Special Entertainment Precincts

Noise Guideline

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Acknowledgements

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Contents

1 Introduction

Special Entertainment Precincts are defined under the Local Government Act 2009 as areas in which:

(a) *amplified music that is played at premises in the area is regulated by a local law, and not by the Liquor Act 1992; and*

(b) *the requirements about noise attenuation under the Planning Act apply to certain types of development in the area.*

The purpose of this document is to provide technical guidance regarding the acoustic requirements for façade design in SEPs.

To aid in the understanding of the terms in this report a glossary is included in **Appendix A**.

2 Background

The purpose of Special Entertainment Precincts (SEPs) is to provide for and encourage a variety of live music, nightclub entertainment facilities and other music venues. SEPs therefore are areas which include higher noise levels to allow the proposed music uses. Currently, the only designated SEPs in Queensland are those located in Fortitude Valley and adjoining suburbs in Brisbane. As such, the policy and other documents contained in the Brisbane City Council City Plan which address noise in the SEPs have been considered in this guideline.

The proposed Sunshine Coast SEPs include the following components:

- Core area – where the music venues are proposed, and residential buildings require very significant acoustic construction upgrades
- Buffer area – the area surrounding the core area, where music venues are not proposed, but residential buildings require significant acoustic construction upgrades due to the music noise from the adjoining core area. Some buffer areas may be split into inner and outer buffer areas with differing acoustic requirements, being more stringent closer to the Core and less stringent further from the Core

There are two SEPs currently being considered on the Sunshine Coast:

- Part of the Maroochydore City Centre Priority Development Area (PDA). This SEP includes a core area and a buffer area. The SEP is shown in **Figure 2.1** and
- Part of Nambour's Business Centre. This SEP includes a core area, inner buffer area, and outer buffer area. The SEP is shown in **Figure 2.2**.

Figure 2.1: SEP Core and Potential Buffer – Maroochydore City Centre PDA

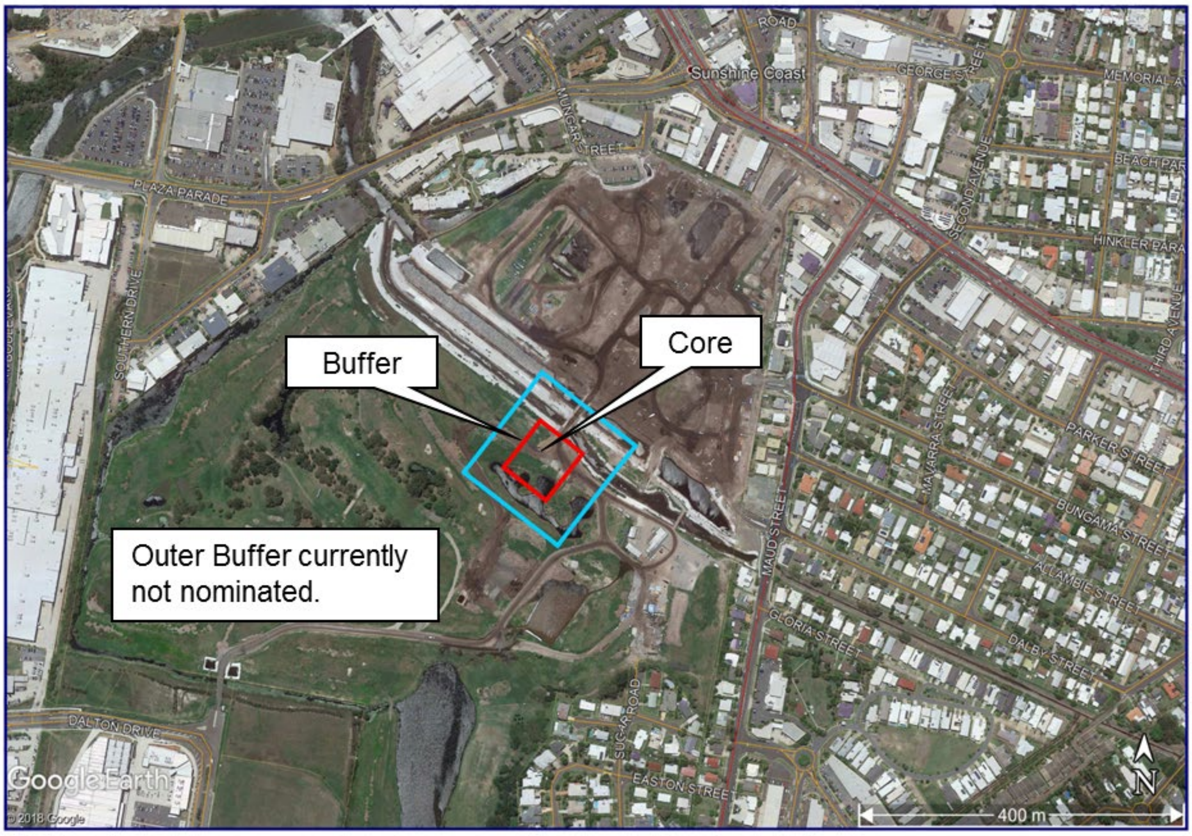
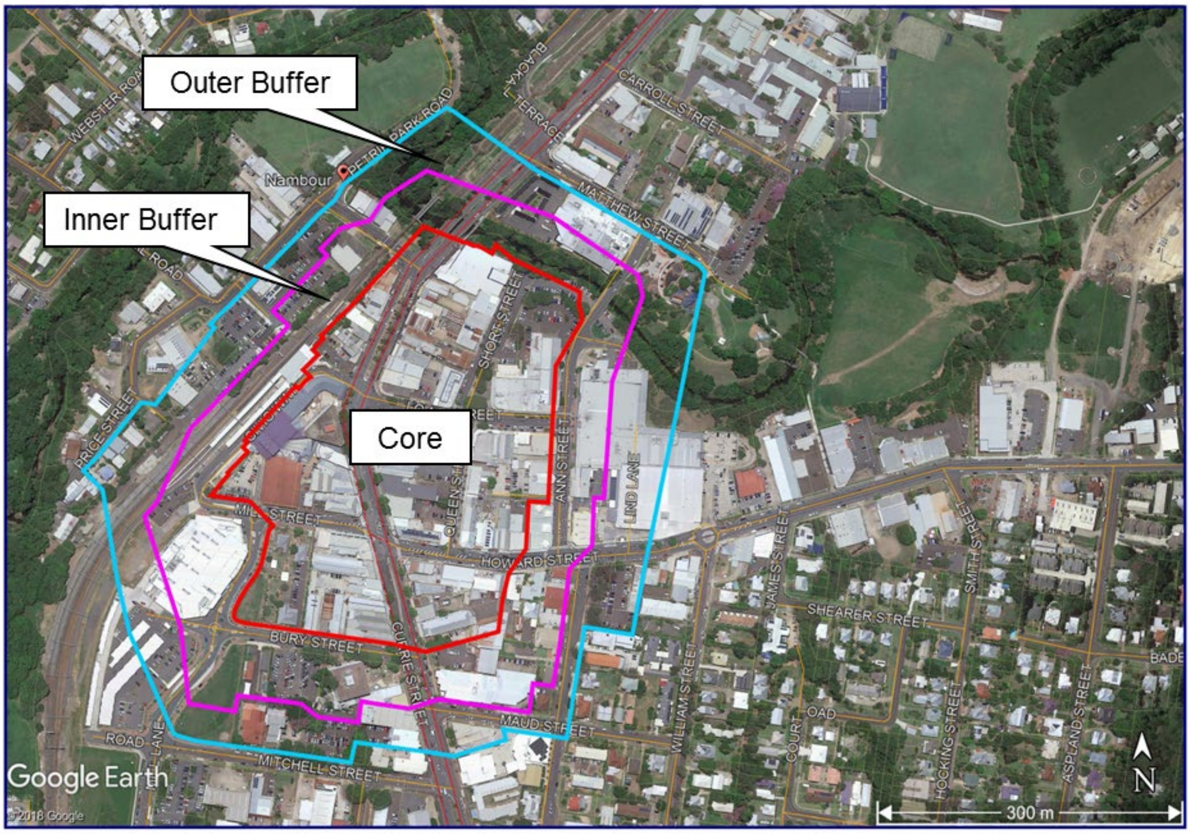


Figure 2.2: SEP Core and Buffers – Nambour



3 Noise Criteria

When designing sensitive uses in these SEPs, moderate to high levels of noise reduction are required. The noise criteria were provided in the ASK SEP Report, and are summarised as follows.

The criteria in the Core area:

- Venue development is designed and constructed to achieve an amplified music noise level at 1m external to any point of the premises of not greater than $L_{Ceq,T}$ 88 dBC for approved activities before 11.30pm, and $L_{Ceq,T}$ 65 dBC and $L_{Leq,T}$ 55 dBC in any one-third octave band between and including 31.5Hz and 125Hz, for approved activities after 11.30pm
- Residential development is designed and constructed to achieve a minimum reduction in sound pressure level between the exterior of the building and the bedroom or living room, of $L_{Leq,T}$ 20 dB at 63Hz octave band and
- Residential development located in the same building as, or that has a wall within 5m of a club, hotel, indoor sport and recreation, nightclub entertainment facility or food and drink outlet (restaurant) ensures the building is designed and constructed to achieve an amplified music noise level of not greater than $L_{Leq,T}$ 43 dB in any one-third octave band between and including 31.5Hz to 125Hz in a bedroom; and not greater than $L_{Leq,T}$ 45 dB in any one-third octave band between and including 31.5Hz to 125Hz in a living room.

The criteria in the buffer areas:

- Within the buffer areas, there is no SEP noise limit for venues, rather the existing Office of Liquor and Gaming Regulation (OLGR) criteria would be applicable for licensed venues, and Council noise policy would be applicable to non-licensed venues
- The criteria applied for residences in the buffer areas are as follows:
  - Inner buffer or overall buffer (if no outer buffer): The residential development criteria in the Core area would be applied
  - Outer buffer: An Rw 35 acoustic rating is required for external glazing (e.g. doors and windows) of residential development.

4 Acoustic Design Solutions for Residences

4.1 Overview

Achieving the criteria in **Section 3** requires a detailed, professional acoustic assessment. Additional detail on calculation and construction requirements is included in the following sections.

4.2 Residences in Core and Inner Buffer or Overall Buffer (if no outer buffer)

The required acoustic performance is a noise reduction of $L_{Leq,T}$ 20dB in the 63Hz octave band. As the noise reduction from outside to inside will depend on the overall transmission loss of the façade, as well as the characteristics of the room (dimensions, volume, surface finishes etc.), the acoustic assessment should clarify how the noise reduction has been determined. For typical residential designs, noise reduction at 63Hz may be assumed to be 6 dB less than the overall façade transmission loss at 63Hz. Alternatively, the assessment should provide details of the methodology, assumptions and provide sample calculations to demonstrate how the noise reduction has been determined.

Some indicative designs that can achieve a 26 dB transmission loss (i.e. 20 dB noise reduction plus 6 dB) are shown in **Table 4.1**.

Table 4.1: Building Elements to Achieve a Transmission Loss of 26 dBA in the 63Hz Octave Band in Core and Buffer Areas

Building Element	Construction
Glazing	Double glazing design – 10.38mm laminated glass, 200mm air gap, 8.38mm laminated glass, with acoustically appropriate frames and seals. (reference: Brisbane City Council).
	Enclosed balcony design (Wintergarden) – 6.38mm laminated glass, 1000mm air gap, 6.38mm laminated glass, with acoustically appropriate frames and seals. (reference: Brisbane City Council).
Walls	100mm solid concrete
	140mm concrete blockwork (hollow or corefilled)
	9mm compressed fibre cement, twin stud design with 204mm cavity (inclusive of studs) with minimum 75mm thick 14 kg/m3 glasswool insulation, and internal sheeting of 2 layers of 13mm sound rated plasterboard.
Roof/Ceiling	100mm solid concrete
	Metal roof sheeting over 19mm timber sheeting on purlins, 270mm cavity (inclusive of purlins and insulation) with minimum 75mm thick 14 kg/m3 glasswool insulation, and internal sheeting of 2 layers of 13mm sound rated plasterboard.
Exposed Floors	100mm solid concrete
General Note	Lightweight linings to concrete/masonry walls can reduce the low frequency transmission loss performance of the bare concrete/masonry wall. Therefore, attachments of light weight linings to aforementioned concrete/masonry walls required acoustic evaluation.

While these systems are calculated to achieve the required noise reduction, the performance of the systems is indicative only and details should be confirmed on a case-by-case basis. As noted above, the requirements for a project should be calculated based on the overall construction with the aim of achieving the overall required noise reduction, and this could result in building systems which are more significant (e.g. 150mm concrete walls instead of 100mm) or less significant (e.g. single layer of plasterboard to ceiling).

Manufacturers' test data[1] should be obtained if possible, though manufacturers' acoustic test data is generally not available in the 63Hz octave band and thus the acoustic assessment should include a description of the methodology used to forecast the performance of the building element.

An acceptable calculation methodology is considered to be using the latest version[2] of the Insul software. When assessing glazing, this software allows consideration of variable glazing thickness and cavity depths, acoustic laminates and overall glazing dimension[3]. At the time of preparation of this guideline, suitable glazing configurations which achieve an octave band transmission loss of 26 dB at 63Hz have been determined as follows:

- 8.38mm laminate plus 325mm airspace plus 10.38mm laminate (2.4m x 2.4m window/door)
- 12.38mm laminate plus 220mm airspace plus 10.38mm laminate (2.4m x 2.4m window/door)
- 12.38mm laminate plus 190mm airspace plus 10.38mm laminate (2.4m x 1.2m window/door)
- 12.38mm laminate (2.1m x 0.9m window/door)
- 10.38mm laminate (1.8m x 0.9m window).

[1] Manufacturers' test data for glazing should be in the form of acoustic certification that the supplied frame, seals and glazing meets the required performance.

[2] Insul Version 9.12 at time of writing.

[3] The suppliers of Insul software have indicated that the appropriate glazing dimension for multi-panel windows/doors is the overall window/door dimension, and not the dimension of a single panel of glass.

It should be noted that Insul and other calculation methods assume no leakage via holes or gaps, and thus require consideration of overall construction. In terms of glazing the results are more applicable to fixed glass and high quality awning windows with acoustic seals. Potential acoustic weaknesses, e.g. sealing arrangements in sliding windows, downlights in ceiling, and mechanical services penetrations, need to be considered when specifying a solution.

4.3 Residences in Outer Buffer

To achieve an Rw 35 acoustic rating for external glazing (e.g. doors and windows) is expected to require an acoustically appropriate frame, 10.38mm laminated glass and acoustic seals.

The glazing supplier should provide acoustic certification that the supplied frame, seals and glazing meets the Rw 35 rating, or higher. It is not sufficient to only have Rw 35 rated glass, as the overall acoustic performance may be reduced due to inadequate frame and seals.

No recommendations are proposed for walls, roof/ceilings and floors as it is typically found that these building elements have higher acoustic ratings than glazing, and thus are unlikely to be acoustic weaknesses in the building envelope.

5 Alternative Solutions for Residences

There may be some locations in the SEP where the acoustic requirements may be reduced; for example, where the location is on the boundary of an SEP and the façade is facing away from any potential music noise source. In these situations, it can be useful to determine the potential noise exposure by using a noise model. The methodology for modelling these scenarios is given in the following paragraphs.

A key focus of the SEPs is for the development of music venues. Venues in the SEPs are allowed a generous level of noise emission in comparison with non-SEP areas. As music venues have the potential to be developed anywhere in the SEP core areas, this potential needs to be accounted for when modelling noise emission.

The criteria permit a music venue to emit 88 dBC in the Core Area. There are no details for the emission spectrum at this level in the local law. A venue can lawfully play music that is dominant in any one-third octave band provided that the C-weighted overall level does not exceed the local law criteria. To assist with producing a noise model to represent a typical music emission spectrum, a level of 86 dB at 63Hz in the Core Area can be used as the venue emission 1 metre from the premises. This is a typical music spectrum in the entertainment precinct that results in the local law criteria being met.

As any site in the entertainment precinct can be used as a potential music venue, all lots in the vicinity of the proposed development should be modelled with the emission levels specified above. All parts of a building can emit this level, including the roof. As there could be multi-story entertainment venues with rooftop bars in the precinct, four storeys can be used to represent a typical rooftop emission scenario.

The resulting noise levels can be forecast at the façades of the proposed sensitive building(s) and based on the forecasts, the required noise reduction can be determined as per **Table 5.1**.

Table 5.1: Noise Reduction Requirements where Noise Levels Forecast through Noise Modelling

Sensitive Use location	Noise reduction requirement
Core Area, Inner Buffer or Buffer (if no outer buffer)	• Noise reduction of L_{LeqT} 20 dB at 63Hz where forecast entertainment noise at the relevant façade is ≥63 dB at 63Hz for a bedroom or ≥65 dB at 63Hz for a living room. • Noise reduction to achieve an amplified music level of L_{LeqT} 43 dB at 63Hz in a bedroom, where forecast entertainment noise at the relevant façade is <63 dB at 63Hz. • Noise reduction to achieve an amplified music level of L_{LeqT} 45dB at 63Hz in a living room, where forecast entertainment noise at the relevant façade is <65 dB at 63Hz.

Appendix A Glossary

Parameter or Term	Description
Frequency	The number of vibrations, or complete cycles, that take place in one second. Measured in hertz (Hz), where one Hz equals one cycle per second. A young person with normal hearing will be able to perceive frequencies between approximately 20 and 20,000 Hz. With increasing age, the upper frequency limit tends to decrease.
Wavelength	The distance travelled by a sound wave during one sound pressure cycle is called the wavelength. A wavelength is usually measured in metres.
dB	The decibel (dB) is the unit measure of sound. Most noises occur in a range of 20 dB (quiet rural area at night) to 120 dB (nightclub dance floor or concert).
dBA	Noise levels are most commonly expressed in terms of the 'A' weighted decibel scale, dBA. This scale closely approximates the response of the human ear, thus providing a measure of the subjective loudness of noise and enabling the intensity of noises with different frequency characteristics (e.g. pitch and tone) to be compared.
dB, dB(flat) dB(lin), dB(linear)	Noise levels are sometimes expressed in terms of the linear, flat or un-weighted decibel scale – they all take the same meaning. The value has no weighting applied to it and is the same as the dB level.
dBZ	Noise levels expressed with a Z-weighting are normally the same as linear, flat or un-weighted levels. The difference is minor and normally of only technical significance, with dB and dBZ values generally considered interchangeable.
dBC	Noise levels are sometimes expressed in terms of the 'C' weighted decibel scale, dBC. This scale is very similar to the dB and dBZ scales. The difference being that some negative weighting is applied below 250Hz and above 1kHz. The magnitude of the weighting is significantly less than the dBA scale.
Octave band	Ranges of frequencies where the highest frequency of the band is double the lowest frequency of the band. The band is usually specified by the centre frequency, i.e. 31.5, 63, 125, 250, 500 Hz, etc.
One-Third Octave Band	Third octave bands, or narrow bands: Each octave band can be divided into a further three octave bands for more detail.
Day	The period between 7am and 6pm.
Evening	The period between 6pm and 10pm.
Night	The period between 10pm and 7am.
$L_{Aeq,T}$	The A-weighted equivalent continuous sound level, which is the constant sound level over a given time period (T), which is equivalent in total sound energy to the time-varying sound level, measured over the same time period (T).
$L_{Ceq,T}$	As for $L_{eq,T}$ except using the C-weighting.
$L_{Leq,T}$	As for $L_{eq,T}$ except without a weighting (i.e. with a linear weighting or Z-weighting).
Transmission Loss	Measure of the airborne sound reduction performance in each frequency band of a particular material (e.g. building facade).
Noise Reduction or Sound Reduction	Measure of the airborne sound reduction between two spaces. It may be calculated using the material transmission loss and accounting for the characteristics of the two spaces.
R_w	Weighted Sound Reduction Index – is a single number evaluation of the property of a partition to attenuate sounds. For the majority of partitions, the value of Rw will be similar to the value for STC. Partitions with particularly poor performance at 100Hz may have lower values for Rw than for STC. Conversely, partitions with poor performance at 4000Hz may have higher Rw than for STC. (As per AS1276.1-1999).

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