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Harbord Diggers Redevelopment

Noise Impact Assessment

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1 INTRODUCTION

This report presents the assessment of noise impacts associated with the proposed Harbord Diggers redevelopment. This assessment discusses all aspects of noise impact associated with the redevelopment including:

- Loading dock operations, truck movements etc;
- Cars entering and exiting the development;
- Noise emanating from licensed areas, outdoor gaming areas and the like;
- Noise emanating from hospitality uses;
- Childcare centre noise; and
- Mechanical plant.

Noise impacts have been assessed in accordance with the following regulations and Australian Standards.

- NSW Environment Protection Authority
    - Industrial Noise Policy
    - Road Noise Policy
- Warringah Shire Council Development Control Plan.

Noise emissions from licensed areas have been also been assessed against the requirements of the Office of Liquor, Gaming and Racing (OLGR). These predictions are to provide an indication of compliance with the OLGR criteria, however the finalised solutions are proposed to be undertaken during the detailed design phase when further development of the internal and external design has been conducted.

This assessment has taken into consideration the objectives of Condition 12 of the Harbord Diggers Master Plan conditions of Consent which states the following:

12. Environmental Noise Impact Assessment

*The Stage 2 DA is to be accompanied by a detailed **Environmental Noise Impact Assessment** addressing the requirements of 'Part D3 Noise' in Warringah Development Control Plan 2011, and including noise sources (mechanical plant, loading dock and garbage removal operations, basement car parking, vehicle access/egress, residential apartments, retail spaces) and noise control measures in relation to glazing, mechanical equipment, sound transmission between neighbouring internal and external properties, construction noise and compliance with BCA.*

***Reason:** To ensure a satisfactory acoustic environment*

2 SITE BACKGROUND

2.1 SITE LOCATION

The proposed development is to be located in place of the existing Harbord Diggers site located along Evans Street, Harbord. Refer to Figure 1.

At present, development on the site consists of:

- Club building, which includes public bars, gaming areas, gym and function rooms.
- Bowling greens.
- Two car parks (one on grade, and the other below the bowling greens).

The site is bounded by the following land uses:

- Evans Street to the Southwest and Northwest;
- Native parkland to the Southeast;
- Lumsdaine Drive to the Northeast; and
- Carrington Parade to the North.

Existing sensitive receivers in the vicinity of the site include the following:

- Residences located across Evans Street to the West of the site;
- Residences across Carrington Parade to the North of the site.

These dwellings will be used as a basis for this assessment for receivers external to the site.

2.2 DEVELOPMENT PROPOSAL

The proposed works involve the adaptive reuse of the existing club building and the construction of four new buildings, comprising:

- The club (bar, gaming areas, function rooms, gym, community facilities and aquatic centre).
- Child Care Centre.
- Seniors Living Accommodation.
- Ancillary facilities, loading dock and car park.

Figure 1: Site Survey and Monitoring Position

3 ENVIRONMENTAL NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental 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.

In analysing 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 by 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 15 minute period. L_{eq} is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

4 EXISTING ACOUSTIC ENVIRONMENT

The existing acoustic environment is described by low to moderate background noise levels in the absence of significant commercial, industrial or traffic noise sources.

4.1 BACKGROUND NOISE MONITORING

Environmental noise monitoring was conducted at the site to establish the rating background noise level and typical ambient acoustic environment.

4.1.1 Period of Measurements

Unattended noise monitoring was conducted between 26 March and 2 April 2013.

4.1.2 Measurement Equipment

Monitoring was conducted 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.

4.1.3 Location of Measurements

The monitor was installed on the western boundary of the Club grounds, adjacent to Carrington Parade (refer to Figure 1).

4.1.4 Background Noise Levels

Background noise levels measured at this location will be indicative of the background levels that would be measured at the nearby residential properties on both Carrington Parade and Evans St.

Measured background noise levels are presented below.

Table 1 - Measured Background Noise Levels

Location	Background noise level dB(A) L_{90}		
Harbord Diggers	Daytime (7am-6pm)	Evening (6pm-10pm)	Night time (10pm-7am)
	43	40	37

Attended background noise measurements were conducted to establish the typical background noise spectrum. This will be used to formulate noise criteria for licensed areas as part of the development.

Table 2 - Background Noise Spectrum

Time	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-weighted level
Day (7am-6pm)	48	48	46	44	41	38	32	24	22	43
Evening (6pm to 10pm)	45	45	43	41	38	35	29	21	19	40
Night (10pm to 7am)	42	42	40	38	35	32	36	18	16	37

5 NOISE EMISSION CRITERIA

Criteria to govern noise emissions generated from the various noise sources as part of the site are summarised in the Table below.

Table 3 – Summary of Noise Emission Regulations and Authorities

Noise Source	Noise Regulation / Authority
Mechanical Plant, Loading Dock and Cafe	Warringah DCP and EPA Industrial Noise Policy
Increased road traffic noise	EPA Road Noise Policy
Child Care Centre	Noise emission guidelines recommended by the Land and Environment Court and AAAC childcare centre guidelines
Patron / music noise within licensed areas	Industrial Noise Policy and Office of Liquor, Gaming and Racing

Each of the criteria nominated in Table 3 are discussed below.

5.1 MECHANICAL PLANT, LOADING DOCK AND CAFÉ NOISE

Both the EPA Industrial Noise Policy and the Warringah DCP have acoustic controls in this regard.

5.1.1 Warringah DCP

Part D3 of the Warringah DCP sets out noise emission goals.

The DCP states that noise emissions from plant are not to exceed background noise levels by more than 5dB(A) when measured in accordance with the NSW Industrial Noise Policy.

Corresponding noise emission goals are as follows:

Table 4 - Plant Noise Emission Goals (Warringah DCP)

Time of Day	Background Noise Level – dB(A)L_{90}	Noise Emission Goal dB(A)L_{eq}
Day (7am-6pm)	43	48
Evening (6pm-10pm)	40	45
Night (10pm-7am)	37	42

5.1.2 EPA Industrial Noise Policy

Both the INP Intrusiveness and Amenity Criteria are applicable to the site. Intrusiveness criteria requires that noise from the site not exceed background noise level by more than 5dB(A) $L_{eq(15min)}$. Amenity criteria are determined based on the land use in the area (be it residential/commercial/industrial and urban/suburban/rural). The Intrusiveness and Amenity Criteria are as follows:

Table 5 - INP Noise Emission Requirements

Receiver Type	Time of Day	Intrusiveness Noise Objective $L_{eq(15min)}$	Amenity Noise Objective (Suburban Areas) dB(A)$L_{eq(Period)}$
All Potentially Affected Residential Properties	Day Time (7am – 6pm)	48	55
	Evening (6pm – 10pm)	45	45
	Night (10pm-7am)	42	40

5.1.3 Peak Noise Events (Sleep Disturbance) – 10pm-7am

Potential sleep arousal impacts should be considered for noise generated after 10pm or before 7am. Sleep arousal is a function of both the noise level and the duration of the noise. To assess potential sleep arousal impacts, a two stage test is carried out:

- Step 1 - An "emergence" test is first carried out. That is, the L_1 noise level of any specific noise source should not exceed the background noise level (L_{90}) by more than 15 dB(A) outside a resident's bedroom window between the hours of 10pm and 7am. If the noise events are within this, then sleep arousal impacts are unlikely and no further analysis is needed. This is consistent with the Noise Guide for Local Government. The guideline level is set out below.

Table 6 - Sleep Arousal Emergence Criteria (10pm-7am)

Location	Background Noise Level (1pm-7am) - dB(A)L_{90}	Emergence Level dB(A) $L_{1(1min)}$
All Potentially Affected Residential Properties	37	53

- Step 2 - If there are noise events that could exceed the emergence level, then an assessment of sleep arousal impact is required to be carried out taking into account the level and frequency of noise events during the night, existing noise sources, etc. This test takes into account the noise level and number occurrences of each event with the potential to create a noise disturbance. As is recommended in the explanatory notes of the EPA Industrial Noise Policy, this more detailed sleep arousal test is conducted using the guidelines in appendix B of the EPA Environmental Criteria for Road Traffic Noise.

5.2 NOISE FROM INCREASED TRAFFIC GENERATION ON PUBLIC STREETS

Council has no specific noise criteria with respect to traffic generation associated with developments. In the absence of this, EPA guidelines can be used for assistance.

For land use developments with the potential to create additional traffic the development should comply with the requirements for new developments detailed in the EPA Road Noise Policy, criteria as follows:

Table 7 - Criteria for Traffic Noise for New Developments

Time of day	Criteria for Acceptable Traffic Noise Level Local Roads - dB(A)
Day (7am to 10pm)	55 $L_{Aeq(1hr)}$
Night (10pm to 7am)	50 $L_{Aeq(1hr)}$

However, if existing noise levels exceed those in the table above, the provisions of section 3.4 of the Road Noise Policy will apply. If practicable, noise on public roads as a result of increased traffic generation should not result in an increase in traffic noise level of more than 2dB(A). In this regard, the Policy relevantly states "*an increase of up to 2dB represents a minor impact that is considered barely perceptible to the average person*".

5.3 CHILD CARE CENTRE NOISE.

The Warringah Council DCP does not contain any provisions with respect to Child Care Centre noise.

In absence of a specific noise emission goal being stated, noise emissions from outdoor play areas should not exceed the following:

- Background noise levels by more than 10dB(A) at nearby residences if children are outside for no more than 2 hours per day.
- Background noise level by more than 5dB(A) at nearby residences if children are outside for more than 2 hours per day.

This "background + 10dB(A)" assessment is typically adopted by the Land and Environment Court (eg in *Mesabo Pty Limited v Mosman Municipal Council* [2004] NSWLEC 492) in the absence of any specific council control and is also recommended by the Association of Australian Acoustical Consultants (AAAC).

Noise emission goals based on the measured background noise levels are presented below.

Table 8 - Outdoor Play Areas - Noise Emission Objectives at Residential Receivers

Location	Time of day	Background Level dB(A)L_{90}	Noise Emission Objective dB(A)$L_{eq\ (15min)}$
Nearest Residents (maximum 2 hours in external areas)	Day (7am to 6pm)	43	53
Nearest Residents (exceeding 2 hours in external areas)	Day (7am to 6pm)	43	48

Noise from the child care during the evening period, (6pm to 7pm) will be assessed against the requirements of the INP. It should be noted that children will be inside during this time and as such will have negligible acoustic impact on surrounding uses.

5.4 PATRON/MUSIC NOISE

When assessing noise emissions from licensed premises, noise emissions must comply with the acoustic requirements imposed by the Industrial Noise Policy and ultimately the Office of Liquor Gaming and Racing.

These guidelines relate to noise generated by patrons and by music. The requirements are set out below:

- *That the L_{10} noise level emitted from the premises shall not exceed 5dB above the background L_{90} sound level in any Octave Band Centre Frequency (31.5kHz to 8kHz inclusive) between the hours of 7.00am to 12.00 midnight when assessed at the boundary of the nearest affected residential premises.*

- *L_{10} noise level emitted from the premises shall not exceed the background L_{90} sound level in any Octave Band Centre Frequency (31.5kHz to 8kHz inclusive) after midnight when assessed at the boundary of the nearest affected residential premises.*

- *After midnight, noise emissions from the Place of Pubic Entertainment are to be inaudible within any habitable rooms in nearby residential properties.*

Corresponding noise emission goals from patrons/music is as follows. These goals are applicable for both noise from internal spaces and noise from outdoor dining areas/beer gardens.

Table 9 - Background Noise Spectrum and Noise Emission Goals (dB)

Time	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-weighted level
Day (7am-6pm) (43BG+5dB)	53	53	51	49	46	43	37	29	27	**48**
Evening (6pm-12am) (40BG+5dB)	50	50	48	46	43	40	34	26	24	**45**
Night (12am-7am) (37BG+0dB)*	42	42	40	38	35	32	26	18	16	**37**

*In addition, noise should be inaudible if measured inside a habitable room of a nearby residence.

Typically noise will be considered inaudible if the source of the noise is 10dB below the background noise in octave bands or where noise is equal to or below the threshold of hearing as per the equal loudness contour in ISO 226.

5.5 NOISE EMISSION OBJECTIVES

The noise emission objectives governing the operation of the project for each noise source is summarised in the Table below.

Table 10 –Noise Emission Objectives (Residential Receivers)

Noise Source	Time of Day	Noise Descriptor	Noise Criteria	1/1 Octave Sound Pressure Level, dB									A-wt
				31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Loading Dock Mechanical Cafe	Day	$L_{eq\ 15\ min}$	Warringah INP Intrusiveness Criteria	Not applicable									48
	Evening	$L_{eq\ 15\ min}$		Not applicable									45
	Night	$L_{eq\ 15\ min}$		Not applicable									42
		$L_{1\ 1\ min}$		Not applicable									52
	Day	$L_{eq\ (period)}$	INP Amenity Criteria	Not applicable									55
	Evening	$L_{eq\ (period)}$		Not applicable									45
	Night	$L_{eq\ (period)}$		Not applicable									40
Licensed Premises	Day	$L_{10\ 15\ min}$	OLGR	53	53	51	49	46	43	37	29	27	N/A
	Evening	$L_{10\ 15\ min}$		50	50	48	46	43	40	34	26	24	N/A
	Night	$L_{10\ 15\ min}$		42	42	40	38	35	32	26	18	16	N/A
		n/a		Inaudible within residential premises									N/A
Childcare	7am - 6pm	$L_{eq\ 15\ min}$	Land Environment Court	Not applicable									53
	6pm – 7pm	$L_{eq\ 15\ min}$	INP Intrusive Criteria	Not applicable									45
Increased Road Noise	7am to 10pm	$L_{eq\ 1\ hour}$	Road Noise Policy	Not applicable									55
	10pm to 7am	$L_{eq\ 1\ hour}$		Not applicable									50

6 ASSESSMENT OF NOISE IMPACTS

Noise generated by the development will be assessed against the noise emission requirements summarised in Table 10.

6.1 LOADING DOCK

Noise from trucks entering the loading dock via Evans Street have been assessed using the following assumptions:

- There is maximum 1 delivery in any 15 minute period incorporating a medium rigid vehicle;
- The truck is assumed to idle within the loading dock for 1 minute.
- A sound power level of 100dB(A) has been adopted for a medium rigid vehicle;

The predicted noise level from the loading dock operation is as follows:

Table 11 – Loading Dock – Predicted Noise Levels

Time of Day	Predicted Noise Level, dB(A) $L_{eq\ 15min}$	Noise Emission Criteria, dB(A) $L_{eq\ 15min}$	Complies
Day	41	48	Yes
Evening	41	45	Yes
Night	41	42	Yes

Noise from the loading dock will only occur sporadically during the day, evening and night time period. On this basis, noise emissions have been assessed against the intrusive noise criterion as it will represent the most stringent of the INP and Warringah Council noise criteria.

The potential for sleep disturbance from noise generated by the loading dock is presented below.

Table 12 – Loading Dock – Predicted Noise Levels

Time of Day	Predicted Noise Level, dB(A) $L_{1\ 1min}$	Sleep emergence level dB(A) $L_{1\ 1min}$	Complies
Night	58	52	Yes

Note: Noise predictions are external to the receiver building façade.

On the basis that the predicted noise level exceeds the sleep emergence level, an analysis should be conducted in accordance with the NSW Environmental Criteria for Road Traffic Noise (ECRTN). The analysis is conducted based on the predicted internal noise level.

ALC typically adopt a 10dB(A) noise reduction across an open window. On this basis, the predicted internal noise level within a bedroom facing Evans Street would be 48dB(A).

Section B5 of the ECRTN states that:

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

On the basis that the predicted internal noise level from a truck delivery is 48dB (A) L_1 and sleep awakening reactions are unlikely to occur below 50dB(A), ALC would consider the use of the loading dock within the night time period as being acoustically acceptable.

6.2 UPPER GROUND CAFÉ NOISE

Noise emissions from the café may have the potential to impact the residences above the tenancy due to noise breaking out through open doors. Noise impacts have been assessed assuming the following:

- Patron noise for patrons sitting externally will have a sound power level 71dB(A) L_{eq} conducive to speaking with a slightly raised voice.
- The majority of noise will be from 30 patrons sitting in the wintergarden area with 1 in 3 patrons talking at any one time.

The predicted noise level on the balcony of the residences above the café are detailed in the Table below.

Table 13 – Café Predicted Noise Levels

Time of Day	Predicted Noise Level, $L_{eq\ 15min}$	Intrusive Noise Criteria, dB(A) $L_{eq\ 15min}$	Amenity Noise Criteria, dB(A L_{eq} (evening)	Complies
Day	41	48	55	Yes
Evening	41	45	45	Yes

Due to the fact that patrons occupying the café could occur throughout the duration of the day or evening, noise emissions are assessed against the intrusive and amenity criterion. The evening amenity criterion has been adopted which will represent the most stringent time period in which the café will operate.

6.3 LICENSED ALFRESCO GAMING AREA

The alfresco gaming area will open up onto Palm Gully and is proposed to operate up from 9am to 4am. As the area will be licensed, noise emissions during the night time period of 10pm to 7am are required to comply with the night time criteria under the Industrial Noise Policy. OLGR requirements dictate that noise from the pokies (being a licensed area) be inaudible when measured in any habitable rooms in the vicinity of the development between 12am and 7am.

ALC notes that the control of noise emission from the outdoor gaming area may be conducted using a combination of internal treatments (line of site barriers within the gaming area etc) and external treatments (acoustic baffles or screens between the Palm Gully and residential facades).

The following assumptions have been used for the assessment of noise emissions from the Alfresco Gaming Area:

- An internal noise level of 65dB(A) $L_{10\ 15min}$ from gaming machines based on noise measurements conducted by ALC at:
    - St Marys Leagues Club;
    - Cabramatta Leagues Club.
- Further to the pokie noise, a sound power level of 67dB(A) L_{10} per person has been adopted for people talking. It is expected that:
    - During the night time period, the pokie area will be at 30% capacity.
    - There will typically be up to 30 people in the room
    - 1 in 3 will be talking at any one time.
- The entirety of the façade is open to palm gully.
- The alfresco gaming area is isolated off from the main bar area such that the noise from the bar does not spill into the gaming area and into palm gully.
- The alfresco gaming area is not a congregation or general seating area. It is expected that patrons within this area between the hours of 12am to 7am are occupying the space for gaming only.

Noise from the alfresco gaming area has been predicted to nearest residential receiver as part of the Harbord Diggers development. Predictions have been presented for the following:

- No acoustic treatment.
- Acoustic treatments as discussed in Section 6.3.1.

Table 14 – Outdoor Gaming Area

Receiver Location	Acoustic Treatment	Time of Day		Octave Band Noise Levels, dB									
				31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Building D	None	Night 12pm to 7am	Predicted Noise Level	41	41	32	30	30	28	23	14	4	32
			Inaudible Criteria	60	38	30	28	25	22	16	8	13	27
			Exceedance	-19	3	2	2	5	6	6	6	-9	N/A
	Refer to Section 6.3.1	Night 12pm to 7am	Predicted Noise Level	31	31	21	19	15	10	9	1	-	17
			Inaudible Criteria	60	38	30	28	25	22	16	8	13	27
			Exceedance	-29	-7	-9	-9	-10	-12	-7	-7	-13	N/A
Building C	None	Night 12pm to 7am	Predicted Noise Level	46	46	37	33	33	33	29	21	13	36
			Inaudible Criteria	60	38	30	28	25	22	16	8	13	27
			Exceedance	-14	8	7	5	8	11	13	13	-	N/A
	Refer to Section 6.3.1	Night 12pm to 7am	Predicted Noise Level	36	36	26	22	18	15	15	8	1	22
			Inaudible Criteria	60	38	30	28	25	22	16	8	13	27
			Exceedance	-24	-2	-4	-6	-7	-7	-1	-	-12	N/A

6.3.1 Discussion

Predicted noise levels from the operation of the outdoor gaming area during the night time period indicates the following:

- Predicted noise levels will be in the order of 22dB(A) L_{10} or 20dB(A) L_{eq}.
- The night time noise objective under the INP is 40dB(A) L_{eq} when assessed against the amenity criterion. Allowing for an intermittent correction of +5dB(A), noise emissions from the outdoor pokie area will be significantly lower than the INP criterion.
- Indicative acoustic treatments to comply with the inaudibility criterion as required by the OLGR are discussed below.

6.3.2 Outdoor Gaming - Recommended Acoustic Treatment

The predicted noise levels presented in Table 14 are based on the following acoustic treatments:

- Acoustically absorptive line of sight screens are to be fitted between pokies (particularly speakers) and palm gully. This will typically afford a 5dB noise reduction.
- Pokie speakers are to be reduced to half volume. This will typically afford a 5dB noise reduction.
- The parapet between the podium walkway and Palm Gully is to be extend to a minimum RL 22.
- Acoustically treating the privacy screen between Palm Gully and receiver locations. This will include fitting an absorptive material to the louvre surface.

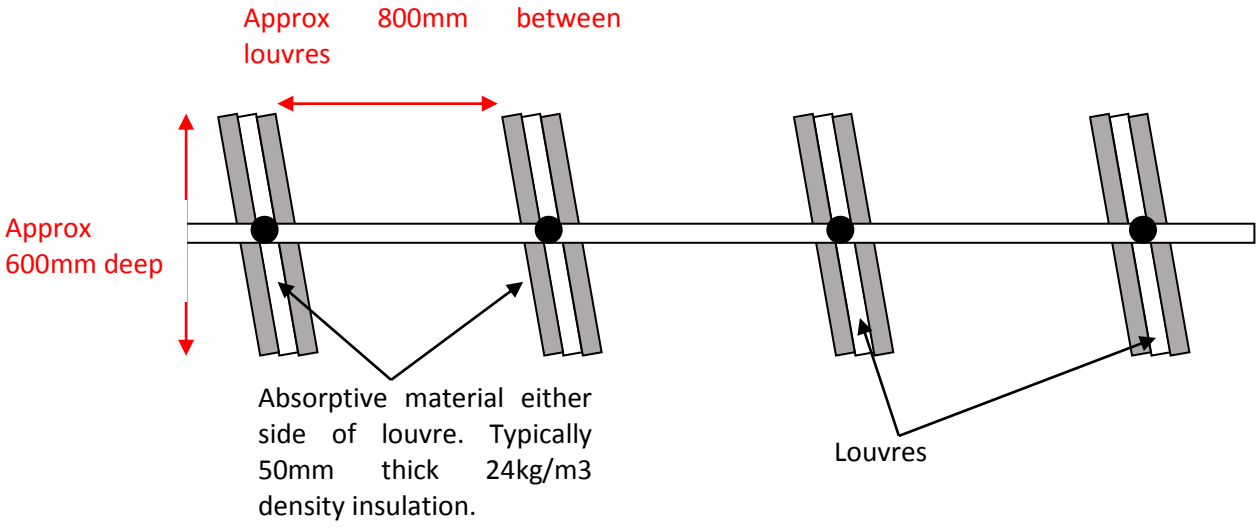


Figure 2: Indicative Treatment to Privacy Screen Treatment (Section Elevation)

The aforementioned acoustic treatments are indicative only. Finalised acoustic treatments will be determined during the detailed design phase with the liquor licensing.

It should be noted that the background + 0dB(A) and inaudibility requirement will ensure that noise emissions from the licensed premises comply with the requirements of the Industrial Noise Policy and Warringah Council by a substantial margin.

Alternative solutions may be formulated as part of the detailed design process once internal layouts (including pokie machines) are finalised.

6.4 LICENSED WINTERGARDEN, OUTDOOR SEATING AND BAR

The bar, wintergarden and outdoor seating are located toward the East of the site facing away from the majority of sensitive receivers (as part of the development and external to the development). These areas are discussed below.

The following have been assessed against the requirements of the Industrial Noise Policy. Indicative compliance has been provided in accordance with the Office of Liquor, Gaming and Racing.

6.4.1 Noise from the Internal Bar

The internal bar opens up to the East via bi-folds granting access to the wintergarden seating and the outdoor seating beyond. Noise associated with this use is assumed as follows:

- Noise within the bar has been based on an overall sound pressure level of 79dB(A) L_{10} which will represent the typical operation of the bar.
- Music levels will typically be background music only, not exceeding 70dB(A) L_{10} at the façade.

6.4.2 Wintergardens

The wintergardens will be associated with the restaurants for outdoor seating. All outdoor seating is located under the upper ground floor under croft. Operable bi-folds may be closed across this area during adverse weather.

Noise associated with this use is assumed as follows:

- The sound pressure level within the wintergarden will be 75dB(A) L_{10} which will typically be associated with a noisy restaurant with absorptive finishes to the ceiling.
- Music will be background only, not exceeding 65dB (A) L_{10}
- There is acoustically absorptive treatment to the underside of the soffit.

6.4.3 Outdoor Areas (Beyond Wintergardens)

The outdoor areas will provide an outdoor hospitality area associated with the club. Noise from this area has been typically associated with a beer garden or deck from a surf club. Whilst voices within this area will be raised, it would not be to levels associated with a large beer garden which has loud music playing. In this respect, patrons would not have to compete with the music in noise level to be heard.

Noise associated with this use is assumed as follows:

- The sound pressure level for each patron is 74dB(A) L_{10}
- There are 33 patrons with 1 in 3 people talking at any one time.

Predicted noise levels from the operation of the club, wintergardens and outdoor areas in compliance with the INP are presented below. Noise emissions are presented for all three uses working concurrently.

Table 15 - Wintergarden and Outdoor Licensed Area (INP Requirements)

Time of Day	Receiver Location	Predicted Noise Level, dB(A) L_{eq}	Noise Criteria, dB(A) L_{eq}	Complies
Day 7am to 6pm	Harbord Diggers Tower F	40	48	Yes
	8 Carrington Parade	31	48	Yes
Evening 6pm to 10pm	Harbord Diggers Tower F	40	45	Yes
	8 Carrington Parade	31	45	Yes

Predicted noise levels from the operation of the aforementioned uses are detailed in the following tables in comparison with the OLGR requirements.

Table 16 – Wintergarden and Outdoor Licensed Area (OLGR Requirements) to Harbord Diggers Residential

Noise Source	Receiver Location	Time of Day		Octave Band Noise Levels, dB									
				31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Bar and Wintergardens	Building F	Day 7am to 6pm	Predicted Noise Level L_{10}	35	35	37	33	37	39	34	25	11	42
			Criteria	53	53	51	49	46	43	37	29	27	-
			Exceedance	-18	-18	-14	-16	-9	-4	-3	-4	-16	N/A
		Evening 6pm to 12am	Predicted Noise Level L_{10}	35	35	37	33	37	39	34	25	11	42
			Criteria	50	50	48	46	43	40	34	26	24	-
			Exceedance	-15	-15	-11	-13	-6	-1	0	-1	-13	N/A
Bar, Wintergarden and Outdoor Seating	Building F	Day 7am to 6pm	Predicted Noise Level L_{10}	35	35	37	33	38	40	36	26	11	43
			Criteria	53	53	51	49	46	43	37	29	27	-
			Exceedance	-18	-18	-14	-16	-8	-3	-1	-3	-16	N/A
		Evening 6pm to 10pm	Predicted Noise Level L_{10}	35	35	37	33	38	40	36	26	11	43
			Criteria	50	50	48	46	43	40	34	26	24	-
			Exceedance	-15	-15	-11	-13	-5	0	2	0	-13	N/A

Note: Building F represents the worst case affected receiver for residential buildings as part of the Harbord Diggers development.

Table 17 – Wintergarden and Outdoor Licensed Area (OLGR Requirements) to External Residential

Noise Source	Receiver Location	Time of Day		Octave Band Noise Levels, dB									
				31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	A-wt
Bar and Wintergardens	8 Carrington Parade	Day 7am to 6pm	Predicted Noise Level L_{10}	22	22	20	15	18	18	19	9	-	23
			Criteria	53	53	51	49	46	43	37	29	27	-
			Exceedance	-31	-31	-31	-34	-28	-25	-18	-20	-27	N/A
		Evening 6pm to 12am	Predicted Noise Level L_{10}	22	22	20	15	18	18	19	9	-	23
			Criteria	50	50	48	46	43	40	34	26	24	-
			Exceedance	-28	-28	-28	-31	-25	-22	-15	-17	-27	N/A
Bar, Wintergarden and Outdoor Seating	8 Carrington Parade	Day 7am to 6pm	Predicted Noise Level L_{10}	24	24	23	23	28	31	27	16	-	34
			Criteria	53	53	51	49	46	43	37	29	27	-
			Exceedance	-29	-29	-28	-26	-18	-12	-10	-13	-27	N/A
		Evening 6pm to 10pm	Predicted Noise Level L_{10}	24	24	23	23	28	31	27	16	-	34
			Criteria	50	50	48	46	43	40	34	26	24	-
			Exceedance	-26	-26	-25	-23	-15	-9	-7	-10	-27	N/A

Note: 8 Carrington Parade represents the worst case affected receiver for residential buildings external to the Harbord Diggers development for the operation of the Wintergardens and Outdoor licensed areas.

Predicted noise levels from the operation of the club, wintergardens and outdoor areas in compliance with the INP are presented below. Noise emissions are presented for all three uses working concurrently.

Table 18 - Wintergarden and Outdoor Licensed Area (INP Requirements)

Time of Day	Receiver Location	Predicted Noise Level, dB(A) L_{eq}	Noise Criteria, dB(A) L_{eq}	Complies
Day 7am to 6pm	Harbord Diggers Tower F	40	48	Yes
	8 Carrington Parade	31	48	Yes
Evening 6pm to 10pm	Harbord Diggers Tower F	40	45	Yes
	8 Carrington Parade	31	45	Yes
Night 10pm – 12am	Harbord Diggers Tower F	39	42	Yes
	8 Carrington Parade	< 30	42	Yes

Note: Patrons are not proposed in the outdoor seating area past 10pm.

6.4.4 Discussion of Outdoor Areas

Predicted noise levels from the operation of outdoor areas indicates the following:

- Noise emissions will comply with the Industrial Noise Policy as per the requirements of Warringah Council for receivers as part of the Harbord Diggers development and external to the development.
- Noise emissions will comply with the OLGR requirements for noise receivers external to the development.
- Noise emissions will slightly exceed the OLGR requirements for noise receivers as part of the Harbord Diggers development based on the patron volumes within the external garden areas.

Further investigation into acoustic treatments and management conditions will be required to ensure compliance with the requirements of the OLGR for receivers as part of the Harbord Diggers development, namely Towers A and are proposed to be conducted during the detailed design phase.

6.5 FUNCTION ROOMS

The function rooms are located on the Northern façade of the development fronting Carrington Parade. Given that the function room is located on the lower ground floor, noise emissions to receivers will typically be through the slab to receivers directly above.

It will be necessary to acoustically treat the building structure depending on the use of these spaces to ensure that any noise (typically music) is compliant with Office of Liquor, Gaming and Racing guidelines. The precise level of acoustic treatment will depend on the time that the rooms operate until and the music noise level proposed.

Acoustic treatments will be explored during the detailed design phase of the development to ensure that noise is not transferred either:

- Via the slab / ceiling construction;
- Through the structure due to speakers improperly mounted on structural columns and the like; and
- Through mechanical ventilation paths and risers.

Acoustic treatments may include:

- An acoustic ceiling, incorporating multiple layers of plasterboard and resilient isolation hangers;
- Resiliently mounted speakers;
- Acoustic treatments to mechanical ventilation grilles and riser paths.

6.6 CHILDCARE CENTRE

A childcare centre is proposed for the northwest corner of the site. Typically, the primary source of noise emission associated with a childcare centre will be from children playing in outdoor playgrounds.

Potential noise impacts on the existing residences on Carrington Parade/Evans Street have been assessed based on the following assumptions:

- There are approximately 90 children using the play area at any one time.
- During active outdoor play, the typical sound power of a child is 78dB(A), with one in two children generating noise at any one time.
- That the playground will be used for a total of no more than 2 hours, per day, between the hours of 7am and 6pm (day time period).

Based on the above, the following noise levels are predicted to the nearest sensitive receivers along Evans Street and Carrington Parade.

Table 19 – Childcare Centre – Predicted Noise Levels (External Receivers)

Acoustic Treatment	Receiver Location	Predicted Noise Level, dB(A) L_{eq}	Noise Emission Criteria, dB(A) L_{eq}	Complies
None	2 The Drive	44	53	Yes
	49 Evans Street	45	53	Yes

Predicted noise levels to residences as part of the development, namely Building C, are presented in the following Table.

Table 20 – Childcare Centre – Predicted Noise Levels (Harbord Diggers Receivers)

Acoustic Treatment	Receiver Location	Predicted Noise Level, dB(A) L_{eq}	Noise Emission Criteria, dB(A) L_{eq}	Complies
Refer to Section 6.6.1 Children allowed maximum 2 hours in outside play areas	Building C	53	53	Yes
	Building B	53	53	Yes
Refer to Section 6.6.2 Children unrestricted in outside play areas	Building C	45	48	Yes
	Building B	45	48	Yes

6.6.1 Childcare Centre – Acoustic Treatment for Restricted Outdoor Use

To comply with the noise emission requirements for children in external yards for up to 2 hours, the following is recommended:

- A solid awning, constructed from Colorbond or equal, is to be constructed over the Upper Ground Floor Terrace area such that a line of sight screen to children using the outdoor terrace is maintained.
- A line of site screen is to be installed full height to the underside of the awning as per below.

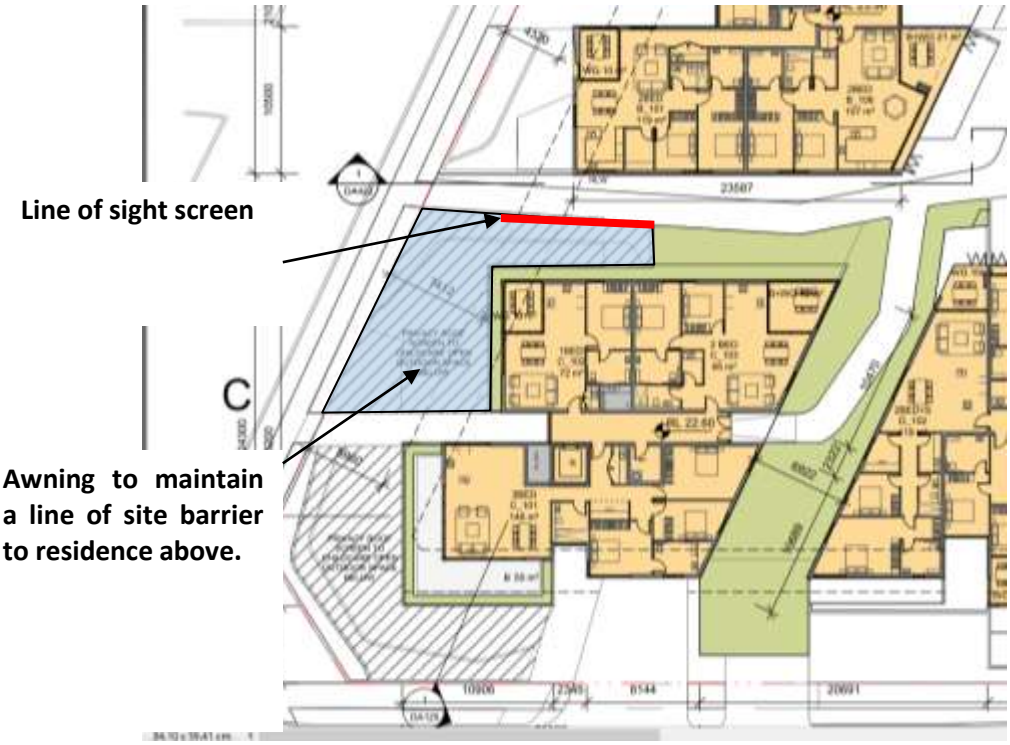


Figure 3: Childcare Terrace Acoustic Treatment

6.6.2 Childcare Centre – Acoustic Treatment for Unrestricted Outdoor Use

To comply with the noise emission requirements for children in external yards exceeding 2 hours, the following is recommended:

- A solid awning, constructed from Colorbond or equal (Minimum 2mm Perspex in-fills for light penetration also acoustically acceptable) is to be constructed over both outdoor play areas such that a line of sight screen to children using the outdoor terrace is maintained.
- A line of site screen is to be installed full height to the underside of the awning in the locations indicated below.

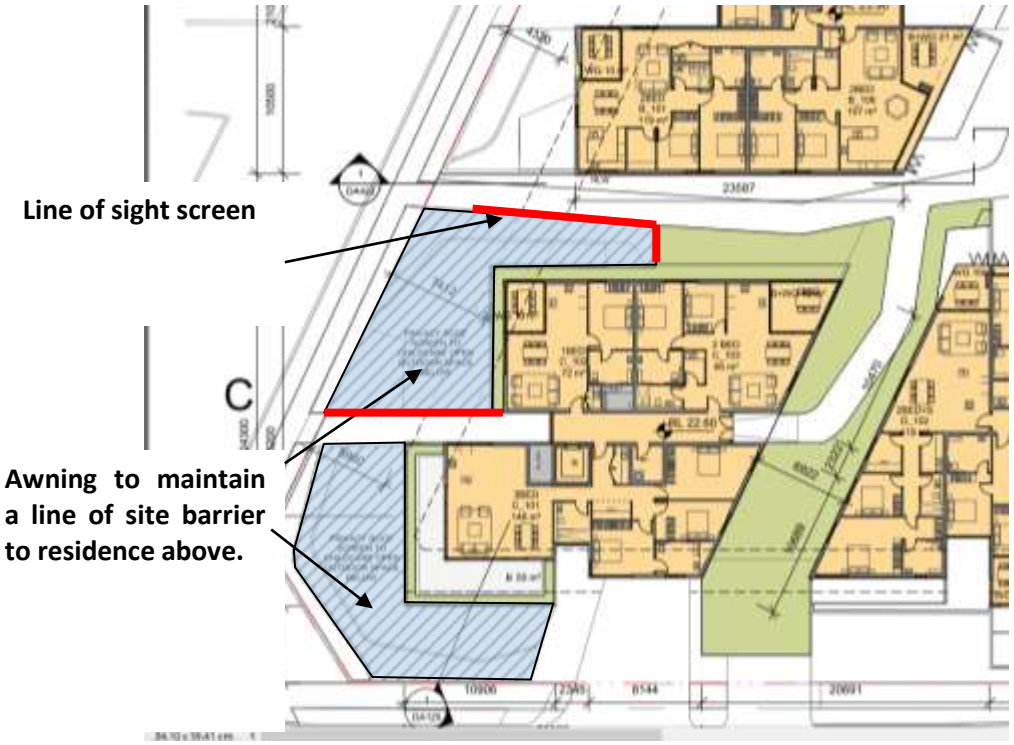


Figure 4: Childcare Terrace Acoustic Treatment

6.7 INCREASED ROAD TRAFFIC NOISE

The potential for increased traffic noise has been assessed using the expected traffic volumes detailed in the GTA Consultants *Traffic and Parking Report* dated 30 June 2014.

Noise predictions are based on the total traffic generation from the club; that being the existing and generated estimates from the new development.

Table 21 – Development Traffic Generation

Vehicle Count	Time of Day	Traffic Generation (veh/hr)
Existing (Evans Street)	AM	187
	PM	209
Development Generation (Evans Street)	AM	338
	PM	488

The predicted noise levels from traffic generated by the development during the peak 1 hour periods are detailed in the Table below. Traffic generation has been assessed against the PM volumes which will be greater than the AM volumes.

Table 22 – Predicted Traffic Noise Levels

Receiver Location	Time of Day	Predicted Noise Level, $L_{eq\ 1\ hour}$	Assessment Criteria, dB(A) $L_{eq\ 1\ hour}$	Complies
Evans Street	Day / Night	38	50	Yes

6.8 MECHANICAL PLANT

Mechanical plant servicing the development have yet to be designed or selected and will typically be assessed at the construction certificate stage prior to implementation. Notwithstanding ALC make the following comments in relation to the mechanical scheme:

- Loud plant items are proposed to be located within the basement levels which will limit direct exposure to surrounding receivers (both as part of the development and external to the development);
- Kitchen and carpark exhaust will typically be via risers discharging at roof level;
- Supply air intakes will typically be via plenums to the basement level plant. Intakes to these plenums may be acoustically treated with internal insulated lining or attenuators where required;
- Residential air conditioning will be via central plant which will be located in the basement.

In all cases, mechanical plant will be designed to comply with the noise emission criteria detailed in Section 5.

7 BUILDING CODE OF AUSTRALIA

Internal noise separation between apartments are to be designed to comply with Part F5 of the National Construction Code (Building Code of Australia).

At this stage of the development, apartment layouts and internal building materials are yet to be finalised and as such acoustic details in compliance with the BCA have yet to be undertaken.

An assessment on internal constructions will be undertaken prior to the construction certificate to ensure that the minimum requirements of the BCA are satisfied.

8 CONSTRUCTION NOISE

A construction noise management plan is not typically required at DA stage, as a construction program has not yet been developed.

Management of construction noise and vibration is a routine practice which is adopted on the majority of large scale developments. Strategies such as equipment selection, noise screens, scheduling of noisy works and respite periods can be adopted to mitigate noise impacts. Detailed recommendations are typically provided at CC/tender stage, once a builder is appointed and a construction program has been developed.

Excavation and piling works are typically the loudest works that occur on site. Construction noise is reduced significantly once the shell of the building is erected due to shielding provided by the building shell.

8.1 EXCAVATION AND PILING

The EPA guidelines defines a 'noise effected' area to have a noise level of background + 10dB(A), which is commonly adopted for setting the noise criteria levels for Construction Noise Management Plans, and with works associated with excavation and piling.

It is likely that the noise effected level will intermittently be exceeded during excavation and piling works, particularly when works are conducted within close proximity of the adjoining residential properties. This being the case, mitigation strategies for control of construction noise will be required.

There is little opportunity for significant acoustic treatments:

- Use of noise screening around the work activities is not practicable, given the work location is constantly moving, and the neighbouring properties would overlook a screen in any event.

- Selection of auger piling if possible would be the most sensible methods of piling as it is typically quieter than other potential piling methods, such as driven and vibration piling.

- Similarly, excavation using pneumatic hammer is to be avoided as much as practicable, however it is likely there will be occasions where it will be required.

Given this, scheduling of these activities will be the most feasible means to mitigate noise impacts on nearby residents. We therefore recommend that piling works or excavation in rock not commence prior to 8am (although set up prior to this time is acceptable).

Use of respite periods (say at lunch time) are not likely to provide significant benefit. Being a predominantly residential area, it is likely that occupants will not be home at these times in any event. Excessive respite periods would therefore simply result in prolonging the excavation/piling period while providing relatively little acoustic benefit in return.

8.2 CONSTRUCTION

The EPA guidelines defines a 'noise effected' area to have a noise level of background + 10dB(A), which is commonly adopted for setting the noise criteria levels for Construction Noise Management Plans, and with works associated with construction.

During the erection of the structure, it is the use of crane movements, hand tools (angle grinders etc) and concrete pumps which are the loudest typical activity (sound power levels of approximately 105dB(A)L_{eq}. Noise levels exceeding EPA "noise effected" levels are likely to occur, particularly when working in close proximity to the northern boundary.

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.

Noise impacts can be minimised by using the following;

- Location of cranes as far as practicable from northern property boundary and eastern property boundary, which are predominately residential dwellings.

- 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, respite periods) when exceedance of management noise levels may occur.

- For activities where acoustic controls and management techniques still cannot guarantee compliant noise levels, implement a notification process whereby nearby dwellings are made aware of the time and duration of noise intensive construction processes.

8.3 CONTINGENCY PLAN

Where non-compliances or noise complaints are raised the following methodology will be implemented.

1. Determine the offending plant/equipment/process

2. Locate the plant/equipment/process further away from the affected receiver(s) if possible.

3. Implement additional acoustic treatment in the form of localised barriers, silencers etc where practical.

4. Selecting alternative equipment/processes where practical

5. Setup noise/vibration and dust monitoring devices at locations represent nearest noise receivers and provide noise data for each complain time period. Analysis is required to determine suitable mitigation measures.

Complaints associated with noise /vibration and dust generated by site activities shall be recorded on a Complaint Form. The person(s) responsible for complaint handling and contact details for receiving of complaints shall be established on site prior to construction works commencing. A sign shall be displayed at the site indicating the Site Manager to the general public and their contact telephone number.

8.4 CONSTRUCTION NOISE & VIBRATION MANAGEMENT PLAN

A detailed construction noise and vibration management plan can be prepared at CC stage (if required) to address noise impacts from future demolition and construction works. This report will set out relevant noise emission and vibration criteria, address potentially affected neighbouring residences, predict noise emissions to potential receivers and put forth a set method for dealing with potential complaints.

9 CONCLUSION

This report presents the assessment of noise impacts associated with the proposed redevelopment of the Harbord Diggers project, Freshwater.

It has been concluded that:

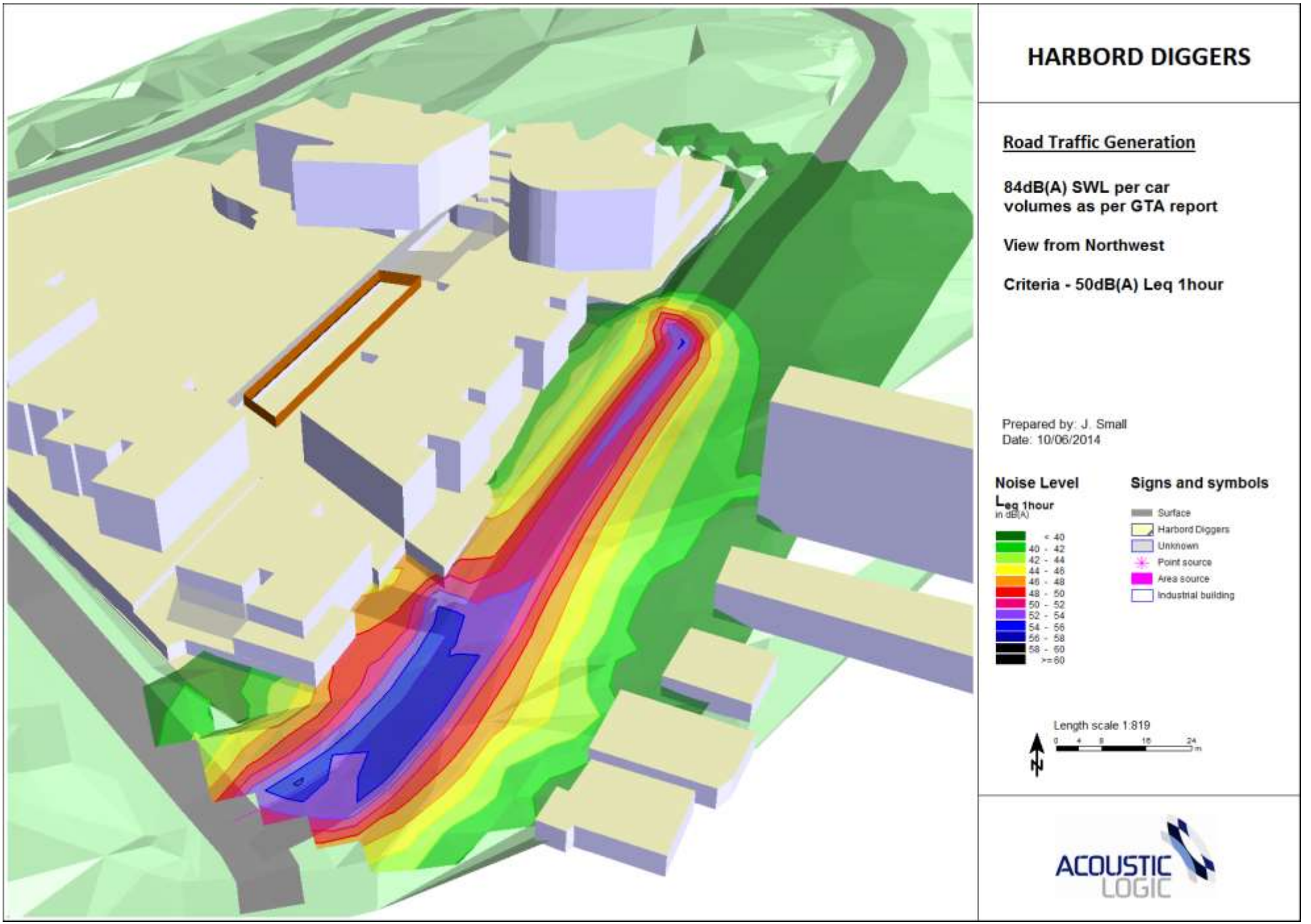
- Noise associated with the café tenancy on the upper ground level will comply with the requirements of the Industrial Noise Policy for residential dwellings located directly above the tenancy and to receivers surrounding the site as discussed in Section 6.2;
- Noise associated with the childcare centre on the lower ground level will comply with the noise requirements for receivers external to the development and for residents within Building C above the child care centre as discussed in Section 6.4.
- Traffic noise generation on local roads will comply with the traffic noise requirements of the Road Noise Policy.
- Noise associated with the winter garden restaurant areas and outdoor seating areas will comply with the requirements of the INP and Warringah Council for the day and evening periods.
- Noise associated with licensed premises can comply with the requirements of the Office of Liquor, Gaming and Racing during the day, evening and night time period. Acoustic treatments have been provided in principle to ensure compliance with the OLGR criteria and will be further explored during the detailed design phase.
- Mechanical noise emanating from the site will be addressed upon selection of mechanical equipment and the finalisation of the mechanical scheme prior to the construction certificate. Notwithstanding, mechanical noise emissions have been discussed in principle in relation to potential mechanical treatments and the location of equipment.
- Noise from the loading dock will comply with the requirements of the Industrial Nosie Policy for operation between the hours of 6am to 6pm, Monday to Sunday.

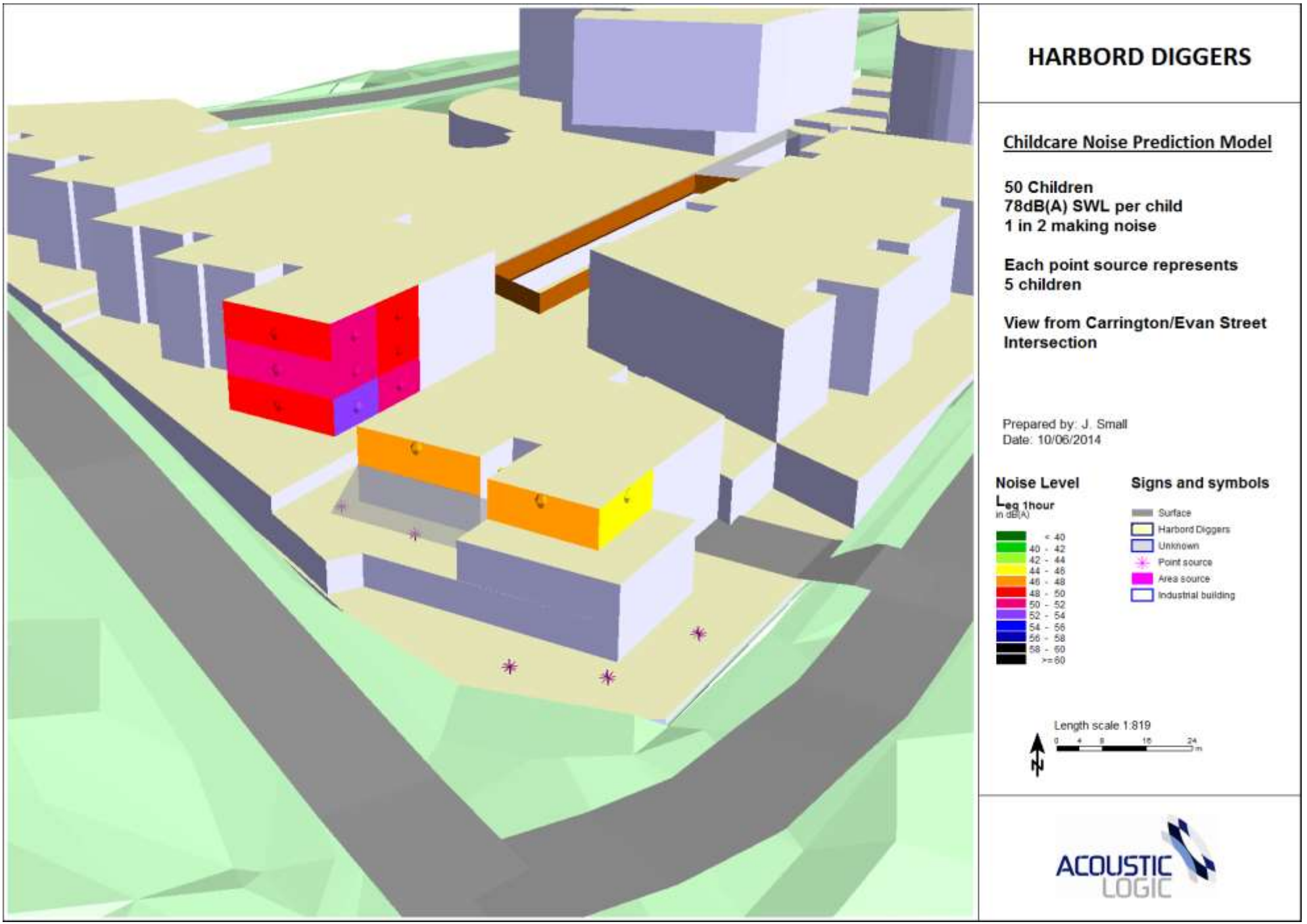
We trust this information is satisfactory. Please contact us should you have any further queries.

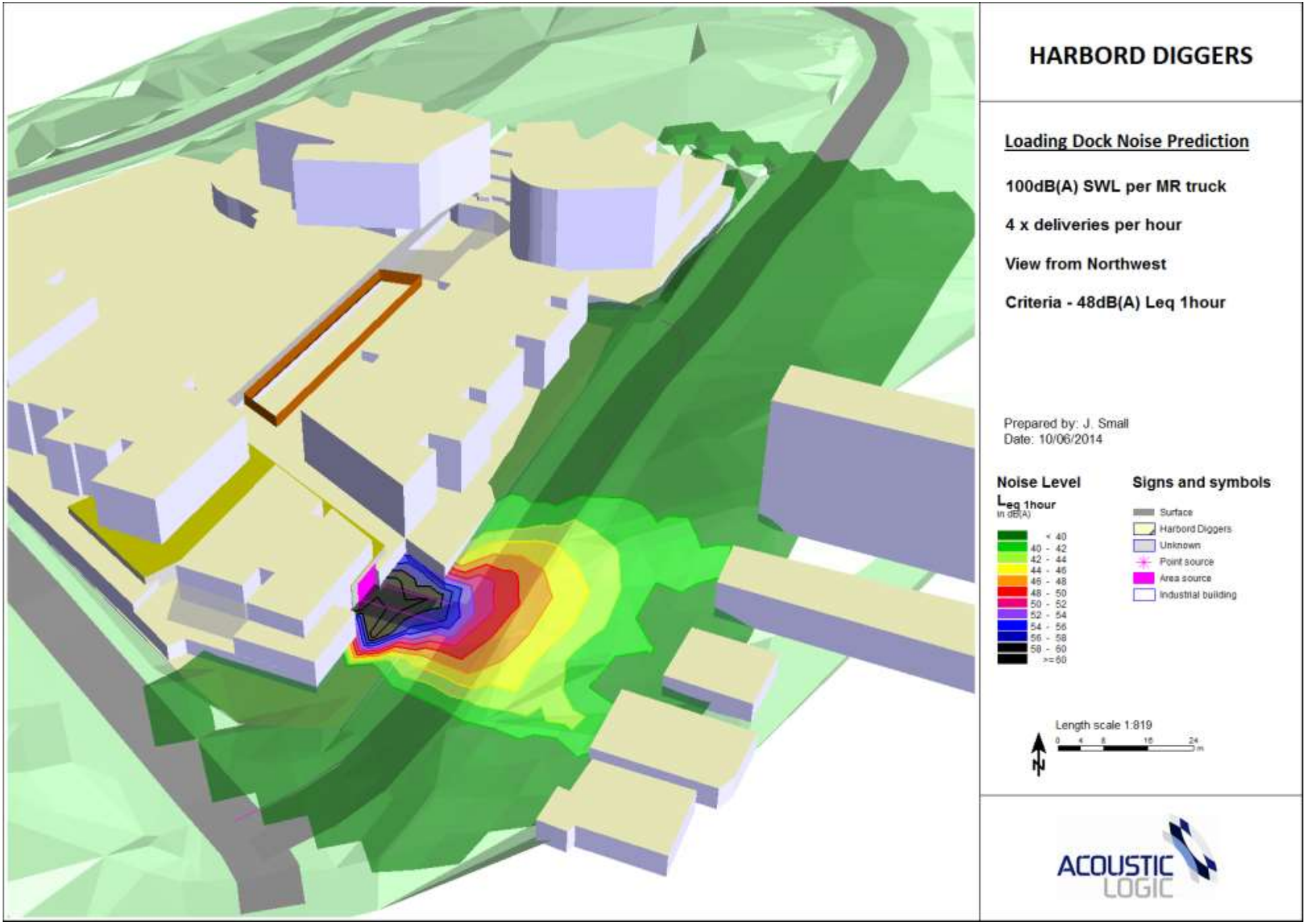
Yours faithfully,

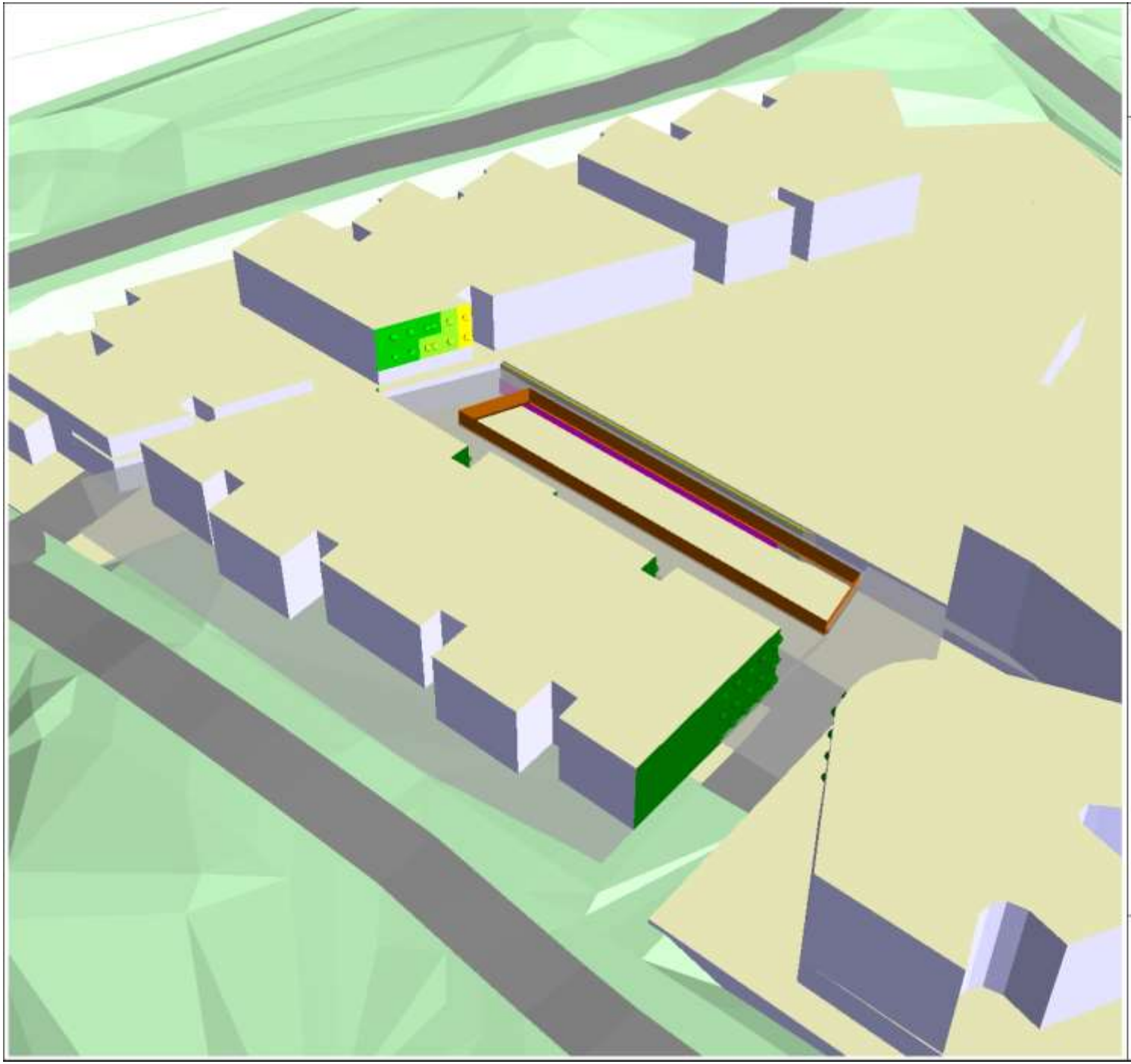
Acoustic Logic Consultancy Pty Ltd
James Small

APPENDIX ONE – SOUNDPLAN NOISE MAPS


HARBORD DIGGERS
Road Traffic Generation
84dB(A) SWL per car
volumes as per GTA report
View from Northwest
Criteria - 50dB(A) Leq 1hour
Prepared by: J. Small
Date: 10/06/2014
Noise Level
Leq 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
Harbord Diggers
Unknown
Point source
Area source
Industrial building
Length scale 1:819
0 4 8 16 24 m
N
ACOUSTIC LOGIC


HARBORD DIGGERS
Childcare Noise Prediction Model
50 Children
78dB(A) SWL per child
1 in 2 making noise
Each point source represents
5 children
View from Carrington/Evan Street
Intersection
Prepared by: J. Small
Date: 10/06/2014
Noise Level
Leq 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
Harbord Diggers
Unknown
Point source
Area source
Industrial building
Length scale 1:819
0 4 8 16 24
m
N
ACOUSTIC
LOGIC


HARBORD DIGGERS
Loading Dock Noise Prediction
100dB(A) SWL per MR truck
4 x deliveries per hour
View from Northwest
Criteria - 48dB(A) Leq 1hour
Prepared by: J. Small
Date: 10/06/2014
Noise Level
Leq 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
Harbord Diggers
Unknown
Point source
Area source
Industrial building
Length scale 1:819
0 4 8 16 24 m
N
ACOUSTIC LOGIC



HARBORD DIGGERS

Outdoor Gaming Noise Prediction

60dB(A) L_{10} internally

Acoustic treatment to privacy screen
Line of sight screens internally
Half volume on Pokie Machines
Patrons talking quietly

Night time background - 37dB(A)

View from Southwest

Prepared by: J. Small
Date: 10/06/2014

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

- < 15
- 15 - 17
- 17 - 19
- 19 - 21
- 21 - 23
- 23 - 25
- 25 - 27
- 27 - 29
- 29 - 31
- 31 - 33
- 33 - 35
- >=35

Signs and symbols

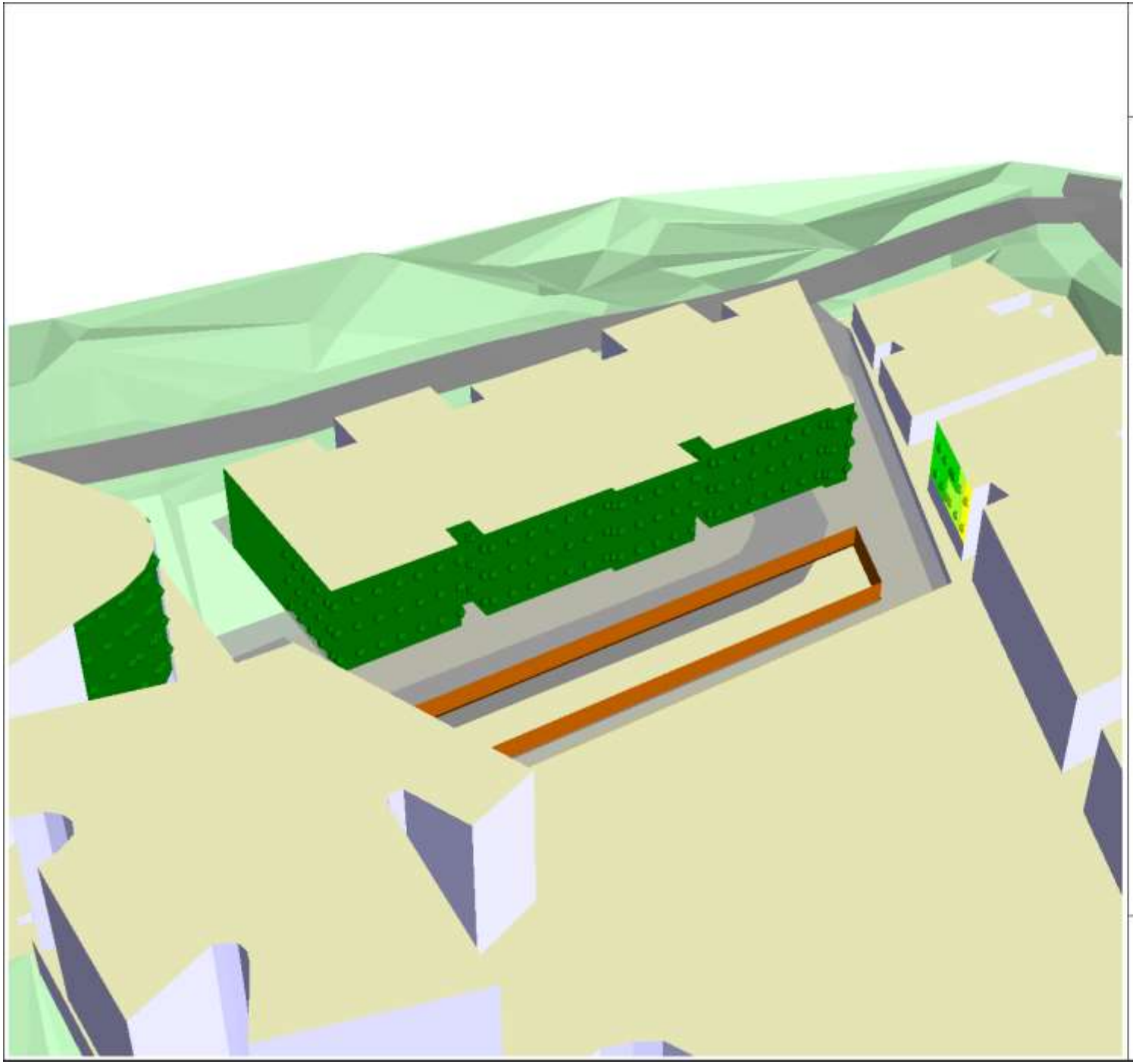
- Surface
- Harbord Diggers
- Unknown
- Point source
- Area source
- Industrial building

Length scale 1:819

0 4 8 16 24 m

N

ACOUSTIC LOGIC



HARBORD DIGGERS

Outdoor Gaming Noise Prediction

60dB(A) L_{10} internally

Acoustic treatment to privacy screen
Line of sight screens internally
Half volume on Pokie Machines
Patrons talking quietly

Night time background - 37dB(A)

View from East

Prepared by: J. Small
Date: 10/06/2014

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

- < 15
- 15 - 17
- 17 - 19
- 19 - 21
- 21 - 23
- 23 - 25
- 25 - 27
- 27 - 29
- 29 - 31
- 31 - 33
- 33 - 35
- >=35

Signs and symbols

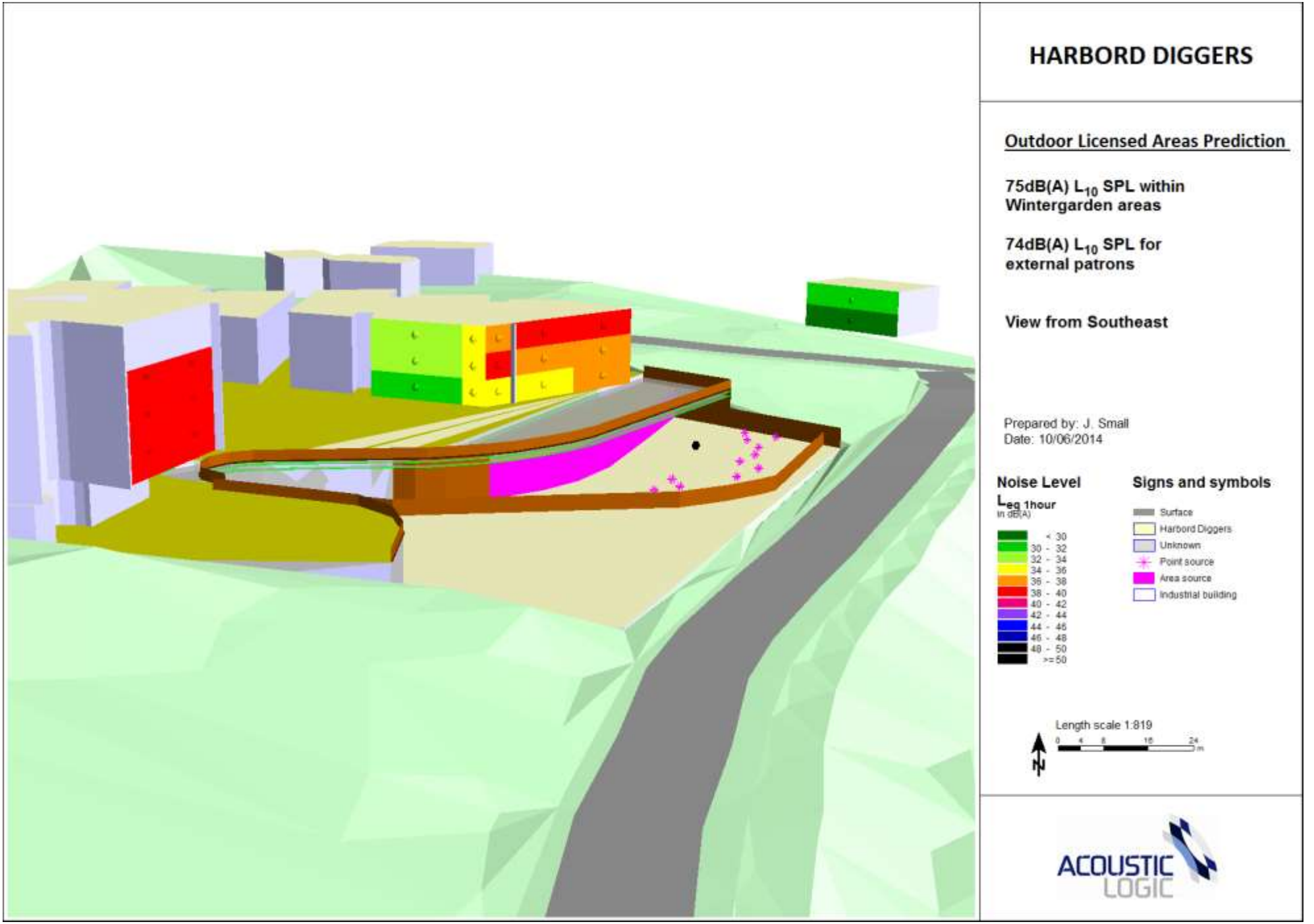
- Surface
- Harbord Diggers
- Unknown
- Point source
- Area source
- Industrial building

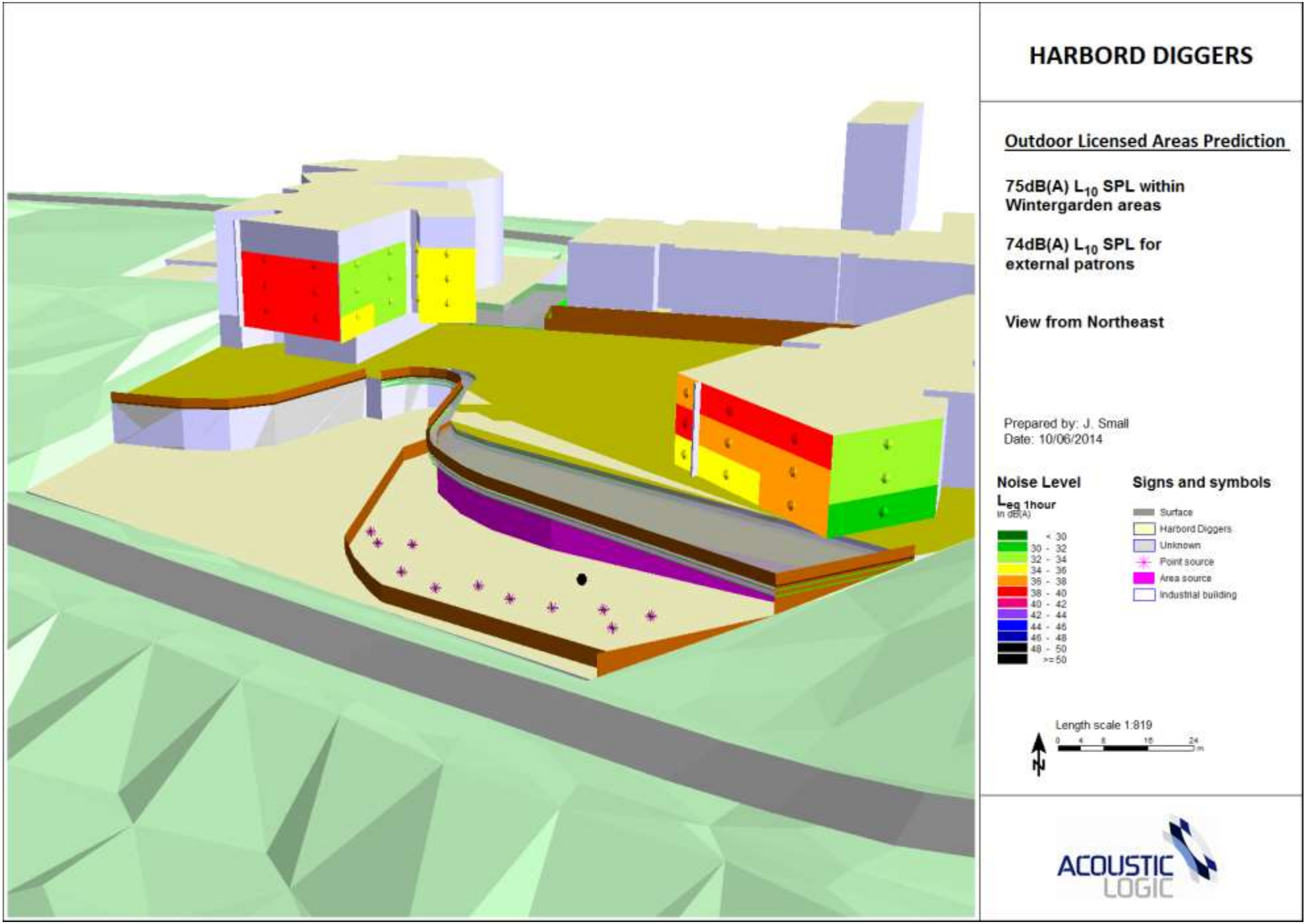
Length scale 1:819

0 4 8 16 24 m

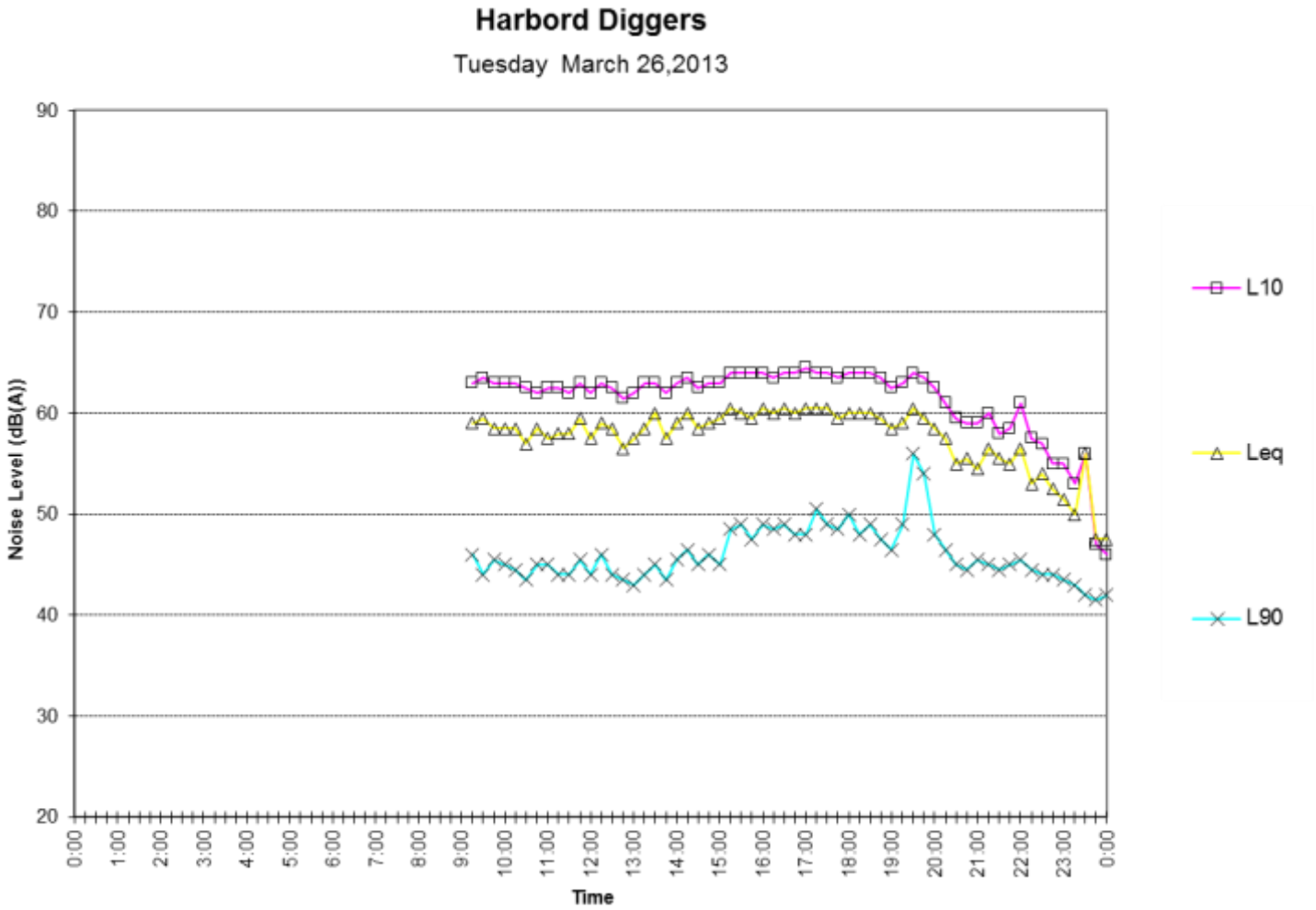
N

ACOUSTIC LOGIC


HARBORD DIGGERS
Outdoor Licensed Areas Prediction
75dB(A) L_{10} SPL within Wintergarden areas
74dB(A) L_{10} SPL for external patrons
View from Southeast
Prepared by: J. Small
Date: 10/06/2014
Noise Level
$L_{eq\ 1hour}$
in dB(A)
< 30
30 - 32
32 - 34
34 - 36
36 - 38
38 - 40
40 - 42
42 - 44
44 - 46
46 - 48
48 - 50
>= 50
Signs and symbols
Surface
Harbord Diggers
Unknown
Point source
Area source
Industrial building
Length scale 1:819
0 4 8 16 24 m
N
ACOUSTIC LOGIC


HARBORD DIGGERS
Outdoor Licensed Areas Prediction
75dB(A) L_{10} SPL within Wintergarden areas
74dB(A) L_{10} SPL for external patrons
View from Northeast
Prepared by: J. Small
Date: 10/06/2014
Noise Level
$L_{eq\ 1hour}$ in dB(A)
< 30
30 - 32
32 - 34
34 - 36
36 - 38
38 - 40
40 - 42
42 - 44
44 - 46
46 - 48
48 - 50
>= 50
Signs and symbols
Surface
Harbord Diggers
Unknown
Point source
Area source
Industrial building
Length scale 1:819
0 4 8 16 24 m
N
ACOUSTIC LOGIC

APPENDIX TWO – UNATTENDED NOISE MONITORING DATA


Harbord Diggers
Tuesday March 26,2013
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
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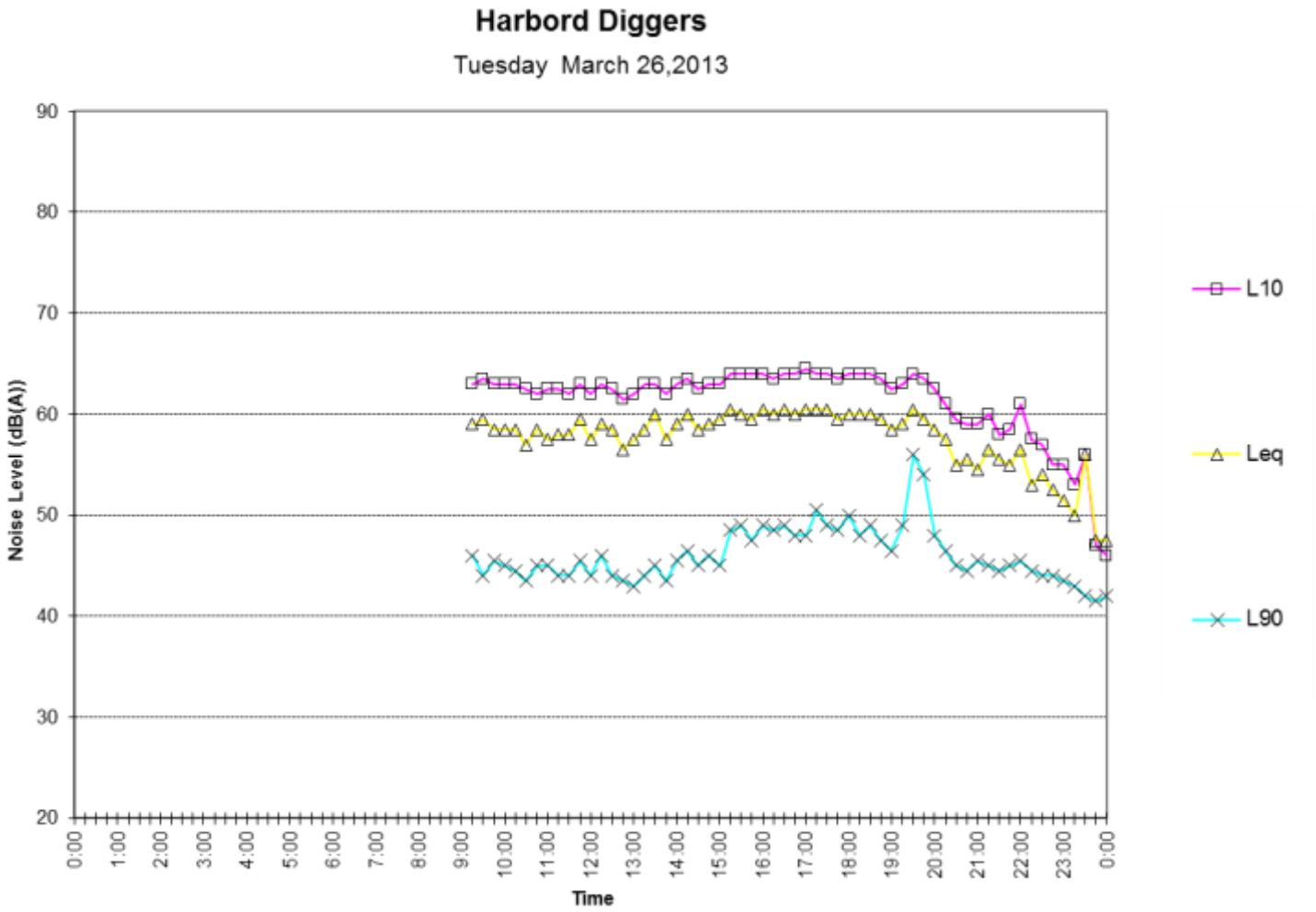
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90


Harbord Diggers
Tuesday March 26,2013
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
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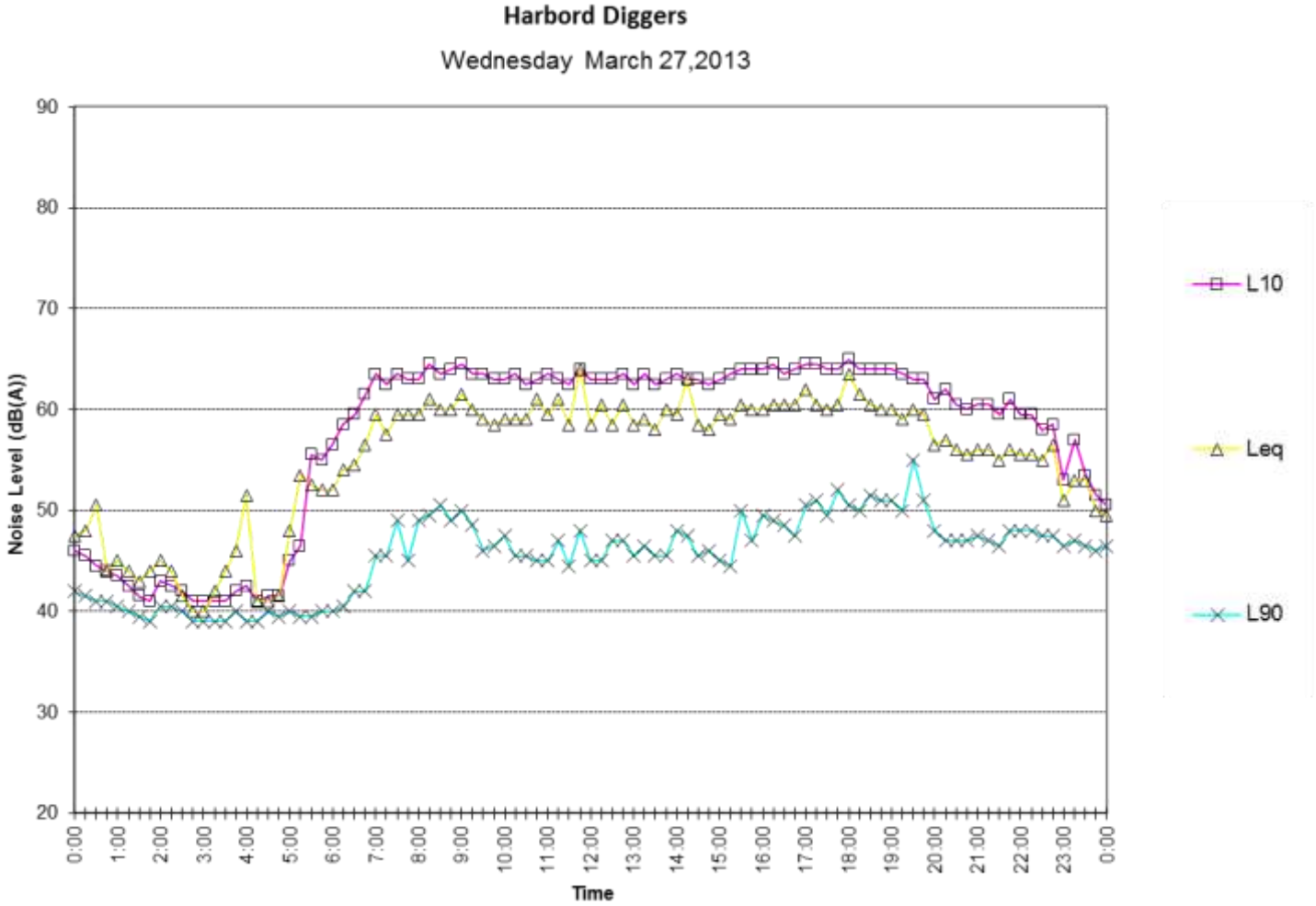
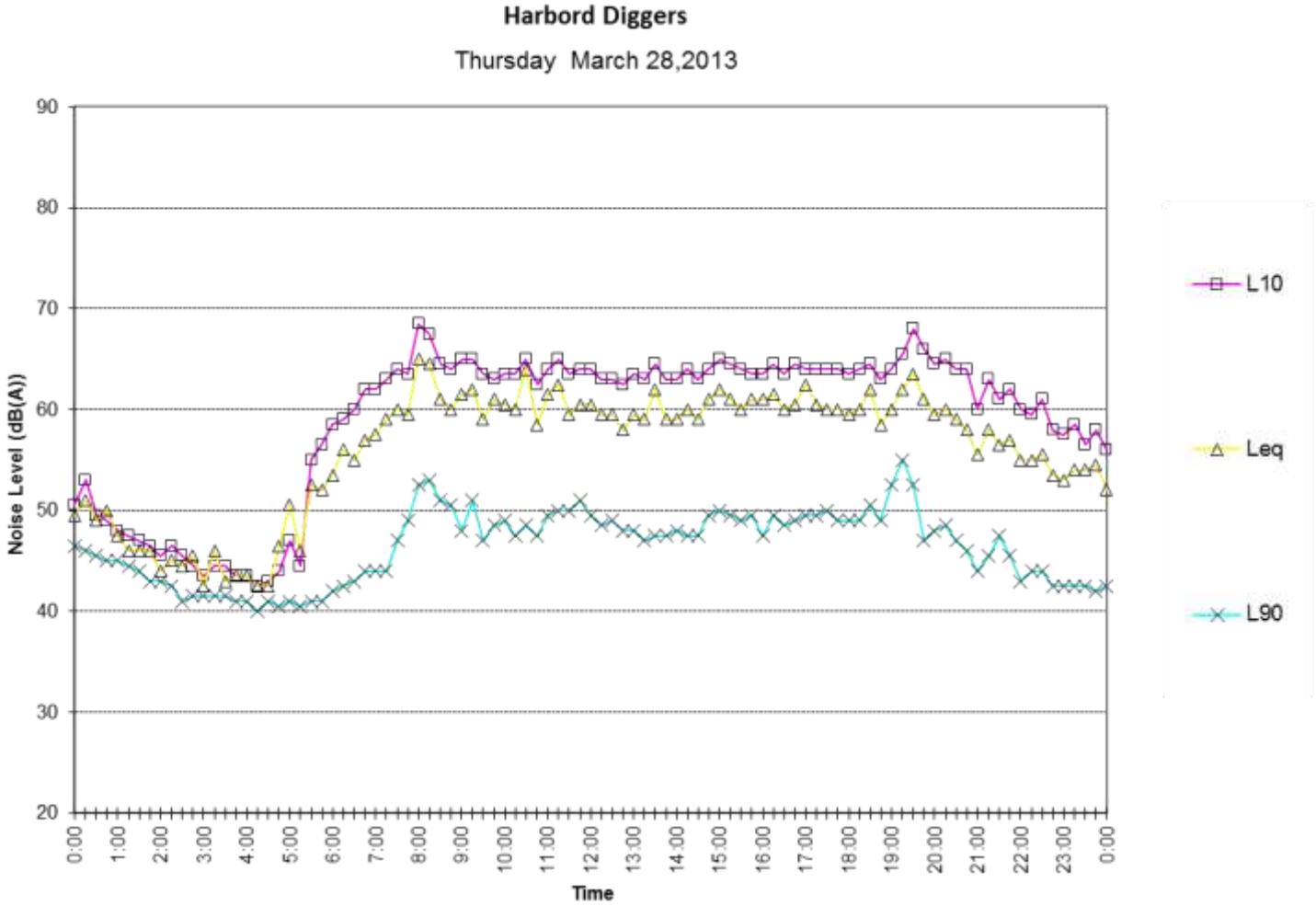
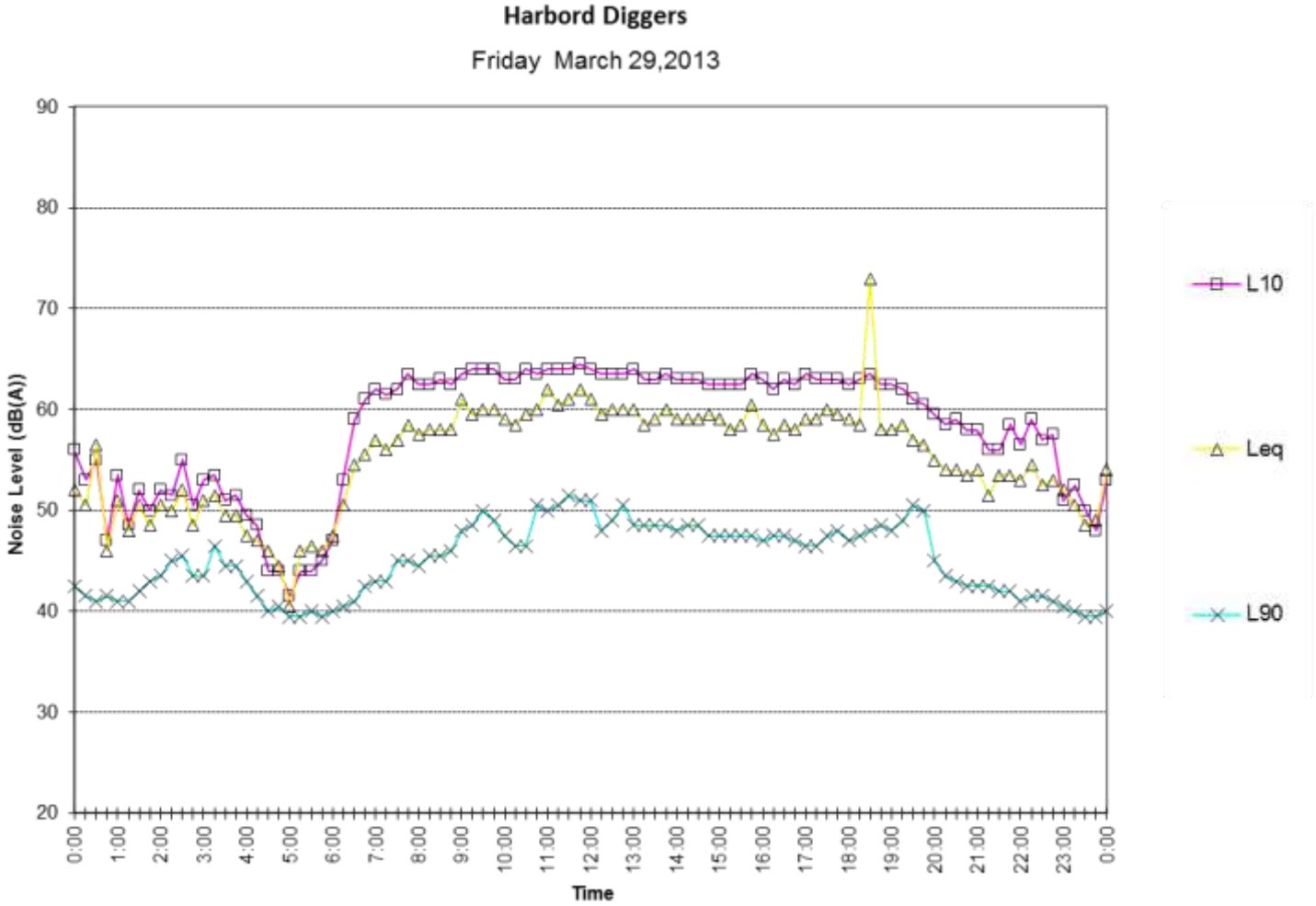
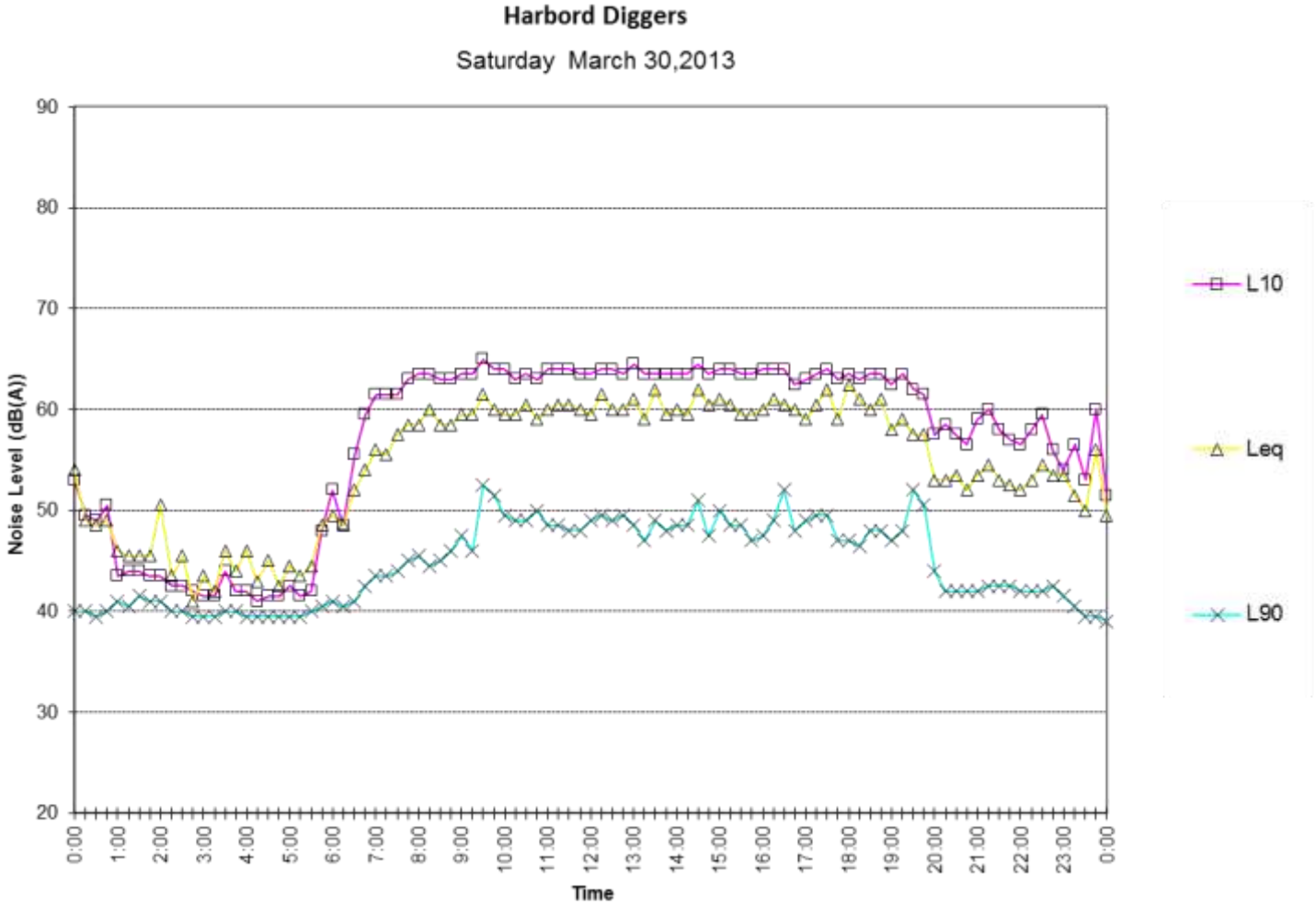
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90


Harbord Diggers
Wednesday March 27,2013
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


Harbord Diggers
Thursday March 28,2013
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


Harbord Diggers
Friday March 29,2013
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


Harbord Diggers
Saturday March 30,2013
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
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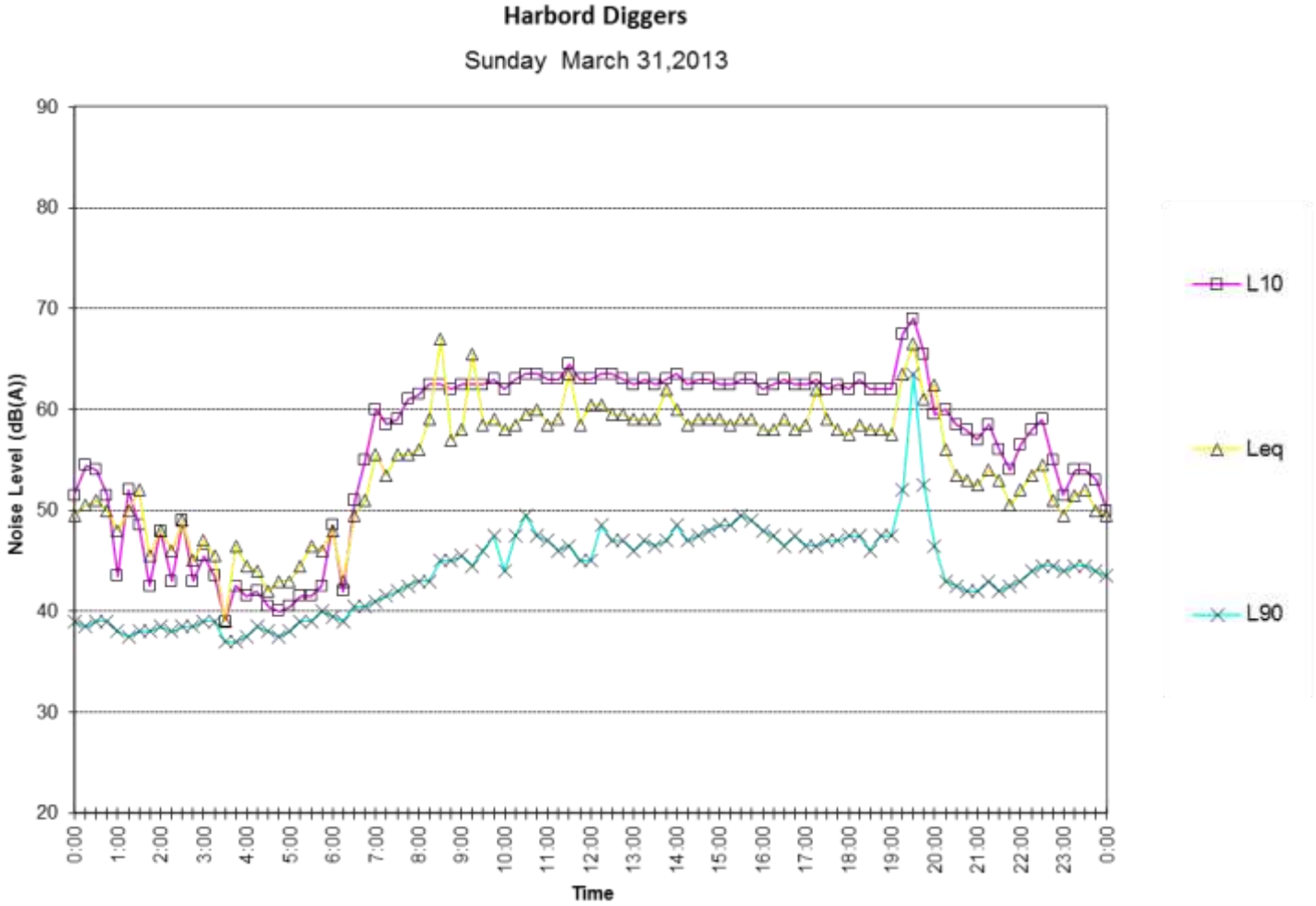
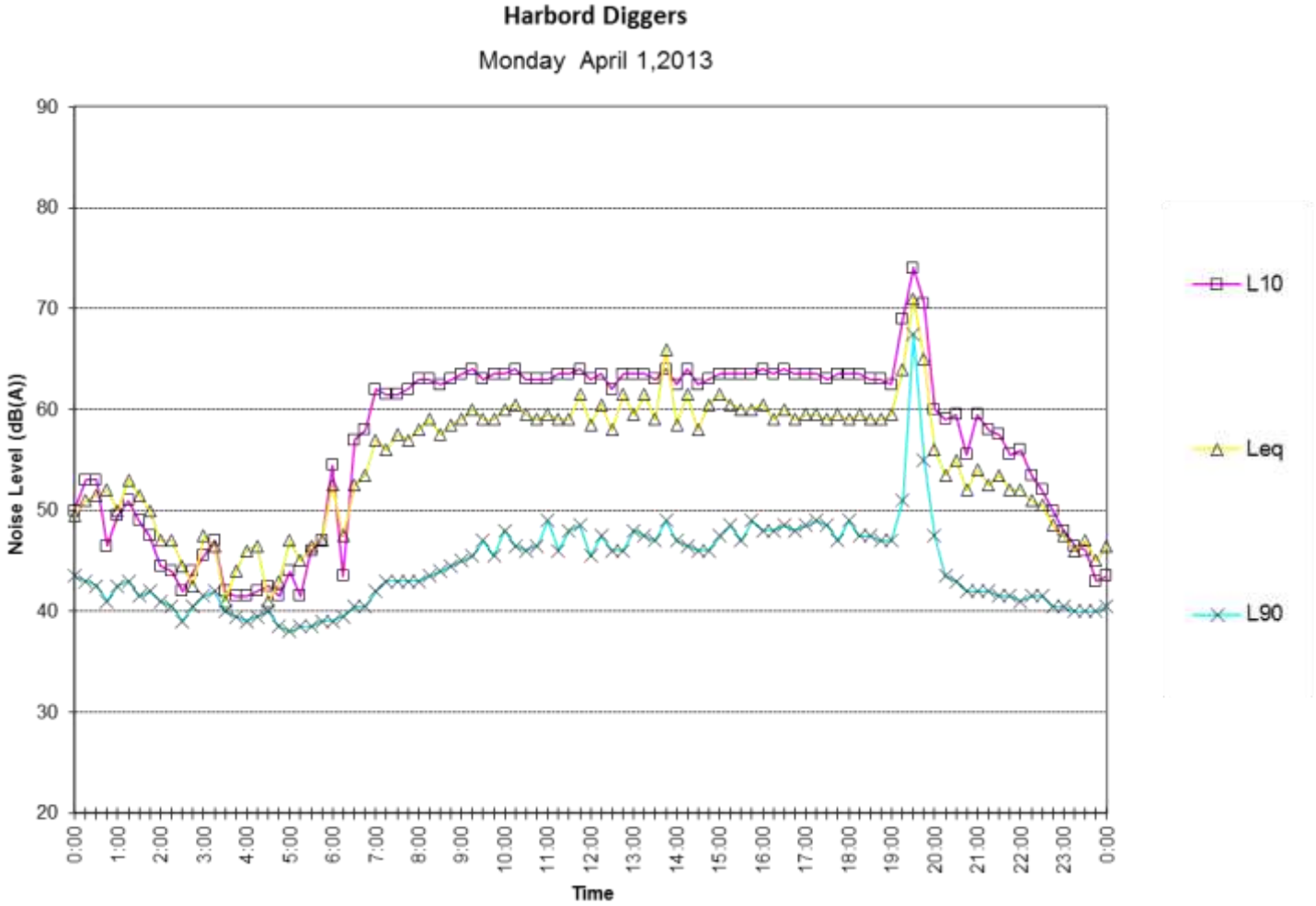
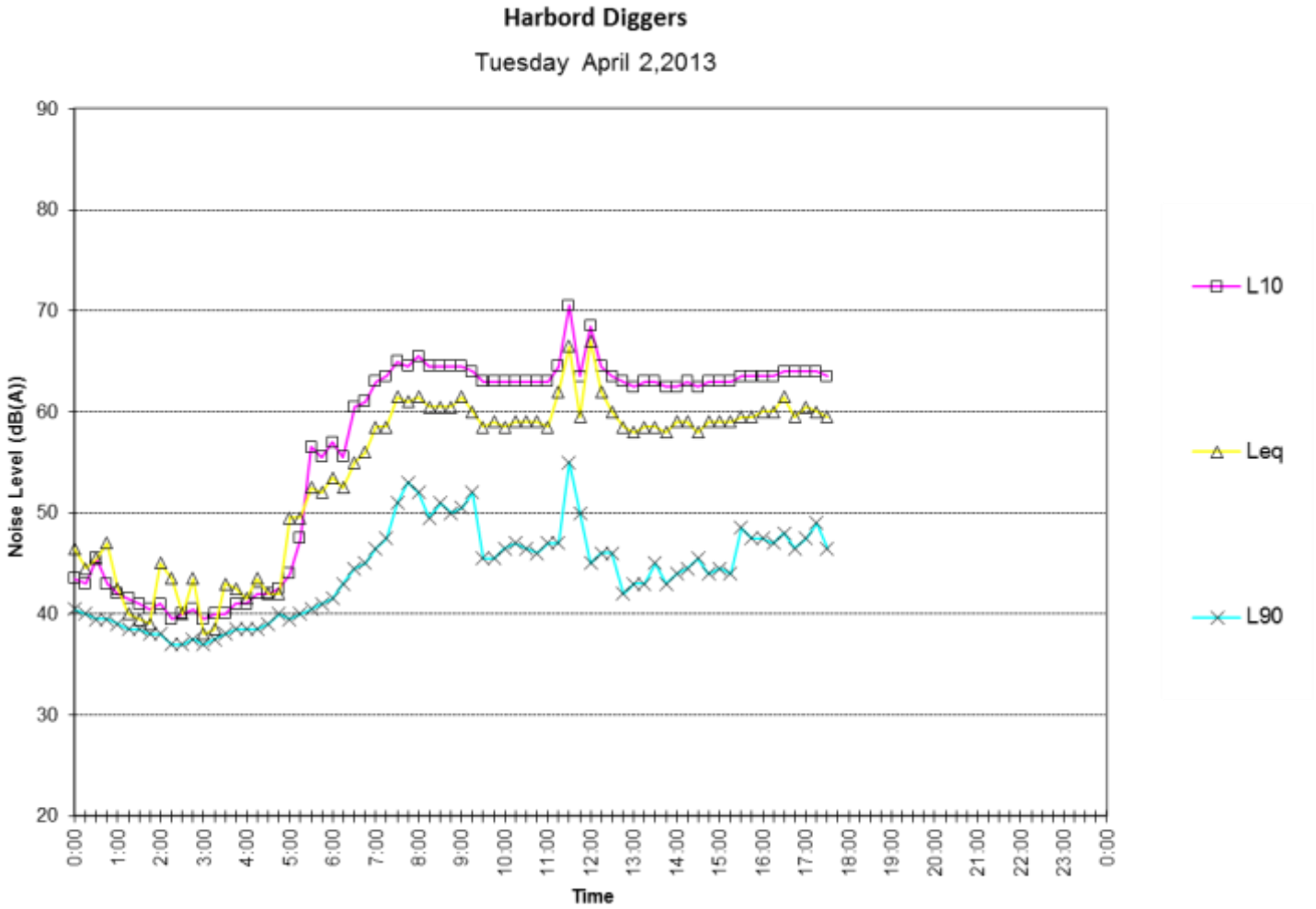
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
L10
Leq
L90


Harbord Diggers
Sunday March 31,2013
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


Harbord Diggers
Monday April 1,2013
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


Harbord Diggers
Tuesday April 2,2013
Noise Level (dB(A))
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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