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# Flagstone Village Shopping Centre Expansion

# Noise Impact Assessment

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Hope Island Consortium Pty Ltd

819 Main Street

Kangaroo Point QLD 4169

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# Flagstone Village Shopping Centre Expansion

# Noise Impact Assessment

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# 1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Hope Island Consortium Pty Ltd to prepare an acoustic assessment to support a development application for the proposed expansion of the existing convenience centre at 1-33 Bushman Drive, Jimboomba, to be submitted to Logan City Council (Council).

This noise impact assessment has been conducted with reference to Australian Standard AS 1055:1997 *Description and Measurement of Environmental Noise* Parts 1, 2 and 3 and in accordance with the Environmental Protection Act 1994 (reprinted as of 1 January 2009), Environmental Protection (Noise) Policy 2008 (reprinted as of 1 January 2009) and Council's Logan Planning Scheme 2015 version 1.1.

# 2 SCOPE OF WORKS AND METHODOLOGY

The scope of works and methodology for the noise impact assessment included:

- A review of previous acoustic assessments completed for proposed developments at this site.
- Based on noise measurement data obtained by SLR at this site in 2011 (refer to SLR Report 620.1023-R1 dated 23 April 2012) and the noise criteria stipulated in the Logan Planning Scheme 2015 version 1.1, determine noise criteria for the assessment.
- Develop a spreadsheet computer noise model for the site to predict noise emission levels from the proposed development at the nearest noise sensitive receptors including the existing child care centre.
- Determine compliance of the predicted future development noise emission with the appropriate noise criteria.
- Determine the nature and form of any noise mitigation measures required to achieve compliance with the relevant criteria.

# 3 STUDY AREA DESCRIPTION

## 3.1 Existing Site

The subject site, illustrated in **Figure 1**, is located immediately west of the intersection of Homestead Drive and Bushman Drive. The development is bordered by the existing commercial centre to the south and east, and bordered by residences to the west along Bushman Drive. Coachwood Park is situated immediately north of the subject site. SLR is not aware of any new residential developments proposed in the immediate vicinity of the subject site.

**Figure 1 Locality Plan – Proposed Development at Flagstone**


## 3.2 Proposed Development

The proposed development use/areas are illustrated in **Figure 2**. The proposed development expands the existing convenience centre to a neighbourhood centre consisting of a variety of shops (1,343 $m^2$), commercial activity (890 $m^2$) and supermarket (2,000 $m^2$), and will include 219 car parking spaces.

The proposed access arrangements for the development are shown in **Figure 2**.

**Figure 2 Layout of the Proposed Development**


# 4 ACOUSTIC TERMINOLOGY

## 4.1 Typical Noise Levels

This report makes repeated reference to certain noise level descriptors, in particular the $L_{A1}$, $L_{A10}$, $L_{A90}$, $L_{Aeq}$ and $L_{Amax}$ noise levels, refer **Figure 3**.

- The $L_{A10}$ is the A-weighted sound pressure level exceeded 10% of a given measurement period and is utilised normally to characterise typical maximum noise levels.
- The $L_{Aeq}$ is essentially the average sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound over the same measurement period.
- The $L_{A90}$ noise level is the A-weighted sound pressure level exceeded 90% of a given measurement period and is representative of the average minimum background sound level (in the absence of the source under consideration), or simply the "background" level.
- The $L_{A1}$ noise level is the A-weighted sound pressure level exceeded 1% of a given measurement period.
- The $L_{Amax}$ noise level is the maximum A-weighted noise level associated with site activity. The $L_{Amax,adj\ T}$ noise level is the average of the maximum noise levels during time period T.

**Figure 3 Graphical Display of Typical Noise Indices**

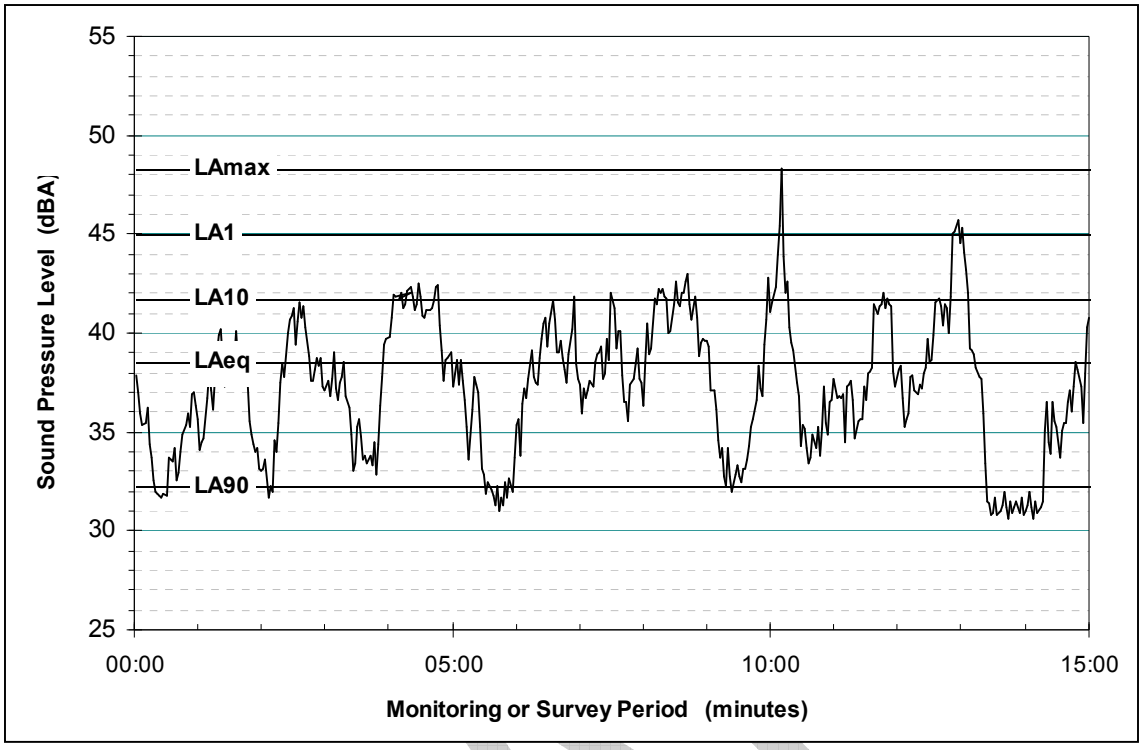


**Table 1** presents examples of typical noise levels.

**Table 1 Typical Noise Levels**

| Sound Pressure Level (dBA) | Typical Source | Subjective Evaluation |
|---|---|---|
| 130<br>120<br>110 | Threshold of pain<br>Heavy rock concert<br>Grinding on steel | Intolerable<br>Extremely noisy |
| 100<br>90 | Loud car horn at 3 m<br>Construction site with pneumatic hammering | Very noisy |
| 80<br>70 | Kerb side of busy street<br>Loud radio or television | Loud |
| 60<br>50 | Department store<br>General Office | Moderate to<br>Quiet |
| 40<br>30 | Inside private office<br>Inside bedroom | Quiet to<br>Very quiet |
| 20 | Unoccupied recording studio | Almost silent |

## 4.2 A-Weighting or dBA Noise Levels

The overall level of a sound is usually expressed in terms of dBA, as is the case in Australian Standards (AS) 1055 *Acoustics – Description and measurement of environmental noises*, which is measured using the "A-weighting" filter incorporated in sound level meters. These filters have a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound.

Different sources having the same dBA level generally sound about equally as loud, although the perceived loudness can also be affected by the character of the sound (eg the loudness of human speech and a distant motorbike may be perceived differently, although they are of the same dBA level).

### 4.3 Sensitivity of People to Noise Level Changes

A change of up to 3 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness.

## 5 NOISE ASSESSMENT CRITERIA

Council's Logan Planning Scheme 2015 version 1.1 *Planning scheme policy 3 - Environmental management* (Policy), stipulates noise criteria applicable to the assessment of new development. The noise criteria are reproduced below:

3.2.1 Noise emission and noise immission standards

(1) The noise emission standards are specified in:

(a) Table 3.2.1.1—Noise emission standards for the protection of residential amenity in this planning scheme policy for the:

(i) Community facilities zone;
(ii) Emerging community zone;
(iii) Environmental management and conservation zone;
(iv) Low density residential zone;
(v) Low-medium density residential zone;
(vi) Medium density residential zone;
(vii) Private sport and recreation precinct of the Recreation and open space zone;
(viii) Rural residential zone other than the Cottage rural precinct;

(b) Table 3.2.1.2—Noise emission standards for the protection of general amenity in this planning scheme policy for the:

(i) Centre zone;
(ii) Low impact industry zone;
(iii) Medium impact industry zone;
(iv) Mixed use zone;
(v) Specialised centre zone.

Table 3.2.1.1 - Noise emission standards for the protection of residential amenity

| **Noise level at the boundary of premises** | | | |
|---|---|---|---|
| Noise type | Time period | Monday to Saturday | Sunday and public holidays |
| Non-steady sound | Day 7:00 am - 6:00 pm | $L_{Aeq,adj,T} \leq L_{A90}$ plus 5 dBA | $L_{Aeq,adj,T} \leq L_{A90}$ plus 5 dBA |
| | Evening 6:00 pm - 10:00 pm | $L_{Aeq,adj,T} \leq L_{A90}$ plus 5 dBA | $L_{Aeq,adj,T} \leq L_{A90}$ plus 5 dBA |
| | Night 10:00 pm - 7:00 am | $L_{Aeq,adj,T} \leq L_{A90}$ plus 0 dBA and $L_{Amax} \leq$ 60 dBA | $L_{Aeq,adj,T} \leq L_{A90}$ plus 0 dBA and $L_{Amax} \leq$ 60 dBA |
| Continuous noise | Anytime | $L_{A90,T}$ plus 0 dBA | $L_{A90,T}$ plus 0 dBA |

Table 3.2.1.2 - Noise emission standards for the protection of general amenity

| **Noise level at the boundary of premises** | | | |
|---|---|---|---|
| Noise type | Time period | Monday to Saturday | Sunday and public holidays |
| Non-steady sound | Day 7:00 am - 6:00 pm | $L_{Aeq,adj,T} \leq L_{A90}$ plus 10 dBA | $L_{Aeq,adj,T} \leq L_{A90}$ plus 5 dBA |
| | Evening 6:00 pm - 10:00 pm | $L_{Aeq,adj,T} \leq L_{A90}$ plus 10 dBA | $L_{Aeq,adj,T} \leq L_{A90}$ plus 5 dBA |
| | Night 10:00 pm - 7:00 am | $L_{Aeq,adj,T} \leq L_{A90}$ plus 5 dBA and $L_{Amax} \leq$ 80 dBA | $L_{Aeq,adj,T} \leq L_{A90}$ plus 5 dBA and $L_{Amax} \leq$ 80 dBA |
| Continuous noise | Anytime | $L_{A90,T}$ plus 5 dBA | $L_{A90,T}$ plus 5 dBA |

Table 3.2.1.3 (from the Policy), which applies to noise immission standards for sensitive land use, is not considered relevant for the Flagstone Village assessment as the development is not regarded as a sensitive land use. Furthermore, the acoustic amenity within the development will largely be controlled by noise from the development itself rather than existing noise sources.

With reference to the noise measurement data presented in SLR Report 620.1023-R1 (dated 23 April 2012), noise criteria applicable to the Flagstone Village development is summarised in **Table 2**.

**Table 2 Flagstone Village Noise Assessment Criteria**

| **Category** | **Noise Type** | **Time Period** | **Monday to Saturday** | **Sunday and Public Holidays** |
|---|---|---|---|---|
| Residential Amenity | Non-steady sound | Day 7:00 am - 6:00 pm | 46 $L_{Aeq,adj,T}$ | 46 $L_{Aeq,adj,T}$ |
| | | Evening 6:00 pm - 10:00 pm | 51 $L_{Aeq,adj,T}$ | 51 $L_{Aeq,adj,T}$ |
| | | Night 10:00 pm - 7:00 am | 34 $L_{Aeq,adj,T}$<br>60 $L_{Amax}$ | 34 $L_{Aeq,adj,T}$<br>60 $L_{Amax}$ |
| | Continuous noise | Day 7:00 am - 6:00 pm | 41 $L_{A90,T}$ | 41 $L_{A90,T}$ |
| | | Evening 6:00 pm - 10:00 pm | 46 $L_{A90,T}$ | 46 $L_{A90,T}$ |
| | | Night 10:00 pm - 7:00 am | 34 $L_{A90,T}$ | 34 $L_{A90,T}$ |
| General Amenity | Non-steady sound | Day 7:00 am - 6:00 pm | 51 $L_{Aeq,adj,T}$ | 46 $L_{Aeq,adj,T}$ |
| | | Evening 6:00 pm - 10:00 pm | 56 $L_{Aeq,adj,T}$ | 51 $L_{Aeq,adj,T}$ |
| | | Night 10:00 pm - 7:00 am | 39 $L_{Aeq,adj,T}$<br>80 $L_{Amax}$ | 39 $L_{Aeq,adj,T}$<br>80 $L_{Amax}$ |
| | Continuous noise | Day 7:00 am - 6:00 pm | 46 $L_{A90,T}$ | 46 $L_{A90,T}$ |
| | | Evening 6:00 pm - 10:00 pm | 51 $L_{A90,T}$ | 51 $L_{A90,T}$ |
| | | Night 10:00 pm - 7:00 am | 39 $L_{A90,T}$ | 39 $L_{A90,T}$ |

# 6 NOISE ASSESSMENT

The noise sources to be assessed as part of this development are:

- Potential noise from loading dock and refuse collection activities.
- Potential noise from vehicle movements and parking activities at the site onto nearby receptors.
- Potential noise from mechanical plant at the site onto nearby receptors

## 6.1 Loading Dock and Refuse Collection Activities

The main loading dock (associated with the supermarket building) is located behind the supermarket building (north-west side) shown in **Figure 2**. The nearest residence to the supermarket loading dock is 35 Bushman Drive which is approximately 20 m from the entrance/ driveway to the loading dock and approximately 95 m from the refuse collection area.

It is noteworthy that the loading dock is significantly shielded, by the supermarket building itself, to 35 Bushman Drive. For this reason, the assessment of loading dock noise also includes 41 Bushman Drive which has line of sight to the refuse collection area located in north-east corner of the loading dock. 41 Bushman Drive is approximately 85 m from the loading dock and 125 m from the refuse collection area.

Noise associated with a large supermarket truck delivering stock to the loading dock and a garbage truck collecting refuse from the refuse collection area is assessed in **Table 3**.

**Table 3 Supermarket Loading Dock and Refuse Collection Noise Assessment**

| Assessment Location | Noise Source Event | Residential Amenity Noise Criteria $L_{Aeq,adj,15min}$ (dBA) | | | Predicted Noise Emission Level $L_{Aeq,adj,15min}$ (dBA) |
|---|---|---|---|---|---|
| | | Day | Evening | Night | |
| 35 Bushman Drive | Delivery to the supermarket loading dock - Truck passby (on driveway), reversing alarm, vehicle door , roller door, trolley and raised voices | 46 | 51 | 34 | 42 |
| | Emptying of skip bin - Garbage truck passby, reversing alarm, skip bin emptying | 46 | 51 | 34 | 45 |
| 41 Bushman Drive | Delivery to the supermarket loading dock - Truck passby (on driveway), reversing alarm, vehicle door , roller door, trolley and raised voices | 46 | 51 | 34 | 34 |
| | Emptying of skip bin - Garbage truck passby, reversing alarm, skip bin emptying | 46 | 51 | 34 | 42 |

Predicted noise levels in **Table 3** associated with typical loading dock delivery and refuse collection activities comply with the residential noise amenity criteria for the daytime and evening periods, however significantly exceed the night-time criteria. It is recommended that loading dock deliveries and refuse collection be restricted to the daytime and evening periods unless noise mitigation (eg a noise barrier) is incorporated into the design of the loading dock driveway adjacent to 35 Bushman Drive.

## 6.2 Patron Vehicle Movement and Parking Activities

Noise sources from car parking activities are from car door slams and engine starts and from general vehicle movement on site. Using sound pressure levels from SLR's noise source database for a range of typical car park related noise events, noise levels predicted at the nearest sensitive receptors including the existing child care centre (shown in **Figure 2**) and 22 Bushman Drive (located approximately 80 m from the Bushman Drive entrance), are presented in **Table 4**.

**Table 4 Typical Car Park Related Noise Events**

| Location | Approximate Distance to Receptor (m) | Amenity Noise Criteria $L_{Aeq,adj,15min}$ (dBA) | | Predicted Noise Emission Level $L_{Aeq,adj,15min}$ (dBA) |
|---|---|---|---|---|
| | | Day | Evening | |
| Child Care Centre | 10 | 51[1] | N/A[2] | **52** |
| 22 Bushman Drive | 80 | 46 | 51 | 39 |

Note 1 - General amenity criteria applied to the child care centre as the residential amenity criteria is considered to be too stringent for outdoor play areas of the child care centre.

Note 2 - Child care centre operating hours between 6:30 am to 6:30 pm, which is considered to be representative of the daytime period.

The predicted car park related noise levels from car door slams, engine starts and vehicle movement presented in **Table 4** indicate compliance with the residential amenity criteria at the nearest residential receptor to the car park (during the daytime and evening period), but a marginal 1 dBA exceedance of the general amenity noise criterion applicable to the child care centre for the daytime period. It should be noted that the predicted car park noise events level in **Table 4** for the child care does not take into consideration any noise attenuation afforded by a barrier around the boundary of the child care centre. As such, it is recommended that (as a minimum) a 1.8 m high lapped and capped timber is constructed around the north, east and west sections of the child care centre boundary that are adjacent to car parking lots.

## 6.3 Mechanical Plant

The precise location and extent of mechanical plant associated with the proposed supermarket is unknown at this stage of planning. Nevertheless all mechanical plant should be designed to achieve the continuous noise source criteria summarised in **Table 2**.

Mechanical plant associated with the proposed development should be located to provide maximum barrier and distance attenuation to the nearest noise sensitive residences particularly for the supermarket rooftop mechanical plant which will potentially be the largest plant associated with the development and closest to existing sensitive receptors.

It is recommended that low noise generating commercial air-conditioning units/refrigeration condensers etc. be selected in order to allow the most stringent of the night-time noise criteria in **Table 2** (ie 34 dBA $L_{A90,T}$) to be achieved. Based on an approximate distance of 50 m from the mid-span of the supermarket roof to the nearest residence in Bushman Drive, an operating maximum noise level of 51 dBA at 7 m would be required in order to comply with the night-time noise criterion of 34 dBA $L_{A90,T}$. This maximum noise level assumes direct line of sight between source and receiver and therefore could be relaxed somewhat if the mechanical plant is screened by the building itself and/or screens are provided around the rooftop mechanical plant.

It is recommended that all mechanical plant associated with the proposed development undergoes detailed acoustic design to ensure compliance with the noise criteria, particularly if multiple rooftop mechanical plant decks are required which could result in cumulative noise impacts. Further, all mechanical plant associated with the proposed development should be checked for compliance with the noise criteria in **Table 2** prior to commissioning.

# 7 CONCLUSION

SLR have conducted an assessment of potential noise impacts associated with the proposed expansion of the existing convenience centre at 1-33 Bushman Drive, Jimboomba, to support a development application to be submitted to Logan City Council.

The predicted noise levels in **Section 6** of this noise impact assessment report show that the proposed development would be able to comply with Council's Logan Planning Scheme Policy 2015, more specifically:

- Typical loading dock delivery and refuse collection activities comply with the residential noise amenity criteria for the daytime and evening periods. It is recommended that loading dock deliveries and refuse collection be restricted to the daytime and evening periods unless noise mitigation (eg a noise barrier) is incorporated into the design of the loading dock driveway adjacent to 35 Bushman Drive.
- Car park related noise levels from car door slams, engine starts and vehicle movement comply with the residential amenity criteria at the nearest residential receptor to the car park during the daytime and evening period.
- A marginal 1 dBA exceedance of the general amenity noise criterion applicable to the child care centre for the daytime period has been predicted for car park related noise events. It is recommended that (as a minimum) a 1.8 m high lapped and capped timber is constructed around the north, east and west sections of the child care centre boundary that are adjacent to car parking lots.
- Based on an approximate distance of 50 m from the mid-span of the supermarket roof to the nearest residence in Bushman Drive, an operating maximum noise level of 51 dBA at 7 m would be required in order to comply with the stringent night-time noise criterion of 34 dBA $L_{A90,T}$.