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Vipac Engineers & Scientists

Walter Projects Pty Ltd

Walter Street & Willoughby Street Planning Proposal

Noise Impact Assessment

20E-17-0030-TRP-457249-5

24 July 2018

Report Title: Noise Impact Assessment **Job Title: Walter Street & Willoughby Street Planning Proposal**	
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REVISION HISTORY		
Revision No.	Date Issued	Reason/Comments
0	24/07/2018	Initial Issue
1		
2		
KEYWORDS:		

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1 INTRODUCTION

Vipac Engineers & Scientists Ltd. (VIPAC) was commissioned by Walter Projects Pty Ltd to provide a traffic noise impact assessment on the proposed site located at 3-31 Walter Street, Willoughby. According to Willoughby Council Local Environment Plan (LEP), the site is found within R3'medium density' residential and it is proposed to change the zoning from R3 'medium density' residential to R4 'high density' residential.

The purpose of this acoustic assessment is to ensure that the proposal of changing the zoning category adheres to relevant acoustic requirements. This assessment will focus on:

- The establishment and recommendation of various acoustic criteria for the site. This includes maintaining satisfactory noise amenity for surrounding receivers and the future occupants of the development.
- Road Traffic Noise Assessment: To determine the road traffic noise impact on the proposed property and recommend exterior building components in order to satisfy indoor noise amenity. This includes investigating the likely traffic noise emitting from the site.

This assessment will consist of measuring the background noise of the site, establishing the relevant criteria, calculating various noise generating scenarios and providing recommendations to minimise the noise impact on the affected receivers, inside and surrounding the site.

1.1 SITE DETAILS

The existing site is made up eighteen (18) lots and is located within Walter Street (south) with Willoughby Road extending along the east side of the proposed development. Gore Hill Freeway is located further south from the site, with the Hallstrom Park located further east and commercial buildings further north from the site.

A noise logger to record the background and traffic noise was installed on the front yard of 9 Walter Street, Willoughby. Figure 1-1 and Figure 1-2 display the location of the proposed development and the nearby residential receivers.

Figure 1-1: Aerial Site Map

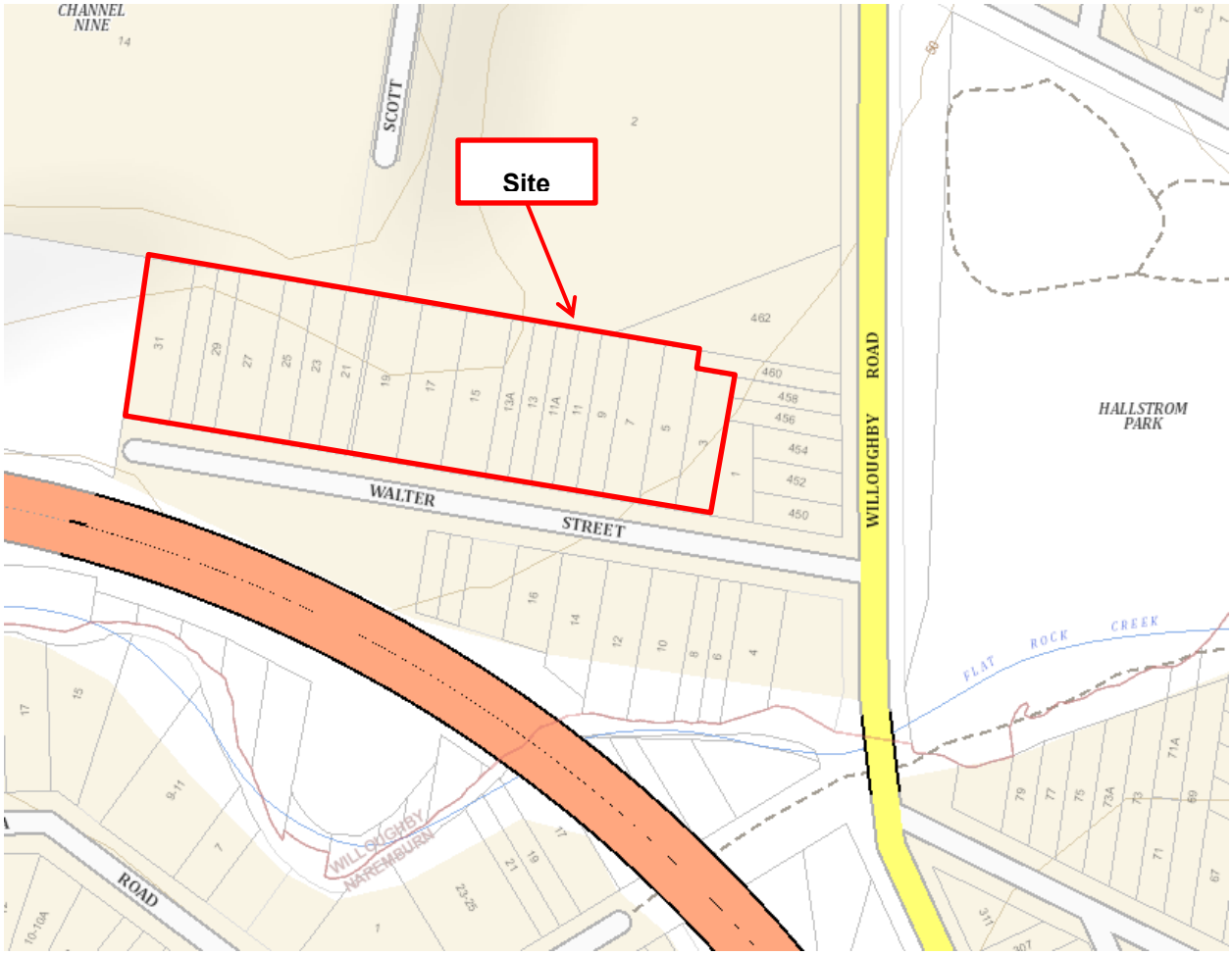

Figure 1-2: Site Map

2 NOISE MONITORING PROGRAM

2.1 NOISE MONITORING METHODOLOGY

Vipac has previously conducted an unattended measurement at this site (Vipac report ref: 20E-16-0060-TRP-455798-3). The following presents noise results extracted from the above referenced report. The measurement of the background noise was conducted between the 17th and 23rd of May 2016 using the ARL 316 Noise Logger. The noise logger was installed on the front property of 9 Walter Street, Willoughby.

The noise logger was set to record the 'A' weighted statistical sound pressure level using a 'fast response'. The unit was calibrated prior to and after the noise measurement and no significant drift was found.

The L_{A90} will be used to determine the Rating Background Level (RBL) for the acoustic assessment. This statistical measurement is a sound pressure level that is exceeded for 90% of the measurement period.

The L_{Aeq} was also collected during the monitoring period. The L_{Aeq} represents the equivalent continuous noise level — the level of noise equivalent to the energy average of noise levels occurring over a measurement period.

2.2 BACKGROUND NOISE MEASUREMENT

Table 2-1 presents a summary of the measured ambient and background noise of the site. The RBL will be used to establish the applicable noise criteria for the assessment of environmental noise emissions.

Table 2-1: Background & Ambient Noise Monitoring Results, dB(A)

Location	Period	Existing Noise Level	
		Ambient Noise (L_{Aeq})	RBL
9 Walter Street, Willoughby	Day	56	52
	Evening	56	52
	Night	52	44

2.3 ROAD TRAFFIC NOISE LEVELS

Road traffic noise values obtained from the noise monitoring are presented in the following **Table 2-2**.

Table 2-2: Summary of Road Traffic Noise measurement, dB(A)

Location	Day		Night	
	$L_{Aeq\ –\ 15hr}$	$L_{Aeq\ –\ Noisiest\ 1Hr}$	$L_{Aeq\ –\ 9hr}$	$L_{Aeq\ –\ Noisiest\ 1Hr}$
9 Walter Street, Willoughby	56	58	53	56

A short attended noise measurement was undertaken at the corner of Willoughby Road and Walter Street on 10th February 2017 to capture the traffic noise from Willoughby Road. The measurement was taken at approximately 9 meters from Willoughby Road. Table 2-3 presents the measured road traffic noise levels.

Table 2-3: Traffic Noise Results on Willoughby Road

Location	Sound Pressure Levels –dB(A)			
	L_{Aeq}	L_1	L_{10}	L_{90}
Corner of Walter Street and Willoughby Road 10/02/2017 13:51	68	74	71	62

3 NOISE CRITERIA

The following standards and guidelines are applicable to this project:

- Willoughby Development Control Plan (WDCP)
- NSW Government's Development near Rail Corridors and Busy Roads – Interim Guidelines
- AS3671 – 'Road traffic noise intrusion, Building siting and construction.'
- NSW Department of Environment, Office of Environment & Heritage (OEH) Industrial Noise Policy (INP).

The requirements of each are summarised as follows:

3.1 ROAD TRAFFIC NOISE

Section C.14 of the WDCP, states the following requirements for new dwellings near busy roads:

Development located in the vicinity of a rail corridor or busy road needs to take into consideration the provisions of the State Environmental Planning Policy (Infrastructure) 2007 and the NSW Department of Planning's Development near Rail Corridors and Busy Roads –Interim Guideline.

The Infrastructure SEPP's publication 'Development near Rail Corridors and Busy Roads – Interim guidelines' will be used to assess the proposed development. **Table 3-1** outlines the indoor noise criteria for residential dwellings and childcare centres near busy roads and rail lines.

Table 3-1 Indoor Noise Criteria

Type of occupancy	Noise Level dB(A)	Applicable time period
Sleeping areas (bedroom)	35	Night Time (10pm to 7am)
Other habitable rooms (excludes garages, bathrooms and hallways)	40	At any time
Childcare Centre	40	When in Use

The site is located approximately 30 metres from Gore Hill Freeway and 13 metres from Willoughby Road to the nearest proposed apartment. Therefore, the traffic noise impact from both roads on the proposed development will be considered to satisfy the indoor noise requirement, as outlined above.

3.2 ENVIRONMENTAL NOISE IMPACT CRITERIA

The OEH's publication 'NSW Industrial Noise Policy' was used to assess the noise emitted from the proposed site, including mechanical plant. This policy provides guidelines for these procedures and noise mitigation strategies if the level exceeds the noise threshold. The main aims for this policy are:

- To establish noise criteria that will protect the community from excessive intrusive noise and preserve amenity for specific land uses.
- To use the criteria as the basis for deriving project specific noise levels.
- To outline a range of mitigation measures that could be used to minimise noise impacts.

The Industrial Noise Policy states that an additional 5dB is to be added to the Rating Background Level to establish the noise criterion. **Table 3-2** outlines the established noise criteria for environmental noise emissions; sleep disturbance from the mechanical plant will also be assessed. This assessment consists of measuring the noise source with the L_1 noise descriptor and comparing it against a criterion of L_{90} + 15dB.

Table 3-2: Industrial Noise Policy Criteria

Location	Rating Background Level	INP Noise Criteria	Sleep Disturbance Criterion (night time period)
9 Walter Street, Willoughby	52	57	67

4 ASSUMPTIONS

4.1 TRAFFIC VOLUMES

In the absence of recent traffic volumes along Gore Hill Freeway, Vipac has utilised RMS Average Traffic Volumes 2012 to project the traffic volumes to Year 2017. The traffic volume was taken at Gore Hill Freeway (Willoughby- North of Northcote Street), RMS Station ID 33205. A 1% of background growth is assumed in projecting the traffic volumes to Year 2017.

Table 4-1 details the traffic volume for Year 2012 and Year 2017.

Table 4-1: Traffic Count on GoreHill Freeway

Description	Traffic Count - Year 2012	Projected Traffic Count – Year 2017
Light Vehicles	102,100	107,308
Heavy Vehicles	685	720
Total Vehicles	102,785	108,028

4.2 TRAFFIC NOISE LEVELS

The proposed development consists of four 8 storey apartment blocks along Walter Street (fronting Gore Hill Freeway) and one 8-storey apartment block facing Willoughby Road. Each apartment façade has different distances to the kerb of Gore Hill Freeway as the road curves away from the proposed development towards the Willoughby Road.

Consequent to the varying distance and height of the proposed apartments to the Gore Hill Freeway, a traffic noise impact calculation is performed to determine the traffic noise level at each level of each apartment block. The calculation is carried out in accordance with CoRTN guideline.

The traffic noise CoRTN calculation is carried out with the following assumptions:

- A noise barrier along Gore Hill Freeway was also noted during site inspection. As the height of the noise barrier is not known, Vipac assumed the barrier height to be approximately 4 meters;
- Traffic volumes detailed in Table 4-1 are used;
- It is assumed the $L_{A10,18hours}$ traffic count is 90% of AADT;
- Traffic speed of 80km/hr;
- 75% ground absorption;
- Ground terrain level for residential apartment blocks located at 29-31, 21-27,15-19 and 3-13A Walter Street to be the same as Gore Hill Freeway;
- The distance from the façade apartment to the centre road of Gore Hill Freeway is as follow. Refer to Figure 4-1 for the apartment location.
    - 29-31 Walter Street (Apartment 1)– approximately 45 meters
    - 21 – 27 Walter Street (Apartment 2) - approximately 50 meters
    - 15-19 Walter Street (Apartment 3) – approximately 65 meters
    - 3-13A Walter Street (Apartment 4) – approximately 80 meters

Figure 4-1: Proposed Apartment Location

The traffic noise calculation is compared with the unattended measurement results conducted in May 2016. The distance of the noise logger to the Gore Hill Freeway is similar to the façade of proposed Apartment 3 and the height of the noise logger is approximately 1.5 meters above ground level. Table 4-2 shows the results of the measured and calculated traffic noise levels

Table 4-2: Calculated and Predicted Noise Levels

Description	$L_{A10,18hour}$	
	Measured	Calculated
9 Walter Street	57.5	56.8

According to EPA requirements, the acceptable difference between the measured and calculated values is ± 2dB(A). The difference of the measured and calculated was within the acceptable levels.

The CoRTN method predicts the LA10 statistics. To determine the other required noise parameters, logging data was used to calculate differences between the noise parameters. Correction factors are presented in Table 4-3.

Table 4-3: Conversion Factors

Noise Parameter	Measured (LAeq)	Measured ($L_{A10,18hours}$)	Difference from Measured Results
$L_{Aeq\ (15hr)}$	56.2	57.5	-1.3
$L_{Aeq\ (9hr)}$	52.3	57.5	-5.2

The calculated traffic noise level at each floor and each block based on the abovementioned assumptions is shown in Table 4-4.

Table 4-4: Calculated Traffic Noise Levels

Description	Apartment 1		Apartment 2		Apartment 3		Apartment 4	
	Day	Night	Day	Night	Day	Night	Day	Night
Lower Ground Floor	-	-	-	-	-	-	56	52
Ground Floor	60	57	60	57	59	55	59	55
1st Floor	63	59	62	59	61	57	61	57
2nd Floor	66	62	65	61	64	60	64	60
3rd Floor	69	65	69	65	68	64	67	63
4th Floor to 7th Floor	72	68	72	68	71	67	70	66

4.3 LAYOUT PLAN

In the absence of the layout plan at this early stage, Vipac assumes the room volume for bedroom and living room spaces to be particularly small with the entire façade fronting the major road to be glazed. The following assumptions are made to determine the sound reduction index (R_w) required.

- Bedroom
  - Reverberation time of 0.5 seconds;
  - Room Volume of 24m^3 - 3m(W) x 3m(L) x 2.7m (H)
  - Glazed area of 8m^2 - 3m (W) x 2.7m (H)
- Living Room
  - Reverberation time of 0.7 seconds;
  - Room Volume of 68m^3 - 5m(W) x 5m(L) x 2.7m (H)
  - Glazed area of 13.5m^2 - 5m (W) x 2.7m (H)

5 TRAFFIC NOISE ASSESSMENT

This section provides acoustic recommendations to achieve the appropriate noise attenuation from the road traffic noise. The façade requirements were determined in accordance with the methodology set out in AS3671 – 'Road traffic noise intrusion, Building siting and construction.' The calculations for the recommended facade are based on various factors including, the measured traffic noise, indoor design sound level criteria, reverberation time, and the room dimensions. Only glazing is considered at this instance as it is the weakest component compared to other facades.

Table 5-1 outlines the required weighted sound reduction index (R_w) for each building to satisfy the appropriate indoor noise levels. It should be noted that only the bedroom and living room fronting Gore Hill Freeway and Willoughby Road are assessed in this instance as it is the worst affected area.

Table 5-1: Require weighted sound reduction index (R_w)

Description	Spaces	Apartment 1 & 2	Apartment 3 & 4
Lower Ground Floor	Bedroom	-	30
	Living Room	-	30
Ground Floor	Bedroom	33	32
	Living Room	30	30
1st Floor	Bedroom	35	33
	Living Room	33	32
2nd Floor	Bedroom	38	36
	Living Room	36	34
3rd Floor	Bedroom	42	39
	Living Room	39	37
4th Floor to 7th Floor	Bedroom	44	42
	Living Room	42	40

Table Notes:

1. An example of suitable construction materials to achieve the minimum required Rw for glazed window and door are listed as follows:
    - **R_W 30** -3mm thick monolithic glass
    - **R_w 32** - 6mm thick monolithic glass
    - **R_w 33 –** 6.38mm laminated glass
    - **R_w 35** – 8.52mm laminated glass
    - **R_w 36** – 10.38mm thick laminated glass
    - **R_w 38** – 13.76mm thick laminated glass
    - **R_w 42 –** double glazing consisting of 6.38mm laminated glass to each side of 12mm air gap
    - **R_w 44** - double glazing consisting of 6mm monolithic glass to 11.52mm laminated glass of 19 mm air gap
2. All windows/doors should be well sealed (air tight) when closed with good acoustic seals around the top and bottom sliders and also with other sliding doors and fixed section. Any air gap will significantly reduce the performance of the glazing in terms of the ability to attenuate noise. All of the above assumes that the glass will be properly sealed airtight. Note that standard (mohair) seals do not have noise reduction properties. Raven seals and Schlegel seals are example of acoustics seals.
3. Equivalent constructions that achieve the minimum required Rw are acceptable. The manufacturer information of the equivalent construction should be forwarded to Vipac for review and approval.

The internal noise levels at different spaces can be achieved, provided the weighted sound reduction index (Rw) detailed in Table 5-1 are installed. Pending on the design details, it is our expectation that, in the worst case, glazing requirement would not exceed the weighted sound reduction index (Rw) detailed in Table 5-1.

Notwithstanding the glazing requirement, the external wall should be constructed with minimum R_w+C_{tr} of 45. A typical wall construction that exceeds the established R_w+C_{tr} value may have the following construction:

- 75mm concrete (97.5 kg/m^2)
- 76mm steel stud with 50mm insulation 10kg/m^3
- 13mm standard plasterboard internally

An acoustically insulated building must be kept virtually airtight to exclude external noise. Therefore mechanical ventilation or air conditioning is needed to provide fresh air and to control odours. Requirements for acceptable indoor-air quality are given in AS 1668.2. Recommended design sound levels for different area of occupancy in buildings are given in AS 2107.

Notes:

1. **The requirement of AS 1668 should be viewed as applying also to Class 1 building as defined by the Building Code of Australia.**
2. **In domestic situations, the minimum requirements set out in AS 1668 are not always adequate to remove kitchen cooking odours or to control damping in older residences.**

6 CONCLUSION

An acoustic assessment of the proposed multi-residential development has been carried out in accordance with the relevant Willoughby Council Development Control Plan (WDCP), Australian Standards and other relevant noise guidelines, as detailed in **Section 3.**

Provided the recommendations in this report are implemented, the multi-residential development located at 3-31 Walter Street, Willoughby is anticipated to comply with the internal noise levels criteria. Notwithstanding the noise compliance, a detailed noise assessment should be carried once the design drawings is finalised.

Appendix A GLOSSARY OF 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 - L_{90}, L_{10}, 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. L_{90} is commonly referred to as the "background" sound level.

$L_{AEQ,T}$:

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.

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