

### **APPENDIX M – NOISE IMPACT ASSESSMENT**

**Range Environmental Consultants** 

# NOISE IMPACT ASSESSMENT Toowoomba Region Sports Precinct



#### **Client: RMA Engineers**

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#### **Document Version Register**



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## 1. Introduction

Range Environmental Consultants (Range Environmental) was engaged by RMA Engineers (hereafter 'the Client') to conduct a noise impact assessment for the proposed Toowoomba Region Sports Precinct (TRSP) at Gowrie Junction on behalf of Toowoomba Regional Council (TRC). The TRSP would be located at Lots 276 SP268921, 110 SP272107, 112 to 117 A345, 111 SP272107, 24 SP214746, 118 to 119 SP203198, 3 RP22810 100SP270472 and two (2) road parcels (hereafter 'the site') (Figure 1).

This noise impact assessment was undertaken to address the following:

- Sections 440X, 440Y and 440ZC of the *Environmental Protection Act 1994* (EP Act);
- Performance Outcome 8 (PO8) and PO13 of the Environmental Standards Code of the Toowoomba Regional Planning Scheme (TRPS) (2012, v27); and
- Acoustic Quality Objectives (AQOs) under the Environmental Protection (Noise) Policy 2019.

The following aspects of the noise impact assessment were developed in consultation with the Client and Luke Jackson from Toowoomba Regional Council:

- Noise measurement methodology for ambient noise levels and the existing rifle range;
- Applicable noise assessment criteria and noise sources; and
- Proposed approach of noise modelling.





## 2. **Project Description**

#### 2.1 Site Description

The site is located at Gowrie Junction, Toowoomba and is formally comprised of Lots 276 SP268921, 110 SP272107, 112 to 117 A345, 111 SP272107, 24 SP214746, 118 to 119 SP203198, 3 RP22810 100SP270472 and two (2) road parcels (Figure 1).

With the exception of the existing rifle club at Lot 276 SP268921 and a portion of Lot 24 SP214746 in the south-west corner, all of the site's land parcels are currently used for grazing purposes and are mostly void of woody vegetation.

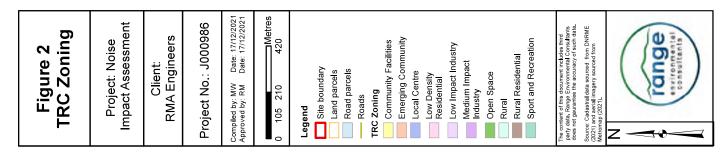
As shown in Figure 2, the site is zoned as Sports and Recreation under the TRC Planning Scheme.

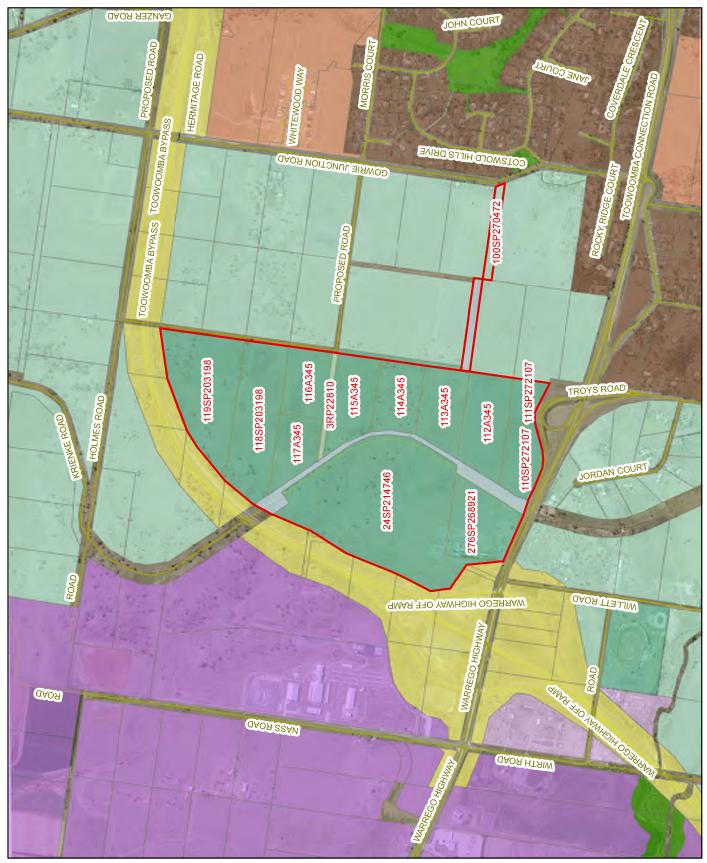
The surrounding land zoning and land uses proximate to the site included (Figure 2):

- North: Community Facilities (Toowoomba Bypass) and Rural (rural dwellings);
- South: Community Facilities (Toowoomba Connection Road) and Rural and Rural Residential (rural residential dwellings);
- East: Rural (rural dwellings); and
- West: Community Facilities (Toowoomba Bypass) and Medium Impact Industry (industrial businesses and rural dwellings).

The key existing noise sources in the local area surrounding the site included the following:

- The existing rifle club at the site (intermittent); and
- Road traffic noise on Gowrie Junction Road (east), the Toowoomba Bypass (north and west) and Toowoomba Connection Road (south).







### 2.2 Proposed Development

The TRSP would consist of the uses outlined in Table 1 below and shown at Appendix A: over seven (7) stages (Plan no. DC-35 to DC-41). The TRSP would include licensed premises such as clubhouses and amenities.

As shown in the detailed plans for the Northern Precinct at Appendix A:, the existing rifle club will be relocated to the northern portion of the site, which is formally described as Lots 118 & 119 SP203198. It is understood that the existing rifle club operations are representative of the proposed rifle club, as all the following gun variables will remain the same - gauge, feet per second (FPS) and calibre. Further details about the existing rifle club are provided at Section 4.

#### Table 1 Proposed development land uses

Site ID at Appendix A	Description	
Detailed Plan - Northern Precinct		
1	Indoor and Outdoor Shooting Precinct	
1a	Indoor Shooting Range	
1b	Skeet Shooting Range	
1c	Long Range Shooting	
2	Archery Precinct	
3	Planted Screen Buffer with Safety Bund (2m high) and Security Fence	
4	Shared Shooting and Archery Clubhouse and Parking	
5	Rectangular Fields Precinct 2	
6	Rectangular Fields Precinct 2: Shared Rectangular Fields with Oval Overlay	
7	Rectangular Fields Precinct 3: Shared Rectangular Fields with Oval Overlay	
8	Rectangular Fields Precinct 3: Clubhouse and Parking	
9	District Level Playground	
10	District Level Carpark	
11	Dry Creek (with Stormwater Treatment)	
12	Amphitheatre Capitalising on the Natural Topography	
13	Dry Creek Stormwater Channels	
14	Oval Field Precinct - Refer to Southern Precinct Plan	
15	Shared Use Clubhouse Rectangular Fields	
16	Shared Path along former Rail Corridor	
17	Shared Pedestrian/Cycle Pathways	
18	Car Parking	
19	Planted Vegetation Buffer	
20	Public Amenities	
21	Small Play Space Associated with Club Facility	
22	Northern Precinct Maintenance Shed/Compound	



Site ID at Appendix A	Description	
Detailed Plan - Southern Precinct		
1	Premier Oval	
2	Premier Rectangular Field	
3	Premier Hub (Amenities)	
4	Premier Hub Setdown Area and Overflow Parking	
5	Entry Parkland	
6	Maintenance Access Track to Adjoining Site	
7	Small Play Space Associated with Club Facility	
8	Rectangular Fields Precinct 1	
9	Oval Field 3	
10	Oval Field 1	
11	Oval Field 2	
12	Southern Precinct Maintenance Shed/Compound	
13	Planted Vegetation Buffers	
14	Access from Gowrie Junction Road	
15	Planted Embankments	
16	Toowoomba Connection Road Entry - Left in/Left out arrangement	
17	Existing Troys Road Interchange	
18	Tree Lined Avenue Entry Road with Central Median	
19	Shared Path along former Rail Corridor	
20	Shared Pedestrian/Cycle Pathways	
21	Shared Use Oval Clubhouse	
22	Overflow (Event) Parking	
23	Spectator Viewing Mounds (Nom. 3m above fields)	
24	Practice Nets	
25	Local Playground/Park	
26	Rectangular Fields Clubhouse	
27	Diamond Fields	
28	Diamond Fields	
29	Car parking	
30	Drop off and PWD parking	
31	Shared Diamond Fields Clubhouse	
32	Dry Creek Stormwater Channels	
33	Rectangular Field Precinct 2: Refer to Northern Precinct Plan	

### 2.3 Hours of Operation

The site's proposed hours of operation are 6:00am to 10:00pm, 7 days per week. However, as shown at Appendix B:, the operating hours will vary within these times according to the following factors:

- Time of year: Winter (March to September) and Summer (October to February);
- The type of activity; and



• The day of the week.

### 2.4 Operational Noise Sources

The following key noise sources from the proposed development were considered in the assessment. Stages 1 to 7 and a One-off Event will not occur simultaneously.

Stages 1 to 7 (Section 6) - represents operations under normal use in peak seasons which could include a regional carnival event where most of the fields are in use simultaneously:

- Raised Voice;
- Amplified Speech;
- Rooftop Plant;
- Spectators;
- Amphitheatre Concert Music and Speech;
- Workshop Noise;
- Cricket Hit;
- 20kW Water Pump;
- Amenities (Hand Dryer, etc);
- Gunshot (L<sub>Zpeak</sub>);
- Clubhouse Internal;
- Vehicle Movement;
- Car Door Closure;
- Sports Field; and
- Referee Whistle.

One-off Event (Section 7) - represents operations for an event approximately once or twice per year where there would be a higher concentration of patrons in the premier fields:

- Raised Voice;
- Amplified Speech;
- Rooftop Plant;



- Spectators;
- Clubhouse Internal;
- Vehicle Movement;
- Car Door Closure;
- Sports Field; and
- Referee Whistle.

### 2.5 Noise Sensitive Receptors

The nearest most potentially affected noise sensitive receptors are shown in Figure 3 and Table 2.

#### Table 2 Noise sensitive receptors

Identification	Real Property Description	Street Address	Receptor Type
Receptor 1	484 AG3377	86 Holmes Road, Gowrie Junction	Existing dwelling
Receptor 2	2 A342650	255 Gowrie Junction Road, Gowrie Junction	Existing dwelling
Receptor 3	5 RP804604	258 Gowrie Junction Road, Gowrie Junction	Existing dwelling
Receptor 4	131 A345	177 Gowrie Junction Road, Gowrie Junction.	Existing dwelling
Receptor 5	134 A345	169 Gowrie Junction Road, Gowrie Junction	Existing dwelling
Receptor 6	115 SP290343	18 Box Drive, Cotswold Hills	Existing dwelling
Receptor 7	196 SP135001	13 Morris Court, Cotswold Hills	Existing dwelling
Receptor 8	195 SP135001	15 Morris Court, Cotswold Hills	Existing dwelling
Receptor 9	194 SP135001	17 Morris Court, Cotswold Hills	Existing dwelling
Receptor 10	193 SP135001	19 Morris Court, Cotswold Hills	Existing dwelling
Receptor 11	192 SP135001	21 Morris Court, Cotswold Hills	Existing dwelling
Receptor 12	139 RP906942	74 Cotswold Hills Drive, Cotswold Hills	Existing dwelling
Receptor 13	142 A345	85 Gowrie Junction Road, Gowrie Junction	Existing dwelling
Receptor 14	136 RP906942	68 Cotswold Hills Drive, Cotswold Hills	Existing dwelling
Receptor 15	135 RP907444	66 Cotswold Hills Drive, Cotswold Hills	Existing dwelling
Receptor 16	134 RP907444	64 Cotswold Hills Drive, Cotswold Hills	Existing dwelling



Identification	Real Property Description	Street Address	Receptor Type
Receptor 17	133 RP907444	62 Cotswold Hills Drive, Cotswold Hills	Existing dwelling
Receptor 18	132 RP907444	58 Cotswold Hills Drive, Cotswold Hills	Existing dwelling
Receptor 19	2 RP162527	8-10 Gowrie Junction Road, Cotswold Hills	Existing dwelling
Receptor 20	1 RP166830	6 Gowrie Junction Road, Cotswold Hills	Existing dwelling
Receptor 21	11 RP910748	1 Rocky Ridge Court, Cotswold Hills	Existing dwelling
Receptor 22	4 RP186848	3 Rocky Ridge Court, Cotswold Hills	Existing dwelling
Receptor 23	3 RP186848	5 Rocky Ridge Court, Cotswold Hills	Existing dwelling
Receptor 24	2 RP186848	7 Rocky Ridge Court, Cotswold Hills	Existing dwelling
Receptor 25	1 RP186848	9 Rocky Ridge Court, Cotswold Hills	Existing dwelling
Receptor 26	10 RP186848	10 Rocky Ridge Court, Cotswold Hills	Existing dwelling
Receptor 27	1 RP118884	24-26 Charlton Pinch Road, Torrington	Existing dwelling
Receptor 28	1 RP131049	28 Charlton Pinch Road, Torrington	Existing dwelling
Receptor 29	2 RP140005	8-10 Troys Road, Torrington	Existing dwelling
Receptor 30	12 RP141936	15-17 Jordan Court, Charlton	Existing dwelling
Receptor 31	9 RP141936	22-24 Jordan Court, Charlton	Existing dwelling
Receptor 32	10 RP141936	26-28 Jordan Court, Charlton	Existing dwelling
Receptor 33	11 RP141936	19-21 Jordan Court, Charlton	Existing dwelling
Receptor 34	16 SP247506	101 Nass Road, Charlton	Existing dwelling
Receptor 35	13 SP191363	Willett Road, Charlton	Existing dwelling





## 3. Ambient Noise Measurements

#### 3.1 Noise Measurement Standard

The ambient noise survey was undertaken in accordance with Australian Standard *AS1055.1:1997 - Acoustics - Description and measurement of environmental noise - Part 1: General procedures* and the Department of Environment and Science's (DES) Noise Measurement Manual 2020. Ambient noise levels were recorded from 3 November 2021 to 10 November 2021. The noise measurement method recorded total ambient noise levels at the site from all noise sources.

#### 3.2 Noise Logger

A BSWA 309 sound level meter was used for the ambient noise survey. The instrument was calibrated before and after the logging session and was found to match the reference signal. The instrument and the calibrator hold current calibration certificates from a NATA certified calibration laboratory.

### 3.3 Unattended Noise Logger Location and Siting

The microphone of the noise logger was situated 1.4 m above ground level and in a free field position (Photograph 1). The location of the noise logger in relation to the site boundary is shown in Figure 3. The noise logger was conservatively sited in this location to represent the ambient noise levels of the nearby sensitive receptors which were less influenced by road noise from the Toowoomba Bypass (north) and the Toowoomba Connection Road (south). These receptors were expected to experience lower background noise levels than other sensitive receptors.





Photograph 1 View to the east of the noise logger in position



### 3.4 Instrument Settings

The following instrument settings were used:

- 'A' frequency weighting;
- 'Fast' time weighting; and
- 15-minute sample integration time.

#### 3.5 Weather Conditions

Weather data was taken from the Toowoomba Airport (weather station ID: 041529). Overall weather conditions during the measurement period were suitable for noise monitoring. This was confirmed by field readings of wind speed and direction at logger deployment and collection.

#### 3.6 Ambient Noise Levels

Ambient noise survey data are presented graphically at Appendix C: and average values are summarised in Table 3.

#### Table 3 Average ambient noise levels

Time of Day	LA01,15 min	LA10,15 min	L <sub>A90,15</sub> min	L <sub>Aeq,15</sub> min	L <sub>Amax,15</sub> min
Day (7am-6pm)	61	54	41	51	68
Evening (6pm-10pm)	59	54	44	51	66
Night (10pm-7am)	57	50	39	47	64

The key existing noise sources in the local area surrounding the site included the following:

- The existing rifle club at the site (intermittent); and
- Road traffic noise on Gowrie Junction Road (east), the Toowoomba Bypass (north and west) and Toowoomba Connection Road (south).



## 4. Existing Rifle Club Noise Measurements

Range Environmental conducted the following attended noise monitoring surveys to ensure a representative gunshot noise level was applied to the model of the proposed rifle club in the Northern Precinct:

- Section 4.1 All gun configurations commonly used at the existing rifle club were measured on 6 October 2021 to confirm which gun configuration generates the loudest noise emissions (hereafter 'test event').
- Section 4.2 Noise measurements were undertaken at the site's existing rifle club on 10 October 2021 to measure the operational noise levels of a typical clay target shooting event (hereafter 'monitoring event') and to apply those representative noise levels to the proposed rifle club in the assessment.

#### 4.1 Test Event Measurements

Range Environmental conducted attended noise monitoring of commonly used gun configurations on 6 October 2021 to determine the noise level differences between the various gun configurations used at the existing rifle club, which will also be used at the proposed rifle club.

#### 4.1.1 Noise Measurement Standard

The attended test event noise survey was undertaken in accordance with the following:

- Australian Standard AS IEC 61672.1-2019 Electroacoustics Sound level meters Specifications;
- Australian Standard AS1055.1:1997 Acoustics Description and measurement of environmental noise Part 1: General procedures; and
- Department of Environment and Science's (DES) Noise Measurement Manual 2020.

The noise measurement method recorded total ambient noise levels at the site from all noise sources.

#### 4.1.2 Noise Logger

A Class 1 Larson Davis 831 sound level meter was used for the attended test event noise survey. The instrument was calibrated before and after the logging session and was found to match the reference signal. The instrument and the calibrator hold current calibration certificates from a NATA certified calibration laboratory.



#### 4.1.3 Attended Noise Logger Location and Siting

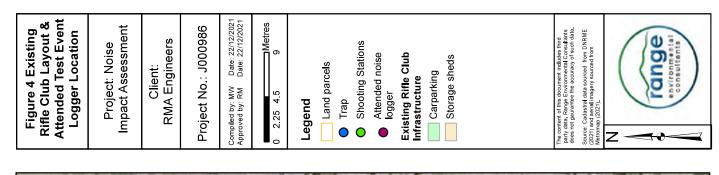
The microphone of the attended noise logger was situated 1.5 m above ground level and in a free field position (Photograph 2). The location of the attended noise logger in relation to the targeted noise source at shooting station 1, Trap 5 is shown at Photograph 2 and Figure 4 below.

The noise logger was sited 16m from shooting station 1 (Figure 4) in consideration of the following:

- The logger had a clear line of sight to shooting station 1 and was at a similar ground level by avoiding contour banks at the site; and
- The distance ensured the measurement threshold of the noise logger (approximately 148dB Peak) was not exceeded during the monitoring.



Photograph 2 View to the east of the attended test event logger in position at Trap 5







#### 4.1.4 Instrument Settings

The following instrument settings were used for the attended test event noise survey:

- 'Z' frequency weighting.
- 'Fast' time weighting.
- < 1 second sample integration time.

#### 4.1.5 Weather Conditions

Weather data was taken from the Toowoomba Airport (weather station ID: 041529). Overall weather conditions during the attended measurement period were suitable for noise monitoring. This was confirmed by field readings of wind speed (calm to 2.2m/s) and wind direction (southerly) during the measurement period.

#### 4.1.6 Attended Test Event Noise Levels

Up to five (5) shots from each gun configuration was measured to determine the noise level for each configuration.

Table 4 below shows that the highest measured noise levels from the different gun configurations were all within 4dB of each other.

#### Table 4 Attended test event results

Gun Configuration	No. shots fired	Distance from logger to shooting station	Highest noise level measured (L <sub>ZPeak</sub> )
410 Bore, 1200 fps, 14g loads.	5	16m	140
28 Gauge, 1200 fps, 21g loads.	5		136
20 Gauge, 1200 fps, 24 g loads.	5		136
12 Gauge, 1200 fps, 28g (over and under using International Shooting Sport Federation loads).	5		136
12 Gauge, 1350fps, 28g (over and under).	5		137
12 Gauge, 1350fps, 28g (over and under - ported barrel).	3 (targets ran out)		138
12 Gauge, 1050fps, 28g (auto using above loads).	5		137
12 Gauge, 1050fps, 28g (over and under using 32-inch barrels).	5		136
12 Gauge, 1350fps, 28g (over and under using 26-inch barrels).	5		140



### 4.2 Monitoring Event Measurements

Range Environmental conducted attended noise monitoring at a typical clay target shooting event on 10 October 2021, where all competitors used double-barrel 12-gauge shotguns, 1150-1250fps, 28g.

Given the marginal noise level differences between gun configurations at the site of 1-4dB (as demonstrated at Section 4.1.6), the monitoring event measurements outlined below are an acceptable representation of the noise emissions from a clay target shooting event at the proposed rifle club.

#### 4.2.1 Noise Measurement Standard

The attended monitoring event noise survey was undertaken in accordance with the following:

- Department of National Parks, Sports and Racing (DNPSR) Planning for Shooting and Motor Sports Facilities (November 2016);
- Australian Standard AS IEC 61672.1-2019 Electroacoustics Sound level meters Specifications;
- Australian Standard AS1055.1:1997 Acoustics Description and measurement of environmental noise Part 1: General procedures;
- Section 440ZC of the EP Act; and
- Department of Environment and Science's (DES) Noise Measurement Manual 2020.

The noise measurement method recorded total ambient noise levels at the site from all noise sources.

To comply with the gunshot monitoring requirements under Section 440ZC of the EP Act, at least 20 individual gunshots in any 30-minute period must be measured. As shown in Section 4.2.6, Range Environmental's noise survey of the monitoring event complied with the EP Act requirements as follows:

- Measured two (2) x 30-minute periods at Trap 4, whilst Traps 3 and 5 were also operational.
- Each 30-minute period measured more than 30 gunshots.

#### 4.2.2 Noise Logger

A Class 1 Larson Davis 831 sound level meter was used for the attended monitoring event noise survey. The instrument was calibrated before and after the logging session and was found to match the reference signal. The instrument and the calibrator hold current calibration certificates from a NATA certified calibration laboratory.



#### 4.2.3 Attended Noise Logger Location and Siting

The microphone of the attended noise logger was situated 1.5 m above ground level and in a free field position (Photograph 3). The location of the attended noise logger in relation to the targeted noise sources at Trap 4 is shown at Photograph 3 and Figure 5 below.

The noise logger was sited 15.4m from shooting station 1 (Figure 5) in consideration of the following:

- The logger had a clear line of sight to the shooting stations and was at a similar ground level by avoiding contour banks at the site;
- The logger was >3m from potential noise reflection sources such as the nearby skeet tower high houses and colour bond fencing;
- The distance ensured the measurement threshold of the noise logger (approximately 148dB Peak) was not exceeded during the monitoring.



Photograph 3 View to the south-west of the attended monitoring event logger in position at Trap 4







#### 4.2.4 Instrument Settings

The following instrument settings were used for the attended monitoring event noise survey:

- 'Z' frequency weighting.
- 'Fast' time weighting.
- < 1 second sample integration time.

#### 4.2.5 Weather Conditions

Weather data was taken from the Toowoomba Airport (weather station ID: 041529). Overall weather conditions during the attended measurement period were suitable for noise monitoring. This was confirmed by field readings of wind speed (calm to 2.4m/s) and wind direction (northerly) during the measurement period.

#### 4.2.6 Attended Monitoring Event Noise Levels

As outlined in Section 440ZC (3) of the EP Act, noise from an outdoor shooting range is measured by working out the arithmetic average of the noise levels of whichever of the following happens first during the measurement period:

- a. at least 40 individual gunshots;
- b. at least 20 individual gunshots in any 30-minute period.

As shown in Table 5 below, the arithmetic average of the 30 loudest shots for both 30-minute measurement periods was 137 dB(Z)(Peak).

Section 6 outlines how the attended monitoring event noise level was applied to the proposed development.

#### Table 5 Attended monitoring event results

30 Loudest Shots in 1st 30min Period (9:30am to 9:59am) L <sub>zPeak</sub>	30 Loudest Shots in 2nd 30min Period (10:00am to 10:29am) L <sub>ZPeak</sub>
138	139
138	139
138	138
137	138
137	138
137	138
137	138



30 Loudest Shots in 1st 30min Period	30 Loudest Shots in 2nd 30min Period
(9:30am to 9:59am) L <sub>zPeak</sub>	(10:00am to 10:29am) L <sub>zPeak</sub>
137	138
137	138
137	137
137	137
137	137
137	137
137	137
137	137
136	137
136	137
136	137
136	137
136	137
136	137
136	137
136	137
136	136
136	136
136	136
136	136
136	136
136	136
136	136
Arithmetic Average = 137 dB	Arithmetic Average = 137 dB



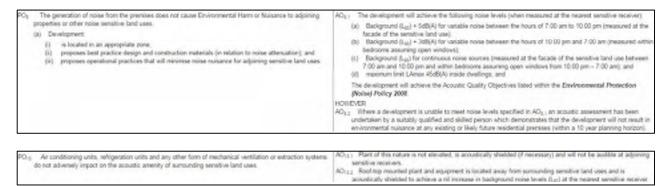
### 5. Noise Assessment Criteria

As shown below, the applicable and most stringent noise assessment criteria are as follows for the assessment, which was modelled as a 24-hour, 7-day operation for ease of modelling:

- Cumulative continuous (L<sub>90</sub>) noise sources during the day, evening and night-time periods see Section 5.1.2.
- Discreet (L<sub>max</sub>) noise sources during the night-time period see Section 5.1.3.
- Cumulative variable (L<sub>eq</sub>) noise sources during the day, evening and night-time periods see Section 5.1.4.
- Gunshot noise source (L<sub>ZPeak</sub>) during the day and night-time periods see Section 5.2.

### 5.1 Criteria for All Activities (Except Rifle Club)

PO8 and PO13 of the Environmental Standards Code is presented below.



The noise assessment criteria to be achieved are described in the following sections.

#### 5.1.1 Variable Noise

Noise assessment criteria for variable noise  $(L_{Aeq})$  were based on Acceptable Outcome (AO) A08.1 (a) and (b) of the Environmental Standards Code of the TRPS and are presented in Table 6.

Time of Day	Ambient background (L <sub>A90</sub> ) (dBA) (from Table 3)	Allowable exceedance above ambient background (dBA) (at façade)	Variable noise assessment criteria (L <sub>Aeq</sub> ) (dBA) at the dwelling façade
Day (7am-6pm)	41	5	46

#### Table 6 Variable noise assessment criteria



Time of Day	Ambient background (L <sub>A90</sub> ) (dBA) (from Table 3)	Allowable exceedance above ambient background (dBA) (at façade)	Variable noise assessment criteria (L <sub>Aeq</sub> ) (dBA) at the dwelling façade
Evening (6pm-10pm)	44	5	49
Night (10pm-7am)	39	3	42

#### 5.1.2 Continuous Noise

Noise assessment criterion for continuous noise described at A08.1(c) of the Environmental Standards Code of the TRPS are provided in Table 7.

Table 7	' Continuous	noise	assessment criteria	
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Time of Day	Ambient background (L <sub>A90</sub> ) (dBA) (from Table 3)	Allowable exceedance above ambient background (dBA) (at façade)	Continuous noise assessment criteria (L <sub>A90</sub> ) (dBA) at the dwelling façade	
Day (7am-6pm)	41	0	41	
Evening (6pm-10pm)	44	0	44	
Night (10pm-7am)	39	0	39	

#### 5.1.3 Sleep Disturbance

The Environmental Standards Code does not specifically refer to criteria for sleep disturbance, however, AO8.1(d) stipulates a noise limit of 45 dBA  $L_{Amax}$  inside a dwelling. This is consistent with the night-time sleep disturbance criteria specified by the EPA (2004). The corresponding external level is 55 dBA  $L_{Amax}$  at the façade of a dwelling for a normal, naturally ventilated building with partially closed windows.

#### 5.1.4 Acoustic Quality Objectives (AQO)

AO8.1 requires developments to achieve the AQOs provided at Schedule 1 of the Environmental Protection (Noise) Policy 2019 (Noise EPP) (Table 8). LAeq is the most relevant descriptor for the noise emissions from the proposed development.

Sensitive Receptor	Time of Day	LAeq,adj,1hr	LA10,adj,1hr	LA01,adj,1hr	
Residence (for outdoors)	Day and evening	50	55	65	
Residence	Day and evening	45	50	55	
	Night	40	45	50	

#### Table 8 Acoustic Quality Objectives from the Noise EPP



Sensitive Receptor	Time of Day	L <sub>Aeq,adj,1hr</sub>	L <sub>A10,adj,1hr</sub>	LA01,adj,1hr
(for indoors) <sup>1</sup>				

#### 5.1.5 EP Act (Open-Air Events & Amplifier Devices)

Section 440X of the EP Act describes requirements for open air events in relation to offences of causing environmental nuisance. Section 440X (1)(b) states that an open-air event at the site must not cause noise of more than 70dB(A) from 7:00am to 10:00pm at the nearest sensitive receptor.

Section 440Y of the EP Act describes requirements for amplifier devices in relation to offences of causing environmental nuisance (other than at an indoor venue or open-air event). At a time when the person may operate the device under 440Y (2), the person must not operate the device in a way that makes noise of more than 10dB(A) above the background level.

### 5.2 Criteria for Rifle Club

Section 440ZC of the EP Act outlines the relevant noise assessment criteria for outdoor shooting ranges as follows:

- 1. A person must not operate, or permit the operation of, an outdoor shooting range, between 6:00am and 6:00pm on any day, if the noise from the operation is more than
  - a. for a range that is normally used at least 5 days a week—95dB Z Peak Hold.

<sup>&</sup>lt;sup>1</sup> Values have been corrected by 10 dBA to account for the façade attenuation provided by a normal, naturally ventilated building with partially closed windows



## 6. Noise Impact Assessment (Stages 1 to 7)

### 6.1 Approach

Forecasts noise emissions from Stages 1 to 7 of the proposed sports precinct have been calculated with SoundPlan v8.0, using the prediction method ISO 9613-2: (1996) which, by default, presents noise levels at the receiver for meteorological conditions which are favourable for propagation from the sound source to the receiver. The predicted noise levels are considered to represent the average propagation under meteorological conditions including wind and temperature inversion.

All prediction models have limits to their accuracy of prediction. This is due to the inherent nature of the calculation algorithms that go into the design of the models, the assumptions made in the implementation of the model, and the availability of good source sound power data. ISO 9613-2 has an estimated accuracy for broadband noise of ±3 dB at 1000 metres. Atmospheric and meteorological factors are not considered significant at the distances involved.

The noise model was undertaken as a 24-hour, 7-day operation for ease of modelling and reporting, due to the variability of the site's operating hours (Section 2.3).

### 6.2 Noise Source Levels

Noise source design sound power levels (SWL) and sound pressure levels (SPL) of activities considered representative of those at the development have been used (Table 16). These noise source levels were derived from SoundPlan v8.0, except for the gunshot noise source, which was sourced from the existing rifle club (Section 4.2.6).

		Sound Levels - 1/1 Octave SWL Lzeq								
Name Descriptor	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Total in dB(A)	
Raised Voice	L <sub>eq</sub>	42	36	36	38	69	65	49	40	71
Amplified Speech	L <sub>eq</sub>	56	50	50	52	83	79	63	54	85
Rooftop Plant	$L_{eq}$ and $L_{90}$	87	82	79	74	72	69	67	65	78
10 x Spectators	L <sub>eq</sub>	61	55	55	57	88	84	68	59	90
Amphitheatre Concert Music and Speech	L <sub>eq</sub>	110	114	105	104	101	100	98	95	108
Workshop Noise	L <sub>eq</sub>	80	80	85	90	80	85	80	80	91

#### Table 9 Design noise source power and pressure levels (Stages 1 to 7)



		Sound Levels - 1/1 Octave SWL Lzeq								
Name	Descriptor	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Total in dB(A)
Cricket Hit	L <sub>max</sub>	99	102	103	105	120	101	99	94	120
20kW Water Pump	$L_{eq}$ and $L_{90}$	101	96	90	90	89	84	81	69	93
Amenities (Hand Dryer, etc.)	L <sub>eq</sub>	100	95	89	89	88	83	80	68	92
Car Door Closure	L <sub>max</sub>	84	87	88	90	90	86	84	79	94
Gunshot	Lzpeak	132	147	156	161	164	163	161	157	169 dB(Z)
Clubhouse Internal SPL	L <sub>eq</sub>	82	86	77	76	73	72	70	67	80
Vehicle Movement	L <sub>eq</sub> and L <sub>max</sub>	78	85	79	76	79	80	76	73	85
Sports Field	L <sub>eq</sub>	65	59	59	61	92	88	72	63	94
Referee Whistle	L <sub>max</sub>	89	83	83	85	116	112	96	87	118

#### 6.3 Input Parameters

The following key noise sources from Stages 1 to 7 were considered in the assessment:

- Raised Voice;
- Amplified Speech;
- Rooftop Plant;
- Spectators;
- Amphitheatre Concert Music and Speech;
- Workshop Noise;
- Cricket Hit;
- 20kW Water Pump;
- Amenities (Hand Dryer, etc);
- Gunshot;
- Clubhouse Internal;
- Vehicle Movement;



- Car Door Closure;
- Sports Field; and
- Referee Whistle.

The cumulative noise emissions from the variable noise sources were modelled. Car door closures and gunshots are considered as discreet events as they are unlikely to occur simultaneously. Continuous noise emissions from air conditioners and mechanical plant were modelled.

Noise source locations for Stages 1 to 7 are presented in Appendix D:.

#### 6.4 Model Assumptions

The noise sources considered in the assessment are outlined below and in Table 10.

Point receivers were located 1m from the building façade at a height of 1.8m above ground. Forecast noise levels were façade-affected. 5m ground contours were sourced from Geoscience Australia.

Source	Quantity in Model and Type of Source	Timing	Variable (L <sub>eq</sub> )	Discreet (L <sub>max</sub> )	Continuous (L <sub>90</sub> )	Gunshot (L <sub>ZPeak</sub> )
Raised Voice	673 points	100%	Yes	-	-	-
Amplified Speech	15 points	100%	Yes	-	-	-
Rooftop Plant	15 points	100%	Yes	-	Yes	-
10 x Spectators	131 points	100%	Yes	-	-	-
Amphitheatre Concert Music and Speech	1 point	100%	Yes	-	-	-
Workshop Noise	2 points	100%	Yes	-	-	-
Cricket Hit	13 points	100%	-	Yes	-	-
20kW Water Pump	1 point	100%	Yes	-	Yes	-
Amenities (Hand Dryer, etc.)	1 point	100%	Yes	-	-	-
Car Door Closure	8 points, 21 areas	100%	-	Yes	-	-
Gunshot	6 points	100%	-	-	-	Yes
Clubhouse Internal SPL	9 industrial buildings	100%	Yes	-	-	-
Vehicle Movement	35 line segments	790vph @ 40kph	Yes	Yes	-	-
Sports Field	23 area sources	100%	Yes	-	-	-
Referee Whistle	23 area sources	100%	-	Yes	-	-

#### Table 10 Noise sources considered for Stages 1 to 7

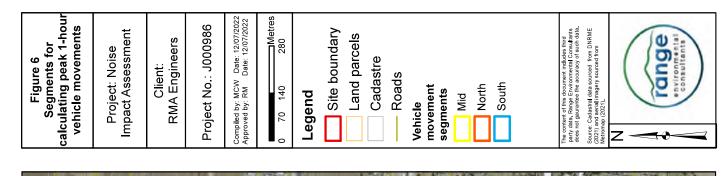


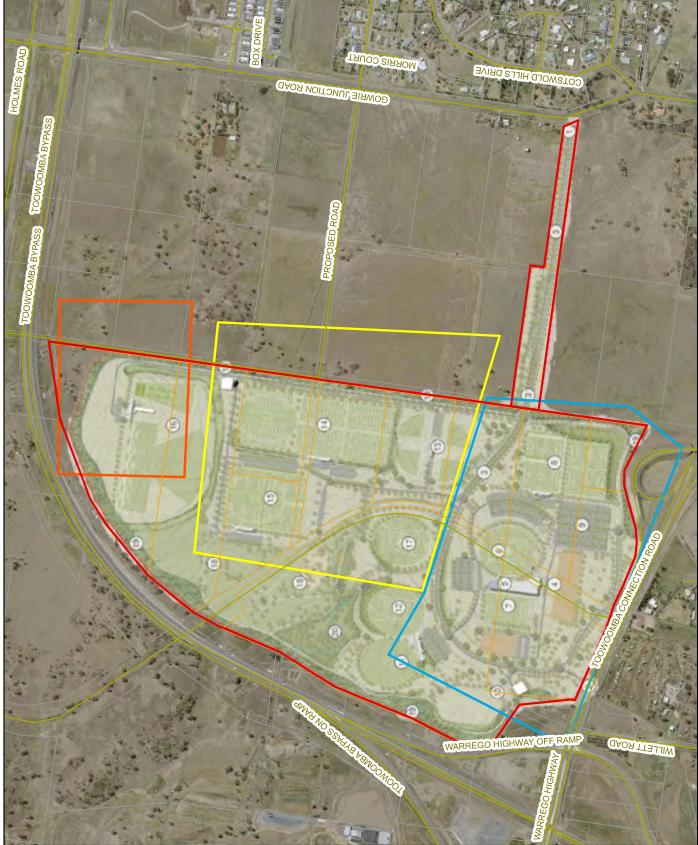
Vehicle movements are represented by an  $L_{max}$  source level that is nominated a speed of 40km/hr and a number of movements per hour in order to present an  $L_{eq,1hr}$ . As shown at Appendix B: in orange, the peak 1-hour event of vehicle movements (790vph) is estimated to occur at 10:00am on Saturday during the Winter period. The distribution of the 790vph 1-hour peak event across the site was calculated as follows:

- The site was divided into three (3) segments (north, middle and south) (Figure 6). These areas represent the three (3) primary areas of vehicle movements and carparking during a major event; and
- The proportion of the peak 790vph applied to each activity was calculated based on the maximum number of patrons estimated to occur during any 1-hour period.
  - The maximum number of patrons values are highlighted green at Appendix B: and are outlined in below for ease of reference.
  - All of the peak patron numbers are expected to occur on Saturdays (Appendix B:).

Area	Maximum 1-hour Period of Patron Numbers (Appendix B:)	% of Total Patrons	Segment of Site ()	
Recreation	56	2%	North	
Rugby League/ Union	360	16%	Mid	
Soccer B	240	11%	Mid	
Athletics	120	5%	South	
Premier Oval	120	5%	South	
Premier Rectangle	105	5%	South	
Soccer A	240	11%	South	
Ovals	150	7%	South	
Softball/ Baseball	130	6%	South	
Netball	720	32%	South	
Total	2241	100%	-	
Maximum 1-hour Period of Vehicle Movements	790	-	-	

#### Table 11 Vehicle movement calculations







Assessment of car door noise emissions is problematic due to the high degree of uncertainty surrounding the frequency and intensity of 'slamming' events. It is practically unknowable precisely how often – and how hard – individuals may shut their car doors at a proposed car park. Slamming is not a necessary outcome of car park activity but is likely to occur at some point, although infrequently. As future car door noise is highly uncertain, assessment of noise impacts requires methodological assumptions regarding the indicative 'design' level of noise emissions.

Noise from car door 'slams' can be characterized by the  $L_{max}$  descriptor, representing a discrete, brief (and in this case, impulsive) event. Council specifies  $L_{max}$  sleep disturbance criteria for the night-time period.

Noise levels from people at the event were categorised into three (3) groups (Raised Voice, Sports Field and Spectators). The total number of people represented in the model equates to 2783 (673 raised voices + 800 sporting participants + 1310 spectators).

- Raised Voice represents patrons and staff at the site who are not engaged in viewing a sporting event and participants at the rifle club.
- Sports Field represents people participating in sporting activities on fields (includes referees and referee whistle).
  - Grassed sports fields are represented by an area source where the nominated SWL is spread across the total area, as described in the SoundPlan Emission Library for a soccer match. The SWL for a soccer match was applied to all sports fields.
  - Each sports field area source was assigned the L<sub>max</sub> SWL representing a referee's whistle. The sports fields were assigned the stated L<sub>max</sub> noise level per square metre (i.e., the equivalent of 1 point source per square metre). The L<sub>max</sub> noise levels for a referee's whistle do not accumulate as they are considered discreet noise events.
- Spectators represents patrons engaged in viewing a sporting event.
  - Spectator noise is represented by point sources each representing 10 spectators based on the formula: SWL = 80 + 10log(n) where n = number of spectators, as per the SoundPlan Emission Library v8.0. The number of spectators at each field is based on the maximum 1-hour period for patrons engaged in viewing a sporting event (see and Appendix B:).

The discreet cricket hit noise source level is expected to vary and was nominated a conservative  $L_{max}$  point source.

Amphitheatre music and speech (amplified) is represented by a point source that is equivalent to 100 dBA measured at 1m. As shown in the noise source locations at Appendix D:, amplified



speech was modelled at 15 locations such as clubhouses where amplified speech and music is likely to occur.

Workshop noise was represented by an  $L_{eq}$  point source in the open-air, as the design of the workshops has not been established. Therefore, this approach allows for the operation of power tools without façade attenuation.

Internal Clubhouse noise emissions (L<sub>eq</sub> descriptor) were represented by a representative noise source from SoundPlan v8.0 which emanates noise from all facades.

The nominated L<sub>eq</sub> noise level for the amenities building at the site represents all reasonable noise sources such as patrons, hand dryer etc.

Rooftop mechanical plant and equipment (L<sub>90</sub> descriptor) was represented by nominal locations for air conditioners and exhaust vents for kitchens at locations such as clubhouses.

The noise level for a 20kW water pump ( $L_{90}$  descriptor) was modelled to represent the sewerage pumping station at the site.

The noise level for outdoor gunshot noise was sourced from the attended monitoring event outlined at Section 4.2. The average maximum gunshot (137dB  $L_{ZPeak}$ ) was converted to a SWL of 169dB(Z) based on the measurement distance (15.4m) and a directivity index of 3dB. The  $L_{Zpeak}$  model results are calculated discretely, therefore the gunshots at the six (6) traps are not cumulative. It is expected that shots may occasionally happen simultaneously, however, that occurrence is expected to be included in the measured data (Section 4.2).

The indoor shooting range is not included in the assessment for the following reasons:

- The L<sub>ZPeak</sub> levels from the outdoor range will dominate the noise levels at the sensitive receptors from this location;
- The L<sub>ZPeak</sub> descriptor is a discreet noise source which is highly unlikely to have cumulative noise emissions with the outdoor range if it happens to be operating at the same time as the indoor shooting range; and
- The indoor shooting range is not expected to include any significant variable (L<sub>Aeq</sub>) noise emissions, therefore it was not included in the model as a noise source.

## 6.5 Noise Attenuation

No acoustic attenuation such as fencing were required for Stages 1 to 7 for the proposed development.



## 6.6 Weather Conditions

Noise modelling has been made using the prediction methodology ISO9613-2: 1996 which, by default, presents noise levels at the receiver for meteorological conditions which are favourable for propagation from the sound source to the receiver. The predicted noise levels are considered to represent the average propagation under meteorological conditions including wind and temperature inversion.

## 6.7 Predicted Noise Levels at Noise Sensitive Receptors

Predicted noise levels and a comparison with the relevant noise assessment criteria are provided below in Table 18 to .

Noise level contour diagrams are provided at Appendix E:.

One (1) exceedance of 1 dB was predicted at Receptor 33 during the night-time period from variable noise sources, therefore, noise emissions from Stages 1 to 7 are predicted to achieve practical compliance without acoustic attenuation measures such as fencing.

Table 12 Stages 1 to 7: Comparison of predicted cumulative variable noise levels with assessment criteria(day and evening)

Receptor	Descriptor	Predicted noise level at the receptor (L <sub>Aeq</sub> )	Variable noise assessment criteria (L <sub>Aeq</sub> )
Receptor 1	L <sub>Aeq,1hr</sub>	31	45 (day and evening)
Receptor 2	L <sub>Aeq,1hr</sub>	25	40 (night)
Receptor 3	L <sub>Aeq,1hr</sub>	24	
Receptor 4	L <sub>Aeq,1hr</sub>	31	
Receptor 5	LAeq,1hr	30	
Receptor 6	L <sub>Aeq,1hr</sub>	30	
Receptor 7	L <sub>Aeq,1hr</sub>	30	
Receptor 8	L <sub>Aeq,1hr</sub>	30	
Receptor 9	LAeq,1hr	30	
Receptor 10	L <sub>Aeq,1hr</sub>	31	
Receptor 11	LAeq,1hr	31	
Receptor 12	LAeq,1hr	33	
Receptor 13	LAeq,1hr	35	
Receptor 14	LAeq,1hr	33	



Receptor	Descriptor	Predicted noise level at the receptor (L <sub>Aeq</sub> )	Variable noise assessment criteria (L <sub>Aeq</sub> )
Receptor 15	L <sub>Aeq,1hr</sub>	34	
Receptor 16	L <sub>Aeq,1hr</sub>	34	
Receptor 17	L <sub>Aeq,1hr</sub>	35	
Receptor 18	LAeq,1hr	30	-
Receptor 19	LAeq,1hr	32	-
Receptor 20	L <sub>Aeq,1hr</sub>	33	-
Receptor 21	LAeq,1hr	30	-
Receptor 22	L <sub>Aeq,1hr</sub>	31	-
Receptor 23	L <sub>Aeq,1hr</sub>	33	-
Receptor 24	LAeq,1hr	34	-
Receptor 25	LAeq,1hr	35	-
Receptor 26	LAeq,1hr	35	-
Receptor 27	L <sub>Aeq,1hr</sub>	34	
Receptor 28	L <sub>Aeq,1hr</sub>	35	
Receptor 29	L <sub>Aeq,1hr</sub>	33	-
Receptor 30	L <sub>Aeq,1hr</sub>	37	
Receptor 31	L <sub>Aeq,1hr</sub>	37	
Receptor 32	L <sub>Aeq,1hr</sub>	39	
Receptor 33	L <sub>Aeq,1hr</sub>	41	
Receptor 34	L <sub>Aeq,1hr</sub>	37	
Receptor 35	L <sub>Aeq,1hr</sub>	29	1

# Table 13 Stages 1 to 7: Comparison of predicted cumulative continuous noise levels with assessment criteria (day and evening)

Receptor	Descriptor	Predicted noise level at the receptor (L <sub>A90</sub> )	Continuous noise assessment criteria (L <sub>A90</sub> )
Receptor 1	L <sub>A90</sub>	9	41 (day) 44 (evening)
Receptor 2	L <sub>A90</sub>	3	39 (night)
Receptor 3	L <sub>A90</sub>	3	



Receptor	Descriptor	Predicted noise level at the receptor (L <sub>A90</sub> )	Continuous noise assessment criteria (L <sub>A90</sub> )
Receptor 4	L <sub>A90</sub>	8	
Receptor 5	Lago	8	
Receptor 6	L <sub>A90</sub>	7	
Receptor 7	Lago	6	
Receptor 8	Lago	7	
Receptor 9	L <sub>A90</sub>	7	
Receptor 10	Lago	7	
Receptor 11	Lago	8	
Receptor 12	L <sub>A90</sub>	9	
Receptor 13	La90	10	
Receptor 14	La90	8	
Receptor 15	Lago	8	
Receptor 16	LA90	8	
Receptor 17	LA90	9	
Receptor 18	Lago	6	
Receptor 19	L <sub>A90</sub>	7	
Receptor 20	Lago	9	
Receptor 21	Lago	6	
Receptor 22	Lago	7	
Receptor 23	Lago	8	
Receptor 24	LA90	9	
Receptor 25	L <sub>A90</sub>	9	
Receptor 26	L <sub>A90</sub>	10	
Receptor 27	L <sub>A90</sub>	8	
Receptor 28	L <sub>A90</sub>	9	
Receptor 29	L <sub>A90</sub>	8	
Receptor 30	LA90	12	
Receptor 31	L <sub>A90</sub>	12	
Receptor 32	Lago	14	

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Receptor	Descriptor	Predicted noise level at the receptor (L <sub>A90</sub> )	Continuous noise assessment criteria (L <sub>A90</sub> )
Receptor 33	Lago	15	
Receptor 34	Lago	12	
Receptor 35	L <sub>A90</sub>	5	

## Table 14 Stages 1 to 7: Comparison of predicted $L_{max}$ noise levels with assessment criteria (night)

Receptor	Descriptor	Predicted noise level at the receptor (L <sub>Amax</sub> )	Sleep disturbance noise assessment criteria (L <sub>Amax</sub> )
Receptor 1	L <sub>Amax</sub>	38	55
Receptor 2	L <sub>Amax</sub>	33	
Receptor 3	L <sub>Amax</sub>	32	
Receptor 4	L <sub>Amax</sub>	41	
Receptor 5	L <sub>Amax</sub>	40	
Receptor 6	L <sub>Amax</sub>	38	
Receptor 7	L <sub>Amax</sub>	37	
Receptor 8	L <sub>Amax</sub>	37	
Receptor 9	L <sub>Amax</sub>	37	
Receptor 10	L <sub>Amax</sub>	38	
Receptor 11	L <sub>Amax</sub>	37	
Receptor 12	L <sub>Amax</sub>	39	
Receptor 13	L <sub>Amax</sub>	40	
Receptor 14	L <sub>Amax</sub>	38	
Receptor 15	L <sub>Amax</sub>	38	
Receptor 16	L <sub>Amax</sub>	38	
Receptor 17	LAmax	38	
Receptor 18	L <sub>Amax</sub>	36	
Receptor 19	L <sub>Amax</sub>	38	
Receptor 20	LAmax	39	
Receptor 21	LAmax	38	



Receptor	Descriptor	Predicted noise level at the receptor (L <sub>Amax</sub> )	Sleep disturbance noise assessment criteria (L <sub>Amax</sub> )
Receptor 22	L <sub>Amax</sub>	39	
Receptor 23	L <sub>Amax</sub>	41	
Receptor 24	L <sub>Amax</sub>	43	
Receptor 25	L <sub>Amax</sub>	43	
Receptor 26	L <sub>Amax</sub>	44	
Receptor 27	L <sub>Amax</sub>	44	
Receptor 28	L <sub>Amax</sub>	46	
Receptor 29	L <sub>Amax</sub>	43	
Receptor 30	L <sub>Amax</sub>	48	
Receptor 31	L <sub>Amax</sub>	47	
Receptor 32	L <sub>Amax</sub>	48	
Receptor 33	L <sub>Amax</sub>	49	
Receptor 34	L <sub>Amax</sub>	45	
Receptor 35	L <sub>Amax</sub>	37	

Table 15 Stages 1 to 7: Comparison of predicted  $L_{ZPeak}$  noise levels with assessment criteria (day and night)

Receptor	Descriptor	Predicted noise level at the receptor (L <sub>ZPeak</sub> )	Section 440ZC of the EP Act noise assessment criteria (L <sub>ZPeak</sub> )
Receptor 1	LzPeak	93	95
Receptor 2	L <sub>ZPeak</sub>	83	
Receptor 3	LzPeak	82	
Receptor 4	LzPeak	87	
Receptor 5	L <sub>ZPeak</sub>	87	
Receptor 6	LzPeak	85	
Receptor 7	LZPeak	83	
Receptor 8	L <sub>ZPeak</sub>	83	
Receptor 9	LzPeak	82	



Receptor	Descriptor	Predicted noise level at the receptor (L <sub>ZPeak</sub> )	Section 440ZC of the EP Act noise assessment criteria (L <sub>ZPeak</sub> )
Receptor 10	LZPeak	82	
Receptor 11	L <sub>ZPeak</sub>	82	n
Receptor 12	LZPeak	82	
Receptor 13	LZPeak	82	
Receptor 14	L <sub>ZPeak</sub>	82	
Receptor 15	LZPeak	81	
Receptor 16	L <sub>ZPeak</sub>	81	
Receptor 17	L <sub>ZPeak</sub>	82	
Receptor 18	LzPeak	78	
Receptor 19	LzPeak	78	
Receptor 20	LzPeak	81	
Receptor 21	LzPeak	77	
Receptor 22	LzPeak	77	
Receptor 23	L <sub>ZPeak</sub>	77	
Receptor 24	LzPeak	78	
Receptor 25	LzPeak	78	
Receptor 26	LzPeak	78	
Receptor 27	LzPeak	76	
Receptor 28	LzPeak	77	
Receptor 29	LzPeak	76	
Receptor 30	LzPeak	78	
Receptor 31	LzPeak	78	
Receptor 32	LzPeak	79	
Receptor 33	LzPeak	80	
Receptor 34	LzPeak	78	
Receptor 35	LzPeak	81	



# 7. Noise Impact Assessment (One-off Event)

## 7.1 Approach

Forecasts noise emissions from a One-off Event at the proposed sports precinct have been calculated with SoundPlan v8.0, using the prediction method ISO 9613-2: (1996) which, by default, presents noise levels at the receiver for meteorological conditions which are favourable for propagation from the sound source to the receiver. The predicted noise levels are considered to represent the average propagation under meteorological conditions including wind and temperature inversion.

All prediction models have limits to their accuracy of prediction. This is due to the inherent nature of the calculation algorithms that go into the design of the models, the assumptions made in the implementation of the model, and the availability of good source sound power data. ISO 9613-2 has an estimated accuracy for broadband noise of ±3 dB at 1000 metres. Atmospheric and meteorological factors are not considered significant at the distances involved.

The noise model represented a One-off Event during the day and evening time periods to align with the relevant noise assessment criteria shown at Section 5.1.5.

## 7.2 Noise Source Levels

Noise source design sound power levels (SWL) and sound pressure levels (SPL) of activities considered representative of those at the development have been used (Table 16). These noise source levels were derived from SoundPlan v8.0.

Name		Sound Levels - 1/1 Octave SWL L <sub>Zeq</sub>								
	Descriptor	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Total in dB(A)
Raised Voice	L <sub>eq</sub>	42	36	36	38	69	65	49	40	71
Amplified Speech	L <sub>eq</sub>	56	50	50	52	83	79	63	54	85
Rooftop Plant	L <sub>eq</sub> and L <sub>90</sub>	87	82	79	74	72	69	67	65	78
Car Door Closure	L <sub>max</sub>	84	87	88	90	90	86	84	79	94
50 x Spectators	L <sub>eq</sub>	68	62	62	64	95	91	75	66	97
Clubhouse Internal SPL	L <sub>eq</sub>	82	86	77	76	73	72	70	67	80
Vehicle Movement	L <sub>eq</sub> and L <sub>max</sub>	78	85	79	76	79	80	76	73	85

## Table 16 Design noise source power and pressure levels (One-off Event)



		Soun	d Level							
Name Descript	Descriptor	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Total in dB(A)
Sports Field	L <sub>eq</sub>	65	59	59	61	92	88	72	63	94
Referee Whistle	L <sub>max</sub>	89	83	83	85	116	112	96	87	118

## 7.3 Input Parameters

The following key noise sources from a One-off Event from the proposed development were considered in the assessment:

- Raised Voice;
- Amplified Speech;
- Rooftop Plant;
- Spectators;
- Clubhouse Internal;
- Vehicle Movement;
- Car Door Closure;
- Sports Field; and
- Referee Whistle.

The cumulative noise emissions from the variable noise sources were modelled. Car door closures were considered as discreet events as they are unlikely to occur simultaneously. Continuous noise emissions from air conditioners and mechanical plant were modelled.

Noise source locations for a One-off Event are presented in Appendix F:.

## 7.4 Model Assumptions

The noise sources considered in the assessment are outlined below and in Table 17.

Point receivers were located 1m from the building façade at a height of 1.8m above ground. Forecast noise levels were façade-affected. 5m ground contours were sourced from Geoscience Australia.



Source	Quantity in Model and Type of Source	Timing	Variable (L <sub>eq</sub> )	Discreet (L <sub>max</sub> )	Continuous (L <sub>90</sub> )
Raised Voice	189 points	100%	Yes	-	-
Amplified Speech	4 points	100%	Yes	-	-
Rooftop Plant	2 points	100%	Yes	-	Yes
Car Door Closure	8 points, 9 areas	100%	-	Yes	-
50 x Spectators	60 points	100%	Yes	-	-
Clubhouse Internal SPL	9 industrial buildings	100%	Yes	-	-
Vehicle Movement	26 line segments	1200vph @ 40kph	Yes	Yes	-
Sports Field	2 area sources	100%	Yes	-	-
Referee Whistle	2 area sources	100%	-	Yes	-

## Table 17 Noise sources considered for a One-off Event

Vehicle movements were based on the total number of vehicles expected during a One-off Event (Appendix B: - 1200) which were modelled during a single hour as a conservative assumption. These vehicles were modelled in the southern section only shown at Figure 6. Vehicle movements were represented by an  $L_{max}$  source level that is nominated a speed of 40km/hr and a number of movements per hour in order to present an  $L_{eq,1hr}$ .

Assessment of car door noise emissions is problematic due to the high degree of uncertainty surrounding the frequency and intensity of 'slamming' events. It is practically unknowable precisely how often – and how hard – individuals may shut their car doors at a proposed car park. Slamming is not a necessary outcome of car park activity but is likely to occur at some point, although infrequently. As future car door noise is highly uncertain, assessment of noise impacts requires methodological assumptions regarding the indicative 'design' level of noise emissions.

Noise from car door 'slams' can be characterized by the  $L_{max}$  descriptor, representing a discrete, brief (and in this case, impulsive) event. Council specifies  $L_{max}$  sleep disturbance criteria for the night-time period.

Noise levels from people at the event were categorised into three (3) groups (Raised Voice, Sports Field and Spectators):

- Raised Voice represents patrons and staff at the site who are not engaged in viewing a sporting event and participants at the premier fields = 189 raised voices.
- Sports Field represents people participating in sporting activities on fields (includes referees and referee whistle). Grassed sports fields were represented by an area source where the nominated SWL was spread across the total area, as described in the SoundPlan



Emission Library for a soccer match. The SWL for a soccer match was applied to all sports fields.

- Each sports field area source was assigned the L<sub>max</sub> SWL representing a referee's whistle. The sports fields were assigned the stated L<sub>max</sub> noise level per square metre (i.e., the equivalent of 1 point source per square metre). The L<sub>max</sub> noise levels for a referee's whistle do not accumulate as they are considered discreet noise events.
- Spectators represents patrons engaged in viewing a sporting event.
  - Spectator noise is represented by 60 point sources each representing 50 spectators based on the formula: SWL = 80 + 10log(n) where n = number of spectators, as per the SoundPlan Emission Library v8.0. The number of spectators at each field is based on the total expected patrons for a one-off event (3000) and divided evenly between the rectangular and oval premier fields.

Amplified speech was represented by a point source that is equivalent to 85 dBA measured at 1m. As shown in the noise source locations at Appendix F:, amplified speech was modelled at four (4) locations such as clubhouses where amplified speech is likely to occur.

Internal Clubhouse noise emissions (L<sub>eq</sub> descriptor) were represented by a representative noise source from SoundPlan v8.0 which emanates noise from all facades.

Rooftop mechanical plant and equipment (L<sub>90</sub> descriptor) was represented by nominal locations for air conditioners and exhaust vents for kitchens at locations such as clubhouses.

## 7.5 Noise Attenuation

No acoustic attenuation such as fencing were required for a One-off Event for the proposed development.

## 7.6 Weather Conditions

Noise modelling has been made using the prediction methodology ISO9613-2: 1996 which, by default, presents noise levels at the receiver for meteorological conditions which are favourable for propagation from the sound source to the receiver. The predicted noise levels are considered to represent the average propagation under meteorological conditions including wind and temperature inversion.

## 7.7 Predicted Noise Levels at Noise Sensitive Receptors

Predicted noise levels and a comparison with the relevant noise assessment criteria are provided below in Table 18.

Noise level contour diagrams are provided at Appendix G:.



As shown below, noise emissions from a One-off Event at the proposed development are predicted to comply with the relevant noise assessment criteria without acoustic attenuation measures such as fencing.

# Table 18 One-off Event: Comparison of predicted cumulative variable noise levels with assessment criteria(day and evening)

Receptor	Descriptor	Predicted noise level at the receptor (L <sub>Aeq</sub> )	Open-Air Event (EP Act) criteria (L <sub>Aeq</sub> )
Receptor 1	LAeq,1hr	26	70 (day and evening)
Receptor 2	LAeq,1hr	22	_
Receptor 3	LAeq,1hr	21	
Receptor 4	L <sub>Aeq,1hr</sub>	27	
Receptor 5	LAeq,1hr	27	
Receptor 6	LAeq,1hr	27	
Receptor 7	LAeq,1hr	28	
Receptor 8	LAeq,1hr	28	
Receptor 9	LAeq,1hr	28	
Receptor 10	LAeq,1hr	29	
Receptor 11	L <sub>Aeq,1hr</sub>	30	
Receptor 12	LAeq,1hr	33	
Receptor 13	LAeq,1hr	35	
Receptor 14	L <sub>Aeq,1hr</sub>	34	
Receptor 15	LAeq,1hr	34	
Receptor 16	LAeq,1hr	35	
Receptor 17	L <sub>Aeq,1hr</sub>	36	
Receptor 18	LAeq,1hr	30	
Receptor 19	LAeq,1hr	33	
Receptor 20	LAeq,1hr	34	
Receptor 21	LAeq,1hr	30	
Receptor 22	LAeq,1hr	31	
Receptor 23	LAeq,1hr	34	
Receptor 24	L <sub>Aeq,1hr</sub>	35	



Receptor	Descriptor	Predicted noise level at the receptor (L <sub>Aeq</sub> )	Open-Air Event (EP Act) criteria (L <sub>Aeq</sub> )
Receptor 25	L <sub>Aeq,1hr</sub>	36	
Receptor 26	L <sub>Aeq</sub> ,1hr	36	-
Receptor 27	L <sub>Aeq,1hr</sub>	35	_
Receptor 28	LAeq, 1hr	37	_
Receptor 29	LAeq,1hr	37	
Receptor 30	L <sub>Aeq,1hr</sub>	40	_
Receptor 31	L <sub>Aeq,1hr</sub>	40	
Receptor 32	LAeq, 1hr	42	_
Receptor 33	L <sub>Aeq,1hr</sub>	45	
Receptor 34	L <sub>Aeq,1hr</sub>	40	
Receptor 35	LAeq, 1hr	27	



# 8. Discussion

Noise emissions from Stages 1 to 7 at the proposed development are predicted to achieve practical compliance with the relevant assessment criteria without acoustic attenuation measures such as fencing. The Department of Environment and Science (DES) (2020) note that a change in level of 3dB(A) is 'just perceptible'. Therefore, the one (1) exceedance of 1dB during the night-time period for variable noise assessment criteria at Receptor 33 is highly unlikely to cause nuisance.

Noise emissions from a One-off Event at the proposed development are predicted to comply with the relevant assessment criteria.



# 9. Recommendations

## 9.1 Mechanical Plant and Equipment

Mechanical plant and equipment that may be required for the development must be selected, sited and acoustically treated as necessary to satisfy the continuous noise assessment criteria, Development Approval conditions and the *Environmental Protection Act 1994*.



# 10. Summary

- A noise impact assessment was completed for a proposed sports precinct at Gowrie Junction, Toowoomba.
- Predicted noise emissions from the proposed development were assessed against the following:
  - Sections 440X, 440Y and 440ZC of the EP Act;
  - PO8 and PO13 of the Environmental Standards Code of the Toowoomba Regional Planning Scheme (TRPS) (2012, v27); and
  - AQOs under the Environmental Protection (Noise) Policy 2019.
- Stages 1 to 7 of the proposed development are predicted to achieve practical compliance with the relevant assessment criteria.
- Noise emissions from a One-off Event at the proposed development are predicted to comply with the relevant assessment criteria.
- Mechanical plant and equipment that may be required for the development must be selected, sited and acoustically treated as necessary to satisfy the continuous noise assessment criteria, Development Approval conditions and the *Environmental Protection Act 1994*.



# 11. References

- Australian Standard AS1055.1:1997 Acoustics Description and measurement of environmental noise Part 1: General procedures.
- Australian Standard AS IEC 61672.1-2019 Electroacoustics Sound level meters Specifications.

Department of Environmental and Science (DES). 2020. Noise Measurement Manual.

- Department of National Parks, Sports and Racing (DNPSR) Planning for Shooting and Motor Sports Facilities (November 2016).
- Environmental Protection Agency (EPA). 2004. Planning for Noise Control Guideline. State of Queensland. Brisbane, Queensland.



**Appendix A: Development Plans** 

# TOOWOOMBA REGION SPORTS PRECINCT



2020 MASTER PLAN [Q] DATE 26/05/2022

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AND LANDSCAPE DESIGN

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- DC-10 CENTRAL HUB SECTIONS DC-11 DETAIL PLAN DISTRICT PARK PLAYGROUND
- DC-12 DISTRICT PARK SECTIONS
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CONSULTANTS

LEAD CONSULTANT:

roowoomba

REGION



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# DESIGN INTENT VISION &

VISION

TO CREATE A MEMORABLE REGIONAL SPORTS AND DISTRICT RECREATION FACILITY THAT REFLECTS THE CHARACTER OF THE SITE AND PROMOTES COUNCIL'S VISION FOR A VIBRANT, INCLUSIVE,

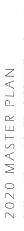
ENVIRONMENTALLY RICH AND PROSPEROUS REGION THAT EMBRACES THE FUTURE WHILST RESPECTING

# THE PAST

# DESIGN INTENT

- CREATE A HIGHLY FUNCTIONAL AND USEABLE SPORTS FACILITY FOR THE TOOWOOMBA REGION CREATE A UNIQUE DISTRICT RECREATION PARK FOR ALL AGES AND ABILITIES
- PROVIDE A ROBUST LANDSCAPE CHARACTER WITH PREDOMINATELY ENDEMIC PLANT SPECIES
- CREATE A PLACE FOR ALL OF THE COMMUNITY TO ENJOY
- BE SYMPATHETIC TO THE SITE'S ENVIRONMENT SUCH AS RUNOFF PATTERNS, VIEWS AND FLORA
- RESPECT AND EMBRACE THE SITE'S CULTURAL HERITAGE INCLUDING THE FORMER RAIL LINE
- EMBRACE BEST PRACTICE FOR CLIMATE-RESPONSIVE DESIGN AND COMMUNITY LIFESTYLE
- EMPOWER THE COMMUNITY TO BE INVOLVED IN ACTIVE SPORTS, OUTDOOR RECREATION, HEALTHY LIVING AND COMMUNITY EVENTS
- CREATE A UNIQUE, APPEALING, DISTINCTIVE AND ATTRACTIVE DESTINATION THAT OFFERS A RANGE OF RECREATIONAL ACTIVITIES
- ESTABLISH A PRECINCT THAT BLENDS AND INTEGRATES LAND USES SUCH AS INFORMAL RECREATION AND STRUCTURED SPORT WITHIN THE ONE SITE
- EXPLORE OPPORTUNITIES IN WATER HARVESTING, WATER SENSITIVE URBAN DESIGN AND FINANCIALLY VIABLE IRRIGATION OUTCOMES
- ENSURE THAT THE MAINTENANCE REQUIREMENTS OF THE NEW INFRASTRUCTURE DOES NOT IMPOSE A SIGNIFICANT OR UNNECESSARY BURDEN ON COUNCIL'S OR CLUB RESOURCES
- ENSURE DISABILITY DISCRIMINATION ACT (DDA) COMPLIANCE, PUBLIC SAFETY AND CPTED, RELEVANT AUSTRALIAN AND INDUSTRY STANDARDS, CODES AND COUNCIL REQUIREMENTS ARE MPLEMENTED
- USE LANDSCAPE TREES, BOLLARDS AND OTHER VEHICLE BARRIERS TO PREVENT VANDALISM OF FACILITIES THROUGH VEHICLE MISUSE

# TOOWOOMBA REGION SPORTS PRECINCT













PROVIDE A 'SENSE OF ARRIVAL' USING LANDSCAPE

- DEVELOP A ROAD HIERACHY IN DESIGN AND VEGETATION TREATMENT TO DEFINE LEGIBILITY AND WAYFINDING
- CREATE A 'LEVEL' SITE AROUND THE CENTRAL ACTIVITY AREA WHILST ENSURING BALANCE OF EARTHWORKS MATERIAL
- CAPITALISE ON TOPOGRAPHY TO CREATE VIEWING AREAS, MOUNDING AND EMBRACE PRINCIPAL VISTAS, SUCH AS THOSE LOOKING NORTH OVER THE PREMIER OVAL AND RECTANGULAR FIELD TO THE DISTANT LANDSCAPE BEYOND THE SITE'S BOUNDARIES
- LOCATE ACTIVITIES THAT ARE COMPLEMENTARY AND USE THE SITE'S PHYSICAL ENVIRONMENT EFFICIENTLY
- DEVELOP AN EXTENSIVE NETWORK OF SHARED PATHS AND TRAILS THAT ENCOURAGE ACTIVE TRANSPORT AND RECREATIONAL ATTRACTION INCLUDING THE FORMER RAIL LINE TRAIL

# OVERALL PLAN

# **Main Access from Gowrie Junction Road**

# Toowoomba Connection Rd Highway Entry - Left In / Left Out $\bigcirc \bigcirc$

# **Tree Lined Avenue Entry Road** $\bigcirc$

# Premier Hub Setdown Area and Overflow Parking (7)

# **Premier Hub** (n)

**Premier Oval** 6

# Premier Rectangular Field (~

# **Rectangular Field Precinct 1** $(\infty)$ 6

# Formalised Car Parking

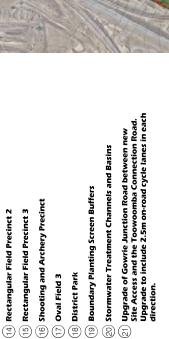
# **Open Parkland and Maintenance Compound**

# **Oval Field 1**

# **Oval Field 2** $(\underline{m})$

# **Diamond Fields Precinct**

# (<u>-</u>)





# BUTTIN SPORT LITTLE open architecture studio CONSULTANT: REGION 8 DC-03 [D] **TOOWOOMBA REGION SPORTS PRECINCT** PO BOX 1640, Buddina, OLD 4575 T: 07 5493 4677 2020 MASTER PLAN

E: admin@greenedgedesign.

800m

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# PLAN NORTHERN PRECINCT DETAILED

Indoor and Outs Indoor and Outs Skeet Shooting Long Range Sho Archery Precinc Planted Screen I Security Fence Shared Shooting Rectangular Fiel Overlay Rectangular Fiel Overlay Istrict Level Piel District Level Piel District Level Piel Dry Creek Storm Dry Creek Storm Oval Field Preci Shared Dath aloi Shared Path	Indoor and Outdoor Shooting Precinct	Indoor Shooting Range	Skeet Shooting Range	Long Range Shooting	Archery Precinct	Planted Screen Buffer with Safety Bund (2m high) and Security Fence	Shared Shooting and Archery Clubhouse and Parking	Rectangular Fields Precinct 2	Rectangular Field Precinct 2: Shared Rectangular Fields with Oval Overlay	Rectangular Field Precinct 3: Rectangular Fields with Oval Overlay	Rectangular Field Precinct 3: Clubhouse and Parking	District Level Playground	District Level Park	Dry Creek (with Stormwater Treatment)	Amphitheatre Capitalising on the Natural Topography	Dry Creek Stormwater Channels	Oval Field Precinct - Refer to Southern Precinct Plan	Shared Use Clubhouse Rectangular Fields	Shared Path along former Rail Corridor	Shared Pedestrian/Cycle Pathways	Car Parking	Planted Vegetation Buffers	Public Amenities	Small Play Space Associated with Club Facility	Northern Precinct Maintenance Shed / Compound			
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# PLAN SOUTHERN PRECINCT DETAILED

הנכויום וגיוומג בינסדדי +513 9 Rectangular Field Precinct 2 - Refer to Northern Precinct Plan Toowoomba Connection Road Entry - Left in / Left Out Tree Lined Avenue Entry Road with Central Median Spectator Viewing Mounds (Nom. 3m above fields) Premier Hub Setdown Area and Overflow Parking Southern Precinct Maintenance Shed / Compound Small Play Space Associated with Club Facility **Maintenance Access Track to Adjoining Site** 19) Shared Path along former Rail Corridor Access from Gowrie Junction Road Shared Pedestrian/Cycle Pathways ) Shared Diamond Fields Clubhouse **Existing Troys Road Interchange Dry Creek Stormwater Channels Rectangular Fields Clubhouse Rectangular Fields Precinct 1** Shared Use Oval Clubhouse **Planted Vegetation Buffers Drop off and PWD parking** Premier Rectangular Field **Overflow (Event) Parking** Premier Hub (Amenities) Local Playground / Park Planted Embankments **Diamond Fields Diamond Fields Entry Parkland** Arrangement **Practice Nets** 1) Premier Oval **Oval Field 3 Oval Field 1 Oval Field 2 Car Parking** (2) R  $(\sim)$ 0 (m (<del>1</del> Q P (m) 0 (@ (Fr



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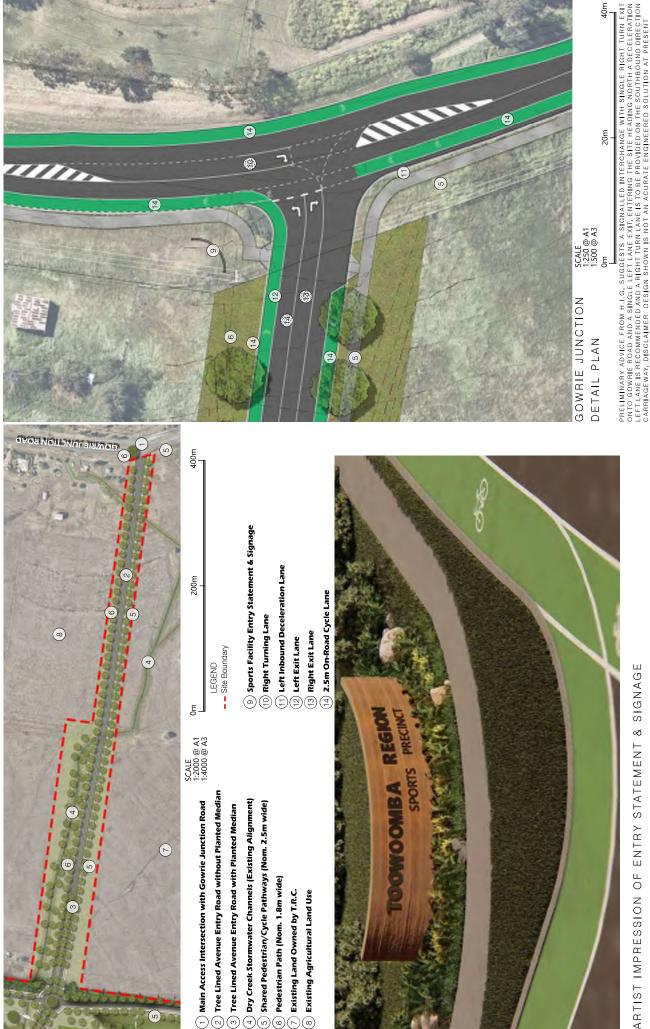
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# PLAN ACCESS ROAD DETAILED

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ARTIST IMPRESSION OF ENTRY STATEMENT & SIGNAGE

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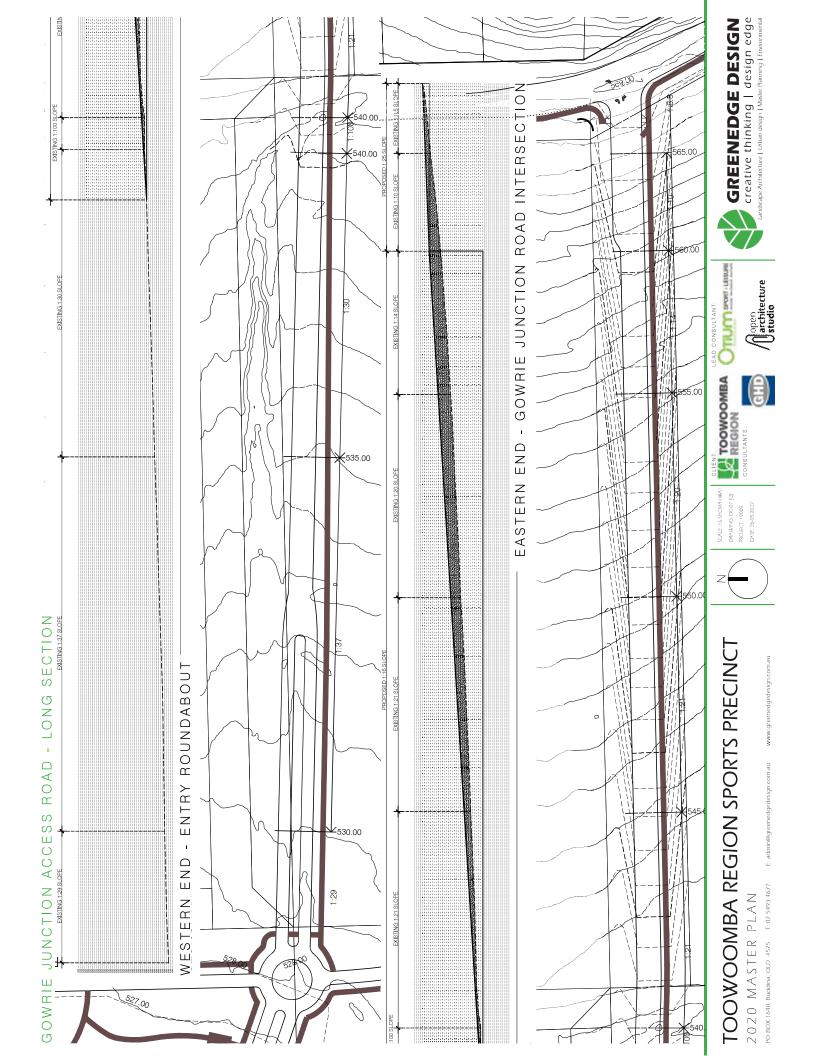
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PROJECT: 19009

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# DETAILED PLAN - CENTRAL HUB

# 1 Premier Oval 2 Premier Rectart

# **Premier Rectangle Field**

- $\overline{\mathfrak{S}}$  Premier Hub Refer Architect for Internal Layouts
  - $\left( 4 
    ight)$  Premier Hub Southern Plaza & Laydown Area

- 5 Spectator Viewing Mounds
- 6 Entry/Exit from Toowoomba Connection Road
  - 7 Parkland / Open Space
- 8 Shared Pedestrian / Cycle Paths
   9 Drop off Area
   10 Parking
   11 Overflow (Event) Parking
   12 Signature Feature Trees

- (13) PWD parking

# (14) Stepped Terraces to Provide Casual Seating

- (15) Northern Entry Plaza



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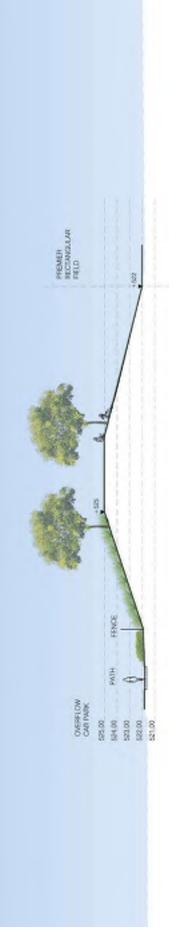
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# SECTION P1 - PREMIER OVAL SPECTATOR MOUND



# SECTION P2 - PREMIER RECTANGULAR FIELD SPECTATOR MOUND



# SECTION P3 - PREMIER OVAL AND PLAZA INTERFACE



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REGION

CONSULTANTS:

SCALE: AS SHOWN (BA) DRAWING: DC-10 [C] PROJECT: 19009

DATE: 26-05-2022

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# DETAILED PLAN - DISTRICT PARK PLAYGROUND

Toddler Play Space	Junior Play Space	Teenage Play Space	Cableway	Slide on Mound	Adventure Net	Nature Play - Dry Creek and Logs	Public Amenities	Picnic Shelters with BBQ	) Kick and Throw Space	Amphitheatre Space and Performance Deck	) Main Pathways	) Heritage Railway Trail (on former line)	Car Parking with 4 PWD Spaces	) Dry Creek (with Stormwater Treatment)	) Future Rectangular Field Precinct	) Open Parkland with Shade Trees	③ Drainage Channel (Dry Creek Bed)	) Vegetated Sediment Pond for Stormwater
1) Toddle	2) Junior	③ Teenag	4 Cablew	5) Slide oi	6 Advent	7) Nature	8 Public /	Picnic S	10 Kick an	11 Amphit	12 Main Pa	13 Heritaç	14) Car Par	15 Dry Cre	16 Future	17) Open P	18) Draina	19) Vegeta



21) Overflow Parking Opportunity (Park Run Events)





50m

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SCALE 1:500 @ A1 1:1000 @ A3

# DISTRICT PARKLAND - SECTIONS

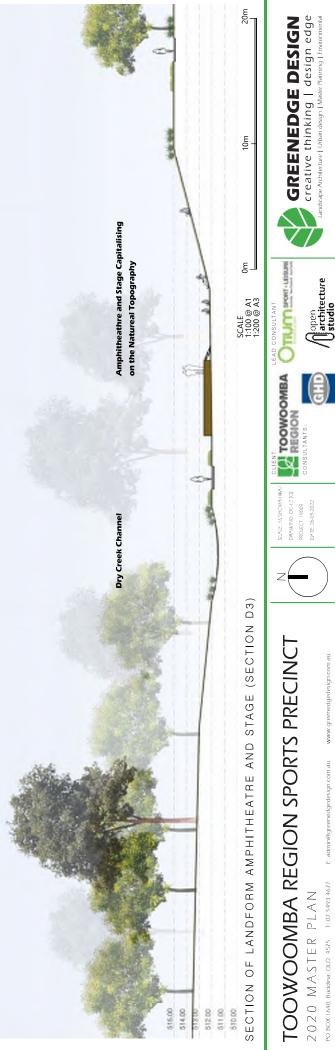


TYPICAL SECTION OF HISTORIC RAILWAY LINE PATH (SECTION D1)



TYPICAL SECTION OF DRAINAGE CHANNEL (SECTION D2)





# DETAILED PLAN - ENTRY PARKLAND & LOCAL PLAYGROUND

 1
 Toddler & Junior Play Space

 2
 Large Shade Trees (Like Ficus)

4 Entry Parkland - Green Open Space 3 Swings

(u)

Slide on Mound

Nature Play - Dry Creek and Logs **Picnic Shelter with Bench** 6  $( \sim$ 

Picnic Shelter with BBQ

Shared Cycle / Pedestrian Paths **Main Pathways** 6

11 Car Parking P

12 Entry Tree Lined Boulevard

13) Rectangular Field Precinct

14 Diamond Fields Precinct

(15) Drainage Channel (Dry Creek Bed)

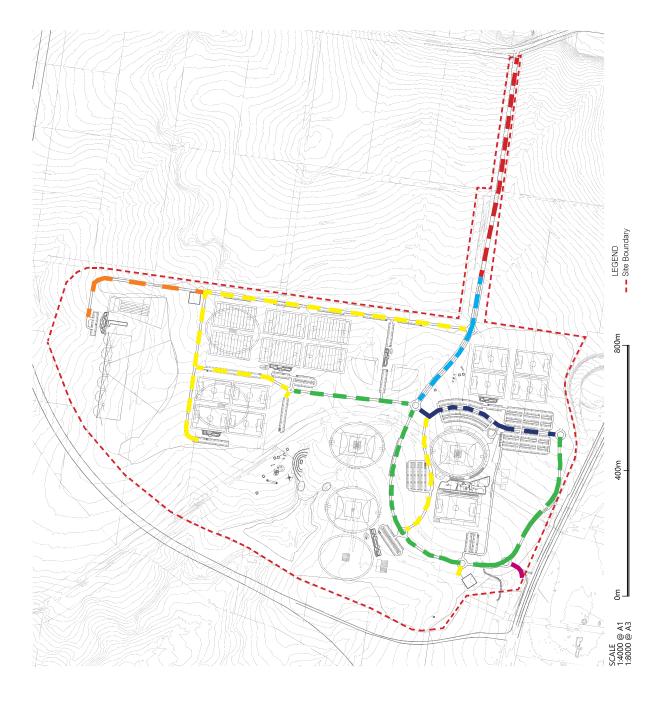
() Entry Parkland with Trees and Grass and some Informal Paths & Seating plus access to the Dry Creek Bed





# HIERARCHY ROAD TYPE KEY PLAN

TYPICAL ROAD TYPE A	TYPICAL ROAD TYPE B	TYPICAL ROAD TYPE C	TYPICAL ROAD TYPE D	TYPICAL ROAD TYPE E	TYPICAL ROAD TYPE F	TYPICAL ROAD TYPE G	
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TOOWOOMBA REGION SPORTS PRECINCT

GREENEDGE DESIGN creative thinking | design edge Landsape Archiecture | Uhan design | Matter Planmap | Environmental

CONSULTANT:

REGION

CONSULTANTS:

SCALE: AS SHOWN @A1 DRAWING: DC-14 [0] PROJECT: 19009

Ζ

DATE: 26-05-2022

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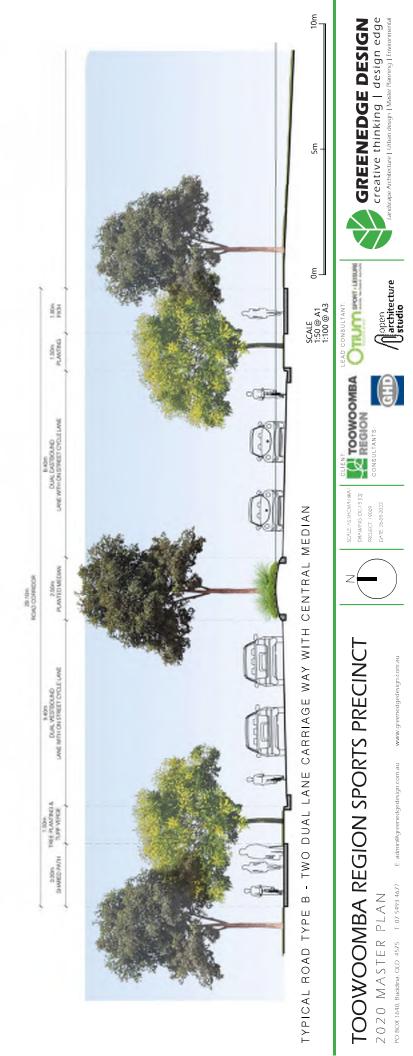
8

2020 MASTER PLAN PO BOX 1640, Buddina, OLD 4575 1: 07 5493 4677 E: admin@greenedgedesign.com.au





TYPICAL ROAD TYPE A - SINGLE LANE CARRIAGE WAY WITH CYCLE LANE

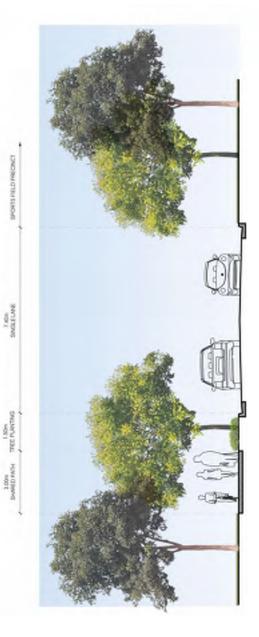


# TYPICAL ROAD SECTIONS

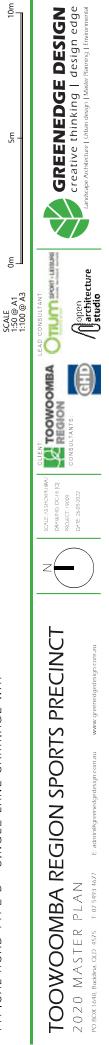


TYPICAL ROAD TYPE C - SINGLE LANE CARRIAGE WAY

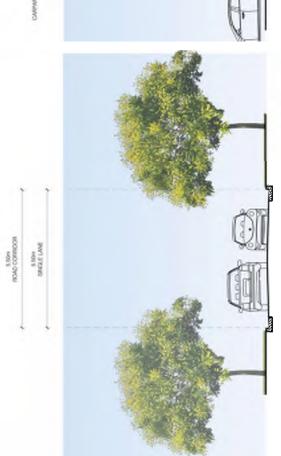
ROAD COMPONE



TYPICAL ROAD TYPE D - SINGLE LANE CARRIAGE WAY



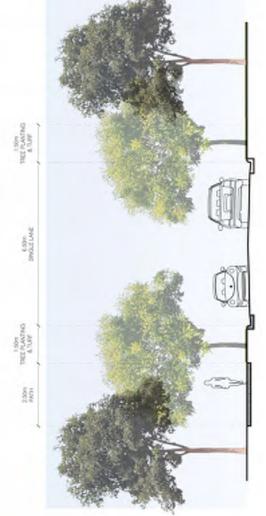
# TYPICAL ROAD SECTIONS

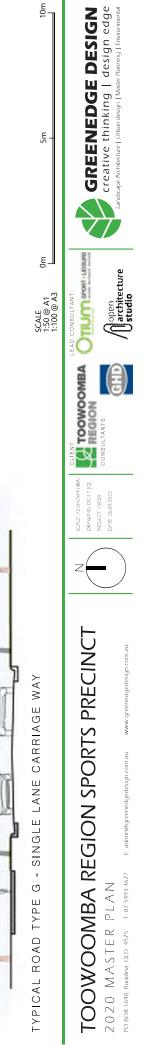


TYPICAL ROAD TYPE E - SINGLE LANE CARRIAGE WAY



TYPICAL ROAD TYPE F - SINGLE LANE CARRIAGE WAY CAR PARK CONNECTION





# h <mark>52 2\*</mark> 800m -\*\* -\*\* 1 81 3\* 中 20 L 400m 300# to) Hat BI-------BI 800# ы. in the second SCALE 1:4000 @ A1 1:8000 @ A3 . F

ACTIVITY	ZONE	FIELDS/COURTS	RATE	FIELDS/COURTS RATE REQUIREMENTS ACHIEVED		PWD
Recreation	Local	-	25	25	25	2
Recreation	District		50	20	50	m
Premier Fields		2	75	150	377	10
Rectangular Fields Precinct 2 North	North	9	50	300	292	9
Rectangular Fields Precinct 1 South	South	4	50	200	200	2
Rectangular Fields Precinct 3 North	North	4	50	200	200	2
Oval Fields 1, 2 & 3		e	50	150	150	co
Diamond Fields		4	25	100	100	4
Archery / Shooting		-	50	50	52	2
Premier Hub		-	50	20	100	5
Sub-total				1275	1546	
Events Allowance#	Approx No.			300	009	
PWD Parking*					39	39
No. of Additional Parking	607					
Spaces Provided						

CAR PARK SPACE QUANTITIES

REGION CONSULTANTS: DRAWING: DC-18 [Q] PROJECT: 19009 SCALE: AS SHOW/N @A. DATE: 26-05-2022 Ζ **TOOWOOMBA REGION SPORTS PRECINCT** PO BOX 1640, Buddina, OLD 4575 T: 07 5493 4677 2020 MASTER PLAN

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