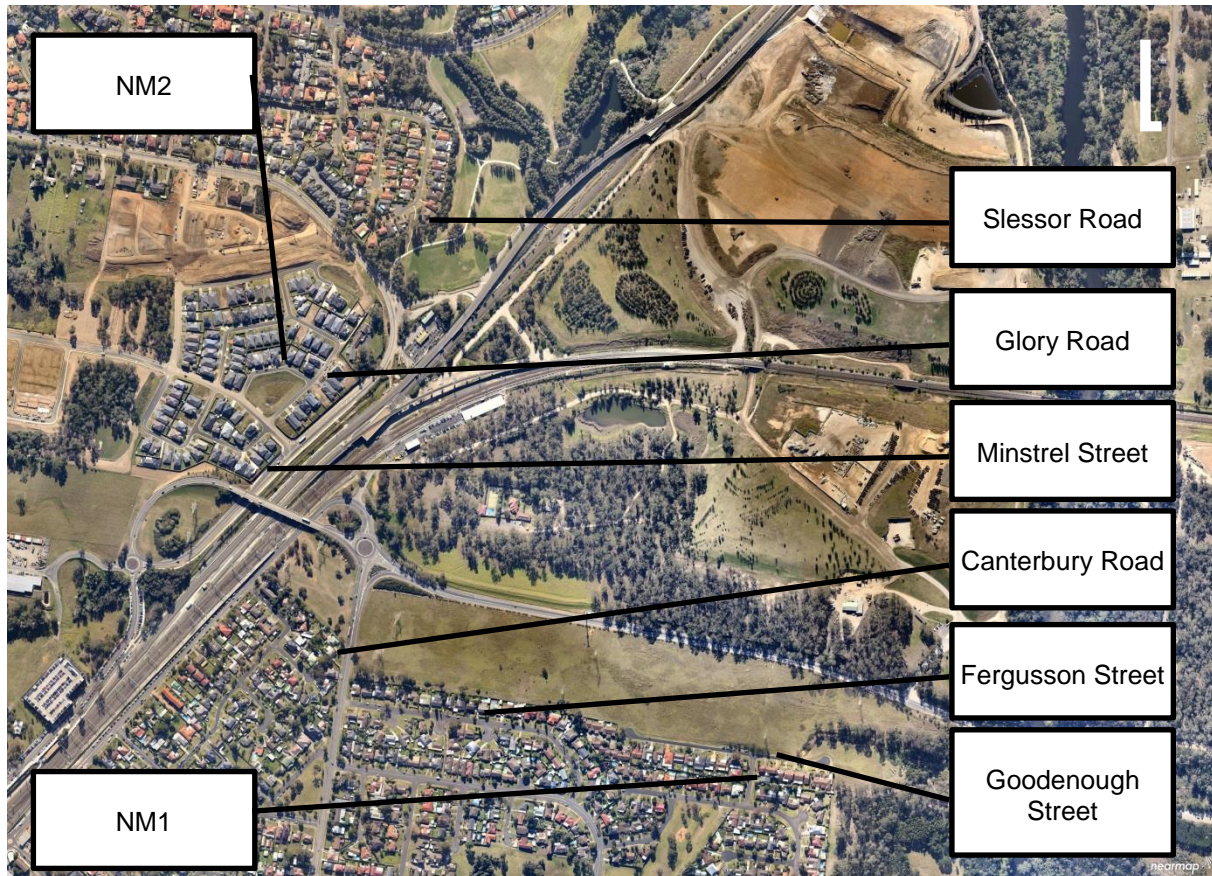
Figure 4 Medium-term to Long-term Land Use Activity



2.4 Nearest Noise Sensitive Receivers

The nearest noise sensitive residential receivers to the Site are located in the Glenfield residential area to the south of Cambridge Avenue and to the west of the Site in the Glenfield Road residential development. The location of the sensitive receivers along with background noise monitoring locations are illustrated in **Figure 5**

Figure 5 Nearest Sensitive Receivers



3 EXISTING ACOUSTICAL ENVIRONMENT

3.1 Methodology

A site inspection was conducted on Thursday 1 May 2014 to gain an appreciation of the subject site and to commence the noise monitoring program. Both short-term operator-attended and long-term unattended noise monitoring surveys were conducted. Two (2) environmental noise loggers were positioned at locations representing the nearest sensitive receivers to the site as shown in **Figure 5**. Details of the loggers and their locations are provided in **Table 1**.

Table 1 Noise Monitoring Details

Location Reference	Location	Noise Logger Type / Serial No.	Monitoring Period
NM1	8 Goodenough Street, Glenfield	ARL Type EL316 / 16-207-042	Thursday 1 May 2014 to Wednesday 14 May 2014, inclusive
NM2	3 Albion Crescent, Glenfield	ARL Ngara / 878049	Friday 16 May 2014 to Friday 23 May 2014 inclusive

Operator-attended noise surveys were conducted during logger deployment for a period of 15 minutes at the logger locations.

All acoustic instrumentation employed throughout the monitoring programme has been designed to comply with the requirements of AS IEC 61672.1-2004 *Electroacoustics - Sound level meters - Specifications* 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.

3.2 Unattended Noise Monitoring

Each noise logger was set to record statistical indices over 15-minute intervals including L_{Amax}, L_{A1}, L_{A10}, L_{A90} and L_{Aeq} noise levels.

Weather data for the survey period was obtained from the nearest Bureau of Meteorology (BoM) weather station located at Bankstown Airport, approximately 9 km north-east of the monitoring location. Unattended noise data corresponding with periods of rainfall and/or wind speeds in excess of 5 m/s (approximately 18km/h) were discarded in accordance with INP data exclusion methodology.

Results of the unattended noise monitoring program are provided in graphical format in **Appendix A**. A summary of noise levels measured during the unattended noise monitoring program is provided in **Table 2**.

Table 2 Summary of Existing Ambient Noise Levels – Glenfield

Location	Period	Background L _{A90} Noise Level	Measured L _{Aeq} (Period)	Estimated Existing Industrial Contribution L _{Aeq}
		Rating Background Level		
NM1 8 Goodenough Street, Glenfield	Day	42 dBA	51 dBA	37 dBA (GWS)
	Evening	42 dBA	49 dBA	< 39 dBA
	Night	36 dBA	48 dBA	< 34 dBA
NM2 3 Albion Crescent Glenfield	Day	39 dBA	52 dBA	< 49 dBA
	Evening	45 dBA	51 dBA	< 39 dBA
	Night	35 dBA	48 dBA	< 34 dBA

Note: Daytime 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 to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 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
All noise levels reported here are free-field measurements, meaning that no noise reflections occurred from building façades at the noise monitoring location.

3.3 Operator-Attended Noise Monitoring

The purpose of the operator-attended noise survey was to determine the character and duration of various noise sources to the total ambient noise level. The results of the operator-attended noise survey are provided in **Table 3**.

Table 3 Operator-attended Noise Survey Results – Glenfield

Location	Date/ Start time/ Weather	Primary Noise Descriptor (dBA re 20 µPa)					Description of Noise Emission, Typical Maximum Levels, LAmax (dBA)
		LAmax	LA1	LA10	LAeq	LA90	
NM1 8 Goodenough Street, Glenfield	1/05/2014 12:10 pm Wind: 0.5 E Temp: 20°C	65	58	50	47	40	Plane 50 to 62 Resident 48 to 53 Traffic 40 to 46 Local traffic 51 to 65 Birds 47 to 52 Train horn 41 GWS site 32 to 62 GWS contribution LAeq(15minute) - 37
NM2 3 Albion Crescent, Glenfield	1/05/2014 12:49 pm Wind: 0.5 E Temp: 20°C	57	52	46	43	38	Plane 42 to 51 Train 47 to 50 Train horn 49 to 56 Insects 41 Dog 54 GWS site not audible

Operator-attended noise survey results indicate that the main contributors to the ambient noise environment in the vicinity of the GWS site are road and rail traffic at both noise monitoring locations with current operations at the GWS site also contributing at Goodenough Street.

4 NOISE IMPACT ASSESSMENT PROCEDURES

4.1 NSW Industrial Noise Policy

Responsibility for the control of noise emission in New South Wales (NSW) is vested in Local Government and the Environment Protection Authority (EPA). The INP was released in January 2000 and provides a framework and process for deriving noise criteria for consents and licences that will enable the relevant authority to regulate premises that are scheduled under the Protection of the Environment Operations Act, 1997.

The specific policy objectives are:

- To establish noise criteria that would protect the community from excessive intrusive noise and preserve amenity for specific land uses.
- To use the criteria as the basis for deriving project specific noise levels.
- To promote uniform methods to estimate and measure noise impacts, including a procedure for evaluating meteorological effects.
- To outline a range of mitigation measures that could be used to minimise noise impacts.
- To provide a formal process to guide the determination of feasible and reasonable noise limits for consents or licences that reconcile noise impacts with the economic, social and environmental considerations of industrial development.
- To carry out functions relating to the prevention, minimisation and control of noise from premises scheduled under the Act.

The policy sets two separate noise criteria to meet environmental noise objectives; one to account for intrusive noise and the other to protect the amenity of particular land uses.

Assessing Intrusiveness

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

Assessing Amenity

The amenity assessment is based on noise criteria specific to land use and associated activities (**Table 4**). 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 (**Table 5**).

Table 4 Amenity Criteria Recommended LAeq Noise Levels from Industrial Noise Sources

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended LAeq(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 - internal	All	Noisiest 1 hour period	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: Monday - Saturday: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 7.00 am. Sundays, 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 LAeq index corresponds to the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

Table 5 Modification to Acceptable Noise Level (ANL)* to Account for Existing Levels of Industrial Noise

Total Existing LAeq Noise Level from Industrial Noise Sources	Maximum LAeq Noise Level for Noise from New Sources Alone, dBA
≥ Acceptable noise level plus 2 dBA	If existing noise level is <i>likely to decrease</i> in future acceptable noise level minus 10 dBA If existing noise level is <i>unlikely to decrease</i> 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 LAeq noise level for the specific receiver, area and time of day from **Table 4**

Section 2.2.4 of the NSW INP provides a coarse methodology for the determination of relevant noise criteria for a proposed industrial area, such as the subject site, and states the following:

Where several developments are proposed for an area, these are to be assessed as a group. This holistic approach allows project-specific noise levels to be set for a proposed industrial development, so that the total impact from all proposed and potential industrial developments does not cause (acoustic) amenity to deteriorate.

Application Notes prepared by the EPA (and approved in December 2010) to accompany the INP state the following:

The intrusive and amenity criteria outlined in Section 2 of the INP were established primarily to deal with individual development applications for industrial sites in the vicinity of existing sensitive receivers with stable background noise levels. In Section 2.2.4 the INP recognises that for multiple developments, such as a new industrial area, a strategic approach can be implemented to ensure the amenity objectives are not compromised and an equitable share of the remaining available allocation of amenity-related noise for each industrial development is achieved.

For the purpose of this noise assessment the amenity noise criteria has been adopted to assess potential noise impacts for the proposed medium to long-term land use where multiple developments are proposed. The intrusive and sleep disturbance impacts of proposed developments for the medium to long-term land use would need to be assessed when more information is known about the developments that will occupy the site.

5 OPERATIONAL NOISE CRITERIA

Residences surrounding the development have been classified for the purposes of this noise assessment as 'suburban'. The 'suburban' classification is not determined in relation to the planning zone of these residences but is an acoustical classification. The ambient noise at these locations is influenced by road traffic noise and (to a lesser extent) noise from existing industrial facilities.

The operational amenity noise criteria contained in **Table 6** have been determined based on measured noise levels (provided in **Table 2**) and with reference to the INP.

Table 6 Project Specific Noise Criteria

Location	Indicative Noise Amenity Area	Period	Amenity Criteria LAeq(Period)
Nearest residences	Suburban	Day	55
		Evening	45
		Night	40

Note: Daytime 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 to 6.00 pm; Evening 6.00 pm to 10.00 pm; Night-time 10.00 pm to 8.00 am.

6 EFFECTS OF METEOROLOGY ON NOISE LEVELS

6.1 Wind

Wind has the potential to increase noise levels 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 (April 2013 to April 2014), from the BoM weather station located at Bankstown Airport, approximately 9 km north-east of the subject site. This data was analysed to determine the frequency of occurrence of winds up to speeds of 3 m/s for day, evening and night in each season.

A summary of the most frequently occurring winds for each period is contained within **Table 7**, **Table 8** and **Table 9**.

Table 7 Seasonal Frequency of Occurrence of 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	2.2%	NNW±45°	3.7%	3.9%	7.6%
Autumn	5.3%	WNW±45°	11.2%	5.5%	16.7%
Winter	5.3%	WNW±45°	12.0%	6.6%	18.5%
Spring	1.9%	WNW±45°	6.2%	5.5%	11.7%

Table 8 Seasonal Frequency of Occurrence of Wind Speed Intervals - Evening

Period	Calm	Wind Direction	0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	1.5%	NE±45°	5.8%	4.9%	10.7%
Autumn	20.3%	NNE±45°	10.1%	3.8%	13.9%
Winter	30.0%	W±45°	10.5%	5.0%	15.5%
Spring	8.3%	NE±45°	8.9%	4.1%	13.0%

Table 9 Seasonal Frequency of Occurrence of Wind Speed Intervals - Night

Period	Calm	Wind Direction	0.5 to 2 m/s	2 to 3 m/s	0.5 to 3 m/s
Summer	30.4%	NE \pm 45°	11.3%	4.0%	15.2%
Autumn	39.8%	WSW \pm 45°	16.7%	5.3%	22.1%
Winter	34.4%	WNW \pm 45°	16.5%	4.2%	20.7%
Spring	39.3%	SW \pm 45°	10.4%	4.6%	15.0%

Seasonal wind records indicate that prevailing winds are not a feature of the area since the frequency of occurrence of winds up to 3 m/s is below the 30% threshold for all seasons. Hence, prevailing winds have not been considered as part of this noise assessment.

6.2 Temperature Inversions

Temperature inversions, when they occur, have the ability to increase noise levels by focusing sound waves. Temperature inversions generally occur during the night-time and early morning periods 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.

Meteorological data regarding the occurrence of temperature inversions was not available for the area. Therefore, it has been assumed that temperature inversions are a feature of the area and have been considered during the night-time period. The default INP value of 3°C/100 m has been adopted for this assessment.

7 NOISE MODELLING

7.1 Noise Modelling Methodology and Assumptions

A computer model was used to predict noise emissions from the proposed development. Noise modelling was undertaken using SoundPLAN v7.3 software, developed by Braunstein and Berndt GmbH in Germany. A three-dimensional digital terrain map giving all relevant topographic information was used in the modelling process. The model used this map, together with noise source data, ground cover and atmospheric information to predict noise levels at the nearest potentially affected receivers.

Topographic contours and drawings of the proposed site were supplied by EPS and utilised for the purpose of modelling noise from the proposed development.

SLR has examined numerous industrial developments and developed a range of representative sound power levels for different scales of industrial operations. The proposed land use strategy is for typically “low noise” industrial use with a focus on warehousing and logistics. Notwithstanding this to provide a conservative assessment approach a number of “medium noise” premises have also been considered at the site. A description of the development type and the representative sound power level (SWL) used in the computer noise model for each site are provided in **Table 10**.

Table 10 Representative Noise Sources

Noise Source	Description	Sound Power Level
"Low noise" industrial premise (24 premises)	E.g. warehousing, logistics, industrial / commercial retailer, restaurant / take-away store.	105 dBA per premise
"Medium noise" industrial premise (2 premises)	E.g. building supplies manufacturer, automotive manufacturer, metal fabrication, livestock processing industries.	116 dBA per premise

The following assumptions have been made for the purpose of modelling noise from the subject site:

- The existing earth bund and fence located immediately north of Cambridge Avenue will remain in place. No other specific noise mitigation measures have been included.
- No hypothetical future buildings or structures have been incorporated across the site.
- The proposed industrial sites are distributed evenly across the subject site. The areas south of Cambridge Avenue and north of the East Hills Railway line have been assumed to be open space and not occupied by industrial uses.
- Modelled noise sources have been assumed not to contain characteristics such as tonality, impulsiveness, intermittency, irregularity or dominant low frequency content. Based on previous experience, these modifying factors do not typically apply to most sources that operate within low and medium noise generating industrial developments.
- During the daytime period the site is 100% utilised, during the evening period the site is 40% utilised and during the night-time the site is 5% utilised.

Prediction of noise under calm and prevailing atmospheric conditions (temperature inversion) was conducted. Meteorological parameters provided in **Table 11** were utilised in the noise model.

Table 11 Meteorological Conditions for Noise Predictions

Scenario	Temperature	Humidity	Wind Speed	Wind Direction	Temperature Gradient
Calm (day/evening)	20°C	65%	n/a	n/a	n/a
Temperature Inversion (night only)	10°C	90%	n/a	n/a	3°C/100m

The potential for the simultaneous operation of proposed developments can be assessed on a worst case scenario basis by adding the predicted noise levels from the proposed operations together. The cumulative level is then adjusted (by -3 dBA) to the equivalent amenity level for comparison with the relevant amenity criteria for each location. It should be noted that, for each of the developments assessed, the likelihood of the proposed future developments emitting simultaneous maximum noise emissions is remote due to the range of development locations and differences in the noise enhancing weather effects. This cumulative assessment is therefore considered to be conservative.

7.2 Noise Modelling Results and Discussion

Predicted $L_{Aeq(period)}$ noise levels at neighbouring noise-sensitive locations representative of potential noise levels likely to be experienced once developments are in use at the GWS site are provided in **Table 12**.

Table 12 Predicted LAeq (period) Noise Emission Levels and Relevant Goals (dBA)

Receiver	Period	Calm	Temperature Inversion	Amenity Criteria
Slessor Road, Casula	Day	44	-	55
	Evening	40	-	45
	Night	31	35	40
Glory Road (north), Glenfield	Day	49	-	55
	Evening	45	-	45
	Night	36	39	40
Glory Road (south), Glenfield	Day	47	-	55
	Evening	43	-	45
	Night	34	38	40
Minstrel Street, Glenfield	Day	47	-	55
	Evening	43	-	45
	Night	34	37	40
Canterbury Road, Glenfield	Day	47	-	55
	Evening	43	-	45
	Night	34	38	40
Fergusson Street (west), Glenfield	Day	46	-	55
	Evening	42	-	45
	Night	33	37	40
Fergusson Street (central), Glenfield	Day	48	-	55
	Evening	43	-	45
	Night	34	37	40
Fergusson Street (east), Glenfield	Day	49	-	55
	Evening	45	-	45
	Night	36	40	40
Goodenough Street (west), Glenfield	Day	49	-	55
	Evening	45	-	45
	Night	36	40	40
Goodenough Street (central), Glenfield	Day	48	-	55
	Evening	44	-	45
	Night	35	39	40
Goodenough Street (east), Glenfield	Day	49	-	55
	Evening	45	-	45
	Night	35	39	40

Predicted noise emission levels (shown in **Table 12**) for a hypothetical industrial estate are predicted to comply with the relevant noise goals during day, evening and night-time periods at all existing residential locations considered under calm and prevailing weather conditions.

It should be noted that the predicted noise levels are conservative; it is possible that considerable screening of acoustically significant activities would be provided by buildings once the site is developed. Furthermore, no specific noise mitigation measures, besides the existing mound and fence, have been included in the noise model. It is possible that actual noise levels would be less than those stated here.

Predicted noise levels could be greatly reduced from judicious planning with potentially noisier developments located further from residential receptors as well as the use of equipment incorporating 'quiet' engineering design, the addition of acoustically designed enclosures, noise barriers or using management techniques. Further discussion in this regard is provided in the following section.

8 NOISE MITIGATION AND MANAGEMENT

The aim of the following discussion regarding noise mitigation and management recommendations is to demonstrate that it will be possible to operate the GWS site as an industrial estate whilst achieving relevant noise objectives. It is likely that a combination of the recommended techniques would be effective at enabling noise emission levels to remain below the relevant noise amenity goals at the subject site.

8.1 Industrial Estate Noise Management

In order to ensure that future potential industrial developments do not cause the amenity level to deteriorate and to minimise 'background creep' the project specific noise level for each individual site should be set so that the total impact from all proposed and potential industrial developments do not exceed the INP Acceptable amenity noise level at the nearest residential receiver. The adoption of this approach also provides an equitable distribution of the burden of meeting the noise criteria between all future potential industrial developments at the site.

The preliminary site layout indicates the potential for six (6) lots where future industrial sites would be developed. The proposed project specific amenity noise criteria for each proposed lot at any potentially affected residential receptor is provided in **Table 13**.

Table 13 Project Specific Noise Criteria

Industrial Noise Source	Amenity Criteria LAeq(period)		
	Day	Evening	Night
Lot 1	47 dBA	37 dBA	32 dBA
Lot 2	47 dBA	37 dBA	32 dBA
Lot 3	47 dBA	37 dBA	32 dBA
Lot 4	47 dBA	37 dBA	32 dBA
Lot 5	47 dBA	37 dBA	32 dBA
Lot 6	47 dBA	37 dBA	32 dBA
Total GWS Site	55 dBA	45 dBA	40 dBA

Where multiple industrial premises are proposed for each lot (as has been assumed in **Section 7**) project specific noise criteria should be set on an individual basis to ensure noise from each lot does not exceed the levels provided in **Table 13**. It should be stressed that the project specific noise criteria detailed in **Table 13** is highly dependent on the number of proposed lots and as such should be considered as indicative only at this preliminary stage.

8.2 Site Specific Noise Mitigation and Management

Selecting an appropriate strategy for the proposed development involves the following steps:

- Determining the noise reduction required to achieve the project-specific noise levels.
- Identifying the specific characteristics of the industry and the site that would indicate a preference for specified measures.

- Examining the mitigation strategy chosen by similar industries on similar sites with similar requirements for noise reduction; and considering that strategy's appropriateness for the subject development.
- Considering the range of noise-control measures available.
- Considering community preferences for particular strategies. This is especially important when the community has particular sensitivities to noise.

It is envisaged that these steps would be considered in greater detail during the development application stage for individual sites within the GWS site when more knowledge is available with regard to the specific types of industry proposed.

The intrusive and sleep disturbance impacts of proposed developments would need to be addressed during the development application process. Furthermore, consideration would also need to be given to the presence of sources that should attract modifying factor corrections as described in the INP.

Essentially, there are three (3) main mitigation strategies for noise control:

1 Controlling noise at the source.

There are two approaches:

- Best Management Practice (BMP): the adoption of particular operational procedures that minimise noise while retaining productive efficiency.
- Best Available Technology Economically Achievable (BATEA): equipment, plant and machinery that produce noise incorporate the most advanced and affordable technology to minimise noise output.

2 Controlling the transmission of noise.

There are two approaches: the use of barriers and land-use controls, which attenuate noise by increasing the distance between source and receiver.

3 Controlling noise at the receiver.

There are two approaches:

- Negotiating an agreement with the landholder.
- Acoustic treatment of dwellings to control noise.

It is envisaged that a combination of the first two mitigation strategies (controlling noise at the source and controlling transmission of noise) will be best suited to industrial activities within the GWS site.

Section 7.7 of the INP describes generic noise control measures applicable to industrial sites. These are contained in **Table 14** together with practical suggestions regarding how these could be applied to effectively minimise noise impacts from the GWS site.

Table 14 Generic Noise Control Measures – Recommendations applicable to GWS

Generic Noise Mitigation Measures (INP Section 7.7)	Applicability to GWS site
Noise source controls	
Enclosing the source – the design of the enclosure and materials used to absorb sound will affect the attenuation achieved.	Operate equipment within buildings or other enclosures. A noise level reduction of approximately 10 dBA is typically assumed for enclosing a noise source.
Silencing exhausts – muffler design and noise barrier systems.	Adjust reversing alarms on heavy equipment to make them 'smarter', by limiting acoustic range to the immediate danger area. Use equipment with efficient muffler design. Use quieter engines, such as electric instead of internal combustion. Dampen or line metal trays or bins.
Times of operation.	Restrict night-time movement of vehicles on-site where practical. Schedule the use of noisy equipment at the least sensitive time of day. This may involve consultation with the nearest noise-sensitive receivers. Where there are several noisy pieces of equipment, schedule operations so they are used separately rather than concurrently.
Controls along the sound transmission path	
Noise barriers – more effective if near source or receiver; effectiveness also controlled by materials used (reflective or absorptive) and by height.	Noise barriers localised to individual proposed lots in GWS site or in the southern 'open space' area.
Mounds, bunds and trenches.	Barriers can take a number of forms including free-standing walls, grass or earth mounds or bunds, and trenches or cuttings within which noise sources are sited. They could be located on the boundary of the GWS site or on individual industrial sites.
Site design to maximise the distance from the critical noise source to the receiver, and with intervening buildings to act as barriers.	Siting noisy equipment behind structures that act as barriers, or at the greatest distance from the noise-sensitive area Orienting noisy equipment so that noise emissions are directed away from any sensitive areas, to achieve the maximum attenuation of noise. Employing 'quiet' practices when operating equipment -for example, positioning idling trucks in appropriate areas. For industrial buildings near the boundary limit the number of openings (doors, windows, etc) that face toward noise-sensitive receivers.

9 CONCLUSION

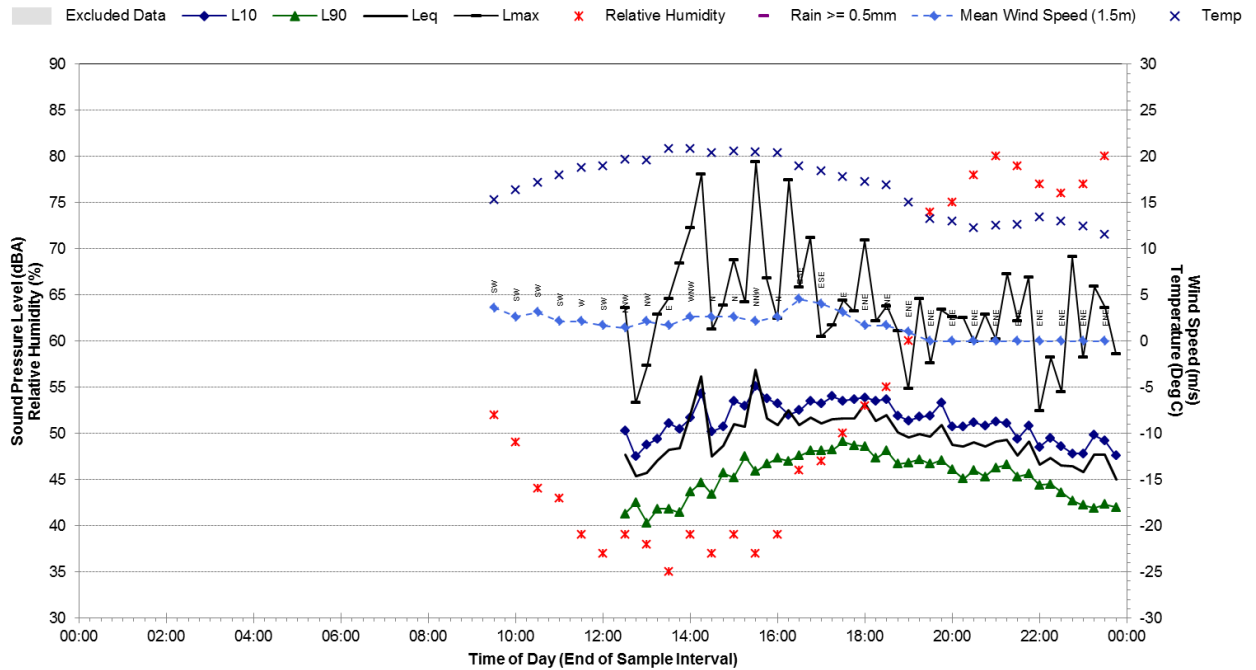
SLR has undertaken a noise assessment relating to the proposed rezoning of the southern parcel of Glenfield Waste Site (GWS) located at Cambridge Avenue, Glenfield.

Noise emission predictions were conducted based on the proposed land usage with a focus on “low noise” premises such as warehousing and logistics, however to provide a conservative assessment approach a number of “medium noise” premises have also been considered at the site. Noise modelling results indicate that relevant noise amenity criteria could be achieved at all surrounding existing residences. Recommendations have also been provided with regard to generic noise mitigation measures that could be implemented at the subject site.

It has been demonstrated that it will be possible to operate the GWS site as an industrial estate whilst achieving relevant noise objectives.

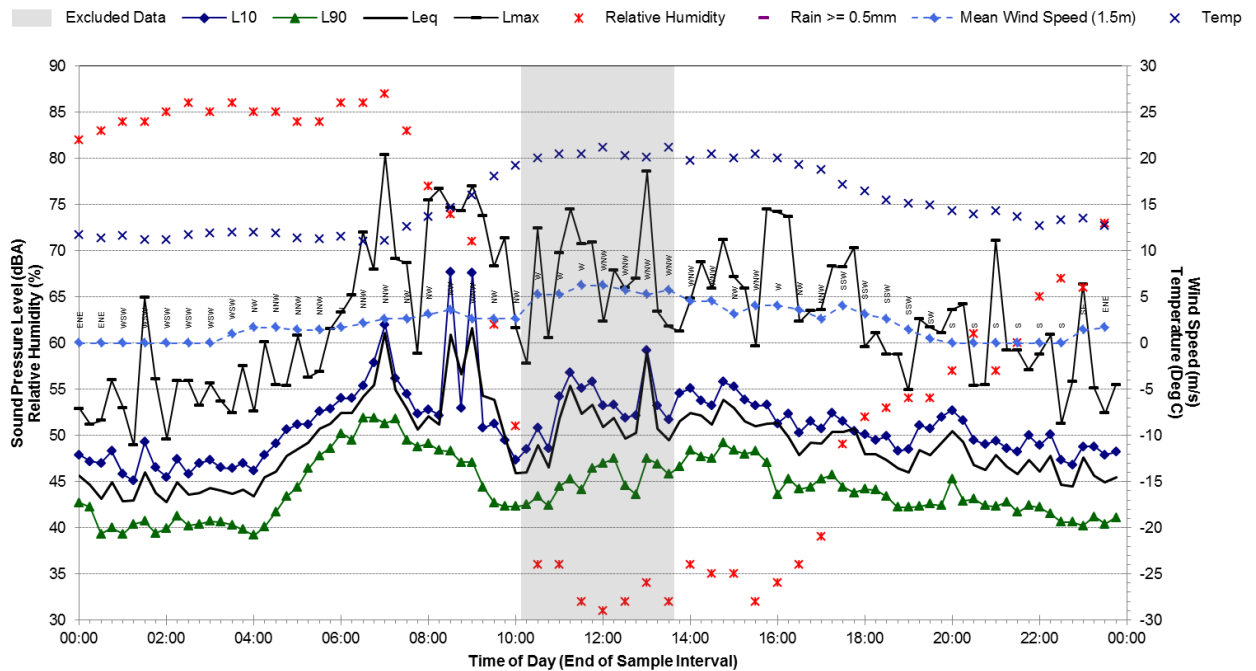
Statistical Ambient Noise Levels

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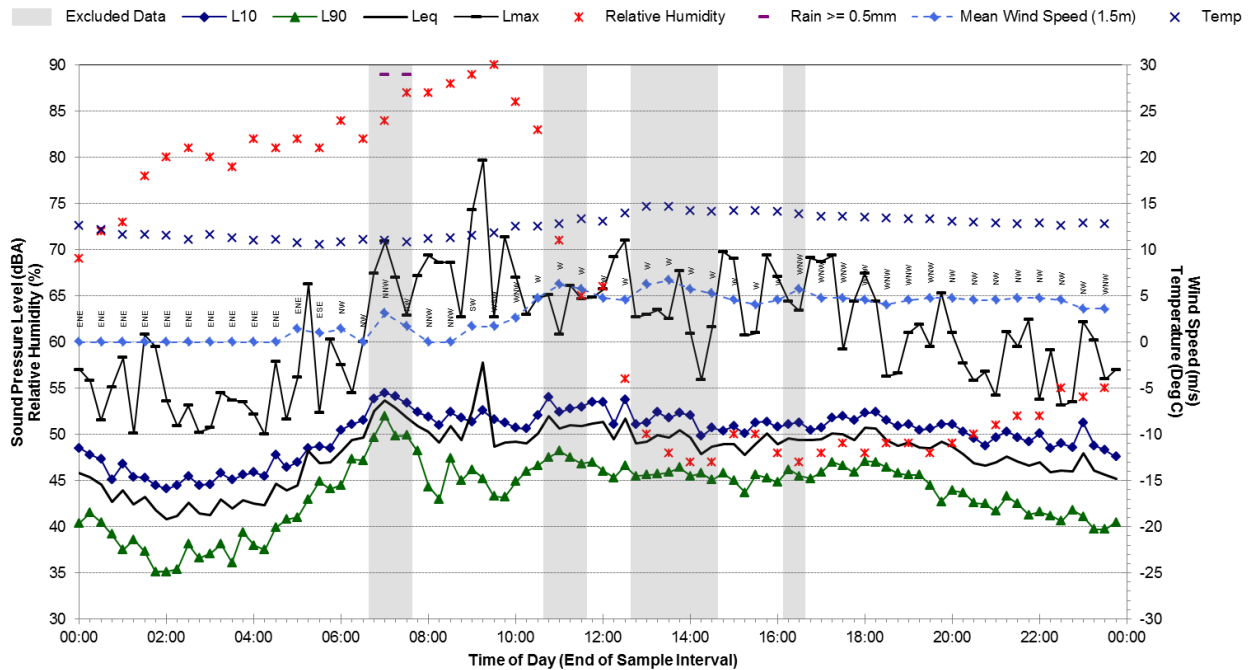


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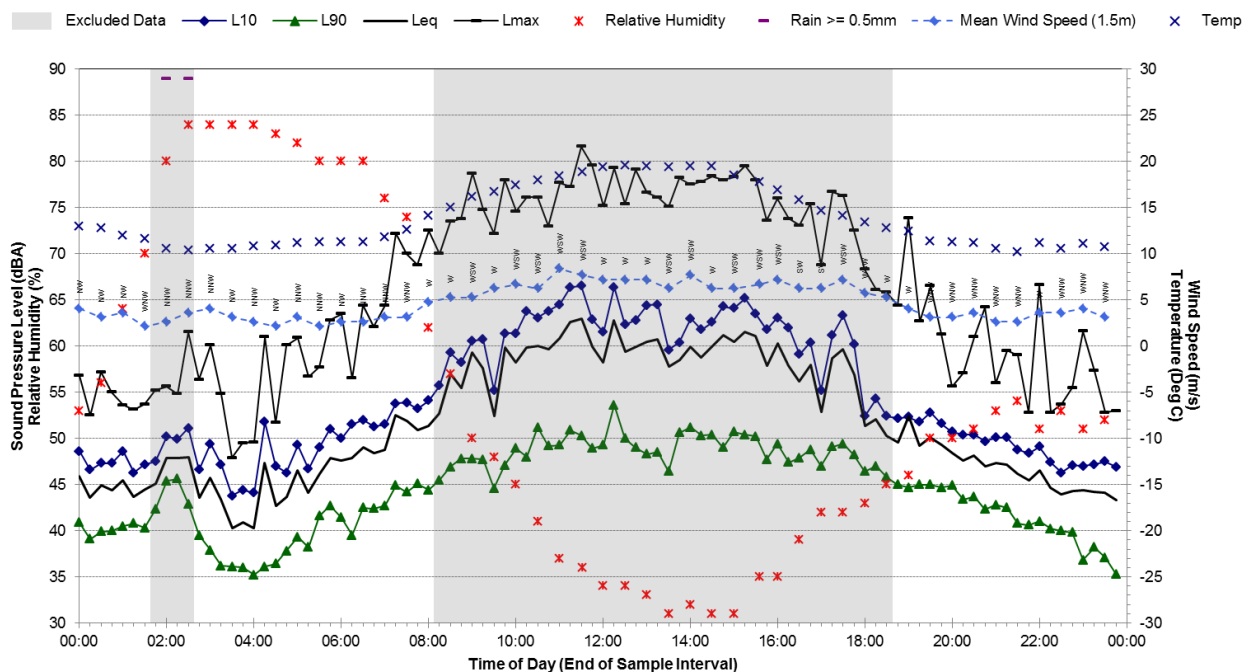
8 Goodenough Street, Glenfield - Friday, 2 May 2014



Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Saturday, 3 May 2014

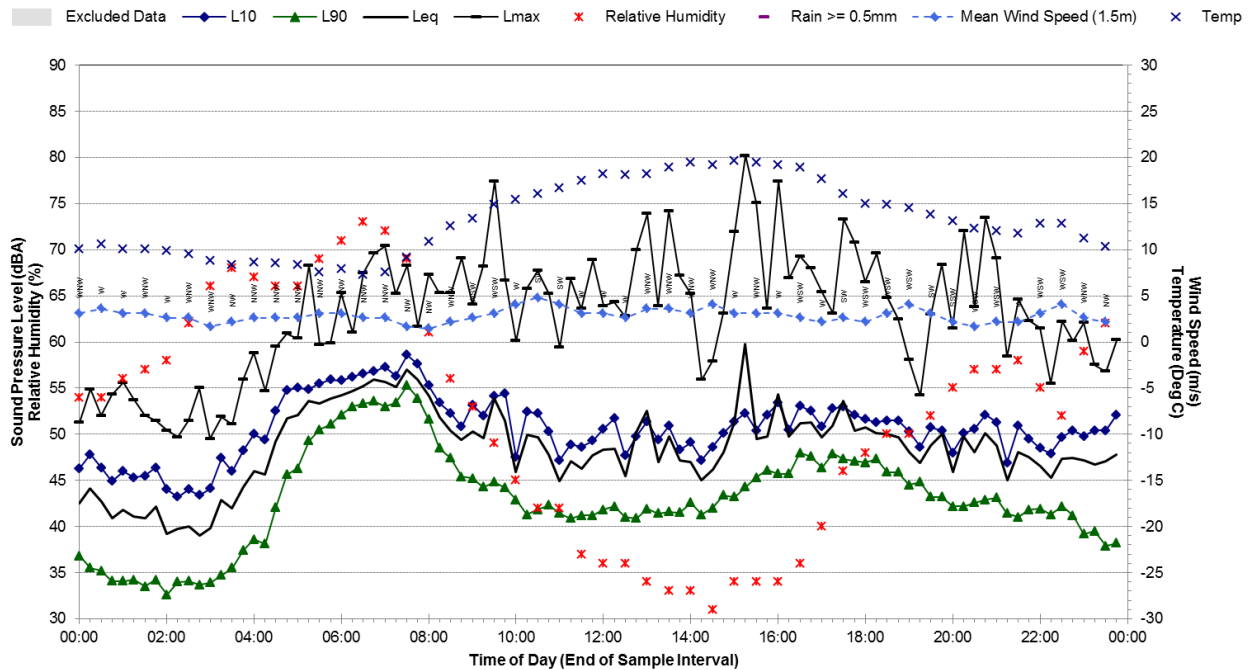


Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Sunday, 4 May 2014



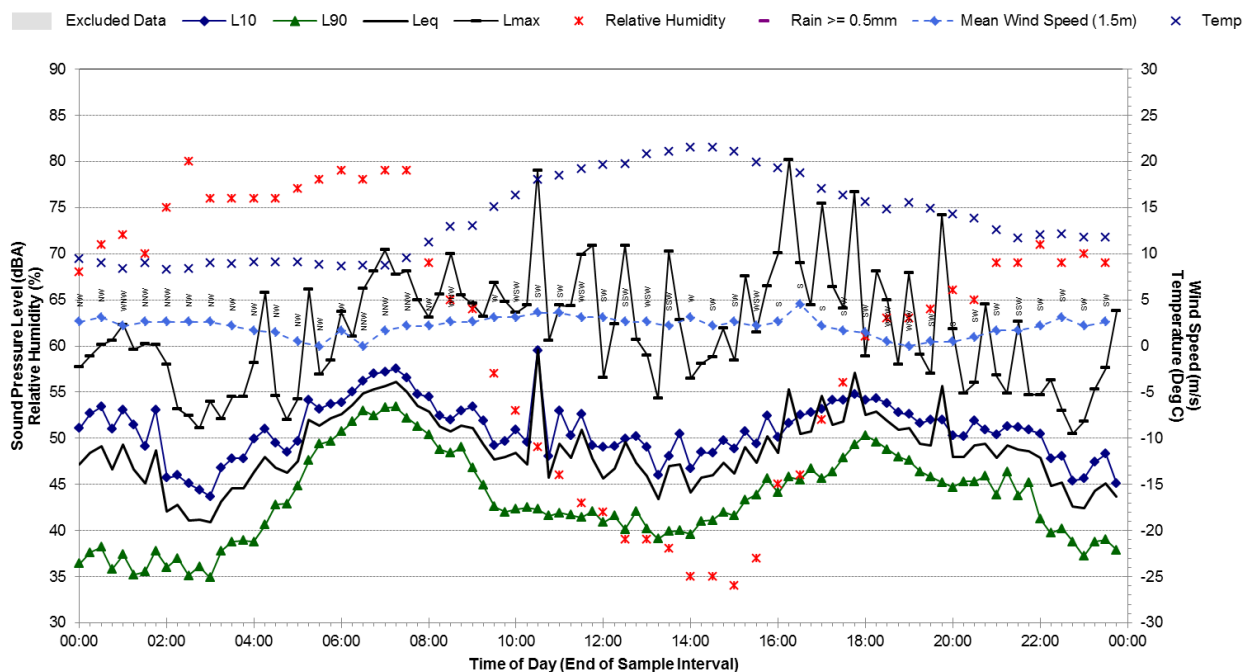
Statistical Ambient Noise Levels

8 Goodenough Street, Glenfield - Monday, 5 May 2014



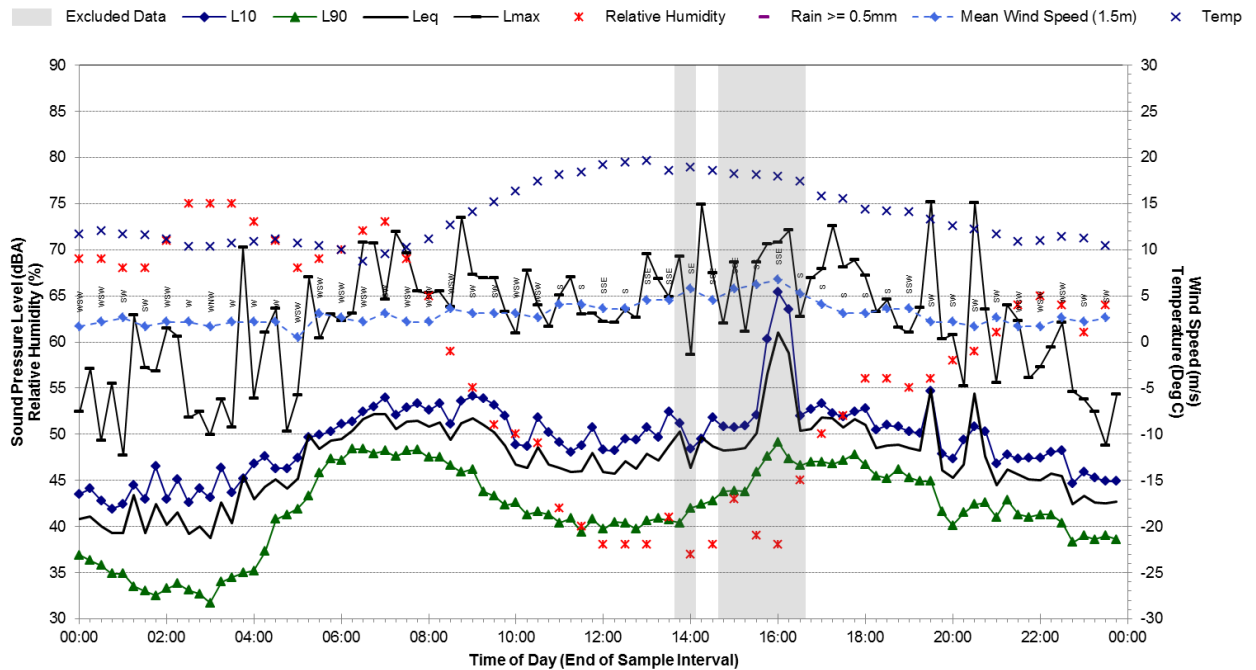
Statistical Ambient Noise Levels

8 Goodenough Street, Glenfield - Tuesday, 6 May 2014



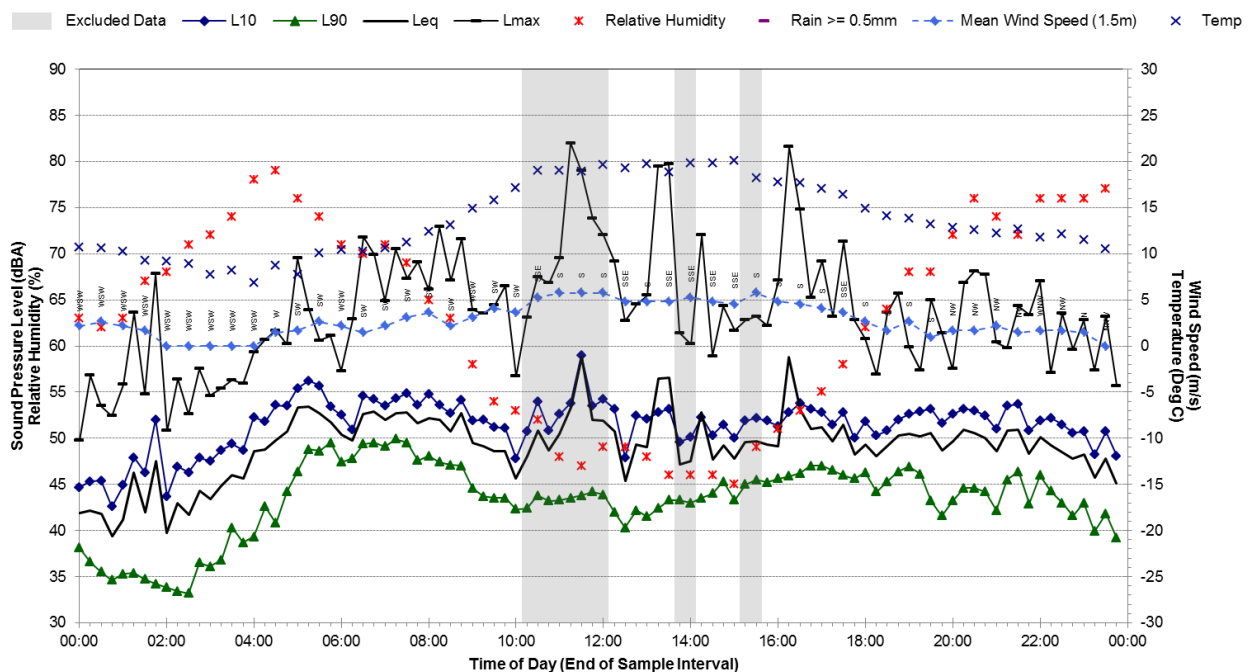
Statistical Ambient Noise Levels

8 Goodenough Street, Glenfield - Wednesday, 7 May 2014

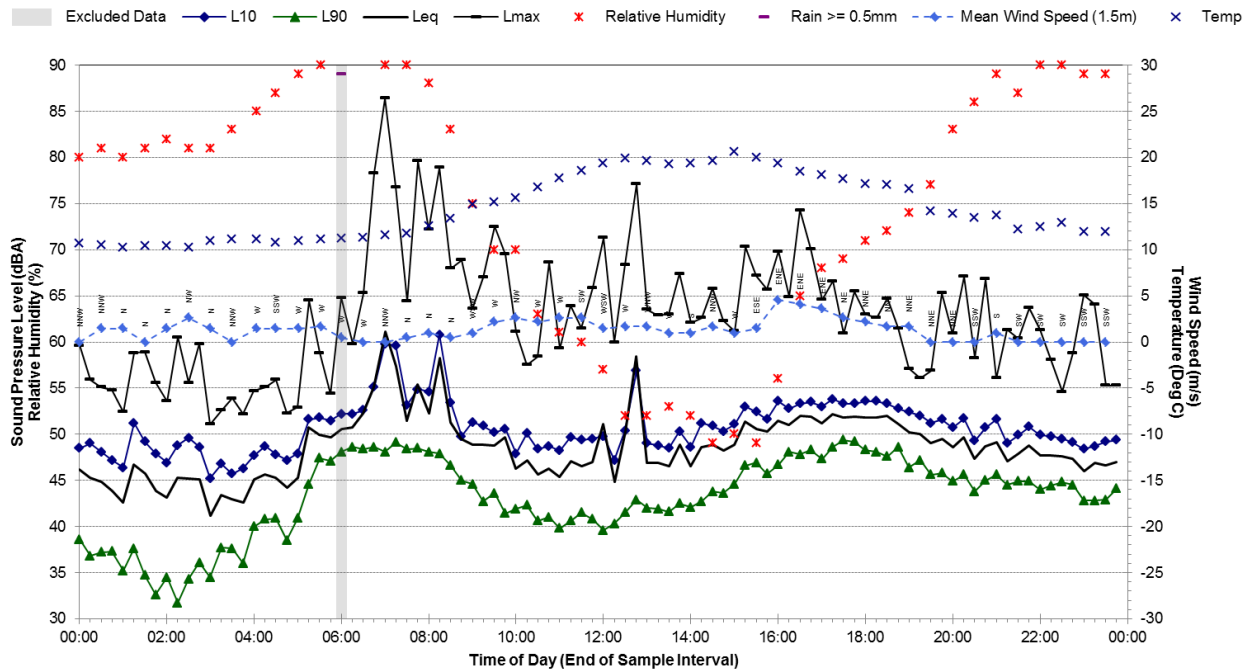


Statistical Ambient Noise Levels

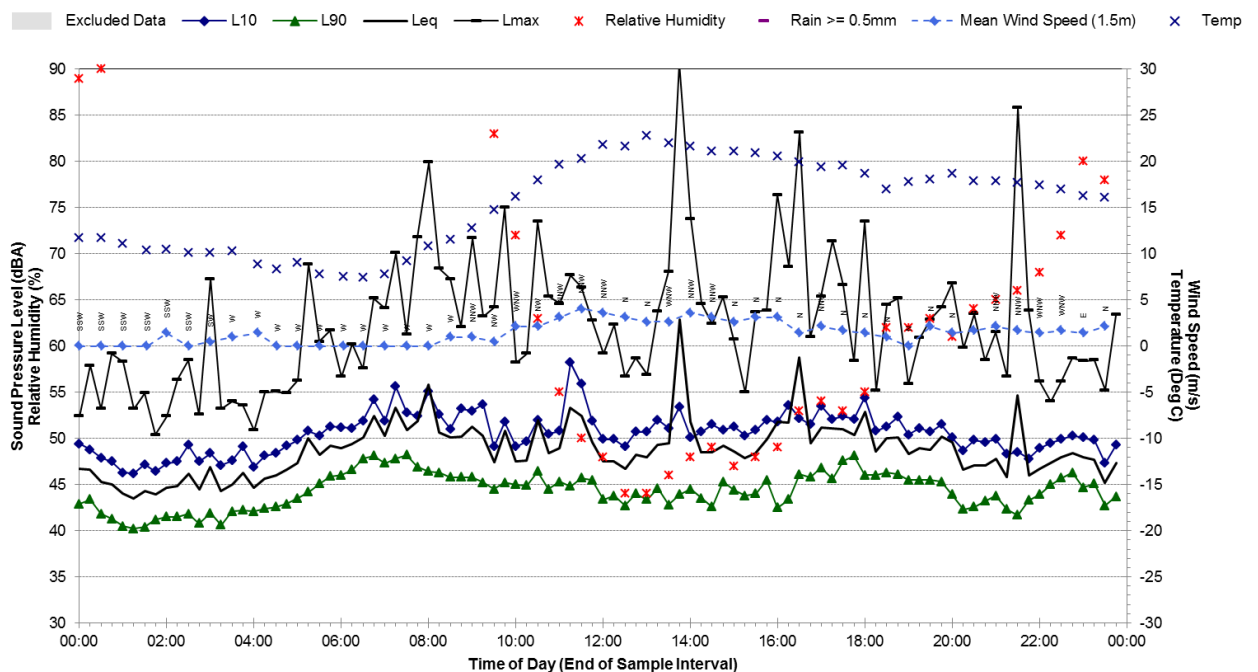
8 Goodenough Street, Glenfield - Thursday, 8 May 2014



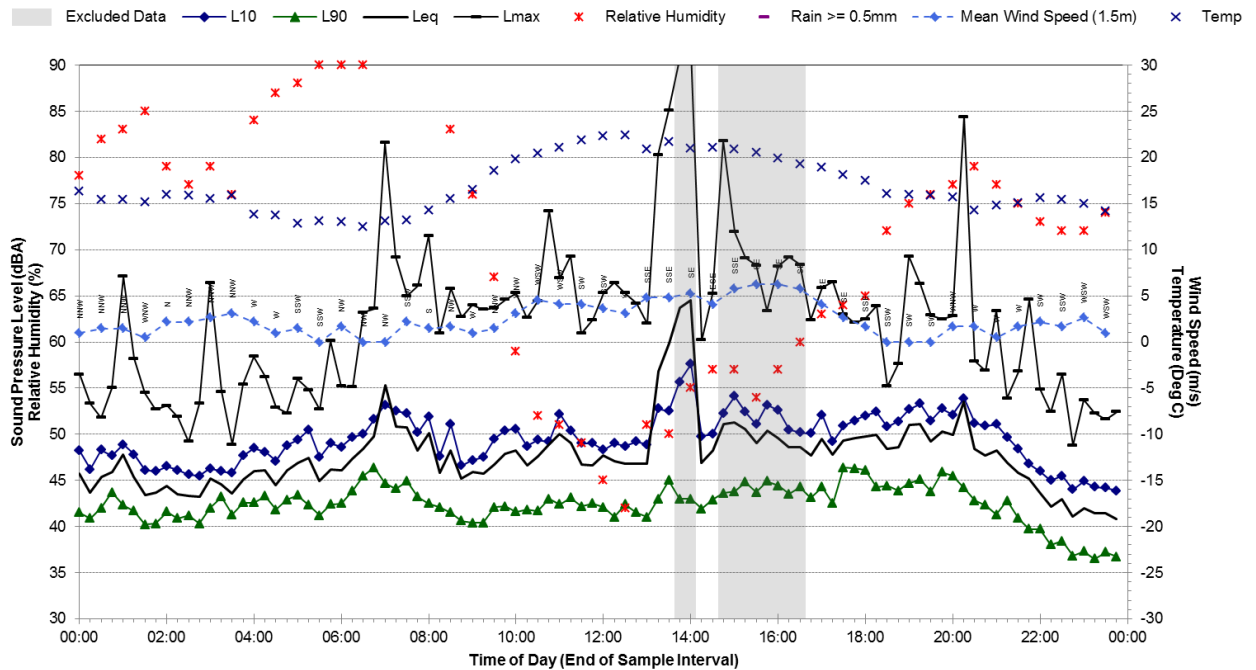
Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Friday, 9 May 2014



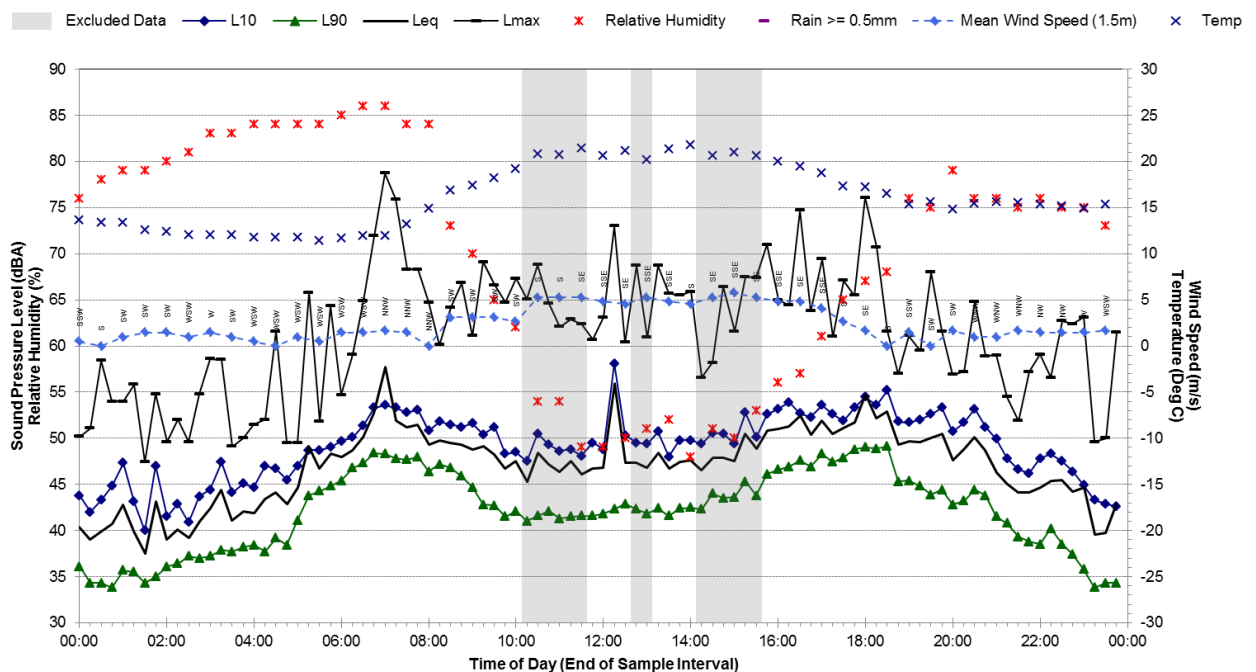
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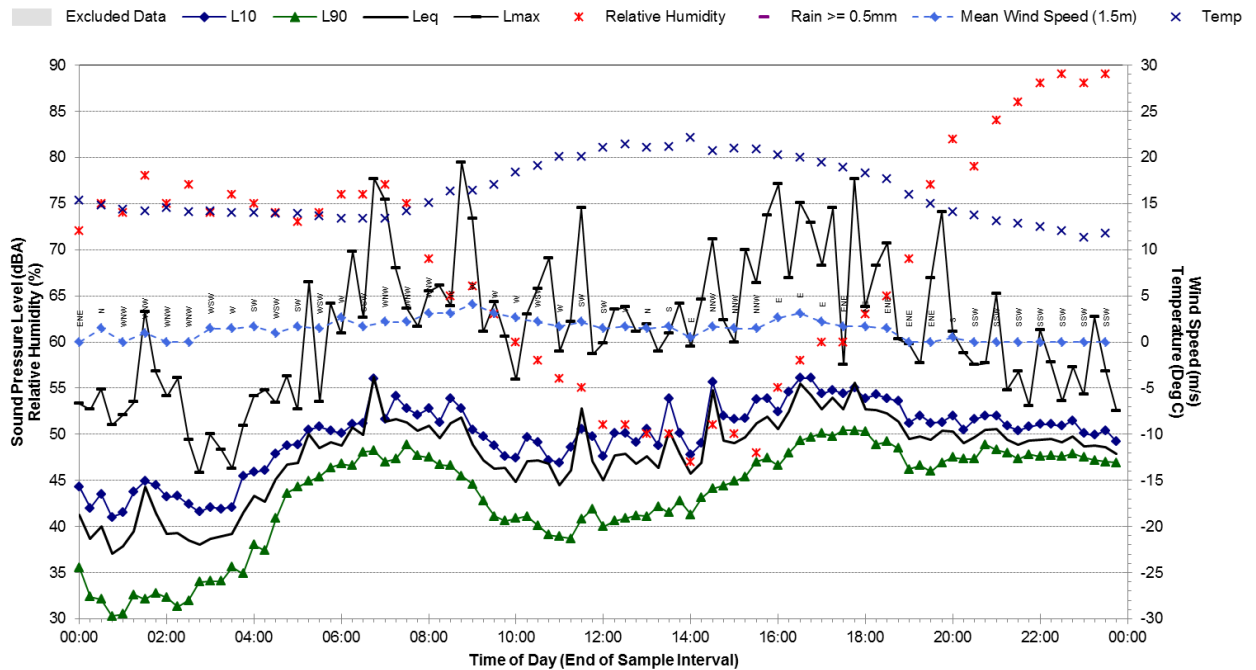


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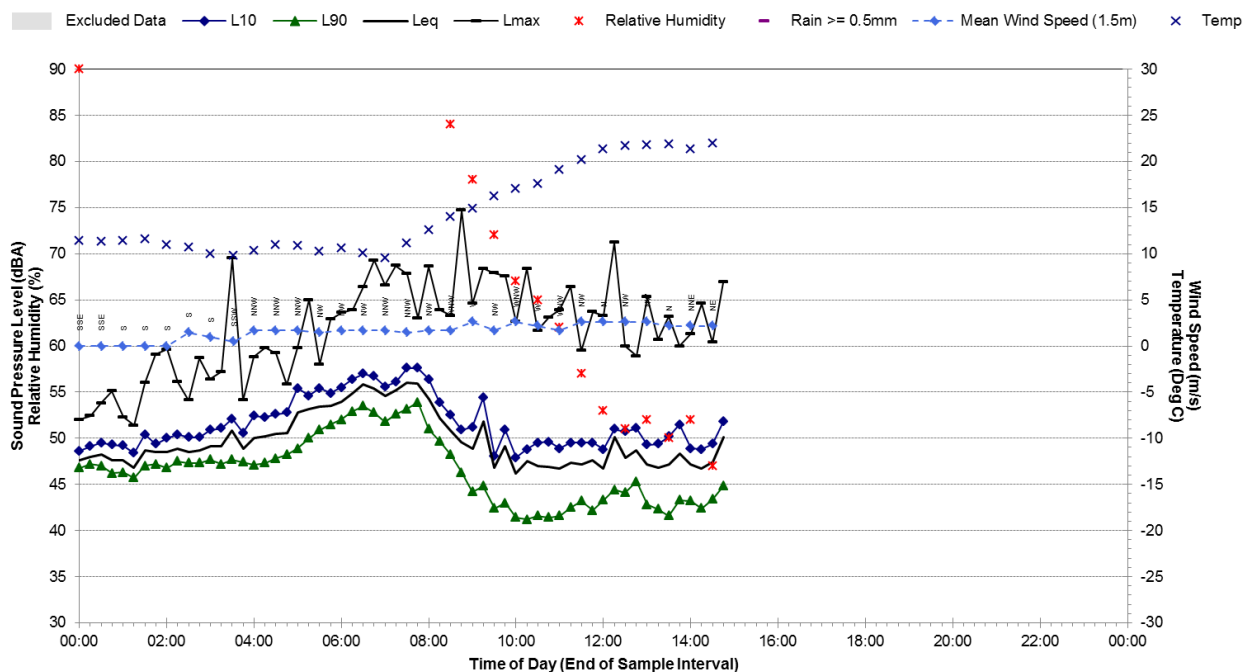
Statistical Ambient Noise Levels

8 Goodenough Street, Glenfield - Tuesday, 13 May 2014

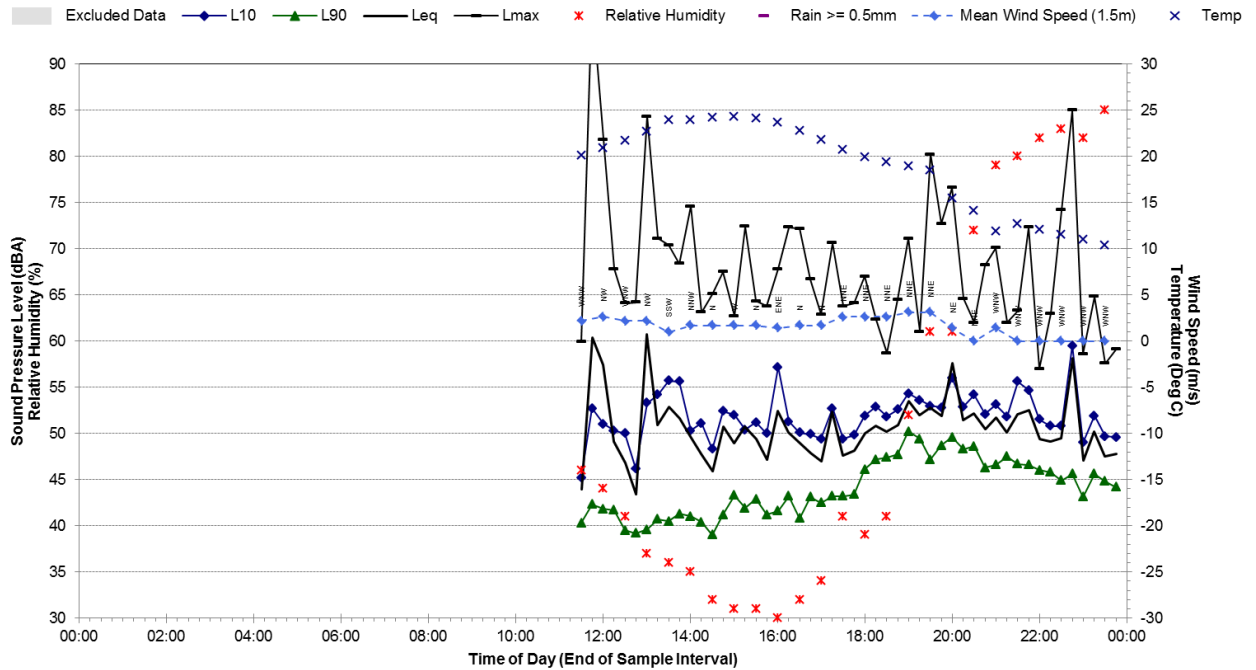


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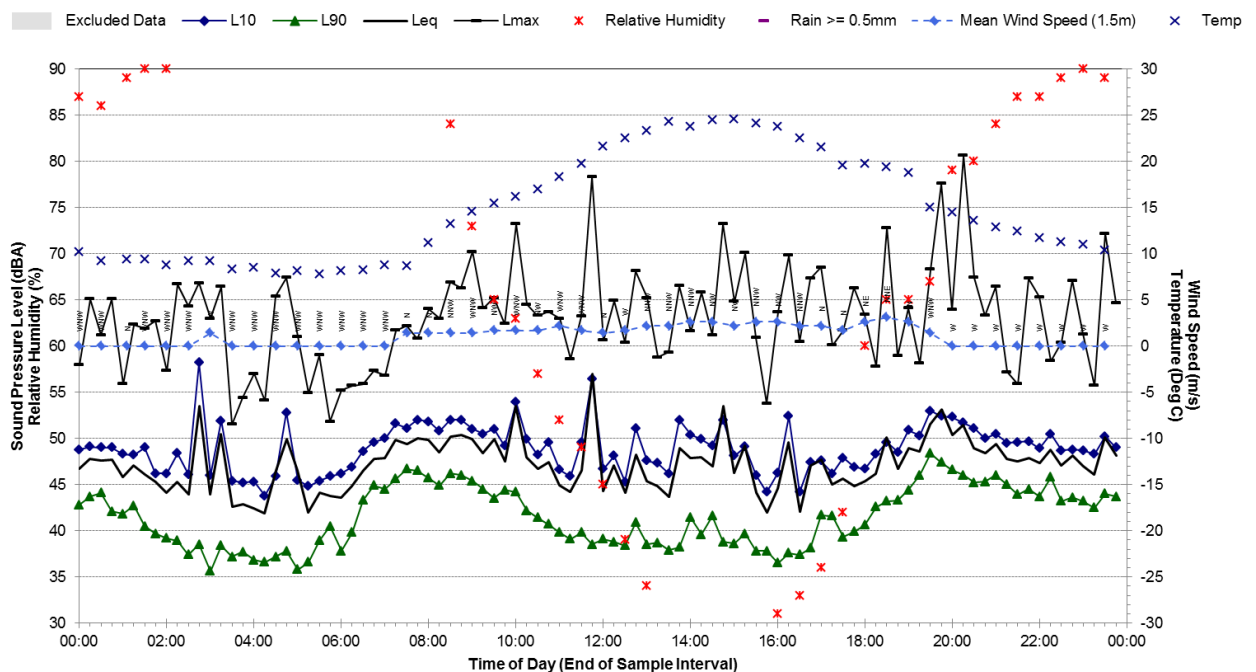
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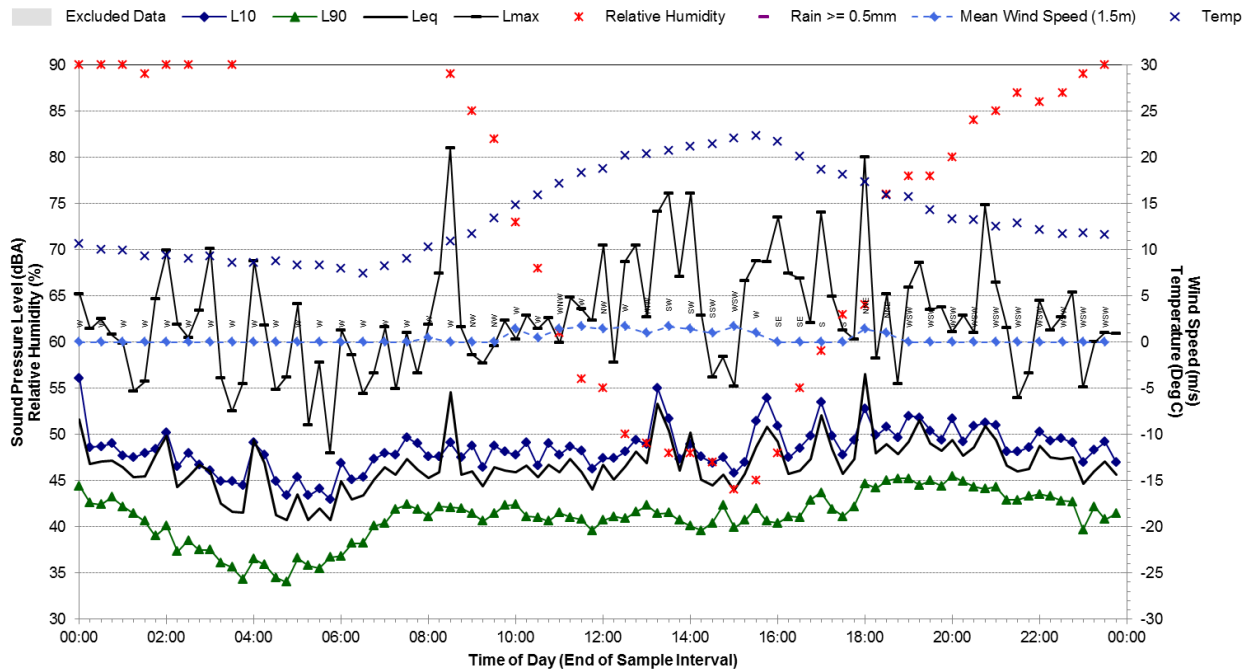
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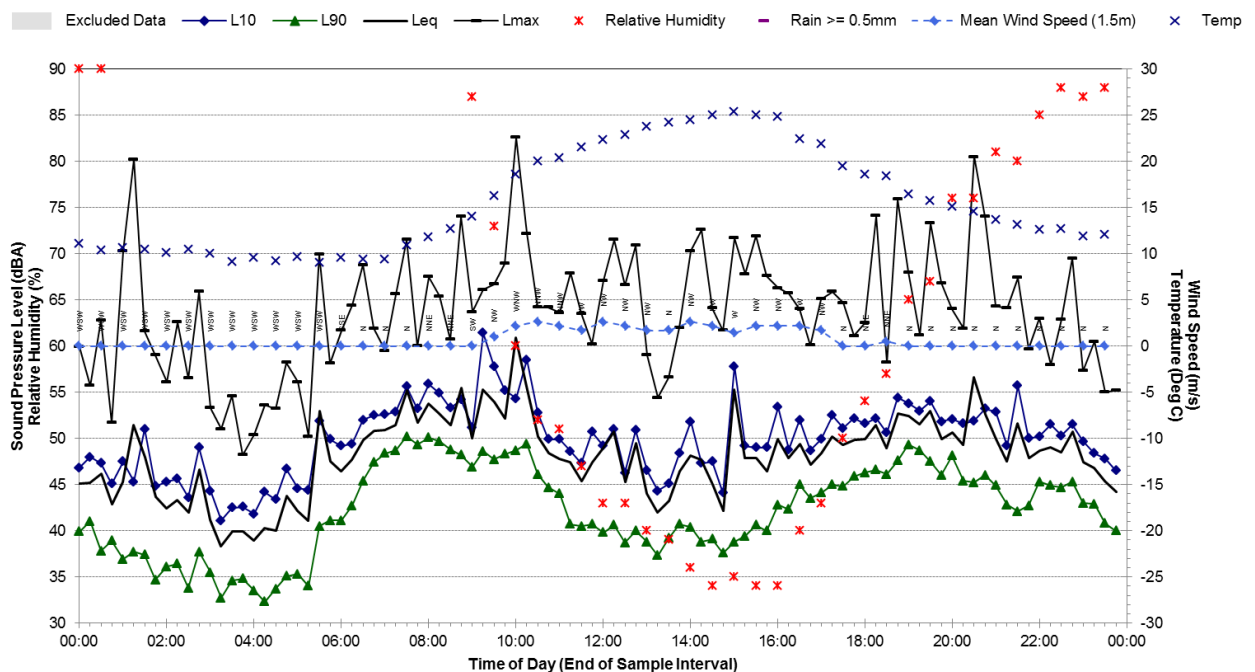
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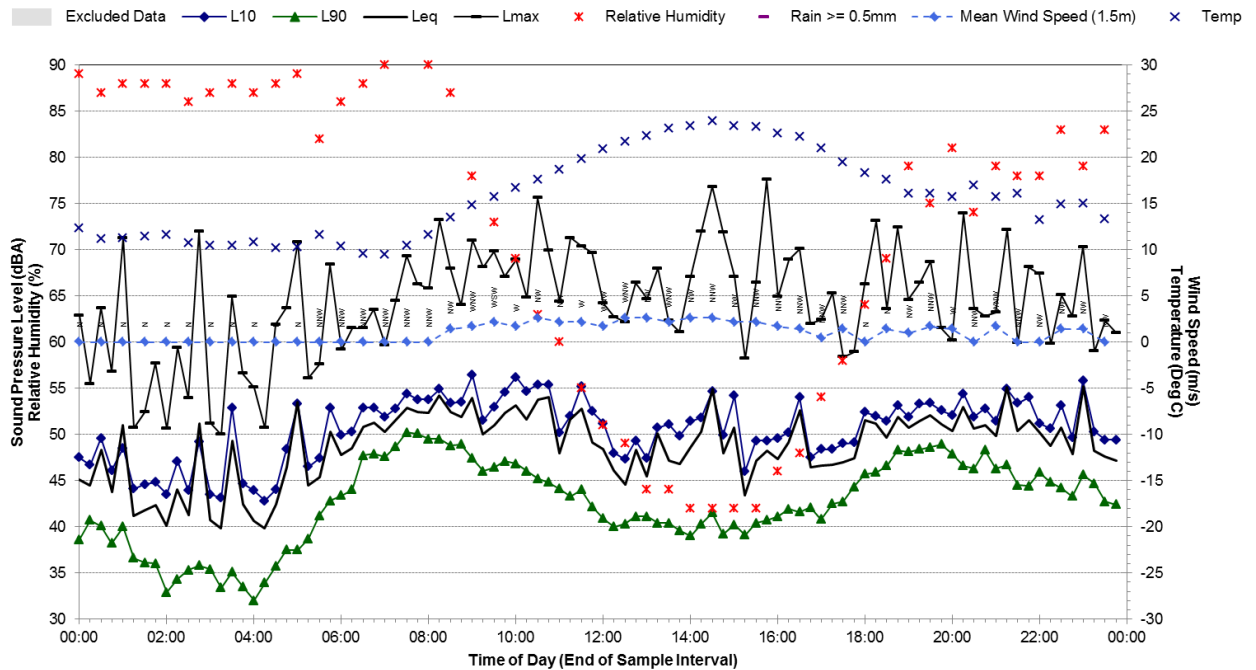
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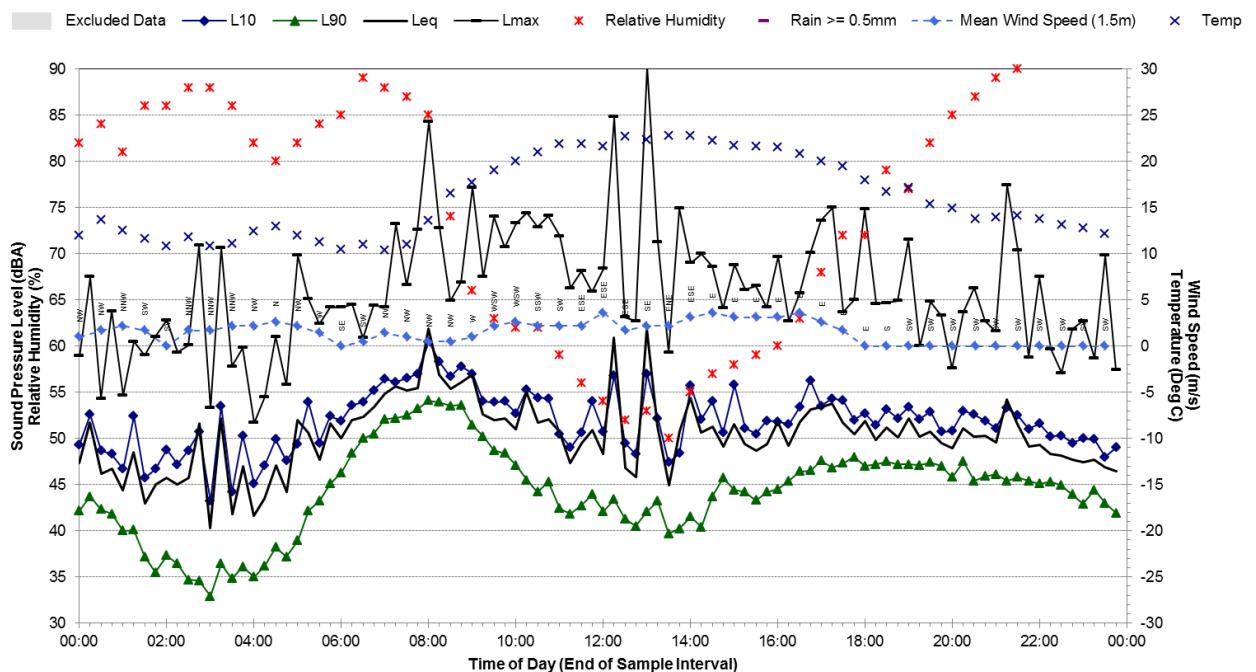
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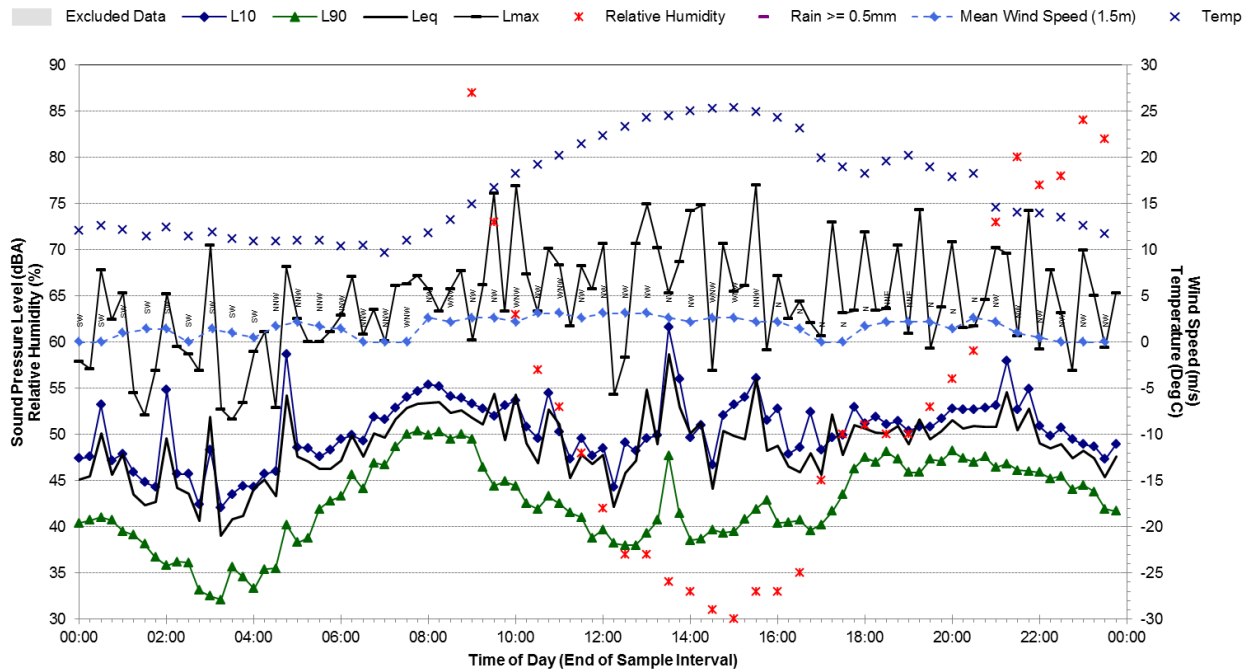
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Statistical Ambient Noise Levels 3 Albion Cres, Glenfield - Wednesday, 21 May 2014



Statistical Ambient Noise Levels 3 Albion Cres, Glenfield - Thursday, 22 May 2014



Statistical Ambient Noise Levels 3 Albion Cres, Glenfield - Friday, 23 May 2014

