HERRING STORER ACOUSTICS

EGLINTON WOOLWORTHS EVELOPMENT

DEVELOPMENT APPLICATION

ENVIRONMENTAL ACOUSTIC ASSESSMENT

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CONTENTS

APPENDICES

1. INTRODUCTION

Herring Storer Acoustics were commissioned by the Woolworths Group to undertake an acoustic assessment of noise emissions associated with the proposed Woolworths to be located on the corner of Imperial Entrance and Marmion Avenue.

The objective of this study was to undertake an assessment of noise received at the noise sensitive premises surrounding the proposed development for compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997*. The noise sources assessed include :

- Mechanical services;
- Delivery vehicles; and
- Alfresco areas.

The site plan is attached in Appendix A.

2. SUMMARY

The mechanical services would be located on the roof and are either within plant spaces or screened from the neighbouring residences. The preliminary assessment of the mechanical services shows that noise emissions would comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times. The screening requirements would be determined during the design of the project.

Noise emissions from large truck deliveries within the proposed loading dock have been calculated to comply with the relevant assigned noise levels for all time periods. Given the location and nature of the closest neighbouring premises. Additionally, noise received at the neighbouring residences from small rigid truck deliveries (i.e. bakery truck deliveries) have also been calculated to comply at all times, thus deliveries not be restricted.

Noise emissions from the alfresco areas associated with the food and beverage tenancies would, at the neighbouring residences, also comply with the Regulatory requirements at all times, without the need for any mitigation. However, it is noted that if any music played in the alfresco area it should be limited to background music.

3. CRITERIA

3.1 ENVIRONMENTAL PROTECTION (NOISE) REGULATIONS 1997

The *Environmental Protection (Noise) Regulations 1997* stipulate the allowable noise levels at any noise sensitive premises from other premises. For noise sensitive premises, the allowable noise level is determined by the calculation of an influencing factor, which is added to the baseline criteria set out in Table 1 of the Regulations. The baseline assigned noise levels are listed in Table 3.1.

TABLE 3.1 – ASSIGNED NOISE LEVELS

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises within 15 metres of a dwelling (Highly Sensitive Areas)	0700 - 1900 hours Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days (Evening)	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	35 + IF	45 + IF	55 + IF
Commercial Premises	All hours	60	75	80

Note: The L_{A10} noise level is the noise that is exceeded for 10% of the time.
The L_{A1} noise level is the noise that is exceeded for 1% of the time.
The L_{Amax} noise level is the maximum noise level recorded.

It is a requirement that noise from the site be free of annoying characteristics (tonality, modulation and impulsiveness) at other premises, defined below as per Regulation 9.

"impulsiveness" means a variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax\ Slow}$ is more than 15dB when determined for a single representative event;

"modulation" means a variation in the emission of noise that –

(a) is more than 3dB $L_{A\ Fast}$ or is more than 3dB $L_{A\ Fast}$ in any one-third octave band;
(b) is present for more at least 10% of the representative assessment period; and
(c) is regular, cyclic and audible;

"tonality" means the presence in the noise emission of tonal characteristics where the difference between –

(a) the A-weighted sound pressure level in any one-third octave band; and
(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

Where the above characteristics are present and cannot be practicably removed, the following adjustments are made to the measured or predicted level at other premises.

TABLE 3.2 – ADJUSTMENTS FOR ANNOYING CHARACTERISTICS

Where tonality is present	Where modulation is present	Where impulsiveness is present
+ 5 dB	+ 5 dB	+ 10 dB

For this development, the closest residential premises of concern are located, as shown on Figure 3.1 below.

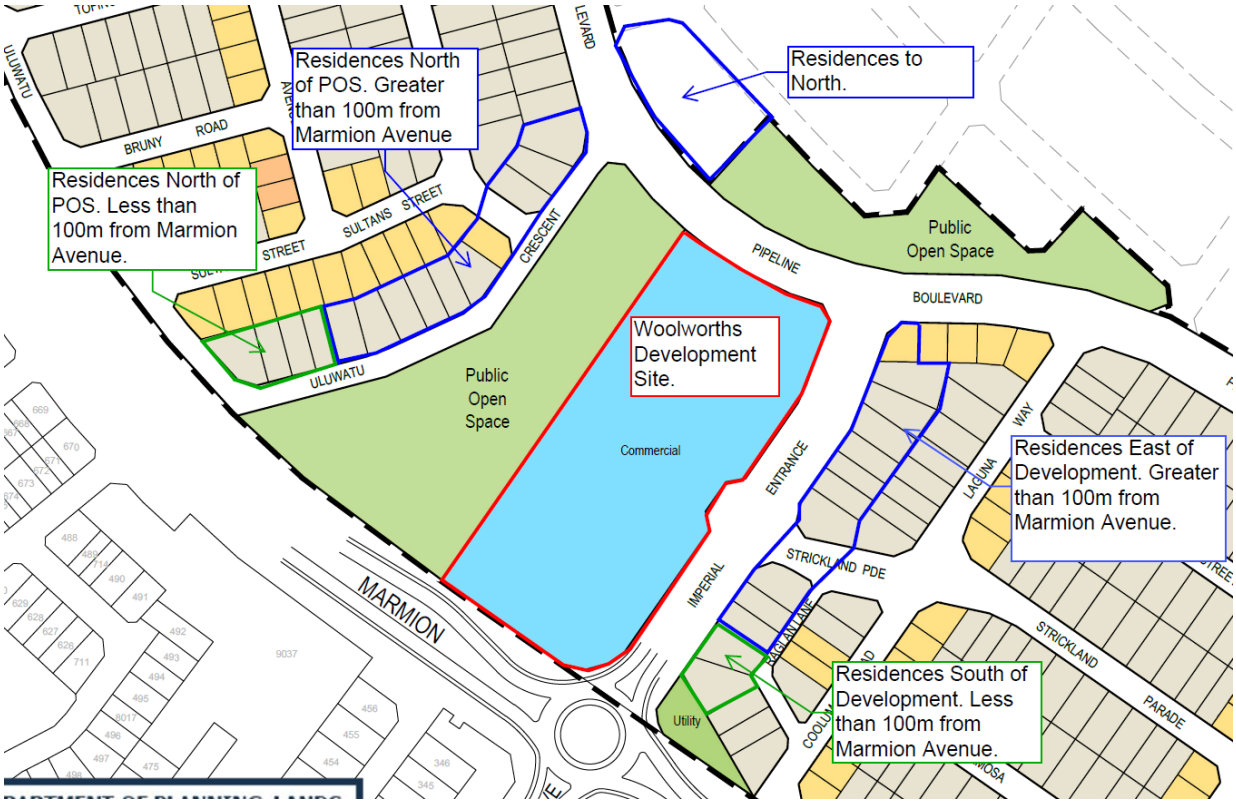

FIGURE 3.1 – NEIGHBOURING PEMISES

The influencing factor at the neighbouring noise sensitive premises have been determined as summarised in Table 3.3.

TABLE 3.3 – INFLUENCING FACTORS

Influencing Factor Parameter	Influencing Factor (dB)				
	North of POS Less than 100m from Marmion	North of POS Greater than 100m from Marmion	North	East Greater than 100m from Marmion	South Less than 100m from Marmion
Major Road within inner circle	+6	-	-	-	+6
Major Road within outer circle	-	+2	+2	+2	-
Commercial Premises within the inner circle	0.0	+0.5 (10%)	+0.7 (14%)	+0.8 (16%)	+1.0 (20%)
Commercial Premises within the outer circle	+0.15 (3%)	+0.15 (3%)	+0.15 (3%)	+0.15 (3%)	+0.15 (3%)
TOTAL IF	+6.15 (Rounded to +6 dB)	+2.65 (Rounded to +3 dB)	+2.85 (rounded to +3 dB)	+2.95 (Rounded to +3 dB)	+7.25 (Rounded to +7 dB)

Based on the above, the assigned noise levels would be as listed in Tables 3.4 to 3.6.

TABLE 3.4 - ASSIGNED OUTDOOR NOISE LEVEL
NEIGHBOURING RESIDENCES NORTH OF POS (WITHIN 100M OF MARMION AVE)

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ max}$
Noise sensitive premises : Highly sensitive area	0700 - 1900 hours Monday to Saturday	51	61	71
	0900 - 1900 hours Sunday and Public Holidays	46	56	71
	1900 - 2200 hours all days	46	56	61
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	41	51	61

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

TABLE 3.5 - ASSIGNED OUTDOOR NOISE LEVEL
NEIGHBOURING RESIDENCES NORTH OF POS (GREATER THAN 100M OF MARMION AVE), NORTH AND EAST

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ max}$
Noise sensitive premises : Highly sensitive area	0700 - 1900 hours Monday to Saturday	48	58	68
	0900 - 1900 hours Sunday and Public Holidays	43	53	68
	1900 - 2200 hours all days	43	53	58
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	38	48	58

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

TABLE 3.6 - ASSIGNED OUTDOOR NOISE LEVEL
NEIGHBOURING RESIDENCES TO SOUTH (WITHIN 100M OF MARMION AVE)

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ max}$
Noise sensitive premises : Highly sensitive area	0700 - 1900 hours Monday to Saturday	52	62	72
	0900 - 1900 hours Sunday and Public Holidays	47	57	72
	1900 - 2200 hours all days	47	57	62
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	42	52	62

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

4. MODELLING

To assess the noise that would be received at the neighbouring residences from noise emissions associated with the proposed development, noise modelling was undertaken using the noise modelling program SoundPlan. To determine the noise received at the neighbouring premises, noise modelling was undertaken for the following scenarios :

- Mechanical services;
- Delivery Vehicles; and
- Patrons within the alfresco area.

Noise modelling was undertaken in accordance with the *EPA Draft Guidance for Assessment of Environmental Factors No. 8 – Environmental Noise*, including worst case down wind conditions.

Calculations were based on the noise levels for the varies noise sources, as listed in Tables 4.1 to 4.3.

TABLE 4.1 –SOUND POWER LEVELS
MECHANICAL SERVICES

Item of Equipment	Sound Power Level, (dB(A))
	Day Period
Air Conditioning Unit	10 @ 75
Exhaust Systems	1 @ 67, 4 @ 74 and 2 @ 80
Condensers	2 @ 91
Refrigeration	2 @ 79

TABLE 4.2 – SOUND POWER LEVELS
DELIVERY TRUCK

Item of Equipment	Sound Power Level, (dB(A))
Refrigerated Delivery truck	89
Small Delivery Truck	84

TABLE 4.3 – SOUND POWER LEVEL
ALFRESCO AREAS

Item of Equipment	Sound Power Level, (dB(A))
Patrons	62 / m^2

Notes :

1 The use of the delivery dock is understood to accommodate 19m articulated delivery trucks and have been assumed to be refrigerated trucks (i.e worst case scenario). In addition to the larger deliveries, small delivery vans or trucks (ie for bakery delivery etc).

2 Given the location of the loading dock, noise emissions from the delivery trucks would occur for less than 10% of the time and noise from these sources would need to meet the assigned L_{A1} noise levels. The noise associated with the delivery is the manoeuvring of the truck into place, upon which the truck engine and refrigeration unit (if applicable) would be switched off – hence – even if the delivery takes some time (i.e. 30 – 60 minutes) the noise level associated with the truck is not present throughout the duration of the delivery.

3 We note that during the night period, most of the mechanical services would not operate. Only the refrigeration equipment, some of the Woolworths exhaust systems associated with food preparation and the mechanical services associated with food and beverage tenancies would operate during the night period. Even then there would be some diversity in the operation for this equipment during various time periods, however, to be conservative, this diversity has not been included in the modelling or assessment.

5. RESULTS

Calculations were carried out to all the neighbouring residences, as shown in Figure 3.1, within each group and to both ground and first floors where applicable. However, to be conservative and to simplify the assessment, only the noise level received in the worst case location have been listed in Tables 5.1 and 5.2, for the different Regulatory parameters.

TABLE 5.1 – RESULTANT NOISE LEVEL FOR L_{A10} NOISE SOURCES

Receiver Location	Operation / Calculated Noise Level, (dB(A))		
	Mechanical		Alfresco Area
	Day Period	Night Period	
Residences North of POS (Within 100m of Marmion Ave)	27 (32)	23 (28)	29
Residences North of POS (Greater than 100m of Marmion Ave)	33 (38)	29 (34)	31
Residences to North	34 (39)	30 (35)	14
Residences to East (Greater than 100m from Marmion Ave)	33 (38)	28 (33)	32
Residences to South (Within 100m of Marmion Ave)	30 (35)	26 (31)	32

( ) Includes +5 dB(A) penalty for tonal component.

TABLE 5.2 – RESULTANT NOISE LEVEL For L_{A1} NOISE SOURCES

Receiver Location	Operation / Calculated Noise Level, (dB(A))	
	Large Delivery Truck	Small Delivery Truck
Residences North of POS (Within 100m of Marmion Ave)	26	18
Residences North of POS (Greater than 100m of Marmion Ave)	41	38
Residences to North	42	36
Residences to East (Greater than 100m from Marmion Ave)	41	29
Residences to South (Within 100m of Marmion Ave)	17	14

Notes:

1 Noise received at the neighbouring noise sensitive premises from mechanical services could be tonal, thus, a +5 dB(A) penalty has been applied to the calculated noise levels.

2 Noise emissions from voices is broadband and does not contain any annoying characteristics.

3 From the definition of tonality under the Regulations, noise emission from truck deliveries, being an L_{A1} noise, would not be considered as tonal and no penalty would be applied.

4 The noise modelling assumed that the fencing and gate to the delivery dock would be an open type fencing, Thus, these were not considered in the noise modelling.

6. ASSESSMENT

Based on the results of the noise modelling, the assessments with regards to compliance with the appropriate assigned noise level has been undertaken and shown below.

6.1 L_{A10} NOISE SOURCES

Noise emissions from the following sources would occur for more than 10% of the time. Thus, noise emissions associated with these sources needs to comply with the assigned L_{A10} noise level.

- Mechanical services; and
- Patrons within the alfresco area.

Tables 6.1 and 6.2 compares the calculated noise levels for the L_{A10} noise sources, being the mechanical services and patron noise, with the assigned noise levels.

TABLE 6.1 – ASSESMENT OF NOISE LEVEL – MECHANICAL SERVICES

Receiver Location	Assessable Noise Level, dB(A)	Assigned Noise Level, L_{A10} dB		Exceedance to Assigned Noise Level
		Time of Day	L_{A10} dB	
Residences North of POS (Within 100m of Marmion Ave)	32	Day	51	Complies
		Sundays	46	Complies
		Evening	46	Complies
	28	Night	41	Complies
Residences North of POS (Within 100m of Marmion Ave)	38	Day	48	Complies
		Sundays	43	Complies
		Evening	43	Complies
	34	Night	38	Complies
Residences to North	39	Day	48	Complies
		Sundays	43	Complies
		Evening	43	Complies
	35	Night	38	Complies
Residences to East (Greater than 100m from Marmion Ave)	38	Day	48	Complies
		Sundays	43	Complies
		Evening	43	Complies
	33	Night	38	Complies
Residences North of POS (Within 100m of Marmion Ave)	35	Day	52	Complies
		Sundays	47	Complies
		Evening	47	Complies
	31	Night	42	Complies

TABLE 6.2 – ASSESMENT OF NOISE LEVEL – ALFRESCO PATRONS

Receiver Location	Assessable Noise Level, dB(A)	Assigned Noise Level, L_{A10} dB		Exceedance to Assigned Noise Level
		Time of Day	L_{A10} dB	
Residences North of POS (Within 100m of Marmion Ave)	29	Day	51	Complies
		Sundays	46	Complies
		Evening	46	Complies
		Night	41	Complies
Residences North of POS (Within 100m of Marmion Ave)	31	Day	48	Complies
		Sundays	43	Complies
		Evening	43	Complies
		Night	38	Complies
Residences to North	14	Day	48	Complies
		Sundays	43	Complies
		Evening	43	Complies
		Night	38	Complies
Residences to East (Greater than 100m from Marmion Ave)	32	Day	48	Complies
		Sundays	43	Complies
		Evening	43	Complies
		Night	38	Complies
Residences North of POS (Within 100m of Marmion Ave)	32	Day	52	Complies
		Sundays	47	Complies
		Evening	47	Complies
		Night	42	Complies

6.2 L_{A1} NOISE SOURCES

Noise emissions associated with truck deliveries would take less than 10% of the time. Therefore, noise from deliveries needs to comply with the Assigned L_{A1} noise levels.

Tables 6.3 and 6.4 compares the assessable noise level for large truck deliveries and small truck deliveries against the relevant L_{A1} Assigned Noise Levels for the day, evening (and Sundays) and night periods.

TABLE 6.3 – ASSESMENT OF NOISE LEVEL – LARGE TRUCK DELIVERIES

Receiver Location	Assessable Noise Level, dB(A)	Assigned Noise Level, L_{A1} dB		Exceedance to Assigned Noise Level
		Time of Day	L_{A1} dB	
Residences North of POS (Within 100m of Marmion Ave)	26	Day	61	Complies
		Sundays	56	Complies
		Evening	56	Complies
		Night	51	Complies
Residences North of POS (Within 100m of Marmion Ave)	41	Day	58	Complies
		Sundays	53	Complies
		Evening	53	Complies
		Night	48	Complies
Residences to North	42	Day	58	Complies
		Sundays	53	Complies
		Evening	53	Complies
		Night	48	Complies
Residences to East (Greater than 100m from Marmion Ave)	41	Day	58	Complies
		Sundays	53	Complies
		Evening	53	Complies
		Night	48	Complies
Residences North of POS (Within 100m of Marmion Ave)	17	Day	62	Complies
		Sundays	57	Complies
		Evening	57	Complies
		Night	52	Complies

TABLE 6.4 – ASSESMENT OF NOISE LEVEL – SMALL TRUCK DELIVERIES

Receiver Location	Assessable Noise Level, dB(A)	Assigned Noise Level, L_{A1} dB		Exceedance to Assigned Noise Level
		Time of Day	L_{A1} dB	
Residences North of POS (Within 100m of Marmion Ave)	18	Day	61	Complies
		Sundays	56	Complies
		Evening	56	Complies
		Night	51	Complies
Residences North of POS (Within 100m of Marmion Ave)	38	Day	58	Complies
		Sundays	53	Complies
		Evening	53	Complies
		Night	48	Complies
Residences to North	36	Day	58	Complies
		Sundays	53	Complies
		Evening	53	Complies
		Night	48	Complies
Residences to East (Greater than 100m from Marmion Ave)	29	Day	58	Complies
		Sundays	53	Complies
		Evening	53	Complies
		Night	48	Complies
Residences North of POS (Within 100m of Marmion Ave)	14	Day	62	Complies
		Sundays	57	Complies
		Evening	57	Complies
		Night	52	Complies

From the above assessment, it can be seen that noise emissions from the proposed development would comply with the requirements of the *Environmental Protection (Noise) Regulations 1997*, at all times. Even so, the following are recommended / required :

1 The mechanical services will need to include screening from the neighbouring residences. To ensure compliance, an acoustic assessment of the mechanical design should be undertaken.

2 Any music played within the alfresco area would need to be limited to background music.