MANAGING DIRECTORS
MATTHEW PALAVIDIS
VICTOR FATTORETTO

DIRECTORS
MATTHEW SHIELDS
BEN WHITE

The Campbell Warehouses, The Rocks

Noise and Vibration Impact Assessment

SYDNEY
A: 9 Sarah St Mascot NSW 2020
T: (02) 8339 8000
F: (02) 8338 8399

SYDNEY MELBOURNE BRISBANE CANBERRA
LONDON DUBAI SINGAPORE GREECE

www.acousticlogic.com.au
ABN: 11 068 954 343

DOCUMENT CONTROL REGISTER

Project Number	20150802.1
Project Name	The Campbell Warehouses, The Rocks
Document Title	Noise and Vibration Impact Assessment
Document Reference	20150802.1/0109A/R3/JS
Issue Type	Email
Attention To	Tallawoladah Pty Ltd Nick Marston

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	10/07/2015	20150802.1/1007A/R0/JL	JL	TT	
1	24/08/2015	20150802.1/2408A/R1/JS	JS		TT
2	1/09/2015	20150802.1/0109A/R2/JS	JS		TT
3	1/09/2015	20150802.1/0109A/R3/JS	JS		TT
4	23/10/2015	20150802.1/2310A/R4/JS	JS		TT

TABLE OF CONTENTS

1 INTRODUCTION

Acoustic Logic Consultancy has been engaged to conduct a noise and vibration emission assessment from the proposed Campbell's Stores redevelopment at Hickson Road, The Rocks, Sydney.

In this report we will:

- Identity properties which are potentially impacted by noise from the site.
- Identify potential noise generation by the site (primarily patron/music noise).
- Identify noise emission controls based on typical noise emission requirements for Licensed Premises.
- Determine acoustic treatments/management controls as necessary to ensure ongoing compliance with noise emission requirements.

This report has been prepared to address Secretary's Environmental Assessment Requirements (SEAR) number 6 and 14 from the Department of Planning and Environment.

This assessment is based on the preliminary architectural drawings from project number 12006, revision A, circulated on the 20 October 2015 and provided by John Pilton Walker Architects.

SoundPlan™ Note

Noise levels have been predicted at the receiver locations using SoundPlan™ modelling software implementing the ISO 9613-2:1996 *"Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation"* noise propagation standard. Noise levels presented in the body of this report are the façade incidence levels and do not include façade reflection.

2 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The site is located at Hickson Road, The Rocks.

The Campbell's Stores development is a three storey building comprising multiple tenancies, consisting primarily of restaurants and ancillary office space.

The restaurants have both indoor dining and an outdoor dining area which is located on the eastern side of the building (adjacent to the harbour side promenade).

Proposed redevelopment works include:

- Construction of a new four storey structure at the northern end of the building (the Bay 12 structure). Although the final use of the space will be determined by the tenancy, it is anticipated that this will be either a retail or restaurant tenancy.

- Internal refurbishment of the existing tenancies to provide building shells to be occupied by future tenants (anticipated to be restaurants/bars/function centres).

- Refurbishment of the existing outdoor dining area on the eastern side of the site. The final capacity of this area is expected to be similar to the current level of usage.

- Creation of two new outdoor dining areas:

    - At the northern end – a new outdoor dining area adjacent to Bay 12, with a capacity of approximately 20 people (Dining Area 1).

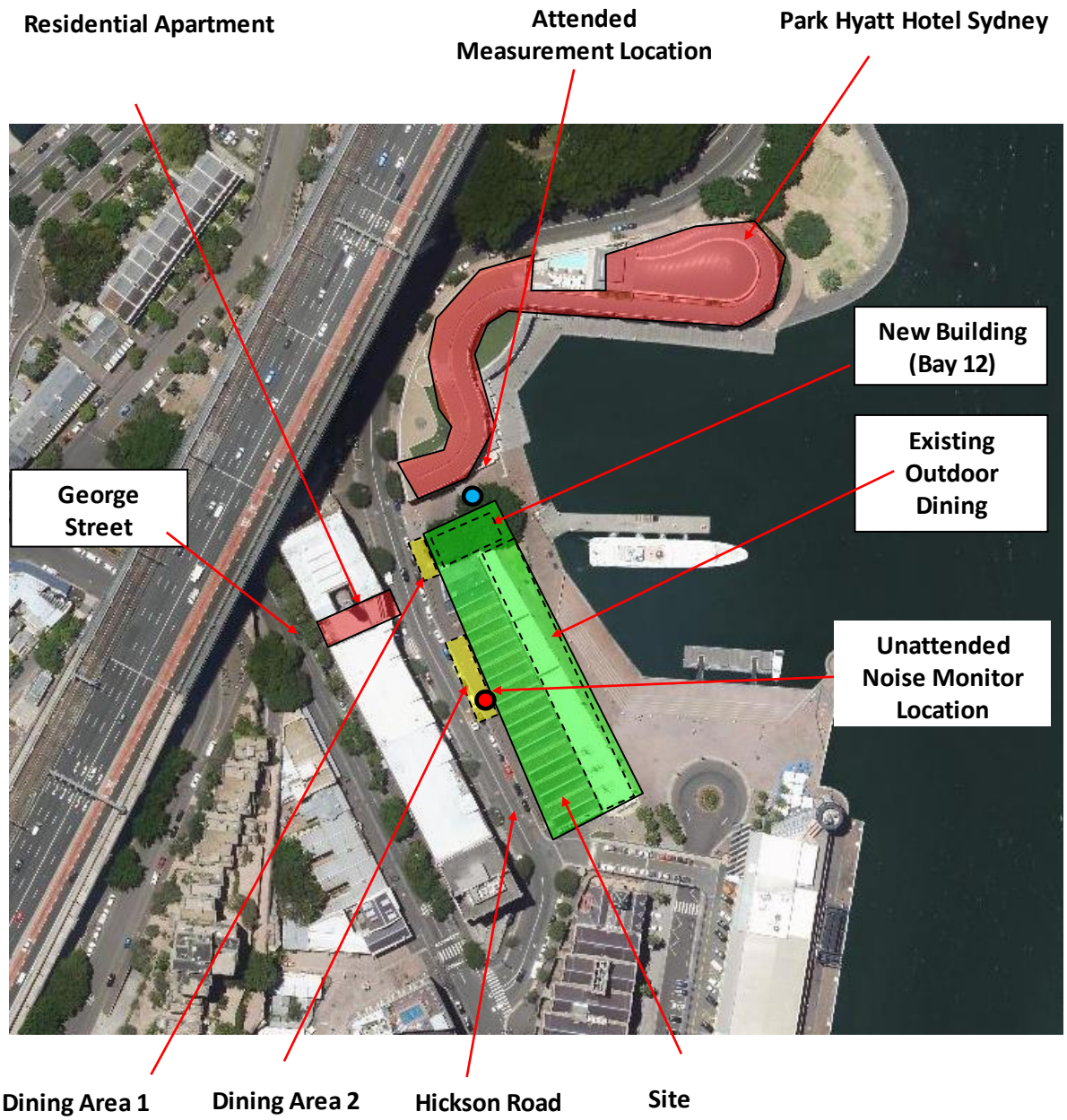
    - Midway along the western facade – a new dining area with a capacity of approximately 60 people (Dining Area 2).

Noise sensitive development in the vicinity of the site consists of:

- The Park Hyatt Hotel, to the north of the site.

- A residential apartment located between Hickson Road and George Street, to the west of the site (the George Street Apartment).

See aerial photograph below.


Residential Apartment
Attended Measurement Location
Park Hyatt Hotel Sydney
New Building (Bay 12)
Existing Outdoor Dining
George Street
Unattended Noise Monitor Location
Dining Area 1
Dining Area 2
Hickson Road
Site

3 NOISE DESCRIPTORS

Noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level. To accurately determine the effects of traffic noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In the case of environmental noise three principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals. The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced at the source. Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; like traffic noise.

4 BACKGROUND NOISE MONITORING

Both long term unattended noise logging, and attended noise measurements were conducted to quantify the existing acoustic environment at the site.

Unattended noise monitoring was conducted between 25 June and 2 July 2015 using an Acoustic Research Laboratories monitor set on A-weighted fast response mode. The monitor was calibrated before and after the measurements using a Rion Type NC-73 calibrator. No significant drift was recorded.

In addition, an attended measurement was made at the property boundary of the Park Hyatt Hotel to ensure that the background noise levels measured by the logger are the same as what would be experienced on the other side of the road (at the residences).

All measurement locations are marked in the aerial photograph in Section 2.

The measured background noise levels have been corrected for meteorological conditions (excessive wind and/or rain), as required by section 3.4 of the EPA Industrial Noise Policy. Exceedances of the 5m/s average wind speed limit of the EPA were noted and corrected for in determining the background noise levels. These areas are highlighted in the logging data in Appendix 1.

Periods of adverse weather have been eliminated when determining the rating background noise level at the site, which is presented below.

Measured noise levels (ambient and rating background noise level) are presented below.

Table 1 - Measured Background Noise Levels

Noise Receiver Location	Rating Background Noise Level dB(A)$L_{90(period)}$		
	Daytime (Up to 6pm)	Evening (6pm – 10pm)	Night (10pm – 12am)
Noise Logger – Project Site	53	53	50

A background noise spectrum measurement was also conducted at the site to ascertain the noise spectrum, as presented below.

Table 2 - Background Noise Spectrum

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	dB(A)
Park Hyatt Hotel	55	55	53	51	48	45	39	31	29	**50**

5 NOISE EMISSION CRITERIA

The relevant sections of the Secretary Environmental Assessment Requirements (SEAR) are set out below.

- SEAR 6 states:

  Outline and address amenity impacts in terms of sunlight, natural ventilation, wind, reflectivity, visual and acoustic privacy, and safety and security.

  Demonstrate that the use of the proposed new structure to the north of the Campbell's Stores is compatible with adjoining uses.

- SEAR 14 states:

  The applicant must include a Noise and Vibration Assessment of construction, operation, traffic and cumulative noise impacts prepare in accordance with the relevant EPA guidelines. This assessment must consider any potential noise impacts on nearby noise sensitive receivers and outline proposed noise mitigation and monitoring issues.

  Should the application seek approval for the fit-out and use of the building, detailed Noise Impact Statements must be prepared for each tenancy.

  Relevant Policies and Guidelines:

  NSW Industrial Noise Policy and Application Notes.

  EPA Interim Construction Noise Guidelines.

  Assessing Vibration, A technical guideline.

  NSW Road Noise Policy and Application Notes.

Although not mentioned by SEAR 14, we would expect that the noise emission requirements for licenced venues as adopted by the Office of Liquor Gaming and Racing would also be assessed, as this is the most relevant noise emission control used in the assessment of licenced premises/entertainment venues.

In our opinion, if the relevant EPA and OLGR acoustic guidelines are addressed, the amenity impact assessment as required by SEAR 6 is also complied with.

5.1 EPA INDUSTRIAL NOISE POLICY (PLANT AND EQUIPMENT NOISE)

Noise sources covered by this code will be mechanical services noise. Both the Intrusiveness and the Amenity criteria (as set out below) must be complied with.

5.1.1 INP - Intrusiveness Assessment

Intrusiveness criteria permit noise generation to be no more than 5dB(A) above existing background noise levels. The criteria are as follow:

Table 3 - EPA Intrusiveness Assessment

Location	Time of Day	Background noise Level – dB(A)L_{90}	Intrusiveness Noise Objective dB(A)$L_{eq(15min)}$ (background + 5dB)
Monitor Location – Project Site	Day Time (7am - 6pm)	53	58
	Evening (6pm - 10pm)	53	58
	Night (10pm - 12am)	50	55

5.2 INP - AMENITY ASSESSMENT

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment. The Industrial Noise Policy sets out acceptable noise levels for various land uses. Table 2.1 on Page 16 of the policy has four categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface.

ALC would determine the site an 'Urban' noise environment given that:

- The site is within close proximity to the Harbour Bridge, which carries heavy and continuous traffic flows during peak periods,
- There is negligible decrease in the evening background noise level and the evening ambient noise levels would not be defined by the natural environment and infrequent human activity.

Amenity criteria are as follows:

Table 4 – EPA Amenity Criteria

Receiver Location	Land Type	Time of Day	Amenity Noise Objective dB(A) $L_{eq(Period)}$
All Potentially Affected Residential Properties	Urban	Day Time (7am – 6pm)	60
		Evening (6pm – 10pm)	50
		Night (10pm-7am)	45
Commercial	All	When in use	65

The aforementioned acceptable levels are to be adjusted in accordance with Section 2.2 of the INP. The existing L_{eq} noise levels recorded at the site are as follows:

- Day – 59dB(A) L_{eq}
- Evening – 56dB(A) L_{eq}
- Night – 52dB(A) L_{eq}

In this regard, ALC notes the following:

- The background noise and L_{eq} noise level in the vicinity of the site are largely controlled by latent traffic noise from the Harbour Bridge, Hickson Road and general urban hum.
- There are no significant industrial noise sources in the area. The surrounding uses are typically commercial/retail which do not have any significant noise sources.

Given the above and in the absence of any significant industrial noise sources, it is in our opinion that noise from existing industrial noise sources would be negligible in comparison with general urban neighbourhood noise and surrounding road noise sources. On this basis, no further adjustment is required to the amenity criterion as detailed in Table 4 above.

5.3 PATRON/MUSIC NOISE (OFFICE OF LIQUOR, GAMING AND RACING ACOSUTIC CRITERIA FOR LICENCED PREMISES)

Typical noise emission criteria adopted by the Office of Liquor, Gaming and Racing are presented below.

- The L_{10} noise emissions not exceed background noise levels by more than 5dB when measured in octave bands between 31.5Hz and 8,000Hz at a residential property boundary between 7am and 12am and
- The L_{10} noise emissions not exceed background noise levels by more than 0dB when measured in octave bands between 31.5Hz and 8,000Hz at a residential property boundary between 12am and 7am.
- Between 12am and 7am, that noise emissions from the site are not audible inside a habitable room of a nearby residence.

We note that these criteria are the same as those adopted by the City of Sydney Council in the assessment of entertainment venues.

Based on the measured background noise levels and spectrums set out in section 4, corresponding external noise emission goals are as follows.

Table 5 – Noise Emission Goals (Patron/Music)

Time of Day	Criteria	31Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
Day (7am-6pm)	**53BG+5**	63	63	61	59	56	53	47	39	37	58
Evening (6pm-10pm)	**53BG+5**	63	63	61	59	56	53	47	39	37	58
Night (10pm-12am)	**50BG+5**	60	60	58	56	53	50	44	36	34	55

5.4 NOISE FROM INCREASED TRAFFIC GENERATION ON PUBLIC STREETS

For land use developments with the potential to create additional traffic on public streets the development should comply with the EPA Road Noise Policy.

Noise levels generated by traffic should not exceed the noise levels set out in the table below when measured at a nearby property.

Table 6 – Criteria for Traffic Noise Generated by New Developments

Road Type	Time of day	Permissible Noise Generation
Local Road (Hickson Road)	Day (7am to 10pm)	55dB(A) $L_{eq(1hr)}$
	Night (10pm to 7am)	50B(A) $L_{eq(1hr)}$

However, if existing noise levels exceed those in the table above, Section 3.4 of the Road Noise Policy is applicable, which requires noise impacts are reduced through feasible and reasonable measures. However, in determining what is feasible/reasonable, the Policy notes that an increase of less than 2dB(A) is a minor impact and would be barely perceptible.

5.5 CONSTRUCTION NOISE AND VIBRATION IMPACTS

5.5.1 EPA Interim Construction Noise Guidelines

EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest residences:

- *"Noise affected" level*. Where construction noise is predicted to exceed the "noise effected" level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the "noise effected level". For residential properties, the "noise effected" level occurs when construction noise exceeds ambient levels by more than:
    - 10dB(A) $L_{eq(15min)}$ for work during standard construction hours (7am-6pm Monday to Friday and 8am to 1pm on Saturdays) and
    - 5dB(A) $L_{eq(15min)}$ for work outside of standard construction hours.
- "*Highly noise affected level".* Where noise emissions are such that nearby properties are "highly noise effected", noise controls such as respite periods should be considered. For residential properties, the "highly noise effected" level occurs when construction noise exceeds 75dB(A) $L_{eq(15min)}$ at nearby residences.

A summary of noise emission goals for both standard hours of construction and outside standard hours are presented.

Table 7 – Construction Noise Emission Goals

Location	"Noise Affected" Level - dB(A)$L_{eq(15min)}$	"Highly Noise Affected" Level - dB(A)$L_{eq(15min)}$
Residences	63 (Standard Construction Hours)	75
Commercial	70	N/A

5.5.2 Construction Vibration

Vibration goals for the amenity of nearby land users are those recommended by the EPA document *Assessing Vibration: A technical guideline.* These levels are presented below:

Table 8 – Construction Vibration Goals

Location	Time	Peak velocity (mm/s)	
		Preferred	Maximum
Continuous Vibration			
Residences	Daytime	0.28	0.56
Commercial	When in use	0.56	1.12
Impulsive Vibration			
Residences	Daytime	8.6	17
Commercial	When in use	18	36

6 ASSESSMENT OF NOISE EMISSIONS

Potential noise emissions from the site are assessed below.

6.1 PATRON /MUSIC NOISE

Operational noise emissions to each of the nearby residential properties are presented below and assessed against relevant acoustic criteria (OLGR Licensed Premises criteria).

Predicted noise emissions are based on the following assumptions:

- The average sound power per patron (raised voice) in an outdoor area (with low-moderate level music) is 77dB(A)L_{10}, and that one in two patrons are speaking at any one time.
- That outdoor areas are populated as follows:
    - Dining Area 1 – 20 patrons (up to midnight)
    - Dining Area 2 – 60 patrons (up to midnight)
- External Music (live or amplified) is played at a low-moderate noise level (65-70dB(A)L_{10}).

All noise emission predictions are based on the assumption that the acoustic treatments set out in section 7 of this report will be adopted.

Noise emissions for two scenarios are predicted:

- Up to 10pm, with Dining Areas 1&2 (in addition to internal areas and the existing outdoor dining area).
- Up to 12am, with Dining Areas 1&2 (in addition to internal areas and the existing outdoor dining area).

Predicted noise levels are as follows.

6.1.1 Noise Emission Assessment – up to 10pm

Table 9 – Patron/Music noise emission - To George Street Apartment
Up to 10pm Assessment (Dining Areas 1&2)

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
Predicted Level dB(A)L_{10}	39	39	45	45	50	49	44	34	19	**52**
Allowable Noise Level (Up to 10pm) – 53dBG+5dB	63	63	61	59	56	53	47	39	37	**58**
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**

Table 10 – Patron/Music noise emission - To Park Hyatt Suites
Up to 10pm Assessment (Dining Areas 1&2)

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
Predicted Level dB(A)L_{10}	36	36	40	37	43	46	40	30	11	**48**
Allowable Noise Level (Up to 10pm) – 50dBG+5dB	60	60	58	56	53	50	44	36	34	**55**
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**

6.1.2 Noise Emission Assessment – up to Midnight

Table 11 – Patron/Music noise emission - To George Street Apartment
Up to 12am Assessment (Dining Areas 1&2)

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
Predicted Level dB(A)L_{10}	39	39	45	45	50	49	44	34	19	**52**
Allowable Noise Level (Up to 12am) – 50dBG+5dB	60	60	58	56	53	50	44	36	34	**55**
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**

Table 12 – Patron/Music noise emission - To Park Hyatt Suites
Up to 12am Assessment (Dining Areas 1&2)

	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-Wt.
Predicted Level dB(A)L_{10}	36	36	40	37	43	46	40	30	11	**48**
Allowable Noise Level (Up to 12am) – 50dBG+5dB	60	60	58	56	53	50	44	36	34	**55**
Complies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**

Provided that the noise control recommendations in section 7 are adopted, noise emissions will be compliant with allowable levels.

6.2 MECHANICAL PLANT

Detailed review of all external mechanical plant should be undertaken at construction certificate stage (once plant selections and locations are finalised). Acoustic treatments should be determined in order to control plant noise emissions to the levels set out in section 5 of this report.

While compliance with noise emission requirements will be achievable with appropriate acoustic treatment, it is highly likely that any roof top equipment which operates 24 hours per day (such as refrigeration plant) will require either enclosure in plant rooms or acoustic screens to provide a line of sight break between the equipment and any residences.

Other equipment external items (fans) would be expected to be capable of compliance through use of internal duct lining and/or in-duct attenuators.

6.3 CONSTRUCTION IMPACTS

6.3.1 Construction Noise

With respect to general construction noise, the impacts on nearby development will be dependant on the activity in question and where on the site the activity is undertaken. Work close to the northern end of the site will have greatest potential impact on residential dwellings (Park Hyatt, and the apartment on George Street). However, a highly detailed acoustic assessment of individual activities cannot be undertaken prior to knowing the activities/construction methods proposed, and their duration and location.

However, based on Initial analysis:

- Bulk excavation/piling or similar works are expected to be minimal.

- During erection of structure of Bay 12, it is the use of cranes, powered hand tools (angle grinders etc) and concrete pumps/vibrators which are the loudest typical activity (sound power levels of approximately 105dB(A) $L_{eq(15min)}$). Intermittent exceedances of noise emission goals at the Park Hyatt Hotel façade will potentially occur.

- Once construction of the building shell is complete, noise from hand tools will be relatively low, as the new building façade will provide considerable noise attenuation. Once the building shell is largely complete, use of hand tools in internal areas is unlikely to exceed EPA recommended levels. Vehicle noise and crane noise will create the greatest possibility of noise disturbance during this phase.

In short, intermittent exceedances of the ICNG “background+10dB(A)” noise emission goal will potentially occur during erection of structure of the new building at Bay 12 (at the northern end of the site).

However, we note:

- Construction noise is not typically predicted to exceed the "Highly Noise Effected" level of 75dB(A).

- Care should be taken in equipment selection, however the use of respite periods and time restrictions would not typically be warranted.

In light of the above, we recommend:

- On completion of a construction program, acoustic review of proposed construction activities and plant/methods should be undertaken to identify the extent and duration of potential exceedances of EPA Noise Effected levels (ie – "background+10dB(A)").

- Identify feasible acoustic controls or management techniques (for example, selection of plant, use of screens around static plant, scheduling of noisy works, notification of adjoining land users) when exceedance of Noise Effected levels may occur.

Through adoption of the above, noise impacts on nearby development can be suitably managed to prevent unreasonable impact.

6.3.2 Construction Vibration

Excavation, earth retention and civil works are the primary vibration generating activities. As the majority of the development will consist of refurbishment works, construction vibration will be relatively minimal.

It will be during erection of structure of the new building at Bay 12 which has the greatest potential to generate construction vibration, however it would only be use of pneumatic hammers which would be likely to generate vibration levels approaching EPA guidelines at the nearest residences (the Park Hyatt Hotel).

However, as a precaution, if bulk excavation in rock or driven/vibrated piles are proposed, we recommend:

- Where practicable, excavation in rock should be done using rippers/ rock saws as opposed to pneumatic hammers.

- In the event of complaint, an attended measurement of construction vibration should be undertaken, and if excessive vibration levels are measured, reselection of equipment or the introduction of a vibration monitoring system should be introduced. Any vibration monitoring system should allow for rapid feedback to the contractor (for example, SMS notification) in the event that excessive levels are reached.

7 RECOMMENDATIONS

Acoustic analysis indicates that the site is capable of complying with typically imposed EPA and OLGR noise emission requirements.

The following noise emission controls should be imposed:

- Individual tenancies are required to lodge a development application for use of any given tenancy. At a minimum, the acoustic report would need to address:
    - Proposed numbers of patrons both in indoor and outdoor areas.
    - The proposed times of use (of both indoor and outdoor areas).
    - Whether there is live or amplified music proposed.
    - In the event that highly amplified music is proposed (more than 85dB(A) pressure in the space), the DA report should include an assessment as to whether any upgrade of the building shell is required (secondary glazing or upgrade of ceiling structure to prevent noise breakout through the roof).
- New outdoor dining areas are not to be used after midnight, with numbers restricted as follows:
    - 20 patrons using Dining Area 1;
    - 60 Patrons using Dining Area 2.

  Any deviation from this should be approved following a development application for use by the prospective tenant.
- Disposal of bottles/waste in internal areas should be done prior to 10pm.
- Detailed review of mechanical plant (typically refrigeration equipment, kitchen ventilation and air-conditioning) should be undertaken at CC stage, once plant selections and locations are finalised. Compliance with EPA Industrial Noise Policy requirements will be achievable using standard acoustic treatments (in duct lining/attenuators, equipment enclosures etc).
- No queuing in external areas on Hickson Road.

8 CONCLUSION

This report provides the results of an assessment of potential noise emissions from the proposed Campbell's Stores development in The Rocks, Sydney.

Noise emission analysis indicates that the site is capable of operating without exceeding commonly adopted EPA and Office of Liquor Gaming and Racing acoustic guidelines used in the assessment of restaurants/places of entertainment.

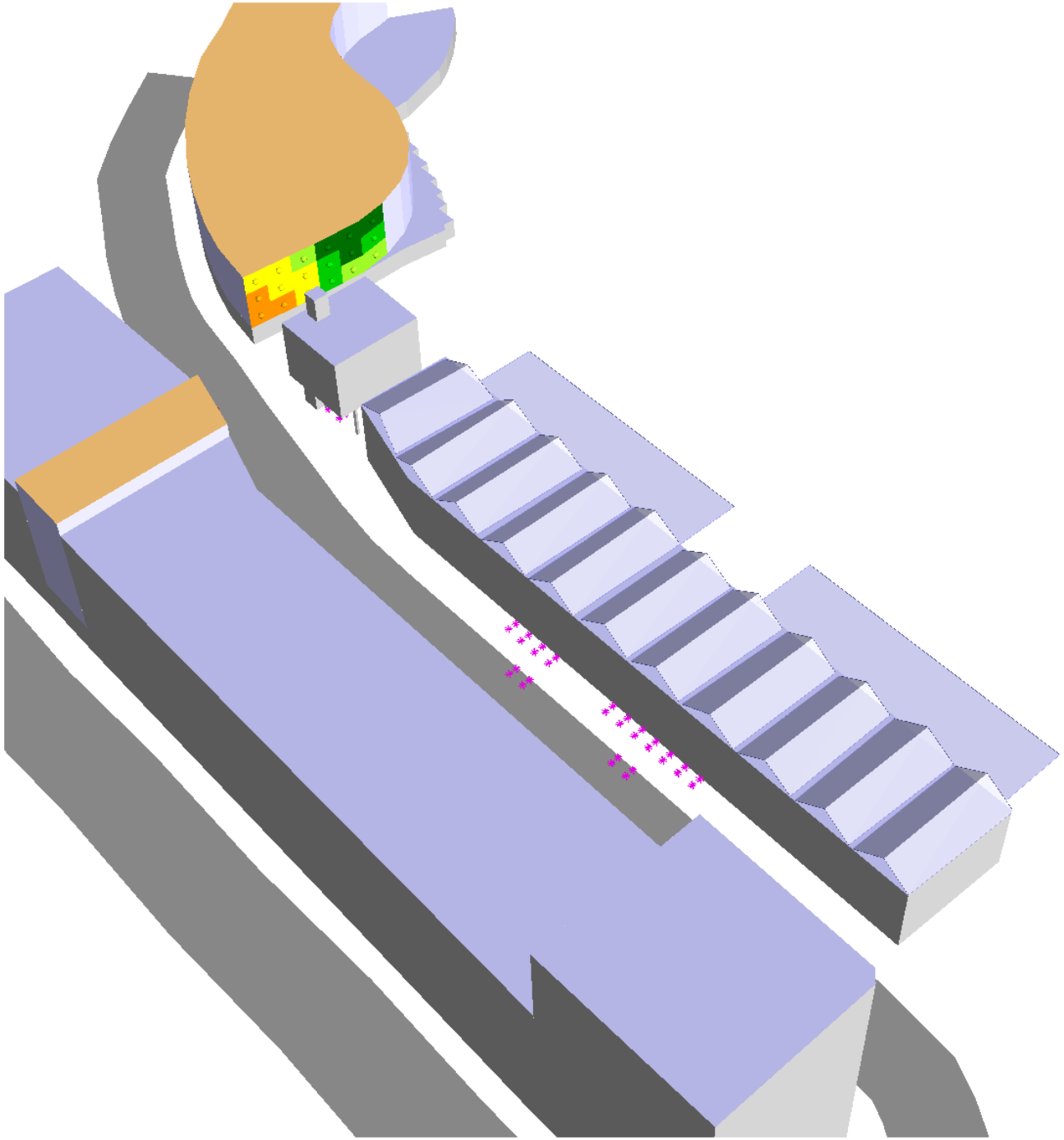
Provided that the recommendations in Section 7 of this report are adopted, noise emissions to all nearby development will be complaint with noise emission guidelines. In doing this, the acoustic requirements of SEAR 6 and 14 are achieved.

Please contact us should you have any further queries.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
James Small

APPENDIX ONE – SOUNDPLAN FAÇADE NOISE MAPS



Campbell Stores

Restaurant Noise Prediction

Facade Noise Levels

Dining Area 1 - 20 Patrons
Dining Area 2 - 60 Patrons

Patron - 77dB(A) L_{10}
1 in 2 Talking

Prepared by: J. Small
Date: 25/08/2015

Noise Level
$L_{10\ 1hour}$
in dB(A)

< 40
40 - 42
42 - 44
44 - 46
46 - 48
48 - 50
50 - 52
52 - 54
54 - 56
56 - 58
58 - 60
>= 60

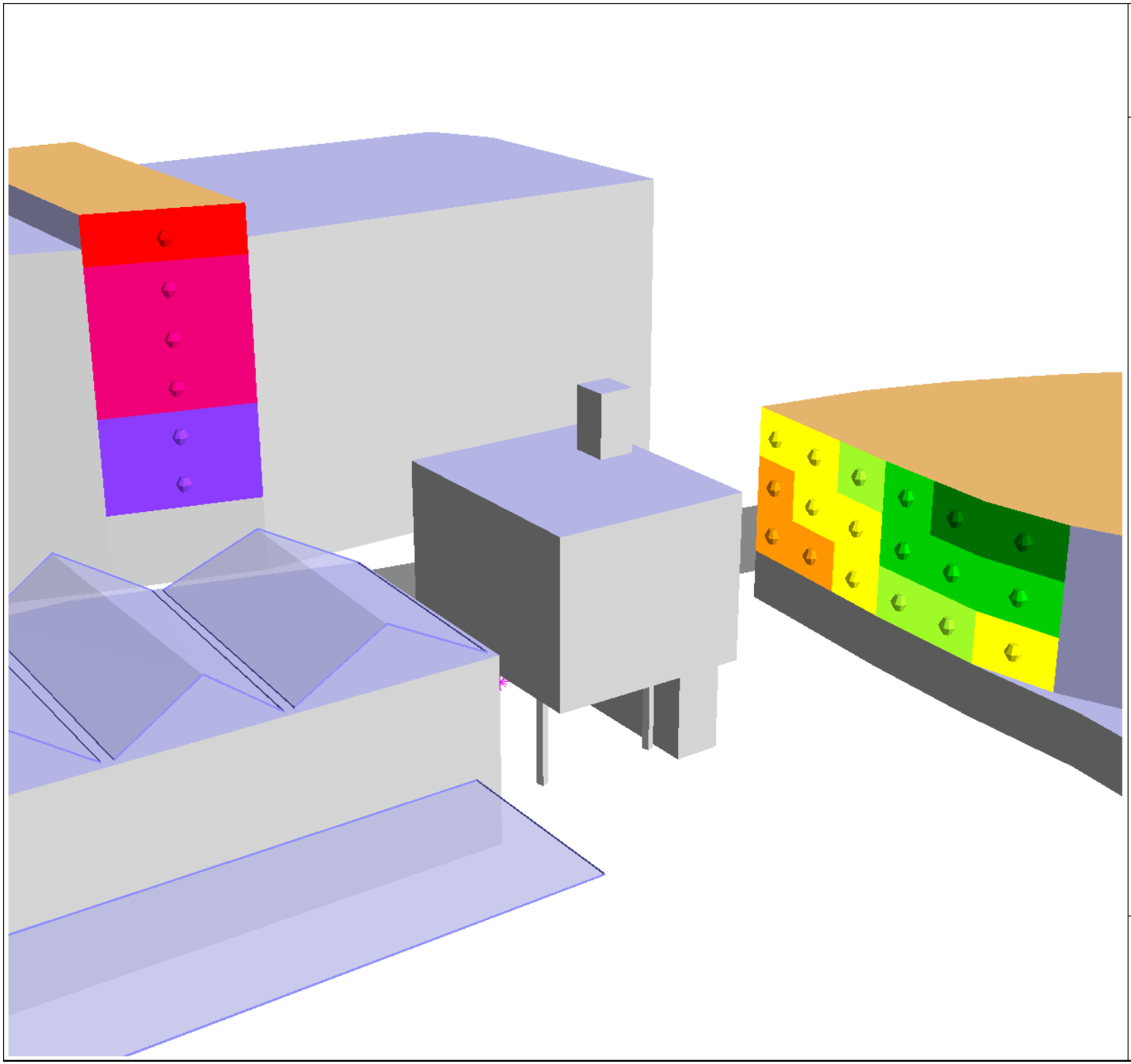
Signs and symbols

- Surface
- Commercial
- Point source
- Sensitive Noise Receiver

Length scale 1:1311
0 5 10 20 30 m

N

ACOUSTIC LOGIC



Campbell Stores

Restaurant Noise Prediction

Facade Noise Levels

Dining Area 1 - 20 Patrons
Dining Area 2 - 60 Patrons

Patron - 77dB(A) L_{10}
1 in 2 Talking
Up to 12am

Prepared by: J. Small
Date: 25/08/2015

Noise Level
$L_{10\ 1hour}$
in dB(A)

< 40
40 - 42
42 - 44
44 - 46
46 - 48
48 - 50
50 - 52
52 - 54
54 - 56
56 - 58
58 - 60
>= 60

Signs and symbols

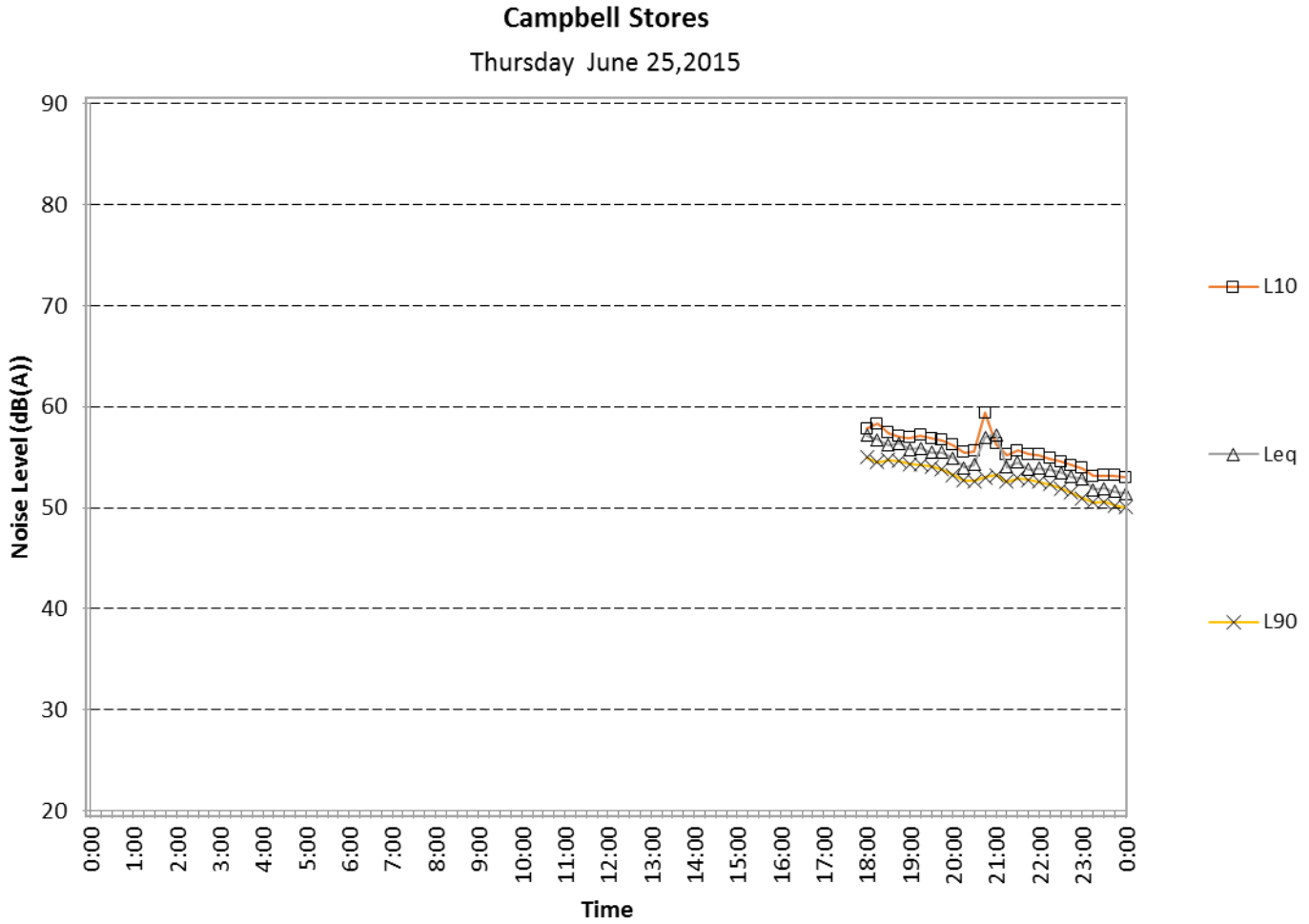
- Surface
- Commercial
- Point source
- Sensitive Noise Receiver

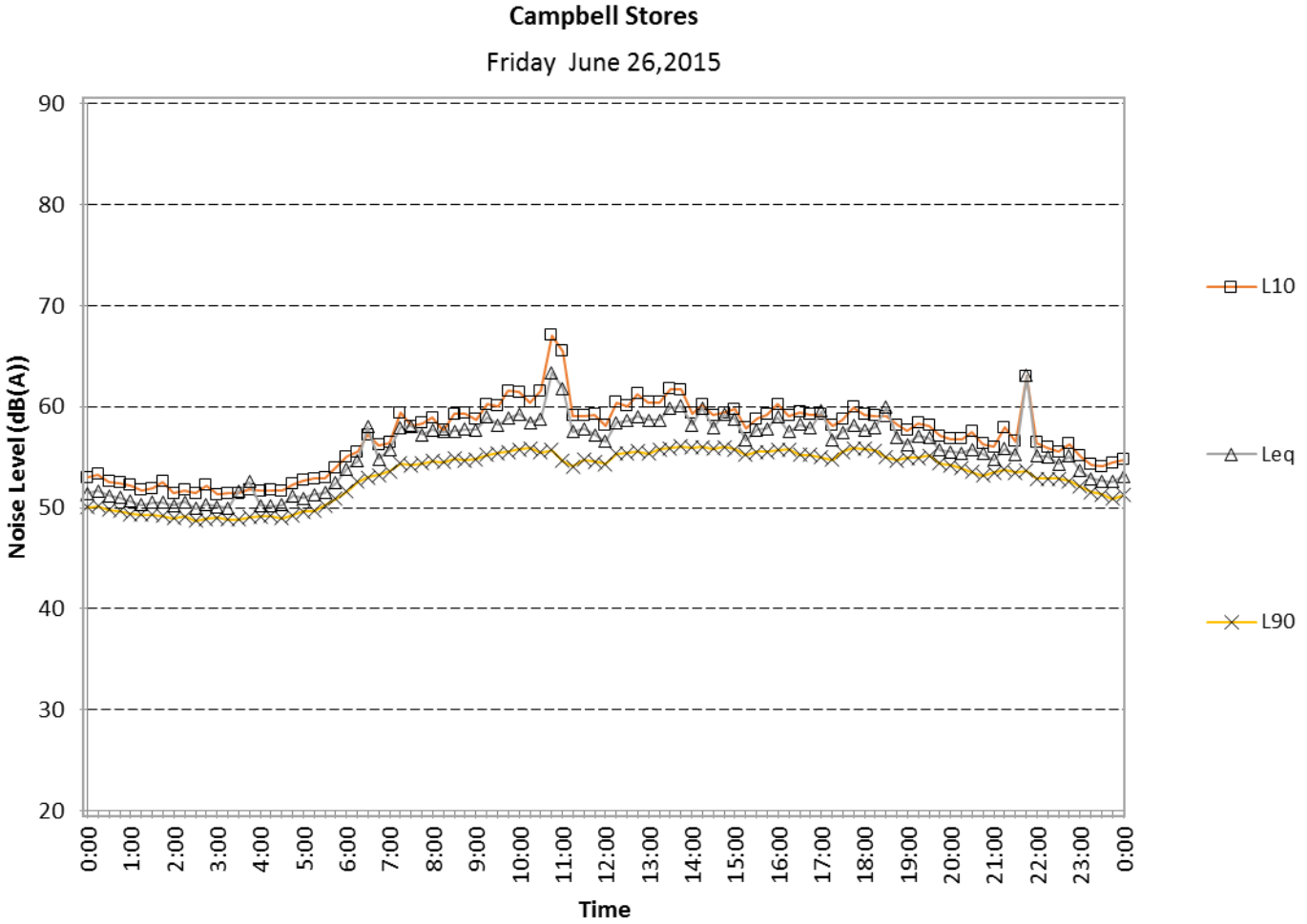
Length scale 1:1311
0 5 10 20 30 m

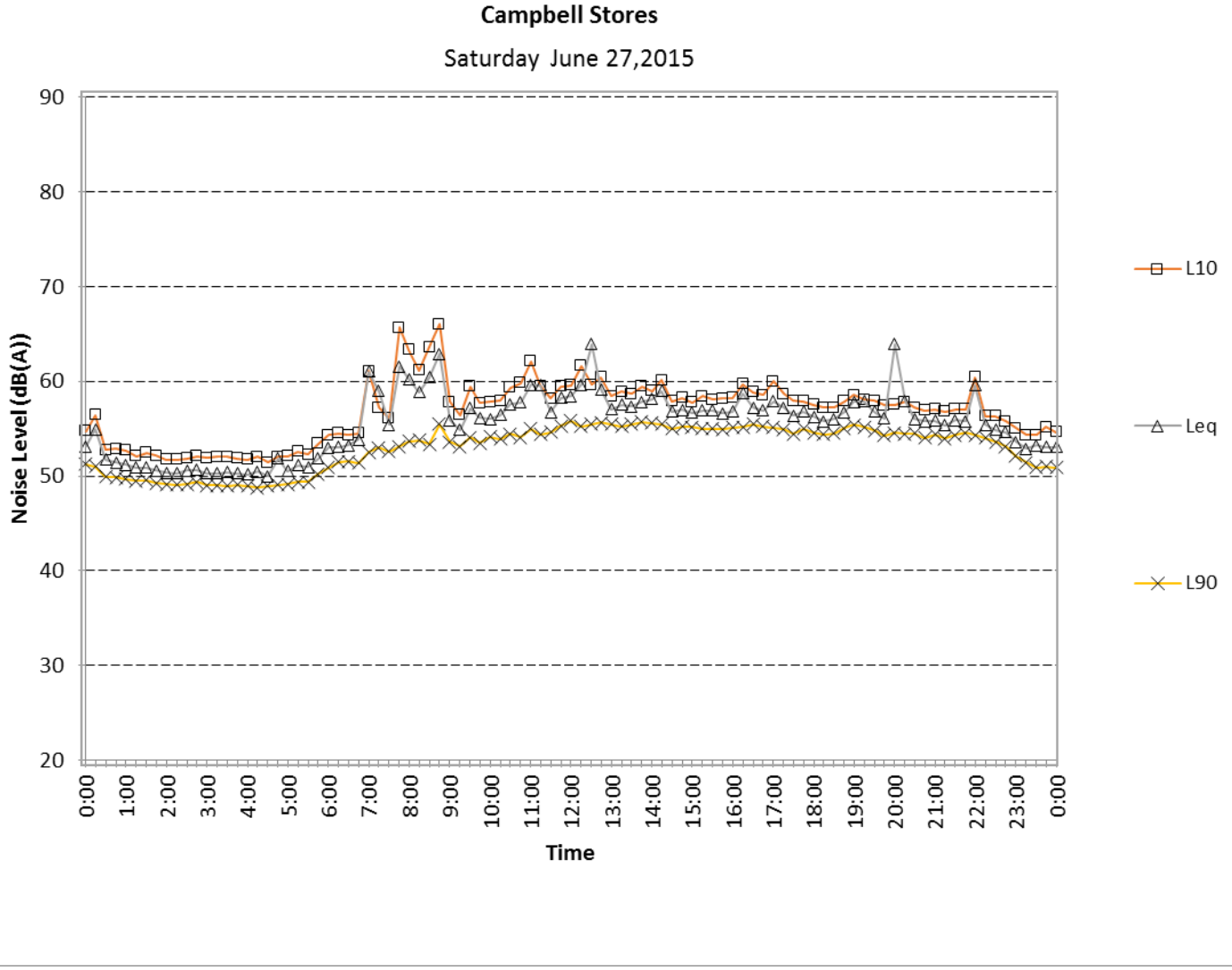
N

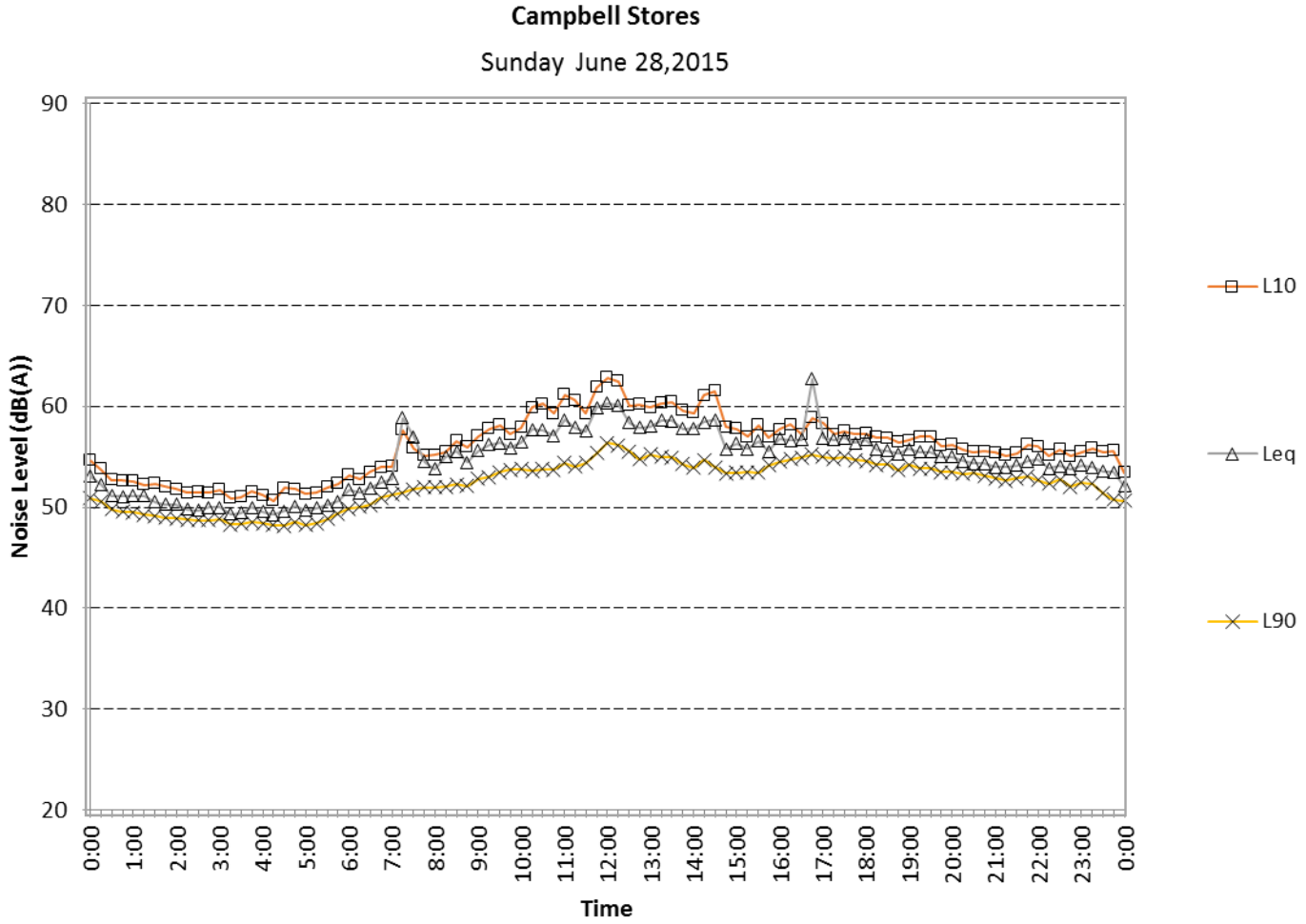
ACOUSTIC LOGIC

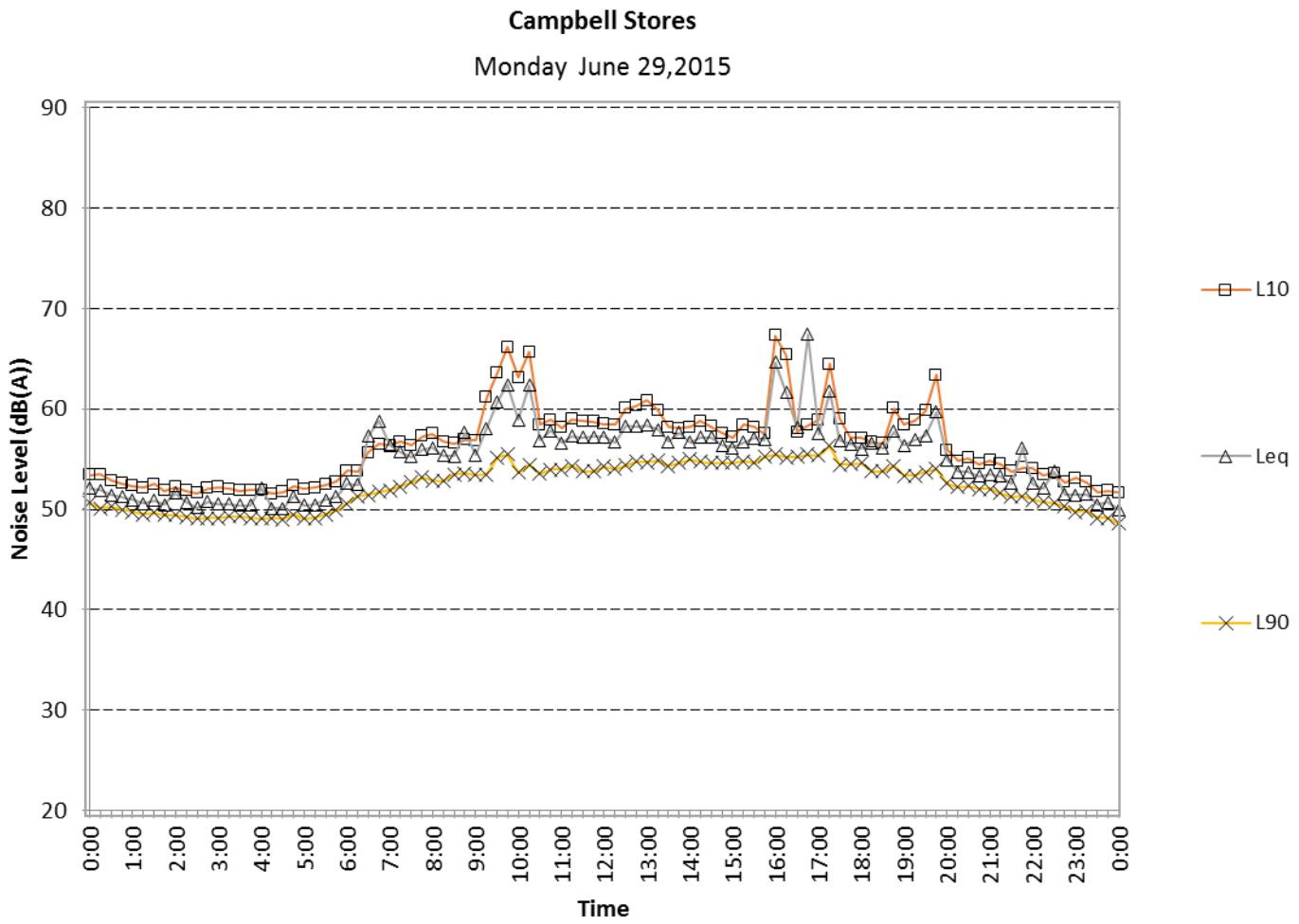
APPENDIX TWO – BACKGROUND NOISE LOGGING

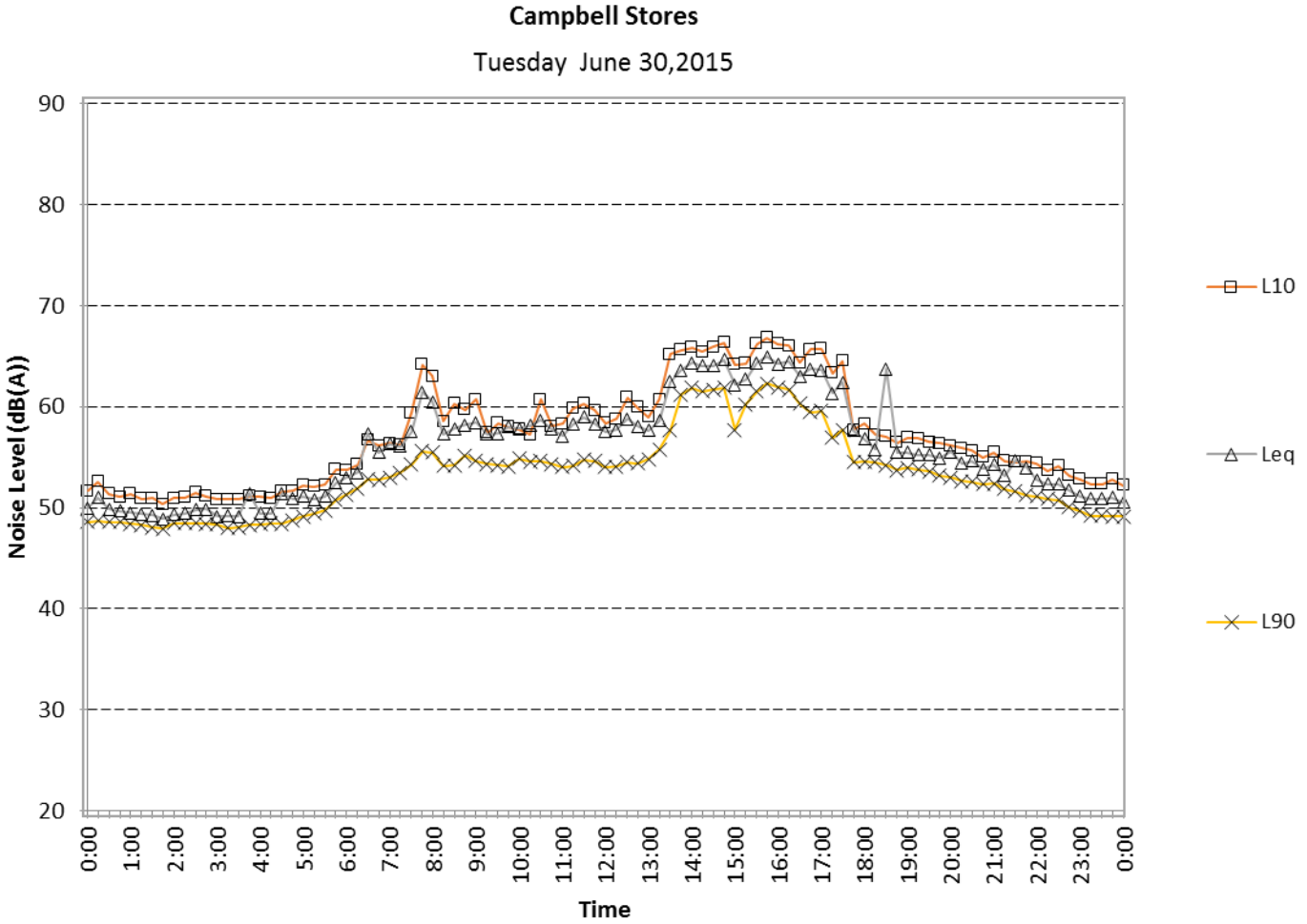

Campbell Stores
Thursday June 25,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

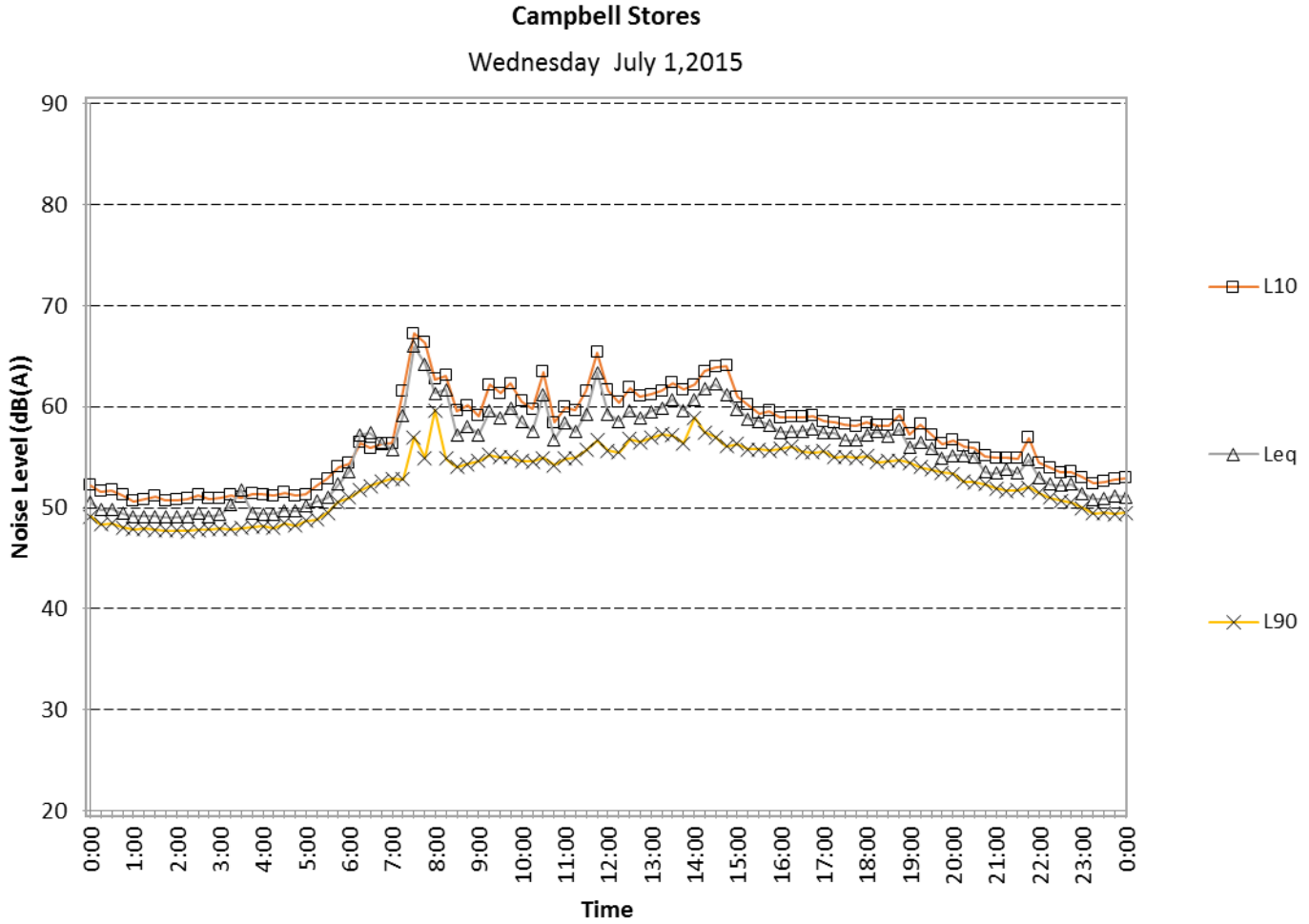

Campbell Stores
Friday June 26,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90

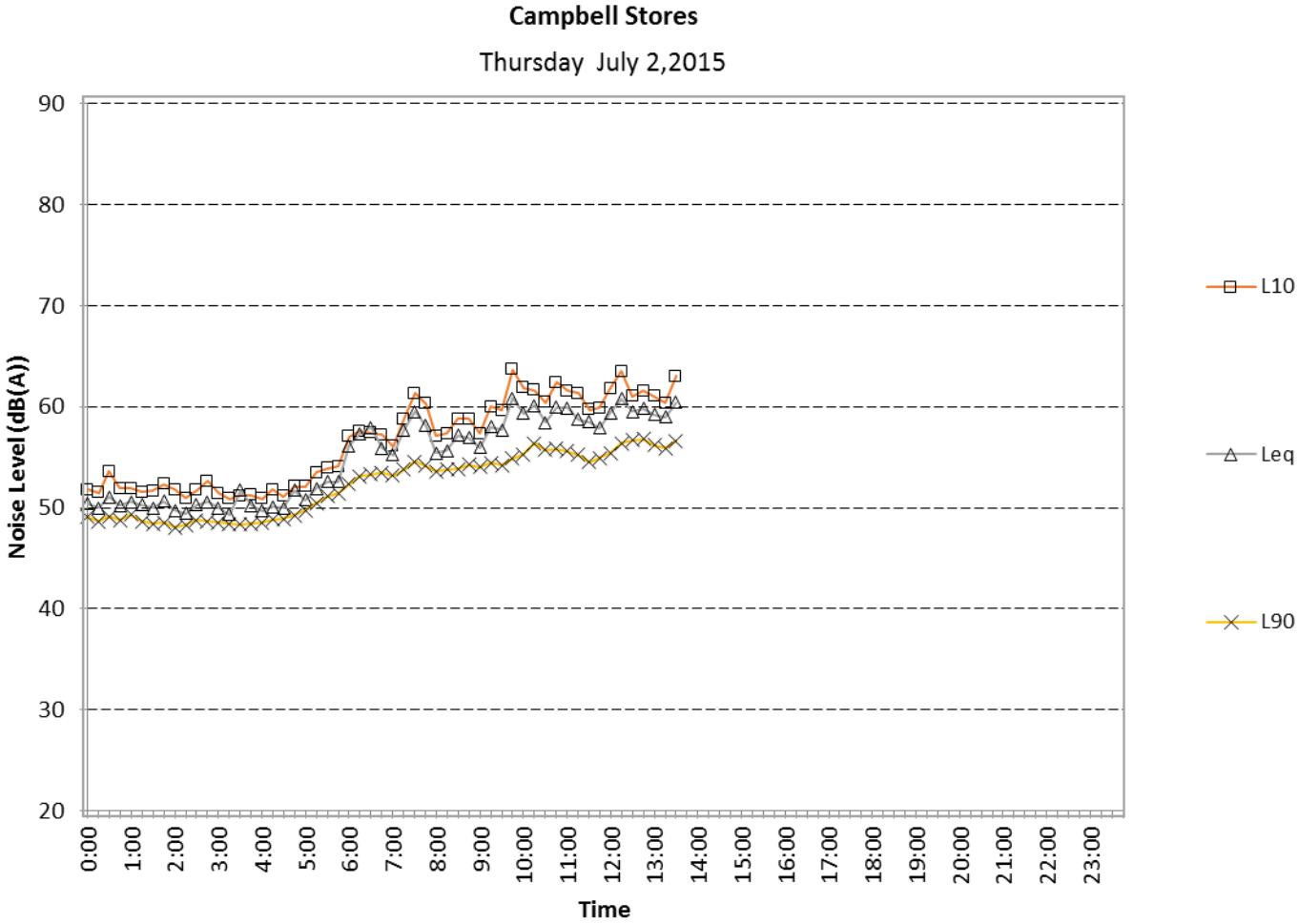

Campbell Stores
Saturday June 27,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90


Campbell Stores
Sunday June 28,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90


Campbell Stores
Monday June 29,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90


Campbell Stores
Tuesday June 30,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90


Campbell Stores
Wednesday July 1,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90


Campbell Stores
Thursday July 2,2015
Noise Level (dB(A))
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time
L10
Leq
L90