Technical Note

ARUP

Level 4, 108 Wickham Street
Fortitude Valley
QLD 4006
GPO Box 685 Brisbane QLD 4001
Australia
www.arup.com

t +61 7 3023 6000
f +61 7 3023 6023

Project title	Cross River Rail	Job number	261603-02
cc		File reference	
Prepared by	Click here to enter text.	Date	10 August 2018
Subject	Noise impacts of proposed coach terminal relocation at Roma Street Station		

1 Introduction

This technical note relates to Roma Street Station and the immediate surrounds and considers the existing situation, the proposed use identified in the reference project and documented in the 2011 Environmental Impact Statement (EIS) for Cross River Rail (CRR) Project and subsequent Request for Project Change (RFPC) approved in 2017, with regard to noise and vibration.

Parkland Crescent is used to access Roma Street Station by vehicle and provides passenger pick-up and set-down locations, a taxi rank and public car park. This was the case at the time of writing of the EIS and remains the current situation. The 2011 Environmental Impact Statement (EIS) for Cross River Rail (CRR) originally contained a construction site for the North Shaft construction on Parkland Crescent at the western end of Platform 10, that necessitated the closure of Parkland Crescent at the intersection with Parkland Boulevard. The road closure also resulted in all access to the construction site for the North Shaft construction being via Parkland crescent. This is shown diagrammatically in Figure 1.

The subsequent previously approved 2017 Request for Project Change (RFPC) realigned the station and CRR route, avoiding the need to construct the North Shaft site identified in the EIS. As such, the need for physical construction activities to occur in proximity to Platform 10 of Roma Street Station was excluded from the previously approved RFPC.

However, under the previously approved RFPC a “general site area” was included taking the whole of the land area. The area including the existing car park and passenger pick-up and set-down locations adjacent to Platform 10 and the residential buildings on Parkland Boulevard is known as Roma Street North Worksite and was identified for use for laydown and storage purposes. This is shown diagrammatically in Figure 2.

Both the EIS and previously approved RFPC works adjacent to Platform 10 entailed a five-year construction period.

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The subject of this current RFPC is to consider repurposing the Roma Street North Worksite (Proposed Site) within the general site area from a laydown and storage work site to a temporary long distance coach terminal with an intended 38-week construction period and 10 year life span. A site locality plan for the proposed coach terminal is shown in Figure 3. The preferred design layout (at the time of writing) for the proposed coach terminal for Parkland Crescent and Parkland Boulevard are shown in Figure 4 and Figure 5 respectively.

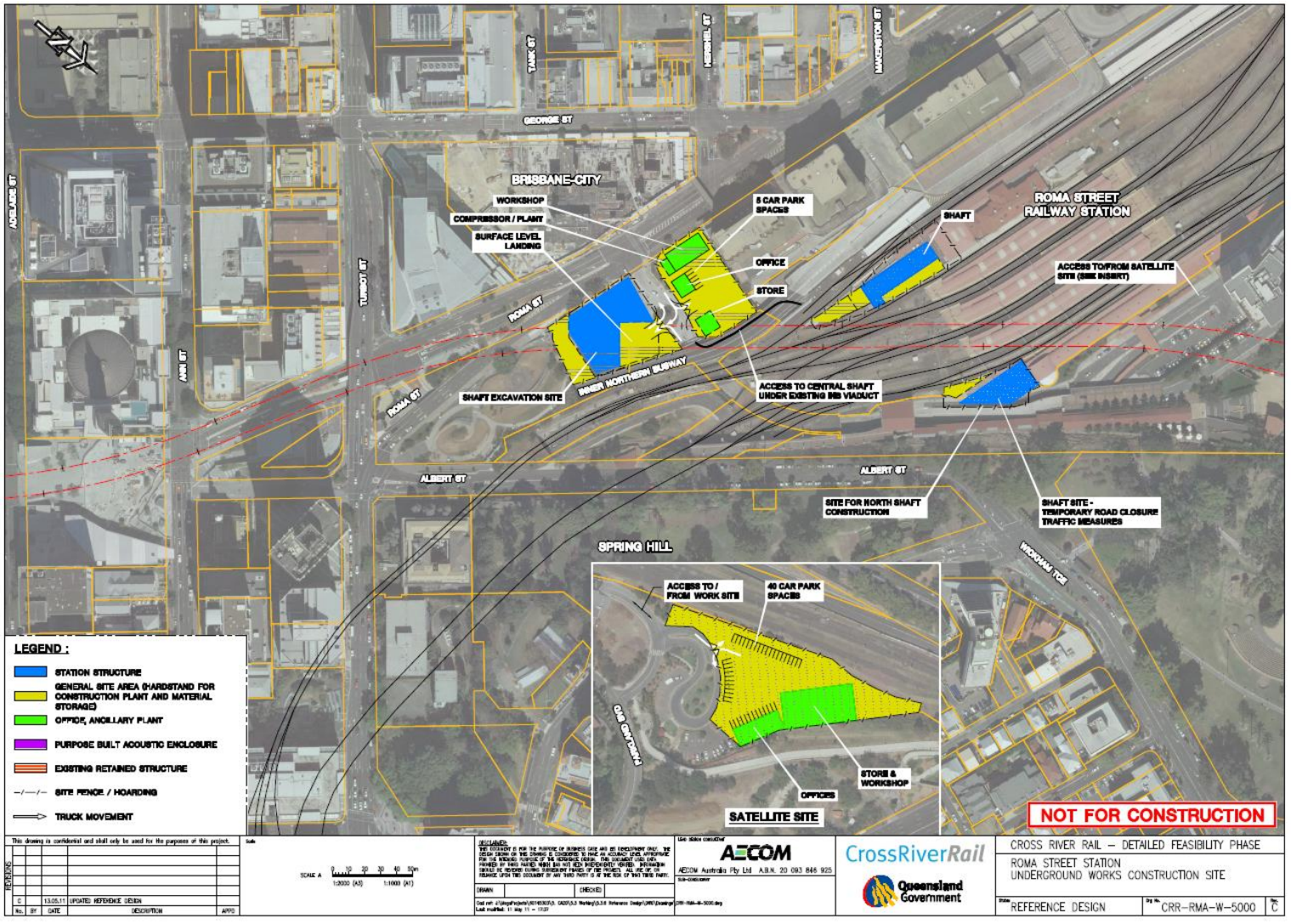


Figure 1: 2011 EIS Construction Site – Roma Street

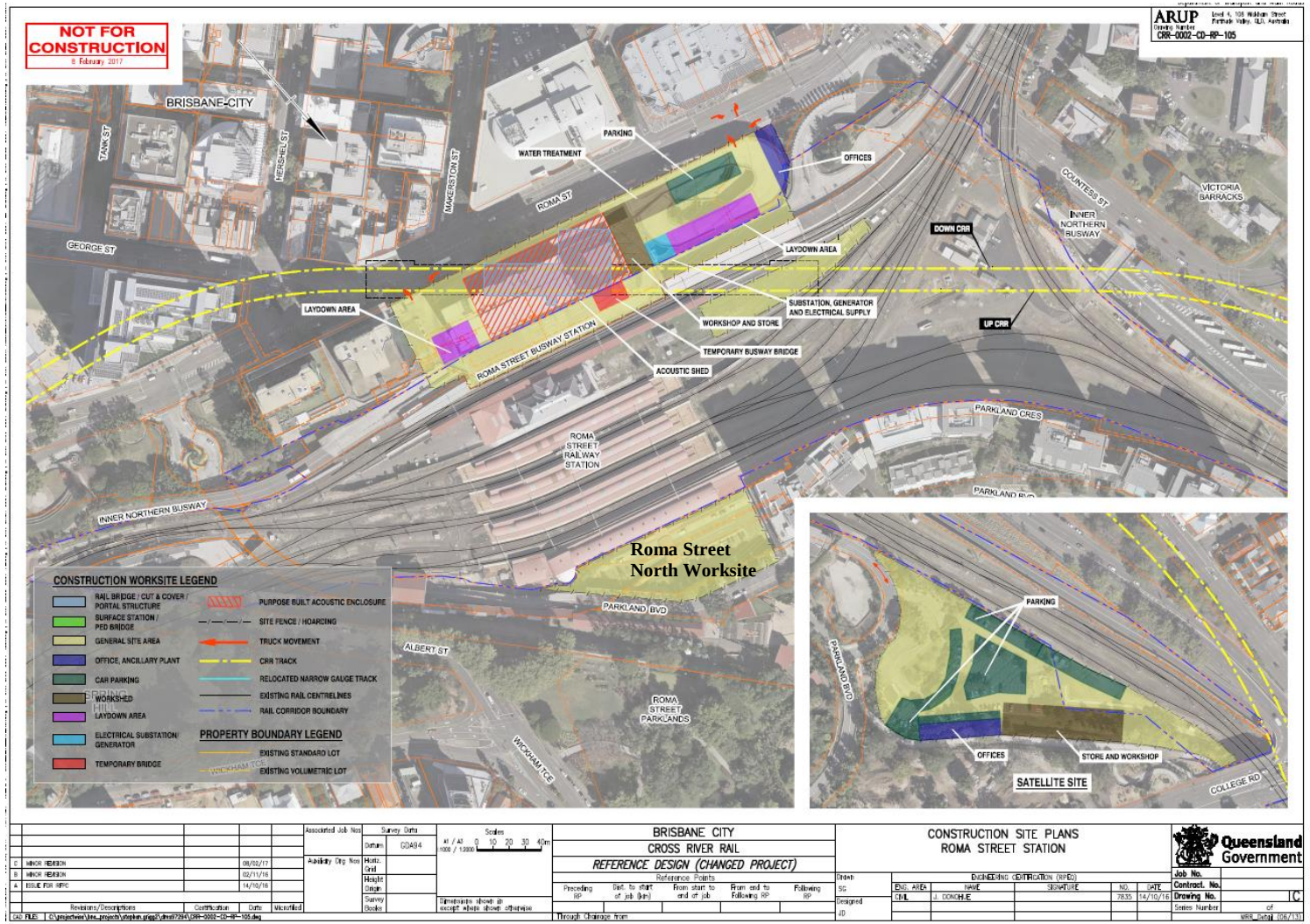


Figure 2: 2017 RFPC construction site – Roma Worksite North

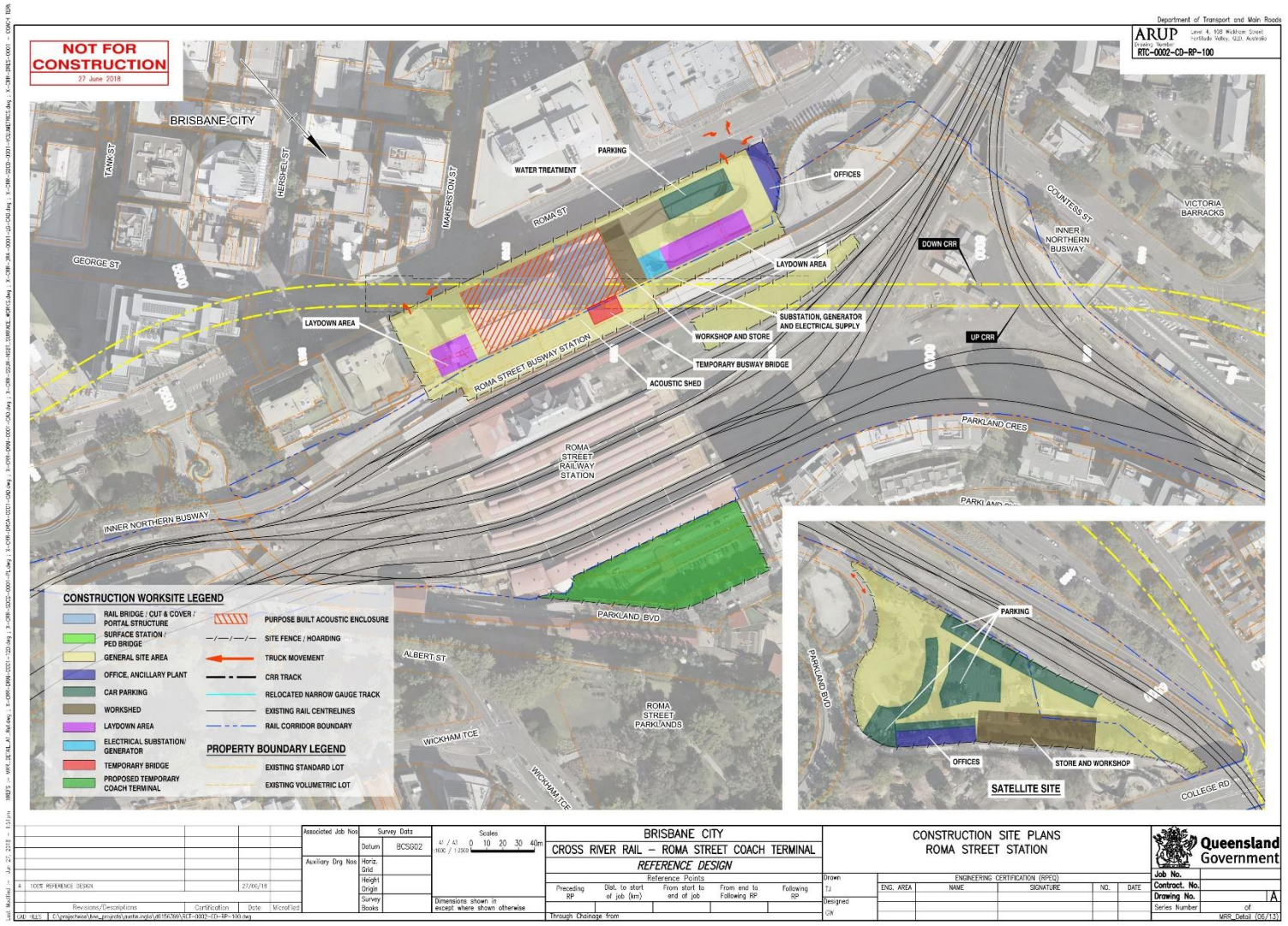


Figure 3: 2018 proposed coach terminal site locality plan

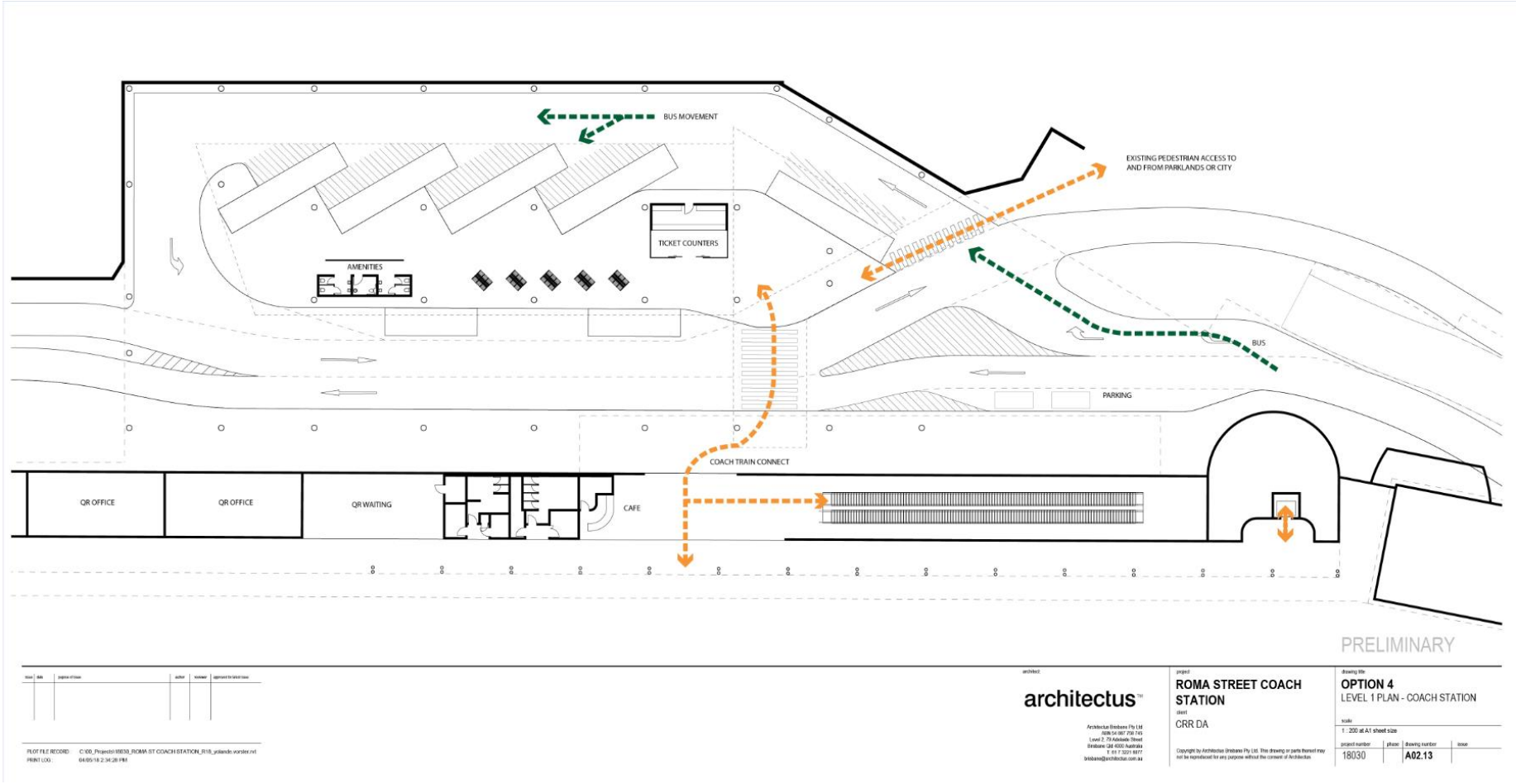


Figure 4: 2018 proposed coach terminal layout at Parkland Crescent

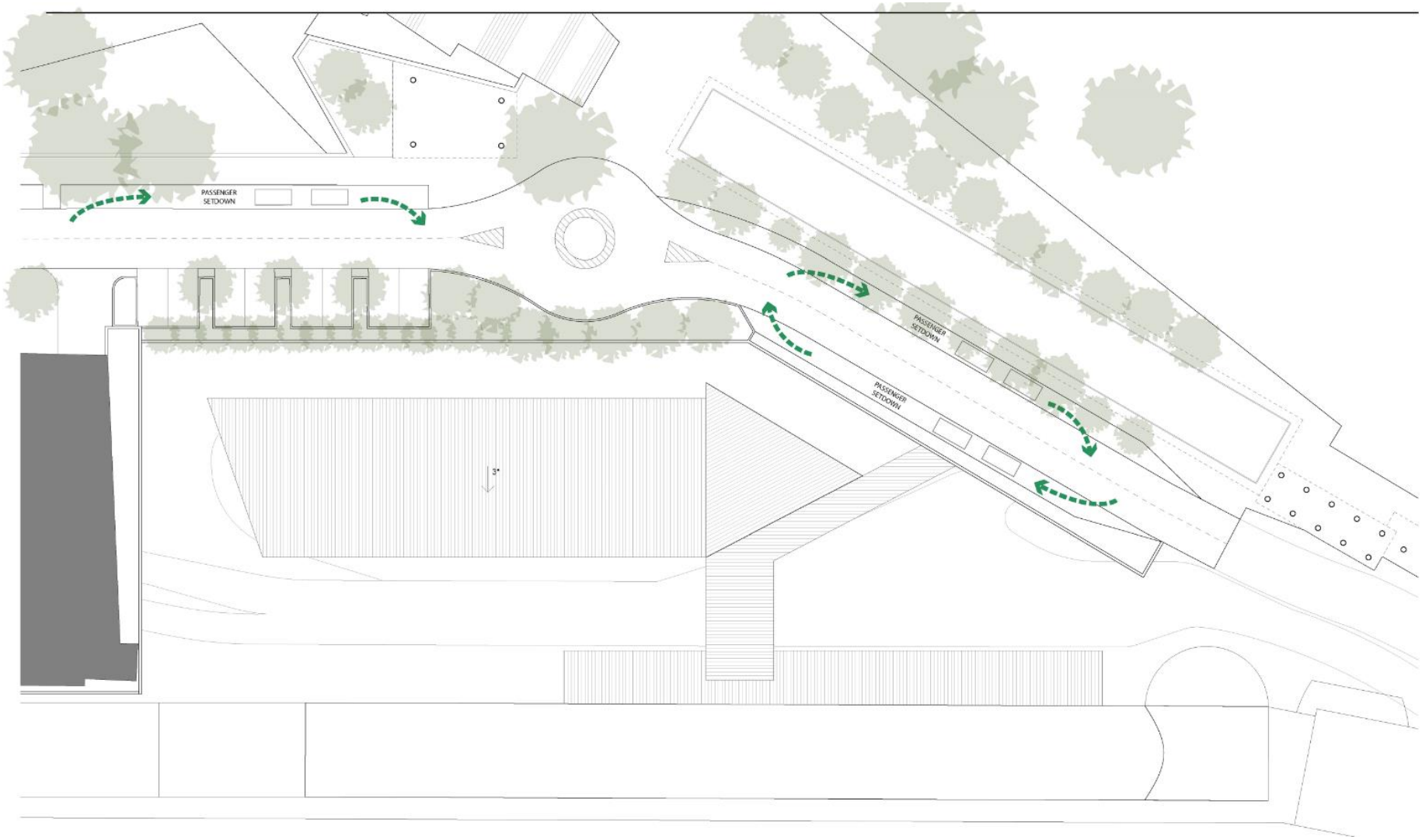


Figure 5: 2018 proposed coach terminal layout at Parkland Boulevard

2 CRR Project Approved Works and Impacts

2.1 Construction

2.1.1 Traffic Noise

For both the EIS and the RFPC, demolition and site establishment would be expected to be for less than six months. The frequency of truck movements is expected to not exceed that of the excavation stage. The peak hourly construction traffic during site establishment and demolition for both the EIS and RFPC is presented in Table 1.

Table 1: Previously approved peak hourly construction traffic (one way movements) for site establishment and demolition

Construction Worksite	**Peak Traffic Movements (Loads / Hour)**	
	2011 EIS	2017 RFPC
Roma Street	10	6

For both the EIS and RFPC, peak daily spoil and delivery vehicle movements are compared in Table 2.

Table 2: Previously approved construction peak daily traffic (one way movements) for spoil and material haulage

Construction Worksite	**Peak Spoil Movements (Loads / Day)**		**Peak Delivery Movements (Loads / Day)**	
	2011 EIS	2017 RFPC	2011 EIS	2017 RFPC
Roma Street	103	39	27	27

Predicted change in traffic noise levels for construction traffic on haul routes was predicted in the EIS using the following parameters:

- L_{A10} (18hour) for between 6 am and 12 midnight; and
- L_{A10} (1hour) for the peak number of heavy vehicle movements during any hour between 12 midnight and 6 am.

The predicted change in traffic noise due to construction traffic in the EIS is presented in Table 3.

Table 3: Predicted change in road traffic noise in the EIS attributable to construction traffic on haul routes

Worksite	**Road Segment**	**Change in Road Traffic Noise Level due to CRR**
Roma Street Station	Roma Street adjacent to existing station	L_{A10} (12hr) +0.3

For the RFPC, it was noted that the EIS traffic volumes where compliant with road traffic noise criteria, therefore the RFPC would also comply with criteria given that construction traffic movement were no greater, and in many cases lower.

2.1.2 Construction Works

Construction activities identified in the EIS at the North Shaft Construction site adjacent to Roma Street Platform 10 were as identified in Table 4.

Table 4: EIS approved construction activities at Roma Street North shaft site

Roma Street Station worksite - north shaft

	Element	Estimated durations (weeks)	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	Year 1
A	Site clearance and establishment	6																											
B	Establish piling rigs on site	4																											
C	Install piles	8																											
D	Excavate to formation level	12																											

Notes:
A: Dominant noise sources include excavators and cranes (mostly daytime construction works)
C: Dominant noise sources include piling rigs (mostly daytime construction works)
D: Dominant noise sources include jumbo drill rigs, excavators and front end loaders

The nearest identified noise sensitive receivers to the North Shaft site were the residential properties on Parkland Crescent located at 150 metres from the proposed North Shaft construction site, referred to in the EIS as Receiver area J.

Worst case construction noise levels were predicted in the EIS for three scenarios as follows:

- Scenario 1 – Site establishment including demolition
- Scenario 2 – Pilling of access shafts
- Scenario 3 – Shaft excavation

The predicted worst case construction noise levels to the residential receivers identified in the EIS were as presented in Table 5.

Table 5: EIS predicted worst case construction noise levels

Receiver Area	Scenario	Period	Noise Goal (dBA)[1]	Predicted Noise Level[2] (dBA)	Noise Goal Exceedance with level of Noise Mitigation (dBA)		
					3 m Hoarding	6 m Hoarding	Enclosure
	2	Night	LAmax,adj – 57	68 – 77	20	15	n/a
	3	Night	LAmax,adj – 57	67 – 76	19	14	7
J – Parkland Crescent Residential	1	Day	LA10,adj – 62	52 – 58	-	-	n/a
	2	Day	LA10,adj – 62	54 – 58	-	-	n/a
	3	Day	LA10,adj – 62	52 – 57	-	-	-
	1	Night	LAmax,adj – 57	57 – 63	6	1	n/a
	2	Night	LAmax,adj – 57	59 – 63	6	1	n/a
	3	Night	LAmax,adj – 57	57 – 62	5	-	-

Note 1 – LA10,adj and LAmax,adj (night-time) assessment parameters applicable for non-steady state and intermittent noise sources. LAeq,adj assessment parameter applicable to steady state or continuous (night-time) noise sources.

Note 2 – Predicted noise levels include 3 m acoustic hoarding between noise sources and receivers.

The EIS identified that the predicted construction noise levels indicate that with provision for 6 m hoarding around each site (where practicable), night-time construction noise levels would be within 1 dB(A) of the sleep disturbance noise goal and therefore unlikely to interfere with the residents sleep. Further to this, it is likely that facade noise reductions for residential buildings located within the CBD are substantially higher than the 10 dB(A) assumed for this assessment.

Further, the EIS identified that in the case of CRR construction works required in the City precinct (i.e. Roma Street Station and Albert Street Station), it may prove onerous to apply absolute noise goals in acoustic environments characterised by relatively constant high ambient noise levels. For example, ambient night-time noise levels measured over a week at monitoring location 6 (i.e. Parkland Crescent) ranged between 75 to 80 dBL_{Amax} and 59 to 63 dBL_{Aeq}. Comparison of predicted night-time construction noise levels in Table 52 with a medium performance acoustic enclosure (e.g. residential receiver I-Holiday Inn L_{Amax} ,adj – 64 dB) indicates that worst case CRR construction noise levels would be below the range of existing night-time ambient (L_{Amax}) noise levels.

The RFPC identifies that the whole of the existing Roma Street Platform 10 car park area will become a construction worksite for the purposes of laydown and storage purposes, therefore under the RFPC, it was noted that the use of the site, whilst larger in area, would revert from a major construction site as identified in the EIS to a non-construction site.

Worst case construction noise predictions were for the Roma Street Station works which identify noise levels at the Parkland Boulevard residential properties, including a 3m site hoarding at worksites, as shown in Table 6.

Table 6: Predicted worst case construction noise levels (unmitigated) from the Roma Street Station worksite for the RFPC

Receptor	Predicted external construction noise levels $L_{A10,adj,15min}$		
	Scenario 1	Scenario 2	Scenario 3
A - Parkland Boulevard Residential	61 - 77	56 - 67	59 - 72

This shows that the mitigated construction airborne noise goals at Parkland Boulevard residential would potentially be exceeded for limited periods, the construction airborne noise goals are identified in Table 7.

Table 7: Construction airborne noise goals from the RFPC

Receiver Location/Type	Monday to Saturday 6:30 am to 6:30 pm		Monday to Saturday 6:30 pm to 6:30 am, Sundays and Public Holidays	
	Steady State (dBA $L_{Aeq,adj,15min}$)*	Non-Steady State (dBA $L_{A10,adj,15min}$)*	Continuous (dBA $L_{Aeq,adj,15min}$)*	Intermittent (dBA L_{Amax})*
Parkland Boulevard Residential	67	77	57	64

2.2 Operation

The proposed design in the EIS had limited operational noise contribution from the area adjacent to Roma Street Platform 10. Operational noise sources consisted of Parkland Crescent plant and ventilation shaft with operational plant being located approximately 130 m from the nearest noise sensitive receivers. The residential apartments located on Parkland Crescent.

The identified noise goals for operation in the EIS are shown in Table 8.

Table 8: Operational Noise Goals from the EIS

Site Location	Ancillary Location	Distance to Nearest Sensitive Receiver (m)	Noise Goal (dBL_{A90})[1]	Maximum Acceptable Sound Power Levels emitted from the Ancillary Facility (dB(A))
Roma Street Station	Southern Entry	~80	47	93
	Parkland Crescent Plant and Ventilation Shaft	~130	47	97

In terms of operational noise assessment, the EIS simply defined the maximum acceptable sound power level identified in Table 8 for each worksite in order to achieve compliance with the noise goals.

Under the RFPC it was noted that the site area adjacent to platform 10 was no longer a source of operational noise unlike in the EIS due to the removal of the North Shaft site and associated ancillary equipment from the area. Therefore, operational noise was considered no further for the site adjacent to Platform 10.

3 Material Changes to impacts

3.1 Assessment Methodology

For the purposes of identifying the risk of change from previously approved works in the site area adjacent to Roma Street Platform 10 (i.e. the area of the proposed coach terminal), a comparison has been made between previously approved construction and operational activities and those that are likely to occur under the proposal for the coach terminal.

These comparisons also consider the relative distance of the proposed and previously approved activities as part of the identification of risk of change in noise impact.

These assessments are qualitative in nature and where risk of a change in impact level is identified a recommendation for further detailed assessment will be identified.

[1] Background creep noise goal in accordance with EPP (Noise). The background creep is the RBL + 0 assessed as the L_{A90} parameter.

3.2 Results and Discussion

3.2.1 Construction

At this early stage in the development of the design, the details of proposed construction requirements have not been established. Therefore, for the purposes of the noise assessment, the construction requirements for the proposed coach terminal have been assumed as follows:

- The existing car park and road surfaces in the proposed coach terminal location are likely to be adequate to form the running surface for the coach terminal where currently in place;
- Some or all existing concrete slabs will need to be removed;
- Some existing kerb lines may need removing / relocating and the ground surface making good;
- Some minor trenching may be required for utilities (e.g. cabling);
- Some minor ground works (levelling of ground not currently asphalted) may be required;
- Concrete pad foundations may need to be laid in passenger loading and transfer areas where canopies are to be provided for weather protection to patrons;
- Canopies would be quick fix bolt down type modular steel frame with sheet metal cladding attached;
- Road line marking would be required;
- Installation of ticketing machines and other similar equipment such as digital signage.

This extent of construction is relatively minor and would be expected to be undertaken over a 38-week period as required to provide an ongoing coach terminal ahead of the demolition of the existing coach terminal at the Brisbane Transit Centre (BTC).

It is anticipated that the construction duration for the proposed coach terminal would be 38 weeks, which is significantly shorter than the proposed five-year construction period for the same area, under the 2011 EIS and 2017 RFPC.

In terms of worst case construction activities for the proposed temporary coach terminal, they are considered to be akin to the Stage 1 site establishment activities identified in the EIS which resulted in predicted construction noise levels of 52 to 58 dB(A) with a 3m high noise barrier at the Parkland Crescent residential buildings for a site located 150m distant away.

It is likely that construction plant for the coach terminal would on average be located approximately 30 metres from the nearest façade of the Parkland Crescent residential properties and would not be screened by a noise barrier as a consequence of the Parklands Crescent apartments overlooking the site effectively rendering a noise barrier ineffective.

Simplistically correcting for the difference in distance of the EIS construction works compared to the coach terminal construction works and removing 10 dB(A) screening to account for the lack of an effective noise barrier, the temporary coach terminal site establishment construction works would give rise to construction an increase in noise levels predicted in the EIS by 24 dB(A) at the nearest apartment building on Parkland Avenue. Therefore, the likely worst case construction noise levels for the proposed temporary coach terminal are in the range of 76 to 82 dB(A) during site establishment, a short duration activity.

This is considered likely to be representative of the worst case construction noise levels that would be experienced at the nearest Parkland Crescent residential apartments from the site establishment stage of construction of the coach terminal.

All latter stages of construction are expected to generate a considerably lower level of construction noise as much will be pre-fabricated off site and effectively put together on site rather than constructed.

It should be noted that the identified noise goal for construction activities at the Parkland Crescent residential properties identified in the RFPC is 67$dB_{LA10adj, 15min}$ for steady state noise and 77 $dB_{LA10adj, 15min}$ for non-steady state construction activities.

Therefore, the proposed coach terminal site establishment construction activities are likely to exceed the construction noise goals at the Parkland Boulevard residential properties as identified in the RFPC by approximately 5 dB(A).

With the nearest residential building on Parkland Boulevard directly overlooking the proposed coach terminal site it will not be possible for noise barriers to be used as a form of noise mitigation for construction activities, however, unlike tunnelling works and associated spoil removal activities it is anticipated that the coach terminal can be constructed within "Standard" daytime construction hours, being, 6.30am to 6.30 pm Monday to Saturday, and as such avoid potential impact at the more noise sensitive periods of the day.

This assessment and recommendations are based on construction methodology with limited earthworks, ground disturbance and reliance on prefabricated materials to limit noise generating activities on site. A detailed noise assessment is required in the event construction methods are substituted with high noise and / or vibration construction methods.

3.2.2 Operation

It is expected that the proposed coach terminal will accommodate all services (i.e. coaches and minibuses) currently operating out of the BTC, including long distance coaches and tour buses. Based on an analysis of the existing coach timetables and traffic surveys, it appears that a maximum of approximately 75 coaches per day currently access the facility. Typically, coaches arrive and depart the facility between the hours of 5am and midnight. Based on the coach terminal layout, a maximum of seven coaches / minibuses will be able to utilise the facility at a given time. Based on the timetable and traffic survey analysis, it is anticipated that the terminal will be operating at capacity a few times per day. Excluding the few peak periods during a given day, typically three to four coaches per hour are anticipated to access the facility.

Whilst the effect of traffic noise was not considered for operation in the EIS or RFPC, traffic noise from construction traffic for spoil removal and deliveries was assessed. Of note, the trucks associated with these movements where in the order of 130 movements daily on the Roma Street network and resulted in a change in traffic noise levels of +0.3 dB(A) on the road network. The proposed coach terminal will utilise less coaches than trucks as previously identified in the EIS for construction. Coaches and trucks are comparable in noise emissions, therefore negligible change in road traffic noise levels is expected for the operation of the coach terminal.

That said, consideration also needs to be given to the coach operation proximity, in particular to the Parkland Boulevard residential property adjacent to the proposed coach terminal. The coaches at the terminal would be approximately 30 metres distant from the building façade typically.

The number of vehicle movements associated with the development are too low to be able to calculate traffic noise in accordance with the calculation of road traffic noise methodology.

Therefore, consideration has been given to the likely maximum noise of a coach accelerating from the terminal as the worst case scenario. Based on simplistic calculations accounting for only distance and none other noise propagation loss it is likely that the maximum noise level at the nearest point of the building façade would be in the order of 70 dB(A).

For operational road traffic noise, the applicable noise criteria is 68 $dBL_{A10,\ 18hr}$ in accordance with the DTMR Road traffic Noise code of Practice. This is the 10^{th} percentile of noise contribution from road traffic noise averaged over an 18 hour period. Given that the maximum noise level is anticipated to be 2 dB(A) above this for a short duration acceleration away from the terminal and that can only be expected 75 times in a given day, it is expected that total noise emissions from coach movements will be compliant with the road traffic noise criteria.

Consideration has also been given to the potential for use of reversing alarms for coaches backing out of the parking bays. Reversing alarms fitted to coaches come in many forms, some are activated by proximity centres and as such only activate if an obstruction is detected in the hazard area when a vehicle is reversing, however the worst case from a noise perspective are the beeper type reversing alarms that are activated when a vehicles reverse gear is selected. For the purposes of this assessment the worst case has been assumed for which noise levels of reversing alarm beepers fitted to coaches can be up to 97 dBL_{Amax} when measured at 1 metre. Simply extrapolating this noise level from the nearest coach parking bay in the proposed temporary coach terminal to the nearest Parklands Boulevard residential apartments would result in a noise level from reversing beepers of 70 dBL_{Amax}, some 3 to 7 dB(A) lower than the existing typical maximum noise levels at the apartments day, evening or night.

It should also be further factored in that the orientation of the coach parking bays relative to the nearest Parklands Boulevard residential apartments is such that the rear of the coach is facing away from the apartments which would result in the body of the coach acting as an effective noise barrier between the apartments and the coach reversing alarms to reduce noise levels yet further, likely a minimum of 5-10 dB(A) at the residential apartments.

It should also be noted that at this location adjacent to the railway tracks of Roma Street that the residential properties will also be exposed to railway noise and that the noise criteria applicable to the railway is a maximum of 87 dB(A), substantially higher than the anticipated maximum from coaches.

Further, existing ambient noise levels at the nearest apartment block to the proposed temporary coach terminal undertaken for the EIS indicate that the typical existing ambient noise environment is 64 dBL_{Aeq} during the day, 62 dBL_{Aeq} during the evening and 57 dBL_{Aeq} during the night-time periods. The typical maximum existing noise levels at the nearest apartment block to the proposed temporary coach terminal undertaken for the EIS are identified as 77 dBL_{Amax} during the day, 75 dBL_{Amax} during the evening and 73 dBL_{Amax} during the night-time period, the maximum noise events are considered likely to be associated with train movements at Roma Station.

Appended to this technical note is a table of predicted operational façade noise levels and façade noise maps for the façade of the nearest apartment building on Parklands Avenue overlooking the proposed temporary coach terminal. Both the noise table and the façade noise maps present predicted noise levels for the day, evening and night-time periods of operation for the proposed temporary coach terminal. These are presented for the average (L_{Aeq}) and maximum ($L_{A}max$) noise emissions predicted from operation of the proposed temporary coach terminal.

It should be noted that in both the predicted façade noise level table and the façade noise maps that the ground floor and 1st floor represent the commercial space of the building and that the first of the noise sensitive residential floors is on Level 2.

The colour scale associated with the façade noise maps has been set such that the predicted noise level on the façade will be in varying shades of colour from green through to purple with red indicating the noise level at which measured existing noise levels for the respective acoustic parameter during that period occurs. Shades of colour below red towards green indicate that the predicted operational noise from the temporary coach terminal are lower than the existing noise environment and as such would not give rise to a cumulative increase in the noise environment over the existing.

On this basis, cumulatively the maximum noise emissions anticipated from the proposed temporary coach terminal are likely to be lower than the prevailing maximum noise levels experienced at the nearest apartment block on Parklands Avenue and as such would only result in an increased frequency of maximum noise events.

With regard to frequency of maximum events, comparison between the number of train movements likely to be the cause of the existing maximum noise events and the proposed coach movements associated with the proposed coach terminal provides a useful gauge of likely change associated with the proposed coach terminal.

A review of the operational timetable for passenger trains passing through Roma Street Station has been undertaken and identified that week day daily services amount to 673 trains in a 24-hour period. They are split approximately 471 trains in the daytime period, 109 trains in the evening period and 93 trains in the night-time period.

Whereas there are 75 coaches passing through the proposed temporary coach terminal which will give rise to approximately 12% increase in the number of events that the Parklands Boulevard apartments would be exposed to. With the exception of 4 of the timetable coach movements, these movements would all occur during the daytime period and only one coach movement would occur in the night-time period.

Given the negligible quantity of coach movements during the evening and night-time periods this would not be perceptible cumulatively amongst the significantly greater number of train movements.

During the daytime period coach movements would have a marginally greater cumulative effect with approximately 1 coach movement for every 6.4 train movements, whilst this is more regular occurrence than the evening and night-time period, cumulatively the coach movements remain

considerably less frequent than the existing trains and as such cumulatively would not be expected to give rise to a significant change in the existing noise environment.

Consideration has also been given to the cumulative noise effect of the existing noise environment (refer to appended noise monitoring graphs for detail) as determined for the EIS combined with the predicted noise from the proposed temporary coach terminal. Cumulative noise levels are provided in the following table.

Description	dBLaeq						dBLamax					
	Day[2]		Eve[3]		Night[4]		Day		Eve		Night	
	Average	Maximum	Average	Maximum	Average	Maximum	Typical	Maximum	Typical	Maximum	Typical	Maximum
Existing measured noise levels at Parklands Crescent from the EIS	64	75	62	67	57	65	77	80	75	76	73	76
Predicted coach terminal noise	57		34		28		69		69		69	
Cumulative noise level	65	75	62	67	57	65	78	80	76	77	74	77
Range of cumulative change	1	0	0	0	0	0	1	0	1	1	1	1

As can be seen from the above, the cumulative noise levels of the proposed coach terminal operation combined with existing noise levels at the nearest apartments on Parklands Crescent overlooking the proposed coach terminal development from the EIS have been considered for both the LAeq and LAmax parameters for each assessment period.

The cumulative assessment has been considered for both the average LAeq reported in the EIS and the maximum LAeq measured in the EIS for each period of the day.

[2] 0600 to 1800hrs
[3] 1800 to 2200hrs
[4] 2200 to 0600hrs

As can be seen for the LAeq parameter the predicted operational coach terminal noise levels at the Parklands Crescent apartment building overlooking the proposed coach terminal are lower than the existing measured noise levels from the EIS in all cases. Cumulatively this results in an insignificant 1 dB(A) change in noise level when compared to the existing average daytime LAeq noise level only. For existing daytime maximum noise level there is no cumulative change in noise level expected.

For the LAmax parameter the predicted operational coach terminal noise levels at the Parklands Crescent apartment building overlooking the proposed coach terminal are also lower than the existing measured noise levels from the EIS in all cases. Cumulatively this results in an insignificant 1 dB(A) change in noise level when compared to all bar the existing maximum daytime LAmax noise level. For daytime maximum and both the average and maximum existing noise level cumulative comparison shows no change to noise levels are expected cumulatively.

It should also be noted that the proposed operations of the temporary coach terminal identify one coach movement in the night-time period and for all periods of the day the frequency of train movements on the adjacent railway lines are many magnitudes of order greater than the proposed coach movements at the temporary coach terminal.

Whilst the existing coach terminal uses PA to announce to passengers when coaches are boarding, the proposed coach terminal will use dynamic signage, this avoids the potential for annoyance of PA announcements at noise sensitive properties. Therefore, PA noise has not been considered any further.

The proposed coach terminal may have some small items of plant such as cooling fans for electrical items and possibly some enhanced cooling for shared QR/ Coach terminal facilities, should this be the case, the noise emissions from the plant would be designed to meet planning design noise goals through the implementation of appropriate plant selection and attenuation if necessary. Therefore, this would be compliant with BCC planning noise criteria and cumulatively insignificant, therefore plant noise emissions have not been considered any further.

There is the potential for an increase in patron volume to occur as a consequence of the proposed coach terminal. Whilst the patron numbers associated with the proposed coach terminal have not been identified as this stage, it is reasonable to assume that a typical coach would hold approximately 46 passengers (weighted average based on five coaches with 56 person capacity and two minibuses with 22 person capacity) and with a maximum of 75 coach trips a day that would equate to a maximum of approximately 3500 potential patrons. In practice that is likely to be an overestimate as some passengers maybe through passengers and some coaches will not be at maximum capacity.

When compared with the patron levels associated with Roma Street Station, the patron numbers of the proposed coach terminal are unlikely to materially change patron noise levels at the nearest noise sensitive properties.

4 Recommendations and Conclusion

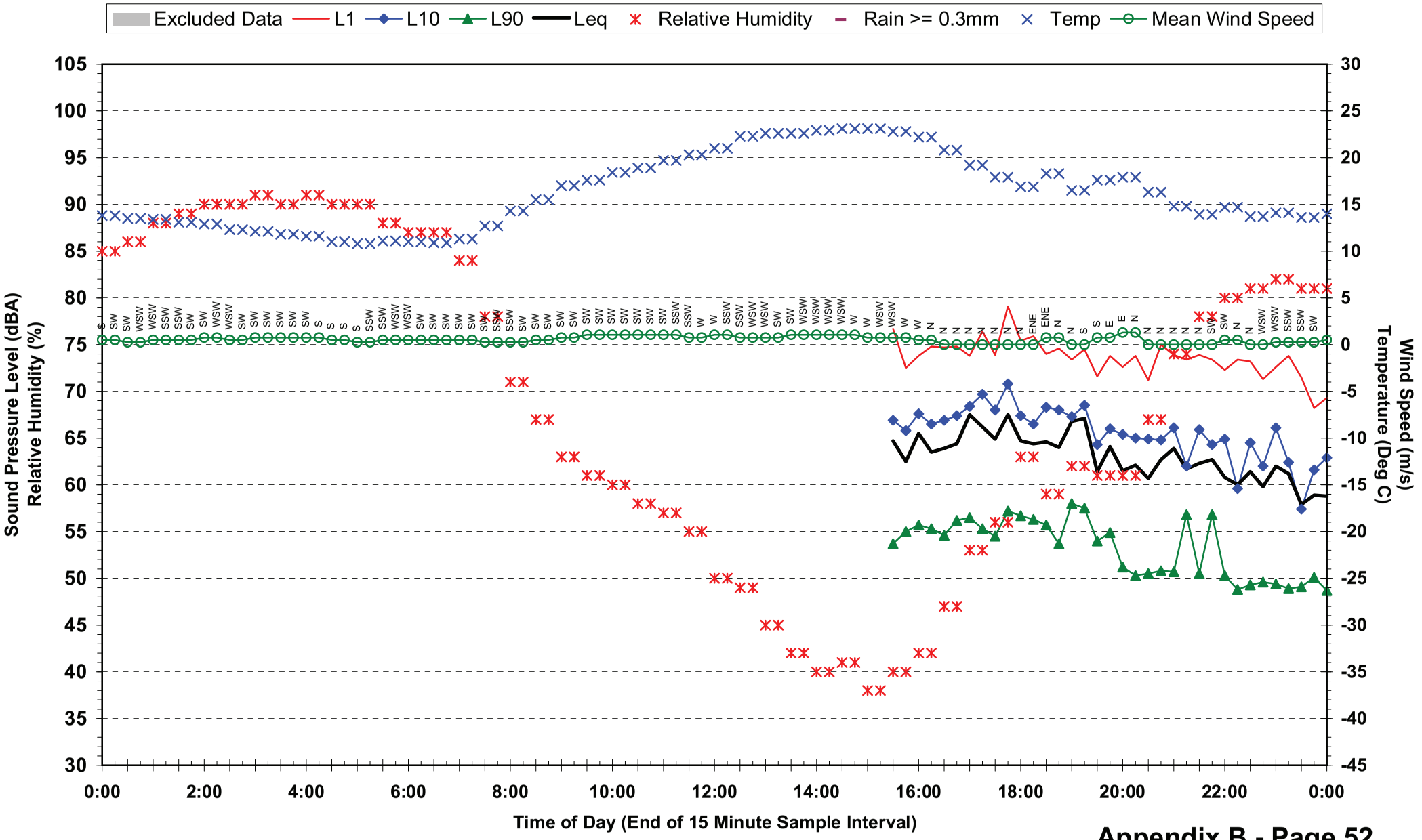
- The proposed coach terminal has been reviewed for construction noise and subject to assumptions about the scale and type of construction activities required for the development of the proposed temporary coach terminal is considered no worse than the construction works previously approved under the Project Change Request. The construction activities associated with the proposed temporary coach terminal are predicted to be in the range 66 to 72 dB(A), the previously approved construction noise levels under the Project change Request were in the range 56 to 77 dB(A).
- The proposed operation of the coach terminal has been reviewed and is considered no worse than the delivery and haul truck noise levels required for the construction phases of both the EIS and the RFPC.
- The proposed operation of the coach terminal has also been compared against DTMR Road Traffic Noise criteria, and traffic volumes arising from the operation of the coach terminal would be compliant with noise limits.
- The proposed operation of the coach terminal has also been considered from a maximum noise level perspective. Whilst reasonably high maximum noise levels, circa 70 dB(A) are predicted briefly during coach acceleration, the relatively low number of coach services from the proposed coach terminal operation would not materially change the existing noise environment which is dominated by train noise such as sounding of horns prior to departure, train cooling systems and wheel squeal.

  As also identified in previous assessment the existing noise environment in the vicinity is high, as is typical of urban city centres. Consequentially residential buildings constructed in a high noise environment would be constructed with a building envelope providing high sound insulation. As such maximum noise levels from the operation of the coach terminal are considered unlikely to materially alter the existing noise environment at the nearest residential properties on Parkland Boulevard.

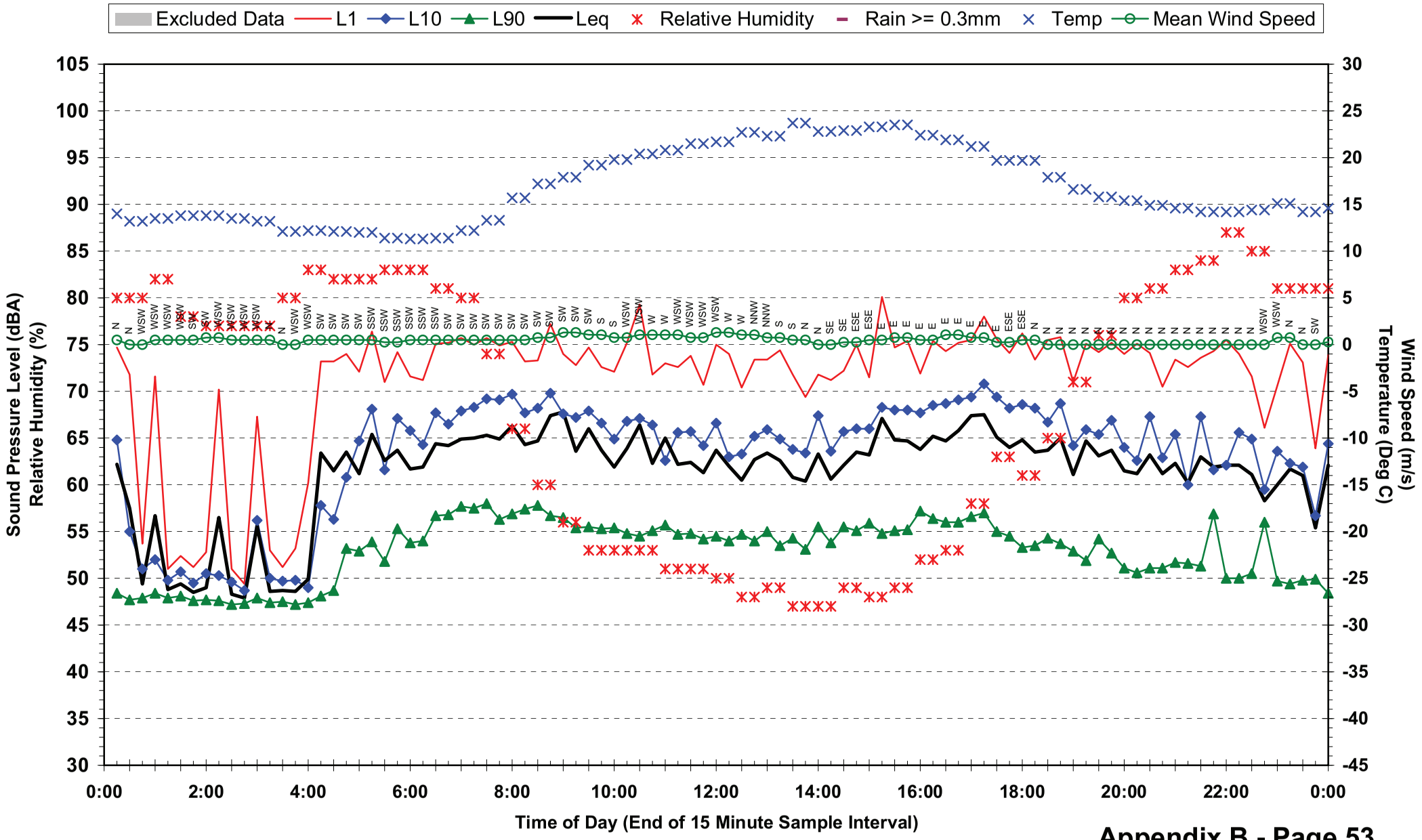
DOCUMENT CHECKING (not mandatory for File Note)

Name			
Signature			

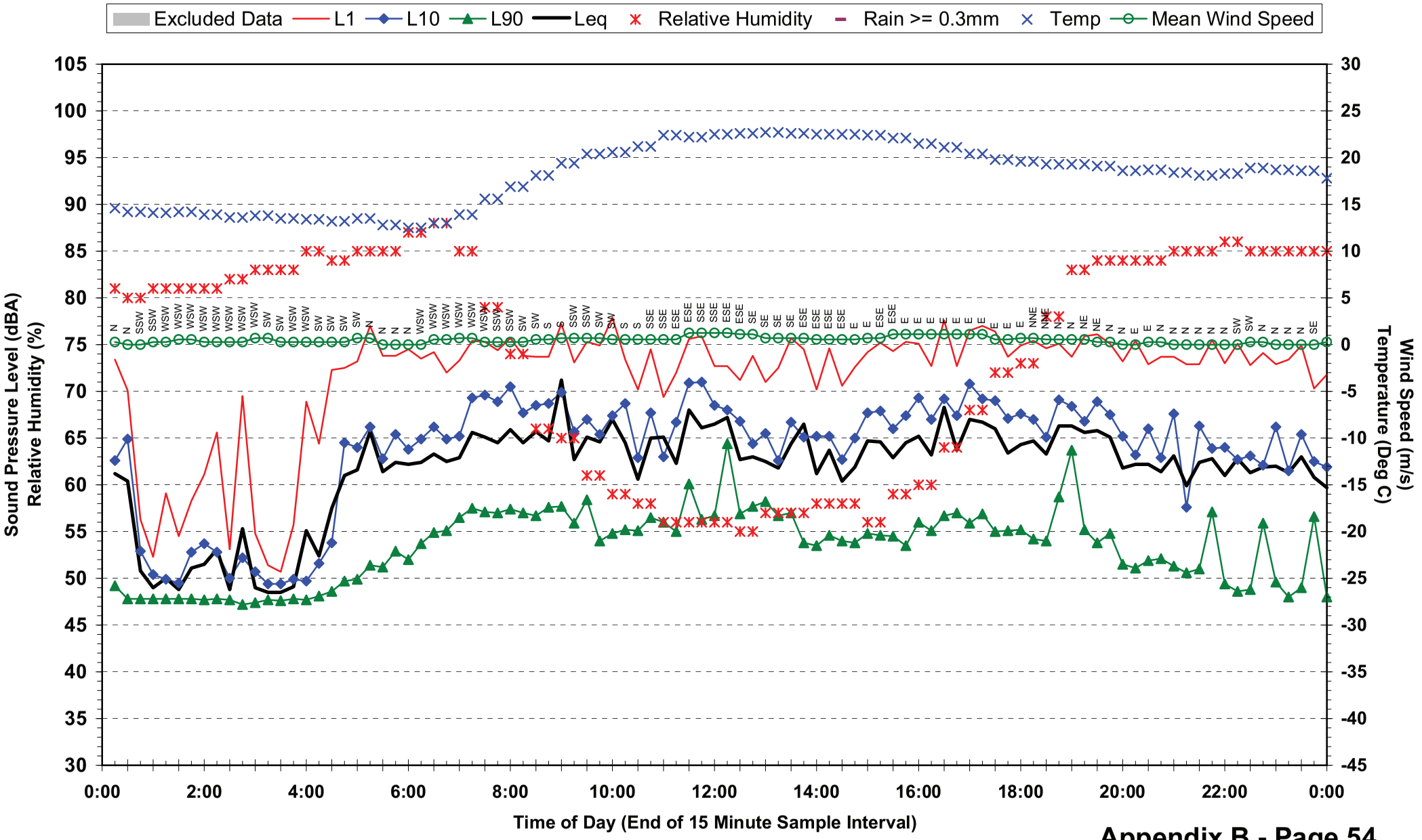
Statistical Ambient Noise Levels
Location 6 - Parkland Cres - Tuesday 18 May 2010



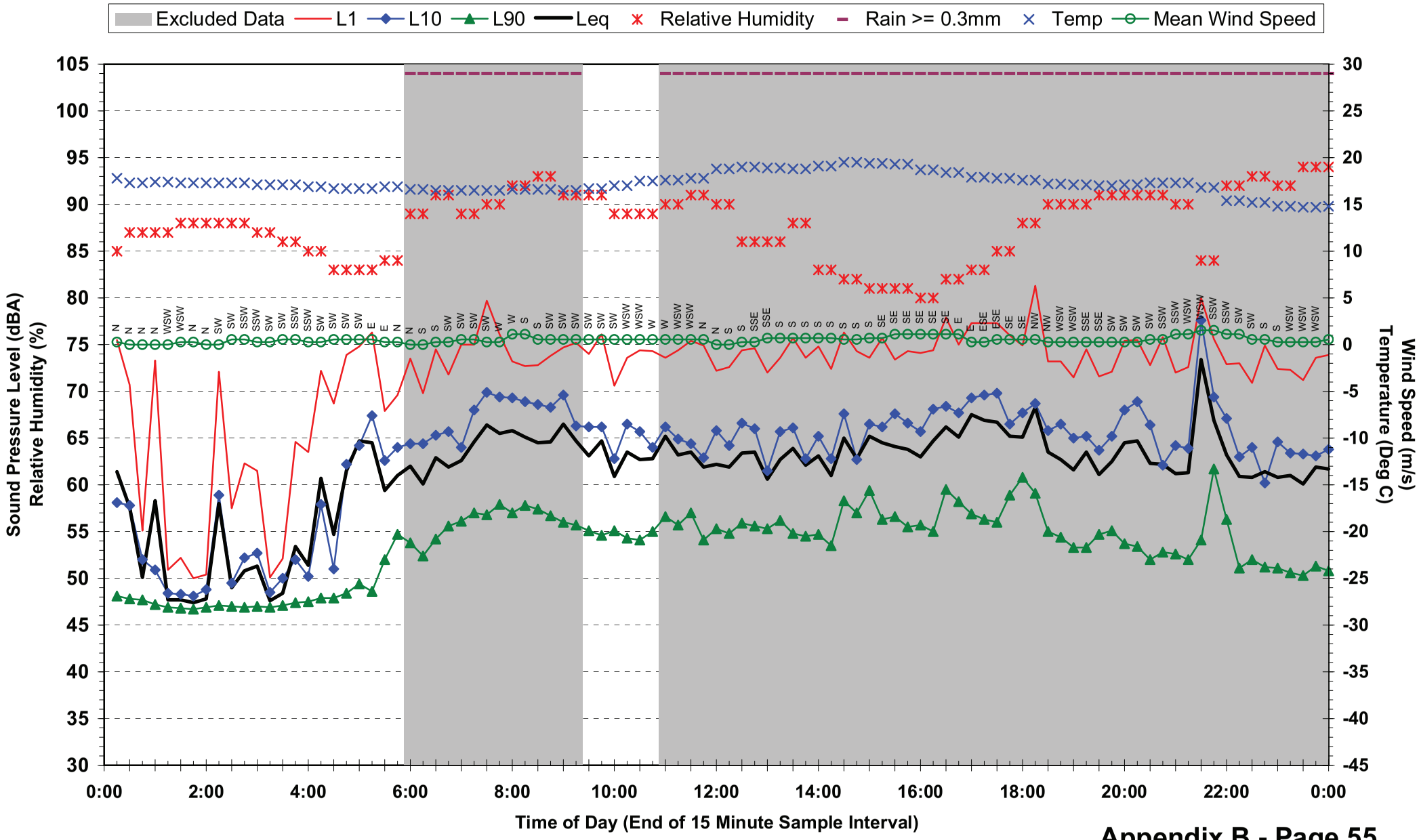
Statistical Ambient Noise Levels
Location 6 - Parkland Cres - Wednesday 19 May 2010



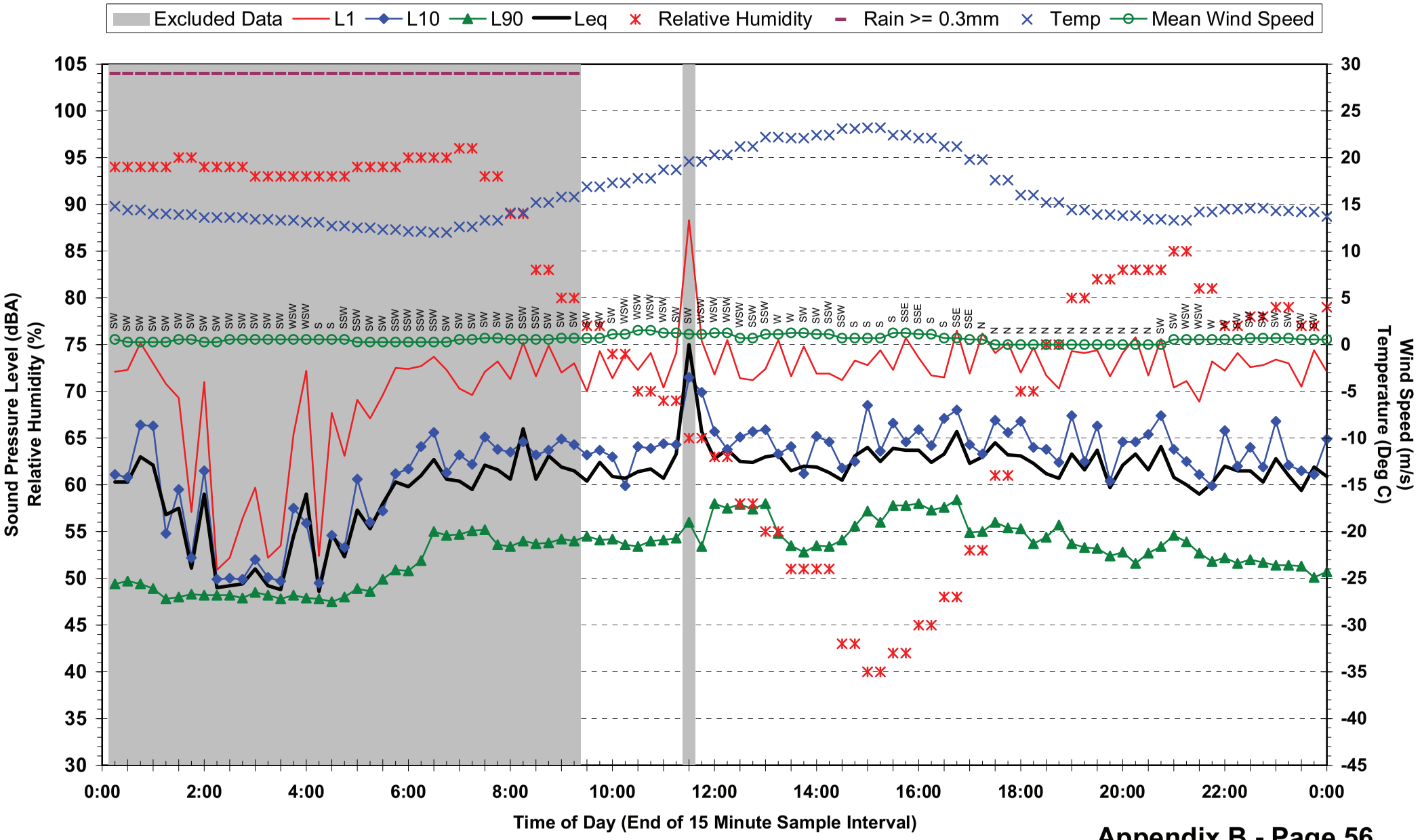
Statistical Ambient Noise Levels
Location 6 - Parkland Cres - Thursday 20 May 2010



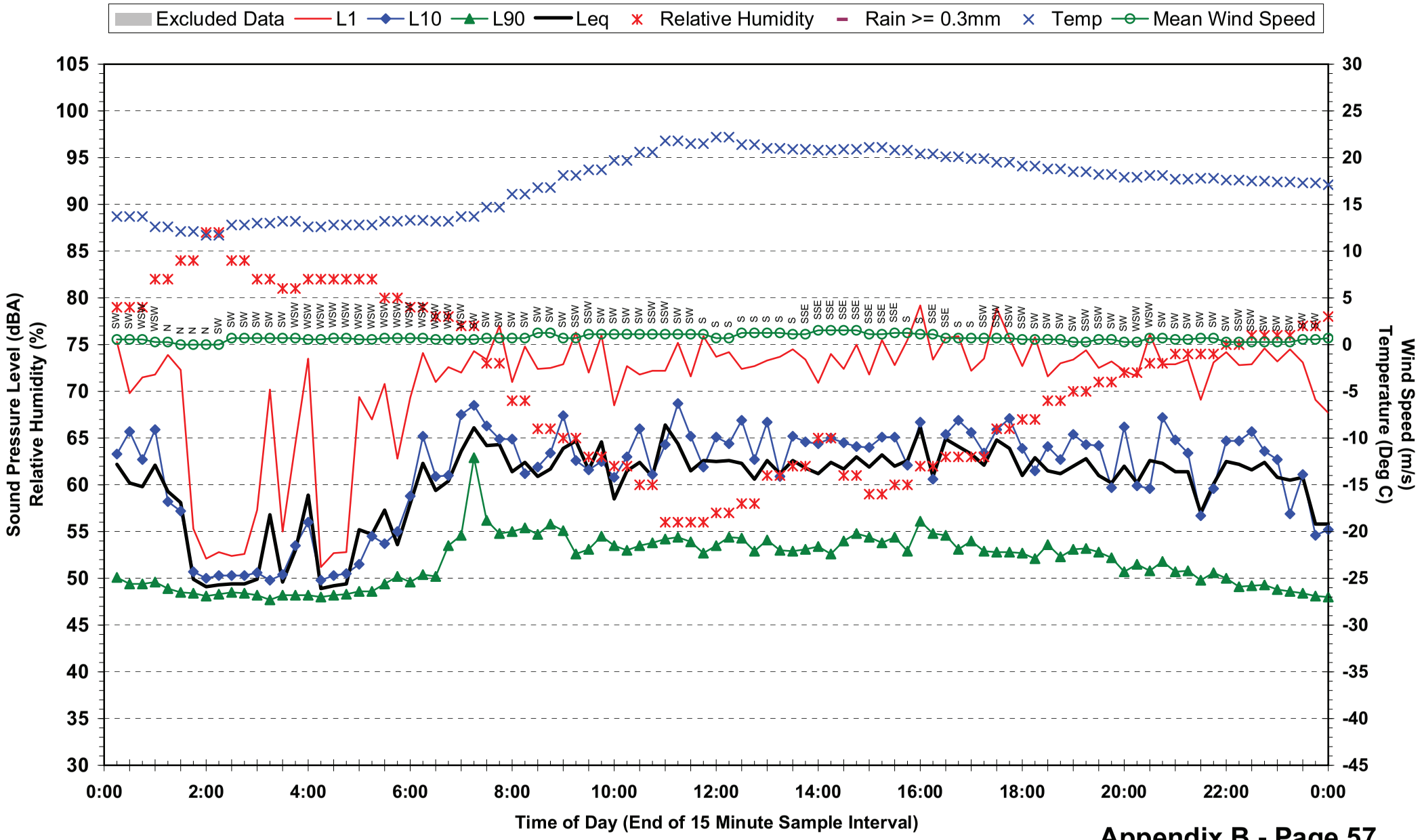
Statistical Ambient Noise Levels
Location 6 - Parkland Cres - Friday 21 May 2010



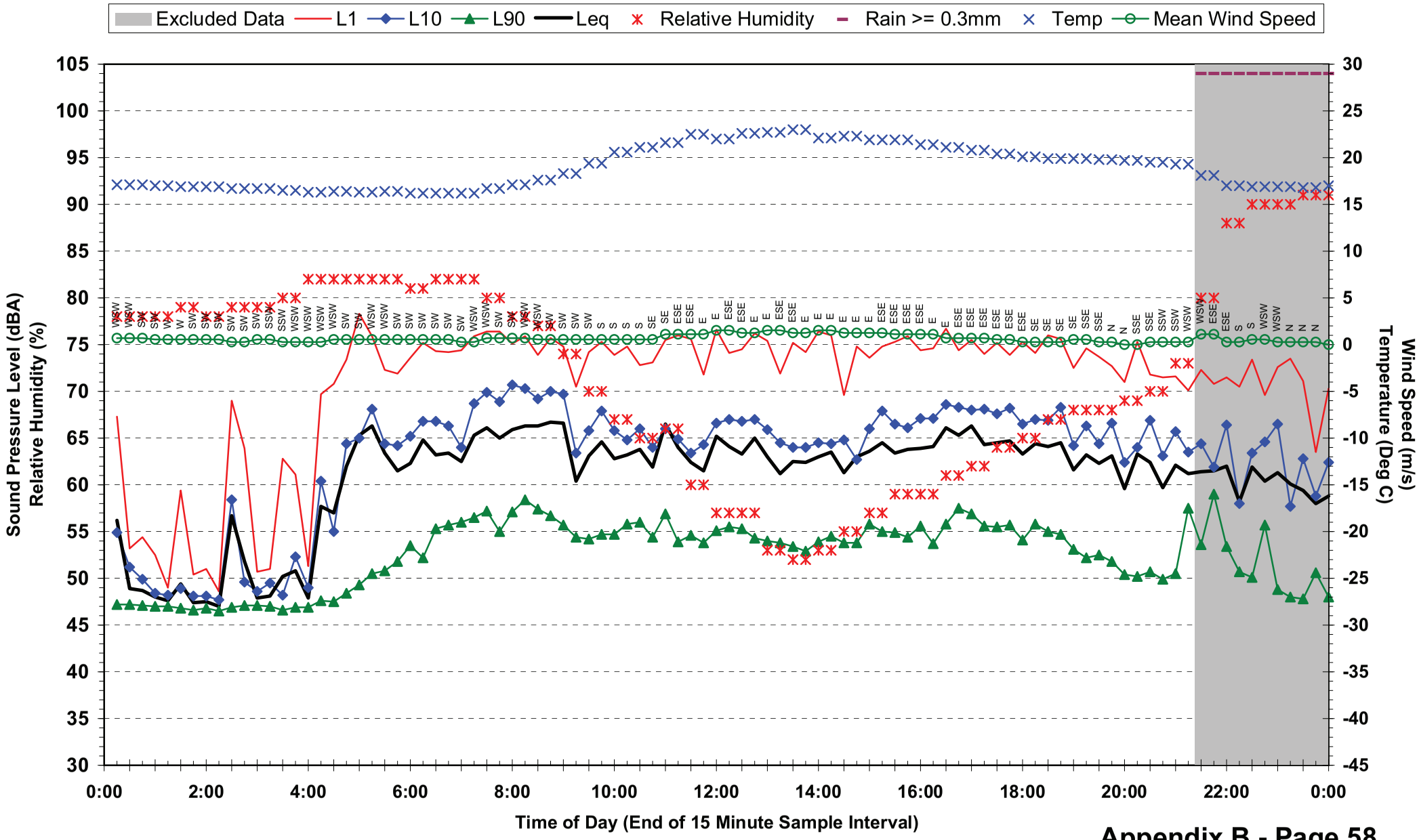
Statistical Ambient Noise Levels
Location 6 - Parkland Cres - Saturday 22 May 2010



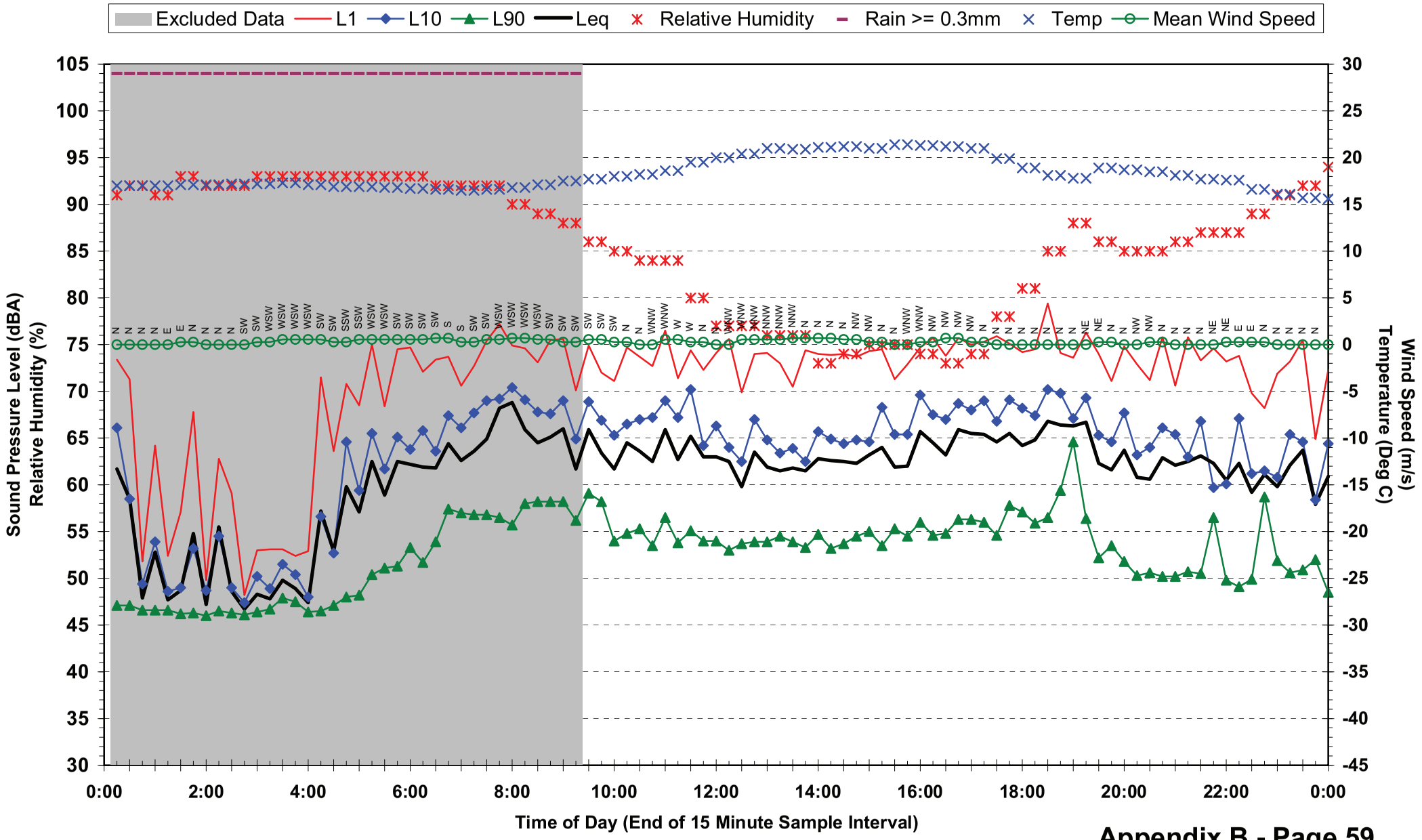
Statistical Ambient Noise Levels
Location 6 - Parkland Cres - Sunday 23 May 2010



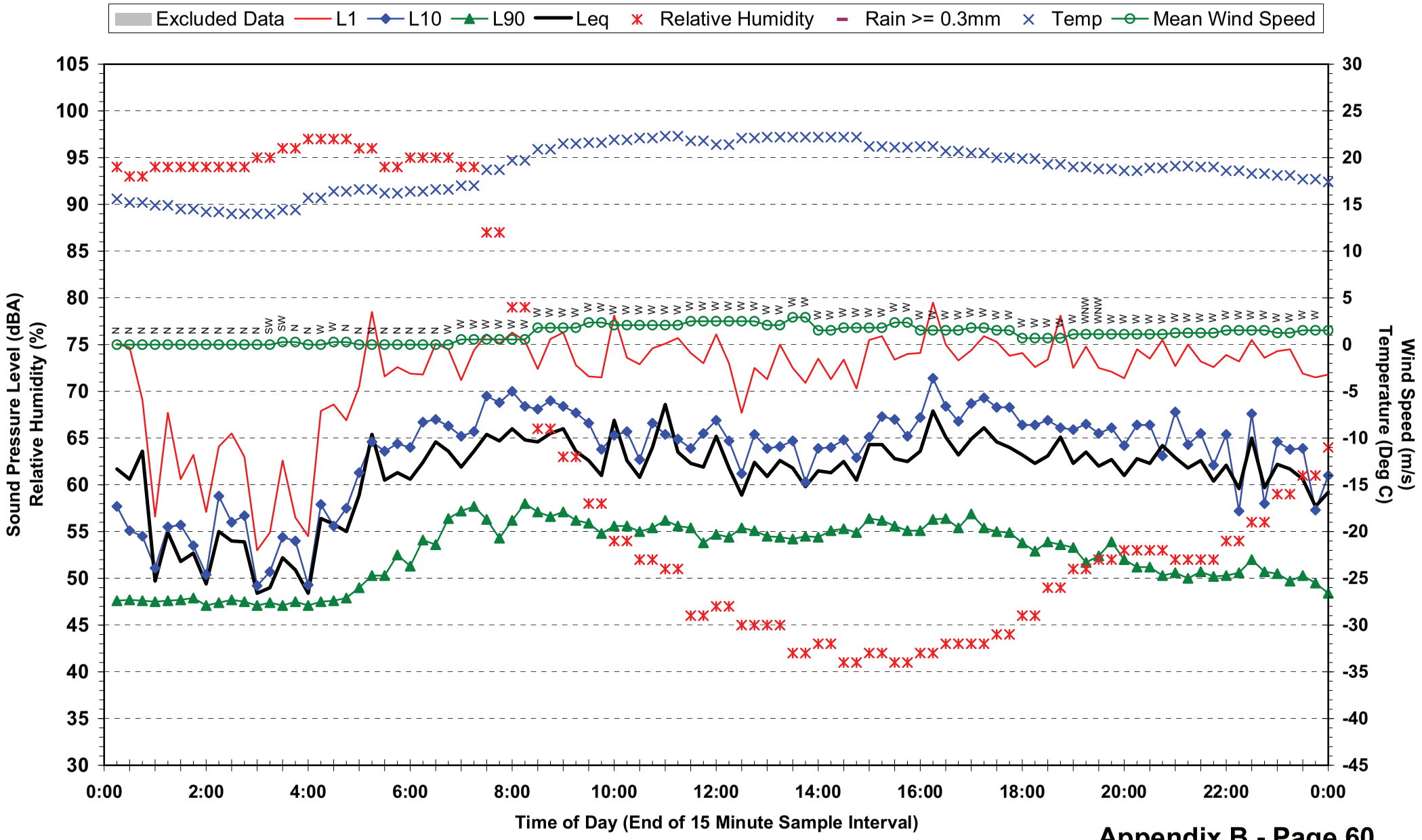
Statistical Ambient Noise Levels
Location 6 - Parkland Cres - Monday 24 May 2010



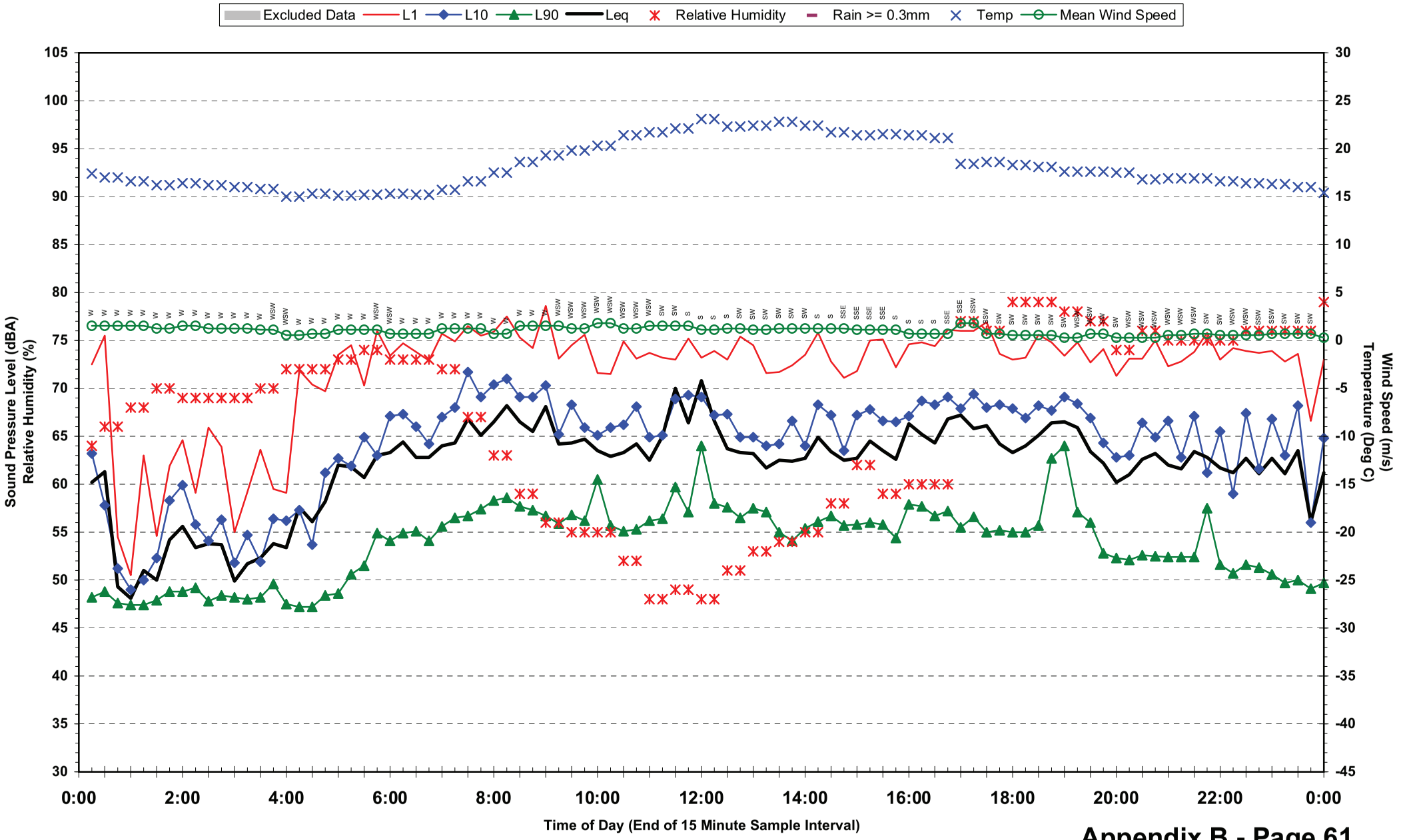
Statistical Ambient Noise Levels
Location 6 - Parkland Cres - Tuesday 25 May 2010



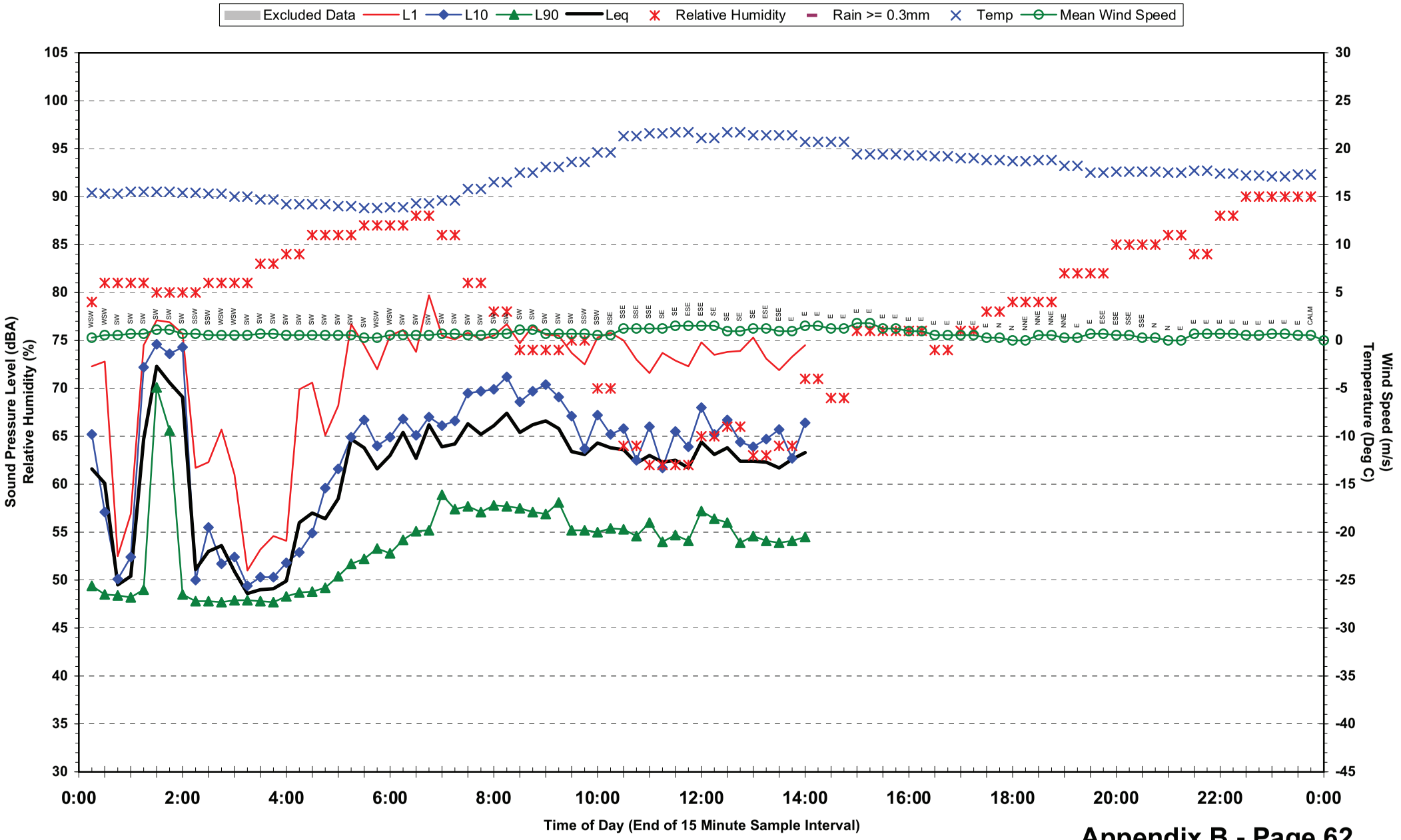
Statistical Ambient Noise Levels
Location 6 - Parkland Cres - Wednesday 26 May 2010



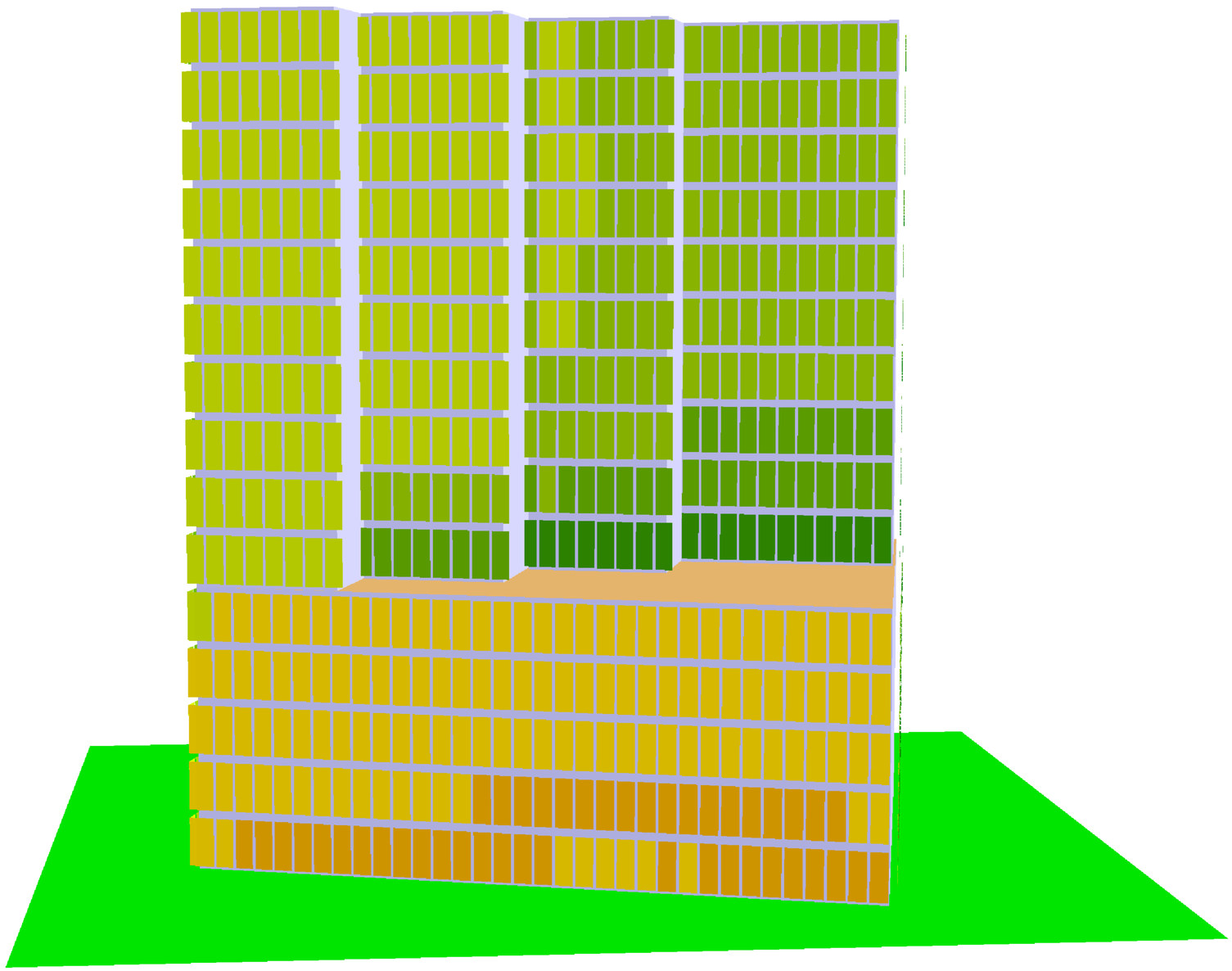
Statistical Ambient Noise Levels
Location 6 - Parkland Cres - Thursday 27 May 2010

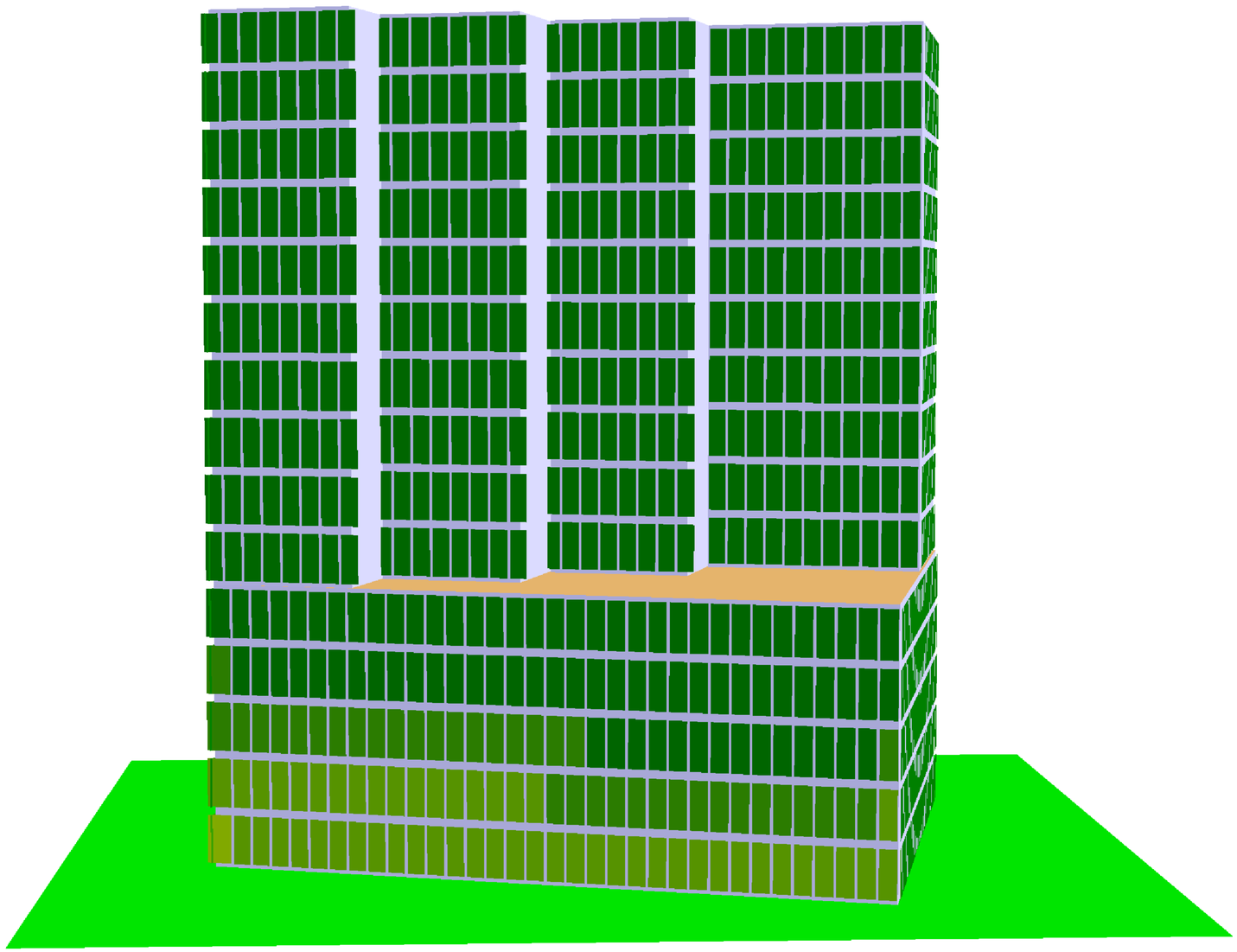


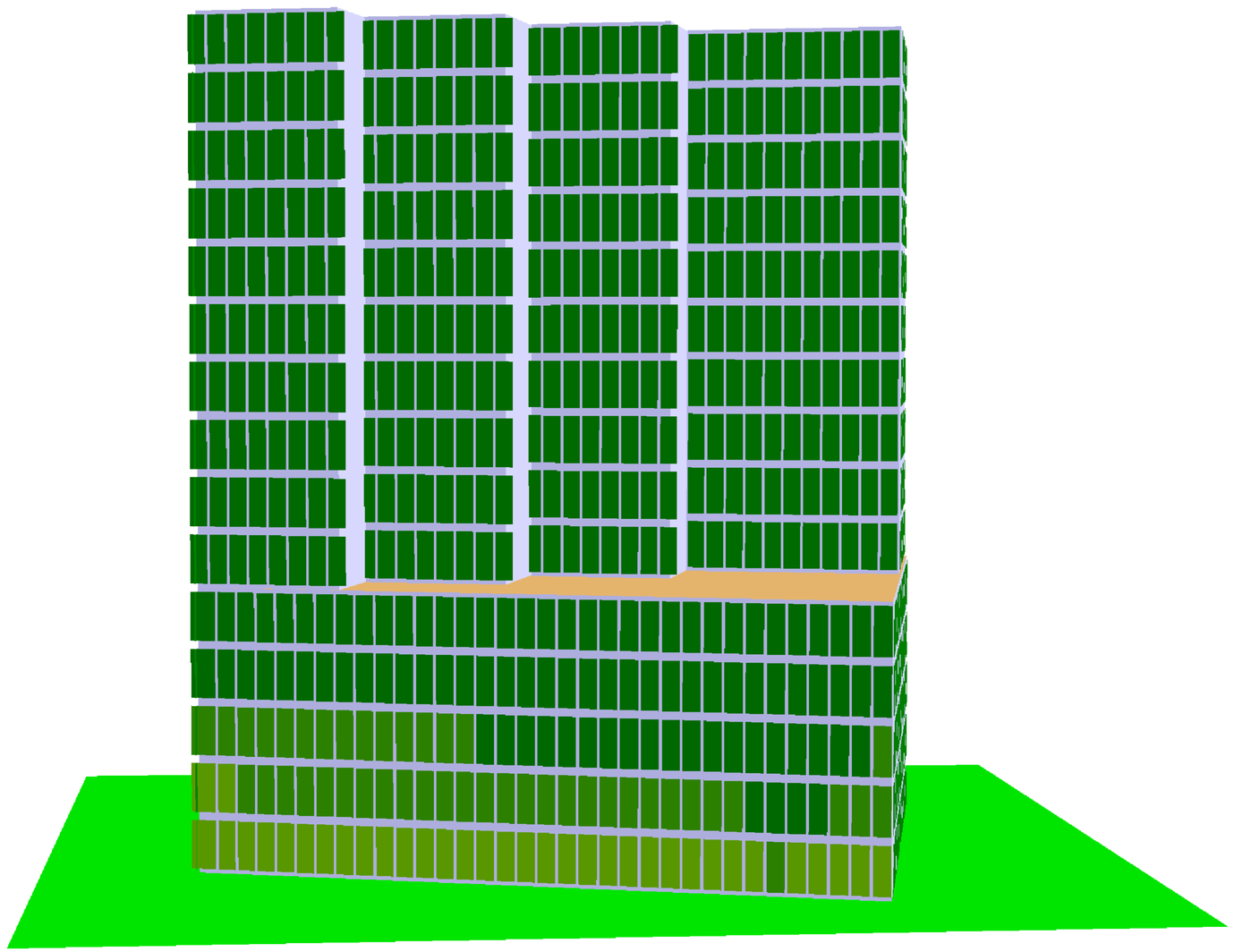
Statistical Ambient Noise Levels
Location 6 - Parkland Cres - Friday 28 May 2010

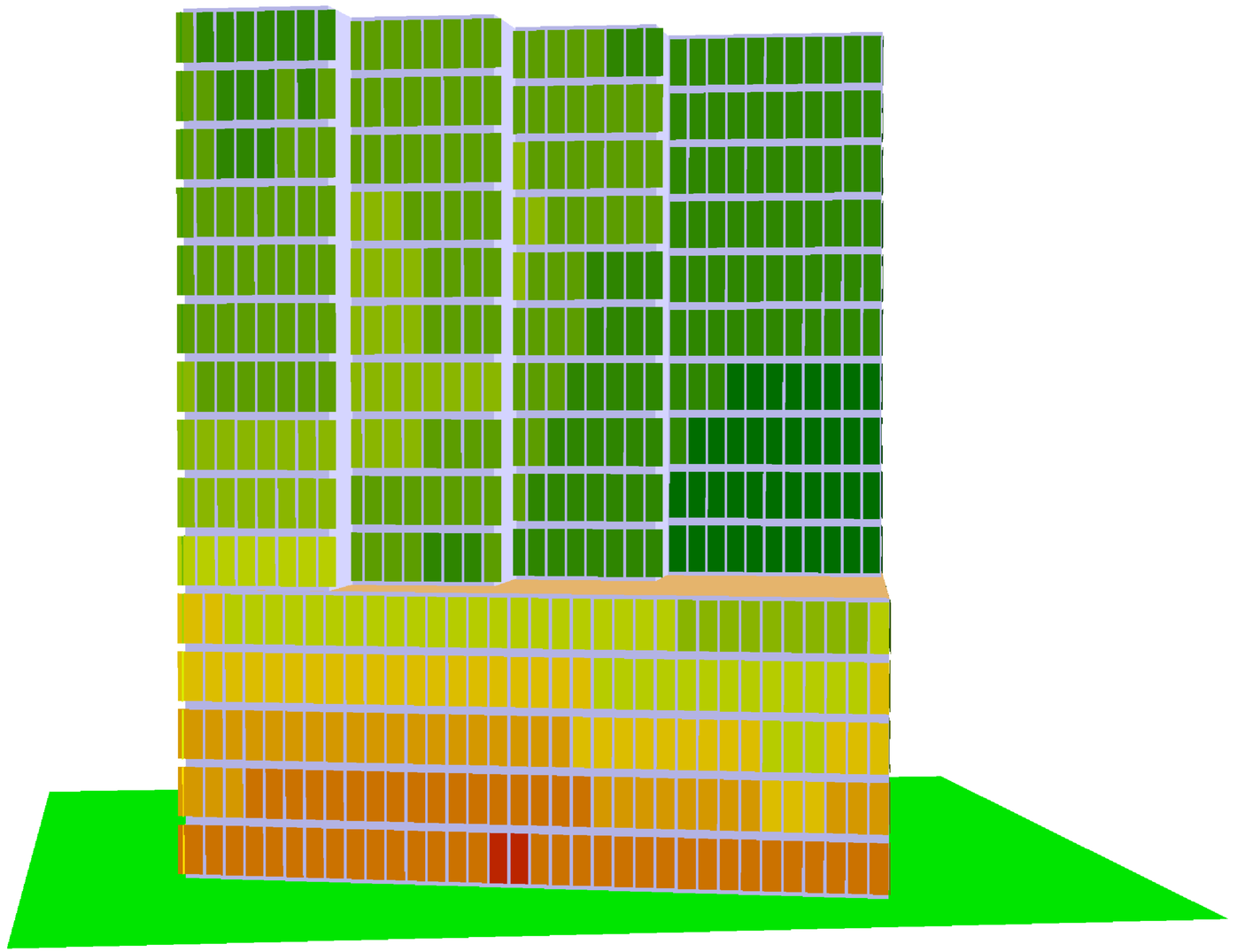


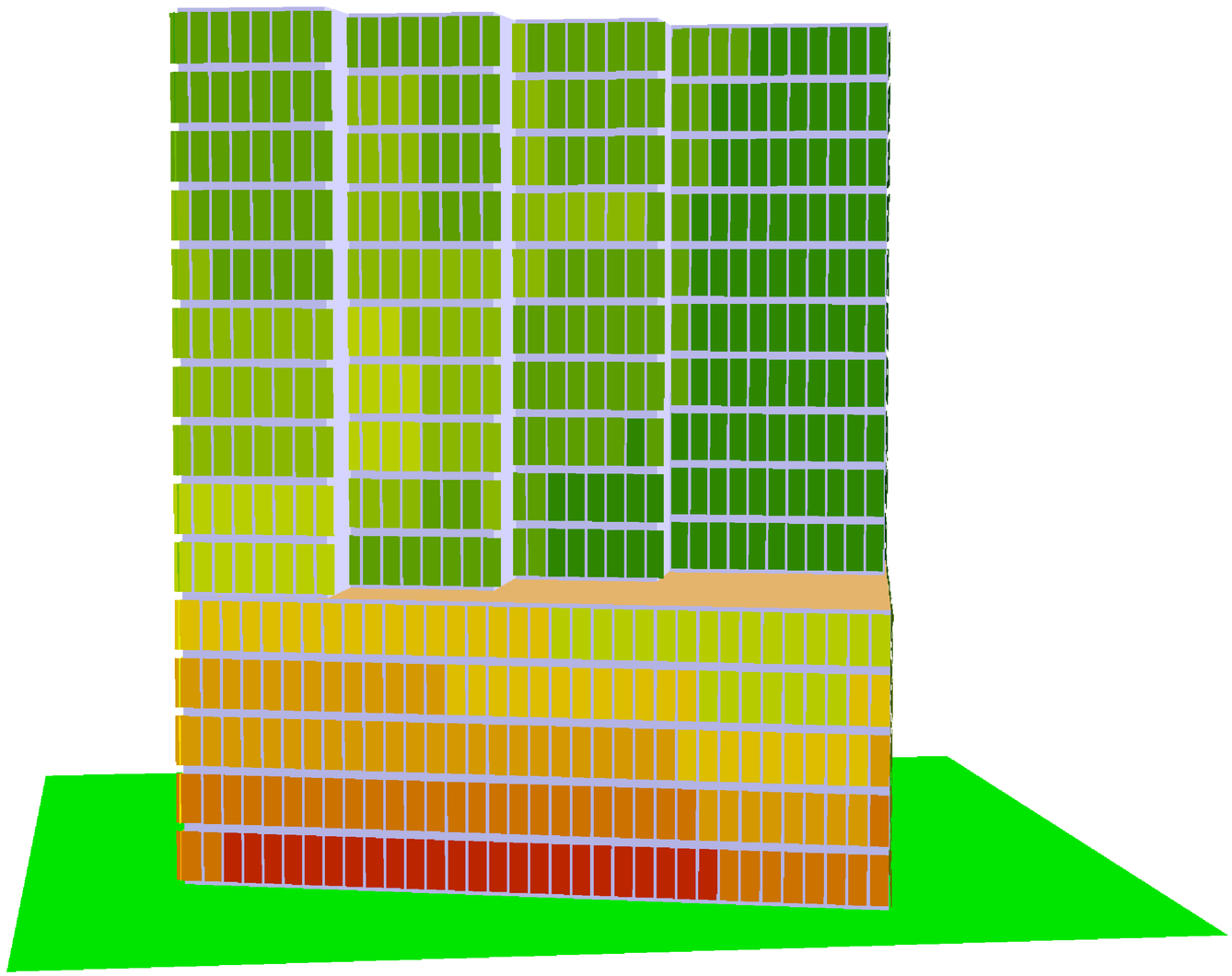
Building Floor	Description of area on the façade of the apartment building on Parkland Avenue cloest to the Proposed temporary coach terminal	Façade Orientation	dBLAeq			dBLAmax		
			Day	Evening	Night	Day	Evening	Night
GF	Podium - Commercial	East - Facing Site	58.5	41.5	35.5	76.9	76.9	76.9
F 1	Podium - Commerical	East - Facing Site	58	37.7	31.7	73.2	73.2	73.2
F 2	Podium - First Residential Floor	East - Facing Site	56.8	33.8	27.8	69	69	69
F 3	Podium	East - Facing Site	55.8	30.7	24.7	65.2	65.2	65.3
F 4	Podium	East - Facing Site	55.2	28.7	22.7	62.5	62.5	62.5
F 5	Highrise Flush with Podium Edge	East - Facing Site	53.4	28	22	61.5	61.5	61.6
F 6	Highrise Flush with Podium Edge	East - Facing Site	52.9	26.4	20.4	59.3	59.3	59.4
F 7	Highrise Flush with Podium Edge	East - Facing Site	52.5	25.1	19.1	57.2	57.2	57.3
F 8	Highrise Flush with Podium Edge	East - Facing Site	52.2	24.4	18.4	56	56	56.1
F 9	Highrise Flush with Podium Edge	East - Facing Site	51.8	23.7	17.7	55	55	55.1
F 10	Highrise Flush with Podium Edge	East - Facing Site	51.5	23.2	17.1	54.1	54.2	54.2
F 11	Highrise Flush with Podium Edge	East - Facing Site	51.4	22.6	16.6	53.4	53.1	53.2
F 12	Highrise Flush with Podium Edge	East - Facing Site	51.2	22.3	16.3	52.8	52.5	52.5
F 13	Highrise Flush with Podium Edge	East - Facing Site	51	21.9	15.9	52.2	52	52
F 14	Highrise Flush with Podium Edge	East - Facing Site	50.7	21.6	15.6	51.6	51.4	51.4
F 5	Highrise Building First set back from podium edge	East - Facing Site	46.9	20.9	14.9	53.6	53.6	53.6
F 6	Highrise Building First set back from podium edge	East - Facing Site	49.6	22.7	16.7	56.4	56.4	56.5
F 7	Highrise Building First set back from podium edge	East - Facing Site	50.8	26.7	20.7	60.9	61	61
F 8	Highrise Building First set back from podium edge	East - Facing Site	51.4	25.3	19.3	58.8	58.9	58.9
F 9	Highrise Building First set back from podium edge	East - Facing Site	51.6	24.6	18.6	57.6	57.7	57.7
F 10	Highrise Building First set back from podium edge	East - Facing Site	51.7	24	18	56.6	56.6	56.7
F 11	Highrise Building First set back from podium edge	East - Facing Site	51.8	23.5	17.5	55.7	55.8	55.8
F 12	Highrise Building First set back from podium edge	East - Facing Site	51.7	23.2	17.2	54.9	55.1	55.1
F 13	Highrise Building First set back from podium edge	East - Facing Site	51.6	22.8	16.8	54.2	54.4	54.4
F 14	Highrise Building First set back from podium edge	East - Facing Site	51.4	22.3	16.3	53.7	53.8	53.8
F 5	Highrise Building Second set back from podium edge	East - Facing Site	42.6	18.4	12.4	50	50	50
F 6	Highrise Building Second set back from podium edge	East - Facing Site	46.6	19	13	50.5	50.5	50.6
F 7	Highrise Building Second set back from podium edge	East - Facing Site	48.5	19.7	13.7	51.5	51.5	51.6
F 8	Highrise Building Second set back from podium edge	East - Facing Site	49.3	20.3	14.3	52.6	52.6	52.6
F 9	Highrise Building Second set back from podium edge	East - Facing Site	49.7	20.6	14.6	53.2	53.2	53.2
F 10	Highrise Building Second set back from podium edge	East - Facing Site	49.9	22.2	16.2	55.4	55.4	55.5
F 11	Highrise Building Second set back from podium edge	East - Facing Site	50	22.8	16.8	55.2	55.3	55.4
F 12	Highrise Building Second set back from podium edge	East - Facing Site	50	22.3	16.3	54.4	54.4	54.5
F 13	Highrise Building Second set back from podium edge	East - Facing Site	49.9	21.9	15.9	53.6	53.7	53.7
F 14	Highrise Building Second set back from podium edge	East - Facing Site	49.8	21.5	15.5	52.9	53	53
F 5	Highrise Building Third set back from podium edge	East - Facing Site	39.5	17	10.9	48.5	48.5	48.6
F 6	Highrise Building Third set back from podium edge	East - Facing Site	43.5	17.5	11.5	48.5	48.5	48.5
F 7	Highrise Building Third set back from podium edge	East - Facing Site	46	17.9	11.8	48.6	48.6	48.7
F 8	Highrise Building Third set back from podium edge	East - Facing Site	47.2	18.1	12.1	49.3	49.3	49.3
F 9	Highrise Building Third set back from podium edge	East - Facing Site	47.8	18.3	12.3	50.1	50	50
F 10	Highrise Building Third set back from podium edge	East - Facing Site	48.2	18.5	12.5	50.4	50.4	50.4
F 11	Highrise Building Third set back from podium edge	East - Facing Site	48.4	18.5	12.5	50.5	50.5	50.5
F 12	Highrise Building Third set back from podium edge	East - Facing Site	48.4	18.4	12.4	50.3	50.3	50.3
F 13	Highrise Building Third set back from podium edge	East - Facing Site	48.4	18.1	12.1	50.3	50.3	50.3
F 14	Highrise Building Third set back from podium edge	East - Facing Site	48.3	18.9	12.9	50.9	50.9	51

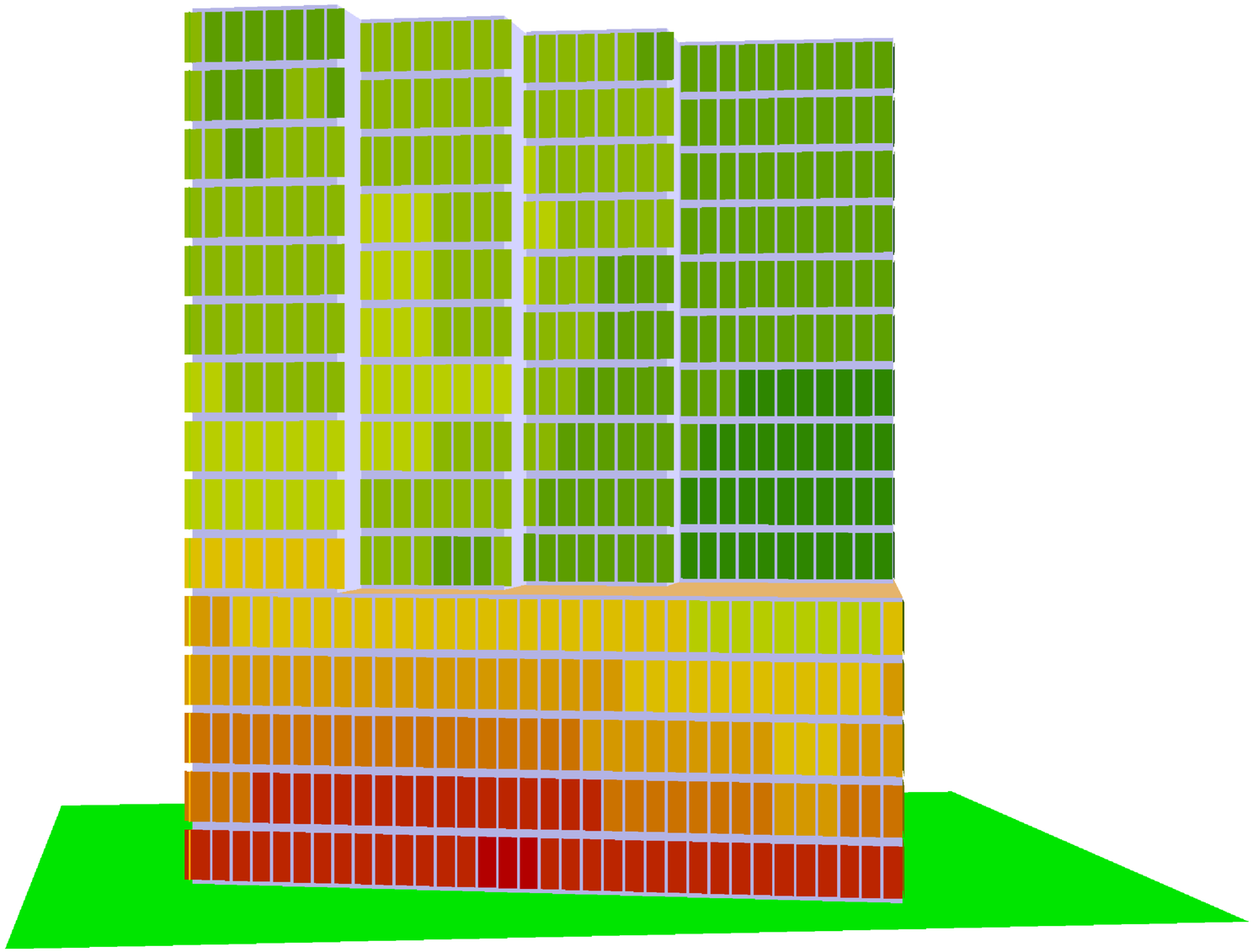

Daytime Leq
in dB(A)
<= 36
36 < <= 40
40 < <= 44
44 < <= 48
48 < <= 52
52 < <= 56
56 < <= 60
60 < <= 64
64 < <= 68
68 < <= 72
72 < <= 76
76 <


Evening Leq
in dB(A)
<= 34
34 < <= 38
38 < <= 42
42 < <= 46
46 < <= 50
50 < <= 54
54 < <= 58
58 < <= 62
62 < <= 66
66 < <= 70
70 < <= 74
74 <


Night Leq
in dB(A)
<= 29
29 < <= 33
33 < <= 37
37 < <= 41
41 < <= 45
45 < <= 49
49 < <= 53
53 < <= 57
57 < <= 61
61 < <= 65
65 < <= 69
69 <


Daytime Lmax
in dB(A)
<= 49
49 < <= 53
53 < <= 57
57 < <= 61
61 < <= 65
65 < <= 69
69 < <= 73
73 < <= 77
77 < <= 81
81 < <= 85
85 < <= 89
89 <


Evening Lmax
in dB(A)
<= 47
47 < <= 51
51 < <= 55
55 < <= 59
59 < <= 63
63 < <= 67
67 < <= 71
71 < <= 75
75 < <= 79
79 < <= 83
83 < <= 87
87 <


Night Lmax
in dB(A)
<= 45
45 < <= 49
49 < <= 53
53 < <= 57
57 < <= 61
61 < <= 65
65 < <= 69
69 < <= 73
73 < <= 77
77 < <= 81
81 < <= 85
85 <