Australian Turf Club Limited

ATC Randwick - Night Racing

Acoustic Report

February 2021

This report: has been prepared by GHD for Australian Turf Club Limited and may only be used and relied on by Australian Turf Club Limited for the purpose agreed between GHD and the Australian Turf Club Limited as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Australian Turf Club Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Australian Turf Club Limited and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Executive summary

This acoustic assessment has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) support a State Significant Development (SSD) application for Night Racing at the Royal Randwick Racecourse (Royal Randwick).

The Australian Turf Club (ATC) is looking for opportunities to improve the racing experience at Royal Randwick for spectators, increase revenue and re-invest into its people, racing infrastructure and entertainment facilities.

Royal Randwick has been part of Australia's racing culture for over 150 years and is the country's oldest horse racing venue, with a history of racing dating back to 1833.

Today, Royal Randwick enjoys a reputation as being one of Australia's premier racing venues and is considered the *Jewel in the Crown of Sydney racing* - hosting some of the world's richest turf races, including The TAB Everest and the Longines Queen Elizabeth Stakes.

As part of a vision to secure Royal Randwick's long-term future and enhance its status as a world-class destination for thoroughbred racing, the ATC has prepared a proposal to introduce night racing at Royal Randwick. The night racing events will create a new spectator experience, attract new audiences and enhance the status of Royal Randwick on the state, national and international racing stage. The night racing events will also provide an alternative night time cultural and sporting event with the opportunity for providing increased tourism and boosting Sydney's night-time economy.

The scope of the proposal includes:

- Consent for up to 16 night racing events per annum (predominately between October and April).
- New trackside lighting to facilitate televised broadcasting.
- Upgrade to Spectator Precinct lighting for patron safety.
- Permanent Generators.

Noise from race commentary, music and patrons entering/exiting the racecourse have been assessed against the adopted criteria. In accordance with the SEARs, a noise management plan has been developed to protect the amenity of the surroundings sensitive receivers.

Table of contents

Table index

Figure index

Glossary of acoustic terms and abbreviations

Abbreviation	Definition
ATC	Australian Turf Club Limited
Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L_{A90} descriptor.
Class 2 Event	Crowd attendance of between 10,001 – 15,000
Class 3 Event	Crowd attendance of less than 1 – 10,000
dB	Decibel is the logarithmic unit used for expressing the sound pressure level (SPL) or power level (SWL) in acoustics.
dBA	Frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at very low and very high frequencies.
$L_{Aeq(period)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
$L_{A90(period)}$	The sound pressure level exceeded for 90% of the measurement period.
L_{Amax}	The maximum A-weighted sound level recorded during the measurement period.
L_{Cmax}	The maximum C-weighted sound level recorded during the measurement period.
$L_{Aeq(15hr)}$	The L_{Aeq} noise level for the period 7 am to 10 pm.
$L_{Aeq(9hr)}$	The L_{Aeq} noise level for the period 10 pm to 7 am.
$L_{Aeq(1hr)}$	The highest hourly L_{Aeq} noise level during the day and night periods.
NCG	Noise Criteria Guideline (Roads and Maritime, 2014)
NPI	Noise Policy for Industry (EPA, 2017)
Noise sensitive receiver	An area or place potentially affected by noise including residential dwellings, schools, child care centres, places of worship, health care institutions and active or passive recreational areas.
Rating background level (RBL)	The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
RNP	Road Noise Policy (DECWW, 2011)
SEARs	Secretary's Environmental Assessment Requirements

1. Introduction

1.1 Introduction

GHD has prepared an acoustic assessment for the proposed night-time racing to be conducted at the existing ATC Royal Randwick Racecourse.

The objective of this acoustic assessment is to respond to the Secretary's Environmental Assessment Requirements (SEARs) and assess noise emission from the night racing events, and recommend acoustic measures to protect the amenity of the surrounding sensitive receivers.

1.2 Scope of works

The scope of this assessment includes:

- Undertake attended and unattended noise monitoring at Randwick Racecourse during a number of events, including:
  - Medium sized event with spectator size of 10,000 to 15,000 (Class 2)
- Prepare an acoustic assessment, providing the following:
  - Review relevant documentation relating to the emission of noise from the site
  - Review operational management plans for other sites within the City of Sydney Council which hold events similar to the proposal
  - Propose relevant noise criteria based on the above review
  - Conduct noise modelling based on the aforementioned noise measurements and information provided by the ATC to determine the noise emission from the proposed night-time racing to assess the potential for noise impacts on the surrounding residential land uses
- Prepare an Acoustic Report outlining results of the acoustic assessment and, where required, mitigation recommendations. The Acoustic Report will form part of the EIS and address the SEARs key issues in relation to noise

2. Existing environment

2.1 Project description

Royal Randwick Racecourse is located in the eastern suburbs of Sydney NSW, approximately 6 km from Sydney's CBD. It consists of the course proper (2224 m circumference) and the inner Kensington track (2100 m circumference). The site is on Crown Land, zoned RE1 – Public Recreation, leased to The Australian Turf Club and is bounded by Alison Road, Wansey Road, High Street & Doncaster Ave. Along these boundaries are a diverse range of neighbouring properties of varying heights, including the UNSW Sydney campus along with several commercial and residential properties.

The Australian Turf Club proposes to facilitate a maximum of sixteen (16) night race meetings per year, typically running from 6.00 pm to 10.00 pm predominantly between October to April. The race classes, crowd numbers and number of events are presented below in Table 2-1.

Table 2-1 Night racing schedule and crowd attendance

Event	Est Crowd Attendance	Number of events per annum
Class 3	0 – 10,000	12
Class 2	10,001 – 15,000	4

The site is located in the Public Recreation (RE1) land zone. The site is surrounded by the following land zone usages:

- Low Density Residential (R2) to the east
- Medium Density Residential (R3) to the east and west
- Infrastructure (SP2) to the north and south
- Neighbourhood Centre (B1) to the north
- Local Centre (B2) to the west
- Public Recreation (RE1) to the north.

The dominant noise sources at this site would be road traffic noise from Anzac Parade and Alison Road, and noise from the Sydney Light Rail and associated stabling facility.

2.2 Sensitive receivers

Noise sensitive receivers are defined based on the type of occupancy and the activities performed in the land use and could include:

- residential dwellings
- educational institutes, libraries or childcare centres
- hospitals, surgery or other medical institutions
- places of worship
- passive and active recreational areas such as parks, sporting fields or golf courses

- community centres
- commercial or industrial premises.

The following sensitive receivers and land uses have been identified for this assessment.

- Randwick TAFE College (to the north of the proposal)
- Residential receivers located along Alison Road (to the north and east of the proposal)
- Residential receivers located along Wansey Road (to the east of the proposal)
- University of New South Wales (to the south of the proposal)
- Residential receivers located along Doncaster Avenue (to the west of the proposal).

Representative sensitive receivers included for modelling and assessment purposes are detailed in Table 2-2. The location of the site including nearby sensitive receivers are shown in Figure 2-1.

Table 2-2 Sensitive receivers

Receiver ID	Receiver address	Receiver type
R01	170 Doncaster Avenue	Residential
R02	142 Doncaster Avenue	Residential
R03	86-92 Doncaster Avenue	Residential
R04	66 Doncaster Avenue	Residential
R05	36 Doncaster Avenue	Residential
R06	4-8 Doncaster Avenue	Residential
R07	University of New South Wales	Educational
R08	Randwick TAFE College	Educational
R09	22 Alison Road	Residential
R10	34-52 Alison Road	Residential
R11	54-76 Alison Road	Residential
R12	80 Alison Road	Residential
R13	88 Alison Road	Residential
R14	47 Wansey Road	Residential
R15	94-96 Alison Road	Residential
R16	2 Wansey Road	Residential
R17	39 Wansey Road	Residential
R18	19 Wansey Road	Residential
R19	102-106 Alison Road	Residential
R20	1 Wansey Road	Residential
R21	110 Alison Road	Residential

The location of the site, including nearby sensitive receivers considered for the assessment, is shown in Figure 2-1 below.

Paper Size A4

0 25 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Proposal
- Sensitive receiver
- B1, Neighbourhood Centre
- B2, Local Centre
- R1, General Residential
- R2, Low Density Residential
- R3, Medium Density Residential
- RE1, Public Recreation
- RE2, Private Recreation
- SP2, Infrastructure

Australian Turf Club
Proposed night racing

Job Number	21-26735
Revision	A
Date	25 Oct 2017

Proposal location and sensitive receivers

Figure 1

G:\21\26173\GIS\Maps\Deliverables\SMA.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: Aerial Imagery: Sixmaps, LPI 2017. General Topo Data: NSW LPI DTCB & DTDB 2012 Created by:afoddy

3. Noise assessment procedure and criteria

3.1 Secretary's Environmental Assessment Requirements

The Secretary's Environmental Assessment Requirements (SEARs) key issues in relation to noise are as follows:

7. Noise impacts

The EIS shall:

- *include an acoustic report which identifies the likely noise generating sources and activities associated with the proposal and any acoustic measures required to ensure acceptable residential amenity in accordance with relevant guidelines*
- *include a noise management plan, which outlines appropriate event specific operational and design mitigation measures, including:*

  (a) dBA noise limits as well as dBC (base noise) limits

  (b) details of site supervision, hours of operation, night management

  (c) details on restrictions to amplified music, operating time and general use

  (d) details about patron attendance times

  (e) details about any signage to inform patrons of approved closure hours and egress after the event

  (f) details on training guidelines for staff

  (g) details on the process for community consultation and dealing with noise complaints from residents including the management of noise related complaints during night events

  (h) details on monitoring noise and vibration and actions to be taken to address complaints or non-compliances

  (i) details on compliance monitoring (provide on-site noise monitoring during the night events)

  (j) details on how any impacts during the event will be mitigated through the coordinated use of a flexible noise monitoring system

    - *include an acoustic monitoring plan to outline results of noise compliance testing which can be used to inform any necessary additional acoustic mitigation measures.*

The NSW Government Major Projects website provides the following guidance around amenity:

> *Amenity is the pleasantness, attractiveness, desirability or utility of a place, facility, building or feature. Amenity is very important to communities and other stakeholders at local, district, regional and State levels. State significant projects should aim to minimise amenity impacts. The documents below should be considered when assessing amenity impacts of State significant projects.*
>
> ***Noise and Vibration***

Noise and vibration associated with State significant projects can have adverse economic, environmental, cultural and social impacts. The guidance below include requirements and best practice for noise and vibration impacts to be avoided or mitigated.

Protection of the Environment Operations Act 1997

The Act details requirements for environment protection licences, noise control notices, noise abatement orders and noise abatement directions.

Note that the *Noise Policy for Industry* (NPI) (EPA, 2017) is not applicable to the assessment of noise impacts as Section 1.5 of the NPI clearly states the following:

"The policy does not apply to:

• noise from sporting facilities, including motor sport facilities

Other government policies, guidelines and legislation typically cover these noise sources."

To minimise amenity impacts and address the SEAR's requirements, a noise management plan and acoustic monitoring plan will be prepared and issued as a separate document. The acoustic monitoring plan will be appended to the management plan for the overall operation of the racecourse during night racing events.

3.2 Protection of the Environment Operations Act

In line with the guidance provided on the Major Projects website, the *Protection of the Environment Operations Act 1997* (POEO Act) has been used to minimise amenity impacts on the surrounding sensitive receivers. The POEO Act also defines 'offensive noise' as noise

a) *That, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:*

   i) *Is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or*

   ii) *Interferers unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or*

b) *That is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances prescribed by the regulations.*

3.3 Proposed criteria to protect amenity

3.3.1 Review of management plans for amplified commentary and music

The *Protection of the Environment Operations Act 1997* doesn't provide specific criteria to preserve amenity. To determine appropriate noise limits to address the SEAR's requirement to *"ensure acceptable residential amenity",* a review of noise management plans for other similar venues within the inner city area has been undertaken to establish appropriate A-weighted and C-weighed maximum noise levels. These will also be included in the Noise Management Plan which is also required under the SEARs.

Maximum noise levels from crowd noise during races will not be considered as this will occur for short periods throughout the event and contain no annoying characteristics which would impact the nearby sensitive receivers. It is also not possible for the event organisers to control crowd noise. It is noted that other noise management plans don't consider crowd noise as part of the compliance assessment requirements.

Maximum noise level criteria for amplified commentary and music will be established based on the following review:

Royal Botanic Gardens and Domain Trust Noise Management Plan

6. VENUE NOISE LIMITS

The Trust sound limits for its various sites are set out below. In recognition of different impacts of some events from others, it will also enforce differential limits for some events and take into account the history of a particular events' impact. For example when events such as Sydney Festival concerts have no complaints, the emissions will be allowed at a higher level than for other events.

6.1. The Phillip & Crescent Precincts

The Phillip and Crescent Precincts are the only areas of Trust land large enough to carry crowds of people larger than 10,000 persons with a common viewing point. The Prevention Notice recognises that a greater decibel limit is required to provide a large number of event patrons with a reasonable event experience where they can comfortably hear and enjoy the entertainment.

6.1.1. Events with > 10,000 PAX

Both dB (A) and dB(C) limits are specified for concerts. This gives recognition to the particular impacts of bass sound on receivers which is the dB (C) measurement.

The measurements at Sydney Hospital and Sydney Eye Hospital which are the closest receivers, must not exceed L_{Amax} 80 dB(A) and L_{Cmax} 100 dB(C) except for Carols and Sydney Festival Concerts which are permitted to L_{Amax} 85 dB(A).

For other monitoring locations outlined in 4.1 which are a substantial distance further than the Hospital, the levels must not exceed LAmax 70 dB(A) and LCmax 90 dB(C)

6.1.2. Events with < 10,000 PAX

The noise levels from any sound amplification equipment measured at the relevant monitoring locations in 4.1 must not exceed LAmax 55dB (A) and LCmax 70dB(C)

6.2. Fleet Steps

Crowds at Fleet Steps are necessarily smaller than 10,000 persons because of the size of the site.

The noise levels from any sound amplification equipment measured at the relevant monitoring locations specified in 4.1 must not exceed LAmax 55dB (A) and LCmax 70dB(C)

6.3. Tarpeian Precinct and Bennelong Lawn

Tarpeian Precinct and Bennelong Lawn, like Fleet Steps, are smaller sites catering to less than 10,000 people.

The noise levels from any sound amplification equipment measured at the relevant monitoring locations specified in 4.1 must not exceed LAmax 55dB (A) and LCmax 70dB(C)

6.4. Other

Where there are no other guidelines, the general limits to be applied at specified locations or other monitoring locations of the Trust choice are:

(i) LAmax 55dB(A); or LAmax that exceeds the background noise level (LA90) by no more than 5dB(A).

Centennial Park and Moore Park Trust Noise Management Plan

7.4.5 Noise Limits

A-Weighted

During the test(s), rehearsal(s) and main event(s), the A-weighted maximum sound pressure level (LA,Max) measured in accordance with condition 7.1.5 and 7.3.2, must not exceed 65 dB(A).

Low frequency

During the test(s), rehearsal(s) and main event(s), the C-weighted maximum sound pressure level (LC,Max) measured in accordance with condition 7.1.5 and 7.3.2, must not exceed 85 dB(C).

Sydney Cricket Ground and Allianz Stadium Noise Management Plan

3.2 Noise Levels

This section presents the noise level limits that apply to sporting events, concerts and other outdoor events held on Trust lands (including the SCG and Allianz Stadium) with the use of sound amplification equipment.

3.2.1 Sporting Events

When measured at the specified monitoring locations, the L_{Amax} of noise emanating from any sound amplification equipment must not exceed 60 dB (A) during any sporting events.

This noise limit applies to wind speeds up to 5m/s, above which wind generated noise on the microphone limits measured accuracy. During periods of wind greater than 5m/s this noise limit does not apply.

Noise levels measured when wind speed exceed 5m/s (at microphone height) should not be used to measure compliance with noise limits, as wind generated noise may influence measurement accuracy. During periods of wind greater than 5m/s the Trust must continue to take all reasonable and feasible actions to minimise noise.

3.2.2 Concerts, Rehearsals and Sound Tests

Both dB(A) and dB(C) limits are specified for concerts as a particular impact on local receptors of amplified music is low-tone bass sounds – measured in dB(C). During sound test(s), rehearsals(s) and concert(s), L_{Amax} and the L_{Cmax} measured at the monitoring locations will not exceed:

- *For activities conducted at the SCG: 70 dB(A) and 90 dB(C); and*
- *For activities conducted at Allianz Stadium: 80 dB(A) and 100 dB(C).*

An exceedance of the noise level limit by a maximum of 5 dB(A) and/or 5 dB(C) during a single five (5) minute period during the first ten (10) minutes of the performance of each new act will not be taken to be a breach of the limits.

Noise levels measured when wind speed exceeds 5m/s (at microphone height) should not be used to measure compliance with noise limits in the Notice, as wind generated noise may limit measurement accuracy. During periods of wind greater than 5m/s the Trust must continue to take all reasonable and feasible actions to minimise noise.

3.2.3 Other Outdoor Events with Sound Amplification

For other outdoor events with sound amplification the L_{Amax} of noise from any sound amplification equipment must not exceed 60 dB(A) measured at the monitoring locations.

This noise limit applies to wind speeds up to 5m/s, above which wind generated noise on the microphone limits measurement accuracy. During periods of wind greater than 5m/s this noise limit does not apply.

Noise levels measured when wind speed exceeds 5m/s (at microphone height) should not be used to measure compliance with noise limits, as wind generated noise may influence measurement accuracy. During periods of wind greater than 5m/s the Trust must continue to take all reasonable and feasible actions to minimise noise.

Table 3-1 Summary of maximum noise limits, dB

Document	Event	Amplified noise L_{Amax}	Amplified noise L_{Cmax}
Royal Botanic Gardens and Domain Trust Noise Management Plan	Events with < 10,000 PAX	55	70
	Events with > 10,000 PAX	70 – 80	90 – 100
Centennial Park and Moore Park Trust Noise Management Plan	All events	65	85
Sydney Cricket Ground and Allianz Stadium Noise Management Plan	Sporting events	60	-
	Concerts, rehearsal and sound tests	70 – 80	90 -100
	Other outdoor events with sound amplification	60	-

Based on the above information, the following maximum noise levels are considered appropriate for the assessment of amplified commentary and music:

- During the event, the A-weighted maximum sound pressure level (L_{Amax}) of amplified commentary and music should be managed so that the noise level does not exceed 65 dB when assessed at the nearest sensitive receiver
- During the event, the C-weighted maximum sound pressure level (L_{Cmax}) of amplified commentary and music should be managed so that the noise level does not exceed 80 dB when assessed at the nearest sensitive receiver

3.4 Sleep disturbance for patrons leaving the event

Based on the time of the events, it is likely that patrons will be leaving the event after 10 pm. As such, an assessment of sleep disturbance is warranted for this activity. Noise from the race event itself would not extend beyond 10 pm and has not been considered as part of the sleep disturbance assessment.

The Noise Policy for Industry (NPI), (EPA 2017) recommends a maximum noise level assessment based on guidance from the World Health Organisation to assess the potential for sleep disturbance impacts which include awakenings and disturbance to sleep stages. An initial screening test for the maximum noise levels events should be assessed to the following levels.

- $L_{Aeq(15\ min)}$ 40 dBA or the prevailing RBL plus 5 dB, whichever is greater, and/or
- L_{AFmax} 52 dBA or the prevailing RBL plus 15 dB, whichever is greater.

If the screening test indicates there is a potential for sleep disturbance then a detailed maximum noise level assessment should be undertaken. The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

The *Road Noise Policy* provides further guidance, which indicates that:

- maximum internal noise levels below 50–55 dBA are unlikely to cause awakening reactions which equates to 60 – 65 dBA outside considering a 10 dBA reduction for partially open windows
- one or two noise events per night with maximum internal noise levels of 65–70 dB(A) are not likely to significantly affect health and wellbeing which equates to 75 – 80 dBA outside considering a 10 dBA reduction for partially open windows.

3.5 Traffic generation

The proposed event has the potential to generate additional traffic on the road network. The *Road Noise Policy* (DECCW 2011) provides traffic noise criteria for sensitive receivers affected by additional traffic on existing freeways/arterial/sub-arterial and local roads generated by land use developments. The criteria are applied to traffic on public roads to identify potential road traffic impacts and the requirement for reasonable and feasible mitigation measures.

The *Road Noise Policy* (DECCW 2011) application notes state that *"for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion."*

If road traffic noise increases during operation is within 2 dBA of current levels then the objectives of the *Road Noise Policy* (DECCW 2011) are met and no specific mitigation measures are required.

Table 3-2 Road traffic noise criteria, dB(A)

Type of development	Day 7 am to 10 pm	Night 10 pm to 7 am
Existing residence affected by additional traffic on sub-arterial roads generated by land use developments	60 $L_{Aeq(15\ hr)}$	55 $L_{Aeq(9\ hr)}$
Existing residence affected by additional traffic on local roads generated by land use developments	55 $L_{Aeq(1\ hr)}$	50 $L_{Aeq(1\ hr)}$

The Roads and Maritime *Noise Criteria Guideline* (2015) defines sub-arterial, collector and local roads as shown in Table 3-3. Based on these definitions, Doncaster Avenue has been classified as a collector road which is assessed under the sub-arterial road criteria as outlined in Table 3-3.

Table 3-3 Roads and Maritime road classification criteria

Road	Definition
Sub-arterial	Connects arterials to regions of development and carry traffic from one part of a region to another. Provide connection between arterial roads and local roads. May support arterial roads during peak periods. A road that collects local traffic leaving a locality and connects to another local road, sub-arterial or arterial. Note not all networks are large enough to have both sub-arterial and collector roads
Collector	Connects the sub-arterial roads to the local road system in developed areas. May support sub-arterial roads during peak periods. May have been designed as local streets but can serve major traffic-generating developments or support non-local traffic. Note not all networks are large enough to have both collector and sub-arterial roads. The Road Noise Policy does not provide separate noise criteria for collector roads. Roads and Maritime applies sub-arterial noise criteria to collector roads and still considers collector roads and sub-arterial roads to be different functional classes.
Local	Provide vehicular access to abutting property and surrounding streets. They are the subdivisional roads within a particular developed area.

3.6 Summary of noise criteria

Based on the information in the previous sections, Table 3-4 and Table 3-5 provides a summary of the project specific noise criteria for the assessment of the night racing events at Royal Randwick Racecourse.

Table 3-4 Project specific noise criteria – amplified music/commentary and sleep disturbance, dB

Receiver	Time period	Amplified music or commentary		Sleep disturbance for patrons leaving the event, L_{Amax}
		L_{Amax}	L_{Cmax}	
Residential receivers	Evening	65	80	
	Early night shoulder period (10 pm to 12 am)	-[1]	-	52[2]

Note: 1) Amplified sound is not proposed after 10 pm

2) Conservatively based on the minimum level presented in the Noise Policy for Industry, in the absence of background noise monitoring

Table 3-5 Project specifc road traffic noise criteria, dB(A)

Location of receivers	Day 7 am to 10 pm	Night 10 pm to 7 am
High Street and Alison Road	60 $L_{Aeq(15\ hr)}$	55 $L_{Aeq(9\ hr)}$
Doncaster Avenue and Ascot Street	55 $L_{Aeq(1\ hr)}$	50 $L_{Aeq(1\ hr)}$

4. Assessment of Impacts

4.1 Assessment source data

The noise impact from the proposed night racing at ATC Randwick have been divided into the following categories:

- Class 3 Event – 0 – 10,000
- Class 2 event – 10,001 to 15,000

Within each category, noise levels can be divided into major and minor races. Typically, each event will have 2 or 3 major races (Group 1 or equivalent) where noise levels are louder than the remaining races.

In addition to noise from the event, noise from patrons exiting the premises, via foot traffic and vehicles, has been assessed against for the period between 10 pm and midnight.

4.1.1 Noise emission from the event

The noise generating sources and activities, and the corresponding maximum noise levels are presented below in Table 4-1.

The noise levels are based on attended and unattended noise monitoring conducted on site during “Colgate Optic White Stakes Day” event on 16 September 2017. The attendance at this event was approximately 12,000. It is considered that this event is representative of a typical Class 2 event. These noise levels have also been conservativity used for the assessment of Class 3 events as an event with 10,000 spectators is unlikely to be significantly less than this.

Table 4-1 Maximum noise levels of sources and activities (L_{max}) – Class 2 and 3

Source	Distance from source	Minor race		Major race	
		L_{Amax} dBA	L_{Cmax} dBC	L_{Amax} dBA	L_{Cmax} dBC
Commentator – race period	130 m – directly in front of grandstand	68	80	75	82
Post-race music and interview		71	79	74	81

4.1.2 Noise emission from light generators

Additional generators will be required to power the lighting for the night racing events. At this stage, the exact make and model of generator has not been selected, however 800 to 1,200 kVA generators have been nominated.

Given the constant nature of this noise source, it is appropriate to assess against the requirements of the Noise Policy for Industry (NPI). In lieu of background noise monitoring for the project, a conservative criteria of $L_{Aeq,\ 15\ min}$ 35 dBA has been selected, which is the minimum criteria for the night-time period for an assessment against the requirements of the NPI.

To achieve a resultant noise level of 35 dBA or less, a generator enclosed in a sound attenuated enclosure should be selected, with a maximum sound power level of 98 dBA. The generators have been located in suitable areas within the infield of the site to have a minimum

impact on the sensitive receivers. Locations are shown in the Lighting Layout drawings prepared by IGS.

4.1.3 Noise emission from patrons and vehicles entering and exiting site

In addition to the above noise emission from the event, there is the potential for noise from patrons entering and exiting the site to exceed the relevant noise criteria presented above. Based on the running time of the events, it is likely that the exit of patrons will extend beyond 10:00 pm. As such, a noise emission assessment of patrons entering and exiting, via foot traffic and vehicle have been assessed against the night-time criteria.

The noise sources used for this assessment are presented below in Table 4-2. GHD has previously conducted a noise emission assessment from the Multi Deck Car Park located adjacent to the Ascot Street exit (GHD report Multi Deck Car Park Noise Assessment dated 26 July 2017). The results of this assessment has also been included in the results section of this report.

Table 4-2 Noise levels of patrons and vehicles – sound power levels

Source	L_{Amax} noise level dB
Patron noise	90[1]
Car drive by	90
Car door slam	97
Note: 1) Based on the sound power level of a male shouting	

4.2 Modelling parameters

Noise modelling was undertaken using CadnaA Version 2020. The following noise modelling assumptions:

- surrounding land is predominantly grass and was modelled assuming majority of soft ground with a ground absorption coefficient of 0.8
- atmospheric absorption was based on an average temperature of 10 ºC and an average humidity of 70%
- modelled scenarios take into account the shielding effect from surrounding buildings and structures on and adjacent to the site.

4.3 Predicted noise levels – race events

4.3.1 Results of noise modelling

Table 4-3 and Table 4-4 present maximum noise levels, both A-weighted and C-weighted, resulting from amplified commentary and music. It is noted that only commentary and music playing through the main speakers on and around the grandstand and spectator viewing area has been assessed. Any other amplified sound would also need to comply with the maximum noise limits presented in this report and should be confirmed by the monitoring program to ensure these limits are not exceeded.

Table 4-3 Predicted maximum noise levels before 10 pm, dBA – A-weighted and C-weighted assessment – commentary

Receiver ID	Receiver address	Class 2 and 3 Event noise levels (L_{max}), dB			
		During minor race		During major race	
Weighting		**A**	**C**	**A**	**C**
Criteria		**65**	**80**	**65**	**80**
R01	170 Doncaster Avenue	50	63	56	63
R02	142 Doncaster Avenue	52	65	58	65
R03	86-92 Doncaster Avenue	51	64	57	64
R04	66 Doncaster Avenue	36	49	42	49
R05	36 Doncaster Avenue	37	50	43	50
R06	4-8 Doncaster Avenue	34	47	40	47
R07	University of New South Wales	49	62	55	62
R08	Randwick TAFE College	54	67	60	67
R09	22 Alison Road	58	71	64	71
R10	34-52 Alison Road	57	70	63	70
R11	54-76 Alison Road	56	69	62	69
R12	80 Alison Road	55	68	61	68
R13	88 Alison Road	54	67	60	67
R14	47 Wansey Road	45	58	51	58
R15	94-96 Alison Road	53	66	59	66
R16	2 Wansey Road	48	61	54	61
R17	39 Wansey Road	48	61	54	61
R18	19 Wansey Road	50	63	56	63
R19	102-106 Alison Road	52	65	58	65
R20	1 Wansey Road	51	64	57	64
R21	110 Alison Road	52	65	58	65

Table 4-4 Predicted maximum noise levels before 10 pm, dBA – A-weighted and C-weighted assessment – music

Receiver ID	Receiver address	Class 2 and 3 Event noise levels (L_{max}), dB			
		During minor race		During major race	
Weighting		**A**	**C**	**A**	**C**
Criteria		**65**	**80**	**65**	**80**
R01	170 Doncaster Avenue	52	60	55	62
R02	142 Doncaster Avenue	54	62	57	64
R03	86-92 Doncaster Avenue	53	61	56	63
R04	66 Doncaster Avenue	39	47	42	49
R05	36 Doncaster Avenue	41	49	44	51
R06	4-8 Doncaster Avenue	38	46	41	48
R07	University of New South Wales	50	58	53	60
R08	Randwick TAFE College	56	64	59	66
R09	22 Alison Road	60	68	63	70
R10	34-52 Alison Road	59	67	62	69
R11	54-76 Alison Road	58	66	61	68
R12	80 Alison Road	57	65	60	67
R13	88 Alison Road	56	64	59	66
R14	47 Wansey Road	46	54	49	56
R15	94-96 Alison Road	55	63	58	65
R16	2 Wansey Road	49	57	52	59
R17	39 Wansey Road	50	58	53	60
R18	19 Wansey Road	51	59	54	61
R19	102-106 Alison Road	54	62	57	64
R20	1 Wansey Road	52	60	55	62
R21	110 Alison Road	53	61	56	63

4.3.1 Discussion of results for race events

Based on the measurements undertaken during race events, noise modelling, results and information provided by the ATC, the following can be concluded regarding the noise emission from the race events:

Class 2 and 3 Events

- Based on noise monitoring undertaken on site and noise modelling, the L_{Amax} and L_{Cmax} noise emission from the amplified commentary and music is predicted to achieve compliance with the relevant noise criteria presented in Section 3.3.

4.4 Patrons/vehicles exiting site following event

4.4.1 Exit locations

An assessment of sleep disturbance has been undertaken to determine the impact of patrons and vehicles exiting the site at the completion of the event, as this is likely to occur after 10 pm. The following summarises entry/exit points for the site:

- Gate 1 (pedestrians / vehicles)
- Gate A and Gate B (pedestrians using buses)
- Gate 18 (vehicle access to members carpark)
- Gate 13 (vehicle access to infield carpark)

These entry/exit points are shown in Figure 4-1 and Figure 4-2 below.

Figure 4-1 Patron/vehicle entry and exit locations (Figure 2 from PTC Traffic Assessment)

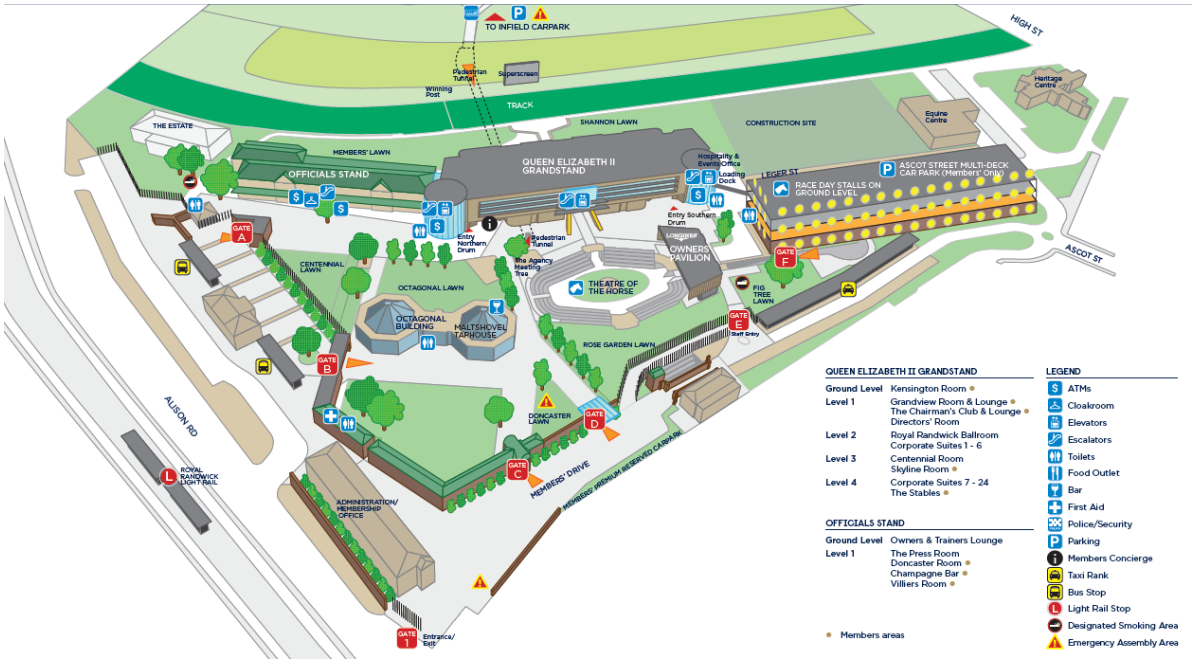


Figure 4-2 Detailed map of patron/vehicle entry and exit points (provided by ATC)

4.4.2 Assumptions for assessment

To reduce the amenity impacts on the receivers on Doncaster Avenue and Ascot Street, Gate 18 will be closed from 8 pm and pedestrians and taxis/ubers will be directed to enter and exit the site via Gate 1, Gate A or Gate B on Alison Road. Members exiting the car park will still be able to exit via Gate 18.

The following assumptions have been made regarding the impacts of patrons leaving the site at the conclusion of the event, based on the Traffic Impact Report, undertaken by PTC Consultants (dated 12 June 2020):

- Foot traffic – 5 % - 750 people (via Gate 1 – Alison Road)
- Public transport – 16 % (light rail) + 27.5 % (bus) – 6,525 (via Gate 1, Gate A and Gate B – Alison Road))
- Private vehicle – 25 % - 3,750 in 1,875 vehicles
  - 574 vehicles in members car park (via Gate 18 – Ascot Street)
  - 1301 vehicles in infield car park (Via Gate 13 – High Street)
- Taxi/uber – 16 % - 2,400 people in 1,200 vehicles (via Gate 1 – Alison Rd)
  - Hire car – 5 % - 750 people in 188 vehicles in infield car park (Via Gate 13 – High Street)
  - Shuttle / coaches – 5 % - 825 people in 34 vehicles in infield car park (Via Gate 13 – High Street)

Given all pedestrians and taxis/Ubers will be exiting via Gate 18 and onto Alison Road, noise impacts would not be significant as there are no receivers within the vicinity of Gate 18 and ambient noise levels will be higher due to traffic and light rail on Alison Road.

4.4.3 Sleep disturbance assessment

To assess sleep disturbance impacts on residential receivers the following has been assessed:

- Car door slam and/or patrons yelling within the taxi rank area (90 metres from nearest receiver) – Sound power level 97 dBA
- Car pass by on Ascot Street (5 metres from nearest receiver) – Sound power level 90 dBA

Based on the above noise levels, the following worst-case resultant external noise levels are predicted:

- Car door slam – L_{Amax} < 30 dBA at nearest sensitive receivers on Doncaster Avenue
- Car pass by – L_{Amax} 63 dBA at nearest sensitive receiver outside Gate 18

These results demonstrate the following:

- Sleep disturbance impacts are not predicted due to patrons or vehicles (including car door slams) at the nearest sensitive receivers on Doncaster Avenue. As these are most impacted receivers, all other activities on the site after 10 pm are not expected to result in sleep disturbance impacts
- Noise levels from vehicles driving past the residents directly outside Gate 18 are predicted to be above the NPI sleep disturbance screening criteria. Based on guidance from the Road Noise Policy, the external noise level of 63 dBA (with a conservative internal level of 53 dBA with 10 dB reduction through open window) are *"unlikely to cause awakening reactions".*

While the guidance within the Road Noise Policy suggests that the noise is unlikely to cause awakening reactions, mitigation measures are provided Section 5 and summarised below to minimise noise impacts:

- Consultation should be undertaken with resident surrounding the exit at Ascot Street (Gate 18) to discuss the potential impacts
- Signage should be located at the exit to remind patrons and vehicles to leave in a quiet and orderly manner and to consider the residential neighbours
- Speed limits should be imposed to reduce the impacts on these receivers
- Once operational, noise monitoring should be undertaken to determine the impacts from vehicles exiting the site and determine whether additional mitigation measures should be proposed, such as at property treatments

Security would likely be required to ensure that patrons and vehicles leave the area in a quiet manner and do not create a noise disturbance for the residents around the Royal Randwick site. A detailed plan is outlined in the noise management plan.

4.5 Traffic noise assessment

Traffic noise levels have been predicted for roads adjoining the site between 10 pm and 12 am, when the majority of patrons will be leaving, and the potential impact will be at its greatest. Noise levels have been predicted from vehicles exiting the members and infield car park, along with patrons leaving via taxi/uber, following completion of the event and are shown in following sections. This is based on data presented in the Traffic Impact Report prepared by PTC Consultants (dated 12/06/2020).

The total expected vehicles for a class 2 event is 1,875, with the following breakdown:

- Infield car park (exiting onto High Street) – 1,500 private vehicle plus 188 hire vehicles and 34 shuttles/coaches
- Members car park (exiting onto Doncaster Avenue and Ascot Street) – 375 private vehicles

The upper limit, worst case scenario of taxi numbers for a class 2 event departing from the taxi rank and exiting via Gate 1 is 1,200.

Most vehicles are likely to depart between 10 pm and 12 am, however approximately 25 % of vehicles and patrons are likely to leave prior to 10 pm

The roads which would be impacted by traffic entering and exiting the site (and the relevant classification is as follows:

- High Street (sub-arterial)
- Doncaster Avenue (collector road)
- Ascot Street (local road)
- Alison Road (arterial road)

Modelling inputs and assumptions

The noise model inputs and assumptions for the existing and proposed scenarios are presented in Table 4-5.

Table 4-5 Operational noise model inputs and assumptions

Inputs/assumptions	Data incorporated into noise model
Noise model	Cadna A
Prediction algorithm	United Kingdom Department of Transport, Calculation of Road Traffic Noise (CoRTN)
Heavy vehicle %	Day and night heavy vehicle (HV) percentages assumed to be the same as current measured traffic data
Traffic speeds	30 km/h for vehicles on Ascot Street and Doncaster Avenue 50 km/h for vehicles on High Street
Traffic volumes	Based on information provided by ATC Consultants
Road surface adjustments	Dense graded asphalt (DGA) – 0 dBA
Façade correction	+2.5 dBA to account for noise reflected from the façade.
CoRTN conversion factors	CoRTN predicts $L_{A10(1hr)}$ noise levels which is converted to the $L_{Aeq(1hr)}$ descriptor with a -3 dBA correction factor
CoRTN factor (Adapted to Australian conditions through research undertaken by the Australian Road Research Board)	-1.7 façade -0.7 freefield
Receiver heights	1.5 m above ground level
Ground absorption	G = 0.5
Fences and existing noise walls	No fences or noise walls have been included in the road traffic assessment

The details of the noise assessment for each exit is provided in the following sections.

High Street

An assessment of vehicles exiting the infield car park has been undertaken to determine the impact on sensitive receivers along High Street. A worst-case scenario has been assumed, with 1,722 vehicles exiting the infield car park after 10 pm following the completion of the race event and evenly dividing in each location. It is likely that during smaller class 3 events, the number of vehicles exiting the site will be less than this, and as such, have a reduced impact on the sensitive receivers along High Street.

The traffic noise emission associated with the racecourse at residential receivers along High Street at 1 metre from the façade, are predicted to be:

- 50 dBA between the racecourse exit and Anzac Parade
- 51 dBA between the racecourse exit and Wansey Road

The typical worst-case distance from the nearest centre line to the façade is approximately 8 metres. The predicted traffic noise is predicted to achieve compliance with the $L_{Aeq(9hr)}$ 55 dB(A) night time noise level criteria presented in Table 3-2.

Doncaster Avenue

An assessment of vehicles exiting the member's car park has been undertaken to determine the impact on sensitive receivers along Doncaster Avenue. It has been assumed that the 375 vehicles will exit the member's car park between 10 pm and 12 am and be evenly distributed between north and south bound on Doncaster Avenue and Ascot Street. It has also been

assumed that no horse floats or heavy vehicles will use this exit. It is likely that during smaller class 2 and class 3 events, the number of vehicles exiting the site will be less than this, and as such, have a reduced impact on the sensitive receivers along Doncaster Avenue.

The traffic noise emission associated with the racecourse at residential receivers along Doncaster Avenue at 1 metre from the façade, are predicted to be:

- 46 – 50 dBA to the north of Gate 18
- 48 – 51 dBA to the south of Gate 18

The predicted traffic noise is predicted to marginally exceed the $L_{Aeq(1hr)}$ 50 dB(A) night time noise level criteria presented in Table 3-2 at one (1) receiver, and predicted to comply at all other receivers on Doncaster Avenue. Noise impacts are not expected for these receivers.

Ascot Street

An assessment of vehicles exiting the member's car park has been undertaken to determine the impact on sensitive receivers along Ascot Street. It is likely that during smaller class 2 and class 3 events, the number of vehicles exiting the site will be less than this, and as such, have a reduced impact on the sensitive receivers along Ascot Street.

The predicted traffic noise is predicted to achieve compliance with the $L_{Aeq(1hr)}$ 50 dB(A) night time noise level criteria presented in Table 3-2

Discussion

The results above demonstrate that for a larger Class 2 event, the noise emission from vehicles leaving the members car park and the infield car are predicted to comply with the relevant road traffic noise criteria at sensitive receivers on High Street, Doncaster Avenue and Ascot Street, with the exception of one (1) receiver to the south of Gate 18. It is likely that for Class 3 events, the noise impact from road traffic will be reduced.

Traffic on all other roads is not expected to impact the residential receivers in the area due to high existing traffic volumes.

It is noted that the impact from traffic exiting the site will be on an infrequent basis for a short duration following each event. The likely impact is not expected to be significant, however mitigation measures are provided below.

Mitigation measures for traffic

Mitigation measures are outlined in Section 5 below. It is also noted that mitigation measures have been outlined within the Traffic Impact Report, including:

- Staggered entry times (staggered exit strategies could also be investigated)
- Promotion of car pooling
- Use of integrated ticketing which includes public transport to and from the event
- Police presence at major intersections, in particular Doncaster Ave and Ascot St
- Discourage parking on local streets
- Undertake a taxi arrangement study to review alternative access arrangements and management measures to significantly reduce impacts along Doncaster Avenue
- Adopt a pedestrian, transport and traffic management plan
- Posting of police at interaction at Doncaster Avenue during Class 2 events

5. Mitigation measures

Table 5-1 below provides details of the noise mitigation measures required to be implemented for the night racing at Randwick Racecourse. Further details are also included in the noise management plan for this proposal.

Table 5-1 Noise mitigation measures

Potential Impact	Approach	Residual Impact
Noise impact from generators required for additional lighting	Generators should be selected to have a maximum sound power level of 100 dBA. This is based on the proposed locations, with the following minimum distances from sensitive receivers: • Receivers R01 to R07 – 170 metres • Receivers R08 to R21 – 110 metres These distances would need to be adjusted to a further distance should a generator with a higher sound power level be selected. Conversely, they may be adjusted to a closer location should they have a lower sound power level.	Noise emission from generators will be sufficiently below the noise criteria that it will not have a negative impact on the sensitive receivers
Noise impact from patrons egressing on foot	Patrons leaving the venue following the completion of the event should exit through the entry/exit gates on Alison Road. The exit to Ascot Street should be blocked for pedestrians after 8 pm. Patrons exiting on Alison Street should be directed by security towards public transport and areas away from residential receivers. Staff should be directed to monitor noise levels and ensure that patrons are departing in a quiet manner as to not impact the residents in the vicinity of the racecourse.	There may be a residual noise impact from patrons exiting the site. Security and management will be important to ensure this impact is kept to a minimum.

Potential Impact	Approach	Residual Impact
	Signage should be erected to inform the patrons to leave in a quiet and orderly manner and to consider the residential neighbours. The signage should also direct patrons to the correct exits.	
Vehicles exiting member's car park using Ascot Street and Doncaster Avenue	Clear signage should be displayed throughout the car park informing patrons to return to their vehicles and exit the car park in a quiet manner. Security should be located at Gate 18 to monitor the movement of traffic exiting the car park. Speed signs should be located throughout with a maximum speed of 10 km/h.	
Vehicles exiting infield car park using High Street	Clear signage should be displayed throughout the car park informing patrons to return to their vehicles and exit the car park in a quiet manner. Security should be located at the exit to High Street to monitor the movement of traffic exiting the car park. Speed signs should be located throughout with a maximum speed of 10 km/h.	Although noise from vehicles exiting the infield car park comply with the requirements of the Road Noise Policy, reasonable and feasible mitigation measures should be put in place to minimise the impacts
Commentary and music from the public address system	Noise emission from the public address system, including commentary and music, must cease prior to 10 pm and not exceed the following maximum noise levels at any sensitive receiver: • L_{Amax} 65 dB • L_{Cmax} 80 dB It is recommended that noise monitoring be undertaken at	Potential exceedances to the noise criteria from crowd noise during major races. The short duration and characteristics of the crowd noise could be considered a low impact on the sensitive receivers as it does not contain annoying characteristics. Since large races only occur occasional and for a short the impact on

Potential Impact	Approach	Residual Impact
	various events throughout the year, including the first event, a Class 2 event and a Class 3 event,. Noise levels of the public address must be reduced should the above maximum noise levels be exceeded.	residential amenity is considered to be minor.
Amplified music from other sources (ie DJ's at the rear of the grandstand)	Noise emission from the amplified music must cease prior to 10 pm not exceed the following maximum noise levels at any sensitive receiver: • L_{Amax} 65 dB • L_{Cmax} 80 dB It is recommended that noise monitoring be undertaken at various events throughout the year, including the first event, a Class 2 event and a Class 3 event. Noise levels of amplified music must be reduced should the above maximum noise levels be exceeded. It is recommended that large post-event concerts should not be held as it is highly likely that the above maximum noise levels will be exceeded.	
Noise management plan	A noise management plan will be prepared to address the SEARs	
Acoustic monitoring plan	An acoustic monitoring plan will be prepared to address the SEARs	

6. Conclusion

GHD has undertaken an acoustic assessment of the proposed night-time racing to be conducted at the existing ATC Royal Randwick Racecourse to address the Secretary's Environmental Assessment Requirements.

A review of existing noise management plans and appropriate noise emission criteria for similar events has been undertaken and is provided in Section 3. The summary of the adopted noise emission criteria has been presented in Section 3.6.

The results of the noise emission assessment are presented in Section 4 and have been divided into the following scenarios:

- Noise emission from amplified commentary and music
- Sleep disturbance impacts from patrons and vehicles departing the site after 10 pm
- Noise impacts from vehicles using roads surrounding the site

Noise from race commentary and music is predicted to comply with the adopted L_{Amax} and L_{Cmax} criteria. Patrons and vehicles exiting the racecourse after the events have the potential to exceed the relevant criteria if not managed, and therefore a noise management plan has been developed to address these issues and provide mitigation measures to reduce the impact at the residences, in accordance with the Secretary's Environmental Assessment Requirements.

Noise impacts from patrons departing the site have the potential to cause sleep disturbance impacts when departing via Gate 18. Mitigation measures have been provided to reduce the impacts of this, including closing the exit to pedestrians and taxis/ubers from 8 pm and redirecting them via Gate 1.

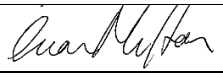
Noise impacts from vehicles on surrounding roads are predicted to comply with the relevant noise goals of the Road Noise Policy, however mitigation measures have been provided to further reduce the impacts of this.

GHD

Level 15
133 Castlereagh Street
T: 61 2 9239 7100 F: 61 2 9239 7199 E: sydmail@ghd.com

12542230-26910-1/https://projectsportal.ghd.com/sites/pp15_03/atcnightracingprojec/ProjectDocs/12542230-REP_ATC Randwick Acoustic Assessment.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	C Gordon	E Milton		E Smith		26/02/2021

www.ghd.com