



MARSHALL DAY
Acoustics



**LILYFIELD SKATE PLAZA
ACOUSTIC ASSESSMENT**

Rp 001 20210285 | 11 February 2022

Project: **LILYFIELD SKATE PLAZA**

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Report No.: **Rp 001 20210285**

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EXECUTIVE SUMMARY

Marshall Day Acoustics (MDA) has been engaged by SJB Planning, on behalf of Inner West Council, to conduct an acoustic assessment of noise emissions that may arise from the proposed Lilyfield Skate Plaza (the Project) to be located within Leichhardt Park in Lilyfield. This acoustic assessment is to supplement a Review of Environmental Factors to be submitted to Inner West Council by others.

Due to limitations associated with the ongoing COVID-19 restrictions, direct measurements of representative background and ambient noise levels at nearby noise sensitive receivers were not practical or feasible.

MDA has provided estimates of background noise levels based on data for the locality type and provisions established by the Transport for NSW *Construction and Maintenance Noise Estimator*. The Project site is significantly affected by highway noise from the City West Link and it is expected that typical representative noise levels measured outside of the COVID-19 period are likely to be higher than that assumed by this assessment. On this basis an assessment considering estimated background noise levels is considered to be conservative.

In the absence of noise criteria relating to recreation spaces or community sporting facilities, site-specific guidance noise levels have been developed to provide context to impacts that may arise from noise levels associated with the Project. The guidance noise levels have been developed with reference to NSW EPA *Noise Policy for Industry* (NPfI), guidelines contained in Camden Council *Environmental Noise Policy* (ENP 2008) and provisions outlined in the World Health Organisation *Guidelines on Community Noise* (WHO Guideline).

It should be noted that while guidance levels have been developed for contextual assistance, such guidance levels do not represent mandatory noise criteria. Evaluation of the acoustic suitability of the proposal remains with Inner West Council and the Project will need to be considered having regard to the overall merit of the proposal.

For the purpose of presenting the range of noise levels likely to be generated by the use of the Skate Plaza, modelling scenarios have been developed based on Low Use and Capacity Use. It is expected that the use of the Skate Plaza is likely to lead to noise levels within this modelled range. We would expect noise generated by typical or average usage would be midway between those generated by Low Use and Capacity Use.

Results indicate that for typical use of the Skate Plaza (being not Low Use and not Capacity Use), the modelled noise levels are below the guidance noise levels developed for the Project at all receiver locations.

The modelling of noise from Capacity Use of the Skate Plaza in the evening period indicates that these may give rise to noise levels marginally above the guidance noise level at 41 Frazer Street and 43 Frazer Street only. To provide context to this it should be noted that noise level differences in the order of 1 dB. A typical receptor is not likely to perceive a difference between noise at the guidance level or a noise levels 1 dB above the guidance level.

Noise levels associated with use of the skate park at residential receivers, in the order of $L_{Aeq\ 15\ min}$ 37-46 dB, are significantly below the indicative ambient noise levels of $L_{Aeq\ 15\ min}$ 51-56 dB measured on site. Additionally, noise from existing recreation activities are a predominant feature of the proposed Skate Plaza site. Residents close to recreation spaces would be exposed to the noise from existing recreation activities as part of their noise environment.

Based on the assessment and the predicted noise levels detailed in this report, the proposed Skate Plaza is indicated to be acoustically compatible with the surrounding area.

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1.0 INTRODUCTION

Marshall Day Acoustics (MDA) has been engaged by SJB Planning (SJB), on behalf of Inner West Council (IWC), to conduct an assessment of acoustic considerations related to the operation of the proposed Lilyfield Skate Plaza (the Project) to be located at Leichhardt Park, Leichhardt, NSW.

The acoustic assessment detailed in this report has been developed to be included in a wider Review of Environmental Factors (REF) to be submitted to IWC by others.

The assessment is based on the following documentation and information:

- Construction drawings as developed by the project landscape architect Enlocus and issued by SJB via email. The drawing set is identified as *1821 Leichhardt Park SkatePark CD rev 05 01*, dated 18 January 2022;
- 3D models of the project design as developed and issued by Enlocus. The model set is identified as *1821 Leichhardt Park SkatePark Acoustic Model C 02*, dated 23 November 2021;
- Topography data for the Project site and near surrounds as provided by Norton Survey Partners, 50111-B Detail Plan received via email dated 26 October 2021;
- Additional topographic data taken from publicly available sources registered with Sixmap; and
- Information with respect to operation of the Project as provided by SJB, IWC and Enlocus.

Acoustic terminology used throughout this report is defined in Appendix A.

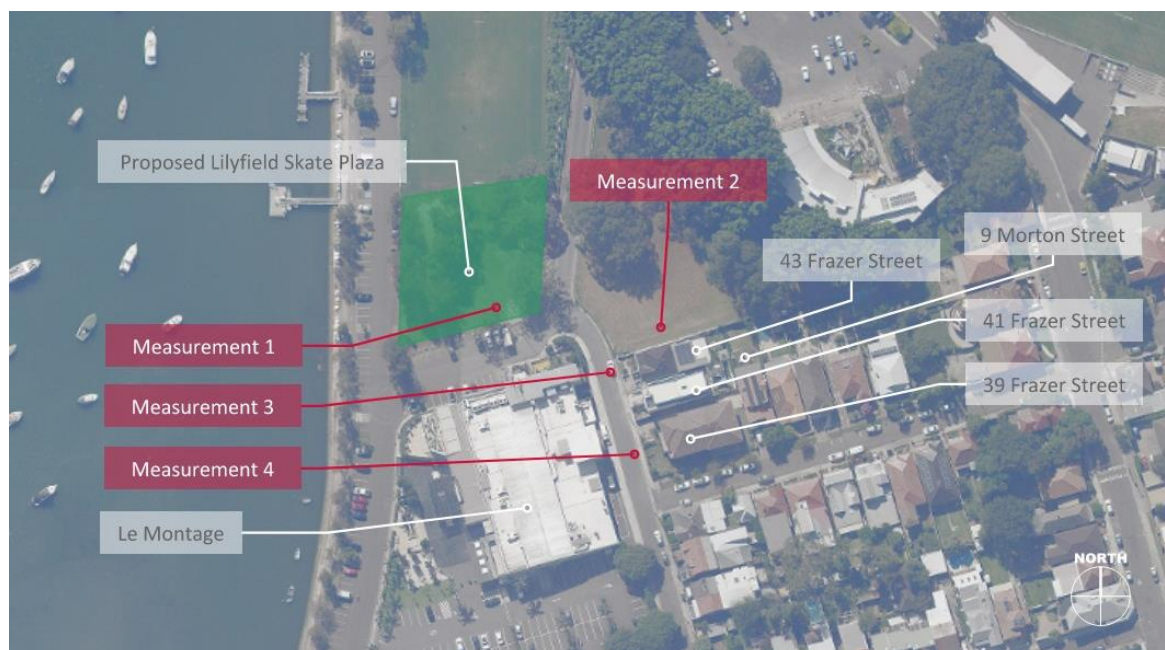
2.0 DEVELOPMENT DESCRIPTION

The Lilyfield Skate Plaza is proposed to be located on the south western corner of Leichhardt Park, to the eastern side of Maliyawul Street and associated parking areas and to the north of an unnamed road which links Frazer Street and Maliyawul Street.

Close to the proposed site are a commercial premises identified as Le Montage function centre and a number of residential premises along Frazer Street and Morton Street. These locations have been identified as the nearest noise sensitive receivers and are considered as part of this assessment.

Aerial imagery identifying the location of the Project as well as the nearby commercial and residential locations is provided in Figure 1.

Figure 1: Aerial imagery of the proposed Skate Plaza and nearby noise sensitive receivers



The noise sensitive receivers identified in Figure 1 are summarised in Table 1. All locations are zoned 'R1 – General Residential' under the applicable Leichhardt Local Environmental Plan 2013.

Table 1: Noise sensitive receivers near the Project

Receiver address	Receiver type	Description
9 Morton St, Lilyfield	Residential	Two storey dwelling
39 Frazer St, Lilyfield	Residential	Three storey apartment building
41 Frazer St, Lilyfield	Residential	Two Storey dwelling
43 Frazer St, Lilyfield	Residential	Single storey dwelling
Le Montage	Commercial	Multi-storey function centre

Directly to the north of the Project is two floodlit junior football pitches, generally identified as Leichhardt Oval Number 3. To the west of the Project is Iron Cove with the A4 City West Link highway approximately 300 m away. The Project has direct line of site to an extensive section of the highway.

MDA have been advised by SJB that the Project will feature floodlighting to permit operation until 2100 hrs, similar to lighting arrangements for other elements of the park, including Leichhardt Oval Number 3.

Based on information provided by Enlocus, the Project comprises 945 m² of active space featuring various concrete forms including quarter pipes, transfers, boxes, rails, stairsets and vert ramp. The design intent of the Project is to provide a compact skate plaza with use more likely to feature trick planning and attempts, as opposed to the constant flow and movement associated with larger skate parks. On this basis Enlocus estimates concurrent use by up to 15 users.

An extract from the construction plans depicting the arrangement of the Project is provided in Appendix B.

3.0 ACOUSTIC ENVIRONMENT AND BACKGROUND NOISE LEVELS

A REF acoustic assessment would typically feature a campaign of background noise monitoring, to quantify background and ambient noise levels in the vicinity of the Project and associated noise sensitive receivers.

Due to the extraordinary circumstances surrounding the COVID-19 pandemic, extensive 'stay-at-home' restrictions have been enacted in the Inner West LGA and throughout Greater Sydney and NSW. As a consequence of these restrictions, noise measurements conducted during this period are highly affected by the significant reduction of road traffic, construction, and general urban and suburban activity, resulting in a decrease in environmental noise that would otherwise be a feature of such environments. Consequently, measurements conducted during COVID-19 restrictions would not be representative of typical noise levels when the restrictions are lifted, and the Project is likely to be in use. These effects have been recognised by both the Australian Acoustical Society (AAS) and Association of Australasian Acoustical Consultants (AAAC).

In order to establish typical background noise levels associated with the Project site and surrounds, MDA has referred to the Transport for NSW *Construction and Maintenance Noise Estimator* (the estimator) which provides guidance on typical background noise levels for example locations based on the local environment and proximity to traffic arteries.

The estimator groups example areas into noise area categories (R0 to R5) previously defined under AS 1055.3-1997¹. While these categories are no longer defined within the most recent version of

¹ AS 1055.3-1997 *Acoustics - Description and measurement of environmental noise - Acquisition of data pertinent to land use*

AS 1055:2018², the estimator provides useful guides of the expected typical Rating Background Noise Levels (RBL) for different areas.

Based on the guidance provided by the estimator, the Project area and surrounds has been classed as an R2 category. Associated estimated day and evening RBLs are detailed in Table 2. Day and evening periods are considered for assessment as they represent the typical periods of proposed Project use, with floodlights proposed to operate until 2100 hrs.

Table 2: Estimated RBLs for category R2

Time period and description	RBL, dB LA90
Daytime Period (0800 – 1800 hrs)	45
Evening Period (1800 - 2200 hrs)	40

In order to give technical context to the above approach, a visit to the Project site was conducted on 25 August 2021 between 1930 and 2045 hrs. The purpose of the visit was to evaluate prevailing noise sources (notwithstanding the expected reduced traffic volumes) and to conduct sample attended measurements to assist in validating the estimated background noise levels.

A descriptive summary of the site visit, measurements and results is provided in Table 3. The attended measurement locations are shown in Figure 1.

Location 1 is at the approximate position of the proposed Skate Plaza. Locations 2, 3 and 4 are adjacent residential premises.

Meteorological conditions were fine with light wind and no rain. Measurements were conducted with a Brüel and Kjær 2250 Sound Analyzer s/n 3010265 with the unit calibrated before and after the measurements with no observed drift.

Measurements were conducted in the evening period as this represents what is expected to be the quietest period during the proposed use of the Project.

² AS 1055:2018 *Acoustics - Description and measurement of environmental noise*

Table 3: Sample attended evening measurement results

Location	Description	Measured noise level, dB	
		L _{A90} 15 min	L _{Aeq} 15 min
1	Noise environment strongly driven by arterial traffic noise with individual heavy vehicle pass-bys audible. Mechanical services noise audible from Le Montage, intermittent condenser units switching on and off. Two park patrons playing football on Oval Number 3. Shouting and loud talking Occasional (<3) car parking events	45	56
2	Noise environment strongly driven by arterial traffic noise with individual heavy vehicle pass-bys audible. Mechanical services noise audible from Le Montage, intermittent condenser units switching on and off. Habitation noise from residences audible including television Oval Number 3 no longer in use	42	52
3	Arterial traffic noise clearly audible and dominant despite shielding from Le Montage Mechanical services related to Le Montage including transformer noise audible. Possible tone at 125 Hz Single car pass by on Frazer Street	40	51
4	Continuous mechanical services noise from Le Montage strongly dominant Minor arterial traffic noise audible	46	53

Based on a comparison of the estimated evening levels detailed in Table 2 and the sample measurements detailed in Table 3 it can be seen that the estimated background noise levels are at the lower end of the range of L_{A90} levels measured during the visit to site. Adoption of the estimated background noise levels for the purposes of this assessment can be interpreted as representing a conservative approach, particularly given the expectation that typical environmental noise levels outside of COVID-19 restrictions may be expected to be higher than the sample measurements acquired during the site visit.

Additionally, operation of mechanical services related to the Le Montage premises, even during COVID-19 restrictions, appears to give rise to significant contributions to the local noise environment.

4.0 GUIDANCE NOISE LEVELS FOR ASSESSMENT

Inner West Council does not provide specific noise criteria, guidance or recommendations for the assessment of noise from parks, recreation facilities or sporting facilities. Additionally, the NSW EPA does not directly provide noise criteria for the assessment of parks or public recreation areas.

In the absence of specific noise criteria or other regulatory requirements, guidance noise levels have been developed to assist in evaluating the acoustic emissions related to operation of the Project. The purposes of the developed guidance levels are to indicate noise levels which might be acceptable by the community such that emissions from the Project can be compared.

To develop the guidance noise levels, MDA has referred wholly or in part to existing policies and reference documents. Ultimately, as no legislated criteria is available, acceptance or otherwise of these guidance levels will be at the discretion of the assessing body, the IWC.

A summary of the derivation of the site-specific assessment guidance noise levels is provided in the following sections. Full details regarding the documents considered can be found in Appendix C.

4.1 Noise Policy for Industry

The NPfl is published by the NSW EPA and is intended for the setting of noise targets for large industrial developments that are scheduled under an EPA licence. The NPfl specifically states that the policy does not apply to *noise from sporting facilities, including motor sport facilities*. However, specific elements of the NPfl referring to acoustic amenity are considered useful for establishing desirable levels of acoustic amenity in the suburban context.

Amenity allowances under the NPfl also provide a point of reference indicating noise levels that would be feasibly expected at the residential boundaries surrounding the park if the site were used for industrial purposes. Further, it provides a means of differentiating between the amenity expectations of residential versus commercial receivers.

The Amenity Noise Levels outlined within the NPfl for the day and evening periods for a suburban environment are detailed in Table 4.

Table 4: Recommended Amenity Noise Levels based on NPfl table 2.2

Assessment period	Recommended Amenity Noise Level, dB L _{Aeq} 15min
<i>Residential receivers – (in this instance 9 Morton St, 39 Frazer St, 41 Frazer St, 43 Frazer St)</i>	
Day (0800-1800 hrs)	55
Evening (1800-2200 hrs)	45
<i>Commercial receiver – (in this instance Le Montage)</i>	
When in use	65

In considering the above amenity noise levels it should be noted that use of the proposed site for the purposes of a skate plaza would likely have a less intense range of noise sources, and likely lower subjective impact, than if the site were used for industrial uses, when the associated acoustical characteristics are considered. The NPfl also indicates that multiple other factors should be considered in the determination of new or modified developments including economic considerations, community benefits and the social worth of the development.

4.2 Camden Council Environmental Noise Policy

Noise criteria or guidance levels for noise from recreation spaces, sporting events or community sports facilities is not frequently developed as part of typical local government policies. Camden Council *Environmental Noise Policy 2008* (ENP 2008) is one of the few that has considered such noise sources:

The following guidelines for any assessment of noise from the use of these Parks have been devised in order to minimise the likelihood of disturbance to the surrounding community. In some instances, however, where an event or activity is determined by Council to be of particular social or cultural benefit, more relaxed criteria may be applied to the use of the site.

Applying the ENP 2008 guidance to estimated background levels presented in Table 2 gives recommended maximum noise levels as shown in Table 5.

Table 5: Camden Council ENP 2008 – Recommended maximum noise levels

Assessment period	Recommended noise level, dB L_{Aeq} 15min
Day (0800-1800 hrs)	50
Evening (1800-2200 hrs)	50

4.3 World Health Organisation: Guidelines on Community Noise

The World Health Organisation (WHO) document *Guidelines for Community Noise* (WHO Guideline) is the outcome of the WHO expert task force meeting held in London, United Kingdom, in April 1999 and details guidance as to noise levels at which there will be an unacceptable impact on the local community.

For dwellings, the WHO Guideline states:

To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq} .

And additionally:

During daytime, few people are highly annoyed at L_{Aeq} levels below 55 dB(A), and few are moderately annoyed at L_{Aeq} levels below 50 dB(A). Sound levels during the evening and night should be 5–10 dB lower than during the day.

Although the type of noise considered in the WHO Guideline relates to steady and continuous sources (unlike a skate park), the above levels are consistent with the ENP 2008 recommended levels presented in Table 5.

4.4 Site-Specific Guidance Noise Levels

Ultimately the acceptance of any guidance levels developed as part of this assessment will be determined by the assessing body, the Inner West Council. As indicated by both the NPfI and the ENP 2008, in considering the acceptability of this proposal, Council will need to consider the balance of any perceived noise generated by the Skate Plaza that may arise against the social, economic and cultural benefits to the community.

Based on the contextual information provided by the NPfI, ENP 2008 and WHO Guideline, and lack of current applicable Council policy with regard to the assessment of noise from parks and recreation spaces, the guidance noise levels shown in Table 6 may be a useful benchmark for comparison.

Table 6: Site-specific guidance noise levels

Period of assessment	Guidance noise levels, dB L_{Aeq} 15min
<i>Residential receivers – 9 Morton St, 39 Frazer St, 41 Frazer St, 43 Frazer St</i>	
Day-time	50
Evening	45
<i>Commercial – Le Montage</i>	
When in use	65

Predicted noise levels above these guidance noise levels would not necessarily mean that such activities should not be permitted, but it would suggest that the noise impacts should be considered by Council with regard to the impact on residential amenity.

Community reaction to noise from recreation is typically lower than that for other noise source types such as commercial or industrial activity, particularly in the vicinity of established recreation land uses. Noise from recreation activities such as football play, group exercise and other park uses are an existing feature of the project site and residents close to recreation spaces typically accept recreation noise as part of their noise environment.

Additionally it should be noted that developed guidance noise levels are independent from background noise levels or other acoustic features of the subject site. This may be considered a conservative approach in the event that the subject site is subject to elevated background noise levels or regular high ambient noise levels.

5.0 NOISE ASSESSMENT

5.1 Source Noise Levels

In addition to limiting the reliability of background noise measurements during periods associated with COVID-19 restrictions, attended measurements of skate park noise have not been practical or feasible due to occupational health and safety considerations as well as unrepresentative use of existing skate park spaces.

In order to develop appropriate source noise levels MDA has relied on review of existing skate park noise assessments in the public domain, as well as measurements previously conducted by MDA. Reports, papers and documented assessments reviewed by MDA are listed in Appendix D.

Based on MDA's literature review, a number of the reference documents were eliminated from consideration. Reasons for elimination included poor quality of reporting, insufficient context given to documented measurements including lack of reference distances, acoustical descriptors, unverified measurement methodologies and other technical considerations.

The following reports were evaluated to have useful reference material and be of sufficient quality and context to be appropriate for consideration.

- *Skate Park at Memorial Playing Fields, Steyning - Noise Assessment*, Atkins
- *Monkton Park, Chippenham – Skate Park Noise Impact Assessment*, MACH Acoustics
- *Monkton Park Skate Park Assessment Of Noise Impact*, Hoare Lea Acoustics

Review of noise data detailed in the above documents indicates a range of useful measurements of typical skate park activities, both for individual skating actions as well as overall typical skatepark activities over longer time periods.

Consideration of the various datasets presented in the referenced reports, as well as library data for skate park measurements previously conducted by MDA indicates broad alignment to noise levels in the order of 82 dB $L_{Aeq\ 15\ min}$ for typical skate activities. This is taken to represent a group of approximately 5 concurrent users.

Octave band data derived considering spectral data detailed in the reference reports, as well as MDA library data is detailed in Table 7 and has been used for assessment.

Table 7: Skate activity source sound pressure levels used for assessment

Source	Octave band centre frequency, Hz, dB $L_{Aeq\ 15\ min}$							Overall
	63	125	250	500	1000	2000	4000	
Skate activity at 1 m Group of 5 users	80	74	77	77	75	76	75	82

In addition to noise from skate activities, vocal sources have been included in the model representing the vocal output of skate plaza users. It should be noted that the various skate park measurements considered in developing the noise levels detailed in Table 7 included some vocal components. In order however, to provide a robust, conservative assessment, specific separate vocal sources have also been included in the model.

Octave band data for vocal sources used in the assessment is detailed in Table 8.

Table 8: Vocal source sound pressure levels used for assessment

Source	Octave band centre frequency, Hz, dB L_{Aeq} 15 min							Overall
	63	125	250	500	1000	2000	4000	
Vocal output at 1 m Single user	--	51	59	64	63	56	49	66

The vocal source noise levels have been derived considering the average between Raised and Loud male vocal output detailed in Table B2 of the Association of Australasian Acoustical Consultants' *Licensed Premises Noise Assessment Technical Guideline*. Whilst the Technical Guideline provides guidance for the assessment of licensed premises, useful reference data for vocal output is also provided.

The spectra and overall level has also been adjusted assuming vocal emissions occur for approximately 30 % of a representative 15 min period and assuming distributed directionality i.e. all talkers not facing the same direction.

It is noted that the AAAC guideline noise levels do not provide spectral content at the 63 Hz octave band, as a typical voice does not have significant content at such low frequencies. Notwithstanding this, noise content at 63 Hz from skate activities would be expected to be significantly greater than vocal output at this frequency and would dominate predicted levels at the receiver position. On this basis omission of 63 Hz data for vocal output is not considered a technical risk.

5.2 Modelling Scenarios

Noise levels from typical skate activities within the Project will be dependent on the number of simultaneous users and their location within the park. Based on information provided by Enlocus, approximately up to 15 users are likely to be skating in the Project concurrently. When assessing this scenario, adjustments were made to the base data shown in Table 7 and in Table 8 to allow for the additional users.

The following scenarios are assessed in this report to present the potential noise levels at the nearest receivers:

- **Capacity Use** – fifteen users distributed throughout the skate plaza based on use of skate plaza features
- **Low Use** – five users distributed throughout the skate plaza based on use of skate plaza features

Due to the design of the skate plaza, certain areas are likely to feature more user traffic than others i.e. where ramps or trick features are located more skate traffic may be expected than areas in which no trick features, flatter ground or resting areas are provided. Skate plaza users have been distributed in the model based on these concentrations, with trick areas featuring increased representation of skate noise levels compared to rest areas.

Similarly, vocal output of skate plaza users has been distributed in the model based on likely occurrence, with rest areas and drop-in positions (where users wait to enter a trick area) featuring greater representation of vocal effort than trick areas where a user is more likely to be skating, concentrating and therefore unlikely to be exhibiting significant vocal output.

These distributions have been developed with assistance from skate plaza designers Enlocus.

The above scenarios will give an effective and representative full range of noise levels that may be associated with use of the Project. In practise, both scenarios are likely to represent a lower and upper range of patronage. Interpretation of any results should be considerate of this range, with average practical noise emissions likely to be closer to the mid-point of the predicted ranges of noise levels.

5.3 Prediction Method and Modelling Parameters

A 3-dimensional digital model of the site and surrounding built environment has been created using SoundPLAN proprietary modelling software (version 8.2). The noise model has been used to calculate noise levels at noise sensitive receivers in accordance with ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613-2).

Modelling assumptions used for noise predictions are presented in Table 9 and are based on information and datasets referenced in this report as well as observations with respect to site conditions such as ground type.

Table 9: Noise modelling assumptions

Variable	Parameters used in noise modelling
3D design of the proposed Skate Park	1821 <i>Leichhardt Park SkatePark CD rev 05 01</i> , dated 18 January 2022 and provided by Enlocus
Ground topography	Topography for areas surrounding the Project based on data provided by Norton Survey Partners, <i>50111-B Detail Plan</i> received via email dated 26 October 2021 and other publicly available sources registered with Six Maps retrieved 9 July 2021
Source height	1 m above ground elevation of the proposed Skate Park
Receiver height	Assessment height of 1.5 m above ground terrain. Noise levels at upper floors may be higher than predicted in this assessment.
Receiver location	Positioned according to publicly available information (aerial imagery) and at the boundary of the identified sensitive receivers in accordance
Ground effect	Ground factor is G = 0 (hard ground)

5.4 Assessment Results and Discussion

Predicted noise levels at the identified noise sensitive receivers for the scenarios described in Section 5.2 are summarised in Table 10.

Table 10: Predicted noise levels due to skateboard activities

Location	Predicted noise levels, dB L _{Aeq} 15 min (Low Use – Capacity Use)	Guidance noise level, dB L _{Aeq} 15 min	
		Day	Evening
9 Morton St	37-42	50	45
39 Frazer St	39-44	50	45
41 Frazer St	41-46	50	45
43 Frazer St	41-46	50	45
Le Montage	48-53	65	65

Results indicate that for typical use of the skate plaza (being a mid-point between Low Use and Capacity Use), the generated noise levels are expected to be less than the guidance noise levels developed for the Project at all receiver locations.

Capacity Use of the skate plaza in the evening period may give rise to noise levels marginally (1 dB) above the guidance noise level at 41 Frazer Street and 43 Frazer Street only. To provide context to this - a typical receptor is not likely to perceive a difference between noise at the guidance level or a noise level 1 dB above the guidance level.

Additional context to the noise level predictions can be gained by considering the measured evening period ambient noise levels in the vicinity of the site and surrounding area, as presented in Table 2 of Section 3.0.

Whilst these sample measurements can be taken as being indicative only, and only reflective of the quieter COVID-19 period, they provide useful context with respect to the emergence of predicted levels above the existing noise environment.

Noise levels in the order of $L_{Aeq\ 15\ min}$ 37-46 due to the use of the Skate Plaza are predicted at the residential boundaries. Such predictions are significantly below the indicative evening ambient noise levels measured at the residences, being $L_{Aeq\ 15\ min}$ 51-53 dB. Additionally, noise from existing recreation activities are a predominant feature of the proposed Skate Plaza site. Residents close to recreation spaces would be exposed to the noise from existing recreation activities as part of their noise environment.

Based on the assessment and predicted noise levels detailed in this report, the proposed Project is indicated to be acoustically compatible with the surrounding area.

As with all community developments, in considering the appropriateness of this proposal, Council will need to consider the impact of noise against the community benefit of the facilities.

APPENDIX A GLOSSARY OF TERMINOLOGY

SPL or L_p	<p><u>Sound Pressure Level</u></p> <p>A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing (20 μPa RMS) and expressed in decibels.</p>
SWL or L_w	<p><u>Sound Power Level</u></p> <p>A logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.</p>
dB	<p><u>Decibel</u></p> <p>The unit of sound level.</p> <p>Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \mu\text{Pa}$ i.e. $\text{dB} = 20 \times \log(P/P_r)$</p>
dBA	<p>The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) so as to more closely approximate the frequency bias of the human ear.</p>
A-weighting	<p>The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.</p>
$L_{Aeq}(t)$	<p>The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level.</p> <p>The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.</p>
$L_{A90}(t)$	<p>The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level.</p> <p>The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.</p>

APPENDIX C GUIDANCE NOISE LEVEL DERIVATION

In the absence of specific noise criteria or other regulatory requirements governing the assessment of noise from sporting activities in public parks or recreation spaces the documents below have been used for guidance.

C1 Noise Policy for Industry

The NSW EPA *Noise Policy for Industry* has superseded the previous Industrial Noise Policy and is designed for the assessment of noise from commercial or industrial sites and how such noise might affect the amenity of nearby receivers.

The NPfI specifically states that the policy does not apply to *noise from sporting facilities, including motor sport facilities*, however specific elements of the NPfI referring to acoustic amenity are considered useful for establishing desirable levels of acoustic amenity in the suburban context.

The NPfI aims to address industrial noise sources with respect to two noise trigger levels, firstly to address short term intrusive noise impacts and secondly to maintain noise level amenity for an area.

The NPfI trigger levels for short term intrusion impacts are based on an RBL3 + 5 dB assessment, forming the Intrusiveness Noise Level. An intrusiveness assessment would generally be considered unreasonable for a community-based activity, such as sporting play in a park. A sensible approach in applying relevant aspects of the NPfI would be to utilise the Amenity Noise Level as a guiding reference of acceptable noise levels near the park.

The Amenity Noise Level is designed to prevent noise from continually increasing above an acceptable level. The recommended maximum noise levels for receivers in a suburban area can be assumed to provide partially suitable guidance for this site, bearing in mind they are designed primarily for industrial applications. The derived Amenity Noise Levels for the day and evening time-periods for a suburban environment are detailed in Table C1 below.

Table C1: Recommended Amenity Noise Levels

Assessment period	Recommended Amenity Noise Level, dB LAeq 15min
<i>Residential</i>	
Day (0800-1800 hrs)	55
Evening (1800-2200 hrs)	45
<i>Commercial</i>	
When in use	65

Source: Table 2.2 NSW *Noise Policy for Industry*

The NPfI also indicates that multiple other factors should be considered in the determination of new or modified developments including economic considerations, community benefits and the social worth of the development.

³ Rating Background Noise Level

C2 Camden Council Environmental Noise Policy

Camden Council *Environmental Noise Policy 2008* (ENP 2008) which is now superseded by Camden Council *Environmental Noise Policy 2018* (ENP 2018) provides guidelines relating to noise from sporting events and community sports facilities. We note that ENP 2018 does not provide such guidance any longer, but does represent one of the few LGAs that has attempted to address such noise sources in their policies.

On this basis we have referenced the following noise guidelines as per the ENP 2008:

6.1 General

Camden Council is responsible for regulating noise emissions from the recreational use of parks (such as Onslow and Kirkham Parks) which are used for sporting events, circuses, and special events.

It is recognised that the use of these parks has the potential to negatively impact on the amenity of surrounding residents with respect to noise. Therefore it is important to consider the level of noise impact when land in the vicinity of such parks is proposed to be rezoned for residential development or similar sensitive land-use.

The following guidelines for any assessment of noise from the use of these Parks have been devised in order to minimise the likelihood of disturbance to the surrounding community. In some instances, however, where an event or activity is determined by Council to be of particular social or cultural benefit, more relaxed criteria may be applied to the use of the site.

Guideline noise levels suggested for the day and evening (referred to as night-time in the Camden Council document) are then provided:

Where residential development is proposed on land that is likely to be impacted by noise from the use of parks then an acoustic assessment report is required.

During the daytime the following hours are:

Monday to Friday 7.00am to 6.00pm

Weekends and Public Holidays 8.00am to 6.00pm

For the above daytime hours the relevant intrusive noise level (LAeq, 15 minutes) should not exceed the background (LA90) plus 5 dB(A).

During night-time hours of 6.00pm and 10.00pm. the relevant intrusive noise level (LAeq, 15 minutes) should not exceed the background (LA90) plus 10 dB(A).

Noise shall be assessed at any proposed residential boundary or, if that boundary is proposed to be more than 30 metres from the residence, at the most affected point within 30 metres of the residence.

It should be noted that the above guidance levels are primarily developed as design targets for new residential developments near recreation spaces, and not the design of the recreation spaces themselves. Despite this, the guidance levels detailed in the ENP 2008 have value in reflecting amenity expectations that might apply to noise sensitive receivers near park and recreation spaces. The ENP 2008 does not provide guidance for the assessment of noise from recreation sources to commercial receivers.

Applying the above guidance to the estimated background levels presented in Table 2 of Section 3.0 results in a noise guidance level of 50 dB LAeq, 15 min during both the day and evening periods.

APPENDIX D LITERATURE REGISTER

The following reports, papers and assessment documents have been reviewed in considering skate park source noise levels.

- *Skate Park at Memorial Playing Fields, Steyning - Noise Assessment*, prepared by Atkins dated 7 September 2011
- *Noise survey in four skateparks*, Robert L. England, University of Toledo, dated 2004
- *Noise Impact Assessment Skate Ramp Lot 6 DP 1161720 Rifle Range Road Wollongbar*, prepared by Tim Fitzroy and Associates, dated 11 March 2019
- *Monkton Park, Chippenham – Skate Park Noise Impact Assessment*, prepared by MACH Acoustics, dated 27 June 2013
- *Acoustic Impact Assessment Proposed Youth Recreation Area at Rushcutters Bay Park New South Head Rd, Darling Point*, prepared by KR Acoustics, dated 7 July 2018
- *Proposed Skate Park Wollongbar Desktop Noise Impact Assessment*, prepared by Greg Alderson & Associates, dated 14 August 2014
- *Monkton Park Skate Park Assessment Of Noise Impact*, prepared by Hoare Lea Acoustics, dated 10 July 2013
- *Noise Mitigation Study, South Arm Skate Park*, prepared by JTA Health, Safety and Noise Specialists Pty Ltd, dated May 2020