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Fruit and Vegetable Orchard Development 5531 West Swan Road, West Swan

Acoustic Report for Development Application Rev. A [draft]

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1. Executive Summary

Hewshott International has been engaged by Urbanista Town Planning on behalf of Hyquality Engineering to undertake the acoustic consultancy services for Development Application for the proposed Fruit and Vegetable Orchard development at 5531 West Swan Road, West Swan.

This desktop review has identified key aspects of the acoustic design of the development.

The key aspects are:

- Environmental noise emission from the development, including patrons' noise, music, carpark activity and mechanical services noise.

An assessment of noise emission from the development has been undertaken in accordance with the Environmental Protection (Noise) Regulation 1997 at the nearest residential noise sensitive receptors (NSRs).

Provisional calculations of the noise emission determine that the noise levels will achieve compliance at the noise sensitive receptors in accordance with WA EPNR 1997.



2. Project Location and Operation

5531 West Swan Road, West Swan WA is a rural land located within Swan Valley Rural zone, according to the City of Swan Local Planning Scheme No. 17. It is surrounded by other rural lands.

The nearest noise sensitive receivers (NSR) have been identified and are located at:

- 5470 West Swan Rd, to the east of the development,
- 5601 West Swan Rd, to the north of the development.

Figure 2.1: Aerial view of site and its surroundings – source: Google Maps



The proposed fruit and vegetable orchard development will be located at the Lot 9 #5531 West Swan Road, West Swan. It will operate seven days a week between 11am and 8pm, and will consist of:

- Restaurant,
- 8x 2-bedroom portable dwellings,
- Commercial warehouse,
- Outdoor BBQ area,
- Kids playground,
- Car park,
- Green vegetable and flower vegetable nursery.

There is an existing single level brick dwelling that is to remain. The site arrangement is presented on Figure 2.2 below.



Figure 2.2: Site arrangement.





3. Environmental Noise Impact Criteria

In Western Australia, the noise emissions from a development to a receiver are assessed in accordance with the Environmental Protection (Noise) Regulations 1997 (EPNR 1997). The noise emissions from the development are compared with calculated assigned noise levels at a given noise sensitive receiver.

3.1. EPNR 1997 Assigned Noise Levels Table

The Western Australian Department of Environmental Protection Noise Regulations (EPNR 1997), operate under the Environmental Protection Act 1986. The Regulations specify maximum noise levels that can be received at noise sensitive premises, including industrial, commercial and residential premises.

EPNR 1997 provides a methodology and stipulates clear procedures relating to noise assessments and control. The regulations provide limits for three types of assigned noise level:

- L_{Amax} assigned noise level which cannot be exceeded at any time;
- L_{A1} assigned noise level that cannot be exceeded for more than 1% of the time;
- L_{A10} assigned noise level that cannot be exceeded for more than 10% of the time.

The resulting assigned noise levels are displayed in Table 3.1.1 below.

Table 3.1.1: Assigned noise levels

Type of premises receiving noise	Time of day	Assigned noise level (dB _A)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises at locations within 15 metres of a building directly associated with a noise sensitive use	07:00 to 19:00 Monday to Saturday	45+IF	55+IF	65+IF
	09:00 to 19:00 Sunday and Public holidays	40+IF	50+IF	65+IF
	19:00 to 22:00 All days	40+IF	50+IF	55+IF
	22:00 to 07:00 Monday to Saturday 22:00 to 09:00 Sunday and public holidays	35+IF	45+IF	55+IF
Noise sensitive premises at locations further than 15 metres from a building directly associated with a noise sensitive use	All hours	60	75	80
Commercial premises	All times	60	75	80
Industrial and utility premises	All times	60	75	80

The “influencing factor” (IF) is calculated for each of noise-sensitive premises receiving noise. It takes into account the amount of industrial and commercial land and the presence of major roads within a 450m radius around the noise receiver.

3.2. EPNR 1997 Noise Character Adjustments

It is a requirement of EPNR 1997 that the noise character of any breakout noise from a development be free of annoying characteristics, namely –

- Tonality, e.g. whining, droning;
- Modulation, e.g. like a siren; and
- Impulsiveness, e.g. banging, thumping.



According to EPNR 1997, “if these characteristics cannot be reasonably and practicably removed, e.g. in the case of an emission like music, then a series of adjustments to the measured levels are set out, and the adjusted level must comply with the assigned level”. The adjustments are set out below.

Table 3.2.1: EPNR 1997 noise character adjustments

Adjustment where noise emission is not music These adjustments are cumulative to a maximum of 15 dB			Adjustment where noise emission is music	
Where tonality is present	Where modulation is present	Where impulsiveness is present	Where impulsiveness is not present	Where impulsiveness is present
+5 dB	+5 dB	+10 dB	+10 dB	+15 dB

3.3. Nearest Noise Sensitive Receiver (NSR)

The assigned noise levels defined in the regulations have been calculated for the following nearest noise sensitive receiver (NSR) below, located about 10m from the development boundary:

1. 5601 West Swan Rd.

3.4. Calculation of Assigned Noise Levels

Based on the regulations set out in the WA Environmental Protection (Noise) Regulations 1997, the maximum allowable noise levels are determined using the assigned noise level base values and the influencing factor (IF). The influencing factor takes into account zoning and road traffic around the receiver of interest within a 100 and 450m radius. In figure 3.4.1, the red circle is the 100m radius circle, and the blue circle is the 450m radius circle. Their centre is the noise-sensitive receiver under consideration (5601 West Swan Rd).

Figure 3.4.1: Composite map showing zoning around proposed development – source: City of Swan Intramaps





3.4.1 100-Metre-Radius Circle

Based on the available information the percentage of commercial and industrial use within the 100-metre-radius circle is 0%.

3.4.2 450-Metre-Radius Circle

Based on the available information, no commercial or industrial activity has been identified within the 450-metre-radius circle.

3.4.3 Traffic/Transport Factor

There is one major (more than 15,000 vehicles per day) road within the 100m radius areas. There are no secondary (6,000 – 15,000 vehicles per day) road within the 100m radius area and no major roads within the 450m radius are from the residential building.

From information provided by Main Roads WA, which is summarised in table below, the transport factor is 6.

Table 3.4.3.1: Traffic data 2020/2021

Road	Vehicles per day	Classification
West Swan Road	15640	Major

3.4.4 Influencing Factor

Based on calculations, and taking into account the percentage of commercial and industrial areas as well as secondary and major roads in the 100 and 450 metre radius circles, the influencing factor is 6 dB.

3.4.5 EPNR 1997 Assigned Noise Levels Table – NSR

The resulting assigned noise levels for the NSR are displayed in Table 3.4.5.1 below.

Table 3.4.5.1: Assigned Noise Levels for the project

Type of premises receiving noise	Time of the day	Assigned Noise Level (dB)		
		L _{A10}	L _{A1}	L _{Amax}
Noise sensitive premises at locations within 15 metres of a building directly associated with a noise sensitive use	07.00 to 19.00 hrs Monday To Saturday	51	61	71
	09.00 to 19.00 hrs Sunday and Public holidays	46	56	71
	19.00 to 22.00 hrs All days	46	56	61
	22:00 to 07:00 Monday to Saturday 22:00 to 09:00 Sunday and public holidays	41	51	61
Commercial premises	All times	60	75	80
Industrial and utility premises	All times	65	80	90

L_{A10} is an acoustic descriptor which corresponds to the noise level exceeded for ten per cent of the time period under consideration; this may be considered to represent an “average maximum level” and is often used for the assessment of road traffic noise. The L_{A1} is the level exceeded for one per cent of the time; this is representative of the maximum levels recorded during the sample period. The L_{Amax} is the absolute maximum recorded level, which is most useful for assessing sounds of short duration.



4. Noise emissions

4.1. Mechanical Services

The mechanical services noise emissions must be kept to a level that is not exceeded at any nearby neighbours' boundary. The evening and night-time assigned noise level is 46 dB, L_{A10} and 41 dB, L_{A10} respectively, and has been calculated in Table 3.4.5.1.

All noise from condenser units and exhaust fans must not exceed this value at the boundary of any nearby residential neighbour. The nearest noise sensitive residential receiver is located about 20m to the north of the site buildings.

Although based on provided information, the development will not have any external mechanical services units, for the future references it is recommended the noise from condenser units will be mitigated using the following options:

- All condenser units should be roof located, facing away from nearby residents.
- If the intention is to mount units on walls, it is the responsibility of the installer that noise at the outlet must be kept to a sound pressure level of 60 dBA or less at one metre, subject to final location.

As far as practicable, noise from mechanical services including condenser units and exhaust fans should be free from tonality and impulsiveness.

If any mechanical services are installed on site in the future, it is recommended that further mechanical services detailed noise assessment is undertaken, in order to confirm environmental noise compliance at the nearest noise sensitive receptors.

4.2. Back-of-House Service Vehicles

The BoH services vehicles noise emissions must be kept to a level that is not exceeded at any nearby neighbours' boundary. The daytime and night-time assigned levels have been calculated and are presented in Table 3.4.5.1.

All noise from services vehicles must not exceed daytime value of 71 dB, L_{Amax} and night-time value of 61 dB, L_{Amax} at the boundary of any nearby residential neighbour.

4.3. Amplified Music and Patrons Noise

An amplified music is proposed to be played at the restaurant to provide an ambience. The restaurant is located approximately 20m away from the north site boundary and 35m from the east site boundary.

The venue will host up to 96 patrons and 6 staff members at any time.

The noise levels from an amplified music must be kept to a level that is not exceeded at any nearby neighbours' boundary.

Typical noise levels for the venue including music and patrons' noise are presented below.

Table 4.3.1: Typical noise levels at live music event.

Noise source	Noise level L_{Aeq} [dB]
Patrons	75
Background music	55
Patrons and Background music	75



Based on the noise levels detailed above, provisional calculations have been undertaken to confirm compliance with the EPNR assigned noise levels. To represent the worst-case scenario for the venue operation, it has been assumed that the doors and windows to the restaurant remain open.

The preliminary predicted noise levels from the site are presented in table 4.3.2. below.

Table 4.3.2: Estimated noise levels at NSRs.

Receiver	Noise Source	EPNR 1997 Assigned Noise Level L _{A10} [dB] 19.00 – 22.00 hours	Predicted Outdoor Noise Level* L _{A10} [dB]	Compliance predicted?
5470 West Swan Rd	Single noise source			
	Music*	46	29	Yes
	Patrons	46	39	Yes
	Combined noise source			
	Music* and Patrons	46	39	Yes
5601 West Swan Rd	Single noise source			
	Music*	46	35	Yes
	Patrons	46	45	Yes
	Combined noise source			
	Music* and Patrons	46	45	Yes

*The predicted noise levels assume a +10dB adjustment on account of music.

Provisional calculations indicate that the noise level will achieve compliance at the NSR in accordance with the EPNR 1997 for evening times.

The above prediction can be regarded the worst-case scenario, as full venue capacity has been assumed.

It should be also noted that the above noise levels are predicted for the situation with all external doors and windows open. In reality, not always the doors and windows to the restaurant will be open. It is predicted that the building façade will provide attenuation of minimum 20dB, therefore the outdoor noise levels received at the NSRs will be 20dB lower than the predicted levels in the table above.



4.4. Car Park Activity

There is one proposed new car park at the eastern side of the site. The car park location is presented in figure 4.4.1 below.

Figure 4.4.1: Proposed car park.



Noise from car park activity with potential to cause impacts at the nearest sensitive receptors are likely to be car door slamming which is generally assessed in terms of L_{max} . From previous measurements a typical Sound Power Level (SWL) has been derived for car door slamming and generally has an L_{max} between 80 to 90 dBA, 85dBA has been used in this assessment which is presented in table 4.4.1 below.

Table 4.4.1: SWL car door slamming.

Item	Sound Power Level (dBA)
Car door slamming	85

Based on the SWL, an approximate distance correction (20m and 40m) noise levels will achieve compliance at noise sensitive receptor in accordance with WA EPNR 1997 as presented in Table 4.4.2 below.

Table 4.4.2: Predicted compliance results.

Location	EPNR 1997 Assigned Noise Level L_{Amax} (dB) 19.00 - 22.00 hours	Predicted L_{Amax} (dB)	Compliance predicted?
5470 West Swan Rd (40m from the closest car park area)	61	53	Yes
5601 West Swan Rd (20m from the closest car park area)	61	59	Yes

The above predictions can be regarded as worst-case, as all cars have been assumed to be at the closest point to the nearest noise sensitive receptor (the development). In reality, cars will not always park at the closest point to the receptors all of the time.



A. Glossary

Term	Description
A-weighting:	Refers to a standardised frequency response used in sound measuring instruments, specified in Australian Standard AS 1259.1. Historically it was developed to model human ear response at low-level sounds. However A-weighting is now frequently specified for measuring sounds irrespective of level, and studies have shown a relationship between the long term exposure to A-weighted sound pressure levels and hearing damage risk.
Airborne sound:	Sound waves propagate within a construction (structure-borne sound) and are radiated into the air where their propagation continues (airborne sound).
AS:2107	AS/NZS 2107:2016 Acoustics -Recommended design sound levels and reverberation times for building interiors
C_{tr}, C_i	Spectrum adaptation term
dB:	Means the abbreviation for decibel.
dBA :	A-weighted sound pressure level in decibels.
$L_{Aeq,T}$:	The equivalent continuous A-weighted sound pressure level in dBA. It is often accompanied by an additional subscript suffix "T" such as $L_{Aeq,15min}$, which means it is evaluated over 15 minutes.
$L_{A10,T}$:	A-weighted sound pressure level in decibels which is not surpassed for more than 10% of the measurement time. This value is often similar to that of the L_{Aeq} for the same period of time.
$L_{A1,T}$:	A-weighted sound pressure level in decibels which is not surpassed for more than 1% of the measurement time. This value is often used to have a reference of the highest levels of the measured noise and is used to evaluate the presence of occasional impulsiveness in the noise.
$L_{A90,T}$:	A-weighted sound pressure level in decibels which is not surpassed for more than 90% of the measurement time. This value is often used to have a certain reference of the constant floor background noise level.
L_{Amax} :	Maximum A-weighted sound pressure level over a certain period of evaluation.
L_w	Impact sound level reduction L_w is an acoustic descriptor quantifying the improvement in impact noise isolation as a result of the installation of a floor covering or floating floor on a test floor in a laboratory (ISO717.2:1997)
$L_{n,w}$	The lower the $L_{n,w}$ rating the better the performance of a building element at insulating impact noise.
Perception of noise level differences:	Generally, a variation of 2-3 dB in a sound pressure level cannot be detected by most of the population; a 5 dB difference is perceived as a louder noise, and a 10 dB variation is perceived as a sound which is twice as loud.