

2.4 Discussion

The noise limit of 55 dBA L₁₀ is somewhat more stringent than would normally be expected for events that occur approximately 25 times per year, finish before 10:00 pm and are generally of short duration (except cricket). By way of comparison, Western Springs Stadium and Westpac Stadium in Wellington have noise limits of 85 dBA and 75 dBA respectively for six concerts per year.

The stringent approach for 'night games' (55 dBA), was taken directly from the Trust Board's original application. At the time of the 1995 application, the Trust Board consciously made the decision to control the level of noise emission from these night-time sporting events to the normal Concept Plan limits to assist the granting of consent and to ensure any adverse effects were much less than minor.

2.5 Construction Noise

Construction noise controls are contained in Rule 4A.1D of the District Plan which requires compliance with New Zealand Standard NZS 6803P:1984 "The Measurement and Assessment of Noise from Construction, Maintenance and Demolition Work". In summary, the relevant limits, which are 5dB more stringent for work of more than 18 weeks duration, are as follows:

- (i) Construction Noise Received in Residential Zones:

Time	Noise Limit dBA			
	Weekdays		Saturdays	
	L ₁₀	L _{max}	L ₁₀	L _{max}
0630 – 0730 hrs	55	65	-	-
0730 – 1800 hrs	70	85	70	85
1800 – 2000 hrs	65	80	-	-

- (ii) Construction Noise Received in Business Zones

Time	Noise Limit dBA L ₁₀
0730 – 1800 hrs	70
1800 – 0730 hrs	75

- (iii) Blast Noise

The Construction Standard provides for blast noise not to exceed 128 dBL_{peak} or 122 dBC_{peak}.

3.0 Sound System Noise

Noise from announcements and music through the in-house sound system is a potential adverse effect through 'spillage' into the surrounding residential area. This issue was specifically addressed by the Environment Court in the '1995 Night Game' Consent. As required by the '1995 Night Game' Conditions of Consent, a sophisticated computer based noise monitoring system was installed in 1999 and has been regularly calibrated as described in the monitoring reports submitted to Council, in accordance with the conditions of consent. This system has monitored the noise emission from the in-house sound system for the specified number of events since 1999 and has continued to be used for all events involving use of the main PA system.

The control and monitoring of noise from 'Night Games' has generally been successful with the specified computer monitoring system and electronic limiters, controlling the noise levels from the sound system. Some minor exceedances (1 or 2 dB) occurred during teething problems on a number of occasions, however, current monitoring procedures ensure events are now in full compliance. These small exceedances, while of significant concern to the Eden Park Trust Board, would not be discernible to the surrounding residents as a difference of 2 dB is not detectable subjectively.

The proposed conditions for the 2006 night-game application do not change the noise limits in any way but clarify a number of issues such as averaging. In summary, the sound system has to comply with an average noise level of L_{10} 55 dBA and any individual ten-minute sample shall not exceed L_{10} 60 dBA at the residential interface.

The computer sound propagation model SoundPLAN has been used to calculate the level of sound system noise spillage to the residential area to assess the ability of the redeveloped stadium to comply with these noise limits.

The design process has involved an interaction between the architectural design, the sound system design and noise mitigation techniques to minimise the noise spillage. A number of different options were modelled including the South Stand with different roof materials, the East Stand with different loudspeaker layouts, different noise barriers and different arrangements of the connection to the ASB and West Stands.

As there is no roof over the East Stand, loudspeakers in this stand cannot easily be located in the preferred position - close to the audience area and pointed directly downwards. To reduce the level of spill to the surrounding residents, a number of different loudspeaker systems and configurations for the proposed East Stand were assessed.

Noise 'spill' from the upper deck of the East Stand is the critical issue due to the high source location and limited screening. To mitigate this effect, a five metre high barrier has been designed for the rear of the upper deck. This enables the loudspeakers to be located slightly below the top of the barrier facing towards the audience. The barrier screen and speaker directivity enable the noise limit to be achieved in the eastern residential area. We understand

the eastern upper deck will only be used for the very large events and the loudspeakers in this area would be turned off for regular games. A barrier behind the speakers at the rear of the west stand is also proposed as part of the redevelopment to reduce noise spill to the west.

Figure 1 attached, show the "SoundPLAN" noise contours calculated for the proposed stadium design. To comply with the 60 dBA objective in the residential area, the sound system inside the South Stand can produce slightly higher levels for the audience than previously (+ 3 dB). The level for the East Stand audience will have to be reduced slightly, to similar levels to the existing design. The colour coding of the noise contours has been chosen so that 61 dBA is shown in red (short term noise limit 60 dBA).

3.1 Assessment of Noise Effects – Sound System

The noise contours in Figure 1 show that the proposed redevelopment, with an appropriately designed sound system can comply with the current conditions for night games.

It is understood that noise from the sound system during daytime and 'night-time' rugby events has not generally caused significant complaint from neighbours over the past several years. Cricket events are of more concern to residents and the noise limit for these events is proposed to be reduced by 2 to 5 dBA as part of the Additional Night Games application. This lower limit can be achieved through the electronic control system in place as part of the existing conditions of consent.

As discussed earlier, the night game noise limits are very restrictive for an activity that occurs infrequently and for limited duration. On this basis and given the predicted compliance with the current night game resource consent conditions, it is our opinion that the adverse effects of noise from the sound system within the proposed redevelopment will be no more than minor.

4.0 Crowd Noise

It is generally accepted that crowd noise is not included in any noise controls for sporting events. The reason for this approach is that it is not possible to control crowd noise and the noise is of very short duration. This approach has previously been adopted for the Eden Park concept plan and 'night-game' resource consent and for other stadia around New Zealand.

However, crowd noise is an effect on the surrounding residential area and any change in this effect needs to be assessed as part of the redevelopment application. 'Crowd noise' in this context is referred as the intermittent short duration cheer that occurs following a significant incident such as a 'try' in rugby or a 'six' in cricket. The level of noise is highly variable depending on the significance of the incident and generally only lasts for a few seconds.

Covered stands such as the ASB North Stand and the South Stand (existing and proposed), help to contain this crowd noise to a greater extent than uncovered stands. Noise spill from uncovered stands can be mitigated to a certain extent