

**PROPOSED DEVELOPMENT OF FAST FOOD
RESTAURANTS
LOT 769 & 770 MONTANA CRESCENT
ALKIMOS**

ENVIRONMENTAL ACOUSTIC ASSESSMENT

JUNE 2022

OUR REFERENCE: 29639-1-22191

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PROPOSED DEVELOPMENT - ALKIMOS

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FOR

PLANNING SOLUTIONS

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1. INTRODUCTION

Herring Storer Acoustics were commissioned to undertake an acoustic assessment of noise emissions associated with the development of 3 fast food restaurants to be located at Lots 769 and 770 Montana Crescent, Alkimos.

This report assesses noise emissions from the premises with regards to compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997*. Noise sources considered as part of this assessment, as requested by council, include:

- Mechanical Services.
- Delivery vehicles; and
- Voices within drive thru.

We also note that from information received from DWER, the bitumised area would be considered as a road, thus noise relating to motor vehicles is exempt from the *Environmental Protection (Noise) Regulations 1997*. We note that these noise sources are rarely critical in the determination of compliance. However, as requested by council and for completeness, they have been included in the assessment, for information purposes only.

For reference, the site plan for the proposed development is attached in Appendix A.

2. SUMMARY

The closest neighbouring residences to this development have been identified as shown in Figure 3.1.

From the analysis undertaken, noise emissions from the proposed development have been assessed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times. However, the following are recommended to be imposed as conditions:

- The mechanical services design needs to be confirmed during the design development phase. An acoustic study of the mechanical services needs to be undertaken once the design has been finalised, to ensure compliance is achieved.
- The mechanical services to be screened from the future neighbouring residences to the west. Finally, the air conditioning condensing units and refrigeration equipment to have "low" noise night period modes.

3. CRITERIA

3.1 ENVIRONMENTAL PROTECTION (NOISE) REGULATIONS 1997

The allowable noise level for noise sensitive premises in the vicinity of the proposed Large Format Retail development is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 and 8 stipulate maximum allowable external noise levels or assigned noise levels that can be received at a premise from another premises. For residential premises, this noise level is determined by the calculation of an influencing factor, which is then added to the base levels shown below. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern. The base noise levels for residential premises and the assigned noise levels for industrial premises are listed in Table 3.1.

TABLE 3.1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises: highly sensitive area	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

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.
IF is the influencing factor.

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), 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 15 dB when determined for a single representative event;

“modulation” means a variation in the emission of noise that –

- (a) is more than 3 dB L_{AFast} or is more than 3 dB L_{AFast} 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_{ASlow} levels.

Where the noise emission is not music, if the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 3.2 below.

TABLE 3.2 - ADJUSTMENTS TO MEASURED LEVELS

Where tonality is present	Where modulation is present	Where impulsiveness is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: These adjustments are cumulative to a maximum of 15 dB.

We note that for this development, the residential premises are located to the west of the development. Although, it is noted that while the adjacent premises to the south are public open space, in the future residences would be located to the south of the public open space. The premises to the east, across Marmion Avenue are zoned commercial. With regards to the premises to the west, as shown below in Figure 3.1, the closest residential premises would be the mixed usage lots 771 and 772.

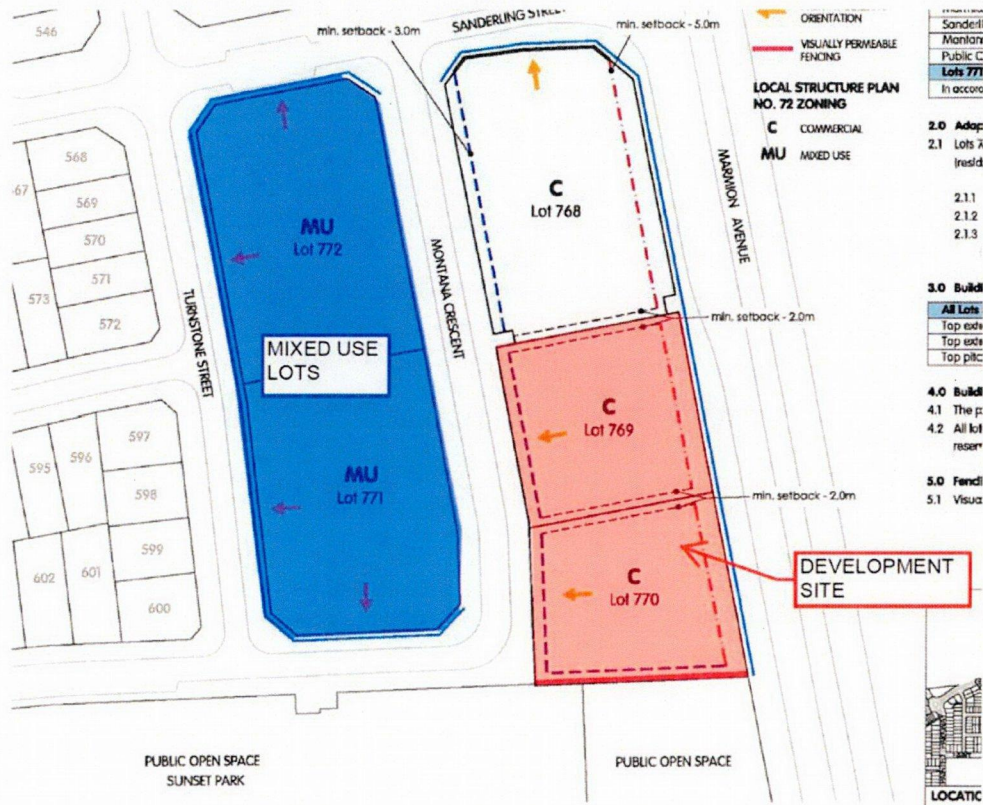


FIGURE 3.1 – AREA AROUND PROPOSED DEVELOPMENT

With Marmion Avenue being a major road, the influencing factor at the possible residence associated with the mixed used lots to the west has been determined to be +9 dB(A), with the influencing factor at the residences to the south of the Public Open Space being +7 dB. Thus, the assigned noise levels would be as listed in Tables 3.3 and 3.4.

TABLE 3.3 - ASSIGNED OUTDOOR NOISE LEVELS
RESIDENCES TO WEST

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	54	64	74
	0900 - 1900 hours Sunday and Public Holidays	49	59	74
	1900 - 2200 hours all days	49	59	64
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	44	54	64

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 3.4 - ASSIGNED OUTDOOR NOISE LEVELS
RESIDENCES TO SOUTH**

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.

Although the movement of vehicles is exempt from the Regulations, we note that if vehicles accessing the site were to be assessed, that as anyone can access the site and the operators of the premises have no control on who can enter the car park or drive-thru, these areas would be designated as public places. Regulation 6 of the *Environmental Protection (Noise) Regulations 1997* relates to noise emissions from public places and under this Regulation, "the person who is causing or permitting that noise to be emitted is to be treated as the occupier...". Therefore, noise emissions from each individual vehicle using the car park needs to comply with the assigned noise levels.

4. PROPOSED DEVELOPMENT

From information provided, we understand that the operating hours for the proposed tenancies are likely to be 24 hours per day, however, deliveries would not occur during the night period, however, they could occur on Sundays and Public Holidays.

5. MODELLING

Modelling of the noise propagation from the proposed development was carried out using an environmental noise modelling computer program, "SoundPlan". Calculations were carried out using the EPA worst case weather conditions as stated in the Environmental Protection Authority's "Draft Guideline on Environmental Noise for Prescribed Premises".

5.1 MECHANICAL SERVICES

It is noted that mechanical services have not been selected at this stage of the development, thus, it is not possible to use actual equipment selections in our calculations. Hence, typical noise levels for air conditioners associated with tenancies of the size proposed has been utilized. The noise modelling is conservative, as it does not include any diversity in load, which would occur (particularly during the night period).

The calculations for the mechanical services were based upon the sound power levels listed in Table 5.1.

TABLE 5.1 – MECHANICAL SERVICES SOUND POWER LEVELS

Item of Equipment	Sound Power Level, (dB(A))
Fast Food 1 (Hungry Jacks)	AC - 2 @ 79
	Refrigeration Units 2 @ 75
	Exhaust Systems 1 @ 80, 1 @ 73 and 1 @ 70
	Supply air 1 @ 75
Tenancies 2 and 3	AC - 1 @ 79
	Refrigeration Units 2 @ 75
	Exhaust 1 @ 77 and 1 @ 70
	Supply 1 @ 75

It is noted equipment selected during the design phase of the development will need to have noise emissions confirmed in relation to the above assumed noise levels.

With regards to noise emissions, the following are noted:

- 1 Noise associated with the mechanical services does not take into account any diversity of operation. Such diversity would occur during the evening and night periods (whilst cooler). Thus, this is a conservative assessment.
- 2 The location of the mechanical plant has been assumed to be located either within the plant compounds (ie air conditioning condensing units and refrigeration equipment) or on the roof of the tenancies (ie, supply and exhaust systems), with screening to the plant.

5.2 CAR MOVEMENT / CAR DOORS

Although, the noise emissions associated with car movements on site would be considered exempt from the Regulations, for completeness, noise modelling and assessment were also undertaken for:

- Car movements on site.
- Cars within Drive-Thru of fast food tenancies.
- Car doors closing within parking areas.

The calculations were based in the sound power levels listed in Table 5.2.

TABLE 5.2 – CAR SOUND POWER LEVELS

Item of Equipment	Sound Power Level, (dB(A))
Cars moving	81
Car Door	87

Note: Under the Regulations, each of these sources needs to be considered individually, it is the highest calculated noise levels used for assessment, rather than the cumulative overall noise levels.

Noise emissions from car movements on site would be compared with the assigned L_{A1} noise level. As the critical period for compliance for this source is the night period, this scenario includes noise emissions from the sources associated with L_{A1} noise levels. However, noise emission from a car door closing would need to comply with the assigned L_{Amax} noise level.

5.3 DELIVERIES

The L_{A1} assigned noise level would be the pertinent prescribed noise level in this instance (for deliveries) as the duration of time that the noise of the deliveries is present is less than 10% of a representative time period. The noise associated with the delivery is the manoeuvring of the truck into place, upon which the truck is 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.

It is also noted that deliveries would not occur at the same time, thus noise emission from this activity would not be cumulative.

The calculations for delivery trucks were based in the sound power levels listed in Tables 5.3.

**TABLE 5.3 – GENERAL SOUND POWER LEVELS
DELIVERY TRUCKS**

Item of Equipment	Sound Power Level, (dB(A))
Fast Food Delivery Truck	85

5.4 VOICES ORDERING

Noise modelling was undertaken for voices within the drive thru's (ie liquor store and fast food outlets 6 and 7); and ordering speakers within Fast Food Outlets 6 and 7.

The noise emissions associated with voices and ordering speaker are listed in Table 5.4.

TABLE 5.4 – SUMMARY OF NOISE EMISSIONS FROM OPERATIONS

Item of Equipment	Sound Power Level, (dB(A))
Voice	73
Ordering Speaker	83

6. PREDICTED NOISE EMISSIONS

Calculations were undertaken to all the residences noted on Figure 3.1. The resultant noise levels are listed in Table 6.1.

Note: Noise levels were calculated at all adjacent noise sensitive premises, however, for simplicity of reporting, only the highest noise levels have been included below.

TABLE 6.1 – CALCULATED NOISE LEVELS

Item	Residences (dB(A))	
	West	South
Mechanical Services	35 L _{A10}	29 L _{A10}
Car Movements	44 L _{A1}	22 L _{A1}
Car Doors	48 L _{AMax}	25 L _{AMax}
Deliveries	44 L _{A1}	24 L _{A1}
Voices		
Voices	33 L _{A10}	12 L _{A10}
Ordering Speaker	42 L _{A10}	20 L _{A10}

7. ASSESSMENT

The following provided the acoustic assessment for the noise sources requiring compliance, as listed in Table 6.1.

7.1 L_{A10} NOISE EMISSIONS

Noise emissions from the mechanical services would be steady state and would operate for the majority of time. Hence noise received from the mechanical services needs to comply with the assigned L_{A10} noise level. Additionally, noise emissions from voices, including the ordering speakers would also occur for more than 10% of the time and would be assessed under the assigned L_{A10} noise Level.

Given the resultant noise level at the residences and likely background noise level in the area, we believe that noise emissions from the mechanical services are likely to be tonal, hence, a +5 dB(A) penalty has been applied to the calculated noise level associated with these noise sources. Table 7.1 lists the characteristics that should be included in the assessable noise level.

TABLE 7.1 – APPLICABLE ADJUSTMENTS AND ASSESSABLE L_{A10} NOISE LEVELS, dB(A)
MECHANICAL SERVICES

Location	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)			Assessable Noise Level, dB(A)
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
West	35	+5	-	-	40
South	29	+5	-	-	34

Table 7.2 shows the applicable Assigned Noise Levels, and assessable noise level emissions associated for the scenarios associated with the mechanical services.

TABLE 7.2 – ASSESSMENT OF L_{A10} NOISE LEVEL EMISSIONS
MECHANICAL SERVICES

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L_{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
West	40	Day Period	54	Complies
		Sunday Day Period	49	Complies
		Evenings	49	Complies
		Night	44	Complies
South	34	Day Period	52	Complies
		Sunday Day Period	47	Complies
		Evenings	47	Complies
		Night	42	Complies

Noise received from voices, including ordering speaker, within the drive thru's, would not contain any annoying characteristics. Thus, the assessable noise level would be as listed in Table 6.1 above.

Tables 7.3 and 7.4 shows the applicable Assigned Noise Levels, and assessable noise level emissions associated for the scenarios associated with voice, and ordering speakers.

TABLE 7.3 – ASSESSMENT OF L_{A10} NOISE LEVEL EMISSIONS
VOICES

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L_{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
West	33	Day Period	54	Complies
		Sunday Day Period	49	Complies
		Evenings	49	Complies
		Night	44	Complies
South	12	Day Period	52	Complies
		Sunday Day Period	47	Complies
		Evenings	47	Complies
		Night	42	Complies

**TABLE 7.4 – ASSESSMENT OF L_{A10} NOISE LEVEL EMISSIONS
ORDERING SPEAKERS**

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L_{A10} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
West	42	Day Period	54	Complies
		Sunday Day Period	49	Complies
		Evenings	49	Complies
		Night	44	Complies
North	20	Day Period	52	Complies
		Sunday Day Period	47	Complies
		Evenings	47	Complies
		Night	42	Complies

7.2 L_{A1} NOISE EMISSIONS

Noise emissions from car movements and deliveries would be present for less than 10% of a representative time period, hence noise received from this noise source needs to comply with the assigned L_{A1} noise level.

However, under the Regulations, car movements need to be considered individually and deliveries would occur at different times, thus, it is the highest calculated noise levels used for assessment, rather than the cumulative overall noise levels.

Based on the definitions of tonality, noise emissions from these sources, being an L_{A1} and being present for less than 10% of the time, would not be considered tonal. Thus, no penalties would be applicable to the noise associated with car movements or delivery trucks. Hence, Tables 7.5 and 7.6 shows the applicable Assigned Noise Levels, and assessable noise level emissions associated for the scenarios associated with the above noise sources.

**TABLE 7.5 – ASSESSMENT OF L_{A1} NOISE LEVEL EMISSIONS
CAR MOVEMENTS**

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L_{A1} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
West	44	Day Period	64	Complies
		Sunday Day Period	59	Complies
		Evenings	59	Complies
		Night	54	Complies
North	22	Day Period	62	Complies
		Sunday Day Period	57	Complies
		Evenings	57	Complies
		Night	52	Complies

**TABLE 7.6 – ASSESSMENT OF L_{A1} NOISE LEVEL EMISSIONS
DELIVERIES**

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L_{A1} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
West	44	Day Period	64	Complies
		Sunday Day Period	59	Complies
		Evenings	59	Complies
		Night	54	Complies
South	24	Day Period	62	Complies
		Sunday Day Period	57	Complies
		Evenings	57	Complies
		Night	52	Complies

7.3 L_{AMax} NOISE EMISSIONS

Noise emissions from car doors would be present for less than 1% of a representative time period, hence noise received from this noise source needs to comply with the assigned L_{AMax} noise level.

Given the resultant noise level at the residences, the likely background noise level in the area, noise received at the neighbouring residences from car doors closing is unlikely to be impulsive. However, to be conservative, a +10dB penalty for impulsiveness has been applied. Thus, Table 7.7 lists the characteristics that should be included in the assessable noise level for car doors closing.

TABLE 7.7 – APPLICABLE ADJUSTMENTS AND ASSESSABLE L_{A1MAX} NOISE LEVELS, dB(A)
CAR DOORS

Location	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)			Assessable Noise Level, dB(A)
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
West	48	-	-	+10	58
South	25	-	-	+10	35

Table 7.8 shows the applicable Assigned Noise Levels, and assessable noise level emissions associated for the scenarios associated with car doors.

TABLE 7.8 – ASSESSMENT OF L_{AMax} NOISE LEVEL EMISSIONS
CAR DOORS

Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable Assigned L _{AMax} Noise Level (dB)	Exceedance to Assigned Noise Level (dB)
West	58	Day Period	74	Complies
		Sunday Day Period	74	Complies
		Evenings	64	Complies
		Night	64	Complies
South	35	Day Period	72	Complies
		Sunday Day Period	72	Complies
		Evenings	62	Complies
		Night	62	Complies

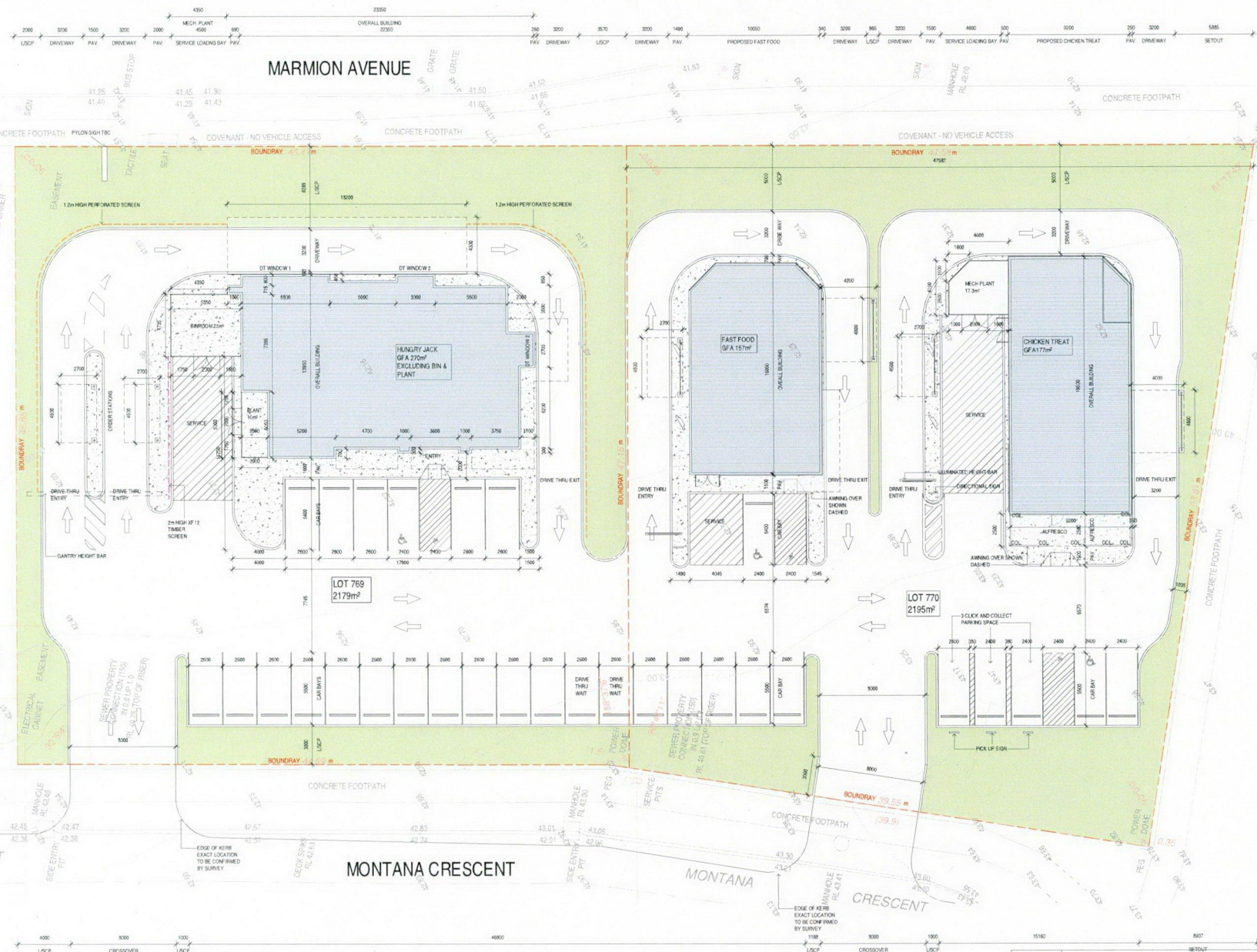
8. CONCLUSION

From the above assessments, the noise received at the neighbouring residences complies with the requirements of the *Environmental Protection (Noise) Regulations 1997* at all times. However, the following are recommended to be imposed as conditions:

- The mechanical services design needs to be confirmed during design development phase. An acoustic study of the mechanical services needs to be undertaken once the design has been finalised, to ensure compliance is achieved.
- The mechanical services to be screened from the future neighbouring residences to the west. Finally, the air conditioning condensing units and refrigeration equipment to have "low" noise night period modes.

APPENDIX A

PLAN



1 SITE PLAN
1:150

INTERIM ISSUE ONLY
DATE: 01.06.2022

A		INTERIM ISSUE	JS	NP	01.06.2022
revision/issue	description		drawn by	check by	date
project	PROPOSED COMMERCIAL DEVELOPMENT				
location	LOT 768, 769 & 770, MONTANA CRES. ALKIMOS WA				
checked by	JS				
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scale	1:150	date	01.06.2022	dwg no.	SK33
project no.	53.21	rev.	A		

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