



Acoustic Engineering Report

Olympic Park Pavilion

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Revision History

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Executive Summary

DDEG has been appointed by Banyule City Council to provide acoustic engineering consulting services associated with the proposed Olympic Park Pavilion at 240 Southern Road, West Heidelberg, VIC.

The assessment has evaluated potential noise due to use of the Olympic Park sports fields reflecting off the proposed new pavilion building to nearby residential receivers at Goodenough Court.

The assessment has determined that the new pavilion building will slightly increase noise levels at Goodenough Court by 0 to +3 dB(A) due to activities on the sports fields, depending on location of the noise sources.

Subjectively, a change of 3 dB(A) is typically only just noticeable, while 2 dB(A) or less is typically imperceptible in most practical conditions. Therefore, the pavilion building is expected to have insignificant impact on acoustic amenity at residences within Goodenough Court.

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1 Introduction

1.1 Purpose

DDEG has been appointed by Banyule City Council to provide acoustic engineering consulting services in relation to the proposed Olympic Park Pavilion at 240 Southern Road, West Heidelberg, VIC.

This document details the evaluation of potential noise impacts from the proposed pavilion building. Specifically, the scope of this document comprises assessment of noise due to use of the Olympic Park sports fields reflecting off the pavilion building to nearby residential receivers at Goodenough Court.

A glossary of the acoustic nomenclature used in this document is presented in Appendix A.

1.2 Reference Documentation

This document is based on information contained in the following documents and drawings:

Table 1 Reference Documentation

Document	Prepared by	Issue
Architectural Drawings; Drawing No. 202402 – WD002, 202402 – WD103, 202402 – WD104, 202402 – WD105, 202402 – WD200	Cassisi Architects	Received – 14/08/2024

1.3 Document Limitations

The following limitations are applicable with respect to the acoustic advice presented in this document:

- DDEG has prepared this document for the sole use of the relevant stakeholders and approval authorities and for the specific purpose expressly stated in the document. No other party should rely on this document without the prior written consent of DDEG. DDEG undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document.
- The information contained in this document provides advice in relation to acoustics and vibration only. No claims are made and no liability is accepted in respect of design and construction issues falling outside of the specialist field of acoustics and vibration engineering including and not limited to structural integrity, fire rating, architectural buildability and fitness-for-purpose, waterproofing and the like. Supplementary professional advice should be sought in respect of these issues.
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- The recommendations, data and methodology presented in this document are based on the listed reference documentation. The recommendations apply specifically to the project under consideration and must not be utilised for any other purpose. Any modifications or changes to the project from that described in the listed reference documentation may invalidate the advice provided in this document, necessitating a revision.
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2 Project Characteristics

2.1 Site Location

The project site is located at 240 Southern Road, West Heidelberg, VIC, as shown in Figure 1. The topography in the area of the site is near flat.



Figure 1 Aerial Image of Site (Aerial Photo Source: Google Maps)

2.2 Proposed Project

The project comprises a proposed new single-storey sports pavilion building. Residents of the nearby Goodenough Court have raised concerns of potential increased noise due to sound reflections off the proposed building from sports activity at the surrounding sports fields.

Figure 2 shows the proposed site plan.

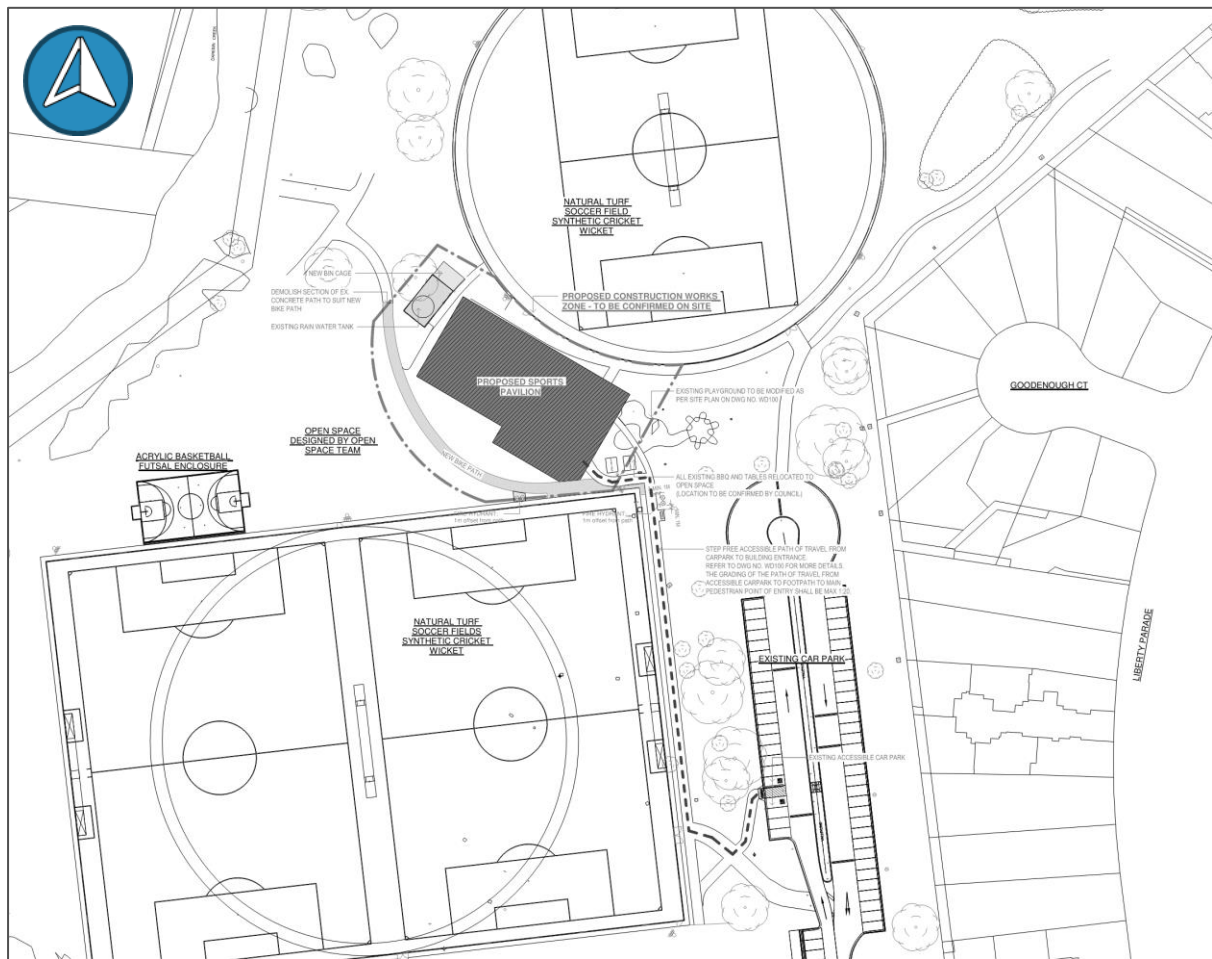


Figure 2 Proposed Site Plan (Image Source: Cassisi Architects)

3 Noise Sensitive Receivers

Table 2 and Figure 3 identify the potentially most-affected noise sensitive receivers (NSRs) in the vicinity of the project site.

Assessment of environmental noise emissions due to the project will be undertaken at these locations.

Table 2 Details of Potentially Most-Affected Noise Sensitive Receivers (NSRs)

NSR Ref.	Address	No. Storeys
1	2 Goodenough Court, Heidelberg West	1
2	2A Goodenough Court, Heidelberg West	1
3	3 Goodenough Court, Heidelberg West	1
4	3A Goodenough Court, Heidelberg West	1
5	4 Goodenough Court, Heidelberg West	1
6	2/4A Goodenough Court, Heidelberg West	1

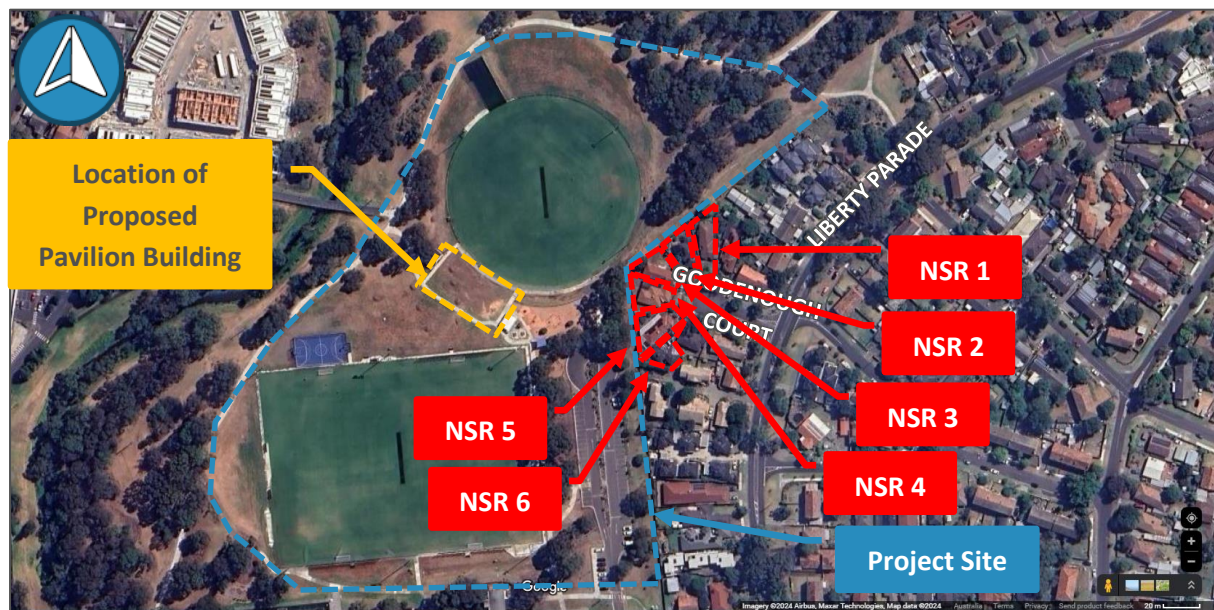


Figure 3 Locations of Potentially Most-Affected Noise Sensitive Receivers (NSRs)
(Aerial Photo Source: Google Maps)

4 Assessment

4.1 Assessment Criterion

The assessment will compare noise levels at the identified noise sensitive receivers at Goodenough Court due to expected use of the cricket ovals and soccer fields, firstly without the pavilion building (existing situation), and then with the pavilion building (proposed situation).

4.2 Methodology

SoundPLAN environmental noise modelling software was used to model the noise emissions with and without the proposed pavilion building.

Noise emission calculations have been based on the following parameters:

- Site layout as per the reference architectural drawings.
 - For the existing situation, no buildings have been modelled within the Olympic Park site.
 - For the proposed situation, the pavilion building has been modelled in accordance with the site layout and general building facade construction and external cladding materials as documented in the reference architectural drawings.
 - The primary noise sources anticipated during the use of the sports fields are crowd / player noise and sound from whistles. Four different noise scenarios have been modelled based on these key sources:
 - Scenario 1: Soccer players playing each of the three soccer fields, as shown in Figure 4. It is expected that soccer players will be generally louder than cricket players during a game. Scenario 1 is therefore considered to be representative of typical soccer games or particularly loud cricket games. Each group of players in each soccer field modelled with an individual Sound Power Level of 95 dB(A)¹.
 - Scenario 2: Crowd gathered along the boundaries of both the cricket oval and soccer fields, as shown in Figure 5. Each crowd modelled with an individual Sound Power Level of 98 dB(A)¹.
 - Scenario 3: Two whistles blown simultaneously at two locations along the boundaries of both the cricket oval and soccer field nearest to the pavilion building, as shown in Figure 6. Each whistle modelled with an individual Sound Power Level of 99 dB(A)^{Error!}
- Bookmark not defined.

¹ Note that whilst sound power levels of sources may vary in practice from those modelled, the absolute sound power levels are somewhat arbitrary for the purpose of this assessment, since the assessment is based on a relative comparison between noise levels for the existing situation and the proposed situation, assuming the same source sound power levels in both cases.

- Scenario 4: Two whistles blown simultaneously at two locations along the boundaries of both the cricket oval and soccer field nearest to the noise sensitive residential receivers, as shown in Figure 7. Each whistle modelled with an individual Sound Power Level of 99 dB(A)^{Error! Bookmark not defined.}.
- All baseline boundary fencing (i.e. without acoustic treatment) modelled as non-acoustic fencing. For the purpose of the calculations all fencing has been taken to have no acoustic screening effect.

Further details of the noise modelling input parameters, assumptions, and data sources are presented in Appendix B.

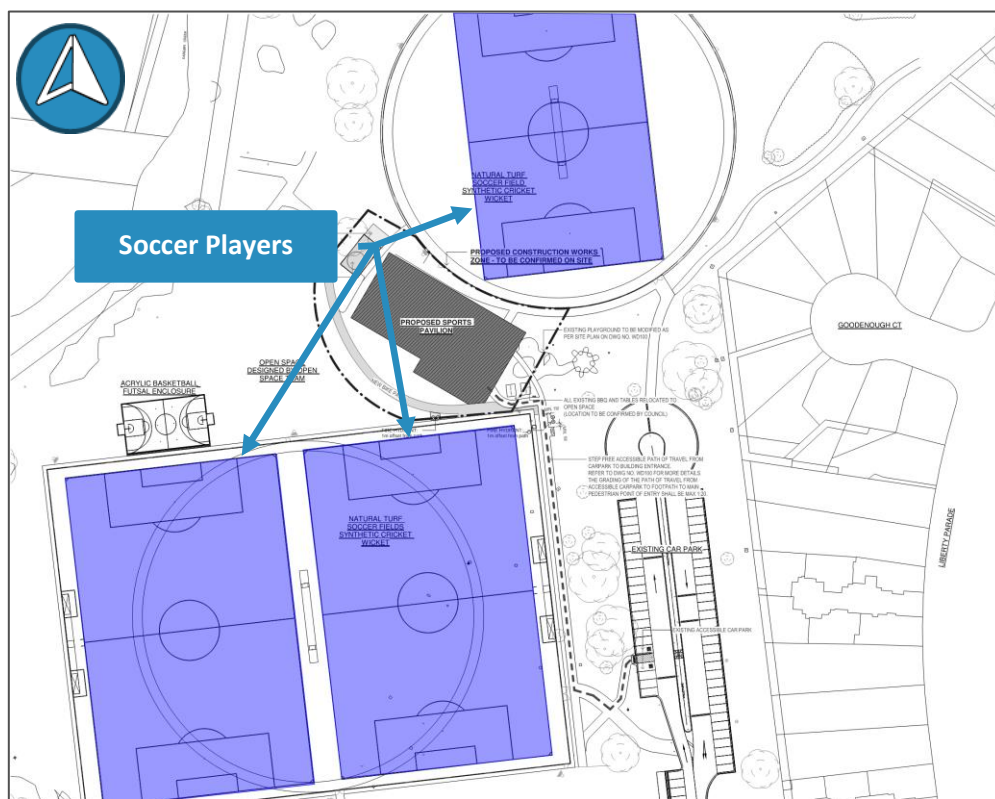


Figure 4 Modelled Soccer Player Locations (Image Source: Cassisi Architects)

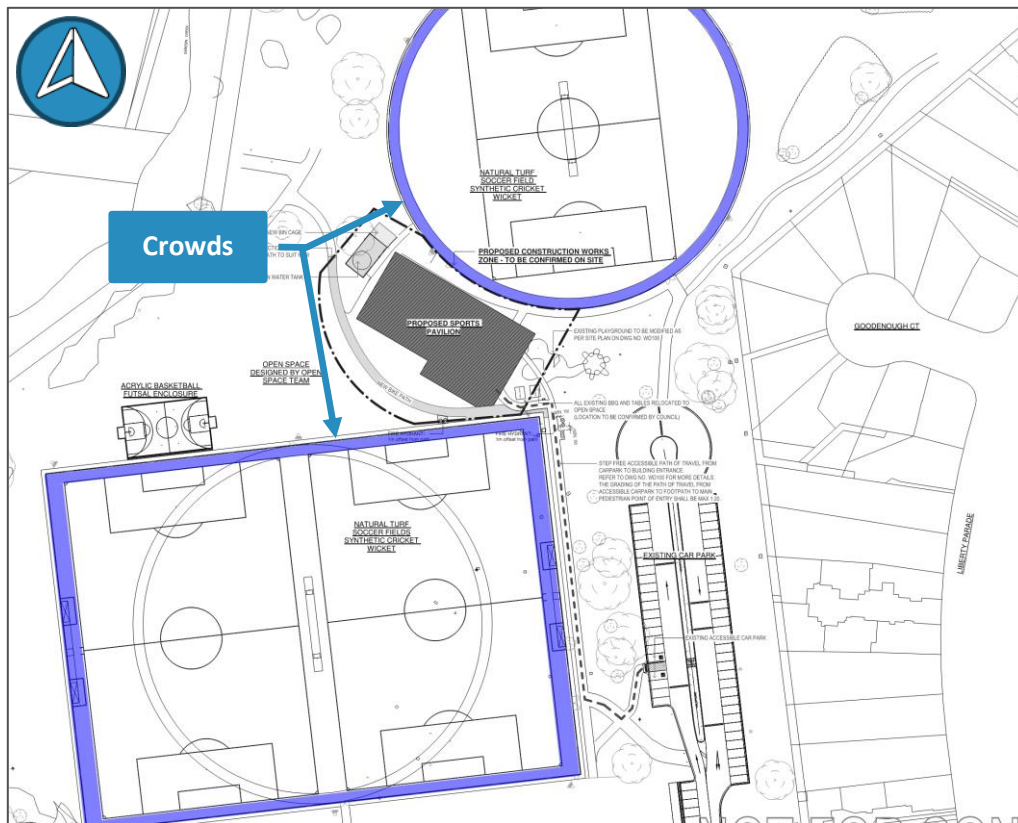


Figure 5 Modelled Crowd Locations (Image Source: Cassisi Architects)

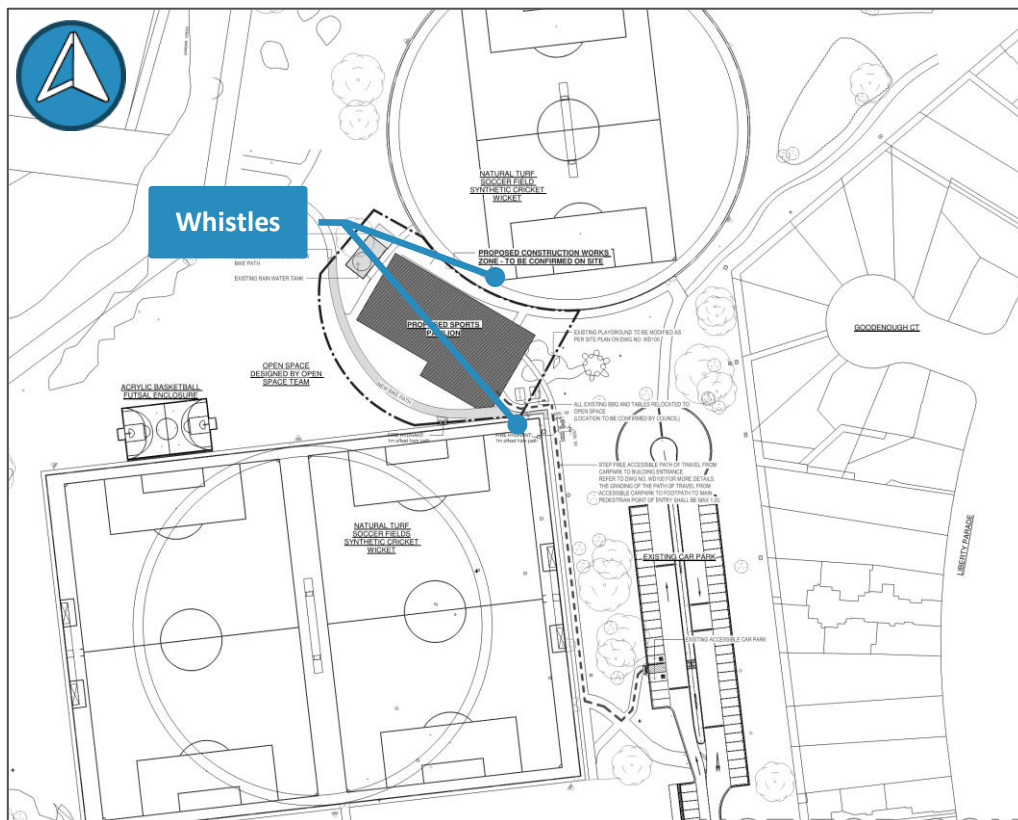


Figure 6 Whistles Near Proposed Pavilion (Image Source: Cassisi Architects)

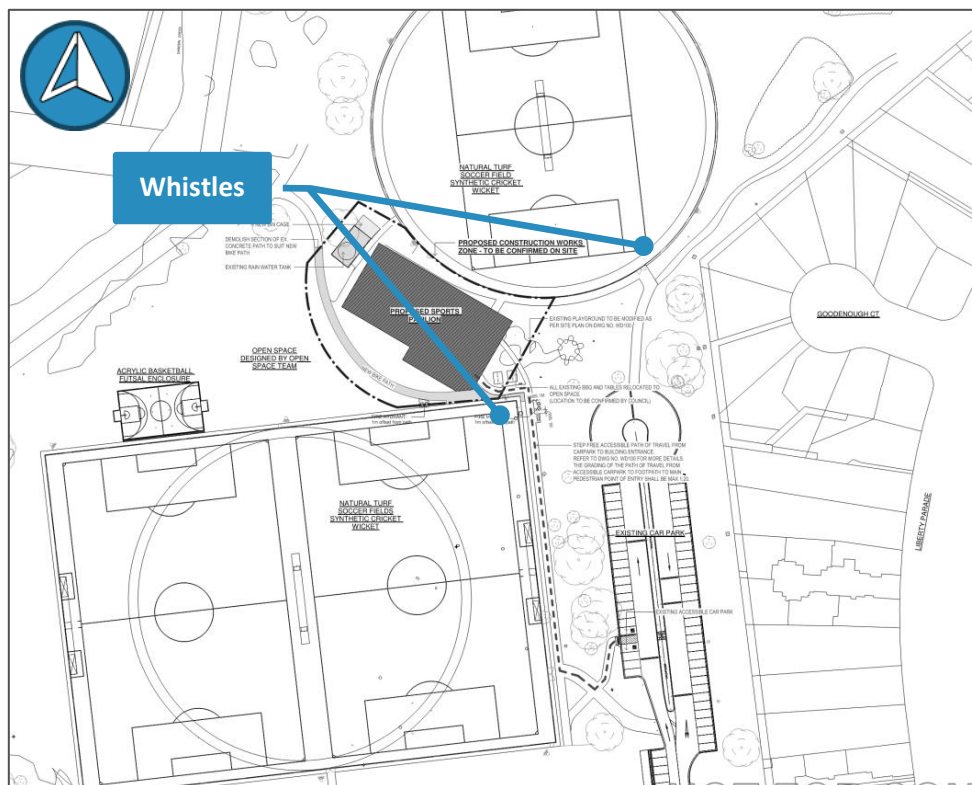


Figure 7 Whistles Near Noise Sensitive Receivers (Image Source: Cassisi Architects)

4.3 Results

4.3.1 Scenario 1 – Soccer Player Noise

Table 3 Calculated Soccer Player Noise Levels

NSR	Calculated Noise Level at NSRs, $L_{A_{Fmax}}$ dB(A)		Change in Noise Level
	Existing Situation	Proposed Situation	
1	44	44	0
2	45	45	0
3	47	47	0
4	47	47	0
5	46	46	0
6	44	44	0

4.3.2 Scenario 2 – Crowd Noise

Table 4 Calculated Crowd Noise Levels

NSR	Calculated Noise Level at NSRs, $L_{A_{Fmax}}$ dB(A)		Change in Noise Level
	Existing Situation	Proposed Situation	
1	49	50	+1
2	51	51	0
3	53	53	0
4	51	52	+1
5	48	49	+1
6	46	47	+1

4.3.3 Scenario 3 – Whistles Near Proposed Pavilion Building

Table 5 Calculated Whistle Noise Levels – Whistles Near Proposed Pavilion Building

NSR	Calculated Noise Level at NSRs, L_{AFmax} , dB(A)		Change in Noise Level
	Existing Situation	Proposed Situation	
1	47	49	+2
2	47	50	+3
3	50	53	+3
4	52	52	0
5	51	51	0
6	50	50	0

4.3.4 Scenario 4 – Whistles Near Noise Sensitive Receivers

Table 6 Calculated Whistle Noise Levels – Whistles Near Noise Sensitive Receivers

NSR	Calculated Noise Level at NSRs, L_{AFmax} , dB(A)		Change in Noise Level
	Existing Situation	Proposed Situation	
1	51	51	0
2	55	55	0
3	59	59	0
4	58	58	0
5	54	55	+1
6	50	51	+1

4.4 Assessment Outcome

The noise modelling results indicate that the proposed pavilion building will result in slightly increased noise levels at the residential receivers at Goodenough Court due to use of the cricket ovals and soccer fields. The noise modelling shows changes ranging from 0 to +3 dB(A) with the new pavilion building compared to without it.

Note that in practice, a 3 dB(A) change in Sound Pressure Level is typically a just-noticeable difference. A 2 dB(A) or less change in Sound Pressure Level is typically not perceivable. As such, the subjective loudness of the calculated noise levels in the proposed situation (with the pavilion building) would not differ perceptibly from that for noise levels in the existing situation (without the pavilion building).

On this basis, it is considered that noise reflecting off the proposed Olympic Park pavilion building due to use of the cricket ovals and soccer fields will have insignificant impact on amenity of the residential receivers at Goodenough Court.

5 Conclusion

This document has presented a noise assessment for the proposed Olympic Park Pavilion at 240 Southern Road, West Heidelberg, VIC.

The assessment has evaluated potential noise due to use of the Olympic Park sports fields reflecting off the proposed new pavilion building to nearby residential receivers at Goodenough Court.

The assessment has determined that the new pavilion building will slightly increase noise levels at Goodenough Court by 0 to +3 dB(A) due to activities on the sports fields, depending on location of the noise sources.

Subjectively, a change of 3 dB(A) is typically only just noticeable, while 2 dB(A) or less is typically imperceptible in most practical conditions. Therefore, the pavilion building is expected to have insignificant impact on acoustic amenity at residences within Goodenough Court.

6 References

ISO. (1996). ISO 9613-2:1996 Acoustics - Attenuation of Sound During Propagation Outdoors - Part 2: General Method of Calculation. International Standards Organisation.

Appendix A Glossary of Acoustic Terms

dB / dB(A) Decibels or 'A'-weighted Decibels, the units of Sound Pressure Level and Sound Power Level. 'A'-weighting adjusts the levels of frequencies within the sound spectrum to better reflect the sensitivity of the human ear to different frequencies at Sound Pressure Levels typical of everyday sounds. [Unit: dB / dB(A)]

The following are examples of the decibel readings of everyday sounds;

- 0 dB The faintest sound we can hear
- 30 dB A quiet library or in a quiet location in the country
- 45 dB Typical office space. Ambience in the city at night
- 60 dB The sound of a vacuum cleaner in a typical lounge room
- 70 dB The sound of a car passing on the street
- 80 dB Loud music played at home
- 90 dB The sound of a truck passing on the street
- 100 dB The sound of a rock band
- 120 dB Deafening

$L_{AFmax,T}$ The maximum value of A-weighted, F time-weighted Sound Pressure Level which occurs during a given measurement period T. [Unit: dB / dB(A)]

Sound Power Level A measure of the total sound energy radiated by a source, per unit time. Mathematically, it is ten times the logarithm to the base ten of the ratio of the sound power (W) of the source to the reference sound power; where the reference sound power is 1×10^{-12} W. [Unit: dB]

Sound Pressure Level A measure of the magnitude of a sound wave. Mathematically, it is twenty times the logarithm to the base ten of the ratio of the root mean square sound pressure at a point in a sound field, to the reference sound pressure; where sound pressure is defined as the alternating component of the pressure (Pa) at the point, and the reference sound pressure is 2×10^{-5} Pa. [Unit: dB]

Appendix B Modelling Parameters

B.1 General Parameters

Parameter	Description
Software	SoundPLAN Version 7.4
Calculation Method	ISO 9613-2:1996 (ISO, 1996)

B.2 Geometrical Parameters

Parameter	Description
Site Layout	As per reference documentation.
Terrain	Ground modelled according to elevation data from ELVIS (Elevation Information System).
Ground absorption	All areas modelled as soft ground using a ground factor of 1.0.
Buildings	- On-site buildings modelled as per referenced architectural drawings. - Buildings in the vicinity of the project site modelled according to the latest Google Earth satellite imagery.
Receptors	Receiver noise levels calculated at positions 1 m in front of the building facade and 1.5 m above floor level for each floor.

B.3 Environmental Parameters

Parameter	Description
Air Absorption Calculation	ISO 9613-2:1996
Air Temperature	10 degrees Celsius
Air Pressure	1013.3 mbar
Humidity	70%
Propagation Conditions	- The propagation conditions used in the modelling are the standard ISO 9613-2 conditions. These represent downwind propagation with: - Wind direction ± 45 degrees of the direction connecting the centres of the dominant sound source and the specified receiver region, with the wind blowing from source to receiver; and - Wind speed between approximately 1 m/s and 5 m/s, measured at a height of 3 m to 11 m above ground. - The modelled conditions would similarly represent average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear, calm nights. - Such conditions result in enhanced noise propagation and can be considered to represent a worst-case scenario for noise propagation.

B.4 Noise Source Parameters

Parameter	Description																		
Soccer Players	The soccer players have been modelled as: ▪ Area sources 1.5 m above ground level. ▪ The modelled Sound Power Levels and octave band spectrum have been based on data of shouting adult males from DDEG’s database. ▪ The modelled octave band spectrum Sound Power Levels are as follows: <table><tr><th>Frequency, Hz</th><th>63</th><th>125</th><th>250</th><th>500</th><th>1K</th><th>2K</th><th>4K</th><th>Total dB(A)</th></tr><tr><th>Sound Level, dB(Z)</th><td>52</td><td>55</td><td>78</td><td>88</td><td>92</td><td>88</td><td>81</td><td>95</td></tr></table>	Frequency, Hz	63	125	250	500	1K	2K	4K	Total dB(A)	Sound Level, dB(Z)	52	55	78	88	92	88	81	95
Frequency, Hz	63	125	250	500	1K	2K	4K	Total dB(A)											
Sound Level, dB(Z)	52	55	78	88	92	88	81	95											
Crowd	The crowds have been modelled as: ▪ Area sources 1.5 m above ground level. ▪ The modelled Sound Power Levels and octave band spectrum have been based on data of shouting adult males from DDEG’s database. ▪ The modelled octave band spectrum Sound Power Levels are as follows: <table><tr><th>Frequency, Hz</th><th>63</th><th>125</th><th>250</th><th>500</th><th>1K</th><th>2K</th><th>4K</th><th>Total dB(A)</th></tr><tr><th>Sound Level, dB(Z)</th><td>55</td><td>58</td><td>81</td><td>91</td><td>95</td><td>91</td><td>84</td><td>98</td></tr></table>	Frequency, Hz	63	125	250	500	1K	2K	4K	Total dB(A)	Sound Level, dB(Z)	55	58	81	91	95	91	84	98
Frequency, Hz	63	125	250	500	1K	2K	4K	Total dB(A)											
Sound Level, dB(Z)	55	58	81	91	95	91	84	98											
Whistle	The whistles have been modelled as: ▪ Point sources 1.5 m above ground level. ▪ The modelled Sound Power Levels and octave band spectrum have been based on data from DDEG’s database. ▪ The modelled octave band spectrum Sound Power Levels are as follows: <table><tr><th>Frequency, Hz</th><th>63</th><th>125</th><th>250</th><th>500</th><th>1K</th><th>2K</th><th>4K</th><th>Total dB(A)</th></tr><tr><th>Sound Level, dB(Z)</th><td>102</td><td>92</td><td>93</td><td>96</td><td>88</td><td>95</td><td>88</td><td>99</td></tr></table>	Frequency, Hz	63	125	250	500	1K	2K	4K	Total dB(A)	Sound Level, dB(Z)	102	92	93	96	88	95	88	99
Frequency, Hz	63	125	250	500	1K	2K	4K	Total dB(A)											
Sound Level, dB(Z)	102	92	93	96	88	95	88	99											