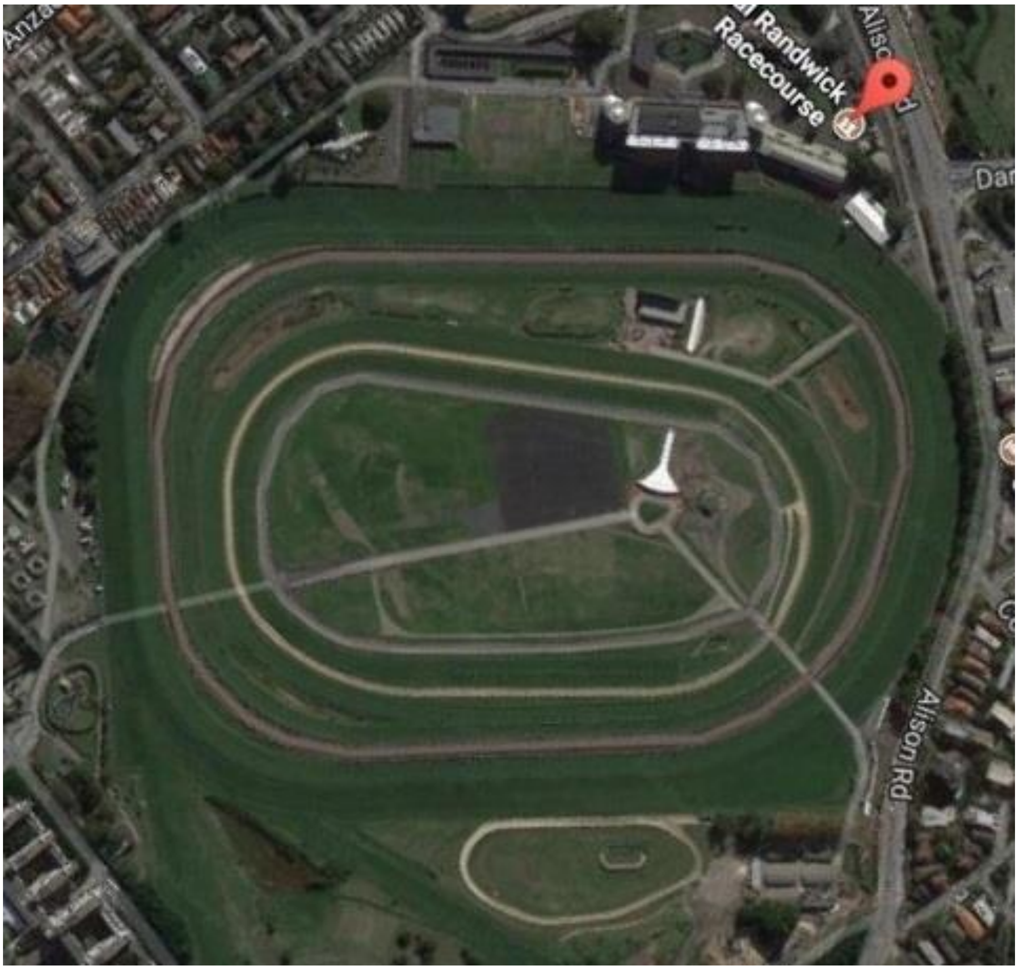

AUSTRALIAN TURF CLUB

Royal Randwick Racecourse

Night Racing Track Lighting Electrical & Communications Infrastructure Report

Job Number: EN - N17_19
March 2021
Rev 3.0

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Document Control

Version	Date	Author		Reviewer	
1.0	19th November 2020	Peter Burns	PB	Vince Nigro	VN
2.0	20th November 2020	Peter Burns	PB	Vince Nigro	VN
3.0	23 March 2021	Julie Van Der Ley	JV	Vince Nigro	VN

CONTENTS

1. GLOSSARY

Please find following a table of acronyms and technical terms that are not commonly used in everyday language which may be used within the body of this report.

Acronym or Technical Term	Meaning/ Definition
ATC	Australian Turf Club
RRRC	Royal Randwick Racecourse
SSDA	State significant development application
LCP	Lighting Control Panel
LCR	Automatic Lighting Control Relays
PC	Automatic Lighting Control Head-End Computer
GMSB	Generator Main Switchboard
GEN	Generator
KVA	1000 Volt Amps
KW	1000 Watts

2. EXECUTIVE SUMMARY

This *Night Racing Electrical & Communications Infrastructure Report* has been prepared to support a State Significant Development application for night racing at the Royal Randwick Racecourse.

The Australian Turf Club 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 patrons safety
- Permanent electricity generators to supply the new track lighting system.

This report provides an overview of the proposed electrical and communications infrastructure to the Royal Randwick Racecourse to support the implementation of new trackside lighting to international broadcast standards .

3. INTRODUCTION

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 (2224m circumference) and the inner Kensington track (2100m circumference). The site is on Crown Land leased to The Australian Turf Club and is bounded by Alison Road, Wansey Road, High Street and Doncaster Avenue. Along these boundaries is a diverse range of neighbouring properties of varying heights: UNSW Sydney campus as well as several commercial and residential properties.

The Australian Turf Club proposes to facilitate a maximum of sixteen (16) night race meetings per year running typically between 6pm to 10pm from October to April. The anticipated mix of events with associated estimated crowd numbers and proposed track use is as follows:

Criteria	2020 Proposal
Class 3 Events (0 – 10,000 patrons)	12 Events per annum
Class 2 Events (10,001 – 15,000 patrons)	4 Events per annum
Class 1 Events (35,000 + patrons)	0 Events

Horse racing is a large spectator sport, usually viewed from the grandstand and the lawn along the home straight and finish line. For television coverage camera/s are located at the finish line.

Floodlighting is required to uniformly light the width of the tracks while providing high vertical illuminance to identify the vertical facing sides of the jockeys and horses over the entire course. Higher levels are required for the photo-finish.

The lighting is principally designed to be confined within the width of the tracks but due to the laws of physics, light cannot physically stop at the boundary. Illuminance from the floodlights, however, does reduce proportionally to the distance i.e. inverse square law ($E = I/d^2$).

For the purposes of the SSDA submission, this report outlines the electrical and communications infrastructure required to support the proposed new trackside lighting system.

Figure 1 - Site Plan

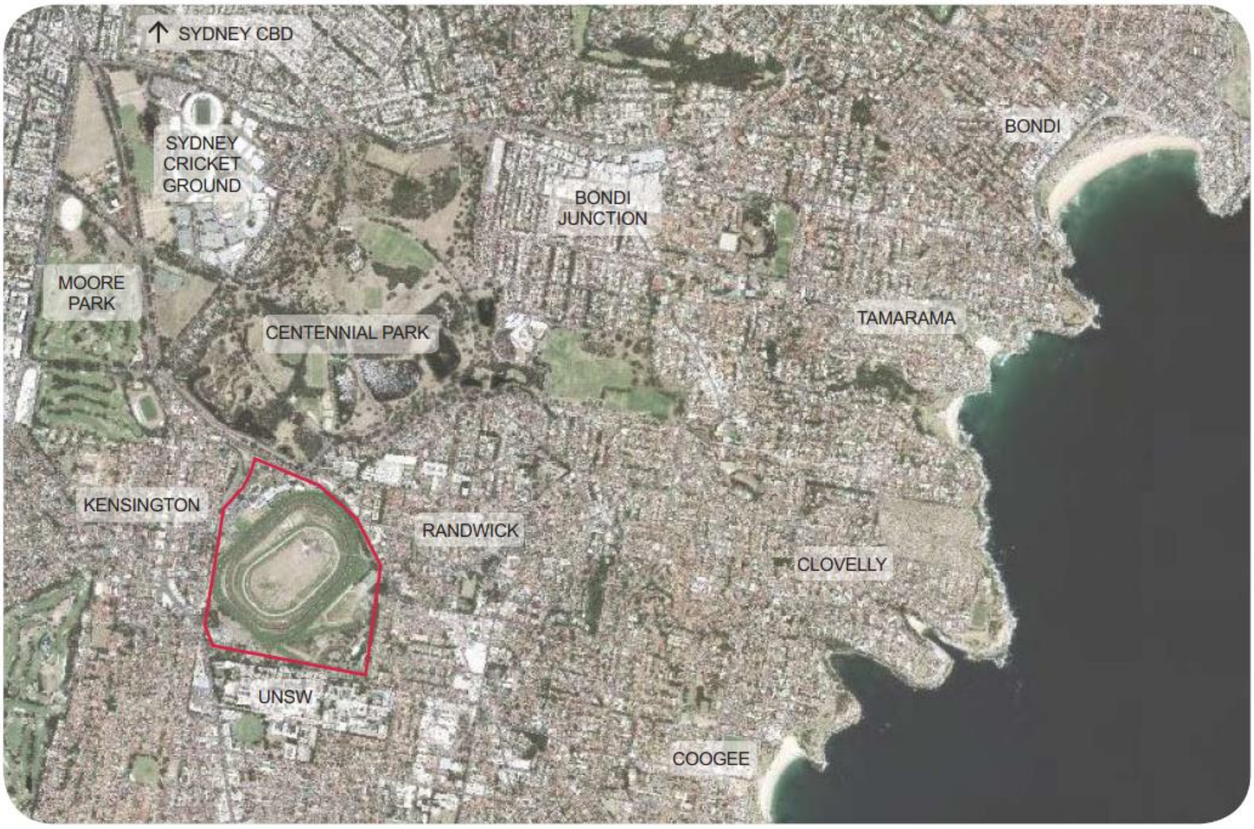


Figure 2 - Proximity to Sydney CBD

4. ELECTRICAL & COMMUNICATIONS INFRASTRUCTURE STRATEGY

4.1 General

Due to the limited capacity of the existing electrical infrastructure, it is proposed to install four (4) diesel powered generators to provide the total power for the whole of the new track lighting infrastructure. The track lighting drawings have has been diagrammatically split into four (4) quadrants with one (1) suitably sized generator positioned in each of the quadrants within the interior of the race course proper. The generators will be remote controlled and monitored utilising the generator control infrastructure.

Power distribution is via an underground conduit system radiating from each generator and reticulating in a circular direction around the race course track, with pits located adjacent or near every lighting pole for ease of "drawing in" the relevant power cables.

Lighting Control Relay Panels (LCP) at every light pole will be interconnected via an underground communications conduit system. A lighting control head end will control the operation of the track lighting. The communications underground conduits will be run adjacent and in parallel with the electrical under ground conduits. With appropriate separation, communications pits will be placed adjacent the electrical pits. The lighting control system and generator control will be via a combination of fibre optic and copper cables.

5. ELECTRICAL INFRASTRUCTURE

5.1 Generators

The selection of four (4) generators has been calculated to sufficiently power the trackside lighting only with the locations selected to evenly service the lighting as practically as possible.

(Refer to IGS Trackside Lighting drawings for locations of "Zones" as described below).

5.2.1 Generator – 1

Generator -1 (GEN-1) has been sized at 1000kVA to be located within Zone 1A (refer to drawing E-004). GEN-1 will service the following lighting poles located within Zones 1 and 1A as per below:-

Zone 1

- E-001: B35 TO B39; A1 TO A4
- E-002: A5 to A9

Zone 1A

- E-004: B31 to B34

5.2.2 Generator – 2

Generator - 2 (GEN-2) has been sized at 1200kVA to be located within Zone 2 (refer to drawing E-007). GEN-2 will service the following lighting poles located within Zone 2 as per below:-

- E-004: B28 to B30
- E-007: B23 TO B28; C7; C14 TO C18; C19 TO C24
- E-008: B17 TO B22; C8 TO C13

5.2.3 Generator – 3

Generator - 3 (GEN-3) has been sized at 800kVA to be located within Zone 3 (refer to drawing E-006). GEN-3 will service lighting poles within Zone 3 as per below:

- E-006: B8 to B11
- E-008: B14 to B16
- E-009: B11 to B14; C1 to C6

5.2.4 Generator – 4

Generator – 4 (GEN-4) has been sized at 1400kVA to be located within Zone 4A (refer todrawing E-006). GEN-4 will service lighting poles within Zones 4 and 4A as per below:

Zone 4

- E-002: M1 to M16
- E-003: A10 to A14; B1 to B3; B40; F1

Zone 4A

- E-006: B4 to B7

5.2.5 Generator – Load Table

Refer to table below for generator capacity and associated loads based on the electrical maximum demand of the proposed lighting installation

GENERATOR ID	GENERATOR SIZE	LIGHTING LOAD
GEN-1	1000kVA	740kW
GEN-2	1200kVA	830kW
GEN-3	800kVA	500kW
GEN-4	1400kVA	1050kW

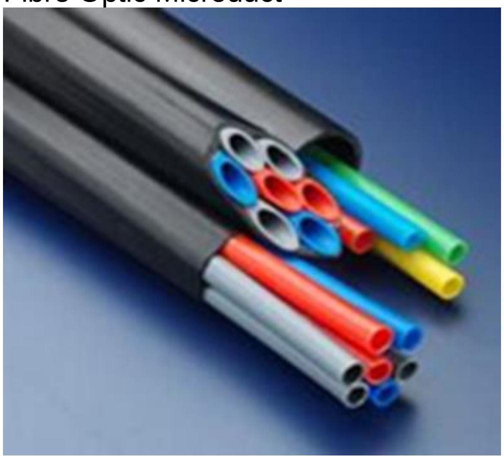
6. COMMUNICATIONS INFRASTRUCTURE

6.1 Copper & Fibre Optic Network

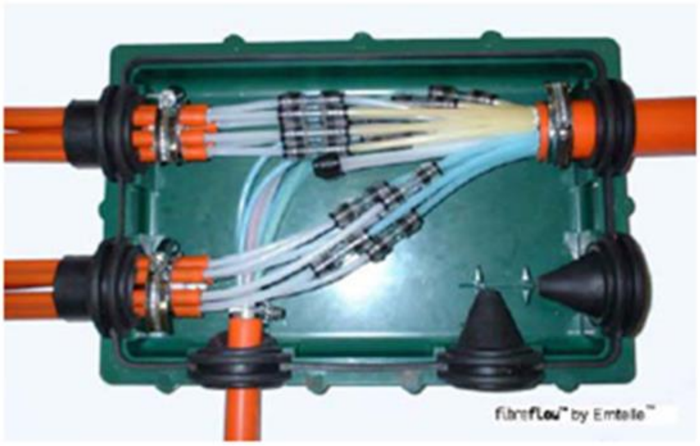
A copper and fibre cable network will be installed throughout the track area via underground communications conduit infrastructure interconnecting the trackside lighting pole LCRs as well as the remote start and monitoring of the generators.

The fibre optic network design will incorporate the air-blown micro duct technology. The micro duct technology can support many types of fibre optic cables, co-existing on the one cable and delivered as and when required. As demand for capacity grows the infrastructure can be retrofitted with new and/or additional fibres without the need to install additional cabling. End tube points can be extended to service new locations by using tube joiners and adding on more micro duct to extend the network further. Future options can be introduced by blowing additional fibre optic connections.

Fibre Optic Microduct



Typical fibre joiner



The system will terminate at a PC head end to allow for a central automatic control of the entire night racing lighting and generator systems.

7. APPENDICES

7.1 Drawing List Table

DRAWING NUMBER	DESCRIPTION
E-000	Legend, Notes and Key Plan
E-001	Lighting Layout Trackside Sheet 1 of 9
E-002	Lighting Layout Trackside Sheet 2 of 9
E-003	Lighting Layout Trackside Sheet 3 of 9
E-004	Lighting Layout Trackside Sheet 4 of 9
E-005	Lighting Layout Trackside Sheet 5 of 9
E-006	Lighting Layout Trackside Sheet 6 of 9
E-007	Lighting Layout Trackside Sheet 7 of 9
E-008	Lighting Layout Trackside Sheet 8 of 9
E-009	Lighting Layout Trackside Sheet 9 of 9
E-010	Theatre of the Horse
E-020	Spectator Precinct Lighting
E-030	Luminaires Schedule and Details
E-031	Main Single Line Diagrams 1 of 2
E-032	Main Single Line Diagrams 2 of 2

7.2 Generator Data Sheets (Typical)

- Catapillar 680kVA to 900kVA Diesel Generator
- Catapillar 1000kVA to 1400kVA Diesel Generator
- Catapillar C13 Sound-Attenuated-Enclosure-50-and-60-Hz
- Catapillar C18 High Ambient-Attenuated-Enclosure-50-and-60-Hz