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Vipac Engineers & Scientists

Pace Development Group Pty Ltd

160 Whitehorse Road Stage 2 - Acoustics Town Planning

Acoustic Town Planning Report

PLANNING AND ENVIRONMENT ACT 1987
WHITEHORSE PLANNING SCHEME

31/07/2019

ADVERTISED MATERIAL

CITY OF WHITEHORSE

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1 INTRODUCTION

Vipac Engineers & Scientists Ltd (ViPAC) has been engaged by *Pace Development Group Pty Ltd* to provide an Acoustic Report for Stage 2 of Town Planning for the proposed development at **160 Whitehorse Road, Blackburn, Victoria**.

2 REFERENCES

- *State Environment Protection Policy (Control of Noise from Industry, Commerce and Trade) No. N-1 (SEPP N-1)*, Environment Protection Authority, Victoria, No. S31, 16/5/1989 Gazette 15/6/1989; as varied 15/9/1992, No. G37, gazette 23/9/1992; as varied 31/10/2001, No. S183, Gazette 31/10/2001
- *AS/NZS 2107:2016 Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors*
- *Better Apartments Design Standards* – Victoria State Government
- *Noise Control Guidelines – Publication 1254*, Environment Protection Authority, Victoria
- *World Health Organisation – Guidelines for Community Noise, MNB-1Q DOC2, April 1999*
- *160 Whitehorse Rd, Blackburn, Town Planning Submission – Stage 02, 08/02/2019*

Acoustic terminology is given in Appendix A.

3 DRAWINGS

Table 3-1: Development drawings

Drawing Title	Drawing Number	Revision	Date
Stage 02 Basement 5	TP-03	A	08/02/2019
Stage 02 Basement 4	TP-04	A	08/02/2019
Stage 02 Basement 3	TP-05	A	08/02/2019
Stage 02 Basement 2	TP-06	A	08/02/2019
Stage 02 Basement 1	TP-07	A	08/02/2019
Ground Floor	TP-08	A	08/02/2019
Stage 02 Level 1	TP-09	A	08/02/2019
Stage 02 Level 2	TP-10	A	08/02/2019
Stage 02 Level 3	TP-11	A	08/02/2019
Stage 02 Level 4	TP-12	A	08/02/2019
Stage 02 Level 5	TP-13	A	08/02/2019
Stage 02 Level 6	TP-14	A	08/02/2019
Stage 02 Level 7	TP-15	A	08/02/2019
Stage 02 Parapet	TP-16	A	08/02/2019

4 DEVELOPMENT DESCRIPTION

Stage 2 of the proposed development at 160 Whitehorse Road, Blackburn encompasses a building that contains office space, an ALDI Supermarket, retail stores and residential apartments. Floors contain the following:

- Basement 2,3,4 and 5 contain car parks
- Basement 1 contains an ALDI Supermarket and car parks
- Ground floor consists of retail stores, office spaces (approximately 12,000m² in total) and a potential sub tenancy
- Level 1 to 5 consists of apartments and office space
- Level 6 consists of apartments only

Figure 4-1 shows the planned site layout and Figure 4-2 shows the current site location.



Figure 4-1: Site Plan

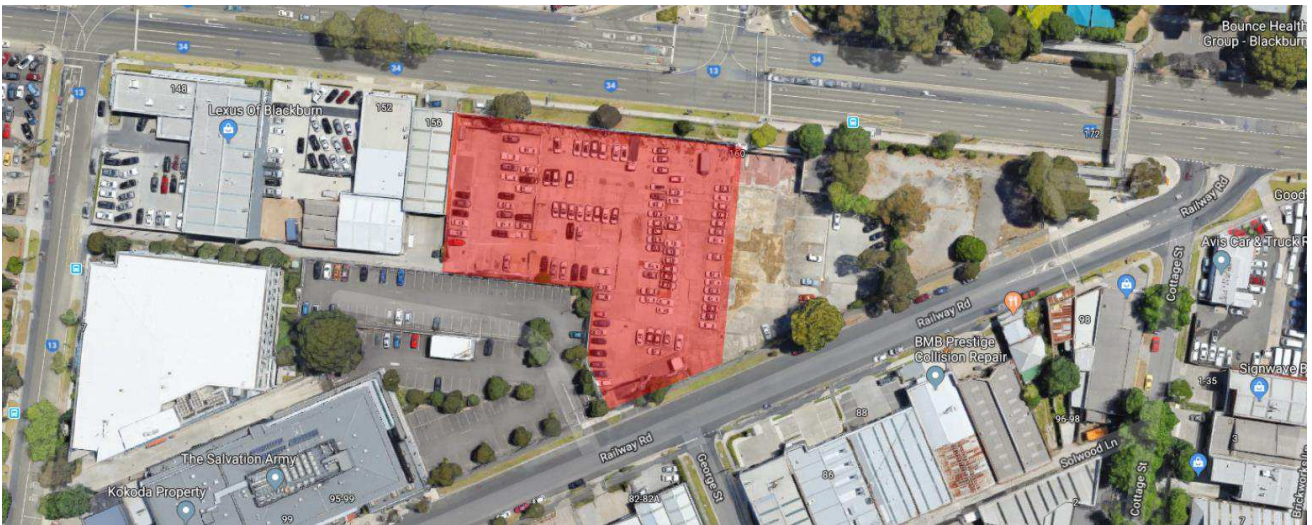


Figure 4-2: Site location

5 NOISE MEASUREMENTS

Noise measurements for background noise and road traffic noise were made on the 12th of November 2018 in accordance with *SEPP N-1* during the Day (0700 – 1800). To obtain the Evening (1800 – 2200) and Night (2200 – 0700) periods two loggers were installed from the 5th to the 7th of November 2018. Weather conditions at the site during measurements were dry with light winds. A calibration check of the sound level meter was performed before and after each measurement set, no significant drift was noted. Figure 5-1 shows the locations for noise measurements. All measurement locations were sufficiently distant from reflective surfaces such that nearfield level corrections were not required.

Instrumentation used for the noise measurements is presented in Appendix B.

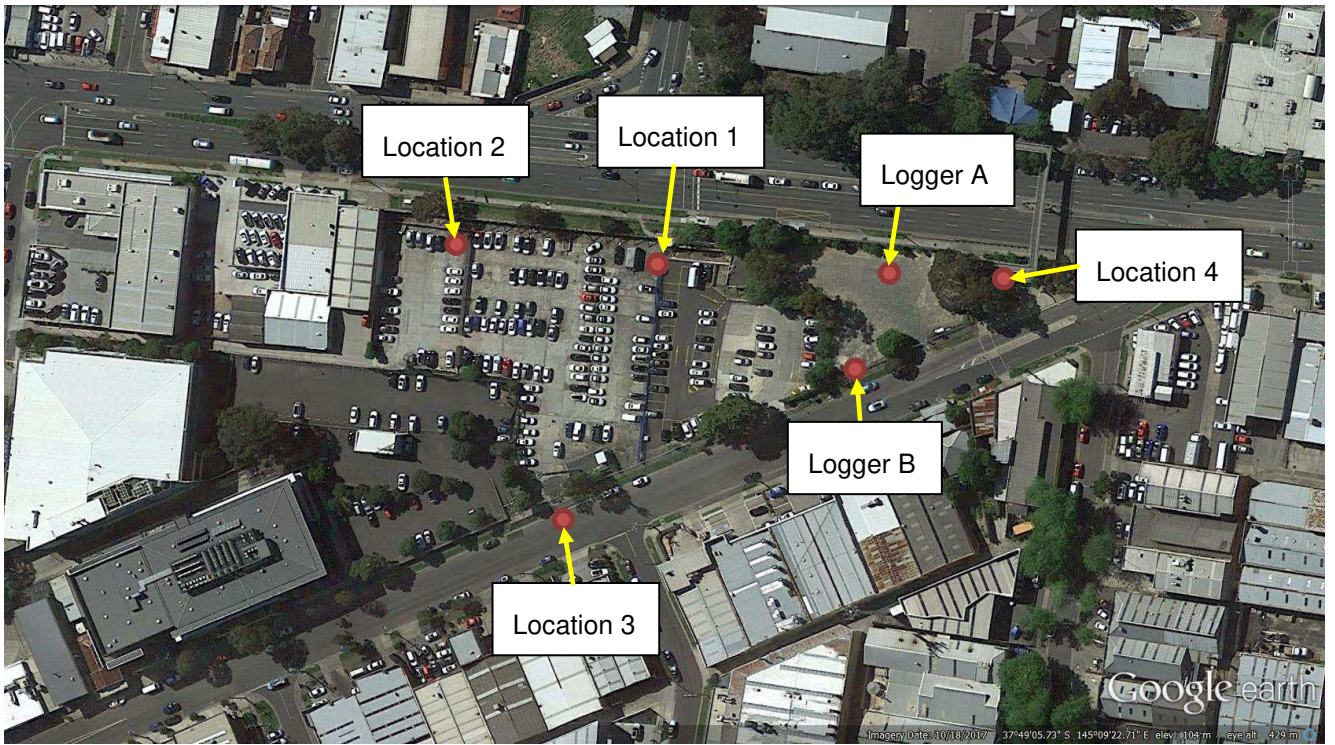


Figure 5-1: Measurement locations

6 ACOUSTIC DESIGN CRITERIA

6.1 RECOMMENDED INTERIOR NOISE LEVELS

Australia and New Zealand standard *AS/NZS 2107* recommends design criteria for conditions affecting the acoustic environment within occupied spaces. The Victorian *Better Apartments Design Standards* also provide acoustic design criteria for apartments. Design sound pressure levels (SPL) for residential and commercial occupancies are given in Table 6-1. The selected design levels for this project are based on *Better Apartment Design Standards*. These values are applicable to steady state or quasi-steady state sounds and are the reference criteria for selection and assessment of building components that exclude noise both external to the building (e.g., traffic noise, industrial noise), and within the building (e.g., building services noise).

Table 6-1: Design sound levels for background noise, AS/NZS 2107 & Better Apartments Design Standards

Type of Occupancy	Design Sound Level Range, L_{Aeq} [dBA]	
	AS/NZS 2107	Better Apartments
Public Buildings		
Supermarkets	< 55	-
Small retail stores (general)	< 50	-
General office areas	40 to 45	-
Apartments (in inner city areas or entertainment districts or near major roads)		
Living areas	-	$L_{Aeq,16h(0600-2200)}$ 40
Sleeping areas (night time)	-	$L_{Aeq,8h(2200-0600)}$ 35
Apartment common areas (e.g. foyer, lift lobby)	45 to 50	-

6.1 NOISE EMISSION FROM THE DEVELOPMENT

6.1.1 PLANT NOISE AT RESIDENTIAL PROPERTIES

Mechanical plant noise must be controlled at any affected residential properties in accordance with State Environmental Noise Policy *SEPP N-1*. Affected residential properties include apartments within the development, and residences in the vicinity of the development. According to the *SEPP N-1* policy environmental noise limits are determined based on a two part procedure – determination of the existing background noise levels (percentile sound pressure level L_{A90}) and zoning levels (obtained from the town plan scheme map). Table 6-2 presents the SEPP N-1 limits calculated from the averaged background measurements taken during each period.

Table 6-2: SEPP N-1 limits for the development and surrounding residences [dBA]

SEPP N-1 Period	Day of week/Time period		Zoning level	Background level, L_{90}	Noise limit
Day	Monday – Friday	0700hrs – 1800hrs	59	62	59
	Saturday	0700hrs – 1300hrs			
Evening	Monday – Friday	1800hrs – 2200hrs	53	56	53
	Saturday	1300hrs – 2200hrs			
	Sunday & public holidays	0700hrs – 2200hrs			
Night	Monday – Sunday	2200hrs – 0700hrs	48	46	48

Note: the developer will need to undertake a formal acoustic review by a suitably qualified engineer for all mechanical plant and equipment used in the development to ensure it complies with EPA guidelines.

6.1.2 PLANT SERVICING INDIVIDUAL DWELLINGS

Noise emissions from any fixed domestic plant such as air conditioners shall be controlled to comply with EPA Noise Control Guidelines 1254. Noise from any fixed domestic plant must not be audible within a habitable room of any other residence (regardless of whether any door or window giving access to the room is open) during prohibited hours prescribed by the Environment Protection (Residential Noise) Regulations 2008.

Table 6-3: EPA 1254 conditions for domestic plant

Period	Hours	Criteria
Day/ Evening	7am - 10pm Monday – Friday 9am - 10pm Weekends & public holidays	Background $L_{90} + 5$ dB(A)
Night	10pm - 7am Monday – Friday 10pm - 9am Weekends & public holidays	Inaudible within a habitable room of any other residence

The roof of the substation located on the ground floor should be constructed to achieve $R_w + C_{tr} \geq 60$ dB. Once relevant data is available a SEPP N-1 assessment should be conducted for the office space above to assess flanking noise through the ventilation on the façade wall of the substation room.

6.1.3 PLANT NOISE IMPACT ON COMMUNAL AREAS

There are no standards or policies for the limitations of noise in a communal amenity area and therefore the common noise requirement for the communal areas in this project is adopted from the *World Health Organisation – Guidelines for Community Noise*. **The noise levels from the plant shall not exceed 50 - 55 dBA in any communal areas on the development.**

6.1.4 PLANT NOISE WITHIN ANY AFFECTED COMMERCIAL PROPERTIES

The noise emissions from plants into the nearby commercial buildings need to be assessed according to the requirements of the acoustic environment inside the affected buildings. General noise limits inside a commercial building (general offices) is 40 dBA according to AS/NZS 2107:2000 and **therefore the noise level from the plants shall not exceed 50 dBA on the façade for an operable windows and 60 dBA for fixed windows.**

6.1.5 CARPARK ACCESS GATES

In order to meet the requirement of noise levels no greater than 60 dBA L_{Amax} outside operable windows (as described in (Section 6.1.4), quiet operation models shall be selected with maximum noise levels produced during operation of the gate, as measured at 3 meters from the gate, not exceeding 60 dBA L_{Amax} . Gates should be fixed with vibrations mounts which are recommended by the product supplier and installed correctly. It is recommended that selected gate models be reassessed as relevant details become available at later stages of the project to ensure compliance.

6.1.6 ALDI SUPERMARKET AND RETAIL STORE

Vipac recommends that the ALDI Supermarket and Retail Stores are designed and constructed using noise proofing and vibration dampening techniques to ensure that noise and vibration emitted as a result of the Store’s business operations (which include extended hours unloading and store stocking) will not impact other areas of the development. Any services penetrating the ALDI Supermarket and Retail Stores tenancy building envelope must be insulated to eliminate transmission of airborne and impact generated sound from within the tenancy to other parts of the development to the relevant Australian Standards.

Mechanical services and plant noise associated with the use of the ALDI Supermarket and Retail Stores are required to comply with the *SEPP N-1* noise limits specified in Table 6-2 at the nearest affected residences. This includes noise from trucks reversing into the ALDI loading bay found on Basement Level 1. Detailed assessment of these items will be required at detailed design phase.

6.2 DELIVERY TRUCKS/LOADING BAYS

In Victoria EPA Publication 1254 - *Noise control guidelines* the noise control guidelines for the deliveries to shops are provided and they are summarised below. These guidelines should be incorporated into the permit condition for delivery trucks/loading bays for this development.

Table 6-4 presents the schedule for deliveries at shops.

Table 6-4: Schedule for deliveries at shops, including truck-mounted refrigeration units

Monday to Saturday	7 am — 10 pm
Sundays and public holidays	9 am — 10 pm

Note: All ancillary motors or trucks should be turned off whilst making the delivery.

For deliveries outside the hours contained in the table above the noise from deliveries should be inaudible in a habitable room of any residential properties regardless of whether any door or window giving access to the room is open. The noise mitigation shall be assessed at the detail design stage if required.

6.3 GARBAGE TRUCKS

In Victoria EPA Publication 1254 - *Noise control guidelines* the noise control guidelines for the industrial waste collection are provided and they are summarised below. These guidelines should be incorporated into the permit condition for garbage trucks operating for this development.

Table 6-5 presents the schedule for garbage trucks at shops.

Table 6-5: Schedule for garbage trucks at shops

One collection per week	
Monday to Saturday	6:30 am — 8 pm
Sundays and public holidays	9 am — 8 pm
Two or more collections per week	
Monday to Saturday	7 am — 8 pm
Sundays and public holidays	9 am — 8 pm

In addition, the following attention should be paid.

- Refuse bins should be located at sites that provide minimal annoyance to residential premises.
- Compaction should be carried out while the vehicle is moving.
- Bottles should not be broken up at collection site.
- Noisy verbal communication between operators should be avoided where possible.

6.4 NCC REQUIREMENTS FOR INTERNAL PARTITIONS

The *National Construction Code* (or *NCC*, previously known as *Building Code of Australia*) gives the requirements for sound insulation between dwellings in multi-residential buildings (Class 2).

6.4.1 NCC REQUIREMENTS FOR INTER-TENANCY WALLS

The *NCC* performance requirements and deemed-to-satisfy provisions for walls are summarised in Table 6-6. This table also recalls the *NCC* requirements for doors from units to common areas (e.g. apartment entry doors).

Required airborne sound insulation performance is expressed in terms of the weighted standardized level difference $[D_{nT,w}]$ and the weighted standardized level difference with spectrum adaptation term $[D_{nT,w} + C_{tr}]$. These rating indices are determined in accordance with *AS/NZS 1276.1* or *ISO 717.1* using results from in-situ measurements.

Deemed-to-satisfy provisions are expressed in terms of the weighted sound reduction index R_w and the weighted sound reduction index with spectrum adaptation term $[R_w + C_{tr}]$. These rating indices are determined in accordance with *AS/NZS 1276.1* or *ISO 717.1* using results from laboratory measurements.

Table 6-6: *NCC Requirements for Airborne Sound Insulation of Walls and Doors*

Partition	In-situ performance requirement	Deemed to satisfy provision
Wall separating two sole occupancy units	$D_{nT,w} + C_{tr} \geq 45$ dB	$R_w + C_{tr} \geq 50$ dB
Wall separating a unit from common areas or buildings of other classification	$D_{nT,w} \geq 45$ dB	$R_w \geq 50$ dB
Door assembly in wall separating a unit from a common area	$D_{nT,w} \geq 25$ dB	$R_w \geq 30$ dB

Certain walls require impact sound insulation rating and these must be of a discontinuous construction. This is summarised in Table 6-7.

Table 6-7: *NCC Requirements for Impact Sound Insulation of Walls*

Partition	Discontinuous construction
Wall separating a wet area ¹ in one unit from a habitable room (other than kitchen) in an adjacent unit	<ul style="list-style-type: none"> for masonry wall, where wall ties are required to connect leaves, wall ties are of the resilient type for walls other than masonry, there must be no contact between the leaves except at the periphery; a 20 mm discontinuity in the construction is required
Wall separating a unit from a plant room or a lift shaft	

Note: Because they share the same space as living room areas, **open kitchen** areas are considered habitable rooms when they are receiving rooms and wet areas when they are source rooms.

¹ a bathroom, a sanitary compartment, a laundry or a kitchen

6.4.2 NCC REQUIREMENTS FOR FLOORS

The NCC performance requirements and deemed-to-satisfy provisions for floors are summarised in Table 6-8.

Required airborne sound insulation performance of floors and deemed to satisfy provisions are expressed in terms of $[D_{nT,w}+C_{tr}]$ and $[R_w+C_{tr}]$, respectively.

Required impact sound insulation performance of floors is expressed in terms of the weighted standardised impact sound level $[L_{nT,w}]$. This rating index is determined in accordance with *AS ISO 717.2-2004* using results from in-situ measurements.

Deemed-to satisfy provisions are expressed in terms of the weighted normalised impact sound level $[L_{n,w}]$. This rating index is determined in accordance with *AS ISO 717.2-2004* using results from laboratory measurements.

An acoustic underlay should be added to roof top areas directly above apartments to reduce impact noise below and achieve an $L_{nT,w} \leq 50$ dB.

Table 6-8: NCC Requirements for Airborne and Impact Sound Insulation by Floors

Insulation Type	In-situ performance requirement	Deemed to satisfy provision
Airborne sound insulation of floors	$D_{nT,w}+C_{tr} \geq 45$ dB	$R_w +C_{tr} \geq 50$ dB
Impact sound insulation of floors	$L_{nT,w} \leq 62$ dB	$L_{n,w} \leq 62$ dB

6.4.3 NCC REQUIREMENTS FOR SERVICES DUCTS AND PIPES

Ducts and pipes for storm water, soil waste or water supply that serve or pass through more than one unit must be contained by a construction providing sound insulation. The NCC criterion for airborne sound insulation performance of this partition is recalled in Table 6-9.

Table 6-9: NCC Requirements for Sound Insulation of Ducts and Pipes

Room	Required Airborne Sound Insulation Rating
Habitable room (other than kitchen)	$[R_w+C_{tr}] \geq 40$ dB
Kitchen or non-habitable room	$[R_w+C_{tr}] \geq 25$ dB

Note: Because they share the same space as living room areas, **open kitchen** areas are considered habitable rooms when they are receiving rooms and wet areas when they are source rooms.

7 BUILDING FAÇADE GLAZING RECOMMENDATIONS

The façade glazing for habitable rooms, retail stores, office space and the ALDI Supermarket will be designed based on measured traffic noise and a truck reversing noise spectrum. For habitable rooms the limits will be **L_{Aeq,8hr} = 35 dBA for bedrooms** and **L_{Aeq,16hr} = 40 dBA living areas**. For Office Space, the AS/NZS 2107 Standards recommends **L_{Aeq} = 40 to 45 dB(A)**, **L_{Aeq} = 50 dBA** for Small Retail Stores and **L_{Aeq} = 55 dBA** for Supermarkets. The spectrum measured during peak traffic flow conditions will be used to achieve noise limits listed in Table 6-1.

The following room finishes are assumed for glazing designs.

- Walls and ceiling: plasterboard
- Floor: carpet for bedrooms, office space and potential sub tenancy, timber floor for living areas and concrete for supermarket and shops

Table 7-1: Minimum transmission loss for glazing

Glazing No.	Room Type	Octave band central frequency (Hz)							Rw
		63	125	250	500	1000	2000	4000	
Aldi Supermarket Basement 1									
1	Aldi	21	24	26	31	34	29	33	31
Office, Sub Tenancy and Retail Stores Ground Floor									
1	Office	21	24	26	31	34	29	33	31
5	Potential Sub Tenancy	25	28	30	36	41	41	46	39
1	Retail G12,G14,G15,G16,G17	21	24	26	31	34	29	33	31
2	Retail G13	22	25	29	34	34	33	40	33
Apartments facing Whitehorse Road (Floors 1 to 4)									
8	Bed Room	27	30	30	39	44	45	55	42
5	Living Room	25	28	30	36	41	41	46	39
Apartments facing Railway Road (Floors 1 to 4)									
7	Bed Room	26	27	26	37	44	46	50	41
5	Living Room	25	28	30	36	41	41	46	39
Apartments facing inside (Floors 1 to 4)									
6	Bed Room	25	26	26	35	43	44	48	39
4	Living Room	25	28	27	34	41	39	47	38
Office Space (Floors 1 to 4)									
3	Office side facing Whitehorse Road	23	26	23	32	40	38	45	35
1	Office side facing	21	24	26	31	34	29	33	31

	Railway Road								
Office Space (5th Floor)									
1	Office	21	24	26	31	34	29	33	31
Apartments facing Whitehorse Road (Floors 5 to 6)									
5	Bed Room	25	28	30	36	41	41	46	39
4	Living Room	25	28	27	34	41	39	47	38
Apartments facing Railway Road and Inside (Floors 5 to 6)									
4	Bed Room	25	28	27	34	41	39	47	38
1	Living Room	21	24	26	31	34	29	33	31

Operable windows must be fitted with acoustic seals to ensure the acoustic performance of the glazing is not compromised. In addition to the provision of suitable glazing requirements, minimum R_w ratings for window systems are provided to ensure the performance of the glazing will not be compromised by frames and seals.

Ventilation ducts on facade need to be assessed during the design and development stage to ensure internal requirements are achieved.

For living room areas where operable windows are desired, awning type windows are preferred in terms of achieving an effective acoustic seal. However, sliding windows are acceptable provided they include tight fitting seals. Care should be taken to ensure that all external sliding glass doors are proprietary acoustic door sets with integral frame and seals.

It should be noted that the minimum glazing requirements specified in this report are based on assumed glazing and room dimensions. If the ratio glazing area to room area differs significantly from the assumed values in Table 7-1, further assessment of glazing will be required.

Table 7-2 - Glazing Numbers Spectrum

Glazing reference No.	Octave band central frequency (Hz)							R_w
	63	125	250	500	1000	2000	4000	
1	21	24	26	31	34	29	33	31
2	22	25	29	34	34	33	40	33
3	23	26	23	32	40	38	45	35
4	25	28	27	34	41	39	47	38
5	25	28	30	36	41	41	46	39
6	25	26	26	35	43	44	48	39
7	26	27	26	37	44	46	50	41
8	27	30	30	39	44	45	55	42

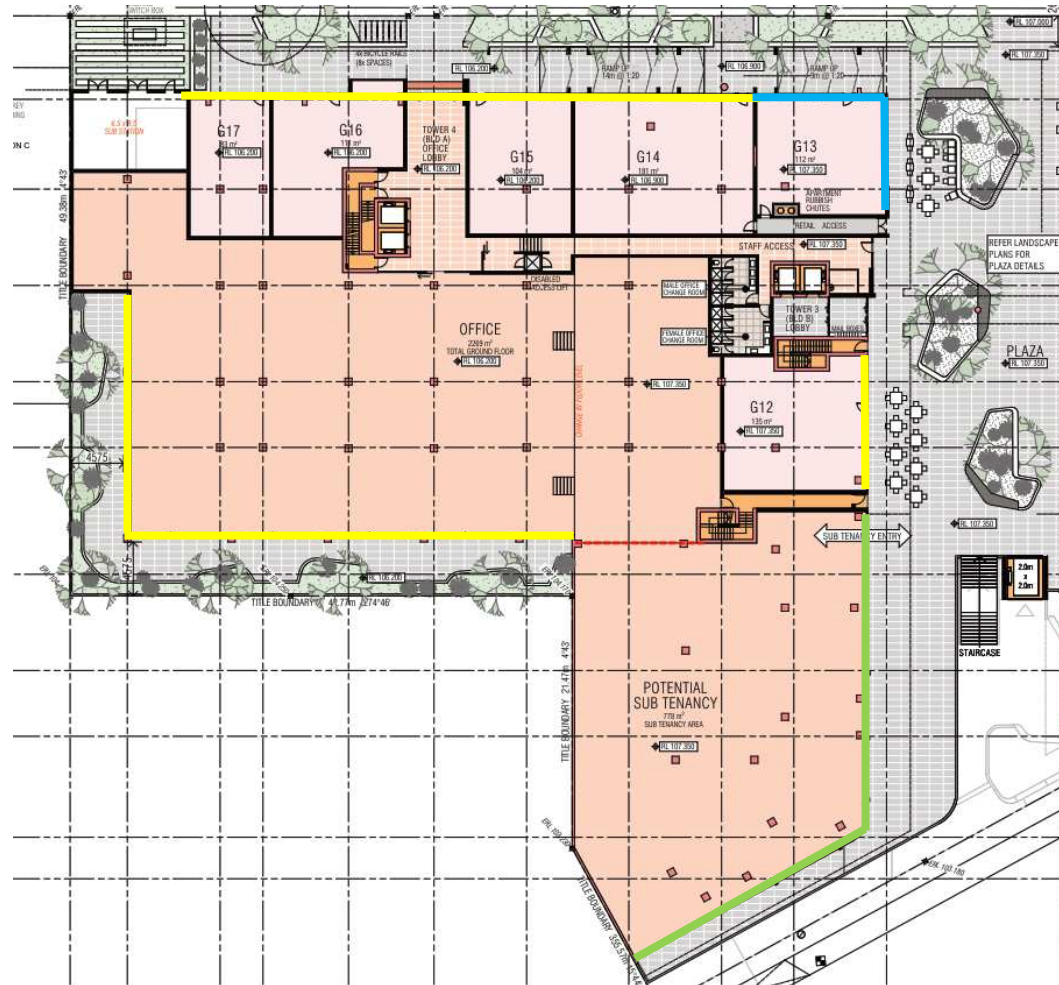


Figure 7-1: Glazing mark-up for ground floor

Glazing No. 1	
Glazing No. 2	
Glazing No. 3	
Glazing No. 4	
Glazing No. 5	
Glazing No. 6	
Glazing No. 7	
Glazing No. 8	

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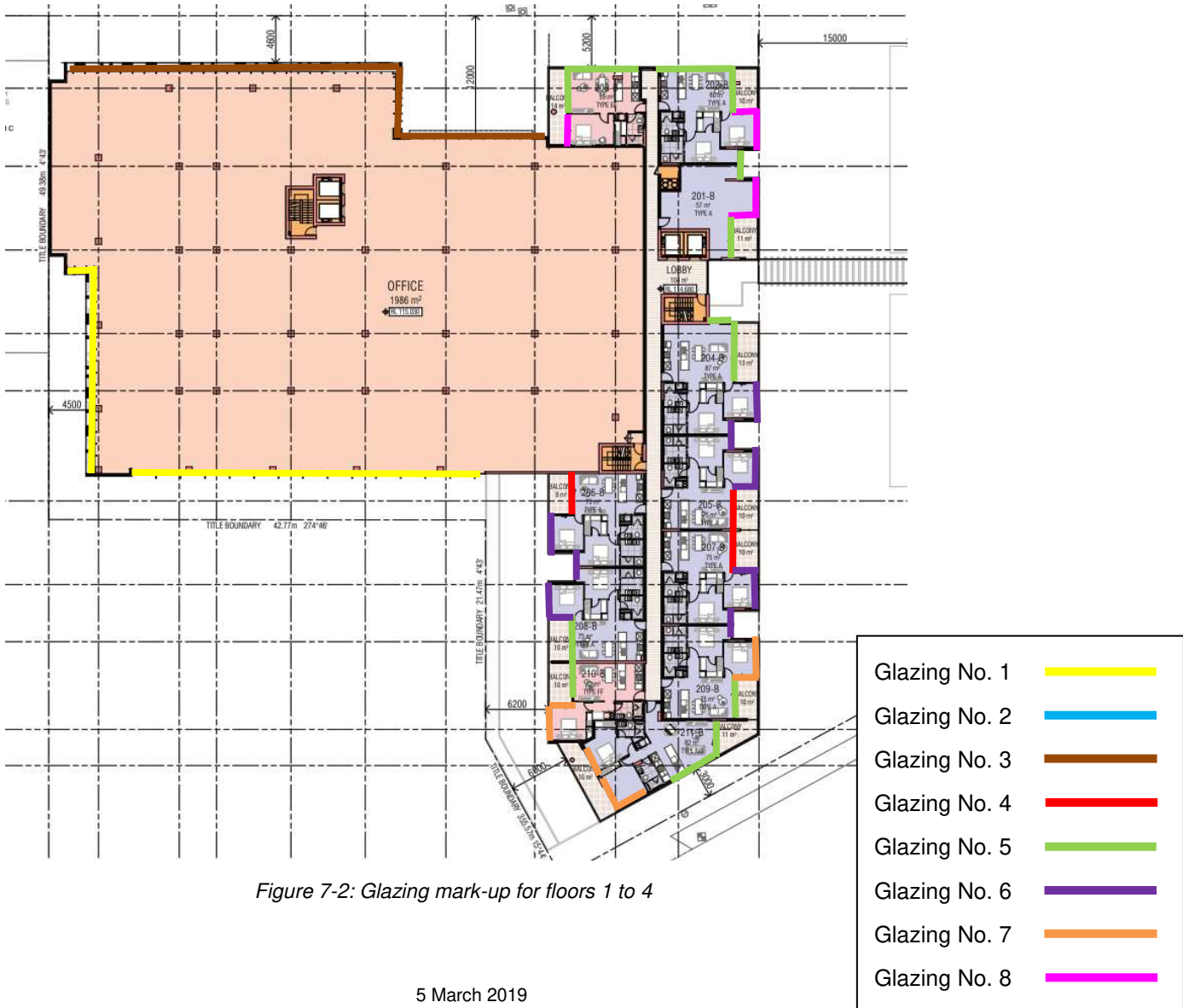


Figure 7-2: Glazing mark-up for floors 1 to 4

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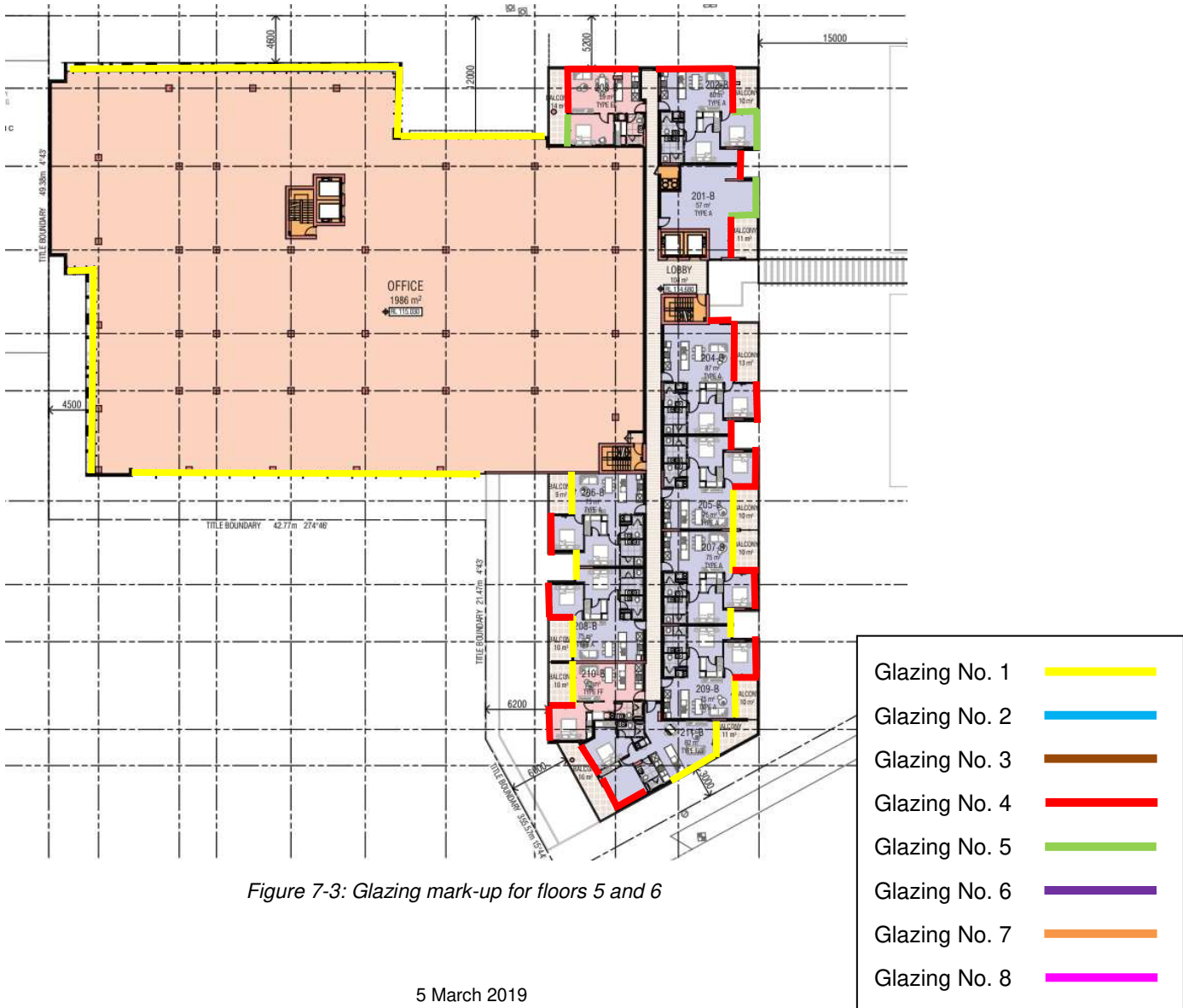


Figure 7-3: Glazing mark-up for floors 5 and 6

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8 CONCLUSION

With the recommended noise attenuation measures, the internal spaces within the development should meet the recommended noise criteria. With appropriate noise attenuation, the development should not produce noise that exceeds the recommended criteria at surrounding properties.

Vipac Engineers and Scientists Ltd (Vipac) have been engaged by *Pace Development Group* to provide acoustic consulting services for the development at 160 Whitehorse Road, Blackburn Stage 2. The assessments contained within this document follow the methodology and criteria specified in relevant Australian standards and guidelines. If the recommendations in this report are followed the development is predicted to comply with the provided assessment criteria.

Appendix A GLOSSARY

Term	Definition
dB	Decibel Magnitude of the sound pressure level.
dBA	A-weighted Decibels. The 'A'-weighting adjusts the measured levels to better reflect the sensitivity of the human ear to different frequencies.
L_{Aeq,T}	The A-weighted continuous equivalent sound pressure level. It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.
L_{A90,T}	The A-weighted sound pressure level exceeded for 90% of the measurement period. L _{A90} is used in Victoria as the descriptor for background noise level.
Sound pressure level	The ratio in decibels (dB) of the sound pressure at a given receiver position to a reference pressure of $2 \cdot 10^{-5}$ Pa. The sound pressure level depends, amongst other parameters, on the sound power level of the source and the distance separating the source and the receiver.



Appendix B INSTRUMENTATION

Instrument	Model/Type	Serial No.	Next Calibration
Bruel & Kjaer sound level meter (type 1)	2250	2690200	16/01/2020
Bruel & Kjaer calibrator	4231	1139057	25/07/2019
01dB Metravib Logger	DUO	10272	24/08/2019
01dB Metravib Logger	DUO	10292	24/08/2019

End of Report