KGS (Vic) Pty Ltd

14-40 George Street, Leichhardt

Masterplan - Environmental Noise Impact Assessment

DRAFT

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EXECUTIVE SUMMARY

Vipac Engineers & Scientists Ltd. (VIPAC) has been commissioned by Catylys Properties Pty Ltd on behalf of KGS (Vic) Pty Ltd to assess the environmental noise interaction of the proposed residential development at 14-40 George Street, Leichhardt on the surrounding environment.

An acoustic assessment of the proposed development has been carried out in accordance with the guidelines set out in Leichhardt Municipal Council DCP, Department of Environment, Climate Change and Water (DECCW) noise policies and relevant Australian Standards.

Noisy activity and operating plant at the existing site prevented a long-term noise survey of the surrounding area. Therefore at this stage, only short term attended background noise measurements were carried out during different time periods. The data obtained, provided the best representation of the ambient noise in the absence of industrial noise from the existing facilities. It is recommended that at a more detailed noise survey is undertaken once the facilities located at the existing site have ceased operation. We would expect that once the existing facilities are vacated, the ambient noise level would decrease.

Limiting criteria for mechanical plant/equipment noise emission have been determined based on Leichhardt Municipal Council DCP and DECCW Industrial Noise Policy requirements.

Table 6 provides the noise level limits for the operation of the mechanical plant. The mechanical services consultants should use these limits when selecting/designing the mechanical plant. Once the plant and equipment selection has been finalised, a separate acoustic assessment should be conducted during the detail design stage. At this later juncture the design and specification of the necessary treatments may be carried out to control the noise emission and to ensure compliance with the criteria specified.

The impact of road traffic noise levels in the surrounding area has been determined in accordance with DECCW ECRTN criteria. Based on the information given in the Preliminary Traffic Report, the predicted traffic noise from the projected traffic flow is expected to be reduced by 6.8dBA.

Based on our assessment of external noise intrusion, acoustic glazing would be required to meet the internal noise level requirements for both traffic and aircraft noise.

Provided the noise level limits in this report are implemented, the proposed mixed-use development is expected not to adversely impact the surrounding noise sensitive receivers.

TABLE OF CONTENTS

LIST OF FIGURES & TABLES

1 INTRODUCTION

Vipac Engineers & Scientists Ltd. (VIPAC) has been commissioned by Catylis Properties Pty Ltd on behalf of KGS (Vic) Pty Ltd to assess the acoustic interaction of the proposed mixed use development at 14-40 George Street, Leichhardt with the surrounding environment.

The proposed mixed-use development will comprise:

- 327 residential units in a total of 7 buildings ranging from 3 to 6 stories.
- 2200m^2 of commercial space.
- Two levels of basement parking

2 SITE DETAILS

The site of the proposed development is currently occupied by industrial and commercial buildings and is located on a block bounded by George Street, Upward Street and McAleer Street. There are residential properties to the north, east and west of the site. To the south, south east and south west are existing commercial and industrial facilities. Site location is shown in Appendix A.

3 NOISE CRITERIA

The following standards and guidlines are applicable to this project:

- Leichhardt Municipal Council DCP
- NSW DECCW Industrial Noise Policy" (DECCW INP).
- NSW DECCW Environmental Criteria for Road and Traffic Noise" (DECCW ECRTN).
- NSW DECCW Interim Construction Noise Guideline.
- Australian standard AS/NZS 3671-1989: Acoustics – Road traffic noise intrusion – Building siting and construction.
- Australian standard AS/NZS 2107-2000: Acoustics – Recommended design sound levels and reverberation times for building interiors.
- Australian standard AS/NZS 2021-2000: Acoustics – Aircraft noise intrusion – Building siting and construction.
- Australian standard AS 1055.1-1997: Acoustics - Description and measurement of environmental noise - General procedures.

The requirements of each are summarised as follows:

3.1 LEICHHARDT MUNICIPAL COUNCIL DCP

Part B (Residential buildings) Section B3.5 of the Councils DCP provides controls pertaining to the acoustic privacy of a new residential development. These controls include:

- Use Urban Framework Plans to establish potential noise producing sources such as rail and road in the vicinity of the site.
- Ensure living rooms, activity areas, parking and service equipment are located away from bedroom windows of adjacent dwellings.
- Construct dividing walls and floors between dwellings, to limit noise transmission to 40-45 dBa.
- Ensure electrical, mechanical or hydraulic equipment or plant does not generate a noise level greater than 5dBa above background sound level at the boundaries of any development
- Ensure internal habitable rooms of dwellings affected by high levels of external noise, are designed to alleviate internal noise levels in accordance with Australian Standard 2107 – Recommended Design Sound Levels and Reverberation Times for Building Interiors.
- Separate and contain the plumbing for each dwelling to prevent the transmission of noise between dwellings using appropriate noise resistant wall, ceiling and floor treatments

3.2 NSW DECCW INDUSTRIAL NOISE POLICY

To control noise from plant or equipment at the development the noise emission levels from the site should be restricted to criteria determined through the outlined in the NSW Department of Environment, Climate Change and Water (DECCW) Industrial Noise Policy.

The procedures detailed in DECCW Industrial Noise Policy has two requirements that must be met, namely:

- that the noise source not be 'intrusive'; and also
- that the 'amenity' of the nearby land be preserved.

This policy sets out two separate noise criteria designed to ensure developments meet environmental noise objectives. The first criterion accounts for intrusive noise and the second criterion applies to protection of amenity of particular land uses. The new development is assessed by applying both the amenity and intrusiveness criteria to the situation and adopting the more stringent of the two. This becomes the project specific noise levels. Applying the most stringent requirement as the Project Specific Noise Levels ensures that both intrusive noise is limited and the amenity is protected.

3.3 CRITERIA FOR THE CONTROL OF ROAD TRAFFIC NOISE

The NSW DECCW Environmental Criteria for Road Traffic Noise (Table 1), recommends traffic noise levels generated by additional road traffic as wall as the criteria for new residential developments affected by existing traffic noise. Recommended noise level limits are shown in Table 1.

Table 1: Road Traffic Noise Criteria for Proposed Road or Residential Land Use Developments

Type of Development	Period	$L_{Aeq,T}$ dB(A)
11. New residential developments affected by traffic noise from local roads.	Day (7am – 10pm)	$L_{Aeq(1hr)}$ 55
	Night (10pm – 7am)	$L_{Aeq(1hr)}$ 50
13. Land use developments with potential to create additional traffic on local roads.	Day (7am – 10pm)	$L_{Aeq(1hr)}$ 55
	Night (10pm – 7am)	$L_{Aeq(1hr)}$ 50

Where criteria for Type of Development 11 is already exceeded, DECCW recommends that:

> *"Where feasible and reasonable, existing noise levels should be mitigated to meet the noise criteria for occupant by judicious design and construction of the development. Relevant strategies will include optimum location and orientation of the building, planning internal layouts, choosing appropriate building materials and using good construction techniques".*

Where criteria for Type of Development 13 is already exceeded, DECCW recommends that:

> *"Where feasible and reasonable, existing noise levels should be mitigated to meet the noise criteria. Examples of applicable strategies include appropriate location of private access roads; regulating times of use; using clustering; using "quiet" vehicles; and using barriers and acoustic treatments. In all cases, traffic arising from the development should not lead to an increase in existing noise levels by more than 2 dB".*

3.4 CRTIERIA FOR INTERNAL NOISE LEVEL

In terms of internal noise levels for residential and commercial occupancies subjected to outside noise sources, the recommended indoor design levels specified in Australian Standard 2107:2000 are considered. Table 2 below summarises the relevant internal sound levels.

Table 2: AS/NZS 2107:2000 - Recommended Design Sound Levels for building interiors

Type of occupancy/activity	Recommended design sound level L_{eq} dB(A)	
	Satisfactory	Maximum
Houses and apartments near minor road		
Living areas	30	40
Sleeping areas	30	35
Work areas	35	40
Apartment common areas	45	55
Commercial & shop buildings		
General office area	40	45
Small retail stores (general)	45	50
Public spaces (eg speciality shops)	40	45

3.5 AIRCRAFT NOISE CRITERIA

Aircraft noise intrusion into the development will be designed to comply with Australian Standard 2021-2000 – Acoustics-Aircraft Noise Intrusion-Building Siting and Construction. Therefore, the maximum internal noise levels (L_{Amax}) during aircraft fly-overs must meet the criteria presented in Table 3 below.

Table 3: Indoor Design Sound Levels for Determination of Aircraft Noise Reduction (Based on Table 3.3 of AS2021-2000)

Building type and activity	Indoor Design Sound Level dB(A)
Houses, home units, flats, caravan parks	
Sleeping areas, dedicated lounges	55
Other habitable areas	65
Bathrooms, toilets, laundries	70
Commercial building, office and shops	
Private offices, conference rooms	55
Shops, supermarkets, showrooms	75

4 ENVIRONMENTAL NOISE SURVEY

4.1 METHODOLOGY

During our visits to the site, noise from the existing facilities was noted to be influencing the ambient levels of the surrounding area. As a result, attended background noise measurements were carried out for short intervals during different time periods around the facility to obtain data, which provided the best representation of the ambient noise in the absence of industrial noise from the existing facilities.

It is recommended that at a more detailed noise survey is undertaken once the facilities located at the existing site have ceased operation. We would expect that once the existing facilities are vacated, the ambient noise level would decrease.

The measurement locations are shown on Appendix A. All measurements conducted were in general accordance with the Australian standard AS1055.

4.2 INSTRUMENTATION

Measurements were conducted using the following equipment:

- Larson Davis Integrating Sound Level Analyser Model LD812, Serial Number 0322.
- Bruel & Kjaer Sound Level Meter Model 2250, Serial Number
- Larson Davis Sound Level Calibrator Model CA250, Serial Number 0665.

The instruments were checked for calibration immediately before and after the measurements and there was no adverse deviation between the two. The instruments carry traceable calibration certificates. The sound analysers are Type 1 and comply with the Australian standard AS1259.2: 1990.

4.3 ROAD TRAFFIC NOISE MEASUREMENT RESULTS

Traffic noise measurements were made on site on the 2nd June and 9th June 2010 during peak traffic and night periods. Measurements were taken at two positions with 15-minute samples recorded for each measurement. Table 4 below presents a summary of the noise measurement levels for the following periods:

- Day - peak hour (8.30am to 9.30am)
- Night (1am to 2am)

Table 4: Summary of Traffic Noise measurement Levels

All Values in dBA[1]

Location	Day (Peak hour) $L_{Aeq\ (15\ mins)}$	Night $L_{Aeq\ (15\ mins)}$
George St	64[2]	42
Upward St	64	43

As the traffic is continuous throughout the measurement periods, it can be assumed that the equivalent 1-hour measurement will have the same value as the 15-minute sample.

4.4 NOISE SURVEY RESULTS

Table 5: Attended Measurement Results

Date (Time)	Location	Existing Noise levels dBA	
		LAeq (1hr)	L_{90} (1hr)
1st June (13:00 – 14:00)	1	47	44
2nd June (01:00 – 02:00)	1	40	38
9th June (00:30 – 01:30)	2	47	41
9th June (00:30 – 01:30)	3	43	36

Based on the attended measurements in Table 5, the lowest levels have been used for the relevant assessment periods to determine project specific noise levels. Table 6 presents a summary of ambient noise measurements and associated noise goals, which have been analysed in accordance with the DECCW Industrial Noise Policy. Values have been rounded to the nearest dB.

[1] Values rounded to the nearest dBA
[2] Adjusted to include façade corrections.

Table 6: Measurement Results and Noise Goals

All Values in dBA

Type	Period	Existing Noise levels dBA		ANL[3]	Operational noise goals (dBA)		
		LAeq	RBL		INP Amenity LAeq (15min)	INP Intrusiveness LAeq (period)	INP Project Specific Level
Residential	Day	47	44	60	60	49	49
	Evening[4]	43	36	45	41	38	38
	Night	43	36	45	41	38	38

Hence, noise from mechanical plant and equipment associated with the proposed development should not exceed the Project Specific Noise Level criteria specified above.

4.5 AICRAFT PASSBY NOISE LEVELS

The aircraft noise levels used for the assessment were obtained from noise levels listed in AS 2021: 2000 Tables 3.4 to 3.24, based on distances between the site and runways. In addition to this, attended measurements were taken at the development site of aircraft during take off and landing. Noise from the North-South runway was considered in the assessment. Distances between the runways/flight paths and the site were determined in accordance with AS2021: 2000 and are shown in Table 7.

Table 7: Distance Coordinates for the site - North South Runway

Parameter	Distance in metres
DS – Distance from the runway centre-line to the site	1150
DL – Distance along the runway centre-line to the building site, starting from the closer end of the runway	5100
DT – Distance along the runway centre-line to the building site, starting from the further end of the runway	9100

Corresponding aircraft noise levels, as documented in AS2021:2000 are shown in Table 8 below. These noise levels represent average maximum noise levels.

[3] Recommended Acceptable Noise Level from table 2.1 in the DECCW Industrial Noise Policy
[4] Assuming the evening has similar noise conditions to night time.

Table 8: AS2021 Aircraft noise levels L_{max} dB(A) – North-South Runway

Aircraft Type	Landing	Take-off (short range)	Take-off (Long range)
747-400	64	70	74
737-300, 737-400, Airbus A320	57	66	-
767	60	69	70

Measured aircraft noise levels, at the development site are detailed in Table 8 below. These noise levels represent average maximum noise levels.

Table 9: Measured levels L_{max} dB(A)– North-South Runway

Aircraft Type	Landing	Take-off
737-800, 737-700	62	77

Review of the tabulated levels in Table 8 and Table 9 the standard indicates that the highest L_{max} level at this site is the take-off of a Boeing 737-700/800 on the main North-South Runway at 77dB(A).

5 ACOUSTIC ASSESSMENT AND RECOMMENDATIONS

5.1 MECHANICAL SERVICES

Mechanical noise emission should be controlled in accordance with the Project Specific Noise Level criteria as shown in Table 6.

At this stage, the design and selection of the plant required to service the proposed development has not been finalised therefore the possible noise impact cannot be assessed. However, the mechanical services consultant should select plant so that the total mechanical services noise does not exceed the lowest project specific noise level at the common boundary of the receiver. The noise level of the mechanical equipment of the carpark should not exceed a level of 65 dB(A) within the carpark.

In general, based on previous experience with similar size developments, a number of amelioration measures can be implemented to control the noise emission.

Typical amelioration measures are outlined below (not necessarily limited to}:

- Location of mechanical services equipment away from noise sensitive receivers.
- Achieving no direct ‘line of sight’ path between the nearest residence and all the major mechanical equipment or exhaust fans.

- Installation of low noise condenser units.
- Installation of barriers and acoustic enclosures where the above measures do not provide sufficient attenuation.

5.2 TRAFFIC NOISE GENERATED BY THE DEVELOPMENT

To assess the increase in noise levels due to additional traffic introduced from the development, the data from Table 2 in Section 8 of the Traffic Report (by McLaren Traffic Engineering– PRELIMINARY TRAFFIC & PARKING REPORT FOR PROPOSED DEVELOPMENT MASTERPLAN OF LAND AT 22 GEORGE STREET, LEICHHARDT) has been used. In addition, the UK Dept of Environment CoRTN model (Calculation of Road Traffic Noise) was used to predict the traffic noise from the projected traffic flow. Based on the traffic report data for the peak hours, the following Table shows the generated impact on traffic flow at the proposed development.

Table 10 Generated Traffic Noise

Existing traffic volume (VPH)	Development's traffic volume (VPH)	Generated noise due to development dBA	Criteria Permitted generated noise dBA	Complies (Yes/No)
846	176	-6.82	2.0	Yes

The above calculations indicate that the generated noise levels from traffic flow at the development comply with the ECRTN criteria.

5.3 EXTERNAL NOISE INTRUSION

The road traffic noise levels measured exceeds the recommended DECCW ECRTN criteria. Therefore mitigation will be required to meet internal noise criteria for the occupants.

Considering the noise data provided in Section 4.3 and 4.5, traffic and aircraft noise, the façade glazing will required to be designed to meet the combination of traffic and aircraft noise requirements.

Based on the measured traffic and aircraft noise levels, a general assessment has been carried out using typical room sizes to determine glazing requirements as detailed in Table 11

Table 11 - Minimum Glazing Requirements[5]

Room	Min. R_w Rating for Glass Alone	Typical Glazing Thickness
Living	35	6.38mm laminated
Bedroom	36	10.38mm laminated

All Windows/doors should be well sealed (air tight) when closed with good seals such as Q-LON® acoustic seals (or equivalent) around the top and bottom sliders. Any air gap will significantly reduce the performance of the glazing in terms of the ability to attenuate noise. All of the above assumed that the glass is properly sealed airtight. Mohair type seals are not considered as acoustic seals.

5.4 DETAILED ACOUSTIC DESIGN

At the design/construction certificate stage, we would recommend that acoustic consultants be engaged to review architectural and mechanical services drawings with the developer, architect and mechanical consultant.

Acoustic consultants provide details of noise mitigating construction and services to meet project acoustic requirements for partitions, impact, riser ducts, waste pipes, hydraulics, lift noise and plant vibration isolation, including provision of relevant construction details. At the design stage, the construction detailing of junctions (e.g. wall/floor/roof/window/service penetrations) can be conducted to ensure acoustic integrity is upheld.

6 GUIDELINES FOR CONSTRUCTION NOISE

The following guidelines for The Interim Construction Noise Guideline developed by the Department of Environment and Climate Change NSW (DECC).

The Guideline presents two ways of assessing construction noise impacts – the quantitative method which is generally suited to longer-term construction, and the qualitative method, which is generally suited to short-term works such as infrastructure maintenance. Using a quantitative as described in the guideline the noise criteria as presented in Table 12 would be adopted.

[5] Glazing requirements have been calculated based on typical room volumes and glazing surface areas. These ratings should only be used as a guide, it is recommended that final glazing requirements be calculated based on architectural drawings when they are made available.

Table 12: Noise at Residences Using Quantitative Assessment

Time of day	Management level, $L_{Aeq(15min)}$	How to apply
Recommended standard hours Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays and Public Holidays	Noise affected RBL+10dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq\ (15\ min)}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences. 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended hours	Noise affected RBL+10dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2. of guideline.

7 ACOUSTIC COMPLIANCE TESTING

Upon the project completion, we recommend that compliance testing be conducted during representative periods; day-time and night-time. Noise measurements should be conducted inside the sensitive spaces (bedrooms and living rooms) in order to confirm satisfactory noise levels.

8 CONCLUSION

An acoustic assessment of the proposed development has been carried out in accordance with the guidelines set out in Leichhardt Municipal Council DCP, Department of Environment, Climate Change and Water (DECCW) noise policies and relevant Australian Standards.

Noisy activity and operating plant at the existing site prevented a long-term noise survey of the surrounding area. Therefore at this stage, only short term attended background noise measurements were carried out during different time periods. The data obtained, provided the best representation of the ambient noise in the absence of industrial noise from the existing facilities. It is recommended that at a more detailed noise survey is undertaken once the facilities located at the existing site have ceased operation. We would expect that once the existing facilities are vacated, the ambient noise level would decrease.

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Based on our assessment of external noise intrusion, acoustic glazing would be required to meet the internal noise level requirements for both traffic and aircraft noise.

Provided the noise level limits in this report are implemented, the proposed mixed-use development is expected not to adversely impact the surrounding noise sensitive receivers.

APPENDIX A: SITE PLAN

Figure A-1: – Site location and Noise Survey Locations

APPENDIX B: ARCHITECTURAL DRAWINGS

The environmental assessment carried out in this report was based on the following architectural drawings provided by Catylis Properties.

Drwg No.	Date	Description
-	-	Indicative Masterplan – Upper Ground Floor Plan

APPENDIX C: GLOSSARY OF ACOUSTIC TERMS

Decibel, dB:
Unit of acoustic measurement. Measurements of power, pressure and intensity. Expressed in dB relative to standard reference levels.

dB(A):
Unit of acoustic measurement weighted to approximate the sensitivity of human hearing to sound frequency.Sound Pressure Level, Lp (dB), of a sound:

20 times the logarithm to the base 10 of the ratio of the r.m.s. sound pressure to the reference sound pressure of 20 micro Pascals. Sound pressure level is measured using a microphone and a sound level meter, and varies with distance from the source and the environment.

Sound Power Level, LW (dB), of a source:
10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 Pico Watt. Sound power level cannot be directly measured using a microphone. Sound power level does not change with distance. The sound power level of a machine may vary depending on the actual operating load.

Ambient Sound:
Of an environment: the all-encompassing sound associated with that environment, being a composite of sounds from many sources, near and far.

Background noise:
The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed.

Percentile Level - L90, L10, etc:
A statistical measurement giving the sound pressure level which is exceeded for the given percentile of an observation period, e.g. L90 is the level which is exceeded for 90% of a measurement period. L90 is commonly referred to as the "background" sound level.

LAEQ,T:
Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

Rating Background Level – RBL:

Method for determining the existing background noise level which involves calculating the tenth percentile from the LA90 measurements. This value gives the Assessment Background Noise Level (ABL). Rating Background Level is the median of the overall ABL.

R_w – Weighted Sound Reduction Index:

A new single number quantity for airborne sound insulation rating which replaces STC. STC has been traditionally used for the classification of partitions and to define acoustical requirements in the Building Code of Australia.

For majority of partitions, the value for R_w will be similar to the value for STC. Partitions with particularly poor performance at 100Hz may have lower values for R_w than for STC. Conversely, partitions with poor performance at 4kHz may have higher values for R_w than for STC.

C_{tr} – Adaptation factor:

C_{tr} is a spectrum adaptation factor which has been chosen in the BCA to take into account lower frequency level sounds. For an airborne sound insulation, the C_{tr} factor and the R_w of building element will need to be considered. C_{tr} is a negative number which means that $R_w + C_{tr}$ of a building element will be less than the R_w of the building element. For example a wall system may have an R_w of 55 but would have an $R_w + C_{tr}$ of 50 if the C_{tr} value was –5.

Weighted Standardised Level Difference, $D_{nT,w}$:

A term used in combination with C_{tr} to describe the airborne sound insulation rating of a building element when tested on site. A higher $D_{nT,w}$ means a higher difference between the sound levels in the originating (source) room and the receiving room and thus a higher standard of insulation. The higher the $D_{ntw} + C_{tr}$ of a building element, the better the performance of the building element in terms of airborne sound insulation.

Weighted Normalised Impact Sound Level, $L'_{n,w}$:

A term used to describe the impact sound insulation of the floor. In the BCA, the use of parameter $L'_{n,w}$ plus spectrum adaptation term C_I will be used to quantify the floor impact sound insulation ratings. The lower the $L'_{n,w} + C_I$ of a floor, the better the performance of the floor in terms of impact sound insulation.

Weighted Standardised Impact Sound Level, $L_{nT,w}$:

A term used in combination with a spectrum adaptation C_I to describe the impact sound insulation rating of a floor when tested on site. Similar to the $L'_{n,w}$, it measures adequateness of a floor in controlling impact sound.