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Lakes Business Park - Southern Precinct

Residential Noise Impact Assessment

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1 INTRODUCTION

This report presents our acoustic assessment for the proposed mixed-use residential development to be located within the Southern Precinct of Lakes Business Park.

This report will:

- Primarily assess how aircraft noise impacts can be addressed in the planning and development of the precinct.
- Conduct an external noise intrusion assessment and recommend acoustic treatments to ensure that a reasonable level of amenity is achieved for future occupants.
- Conduct background noise monitoring to determine noise emission goals for future use of the development to meet Council and NSW EPA acoustic requirements.

2 SITE DESCRIPTION

The southern precinct of Lakes Business Park is located at 11 – 13 Lord Street, Botany. The site is currently occupied by commercial warehouses. To the west of the site is a Roads and Maritime Registry, which is scheduled for refurbishment to a Services NSW Registry. To the north of the site is the northern precinct of Lakes Business Park. To the east of the site is Booralee Park, and to the south is existing residential development on Daphne Street.

The proposed mixed use residential development includes twelve residential buildings with ground floor commercial spaces on each building facing Lord Street.

The site is located between ANEF 25 and 30 according to the Sydney Airport 2033 Australian Noise Exposure Forecast map.

Figure 1 shows the site surroundings and measurement locations. Figure 2 details the proposed Masterplan for the site.

Figure 1: Site Map and Measurement Locations

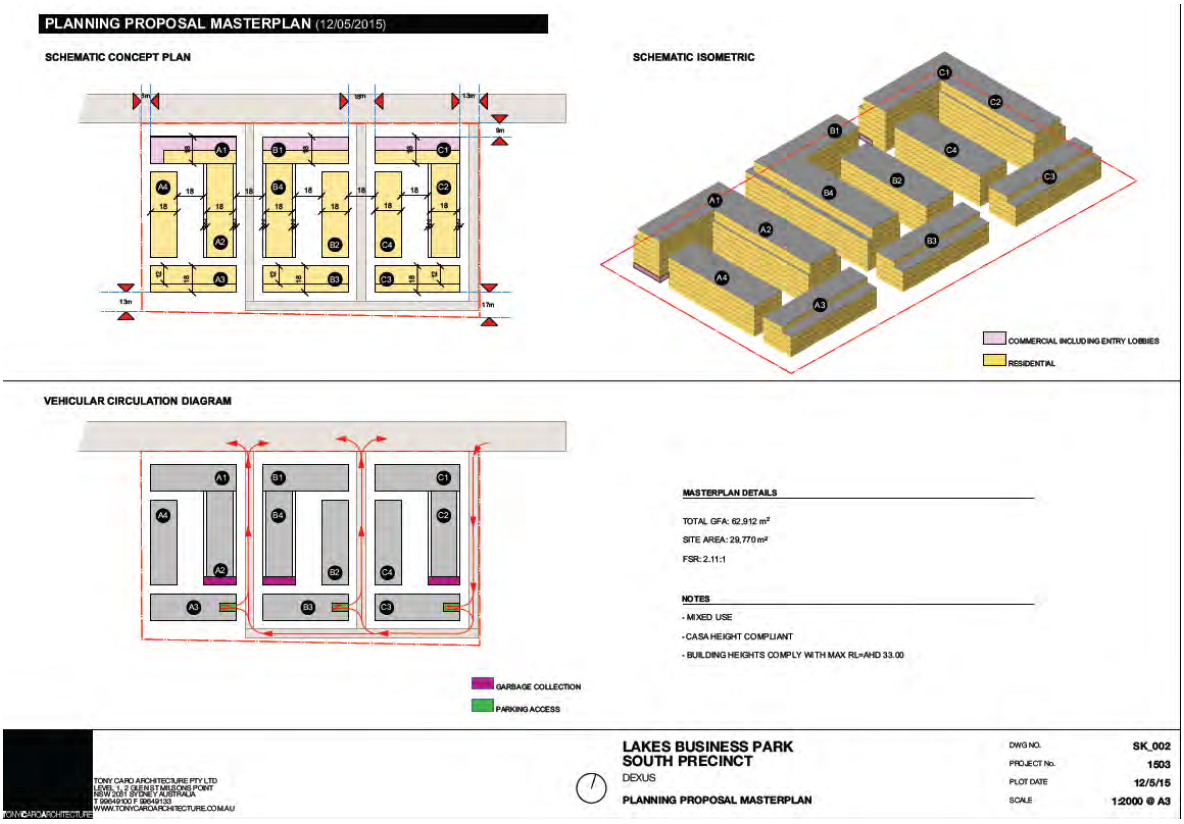


Figure 2: Proposed Masterplan

3 ASSESSMENT OF AIRCRAFT NOISE – AS2021:2000

While there is no statutory requirement to comply, aircraft noise exposure is generally assessed using Australian Standard AS2021-2000 "Aircraft Noise Intrusion - Building Siting and Construction".

Assessment under this Standard is a two stage approach.

Firstly, a site evaluation is carried out to determine whether the overall aircraft noise exposure of the site is compatible with the proposed use.

Where it is established the site has a level of aircraft noise exposure, the second stage determines the building envelope requirements to attenuate aircraft noise within buildings to a level compliant with the recommended internal noise levels set out within the Standard.

The acceptability of a site in terms of aircraft noise exposure is usually assessed using the Australian Noise Exposure Forecast System (ANEF), which measures overall exposure to aircraft noise. Three basic parameters influence perception of aircraft noise:

- The frequency of aircraft movement's overhead;
- The noise level and duration of individual aircraft movements; and
- The time of the day in which they occur.

The ANEF is a calculated number based on the anticipated mix of aircraft types and number of movements.

Using the Standard, a site can be classed as either:

- Acceptable – Development can occur with no specific measures needed to control aircraft noise.
- Conditionally Acceptable - Development can occur, however it is normally required to upgrade the building façade to control internal noise levels within buildings.
- Unacceptable – Development not normally considered.

Notwithstanding this, the Standard indicates that departures from these recommendations may be permitted where there are existing built up areas. This is reflected in a number of existing Development Control Plans developed by Councils close to the airport. For example, Marrickville Council DCP – Clause A18 C7 requires all buildings in noise exposures exceeding ANEF 20 to be designed to meet the internal noise levels stipulated in AS 2021. It does not, however, preclude development in zones exceeding ANEF 20.

Botany Council, in Section C3 of Part 3J of their DCP state that:

> *"Council may grant consent to development where the building site has been classified as "unacceptable" under Table 2.1 of AS2021-2000. For Council to be able to consider such applications for development, the following factors must be complied with:*
>
> *(i) Submission of specialist acoustic advice by an accredited acoustical consultant certifying full compliance with the requirements of Table 3.3 of AS2021-2000; …"*

Figure 3 shows existing residential zones subject to noise exposures exceeding ANEF 25, and residential projects Acoustic Logic has been involved with that have been recently approved in exposure zones exceeding ANEF 25. The figure indicates that there is a considerable area of residential dwellings having exposures exceeding ANEF 25, and a number of new residential developments have recently been approved in areas exceeding ANEF 25.

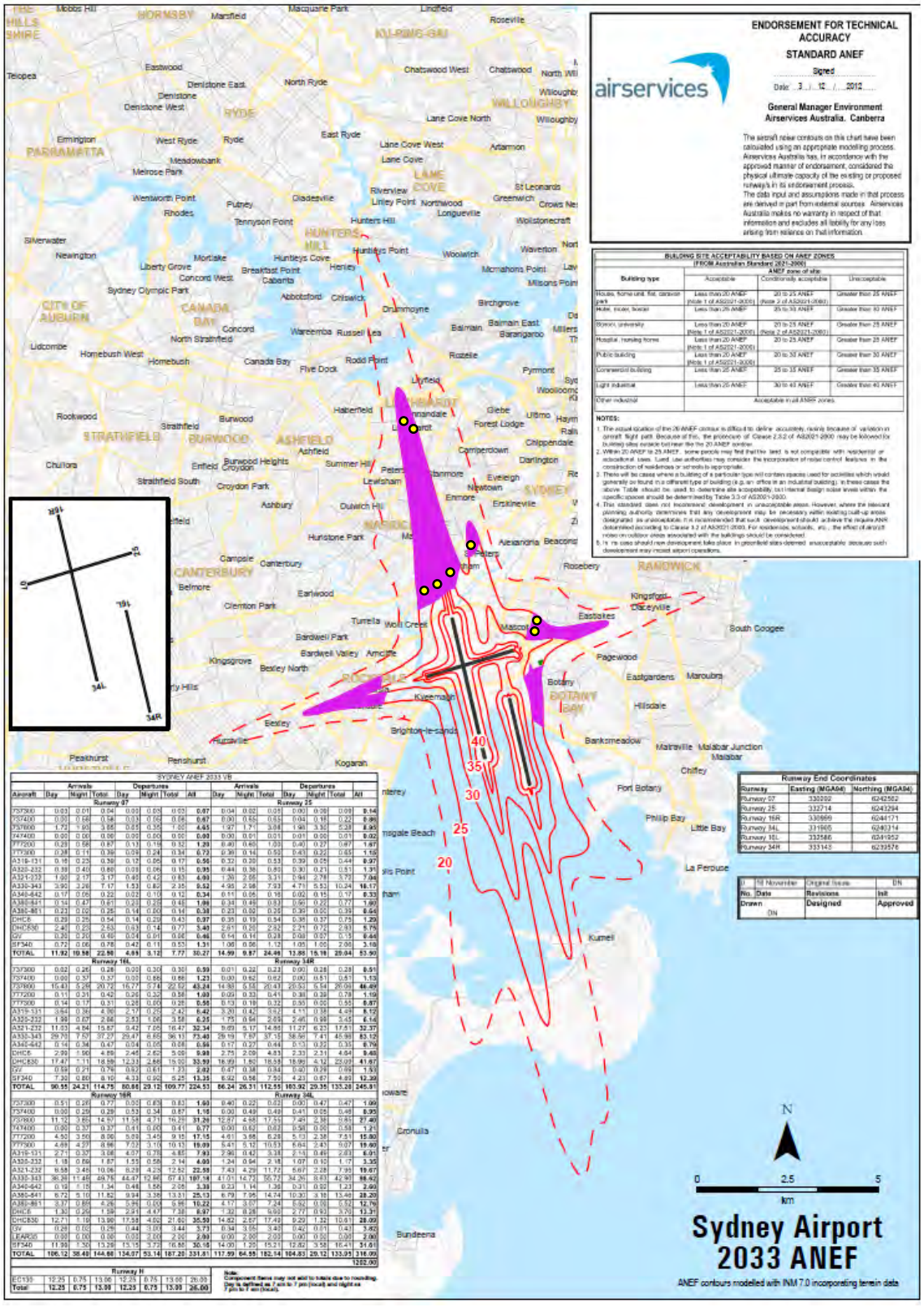
While development on aircraft noise exposed sites is not desirable, there is also recognition that strict adherence to the land use compatibility guidelines in the Standard is unrealistic given the history of nearby development and airport growth.

Thus, Councils surrounding Sydney Airport modify or bypass totally the ANEF site assessment aspect of AS2021:2000 and require only the second stage building construction assessment to be strictly met. AS2021:2000 requires a full evaluation of internal noise levels should be carried out for residential locations with an aircraft noise exposure close to or exceeding ANEF 20. The building envelope is designed to achieve the recommended internal noise levels based on the typical worst case flyover noise level.

In this regard, it is important to note that the final internal noise levels achieved in the dwellings are not affected by the ANEF zone in which the property is located. A building located in a high ANEF area would need to have a better performing façade, but the internal noise levels achieved would be the same as a development adjacent to the ANEF20 in a “conditionally acceptable” zone

It is noted that much of the existing residential dwellings located in aircraft noise affected areas have not been constructed to exclude aircraft noise, whereas new buildings would be constructed to ensure that internal noise levels would comply with the Standard (refer below).

Figure 3 – Existing Residential Development in Areas Exceeding ANEF 25



Residential areas exceeding ANEF 25

Residential Developments Recently Approved in Noise Exposures Exceeding ANEF 25

3.1 APPLICATION TO THE STUDY AREA

3.1.1 Aircraft Noise Exposure of the Study Area

Figure 4 shows the study area.

Overlayed are ANEF contours for the two most recent ANEF charts, ANEF2029 and ANEF2033. The ANEF contours for Sydney Airport have changed a number of times in the last 15 years in response to changing airport operation including “noise sharing”.

The current ANEF2033 maps indicate that the site is located on the ANEF 25 contour, with the eastern portion of the site within the ANEF 20 – 25 site area and the western portion of the site within the ANEF 25-30 site area. This is in contrast to the superseded ANEF2029 map, where the entire site was contained within the ANEF 25-30 site area. This indicates that the forecast noise level exposure at the site has decreased since the production of ANEF2029 in 2009.

This long term trend is likely to continue given Sydney Airport has a cap on aircraft movements, and that new generation aircraft, such as the A380, are quieter than the current generation of aircraft on which the current ANEF contours are based.

Notwithstanding that aircraft exposure at the site has decreased in the past and is likely to continue into the future, the study area will still be noise affected and new buildings should be constructed to exclude aircraft noise using the recommendations contained in AS 2021.

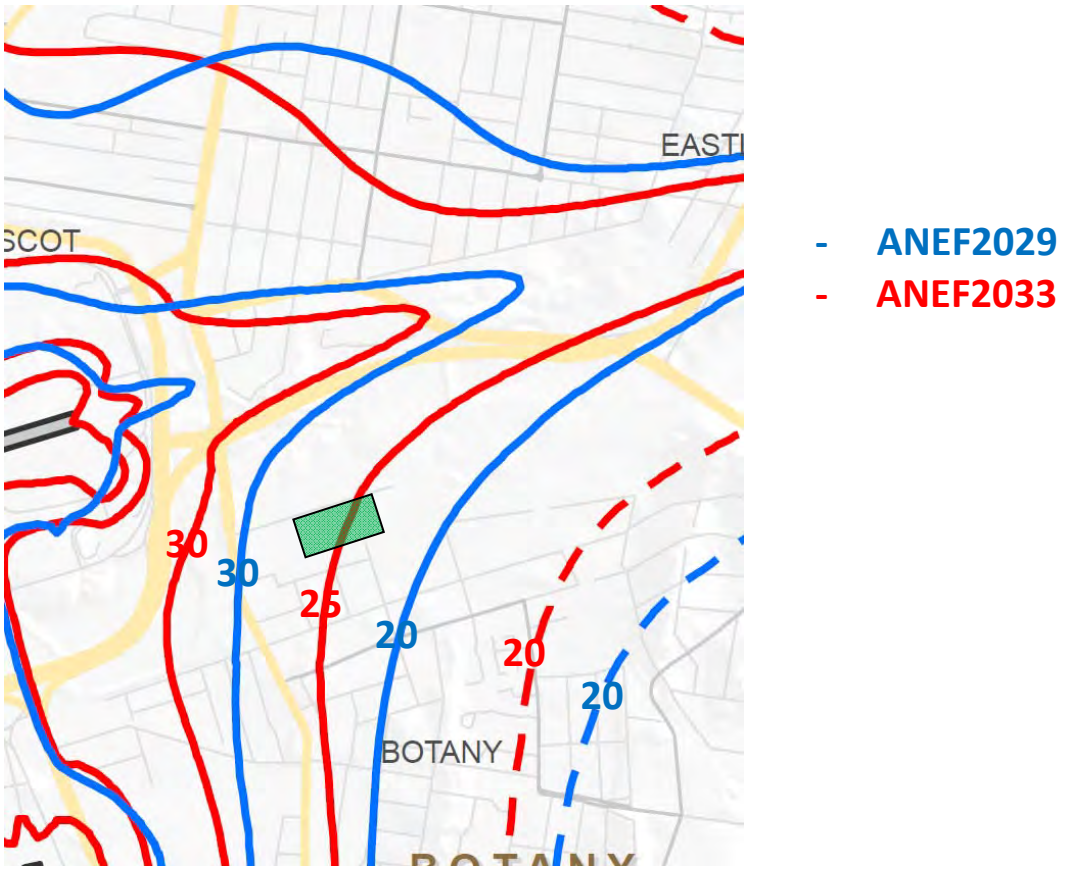


Figure 4 – Aircraft Noise Exposure Study Area

3.1.2 Effect of Aircraft Noise on Residential Uses Within the Study Area

Adopting the approach in the Section C3 of 3J.2 of Botany Council DCP, an appropriate approach for the study area would be to design the residential building envelopes so that the internal noise recommendations in AS2021:2000 are achieved. All portions of the site can be designed to comply with the internal noise levels stipulated within Table 3.3 of AS2021:2000. Thus, the occupants of future dwellings would experience the same internal noise levels regardless of their location within study area.

While acceptable noise levels within future dwellings can be achieve through appropriate building design, the need for adequate ventilation and external recreation space should also be addressed.

To exclude aircraft noise, windows would need to be closed and an alternative ventilation or air conditioning system incorporated so that the dwellings are ventilated even when external windows need to be closed to minimise aircraft noise. It is noted that windows can still be made openable, so that occupants can take advantage of the significant periods when aircraft flyovers are not occurring (or are of lower frequency) as a result of the noise sharing arrangements and the night curfew.

The need for external recreation space is addressed by providing external spaces for use by local residents. Ideally the external recreational areas would be located in the least aircraft noise affected portion of the site. In this regard, the existing Booralee Park is ideally situated on the eastern boundary of the site. Additionally, building designs could incorporate wintergardens that would provide a “half way” space where aircraft noise levels can be moderated and the feel of an external space can be provided.

3.2 INDICATIVE CONSTRUCTIONS FOR AS2021:2000 COMPLIANCE

Based on the distance from the site to the runways, and an assessment of all the aircraft listed in AS 2021:2000, the Standard predicts that the highest typical aircraft movements will be from Boeing-767s landing on the East/West Runway and taking off from the Third Runway. The noise level at the site as indicated by the standard is 72dB(A) for landing aircraft and 74dB(A) from aircraft taking off. These noise levels have been used to predict the internal noise levels and specify indicative façade constructions.

It is noted that the façade recommendations are indicative only and should be reviewed at DA stage when elevations and detailed floor plans become available.

3.2.1 Indicative Glazing

Assuming typical bedroom and living room size, medium to heavy weight single glazing with full perimeter acoustic seals would result in AS2021:2000 compliant internal noise levels.

3.2.2 Indicative External Walls

For external walls of masonry construction, no acoustic upgrade is required for AS2021:2000 compliance.

3.2.3 Indicative Roof/Ceiling Construction

The proposed concrete slab roof does not require any acoustic upgrade for AS2021:2000 compliance.

4 ASSESSMENT OF TRAFFIC AND RMS NOISE INTRUSION

The site is marginally affected by traffic noise from Lord Street to the north of the site and by operational noise from the Roads and Maritime Services Registry to the west of the site.

Attended noise measurements of noise from Lord Street and operational noise from the Roads and Maritime Services development have been conducted to characterise the acoustic environment surrounding the site.

Section 4C.5.12 of the Botany Council DCP states that noise from external noise sources should comply with the internal noise goals stipulated in the Table below.

Table 1 - External Noise Intrusion Criteria

Internal Area	Time	Repeatable Maximum LAeq (1 Hour) with closed windows and doors	Repeatable Maximum LAeq (1 Hour) with open windows and doors
Living Areas	Day or Night	< 40 dB(A)	<50 dB(A)
Sleeping Areas	Day or Night	< 40 dB(A)	<50 dB(A)

The glazing and façade treatments required to attenuate aircraft noise levels to AS2021:2000 internal noise levels are sufficient to reduce all other external noise sources to the requirements of Botany Council DCP.

Detailed assessment of façade treatments should be conducted at DA stage when elevations and detailed floor plans become available.

5 ASSESSMENT OF POTENTIAL NOISE EMISSIONS

Under the current Masterplan scheme, the only potential source of noise emissions from the proposed development would be mechanical plant.

The external noise emission criteria are set up in this section of the report to ensure that the amenities of nearby land users are not adversely affected.

5.1 BACKGROUND NOISE MONITORING

A long-term unattended monitor was installed on site to measure background noise levels. These unattended measurements were supplemented with attended measurements at the eastern, western and southern boundary of the site. The results of the long term unattended monitoring is presented in Appendix One.

Table 2 – Measured Background Noise Levels

Location	Period/Time	Background Noise Level dB(A) $L_{90(period)}$
Lakes Business Park	Day (7am-6pm)	46
	Evening(6pm-10pm)	45
	Night(10pm-7am)	42

5.2 NOISE EMISSION OBJECTIVES

The following documents are used to establish the noise emission criteria for the development site:

- City of Botany Bay Council DCP
- EPA Industrial Noise Policy
- Protection of Environmental Operation Act Regulation

5.2.1 City of Botany Bay Council DCP

Section 4C.5.15 of Botany Bay Council DCP states:

"C20 - The noise level from air conditioning systems is not to exceed the $L_{Aeq\ 15\ minute}$ by 5dBA measured at the property Boundary.

5.2.2 EPA Industrial Noise Policy

The EPA Industrial Noise Policy, has two criteria which need to be satisfied namely Intrusiveness and Amenity.

The EPA Industrial Noise Policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. Under the policy the nearest residence would be assessed against the urban criteria.

Noise levels are to be assessed at the property boundary or nearby dwelling, or at the balcony or façade of an apartment.

5.2.2.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted for the site are presented in Table 2 above. Noise emissions from the site are to comply with the Intrusiveness noise criteria detailed in the Table below:

Table 3 – EPA Intrusiveness Criteria

Location	Time of Day	Background noise level dB(A)L_{90}	Noise Emission Criteria dB(A)L_{eq} (Background + 5dB)
Residential Properties surrounding the site	Day Time (7am – 6pm)	46	51
	Evening (6pm – 10pm)	45	50
	Night (10pm-7am)	42	47

5.2.2.2 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The EPA's Industrial noise policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. This site is categorised by the residential receivers as suburban.

For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays.

Table 4 – EPA Amenity Noise Level Criteria

Type of Receiver	**Time of day**	**Recommended Noise Level dB(A)$L_{eq(period)}$**
Residential – Suburban	Day	55
	Evening	45
	Night	40

5.2.3 Sleep Arousal

To minimise the potential for sleep arousal the $L_{1\ (1\ minute)}$ noise level of any specific noise source does 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.

The L_1 noise level is the level exceeded for 1 per cent of the time and approximates the typical maximum noise level from a particular source. Where the typical repeatable existing L_1 levels exceed the above requirement then the existing L_1 levels form the basis for, sleep disturbance criteria.

5.2.4 Protection of the Environmental Operation Act Regulation

Protection of the Environmental Operations regulation limits the noise levels associated within the operation of domestic air conditioning criteria during night time periods which is presented below:

Protection of the Environmental Operations (Noise Control) Regulation 2000-Sect 52

52 Air Conditioners

(1) A person must not cause or permit an air conditioner to be used on residential premises in such a manner that it emits noise that can be heard within a habitable room in any other residential premises (regardless of weather any door or window to that room is open):

(a) before 8 am or after 10 pm on any Saturday, Sunday or public holiday, or
(b) before 7 am or after 10 pm on any other day.

5.2.5 Summary of Noise Emission Objectives

Based on the requirements stated in the sections above, Table 5 below provides a summary of the assessment criteria applicable to the future residential development at the project site. The assessment criteria are also based on the ambient noise monitoring conducted at the site.

Table 5 – Environmental Noise Emission Criteria

Time Period	Amenity Criteria (dB(A)$L_{eq(Period)}$)	Intrusiveness Criteria (dB(A)$L_{eq(15min)}$)	EPA Criteria for Residential Condensers	EPA Criteria for Sleep Disturbance dB (A)$L_{1(1minute)}$
Day (7am-6pm)	55	51	N/A	N/A
Evening (6pm-10pm)	45	50	N/A	N/A
Night (10pm-7am)	40	47	Inaudible within neighbouring premises	57

5.3 ASSESSMENT OF NOISE EMISSIONS

Noise emissions from the operation of the development must comply with the noise emission goals set out in section 5.2.5.

Detailed plant selection has not been undertaken at this stage, as plant selections have not been determined. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels.

Satisfactory levels will be achievable through appropriate plant selection and location and, if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

6 CONCLUSION

A noise impact assessment of the proposed mixed-use residential development to be located within the Southern Precinct of Lakes Business Park located at 11 – 13 Lord Street, Botany has been conducted.

It is concluded that:

- Residential development over a portion of the proposed site would not normally be envisaged by the normal requirements of AS 2021:2000. However, AS 2021 envisages that concessions may need to be made for existing built up areas. In practice, the land use assessment provisions in AS 2021:2000 are not strictly applied by councils near Sydney Airport as it is clearly impractical to do so given existing development.

- It would be appropriate to permit residential development on the basis that the buildings would be constructed to meet the internal noise level recommendations contained in AS2021:2000.

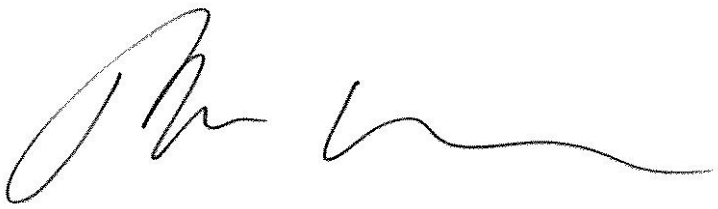
- Typical building and façade constructions will result in internal aircraft noise levels that are compliant with the requirements of AS2021:2000.

- Marginal external noise impacts from traffic and RMS Registry operation can be ameliorated through typical façade constructions.

- Noise emissions from the development (primarily mechanical plant) can be treated to fully comply with the requirements of City of Botany Bay DCP and the EPA Industrial Noise Policy.

We trust this information is satisfactory.

Yours faithfully,



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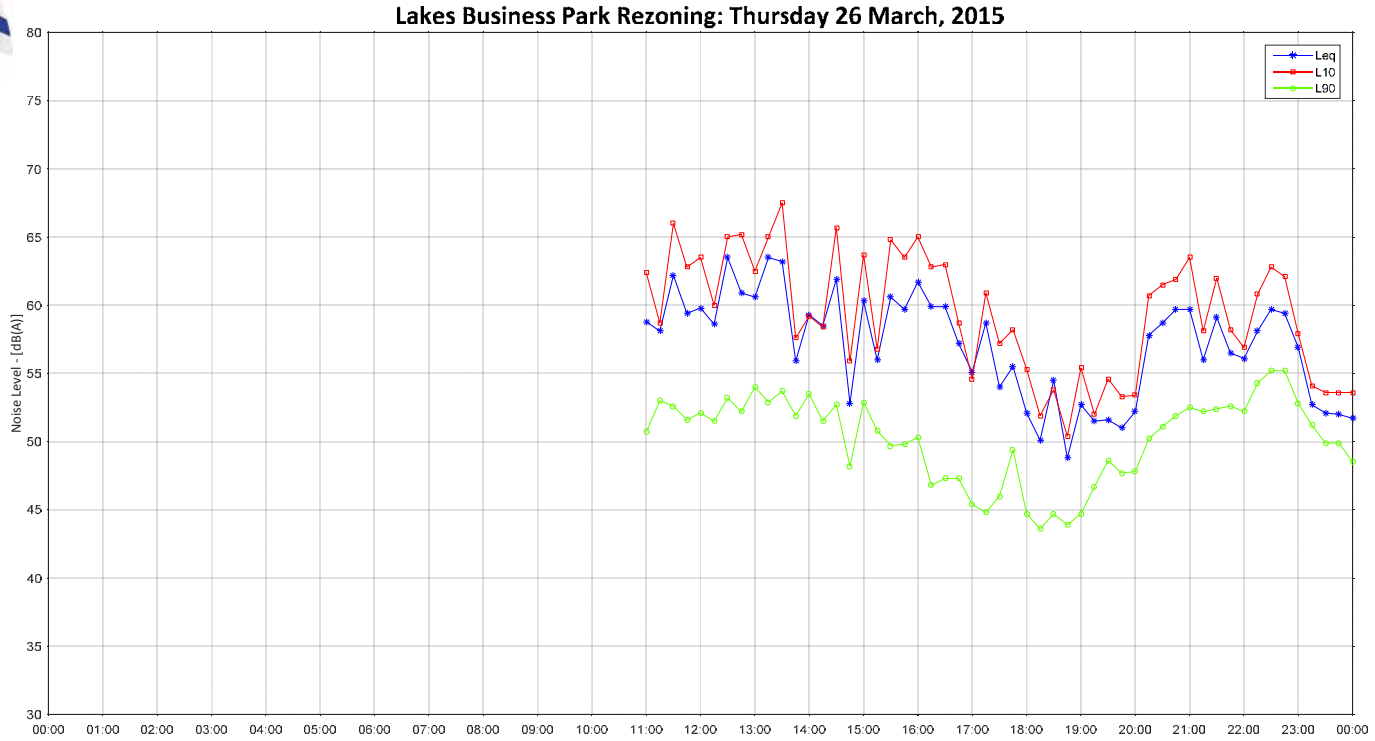
Tom Aubusson MAAS

Appendix One - Unattended Monitoring Data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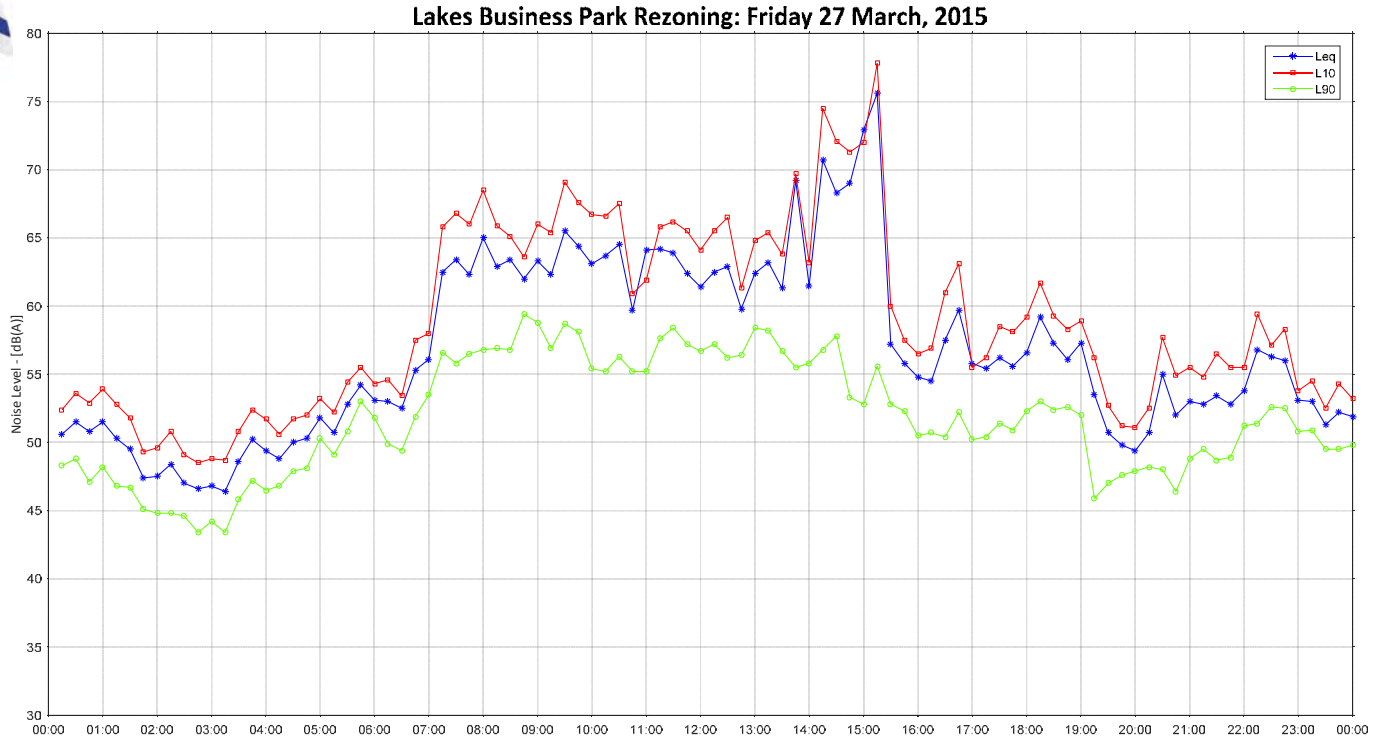
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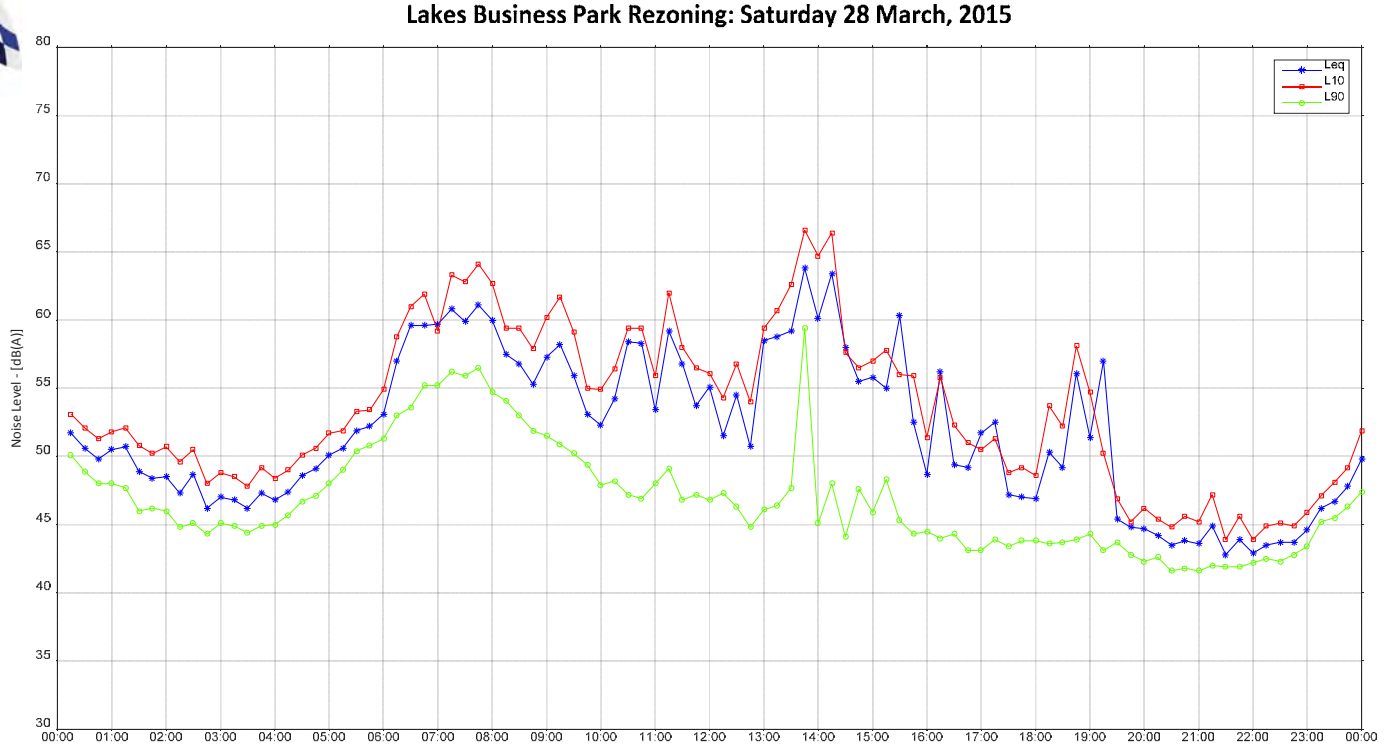
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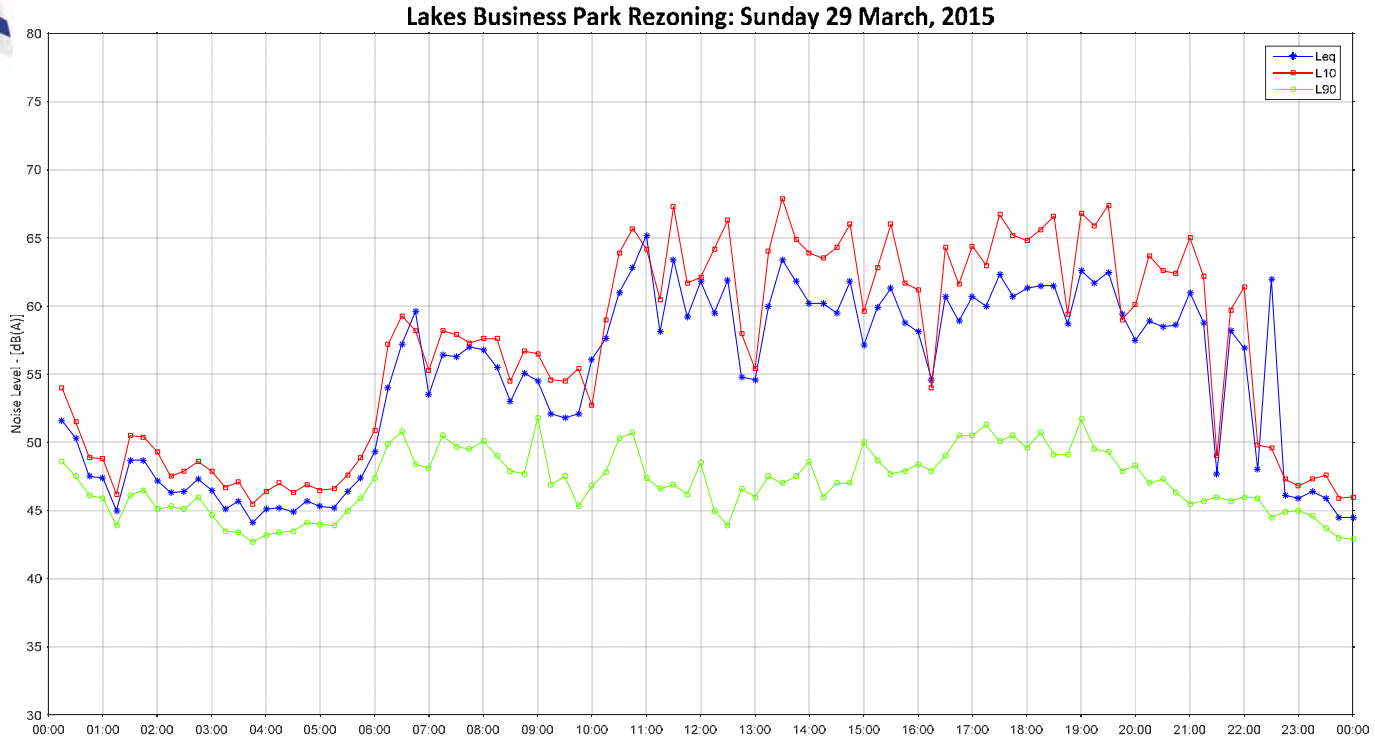
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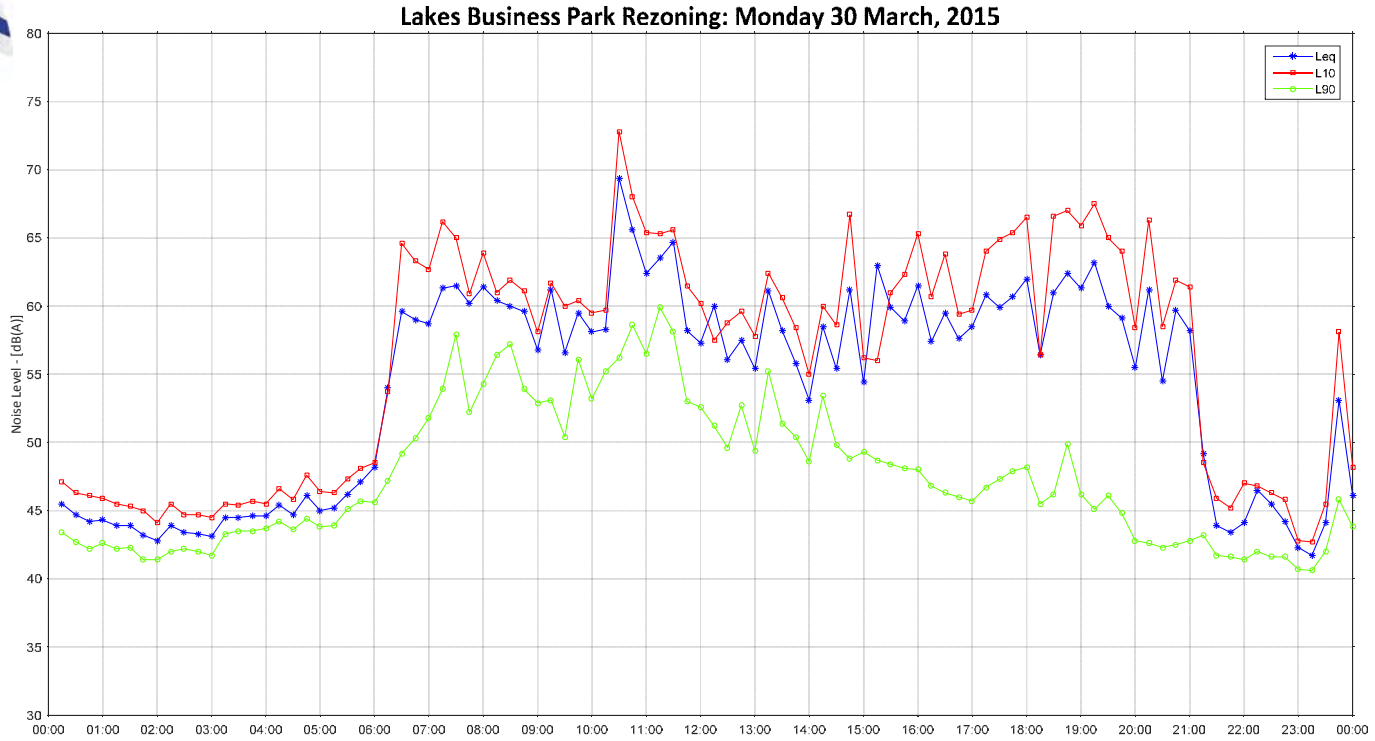
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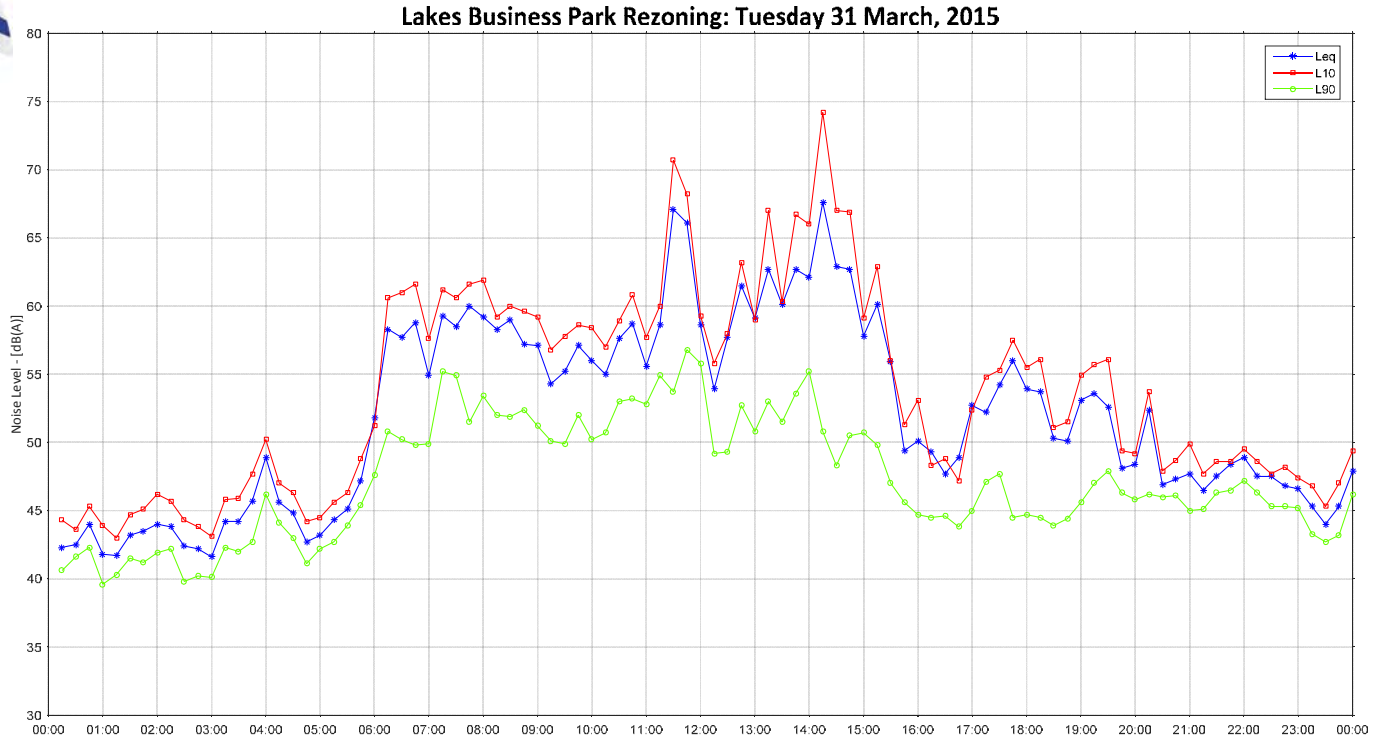
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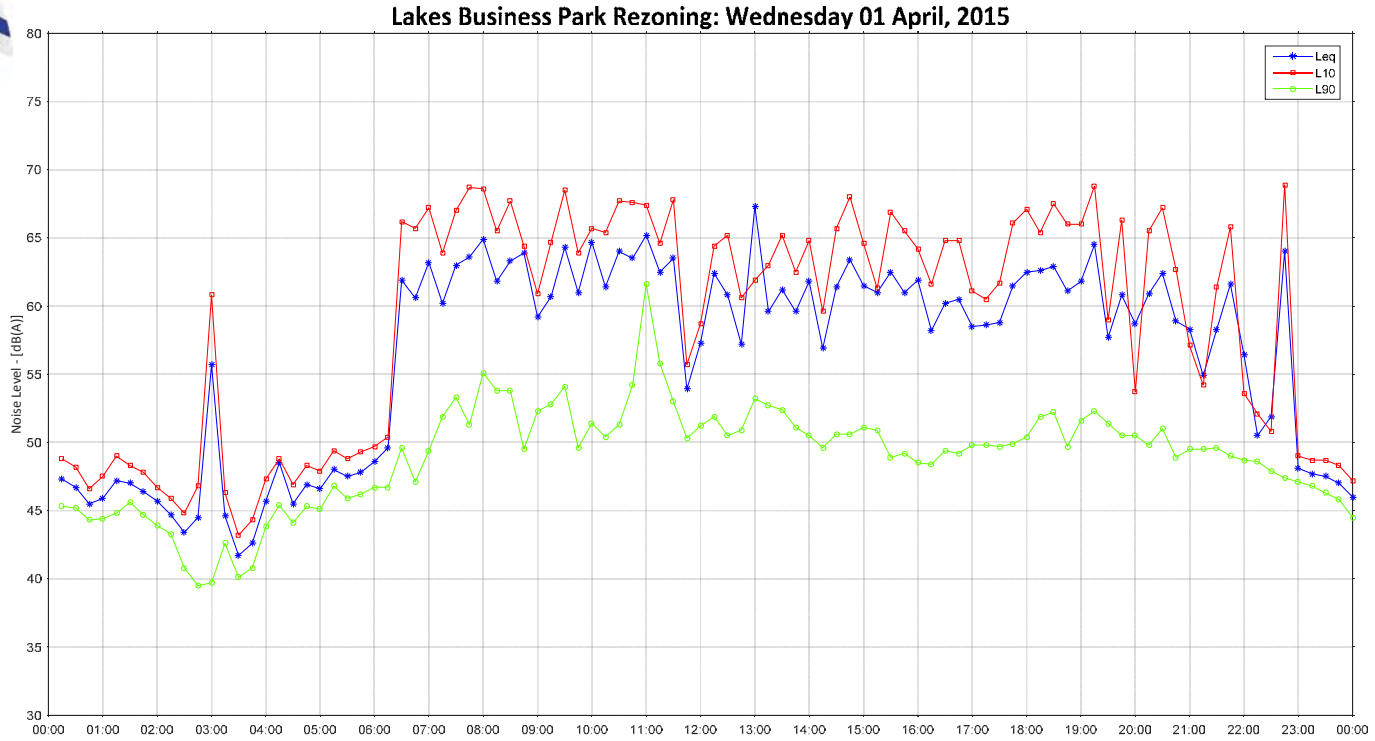
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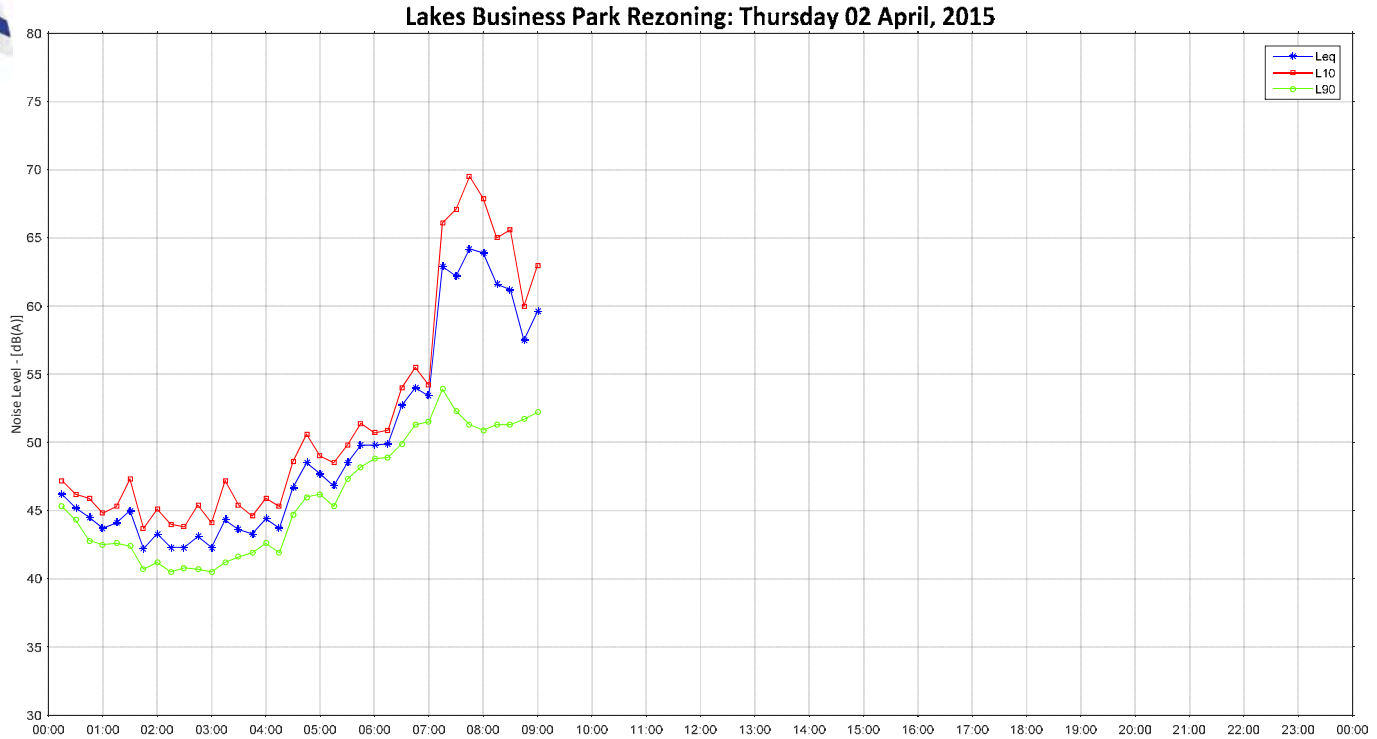
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