

NOISE ASSESSMENT

Recycling Facility Glenfield

Prepared for:

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20 Bond Street Sydney
NSW 2000

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BASIS OF REPORT

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1 Introduction

Text Introduction Style for introduction paragraph.

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Glenfield Waste Disposals Pty Ltd to undertake an updated Noise and Vibration Impact Assessment (NVIA) relating to the amended Materials Recycling Facility (MRF) at the Glenfield Waste Site (GWS), located at Cambridge Avenue, Glenfield NSW. The updated NVIA is required following a formal amendment to SSD 6249 (the Project).

A noise impact assessment report was prepared by SLR (refer to SLR report 630.10711-R2R1 Glenfield Waste Site – Materials Recycling Facility – Noise Impact Assessment dated 21 September 2015) as well as an addendum report (refer SLR report 630.10711-R03-v1.0 Glenfield Waste Site - Materials Recycling Facility - Addendum Noise Impact Assessment dated 16 January 2017). An updated noise impact assessment was also prepared by SLR (refer to SLR report 630.10711-R04-v1.0 Glenfield Waste Site – Materials Recycling Facility dated 3 October 2018).

The aim of this assessment is to assess the potential noise and vibration impacts on surrounding sensitive receptors associated with the updated Project against the current noise assessment guidelines.

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 Noise Policy for Industry, Interim Construction Noise Guideline (ICNG) (DECC, 2009) and the NSW Road Noise Policy (RNP) (DECCW, 2011).

2 Statutory Requirements

The Director-General of the NSW Department of Planning and Infrastructure (DP&I) issued the Secretary's Environmental Assessment Requirements (SEARs) for the project. The SEARs relevant to noise are provided in Table 1 together with the relevant section of the NIA indicating where the requirements have been addressed.

Table 1 SEARs - Noise

Environmental Assessment Requirement	Relevant NIA Section
The EIS must address the following specific matters: Noise – including:	
- a quantitative assessment of potential construction, operation and traffic noise, and	Whole NIA
- details of all proposed mitigation, management and monitoring measures	Section 7.1, Section 10
Noise NSW Industrial Noise Policy (DECC) NSW Road Noise Policy (EPA, 2011) Environmental Criteria for Road Traffic Noise (NSW EPA) Interim Construction Noise Guideline (2009)	

Given that the SEARs are over two (2) years old, under the implementation and transitional arrangements for the NPfI, it is appropriate to use the relevant assessment methodology in the NPfI rather than the superseded NSW Industrial Noise Policy (in effect during the previous assessment) for this assessment. Similarly the RNP has superseded the Environmental Criteria for Road Traffic Noise (ECRTN) since 1 July 2011. As such the ECRTN has not been considered as part of this NIA.

3 Project Description

3.1 Overview

Glenfield Waste Disposals Pty Ltd is proposing to develop a materials recycling facility within the southern portion of the GWS. The facility will have capacity to process recycling of 300,000 - 450,000 tonnes per annum of non-putrescible waste for reuse in secondary markets. The proposal seeks to gain development approval for operations to occur on approximately 12 hectares (ha) of a 30 ha site that is zone IN1 'Industrial' under the Campbelltown Local Environmental Plan (LEP). Operations would occur in two (2) differentiated enclosed areas and positioned to avoid existing landfill cells. Site entry and egress for transport of material will utilise existing site access location along Cambridge Avenue. Activities such as delivery, materials handling, processing (pulverising, crushing/screening and shredding) storage and despatch of materials would be performed at the proposal site.

3.2 Site Development

A number of site upgrades and provision of additional facilities will be required to assist the Project. These works include:

- Installation of stormwater management systems.
- Upgrade of existing water retention & distribution systems for on-site dust management.
- Provision of other utility services (electricity, communications, etc.) as required.
- Clearing and grading of the site for the construction of two (2) enclosed sheds for the processing areas storage of materials and operation of machinery.
- Construction of internal two-way road and parking area.
- Landscaping, fencing and signage.

3.3 Site Operation and Layout

3.3.1 Materials Received

The Project intends to recycle and process waste produced by the Construction and Demolition (C&D), and Commercial and Industrial (C&I) sectors to produce goods for resale to the construction markets. Strict quality controls will be used to ensure the quality of the incoming materials, and this in turn will underpin the quality of the final saleable product.

3.3.2 Quality Control Management

- Ensures the quality of incoming materials.

- Avoids raw material stockpile cross contamination.
- Allows tracking of the materials source and progress through the facility.

Anticipated waste classifications which are to be accepted and processed on site are:

- C&I waste (typically paper/cardboard, plasterboard, ceramics, natural and manufactured timbers, metal, green waste, plastics (hard and soft) and glass).
- C&D waste (asphalt, concrete, brick, crushed concrete, concrete plant washout, concrete waste from batching plants).
- Excavated Natural Material (ENM).

In line with the current process adopted at GWS, the Recycling Facility will not accept hazardous materials such as asbestos and chemical waste. Additionally, all personnel will be required to undertake asbestos awareness training as part of the site induction process and ongoing training program.

3.3.3 Materials Produced

Products expected to be produced on site and sold back into the construction markets are provided in **Table 2** together with their applications.

Table 2 Materials Produced

Material/Product Type	Applications
Recycled Aggregates	Landscaping, filter material, concrete products, pipes manufacture, asphalt products, road applications, backfill, concrete blocks, and drainage materials.
Recycled Pipe Bedding	For the application of and not limited to bedding sand and fill under concrete slabs.
ENM	Engineered and non-engineered fill applications such as subgrade replacement, reinforced earth wall fill, pavement applications.
Recycled General Fill	Filter material, select fill, re-enforced earth wall select fill, fill for structural applications.
Road base	Engineered and non-engineered applications. which applies to and is not limited to local roads, highways, hardstand and car parks.
Timber Mulch	Landscaping, chicken bedding for agriculture purposes, council use.

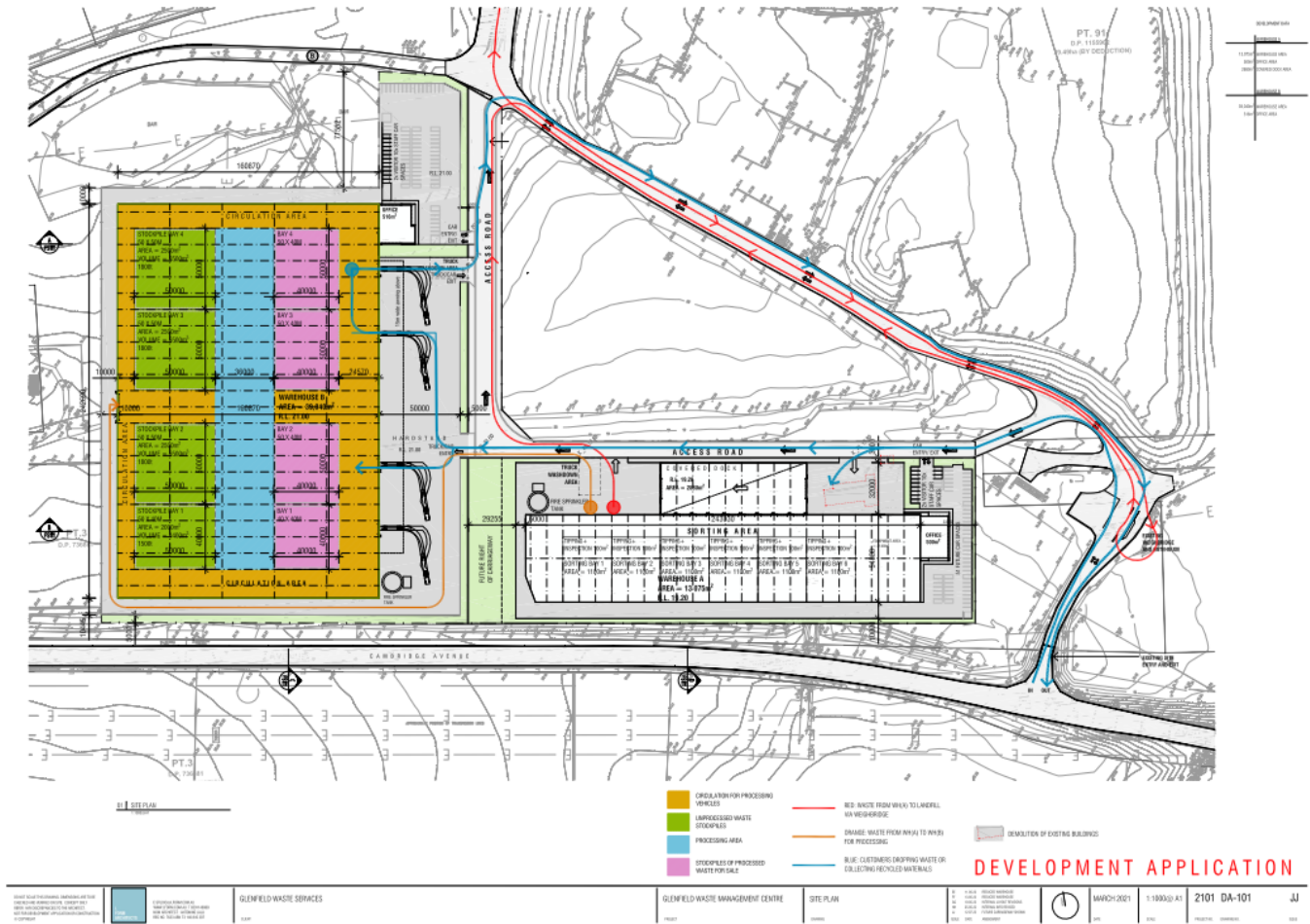
3.3.4 Capacity

In total, the facility is expected to receive and process up to 450,000 tonnes per annum (tpa) of non-putrescible waste which will be distributed across the two (2) lots.

3.3.5 Facility Layout

A copy of the site layout plan is provided in **Figure 1**.

Figure 1 Site Layout Plan



3.3.6 Operation Process

The waste receipt, processing and storage activities within the Proposal site would be located across an area of approximately 12 ha, shown as Lot 1 and Lot 2 in Figure 1. Material would be delivered to the Proposal site via Cambridge Avenue and exit the Proposal site on Cambridge Avenue. Material would be transferred between sheds using an articulated dump truck where processing, recycling and then handling and storage (pending sale) of materials would occur. Vehicles arriving to collect materials would enter the Proposal site via Cambridge Avenue, be loaded and depart the site via Cambridge Avenue.

The operations carried out on site will primarily comprise:

1. Receipt of waste materials:

- It is anticipated that majority of the material received by the Materials Recycling Facility will be source separated, however there is margin of capacity to sort mixed loads.
- All material entering the facility will be visually inspected upon arrival.
- Material received will be charged based on weight and/or volume.

2. C&I materials are separated into different waste streams and stockpiled in relevant areas on site.

- Mechanical or manual sorting and processing is then undertaken.
- Paper/cardboard and plastics are separated for baling and recycling.
- Timber, metals and glass are separated for recycling.

3. C&D materials will be processed using the following methods depending on the type of treatment required:

- Breakdown/pre-processing - material that is delivered to the site in large sections (over 600mm) is first broken down into manageable sizes using a pulveriser attached to a 45 tonne excavator.
- Initial processing (pulverising) to remove reinforced steel, this is done using standard type excavator. The steel, once removed is separated and stored until taken off-site for recycling;
- The pulverised material is then crushed using mobile plant.
- The crushed material will then be blended (mixed) into finished product and stored in separate signposted stockpiles by blend type and specification.
- The finished product will be tested (as relevant to that blend) prior to sale, then loaded and weighed for dispatch using machinery buckets with weighing capabilities.

3.3.7 Plant and Equipment

The following mobile machinery are proposed to be utilised on site (and stored on site when not in use) to carry out the processing of materials:

- 1 x Crusher and screen
- 3 x Front End Loader's
- 2 x 45t Excavators – one (1) with Pulveriser attachment
- 2 x Articulated dump trucks for transferring material.

All plant and equipment will be operated within the two sheds with the exception of material delivery/despatch/transfer trucks.

This assessment has considered eight (8) heavy vehicles entering the site to load/unload material in any operational 15 minute period.

3.3.8 Access

Traffic access to the facility will utilise the existing main southern entry of the GWS which enters from Cambridge Avenue. Trucks will be entering via Cambridge Avenue to an inspection point. A two-way internal road will be constructed which will guide traffic along the perimeter of the facility and then facilitate traffic egress back through the entry at Cambridge Avenue

3.3.9 Hours of Operation and Staffing

The GWS site is currently proposed to operate between the hours of 6.30 am to 4.30 pm with no restrictions recorded for days of operation. The Project is proposed to operate between the hours of 6.30 am to 4.30 pm Monday to Friday and 8.00 am to 4.00 pm on Saturdays. Access until 6.00 pm Monday to Friday will be required for maintenance. The operating hours will be clearly displayed at the entry to the site.

The proposed recycling facility is anticipated to employ 20 staff during the operational stage of the development. In addition, during the construction period, approximately five (5) full time equivalent jobs will be created.

4 Sensitive Receivers

The nearest 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 locations of the sensitive receivers along with background noise monitoring locations are illustrated in **Figure 2**.

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LEGEND

- Glenfield Waste Services Site Boundary
- Recycling Facility Subject Allotments
- Noise Monitoring Locations



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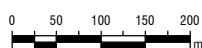
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Projection: GDA 1994 MGA Zone 56



Environmental Planning Services

Noise Assessment

**Nearest Sensitive Receivers
Proposed Recycling Facility
Glenfield NSW**

FIGURE 2

5 Existing Meteorological and Noise Environment

5.1 Meteorological Environment

5.1.1 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 24 months (June 2016 to June 2018) 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 in **Table 3** and **Table 4**.

Table 3 Seasonal Frequency of Occurrence of Wind Speed Intervals - Daytime

Season	Percentage Occurrence - Wind Direction $\pm 45^\circ$							
	N	NE	E	SE	S	SW	W	NW
Summer	4.1	5.8	4.5	7.8	7.4	7.0	3.3	6.4
Autumn	4.7	11.8	10.7	15.6	6.9	7.0	3.3	5.7
Winter	5.0	14.2	12.2	20.8	8.8	4.5	2.6	4.8
Spring	3.1	7.1	6.1	10.9	5.9	5.4	2.5	4.8

Table 4 Seasonal Frequency of Occurrence of Wind Speed Intervals - Evening

Season	Percentage Occurrence - Wind Direction $\pm 45^\circ$							
	N	NE	E	SE	S	SW	W	NW
Summer	4.4	2.7	1.4	2.5	6.2	19.8	8.4	9.8
Autumn	11.1	13.6	5.6	7.6	5.9	12.4	6.6	8.8
Winter	7.8	18.7	12.7	16.9	7.2	2.8	1.0	2.8
Spring	4.9	8.9	5.4	7.1	7.9	16.8	8.5	11.1

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.

5.1.2 Temperature Inversion

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 conservatively assumed that temperature inversions are a feature of the area and have been considered as part of this noise assessment. The default NPfI value of F class inversion conditions has been adopted for this assessment and applies to the morning shoulder period.

5.2 Noise Environment

5.2.1 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 2**. Details of the loggers and their locations are provided in **Table 5**.

Table 5 Noise Logger 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.

5.2.2 Unattended Noise monitoring Results

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 6**.

Table 6 Summary of Existing Ambient Noise Levels – Glenfield

Location	Period	Rating Background Level	Measured LAeq(Period)	Estimated Existing Industrial Contribution LAeq
NM1 8 Goodenough Street, Glenfield	Morning Shoulder	48 dBA	52 dBA	37 dBA (GWS)
	Day	42 dBA	51 dBA	37 dBA (GWS)
NM2 3 Albion Crescent Glenfield	Morning Shoulder	47 dBA	52 dBA	Non discernible
	Day	39 dBA	52 dBA	Non discernible

Note: Daytime 7.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm
On Sundays and Public Holidays, Daytime 8.00 am to 6.00 pm; Evening 6.00 pm to 10.00 pm

It is noted that the GWS contributed to the noise levels recorded at monitoring location NM1. The GWS operated between 6.30 am and 4.00 pm each weekday during the noise monitoring period. The influence of the GWS on the overall background noise level recorded at NM1 however is deemed to be minimal.

5.3 Operator Attended Noise Measurements

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 7**

Table 7 Operator Attended Noise Survey Results

Location Period	Date/Start Time/ Weather	L _{Amax}	L _{A1}	L _{A10}	L _{Aeq}	L _{A90}	Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
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

Location Period	Date/Start Time/ Weather	L _{Amax}	L _{A1}	L _{A10}	L _{Aeq}	L _{A90}	Description of Noise Emissions and Typical Maximum Noise Levels (dBA)
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.

6 Project Noise Impact Assessment Criteria

6.1 Operational Noise

6.1.1 NPfI Trigger Noise Levels

The EPA has regulatory responsibility for the control of noise from “scheduled premises” under the *Protection of the Environment Operations Act 1997*. It is noted that the Project is not a “scheduled premises” however it is common and appropriate to consider noise from a development such as this with regard to the *NSW Noise Policy for Industry 2017* (NPfI). In implementing the NPfI, the EPA has two broad objectives:

- Controlling intrusive noise levels in the short term.
- Maintaining noise amenity levels for particular land uses over the medium to long-term.

In general terms, the NPfI sets out procedures for establishing the project intrusiveness $L_{Aeq(15\text{minute})}$ and project amenity $L_{Aeq(\text{period})}$ noise levels, with a view determining the lower (that is, the more stringent) being the Project Noise Trigger Level (PNTL), NPfI Section 2.1 states:

The project intrusiveness noise level aims to protect against significant changes in noise levels, whilst the project amenity noise level seeks to protect against cumulative noise impacts from industry and maintain amenity for particular land uses. Applying the most stringent requirement as the project noise trigger level ensures that both intrusive noise is limited and amenity is protected and that no single industry can unacceptably change the noise level of an area.

For assessing intrusiveness, the existing background noise generally needs to be measured. The intrusiveness trigger level essentially means that the equivalent continuous noise level (L_{Aeq}) of the source should not be more than 5 dBA above the measured (or default) Rating Background Level (RBL).

The amenity assessment is based on amenity noise levels specific to the land use and associated activities. The project amenity noise levels are shown in **Table 8** and relate only to industrial-type noise and do not include road, rail or community-related noise. Based on the NPfI land use descriptions and the background noise levels residences surrounding the development have been classified for the purposes of this noise assessment as 'suburban'. The ambient noise at these locations is influenced by traffic noise and (to a lesser extent) noise from existing industrial facilities.

Table 8 Amenity Criteria – Recommended Amenity Noise Levels

Type of Receiver	Noise Amenity Area	Time of Day	Recommended LAeq(Period) Noise Level, dBA
Residential	Suburban	Day	55
		Evening	45
		Night	40

The PNTLs are then determined in accordance with NPfI Section 2.1 *Project Noise Trigger Level* by identifying the lower of the project amenity or project intrusive noise levels (following conversion of the LAeq(period) project amenity noise level to an equivalent LAeq(15minute) value for comparison with the LAeq(15minute) project intrusive noise level). NPfI Section 2.2 *Noise Descriptors* assumes a default conversion factor of +3 dB for the conversion of LAeq(period) noise levels to LAeq(15minute) noise levels.

6.1.2 Sleep Disturbance

In addition to the PNTLs, NPfI provides guidance in relation to the assessment of sleep disturbance. Specifically, the NPfI states:

Where the subject development/premises night-time noise levels at a residential location exceed:

- *LAeq(15minute) 40 dBA or the prevailing RBL plus 5 dB, whichever is the greater, and/or*
- *LAfmax 52 dBA or the prevailing RBL plus 15 dB, whichever is the greater,*

a detailed maximum noise level assessment should be undertaken.

Where those trigger levels are not met, it is appropriate to consider any effect of the noise with regard to:

- The extent to which the maximum noise level exceeds the rating background noise level
- How often high noise events will occur
- The distribution of likely events across the night-time period and the existing ambient maximum events in the absence of the subject development
- Whether there are times of day when there is a clear change in the noise environment (such as during early-morning shoulder periods)
- Current scientific literature available at the time of the assessment regarding the impact of maximum noise level events at night.

It may also be appropriate to consider other published research including the NSW *Road Noise Policy* which contains additional guidance relating to potential sleep disturbance impacts.

A review of research on sleep disturbance in the RNP indicates that in some circumstances, higher noise levels may occur without significant sleep disturbance. Based on studies into sleep disturbance, the RNP concludes that:

- Maximum internal noise levels below 50 dBA to 55 dBA are unlikely to cause awakening reactions; and that
- One or two noise events per night, with maximum internal noise levels of 65 dBA to 70 dBA, are not likely to affect health and wellbeing significantly.

Internal noise levels in a dwelling, with the windows open, are commonly 10 dB lower than external noise levels. Therefore, the first conclusion above suggests that short-term external noises of 60 dBA to 65 dBA are unlikely to cause awakening reactions. The second conclusion suggests that one or two noise events per night with maximum external noise levels of 75 dBA to 80 dBA are not likely to affect health and wellbeing significantly.

6.1.3 Project Trigger Noise level

Applicable PNTLs for all receiver areas surrounding the Project have been established with reference to the NPfI and are contained in **Table 9**.

Table 9 Project Noise Trigger Levels

Location	Period	Project Intrusive ¹ dBA LAeq(15minute)	Project Amenity ² LAeq(period)	Project Amenity ³ dBA LAeq(15minute)	Resulting PNTL ⁴ dBA LAeq(15minute)
Residents on Goodenough Street, Ferguson Street and Canterbury Road, Glenfield	Morning Shoulder	47 ¹	43	46	46
	Day	47	50	53	47
Residents on Slessor Road, Glory Road and Minstrel Street	Morning Shoulder	44 ¹	43	46	44
	Day	44	50	53	44

1. Project Intrusive is the RBL plus 5 dB. Morning Shoulder RBL set at no greater than the daytime RBL.
2. Project amenity (period) noise level is the Amenity Criteria minus 5 dB. For the morning shoulder the mid-point between the daytime and night-time has been used.
3. Project amenity (15 minute) noise level is the Project Amenity (period) noise level plus 3 dB
4. Resulting PNTL is the lower of the project intrusive and the project amenity (15 minute) noise levels

The relevant sleep disturbance noise goals for the Project are provided in **Table 10**.

Table 10 Sleep Disturbance Noise Goals

Location	Period	RBL	SDNL LAmax
Residents on Goodenough Street, Ferguson Street and Canterbury Road, Glenfield	Morning Shoulder	48	63
Residents on Slessor Road, Glory Road and Minstrel Street	Morning Shoulder	47	62

6.2 Construction Noise

The NSW Environment Protection Authority (EPA) Interim Construction Noise Guideline (ICNG) sets out Noise Management Levels (NMLs) for residential and other noise-sensitive receivers and outlines how they are to be applied during demolition and construction works.

The NMLs are non-mandatory criteria to identify where feasible and reasonable noise mitigation measures are likely to be required in order to reduce and control noise levels. A summary of the noise management levels from the ICNG is contained in **Table 11**

Table 11 Construction Noise Management Levels at Residential Receivers

Time of day	NML, dBA LAeq(15minute) ¹	How to apply
Standard daytime construction hours Monday to Friday 7am to 6pm Saturday 8am to 1pm No work Sundays or public holidays	Noise Affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured LAeq(15minute) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly Noise Affected 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences) 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise Affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see section 7.2.2 of the ICNG.

¹ Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level. If the property boundary is more than 30m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence. Noise levels may be higher at upper floors of the noise-affected residence.

The ICNG suggests restricting the hours of construction for activities that generate noise at residences above the 'highly affected' noise management level.

The Noise Management Levels (NMLs) for the Project during standard construction hours have been determined in accordance with the ICNG. The NMLs which are relevant to the receivers in the vicinity of the project are provided in **Table 12**.

Table 12 Noise Management Levels

Location	Time of Day	Standard Hours NML	Highly Affected NML
Residents on Goodenough Street, Ferguson Street and Canterbury Road, Glenfield ¹	Recommended standard hours	52	75 dBA
Residents on Slessor Road, Glory Road and Minstrel Street	Recommended standard hours	49	75 dBA

6.3 Road Traffic Noise Criteria

Operation of the Project has the potential to increase road traffic noise received at residents adjacent to Glenfield Road. The NSW *Road Noise Policy* (RNP) noise goals are summarised in **Table 13**.

Table 13 Road Traffic Noise Assessment Criteria for Residential Land Uses

Road Category	Type of Project/Land Use	Assessment Criteria	
		Day (7am to 10pm)	Night (10pm to 7am)
Freeway/arterial/sub-arterial roads –Glenfield Road	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land-use developments.	LAeq(15hour) 60 dBA (external)	LAeq(9hour) 55 dBA (external)

In addition to the assessment criteria provided in **Table 13**, any increase in the total traffic noise level at a location due to a proposed project or traffic-generating development must be considered. Residences experiencing increases in total traffic noise level of more than 12 dBA (compared to existing road traffic noise levels for the relevant “no build” option) should also be considered for mitigation.

7 Operational Noise Impact Assessment

7.1 Noise Modelling Methodology

A computer model was used to predict noise emissions from the operations of the Project. The operational noise modelling was undertaken using the Concawe algorithms within SoundPLAN v8.1 software. A three-dimensional digital terrain map providing relevant topographic information was used in the modelling process. The model used this map, together with noise source data, ground cover, shielding by barriers and/or adjacent buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers.

Topographic contours and operational information as supplied from previous studies has been utilised. Prediction of noise emission levels was carried out under standard prevailing atmospheric conditions. Atmospheric parameters under which noise predictions were made are given in **Table 14**.

Table 14 Meteorological Parameters Considered for Noise Predictions

Meteorological Scenario	Temperature	Humidity	Wind Speed	Wind Direction	Stability Class
Standard Morning Shoulder and Day	20	70%	0.5 m/s	Source to receiver	D
Enhancing Morning Shoulder only	20	70%	0.5 m/s	Source to receiver	F

Sound power levels of acoustically significant plant and equipment proposed for use on the subject site have been obtained from a SLR database of similar equipment. Detailed sound power level data is provided in **Appendix B**.

Other assumptions incorporated in the noise model include the following:

- All acoustically significant plant and equipment operate simultaneously over a 15 minute period.
- Customers dropping waste or collecting recycled materials are assumed to use road trucks such as semi trailer or truck and dog styles and have been modelled as travelling at 15 km/h along internal access routes. Customers accessing Warehouse A would travel in a forward direction to the covered dock area, with customers accessing Warehouse B travelling to the hardstand before manoeuvring into the docks.
- Articulated dump trucks transferring material between the warehouses have been modelled as travelling at 15 km/h along internal access routes and accessing warehouse B from the western side.
- Reverberant internal noise levels within each warehouse has been calculated based on the relevant plant and equipment operating within each area. The breakout noise from the warehouse buildings has been calculated based on construction consisting of a steel clad roof with no underlying anticon/insulation blanket and 3 mm alucobond or similar wall cladding with no internal lining. To provide a conservative assessment a northern opening quick opening and shutting roller door on Warehouse A and an eastern and western opening roller door on Warehouse B have been assumed to remain fully open for a 15 minute period.

The operational scenario modelled during each period together with assumed sound power level information is summarised in **Table 15** and Error! Reference source not found.. A tick (✓) indicates that the equipment is in operation during the relevant period. A cross (×) indicates that the equipment is not in operation during the relevant period. Where there is a number in brackets following a tick, this represents the number of items of the equipment that has been considered in the noise model during the relevant period.

Table 15 Operational Scenario Daytime

Plant and Equipment	Sound Power Level	Morning Shoulder	Daytime
Front End Loaders	109 dBA	✓ (3)	✓ (3)
Crusher/Screen	114 dBA	✓	✓
8T excavator	98 dBA	✓	✓
45t Excavator with Pulveriser attachment	108 dBA	✓ (2)	✓ (2)

Plant and Equipment	Sound Power Level	Morning Shoulder	Daytime
Product despatch/delivery trucks (33t Road Trucks)	103 dBA	✓ (8)	✓ (8)
Articulated Dump Trucks	112 dBA	×	✓ (2)

7.2 Predicted Operational Noise Levels

Noise emission levels were predicted from the proposed development for the typical operational scenarios described in **Table 15**. Predicted noise levels at the nearest potentially affected residential locations are provided in **Table 16**.

Table 16 Predicted Noise Levels

Location	Period	Predicted Noise Level LAeq(15minute)		PNTL LAeq(15minute)
		Standard Weather Condition	Noise Enhancing Weather Condition	
Slessor Road, Casula	Morning Shoulder	36	38	44
	Day	37	n/a	44
Glory Road (north), Glenfield	Morning Shoulder	36	38	44
	Day	37	n/a	44
Glory Road (south), Glenfield	Morning Shoulder	35	37	44
	Day	37	n/a	44
Minstrel Street, Glenfield	Morning Shoulder	35	37	44
	Day	36	n/a	44
Canterbury Road, Glenfield	Morning Shoulder	37	39	46
	Day	39	n/a	47
Fergusson Street (west), Glenfield	Morning Shoulder	38	39	46
	Day	39	n/a	47
Fergusson Street (central), Glenfield	Morning Shoulder	42	42	46
	Day	43	n/a	47
	Morning Shoulder	45	45	46

Location	Period	Predicted Noise Level LAeq(15minute)		PNTL LAeq(15minute)
		Standard Weather Condition	Noise Enhancing Weather Condition	
Fergusson Street (east), Glenfield	Day	46	n/a	47
Goodenough Street (west), Glenfield	Morning Shoulder	45	46	46
	Day	46	n/a	47
Goodenough Street (central), Glenfield	Morning Shoulder	44	45	46
	Day	46	n/a	47
Goodenough Street (east), Glenfield	Morning Shoulder	44	45	46
	Day	44	n/a	47

Note 1: Predicted noise level complies with the PNTL

Table 16 indicates that compliance with the PTNLs would be expected at all times for all receivers

Maintenance activities proposed would include the use of grinders, rattle guns and small hand tools. Given that that all maintenance works would be conducted within the enclosed sheds noise levels from maintenance activities are also predicted to comply with the relevant daytime PNTLs.

7.3 Sleep Disturbance

In assessing sleep disturbance, typical L_{Amax} noise levels of acoustically significant plant and equipment to be used during the morning shoulder and out of hours operations were used as input to the computer model and are presented in **Table 17**.

Table 17 Maximum Noise Events

Source	L _{Amax}
Truck Accelerating	108 dBA
Truck Handbrake (Air Release)	118 dBA

Predicted maximum noise levels during the morning shoulder period are provided in **Table 18**.

Table 18 Maximum Noise Predictions

Location	Period	Predicted Noise Level L _{Amax}		SDNL L _{Amax}
		Standard Weather Condition	Noise Enhancing Weather Condition	
Slessor Road, Casula	Morning Shoulder	45	48	62
Glory Road (north), Glenfield	Morning Shoulder	44	47	62
Glory Road (south), Glenfield	Morning Shoulder	43	46	62
Minstrel Street, Glenfield	Morning Shoulder	40	43	62
Canterbury Road, Glenfield	Morning Shoulder	42	45	63
Fergusson Street (west), Glenfield	Morning Shoulder	47	50	63
Fergusson Street (central), Glenfield	Morning Shoulder	51	53	63
Fergusson Street (east), Glenfield	Morning Shoulder	55	58	63
Goodenough Street (west), Glenfield	Morning Shoulder	57	59	63
Goodenough Street (central), Glenfield	Morning Shoulder	56	58	63
Goodenough Street (east), Glenfield	Morning Shoulder	58	60	63

Results of maximum noise predictions indicate that the sleep disturbance screening criteria will be achieved at all receiver locations during morning shoulder operations.

8 Construction Noise Assessment

The most significant impacts are expected to occur during bulk earthworks across the site. It has been assumed that all construction activity associated with the Project would be conducted during recommended standard construction hours.

Table 19 Assumed Construction Plant and Equipment

Plant and Equipment	Sound Power Level (dBA)
Front End Loader	109 dBA
45t Excavator with Bucket	107 dBA
33t Product Truck	103 dBA
Transit Mixer (unloading)	111 dBA
Crane	104 dBA
Generator	99 dBA
Grader	111 dBA

Noise predictions at the nearest potentially affected residences are provided in **Table 20**.

Table 20 Predicted Construction Noise Levels

Location	Time of Day	Predicted Construction Noise Level LAeq(15minute)	NML LAeq(15minute)	
			Noise Affected	Highly Noise Affected
Slessor Road, Casula	Recommended standard hours	38	52	75
Glory Road (north), Glenfield		41	52	75
Glory Road (south), Glenfield		40	52	75
Minstrel Street, Glenfield		39	52	75
Canterbury Road, Glenfield		41	54	75
Fergusson Street (west), Glenfield		41	54	75
Fergusson Street (central), Glenfield		44	54	75
Fergusson Street (east), Glenfield		48	54	75
Goodenough Street (west), Glenfield		47	54	75
Goodenough Street (central), Glenfield		47	54	75
Goodenough Street (east), Glenfield		50	54	75

Results of construction noise modelling indicate that the noise affected management level is predicted to be achieved at all noise sensitive locations.

Notwithstanding the above, the following recommendations are made with the aim of minimising construction noise impacts at nearby noise sensitive receivers:

- An important aspect of the mitigation of noise impacts during all construction phases will be adherence to the standard daytime construction hours.
- Noisy plant operating simultaneously to be avoided wherever possible.
- Maintenance work on all construction plant will be carried out away from noise sensitive areas and confined to standard daytime construction hours, where practicable.
- Site noisy equipment behind structures that act as barriers or at the greatest distance from the noise-sensitive area or orient the equipment so that noise emissions are directed away from any sensitive areas.
- Keep equipment well maintained.
- Employ “quiet” practices when operating equipment (eg positioning and unloading of trucks in appropriate areas).

With regard to potentially offensive noise events associated with construction activities AS 2436-1981 “*Guide to noise control on construction, maintenance and demolition sites*” provides the following:

If noisy operations must be carried out, then a responsible person should maintain liaison between the neighbouring community and the contractor. This person should inform the public at what time to expect noisy operations and also inform the contractor of any special needs of the public.

Consultation and co-operation between the contractor and his neighbours and the removal of uncertainty and rumour can help to reduce the adverse reaction to noise.

9 Road Traffic Noise

It is noted that the nearest residences potentially affected by an increase in road traffic noise associated with the Project are located approximately 8 m from Glenfield Road.

The GWS site, including the Project will generate approximately 874 vehicles on Glenfield Road. Annual average daily traffic (AADT) for Glenfield Road was 12,841 in 2009 (ARC TIA report). The corresponding increase in road traffic noise would therefore be expected to remain below 2 dB which, according to the RNP, is unlikely to be discernible and would not require consideration of mitigation.

10 Noise Management and Monitoring

GWS will prepare an Operational Noise Management Plan (ONMP) prior to commencement of operations at the subject site. The ONMP will consider the following:

- Relevant noise goals for the subject site.
- A program to monitor and report on noise emission levels from the site and the effectiveness of noise mitigation measures.
- A protocol for managing and reporting any noise complaints.

11 Conclusion

SLR has undertaken a NIA relating to the proposed Materials Recycling Facility at the Glenfield Waste Site (GWS) located at Cambridge Avenue, Glenfield NSW.

The aim of this assessment was to assess the potential noise impacts associated with the proposed development on surrounding sensitive receptors.

Noise levels under standard weather conditions are predicted to be compliant during the daytime and morning shoulder periods at all receiver locations.

Construction noise impacts are predicted to be below the relevant noise goals. Notwithstanding this, recommendations have been provided with the aim of minimising construction noise impacts at nearby noise sensitive receivers.

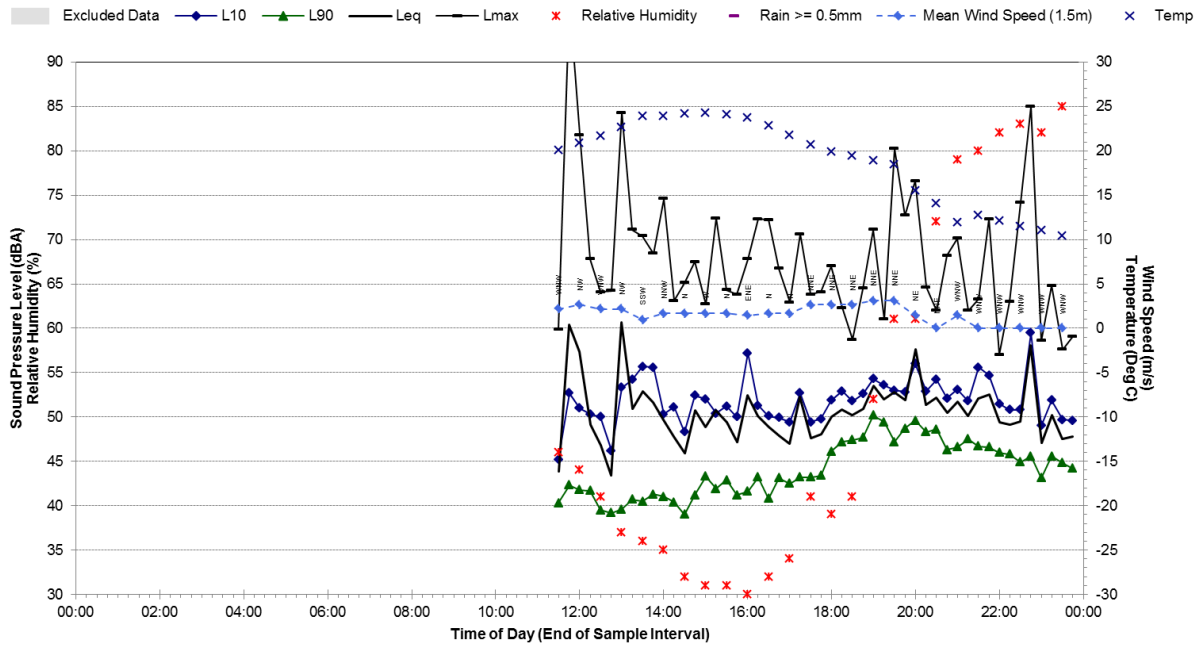
Road traffic noise impact associated with the Project is expected to be minimal given the relatively small increase in proposed traffic volumes compared to existing volumes.

Appendix A:

Statistical Ambient Noise Levels

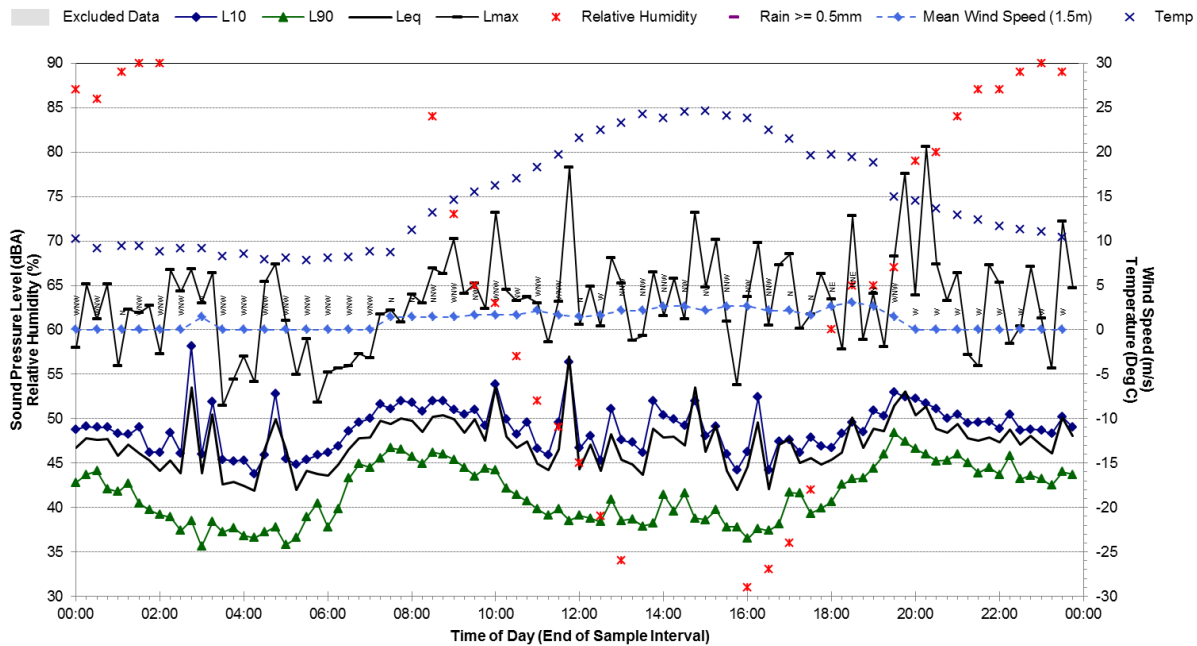
Statistical Ambient Noise Levels

3 Albion Cres, Glenfield - Friday, 16 May 2014



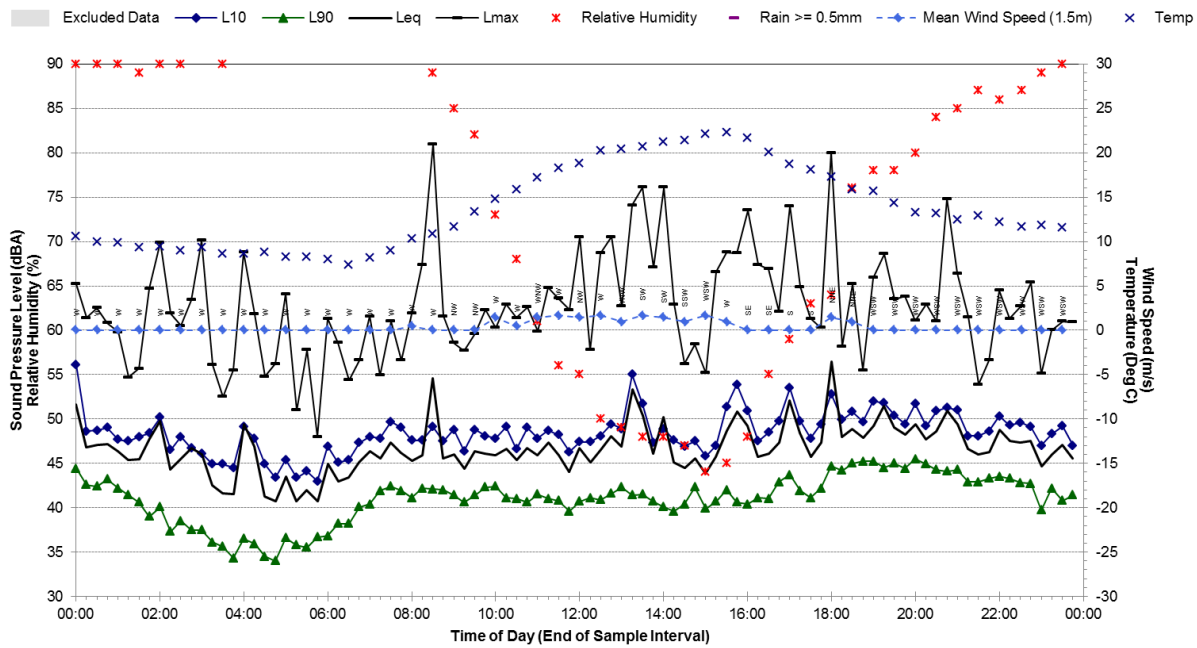
Statistical Ambient Noise Levels

3 Albion Cres, Glenfield - Saturday, 17 May 2014



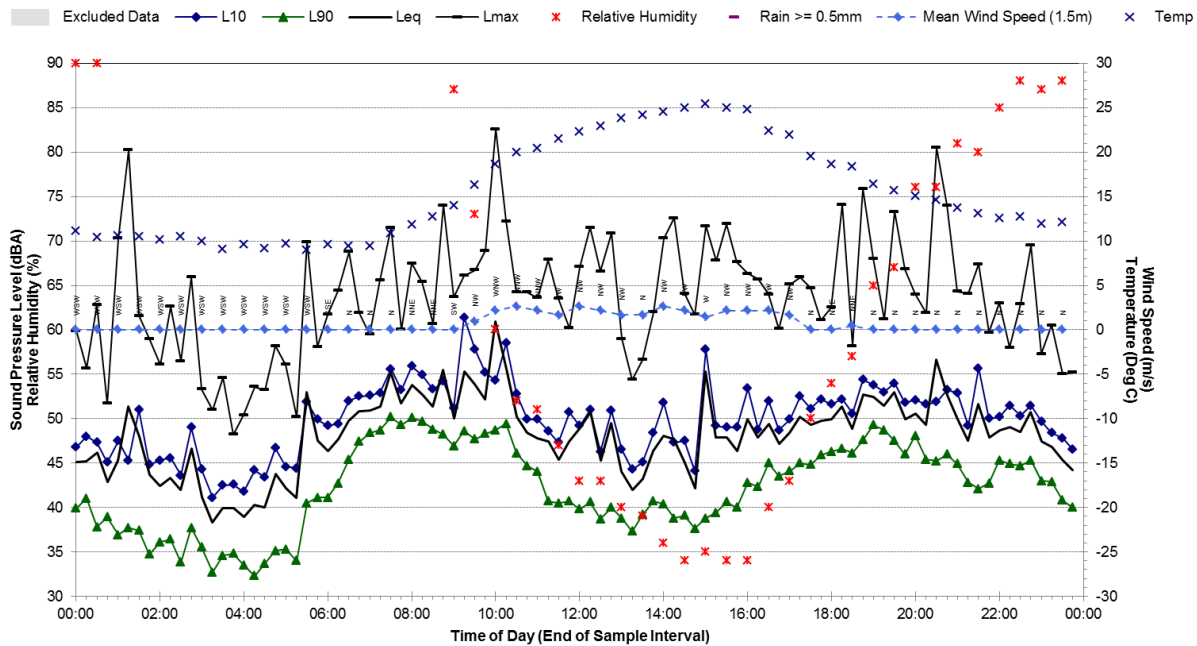
Statistical Ambient Noise Levels

3 Albion Cres, Glenfield - Sunday, 18 May 2014



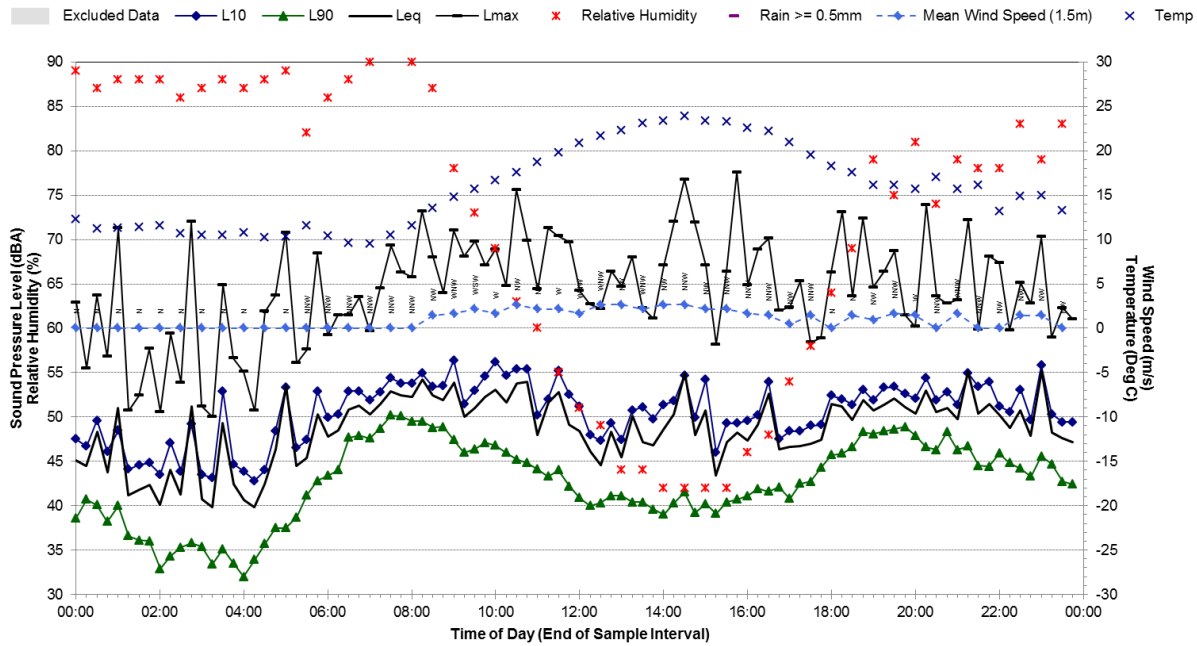
Statistical Ambient Noise Levels

3 Albion Cres, Glenfield - Monday, 19 May 2014



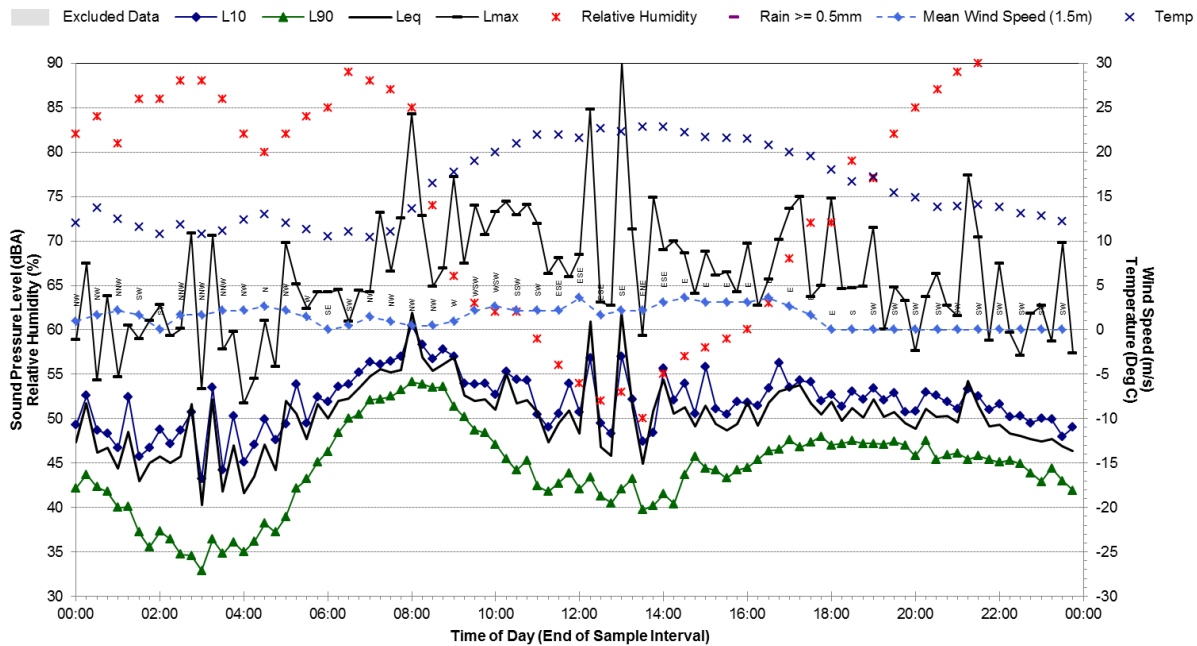
Statistical Ambient Noise Levels

3 Albion Cres, Glenfield - Tuesday, 20 May 2014

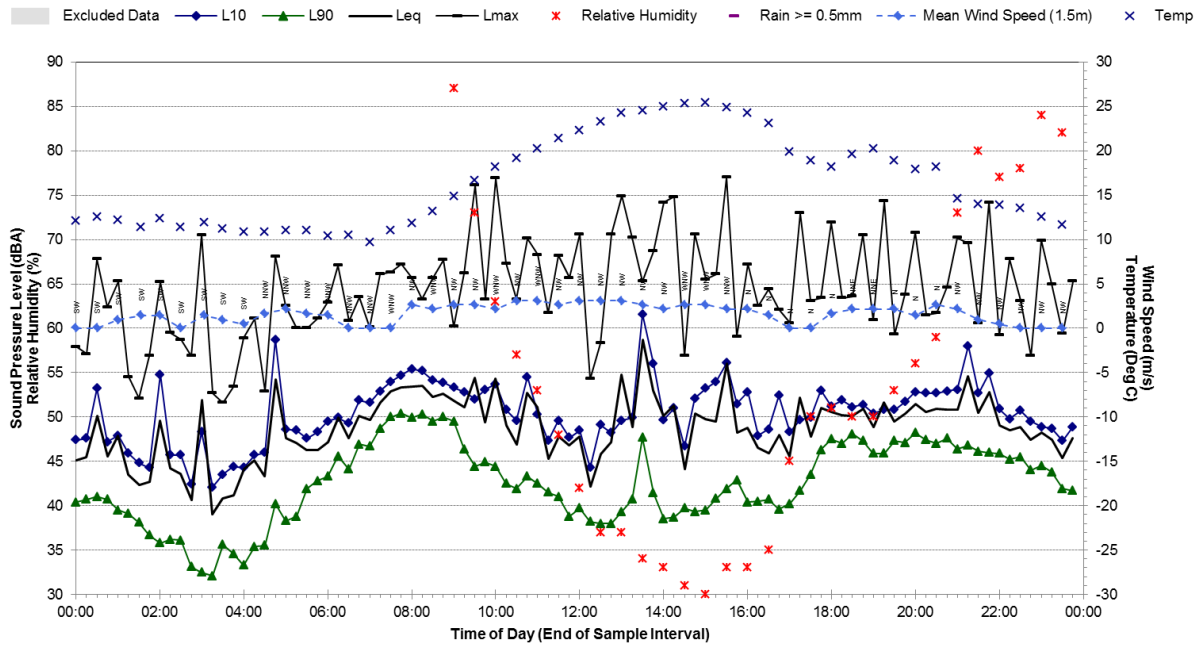


Statistical Ambient Noise Levels

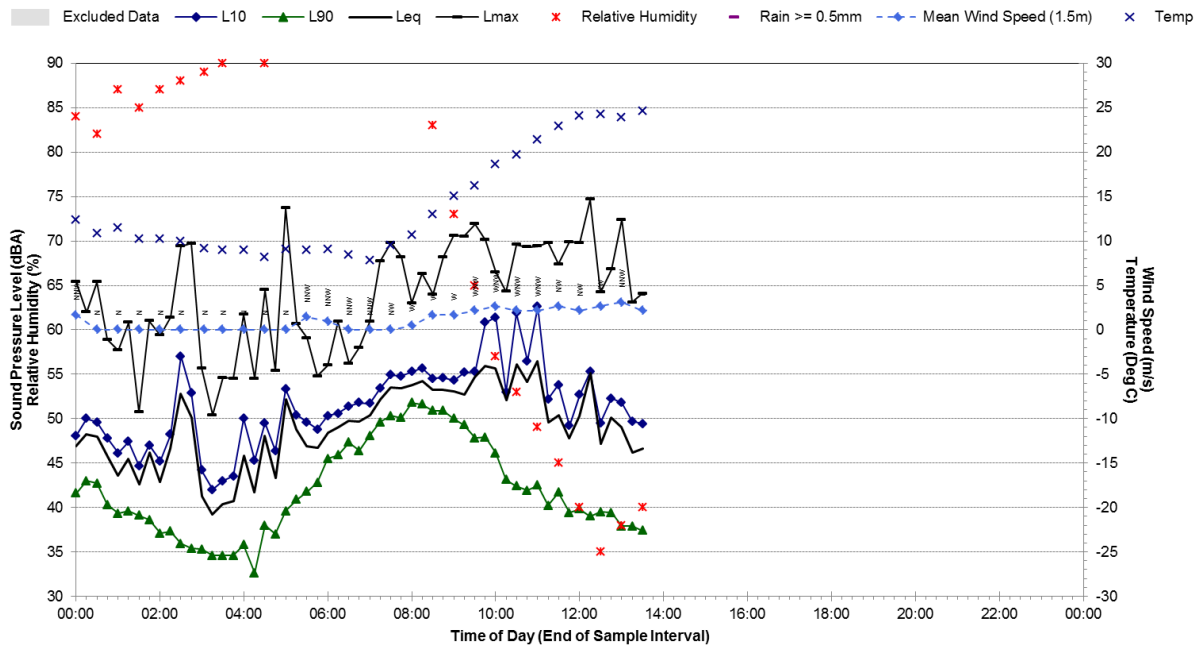
3 Albion Cres, Glenfield - Wednesday, 21 May 2014



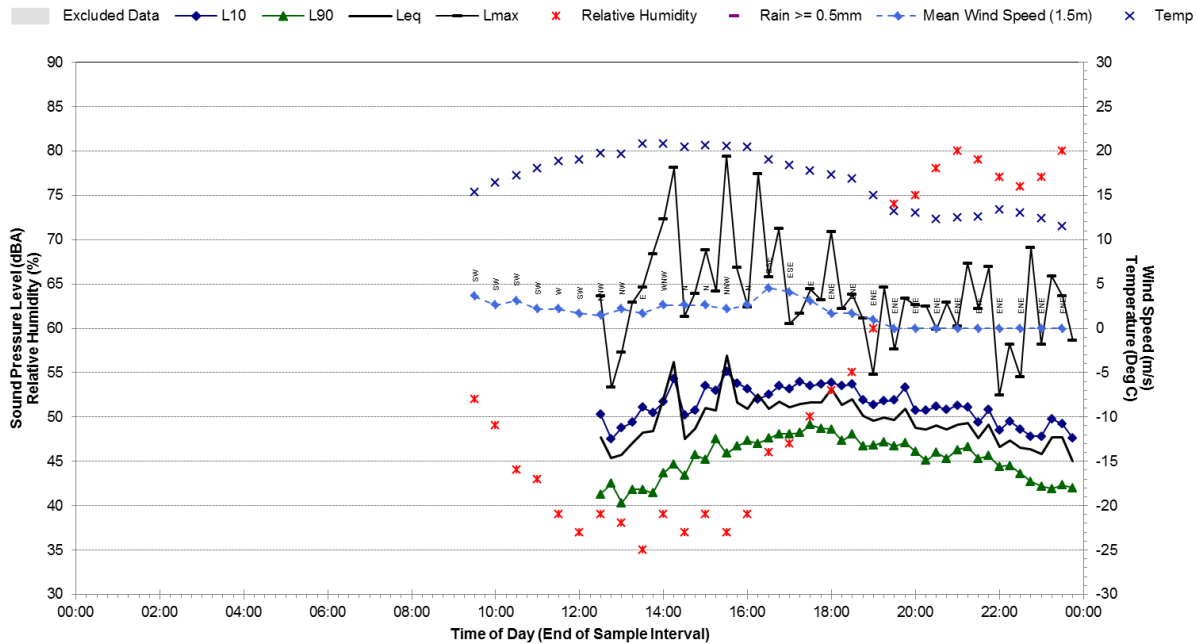
Statistical Ambient Noise Levels 3 Albion Cres, Glenfield - Thursday, 22 May 2014



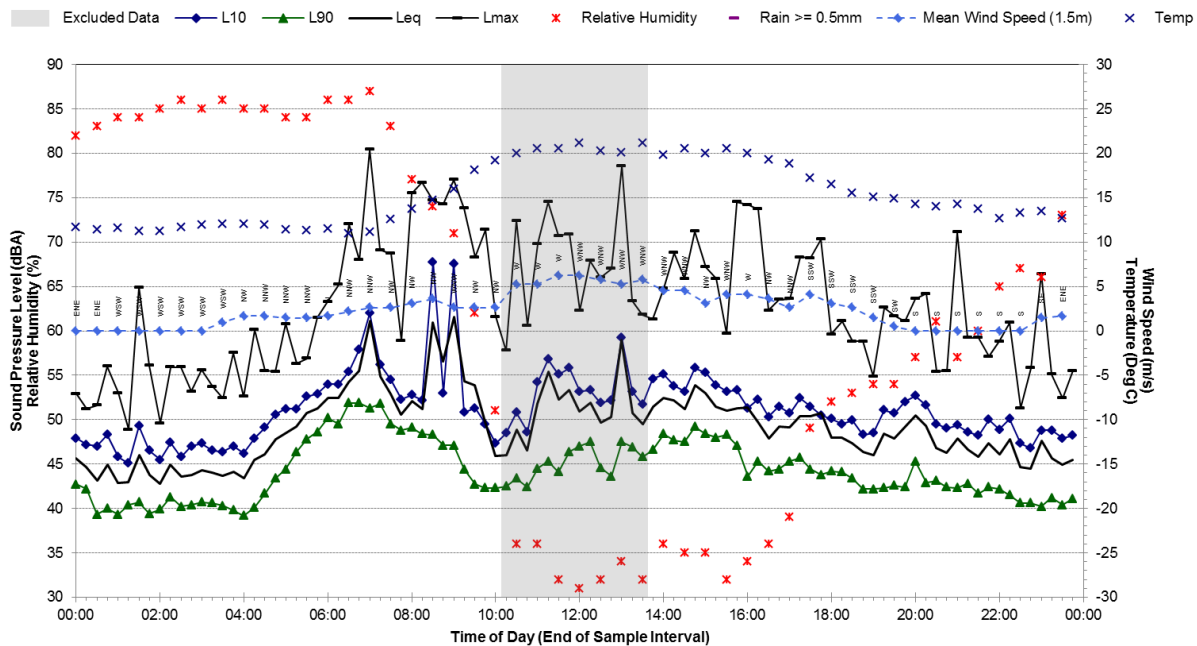
Statistical Ambient Noise Levels 3 Albion Cres, Glenfield - Friday, 23 May 2014



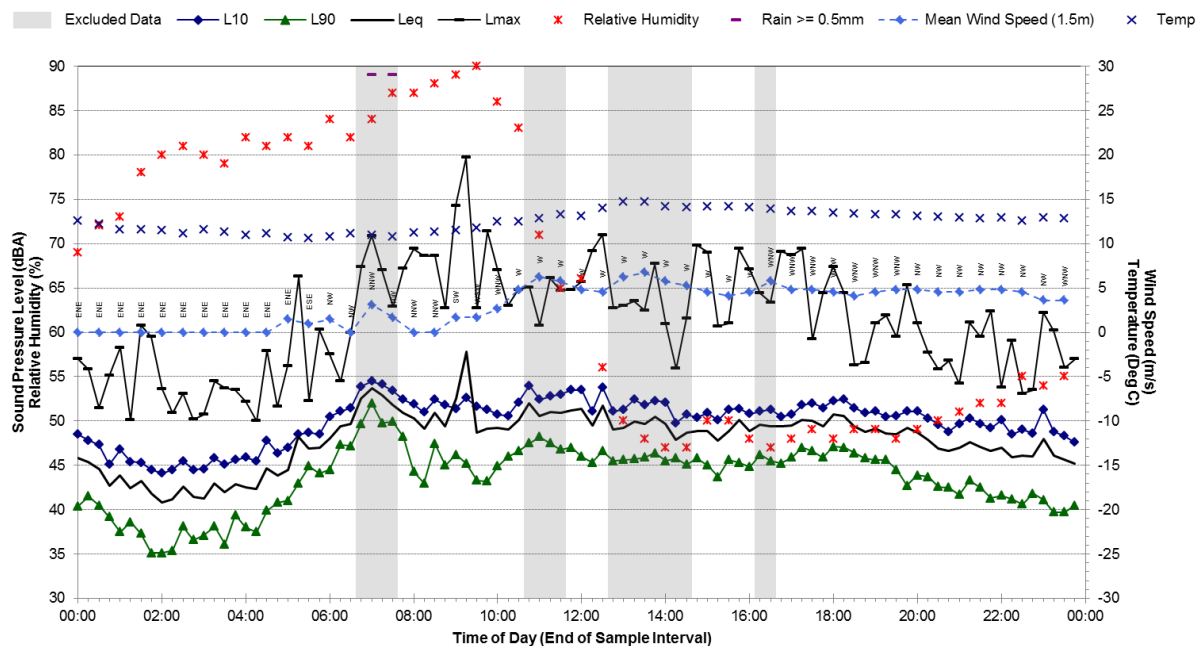
Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Thursday, 1 May 2014



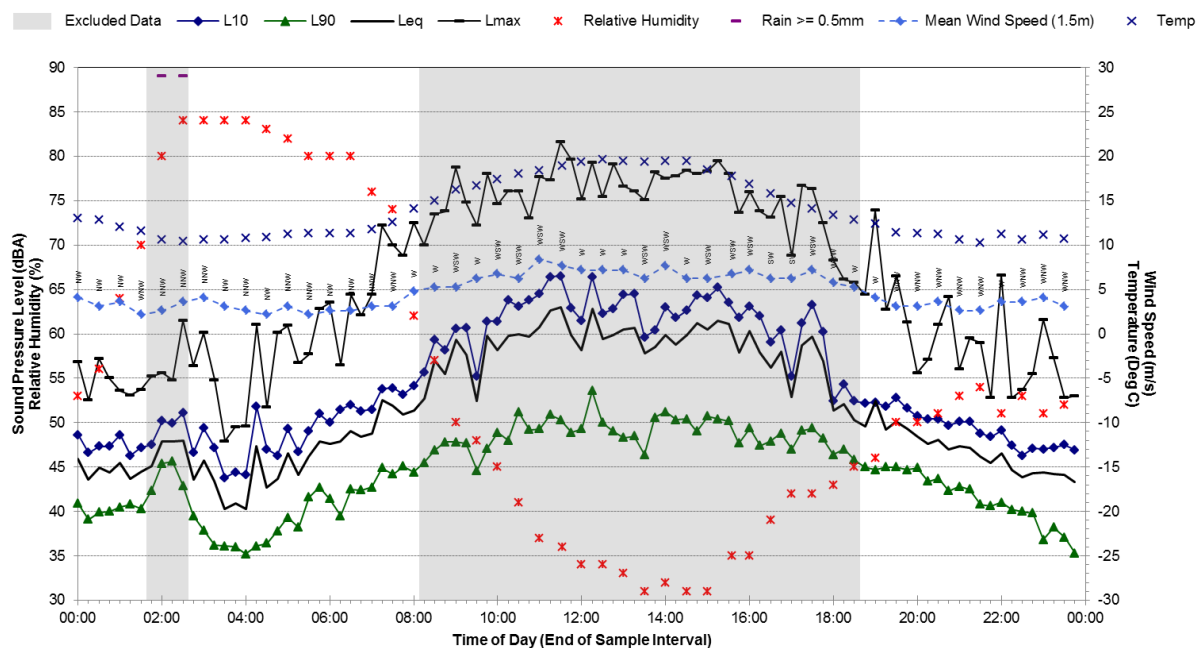
Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Friday, 2 May 2014



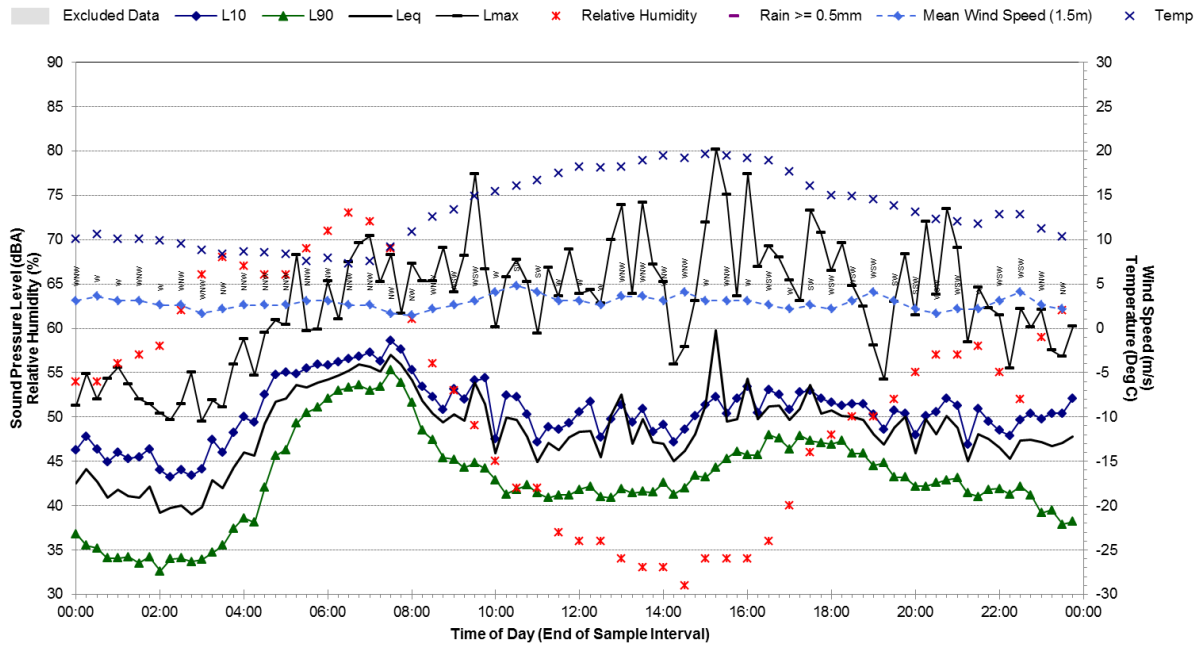
Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Saturday, 3 May 2014



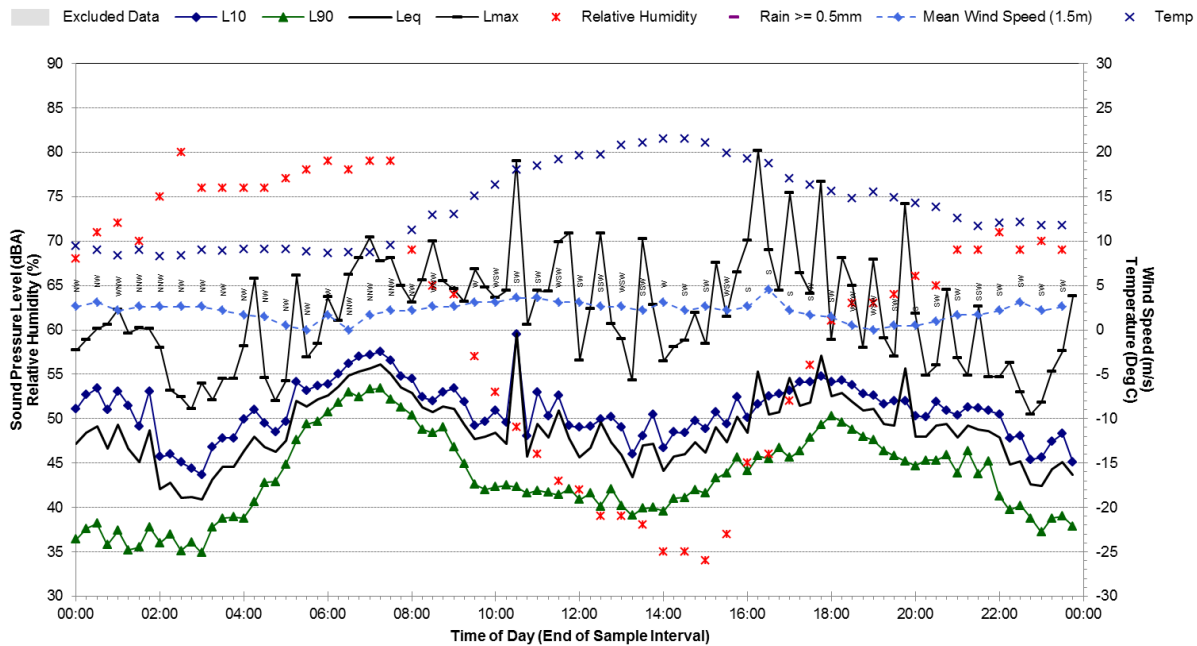
Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Sunday, 4 May 2014



Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Monday, 5 May 2014

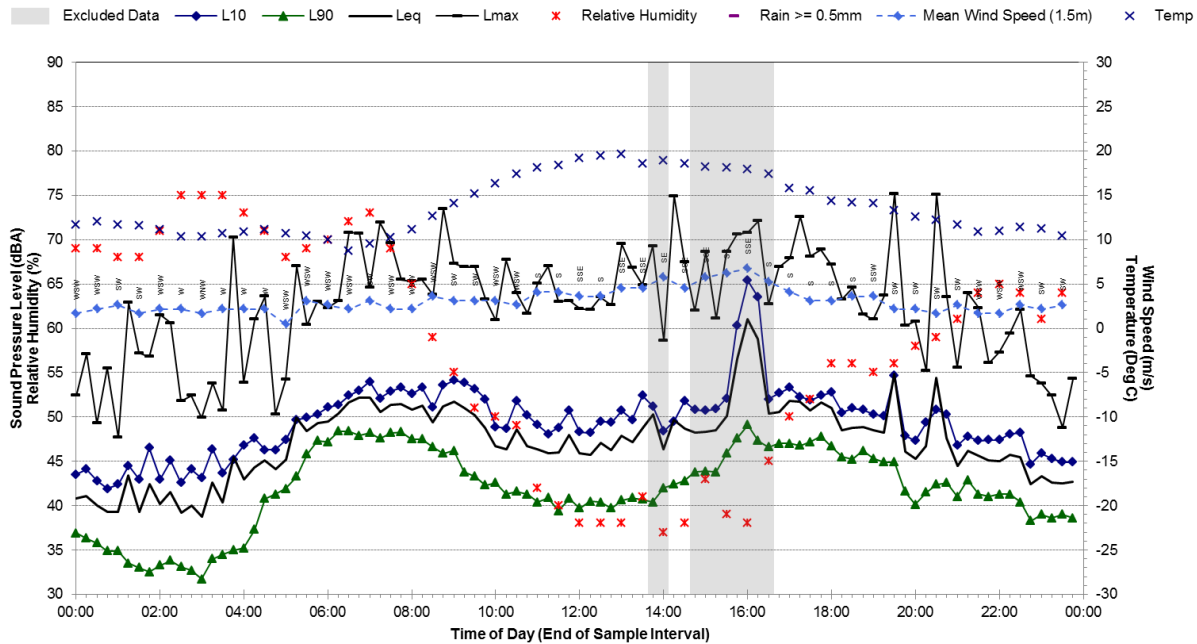


Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Tuesday, 6 May 2014



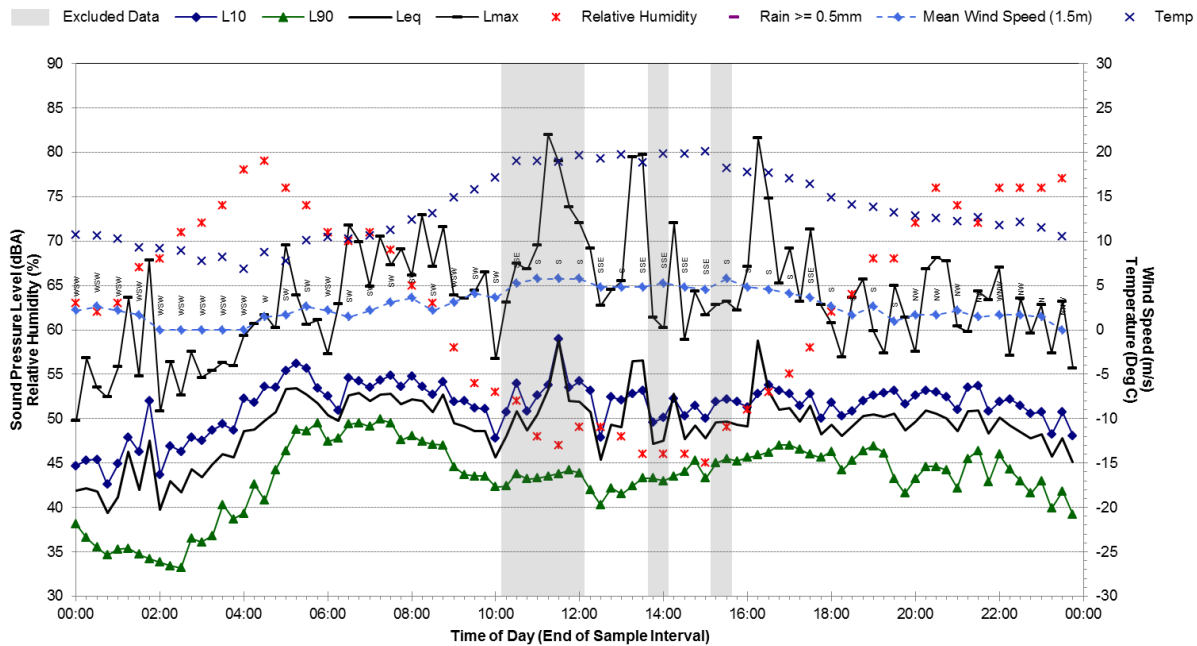
Statistical Ambient Noise Levels

8 Goodenough Street, Glenfield - Wednesday, 7 May 2014

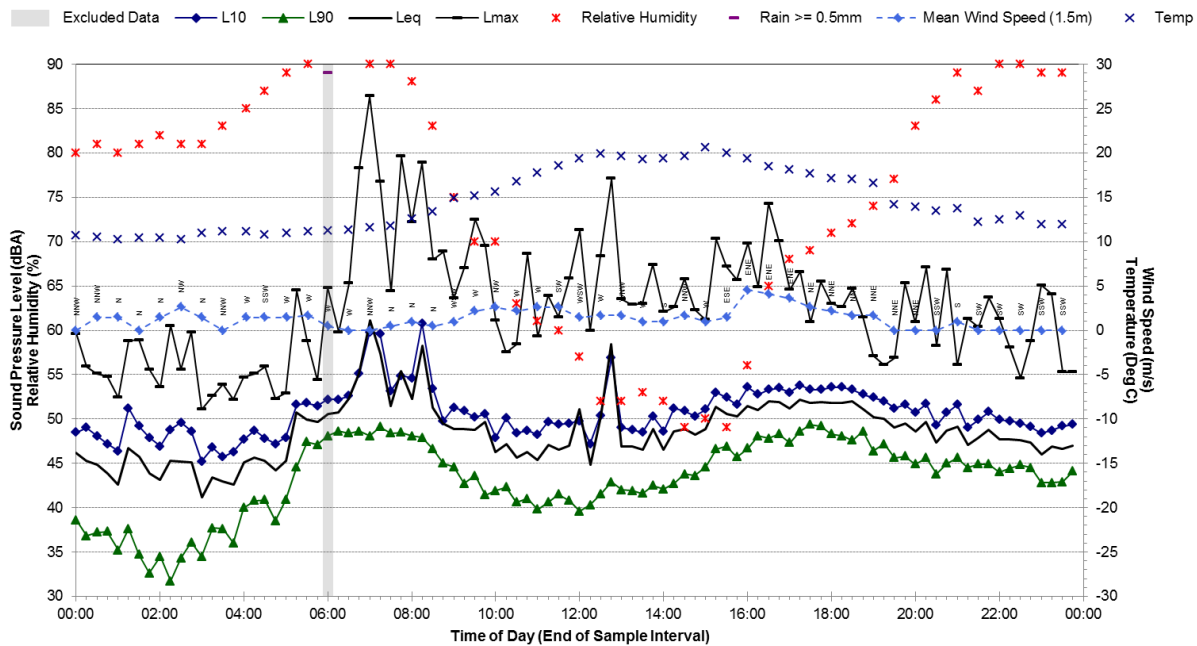


Statistical Ambient Noise Levels

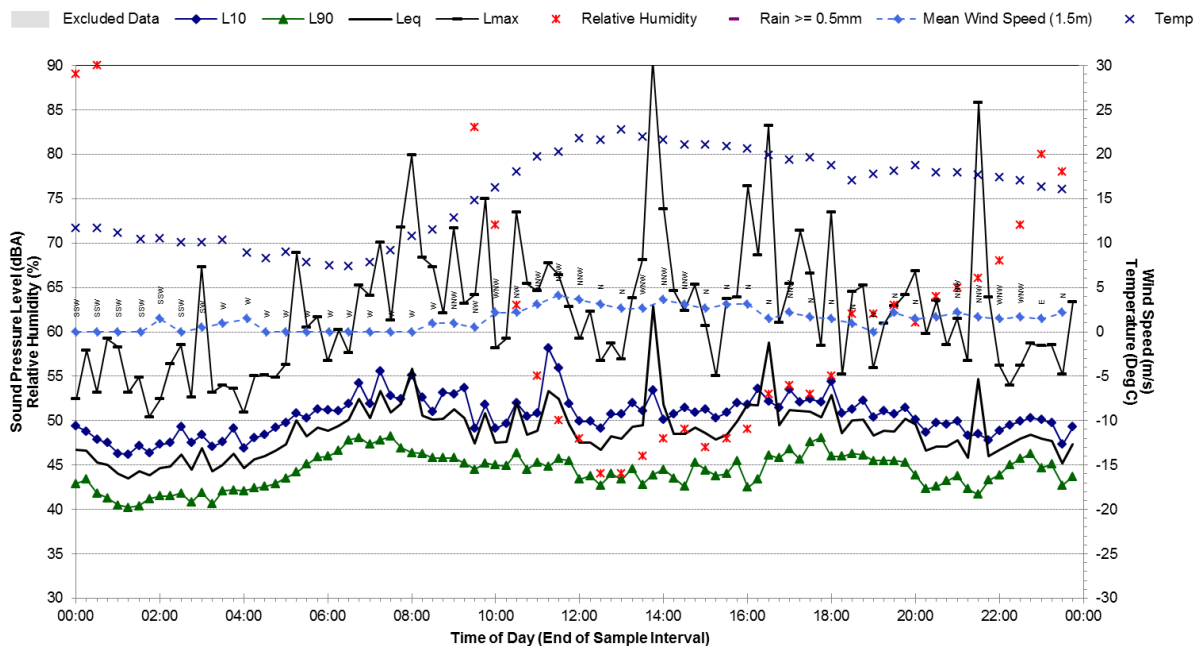
8 Goodenough Street, Glenfield - Thursday, 8 May 2014



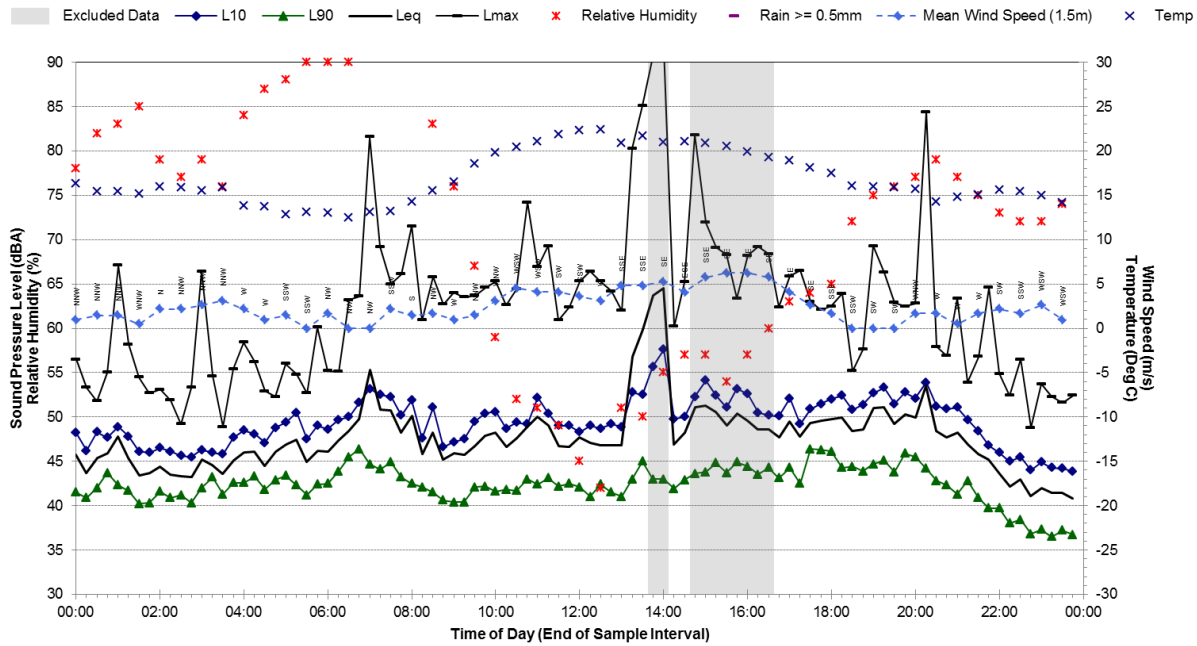
Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Friday, 9 May 2014



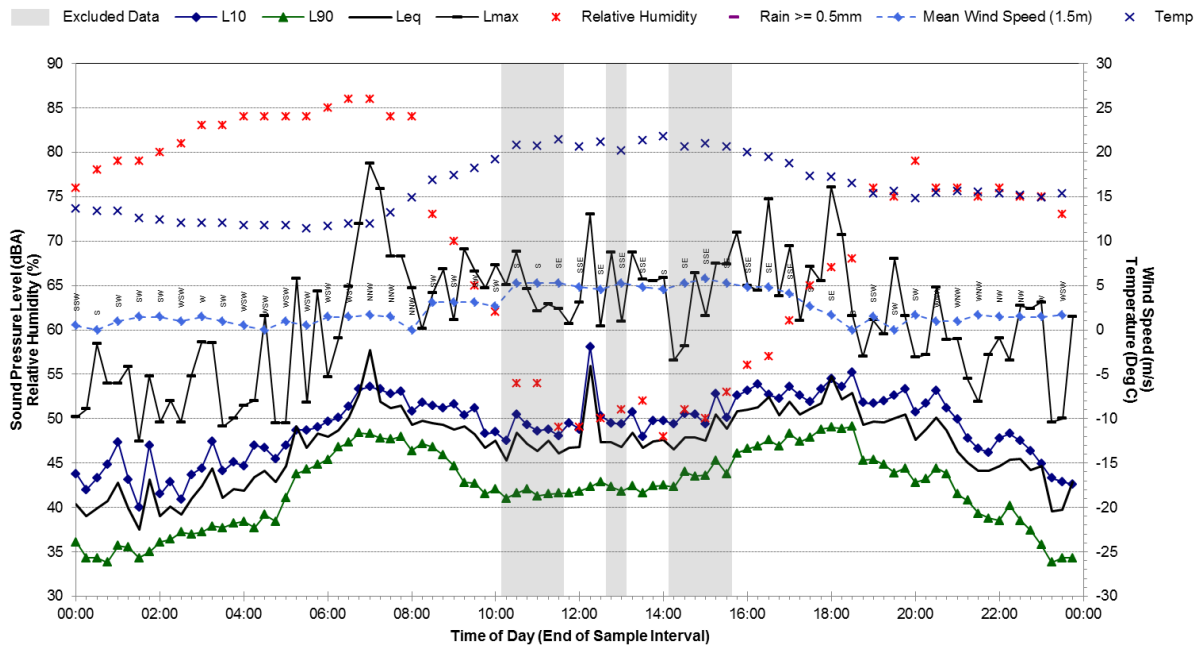
Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Saturday, 10 May 2014



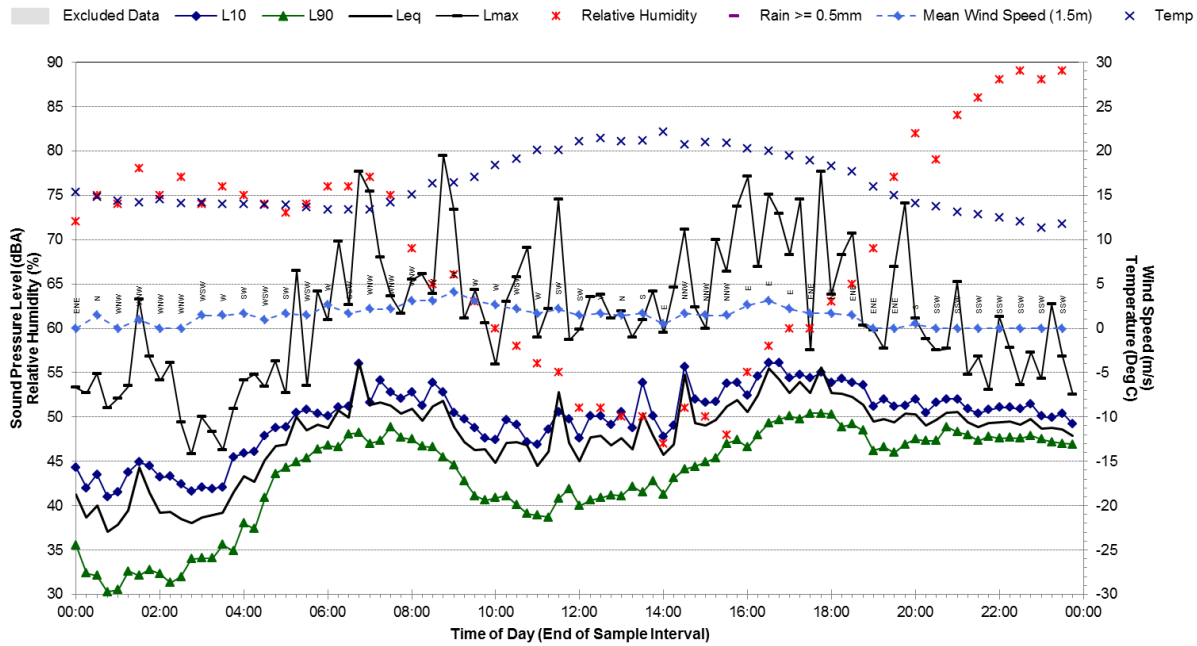
Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Sunday, 11 May 2014



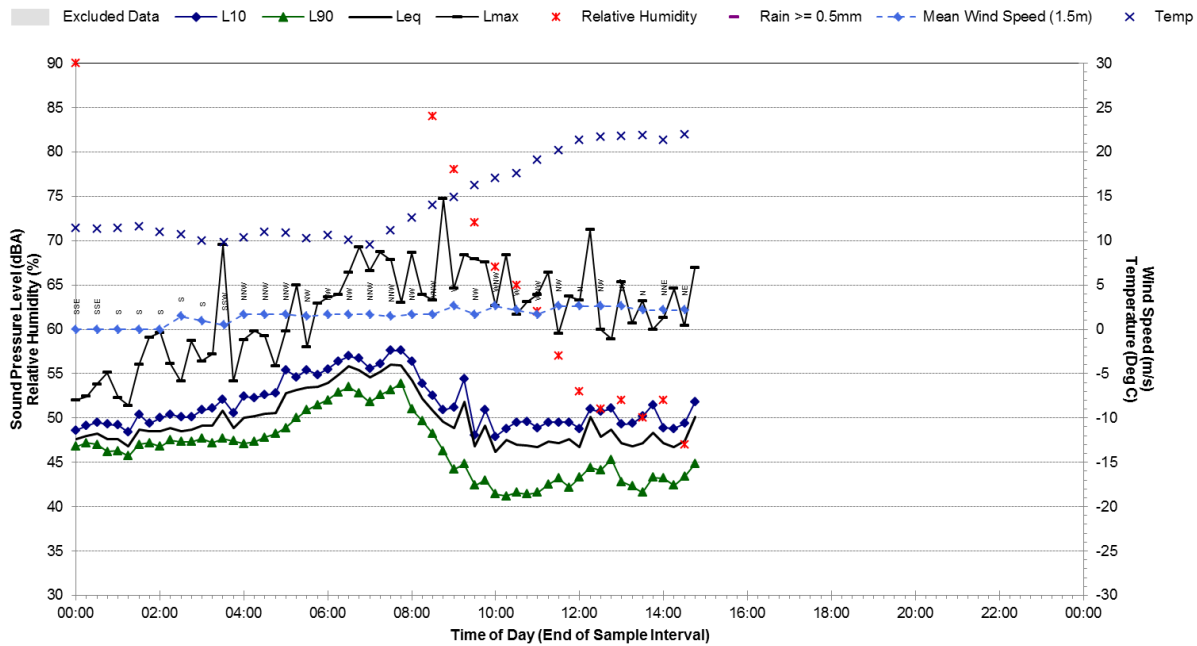
Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Monday, 12 May 2014



Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Tuesday, 13 May 2014



Statistical Ambient Noise Levels 8 Goodenough Street, Glenfield - Wednesday, 14 May 2014



Appendix B:

Operational Equipment Sound Power Levels

Plant and Equipment	Total Sound Power Level	Octave Band Sound Power Level - dBA									
		31Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
Front End Loader	109 dBA	72	92	96	100	101	103	102	99	89	80
Crusher and Screen	114 dBA	65	91	104	102	106	108	106	104	98	91
8t Excavator	98 dBA	62	76	82	87	92	92	91	87	77	69
45t Excavator with Pulveriser attachment	108 dBA	73	87	88	93	100	102	104	99	92	83
Product despatch/delivery trucks (33t Road Trucks)	103 dBA	70	84	87	87	91	95	91	87	77	68
Articulated dump Truck	112 dBA	83	97	100	100	104	108	104	100	90	81

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