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Report on Preliminary Contamination, Salinity and Acid Sulphate Soil Assessment

Proposed Spectator Precinct
Royal Randwick Racecourse, Randwick

Prepared for
Australian Jockey Club

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Executive Summary

This report details the methodology and results of a preliminary contamination, salinity and acid sulphate soil assessment undertaken by Douglas Partners Pty Ltd (DP) at an area identified as the proposed Spectator Precinct (the site) located at the Royal Randwick Racecourse. The current assessment was commissioned by the Australian Jockey Club (AJC). This report will be used as part of a submission relating to the Director-General Environment Assessment Requirements (DGRs) for the proposed development.

The objective of the current assessment was to provide preliminary data on the contamination status and the presence/absence of ASS and saline soils at the proposed Spectator Precinct. The assessment comprised a review of previous assessments undertaken at the overall RRR, a site history review and intrusive soil (from six sampling locations) and groundwater (from one groundwater monitoring well) investigations at the site.

The site history and the field observations suggest that with the exception of the quality of fill placed on the site, the site has a relatively low potential for contamination. Further, as the site has undergone modifications since as early as 1860, there is also a potential for buried asbestos pipes to be present. Asbestos pipes that may be uncovered during bulk excavation can be managed by the implementation of an Unexpected Asbestos Finds Protocol that can be developed prior to commencement of the construction phase.

The analytical results for the groundwater samples indicated that concentration of heavy metals, TPH/BTEX, PAHs, OCPs/PCBs/OPPs and phenols was generally low and within the adopted GILs. Further, the results of the assessment also showed that acid sulphate soils and saline soils are not present within the proposed development area.

Whilst the analytical results for the soil samples showed that the concentration of heavy metals, TPH/BTEX, PAHs, OCP/PCB/OPP and phenols was generally low and within the adopted SAC for a commercial/industrial landuse, asbestos fibres were detected in only one soil sample i.e., TP102/0.4 - 0.8. This sample which was collected from a fill profile of red mottled, brown sand filling present between the depths of 0.3 - 1.0 m bgl at TP10 was distinct to this sampling location. Therefore, based on the field observations and the analytical results, the red mottled, brown sand filling at TP102 is considered to be contaminated with asbestos. As the red mottled, brown sand filling was only observed in TP102, it is considered that the asbestos contamination is expected to be limited to the immediate vicinity of TP102. As the current assessment was preliminary in nature and comprised soil sampling from only six locations, additional investigations would be required to delineate the horizontal extent of the asbestos contaminated fill. Therefore, it is recommended that step-out sampling should be carried out at sampling location TP102 with the objective of delineating the extent of asbestos contamination. Subsequent to delineating the extent of the asbestos contamination in the vicinity of TP102, remedial works as discussed in Section 13.2 should be undertaken in the vicinity of TP102.

Therefore, on the basis of the investigation findings, the site can be rendered suitable for the proposed commercial landuse subject to the remediation of the asbestos contaminated soil in the vicinity of TP102.

The results of the provisional *in situ* waste classification assessment showed that the filling material in the vicinity of sampling locations TP101, BH1, BH2, BH3 and BH4 is provisionally classified as

GENERAL SOLID WASTE (NON PUTRESCIBLE) and should be disposed off site to a landfill licensed to receive such waste. Further, in view of the asbestos fibres detected at sampling location TP102, the red mottled brown silty sand filling present at a depth of 0.3 - 1.0 m bgl in the vicinity of TP102 is provisionally classified as SPECIAL WASTE (ASBESTOS WASTE) and should be disposed of to a landfill that is licensed to receive such waste. During bulk excavation works, if any additional asbestos contamination is found, then the material must be segregated from the general spoil, to be further assessed/waste classified. All asbestos contaminated waste must be classified and disposed of as Special Waste (Asbestos Waste) to a suitably licensed landfill.

The natural grey/yellow/white sands in the test bore logs is considered to be Virgin Excavated Natural material (VENM), on the proviso that the natural, *in situ* soil does not contain discernible signs of contamination and is not cross-contaminated with any non-VENM material.

Table of Contents

Page

Table of Contents (Cont'd)

Report on Preliminary Contamination
Salinity and Acid Sulphate Soil Assessment
Proposed Spectator Precinct
Royal Randwick Racecourse, Randwick

1. Introduction

This report details the methodology and results of a preliminary contamination, salinity and acid sulphate soil assessment undertaken by Douglas Partners Pty Ltd (DP) at an area identified as the proposed Spectator Precinct (the site) located at the Royal Randwick Racecourse. A site plan showing the location of the site is provided in Drawing 1, Appendix A. The current assessment was commissioned by the Australian Jockey Club (AJC). This report will be used as part of a submission relating to the Director-General Environment Assessment Requirements (DGRs) for the proposed development. The relevant DGRs are provided below.

The aim of the investigation was to:

- provide preliminary data on the contamination status of the subsoils present in the Spectator Precinct;
- provide preliminary data on the salinity of the sub soils and, as appropriate, provide recommendations for salinity management techniques; and
- provide preliminary data on the presence/absence of acid sulphate soils (ASS) and, as appropriate, provide recommendations for acid sulphate soil management techniques;

The site, which is located within the boundaries of the Royal Randwick Racecourse (RRR), is an irregular shaped land parcel that is currently occupied by operational grandstands, a paddock stand, walkways and lawns. The investigation included the excavation of two test pits, drilling of four test bores, collection of soil and groundwater samples and analysis of the samples for various contamination, salinity and acid sulphate soil parameters. The details of the fieldwork are presented in this report, together with comments and recommendations on the issues listed above.

1.1 Proposed Development

The proposed development is for the refurbishment of Spectator Precinct. The general features of the redevelopment include:

- Demolition of the existing Paddock Stand and construction of a new replacement stand (southern section of the site). Part of the footprint of the new stand will be occupied by a basement several metres deep.
- Structural modifications will be made to the existing QEII Stand (southern section of the site).
- A parade ring will be constructed in the area currently occupied by the Tea House and the lawn behind it (north-western section of site). The parade ring will essentially involve an excavation to

approximately 3 to 4 m depth, with battered side slopes for seating, and two or three storey buildings at opposite ends).

- Construction of a new Owners and Trainers Pavillion adjacent to the Parade Ring.
- A tunnel for the passage of horses will be constructed from the parade ring to the existing tunnel that currently starts under the QEII Stand (southern section of site). The tunnel's depth below existing ground level could be up to 4 m.
- There will also be other, relatively minor, civil and structural works such as localised cut and fill, retaining walls etc.

2. Scope of Works

The assessment has been developed broadly in accordance with the seven step data quality objective process, as defined in Australian Standard (AS) *Guide to the Sampling and Investigation of Potentially Contaminated Soil Part 1: Non-volatile and Semi-volatile Compounds* (AS 4482.1 – 2005). The DQO process is outlined in the AS and defined by:

- Stating the Problem;
- Identifying the Decision;
- Identifying Inputs to the Decision;
- Defining the Boundary of the Assessment;
- Developing a Decision Rule;
- Specifying Acceptable Limits on Decision Errors;
- Optimising the Design for Obtaining Data.

Data quality objectives have been established for the project and are summarised in Table 1 and discussed in detail in Section 9.

Table 1: Data Quality Objectives

Data Quality Objective	Report Section Where Addressed
State the Problem	S1 Introduction
Identify the Decision	S9 Site Assessment Criteria S13 Discussion S14 Conclusions
Identify Inputs to the Decision	S3 Background and Previous Reports S4 Site Description S5 Geology and Hydrogeology S7 Potential For Contamination S9 Site Assessment Criteria S11 Field Results S12 Laboratory Testing

Data Quality Objective	Report Section Where Addressed
Define the Boundary of the Assessment	S4 Site Description
Develop a Decision Rule	S9 Site Assessment Criteria
Specify Acceptable Limits on Decision Errors	Appendix F
Optimise the Design for Obtaining Data.	S8 Fieldwork Methods

The scope of works for the assessment was based on our proposal dated 20 July, 2010, and revisions dated 13 August, 2010 which was accepted by AJC.

The scope of works for contamination component of the assessment was as follows:

Desktop Component

a. Review readily available site history information available for the site including previous environmental studies, historical title deeds, Council records, 149(2) certificates, WorkCover records, historical aerial photographs, groundwater bore records;

b. Review published geological, soil, salinity and acid sulphate soil maps to determine the likely soil conditions at the site.

c. Conduct a site inspection to identify areas of environmental concern (AEC);

Field Component

a. Excavation of a total of two test pits (TP101 and TP102) using a backhoe and drilling of four test bores (BH1-BH4) using a bobcat-mounted drill rig. Test pits were extended to a depth of 0.5 m into natural material (nominally 3 to 4 m) or prior refusal. The test bores were extended to a depth of 0.5 m into natural material (nominally 3 to 4 m) or prior refusal.

b. One of the four above-mentioned test bores (BH2) was extended to a nominal depth of 7.5m below ground level (bgl) with a view to intercepting the groundwater table, installation of a groundwater monitoring well and also to evaluate the presence/absence of acid sulphate soils and saline soils.

Underground service scanning was conducted prior to excavation and drilling to locate detectable services as a precautionary measure.

c. Collection of soil samples (including 10% for QA/QC) from the test pits and test bores at broadly regular intervals and, based on field observations, at signs of contamination (staining or olfactory signs).

d. At BH2, soil samples were collected at 0.5m intervals to evaluate the potential for the presence/absence of acid sulphate soils and saline soils;

e. Screen all soil samples for contamination purposes using a calibrated photo-ionisation detector (PID) for volatile organic compounds;

f. Screened 10 samples for field pH and oxidised pH to provide an indication of the samples most likely to be ASS;

g. Despatched nine selected soil samples to a NATA accredited laboratory for quantitative analysis for the following potential contaminants:
   - The priority heavy metals arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc (9 soil);
   - Polycyclic Aromatic Hydrocarbons (PAH) (9 soil);
   - Total Petroleum Hydrocarbons (TPH) and benzene, toluene, ethyl benzene and xylenes (BTEX) (9 soil);
   - Organochlorine pesticides (OCP) and Organophosphate pesticides (OPP) (5 Soil);
   - Total Phenols (5 soil);
   - Polychlorinated biphenyls (PCB) (5 soil);
   - Asbestos (7 soil/ material);
   - Toxicity Characteristic Leaching Procedure tests for metals and PAHs (2 samples);

h. Despatched ten selected soil samples to a NATA accredited laboratory for pH and Electrical conductivity to assess the potential for saline soils;

i. Despatched three selected soil samples to a NATA accredited laboratory for suspended peroxide oxidation combined acidity and sulphate (SPOCAS) to assess the potential for acid sulphate soils;

j. Collection and analysis of the following samples for QA/QC purposes:
   - 1 intra-laboratory field replicate soil samples for heavy metals and TPH;
   - 2 trip blanks for TPH/BTEX; and
   - 2 trip spikes for BTEX

k. Soil textural classification on 10 soil samples collected from BH2 for the preliminary salinity assessment.

l. Developed, purged and sampled one groundwater monitoring well (BH2);

m. Despatched one groundwater sample to a NATA accredited laboratory for quantitative analysis for the following potential contaminants:
   - The priority heavy metals arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc;
   - Polycyclic Aromatic Hydrocarbons (PAH);
   - Total Petroleum Hydrocarbons (TPH) and benzene, toluene, ethyl benzene and xylenes (BTEX);
   - Organochlorine pesticides (OCP) and Organophosphate pesticides (OPP), Polychlorinated bi-phenyls (PCBs) (trace levels to meets ANZECC 2000 criteria); and
   - Total Phenols;

n. Collection and analysis of the following groundwater samples for QA/QC purposes:
   - 1 intra-laboratory field replicate soil sample for heavy metals and PAH;
   - 1 trip blank for TPH/BTEX; and
   - 1 trip spike for BTEX

Reporting Component

a. Preparation of this preliminary Contamination, Salinity and Acid Sulphate Soil Assessment which details the methodology, results of the assessments, a discussion of the analytical results and recommendations for further work if considered necessary.

3. Background and Previous Reports

DP has previously undertaken a number of contamination investigations within the overall Royal Randwick Recourse (RRR). The most recent assessments focussed on the New Days Stalls site which is located to the immediate west of the current study area. The relevant DP reports (listed in chronological order) are as follows:

- *Report on Preliminary Waste Classification, Proposed New Day Stalls, Randwick Racecourse, Alison Road, Randwick*, reference 45236, dated 28 November, 2007;
- *Report on Supplementary Waste Classification Proposed New Day Stalls, Randwick Racecourse, Alison Road, Randwick, reference 45236.03, dated 15 April, 2008;*
- *Final Report on Contamination and Validation Assessment, New Day Stalls Site, Randwick Racecourse, reference 45236.08, dated March 2010.*
- *Environmental Management Plan, New Day Stalls Site, Randwick Racecourse, reference 45236.08, dated March 2010.*

3.1 DP Preliminary Waste Classification (dated November, 2007)

The DP 2007 assessment comprised the excavation of three test pits (TP1, TP2 and TP3) to obtain a preliminary waste classification of the *in situ* materials in the inferred footprint of the proposed day stalls building. The results of the DP 2007 assessment indicated that the concentrations of PAH [including Benzo(a)pyrene] in filling materials were at levels ranging from Inert and Solid to Industrial and Hazardous waste (under the then current waste classification system). The DP 2007 assessment, therefore, concluded that in view of the limited sampling regime, additional testing would be required to ascertain the final waste classification of the filling material.

3.2 DP Supplementary Waste Classification (dated April, 2008)

The DP 2008 assessment comprised the excavation of 13 test pits around the DP 2007 sampling locations to delineate the extent of the previously identified contaminated filling with a focus on confirming, or otherwise, the extent of the fill classified as hazardous waste. From 13 test pits, 26 soil samples were collected and analysed for a range of common contaminants. The results of the DP 2008 assessment indicated that, while the majority of the soil samples analysed were within the threshold criteria for Inert Waste (under the then current waste classification system) and also within the health based investigation levels for recreational open spaces. Minor PAH and TPH C_{10}-C_{36} exceedances were found in four samples collected from three sampling locations (TP1, 3 and 7). It was noted that the exceedances detected in Test Pit 3 were associated with the samples collected from a filling layer comprising slag and ash present at a depth of 0.9 m - 1.4 m bgl. Therefore, on the

basis of the analytical results, the DP 2008 report concluded that the filling material in Test Pits 1, 3 and 7 was not suitable to remain on site and should be disposed of to a suitably licensed Solid Waste Landfill (i.e., General Solid Waste Landfill under the current (2008) waste classification system). In addition, the report also recommended that the excavation of materials from Test Pits 1, 3 and 7 should be supervised by an environmental consultant and validated to confirm its removal.

3.3 DP Contamination and Validation Assessment (dated March 2010)

The assessment comprised a site history review, soil sampling from twenty four test pits and groundwater sampling from four groundwater monitoring wells. The findings of the assessment were the subject of a statutory site audit by Mr. Mike Hayter (a Department of Environment, Climate Change and Water accredited site auditor).

The results of the site history search which is relevant to the overall RRR are presented in Section 6 of this report. Subsurface conditions at the site included filling at all sampling locations to nominal depths ranging between 0.3 m - 3.4 m below ground level (bgl). The deepest fill was encountered in the south-western portion of the day stalls site. The fill at the site typically comprised brown silty sand filling with trace amounts of gravel, brick, concrete, sandstone fragments, asphalt, ash and slag underlain by natural white and yellow sands.

The laboratory results indicated that the concentrations of PCB, OCP, OPP, BTEX and phenols in all analysed soil samples (comprising Area 1 and Area 2) were below the limit of reporting and, therefore, within the adopted site assessment criteria (SAC) for a commercial landuse. Further, asbestos or respirable asbestos fibres were not detected in the analysed soil samples. Whilst heavy metals were detected at low concentrations, they were below the SAC in all cases. Further, groundwater was assessed at four locations across the New Day Stalls site and was not found to be contaminated.

The principal chemical contaminants in the soil above the site acceptance criteria (SAC) were medium to heavy fraction petroleum hydrocarbons (TPH C_{10}-C_{36}) (ranging between 2040 mg/kg and 9250 mg/kg) and polycyclic aromatic hydrocarbons (PAH) (ranging between 232.4 mg/kg and 2639.8 mg/kg) which were associated with a buried road profile at a nominal depth of 1.0 m -1.5 m bgl in the south-western portion. The results of toxicity characteristic leaching procedure tests (TCLP) showed that the leachable concentration of PAH in the road profile was below the laboratory practical quantitation limits (PQL) suggesting that the PAH associated with the road materials was immobilised. Further, in view of the nature of the detected contamination, it was considered that the elevated TPH C_{10} - C_{36} in the sample was attributable to the PAH present in the road tar. On this basis, the profile of road tar present at TP109 at a depth of 1 - 1.5 m bgl was characterised as being impacted by medium to long chain TPH and PAH. Importantly, the same contaminant concentrations in the fill profile overlying and under the buried road surface were generally low and within the adopted SAC. Further, the DP report also noted that whilst the extent of the road tar profile was expected to be limited to the south-western section of the New Day Stalls site, the possibility of encountering the profile in other portions of the site could be ruled out. Whilst a small section of the buried road profile was excavated and disposed off site during recent bulk excavation works, residual sections of the road profile potentially remained in the south-western and other portions of the New Day Stalls site.

In addition to the above, asbestos was also identified as a contaminant of concern during construction works. Asbestos-cement drainage pipes, at a nominal depth of 1.8m bgl in south-western portion of the site, were uncovered during bulk excavation works. The DP report noted that whilst sections of

the asbestos-containing pipes within the areas designated for bulk excavation were removed and validated, residual pipes may still be present in the portion of the site that was not bulk excavated.

In view of the nature of the contamination at the New Day Stalls site i.e., the immobile PAHs associated with the buried road profile and the *in situ* asbestos pipes, the DP report recommended that a 'Cap and Contain' Strategy would be the most suitable means of rendering the day stalls site suitable for the proposed development. The strategy therefore, comprised the capping and containment of the road tar impacted profile and the residual asbestos-containing pipes under the existing filling material (which was within the adopted SAC) and management of the contamination in perpetuity by means of an Environmental Management Plan as agreed by all parties.

3.4 DP Environmental Management Plan (dated March 2010)

The EMP for the New Day Stalls site (located to the west of the current study area) outlined the requirements for managing capped, contaminated fill at the site under normal commercial usage. The EMP also included an unexpected asbestos finds protocol and procedures for the any intrusive works that may require breaching of the cap at the New Day Stalls site.

4. Site Description

The site is identified as the 'proposed Spectator Precinct' and is located within the boundaries of the RRR. It is an irregular shaped land parcel that forms part of Lot 1 in Deposited Plan 130234 and has been leased to the Australian Jockey Club. The local government authority is the Randwick City Council.

The area of investigation is bounded by the Fig Tree Lawn to the west, the racetrack to the south, and Alison Road to the east. The study area and location is shown in Drawing 1, Appendix A. At the time of the current investigation:

- the north-western portion of the site was occupied by a lawn and a two storey building of brick construction known as the 'Tea House';
- the southern section of the site was occupied by two spectator stands known as the Grand Stand and the QEII Stand;
- the central portion of the site was occupied by an octagonal shaped building (tote Building);
- the majority of the eastern section comprised bitumen paved, internal roadways and a lawn; and
- the remainder of the site comprised brick paved walkways.

5. Geology and Soil Landscape

Reference to the Sydney 1:100,000 Geological Series Sheet 9130 indicates that the site is underlain by medium to fine grained marine sands. The sands were laid down in recent geological time as transgressive dune deposits over which freshwater swamps were formed, typical of those still existing at Centennial Park and Eastlakes.
The site and its surroundings are relatively flat, with the only elevated areas being generally the result of previous filling and landscaping. Within the site, the ground surface generally falls to the south-west.

Surface water is expected to flow into the local stormwater system. It is considered that, on a regional level, the groundwater is likely to flow in an easterly direction towards Botany Bay.

A review of the Department of Land and Water Conservation (now part of the Department of Environmental, Climate Change and Water - DECCW) *Acid Sulphate Soil Risk Map for Botany Bay (Edition 2, 1997)* indicated that there is no known occurrence at the site and acid sulphate soil (ASS) is not expected to occur in the surrounding environments.

Information sourced from the DP March 2010 *Contamination and Validation Assessment Report* for *the New Day Stalls* site indicates that, as per the records of the NSW Groundwater Works database of licensed groundwater bores, ten registered bores were present within a 700m radius of the overall RRR. The bores were constructed for a variety of uses including industrial irrigation, recreational, monitoring and domestic purposes (refer Table 2).

Table 2: Summary of Groundwater Bores

Groundwater Bore	Standing Water Level (Bgl) (m)	Depth of Bore (m)	Purpose Of Bore	
			Authorized	Intended
GW107342	Unknown	Unknown	Domestic	Unknown
GW106554	Unknown	Unknown	Domestic	Unknown
GW040223	Unknown	7.0	Recreation	Recreation
GW047544	Unknown	23.00	Industrial Irrigation	Industrial Irrigation
GW104773	4.90	25.00	Recreation	Recreation
GW040224	Unknown	7.00	Recreation (Groundwater)	Recreation (Groundwater)
GW075018	0.48	43.00	Monitoring bore	Monitoring Bore
GW107681	Unknown	Unknown	Dewatering	Dewatering
GW024367	Unknown	4.20	Commercial	General Use
GW104525	2.00	17.65	Monitoring Bore	Monitoring Bore

Based on the available data it is considered that some beneficial (domestic, industrial and recreational) use of groundwater may be occurring in the surrounding area.

The NSW Department of Infrastructure and Natural Resources (DIPNR – now Department of Water and Energy DWE) *Salinity Potential in Western Sydney* 2002 map indicates that the site is not located in an area of saline prone soils.

6. Site History

The site history information pertaining to the overall RRR that has been provided in Sections 6.1 - 6.3 has been sourced from the DP March 2010 Contamination Assessment that was undertaken at the New Day Stalls site. Additionally, historical aerial photographs were also reviewed as part of the current assessment to identify changes that have occurred at the current study area.

6.1 Information Sourced from AJC website

The land currently occupied by the RRR was granted for use as a racecourse in 1833. Between 1833 and 1838, the land was regularly utilised for the purpose of horse racing. As a result of track deterioration, racing activities ceased in 1838 and between 1838 and 1860, the land was used for horse training. The use of the land as a racecourse recommenced in 1860, and in 1863, the Randwick land was granted by the Crown to trustees representing the Australian Jockey Club. In 1961 the Australian Jockey Club (Amendment) Act altered the AJC lease of Randwick racecourse from a 21-year to a 99-year term.

6.2 Historical Title Deeds

As part of the DP March 2010 Contamination Assessment at the New Day Stalls site, a title deed search for the overall RRR was undertaken and has been summarised in this section. Determination of the ownership or occupancy of the property, including company names, can assist in the identification of previous land uses and therefore assist in establishing potentially contaminating activities. The land titles are included in Appendix B.

The land occupied by the Royal Randwick Racecourse (of which the site is a part) is currently registered in the name of Leslie Fredrick Bridge, Ken Arthur Murray and Paul Francis Patrick Whelan and has been leased to the Chairman of the Committee of the Australian Jockey Club since as early as 1907. Ownership of the property from 1915 to 2006 is summarised in Table 3, below, together with the occupation of the owner given in the title and the likely use of the site or nature of the business of the site/owner.

Table 3: Land Ownership Lot 1 DP 130234

Royal Randwick Racecourse			
Lot 1 DP 130234			
Year of Transfer	**Owner's Name**	**Occupation of Owner**	**Likely use of the property**
1915	Henry Cary Dangar Adrian Knox Edmund Fosbery	Esquire Barrister of Law Member of Legislative Council	Racecourse
1917	Adrian Knox Edmund Fosbery	Barrister of Law Member of Legislative Council	Racecourse
1917	Adrian Knox Samuel Hordern Richard Halifax Dangar	Barrister of Law; Esquire; and Esquire.	Racecourse
1932	Samuel Hordern Richard Halifax Dangar	Esquire; and Esquire.	Racecourse.
1932	Samuel Hordern Richard Halifax Dangar; and Thomas Lloyd Forster Rutledge	Esquire; Esquire; and Grazier	Racecourse
1941	Samuel Hordern; Thomas Lloyd Forster Rutledge; and George Main	Esquire; Grazier; and Grazier	Racecourse
1955	Samuel Hordern; Thomas Lloyd Forster Rutledge; William McCulloch Gollan; and Maurice Victorian Point	Esquire; Grazier; Member of Legislative Council; Grazier	Racecourse
1963	William McCulloch Gollan; and Maurice Victorian Point	Member of Legislative Council; Grazier	Racecourse

Royal Randwick Racecourse			
Lot 1 DP 130234			
Year of Transfer	**Owner's Name**	**Occupation of Owner**	**Likely use of the property**
1980	Sidney George White; Robert William Askin; and Laurie John Ferguson	Unknown; Unknown; and Unknown.	Racecourse
1983	Laurie John Ferguson; Tristan Antico; and Leslie Fredrick Bridge	Unknown; Unknown; and Unknown.	Racecourse
2006#	Leslie Fredrick Bridge; Ken Arthur Murray; and Paul Francis Patrick Whelan	Unknown; Unknown; and Unknown.	Racecourse

= Current Owner

6.3 WorkCover, NSW Records

As part of the DP March 2010 Contamination Assessment, a review of WorkCover NSW records pertaining to the overall RRR was undertaken. Therefore, during the current assessment, DP reviewed these WorkCover NSW records to verify whether any dangerous goods were stored in the current study area. The review indicated that that no dangerous goods were stored within the boundaries of the site currently being investigated (proposed Spectator Precinct). The NSW WorkCover records pertaining to the Randwick Racecourse are provided in Appendix C. WorkCover records did, however, indicate the presence of three underground storage tanks (USTs), two aboveground storage tanks, oil storage drums and two bowsers in the vicinity of the maintenance workshop located south-west of the current area of investigation. In this regard, it is noted that in February 2009, DP undertook a remediation and validation assessment for the removal of the above-mentioned USTs and AST. The results of the assessment were presented in DP's report titled '*Remediation and Validation Assessment, High Street Connection, Randwick Racecourse*' dated 27 February, 2009 (DP ref: 45781.01-3).

6.4 Historical Aerial Photographs

1930 Image (Plate 1)

The 1930 aerial image indicates that the racecourse was operational at this stage. With regard to the current study area, the 'Tea House' had already been constructed in the north-western portion. The central and northern portions of the site comprised trees and lawns. The southern portion was occupied by an elongated building which was most probably utilised as stands. The eastern portion was characterised by the presence of trees and a paved surface.

1943 Image (Plate 2)

The 1943 aerial photograph indicates that the site remained relatively unchanged since 1930.

1951 Image (Plate 3)

The 1951 image indicates the presence of a triangular structure (most probably minor landscaping works) on the lawn to the north of the Tea House. The remainder of the site remained relatively unchanged since 1943.

1965 Image (Plate 4)

The 1965 aerial photograph indicates that the site remained relatively unchanged since 1951.

1970 Image (Plate 5)

The 1970 image indicates the presence of a shelter/building located adjacent to the stand that was seen in the 1930 image. This structure most probably marks the construction of the present day stands that are located in this portion of the site. The remainder of the site remained relatively unchanged from the 1965 image.

1994 Image (Plate 6)

The image is not very clear, however, the site appears to have undergone significant changes when compared to the 1970 image. The stand that was seen in the 1930 image has been replaced by two buildings that resemble the present day Grand Stand and QEII Stand. Further there appears to be rectangular shaped building and a number of paved surfaces in the central and eastern portions of the site.

2000 Image (Plate 7)

The image indicates further changes since 1994. The present day octagonal shaped building in the central portion of the site has been constructed. The eastern portion of the site comprises bitumen paved areas that resembles the present day layout.

2007 Image (Plate 8)

The triangular structure on the lawn north of the Tea House has been removed. The central and western portions of the site have been paved with the present day brick pavers. The site resembles the present day layout.

The historical aerial photographs for the site are provided in Appendix B.

7. Potential for Contamination

The results of the previous assessments which focussed on the Day Stalls (portion of land adjacent to the current study area), indicate the presence of TPH, PAH and asbestos impacted filling material at the adjoining site. Therefore, there is a potential for similar contaminants to present in the fill at the current study area. In addition, there is also a limited potential for contaminants such as heavy metals, BTEX, PCBs, OCPs/OPPs and phenols to be present. Therefore, the soil samples were assessed for a combination of the following suite of the common contaminants:

- The priority heavy metals arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc;
- Polycyclic Aromatic Hydrocarbons (PAH);
- Total Petroleum Hydrocarbons (TPH) and benzene, toluene, ethyl benzene and xylenes (BTEX;
- Organochlorine pesticides (OCP) and Organophosphate Pesticides (OPP);
- Total Phenols;
- Polychlorinated biphenyls (PCB); and
- Asbestos.

To address the potential for groundwater impacts, a groundwater monitoring well was installed in BH2 and the groundwater sample was analysed for the following:

- Priority Heavy metals (As, Cd, Cr, Pb, Cu, Hg, Ni, Zn);
- Benzene, Toluene, Ethylbenzene and Xylene – BTEX;
- Total Petroleum Hydrocarbons;
- Polycyclic Aromatic Hydrocarbons;
- Polychlorinated Biphenyl;
- Organochlorine Pesticides;
- Phenols; and
- pH and hardness.

8. Fieldwork

The current assessment at the proposed Spectator Precinct comprised soil sampling from two test pits (TP101 and TP102) and four test bores (BH1-BH4), installation of one groundwater monitoring well in BH2 and groundwater sampling in accordance with scope works provided in Section 2.

Fieldwork was undertaken on 20 and 23 August 2010. Prior to the commencement of drilling/test pitting all test locations were checked for underground services using an electronic scanner and a review of available plans. A differential GPS was used to determine the position of each test bore/pit. The test bore/pit logs and coordinates are provided in Appendix D.

Test pits 101 and 102 were excavated by means of a backhoe to nominal depths of 2m bgl or 0.5 m into natural material (whichever was the lesser). Bores BH1-BH4 were drilled to nominal depths of 3m bgl with a bobcat-mounted rig using solid flight augers. In this regard it is noted the BH2 was extended

to a nominal depth of 7.5m bgl with the objective of intercepting the groundwater table, installation of a groundwater monitoring well and for acid sulphate soil and soil salinity sampling. Soil samples were collected at regular intervals, at signs of contamination (e.g. odours or staining) and at profile changes.

8.1 Environmental Soil Sampling Procedures

Environmental sampling was performed according to standard operating procedures outlined in the DP *Field Procedures Manual*. All sampling data was recorded on DP chain-of-custody sheets. The general soil sampling procedure comprised:

- decontamination of all re-usable sampling equipment using a 3% solution of phosphate free detergent (Decon 90) and distilled water prior to collecting each sample or use of disposable sampling equipment;
- transfer of samples into laboratory-prepared glass jars and capping immediately with teflon lined lids;
- collection of at least 10% replicate samples for QA/QC purposes;
- labelling of sample containers with individual and unique identification, including project number, sample location and sample depth; and
- placement of the sample jars and replicate sample bags into a cooled, insulated and sealed container for transport to the laboratory.

SGS Australia Pty Ltd and Labmark laboratories, accredited by the NATA, were employed to conduct the sample analysis. The laboratories are required to carry out routine in-house QC procedures.

8.2 Groundwater Monitoring Well (Piezometer) Construction and Sampling Details

One piezometer was installed in BH2 to a nominal depth of 5.5m bgl (refer Drawing 1, Appendix A). Piezometer construction details are presented in the Test Bore Logs in Appendix D.

The piezometer was constructed of 50 mm diameter acid washed, class 18, PVC casing and machine slotted well screen intervals. Joints were screw threaded, thereby avoiding the use of glues and solvents which may contaminate the groundwater. The well was completed with a gravel pack extending at least 0.3 m above the well screen and, thence, a bentonite plug of at least 0.5 m thickness. The well was capped and finished flush with the ground by means of a Gatic.

The water level in BH2 was recorded prior to development using an electronic interface probe which can detect the presence of separate phase liquid in the water column (such as light non-aqueous phase liquids (LNAPL) including petroleum hydrocarbons). No free product or separate phase liquid was detected in the BH2. Subsequently, the well was developed on 3 September, 2010, by removing a minimum of three bore volumes of water using a bailer. The well construction and development details are summarized in Table 4 below.

Table 4: Piezometer Construction Details

Bore ID	Location of groundwater monitoring well	Bore depth (m bgl)	Screened interval (m bgl)	Pre-purge Standing water level depth (m bgl)	Well Volume (L)	Volume Purged (L)	Standing water level after well development (m bgl)	Method of Purging
BH2	Adjacent to Tea House Building and in the vicinity of the proposed tunnel	5.5	3.0-5.5	5.33	1.05	10	5.33	Disposa-ble Bailer

Groundwater sampling was undertaken using a decontaminated, low-flow geo-pump. The decontamination procedures for the pump consisted of a "three bucket wash" i.e. the equipment was rinsed of sediment in tap water then decontaminated using a 3% Decon 90 solution and rinsed using demineralised water. Field parameters were measured using a 90FLMV water quality meter, with the probes placed inside a flow-through cell. The flow-through cell's inlet was directly from the micro-purge pump and the outflow was collected in a bucket for disposal. Measurement of field parameters including depth to water (DTW), dissolved oxygen (DO), temperature, pH, electrical conductivity and turbidity were measured constantly during purging. The samples were collected after stable readings were obtained for pH, conductivity, dissolved oxygen and temperature (Refer Section 11.3). Samples were carefully decanted from the flow-through cell connected to the geo-purge pump, into laboratory prepared sampling vessels including hydrochloric acid (HCl) preserved BTEX vials. The groundwater sample collected for heavy metal testing was filtered in the field through a 45 µm membrane filter into nitric acid preserved bottles.

Collection of groundwater samples was carried out in accordance with the methodology prescribed in the *DP Field Procedures Manual*. Sample handling and transport was as set out below:

- sample containers (supplied by the laboratory) were labelled with individual and unique identification, including project number and sample number;
- collection of one replicate sample for QA/QC purposes;
- samples were placed in insulated coolers and maintained at a temperature of approximately 4°C until transported to the analytical laboratory; and
- chain-of-custody documentation was maintained at all times and countersigned by the receiving laboratory on transfer of samples.

All samples were dispatched to NATA accredited laboratories for analysis under chain-of-custody documentation.

8.3 Acid Sulphate Soil Screening

Samples collected from BH2 were screened for pH and peroxide pH to check for signs of potential acid sulphate producing soils. On the basis of the pH screening results, three samples were despatched to SGS, a National Association of Testing Authorities (NATA) accredited analytical laboratory, for suspended peroxide oxidation acidity and sulphate (SPOCAS) testing as per Method 21 of the NSW *Acid Sulphate Soil Management Advisory Committee Manual* (1998) [ASSMAC].

The following methodology was adopted for pH pre-screening:

pH measurement

- placement of 10 mL of soil in small glass container;
- addition of 25 mL of water followed by thorough mixing; and
- measurement of pH using a calibrated Ionode IJ46 pH probe.

Peroxide pH measurement

- placement of 10 mL of soil in small glass container;
- addition of a few drops of pH-adjusted 30% hydrogen peroxide solution;
- observation of sample for effervescence, colour change or odour;
- addition of 25 mL of water followed by thorough mixing; and
- measurement of pH using a calibrated Ionode IJ46 pH probe.

On the basis of the pH screening results, three samples deemed as most likely to be ASS were selected for SPOCAS testing.

The results of pH screening is summarised in Section 11.2.3. Detailed laboratory test results are included in Appendix E.

9. Data Quality Objectives

The scope of the Preliminary Contamination Assessment works has been devised generally in accordance with the seven step data quality objective (DQO) process, as defined in Australian Standard *Guide to the investigation and sampling of sites with potentially contaminated soil Part 1: Non-volatile and semi-volatile compounds* (AS 4482.1 – 2005) and DP's proposal dated 20 July 2010 (revised 13 August 2010) which was accepted by AJC.

The seven step DQO process is as follows:

1) State the Problem
2) Identify the Decision
3) Identify Inputs to the Decision
4) Define the Boundary of the Assessment
5) Develop a Decision Rule

6) Specify Acceptable Limits on Decision Errors

7) Optimise the Design for Obtaining Data.

1. State the Problem

The site is required to be rendered suitable for a commercial land use wherein spectator stands and a parade ring will be constructed. The purpose of this investigation is to assess the suitability of the site for the intended commercial use. This will be achieved by obtaining preliminary data to characterise the soil and groundwater from a contamination perspective and also to verify the presence/absence of saline and acid sulphate soils.

2. Identify the Decision

Whilst it is noted that the Randwick Racecourse would generally be considered as a recreational open space, the Spectator Precinct site is considered to be a commercial site as:

- It is assumed that exposure of the general public to the soil is expected to be minimal, as only a limited number of people are expected to visit the site several times a year (owners) and only during events (such as races) for periods of typically 3-4 hours at a time;
- Persons that are expected to be exposed to the soil for greater periods of time are the staff associated with the racecourse and the events; and
- The Randwick Racecourse has recently extended its lease for the site for a period of 99 years. Therefore, there appears to be no likelihood that the site will be used for any residential purpose and, as such, a 'residential' setting has not been considered.

The suitability of the site for a commercial land use will be on the basis of the current preliminary soil and groundwater investigations. As such, the analysis will focus on the contaminants of concern viz., heavy metals, TPH/BTEX, PAH, PCB, OCP/OPP, phenols and asbestos.

The soil analytical data has been compared to the Site Assessment Criteria (SAC) for a commercial land use. In view of the proposed commercial land use of the site, provisional phytotoxicity based investigation levels (PPILs) were not considered as part of the SAC. The optimal situation is for soil/fill remaining on the site to be within the adopted SAC, therefore, forming a suitable substrate without requiring management. The soil health-based investigation levels (HILs) sourced from the DECC publication *Guidelines for the NSW Site Auditor Scheme* (2006), Appendix II, Column 4, are summarized in Table 5.

The applicable guidelines for groundwater are the NSW DECC (2007) *Guidelines for the Assessment and Management of Contaminated Groundwater*. The DECC (2007) guidelines state that 'the concentrations must be compared against the existing generic GILs [Groundwater Investigation Levels], if available, which protect the following environmental values':

- *Drinking Water (Australian Drinking Water Guidelines* (NHMRC & NRMMC, 2004))
- *Aquatic ecosystems* (ANZECC & ARMCANZ, 2000).

As the regional groundwater direction is expected to be in an easterly direction towards Botany Bay, the nearest receptor and surface water body is considered to be Musgrave Pond located approximately 2 km north-east of the site. The appropriate Groundwater Investigation Levels (GIL) are, therefore, considered to be the ANZECC *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (2000) trigger values for toxicants in freshwaters for the protection of 95% of freshwater species. The GIL adopted for the site are shown in Table 6.

With regard to waste classification, it is noted that wherever possible the materials will be reused on site. However, some surplus material may be present. Any surplus material that requires off-site disposal to landfill requires waste classification. For waste classification purposes, filling will be assessed against:

- *NSW DECC Waste Classification Guidelines: Classifying Waste (2008, revised 2009).*

The waste classification criteria for the contaminants of concern are provided in Table 7.

3. Identify Inputs to the Decision

The primary inputs that will be utilized to assess the suitability of the site for a commercial land use are:

- Available site information regarding activities undertaken on the site and the surrounding area;
- Results of previous investigations undertaken by DP (outlined in Section 3);
- The local geology, topography and hydrology;
- Potential contaminants;
- Published guidelines for assessing soil and groundwater quality; and
- Field observations/measurements and analytical results from the current assessment.

4. Define the Boundary of the Assessment

The boundary of the assessment is defined by the extent of the works required to construct the proposed Spectator Precinct and is shown in Drawing 1, Appendix A. This is considered to be the extent of the contamination assessment.

5. Develop a Decision Rule

The decision rule is the comparison of the analytical results against relevant published guideline criteria including:

- NSW DECC *Guidelines for the NSW Site Auditor Scheme 2nd edition* (2006);
- NSW DECC *Guidelines for Assessing Service Station Sites* (1994); and
- ANZECC *Guidelines for Fresh and Marine Water Quality ANZECC* (2000) for the protection of 95% of Marine species; and
- *NSW DECCW Waste Classification Guidelines: Classifying Waste (2008, revised 2009).*

These assessment criteria will be used to evaluate whether the site is suitable for a commercial land use, from a contamination standpoint.

Table 5: Site Acceptance Criteria for Soil

Contaminant	Adopted Criteria (SAC)	Source
TPH $C_6 – C_9$ $C_{10} – C_{36}$	 65 mg/kg 1000 mg/kg	NSW EPA Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) threshold concentrations for sensitive land use - soils. Currently there are no other comprehensive, EPA endorsed investigation levels for petroleum hydrocarbons.
BTEX Benzene Toluene Ethylbenzene Xylene	 1 mg/kg 1.4 mg/kg 3.1 mg/kg 14 mg/kg	
Metals Arsenic (total) Cadmium Chromium Copper Lead Mercury Nickel Zinc	 500mg/kg 100 mg/kg 60% 5000 mg/kg 1500 mg/kg 75 mg/kg 3000 mg/kg 35,000 mg/kg	NSW EPA Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* (2nd Edition) (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based Investigation Levels outlined in Column 4, Appendix II for commercial and industrial sites
Total Phenols	42,500 mg/kg	NSW EPA Contaminated Sites *Guidelines for the NSW Site Auditor Scheme* (2nd Edition) (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based Investigation Levels outlined in Column 4, Appendix II for commercial and industrial sites
PAH Total Benzo(a)Pyrene	 100 mg/kg 5 mg/kg	
PCB	50 mg/kg	
OPP	Not defined	
OCP Aldrin + Dieldrin Chlordane DDT+DDD+ DDE Heptachlor	 50 mg/kg 250 mg/kg 1000 mg/kg 50 mg/kg	
Asbestos	No asbestos present in soil at the surface	Correspondence from NSW EPA Director of Contaminated Sites to Accredited Site Auditors

1 NSW EPA is now part of the NSW Department of Environment and Climate Change and Water (DECCW).

2. DECC now administered by the DECCW.

A contaminant concentration in soil/filling material is considered to be significant if:

- The concentration of the contaminant is more than 2.5 times the site assessment criteria (SAC). Any location more than 2.5 times the SAC is classified as a 'hotspot', requiring further assessment/ management
- For a data of like material, with respect to the health-based criteria, the calculated 95% Upper Confidence Limit of average concentrations (excluding any 'hotspot' concentrations) exceeds the SAC.
- The standard deviation of the results is greater than 50% of the health-based investigation levels (HIL).

Table 6: Groundwater Investigation Levels for the Protection of a Freshwater Ecosystem (ANZECC)[a]

Compound	Groundwater Investigation Levels (GILs) (µg/L)
Arsenic	13 [b]
Cadmium	0.2 [b]
Chromium(III)	27.4 [c]
Copper	1.4 [b]
Lead	3.4 [b]
Mercury(Total)	0.6 [b]
Nickel	11 [b]
Zinc	8 [b]
TPH: C_6-C_9	150 [d]
TPH: C_{10}-C_{36}	600 [d]
Benzene	950 [b]
Toluene	300 [e]
Ethyl benzene	140 [e]
Xylene	380[e]
PAH-total	not available
Naphthalene	16 [b]
Total phenols	320 [b]
PCBs	0.6/0.03 b (Arochlor 1242 and 1254 respectively)
OCPs	

Compound	Groundwater Investigation Levels (GILs) (µg/L)
Chlordane	0.08 [b]
DDT	0.01 [b]
Heptachlor	0.09 [b]

Notes for Table 6:

a. Australian and New Zealand Environment and Conservation Council '*Australian and New Zealand Guidelines for Fresh and Marine Water Quality – October 2000'.*

b. Trigger Values for a 95% Level of Protection of Species in Fresh Water (Table 3.4.1)

c. Trigger Values for a 95% Level of Protection of Species in Marine Water (Table 3.4.1) adopted in the absence of trigger values for freshwater species.

d. ANZECC threshold not available. It is noted there is a 'low reliability' Interim Working Value (Section 8.3.7) final chronic value of 7 µg/L for petroleum hydrocarbon but that commercial laboratories are not generally able to achieve the necessary detection limits to demonstrate compliance. For reference purposes, DP has referred to other available Australian guidelines for TPH *viz. Airport (Environment Protection) Regulations* (1997), Schedule 2 Water Pollution Accepted Limits: Table 1.03 – Accepted limits of contamination. It should be noted however that these have not been endorsed by DECCW and are used as 'screening levels' only.

e. NSW EPA Contaminated Sites *Guidelines for Assessing Service Station Sites* (1994) *Threshold concentrations for sensitive land use, Protection of Aquatic Ecosystem* is adopted in the absence of other comprehensive investigation levels for toluene and ethyl benzene in freshwater.

Table 7: Contaminant Threshold Values (CT1 and CT2) for Classifying Waste by Chemical Assessment without the Leaching (TCLP) Test

	Maximum Values of specific contaminant concentration for classification without TCLP	
Contaminant	General Solid Waste[1]	Restricted Solid Waste
	CT1 (mg/kg)	CT2 (mg/kg)
Arsenic	100	400
Benzene	10	40
Benzo(a)pyrene[2]	0.8	3.2
Cadmium	20	80
Chromium (IV)[3]	100	400
Ethyl Benzene	600	2400
Lead	100	400
Mercury	4	16
Nickel	40	160
C6-C9 Petroleum Hydrocarbons	650[4]	2600[4]
C10-C36 Petroleum Hydrocarbons	10000[4]	40000[4]

	Maximum Values of specific contaminant concentration for classification without TCLP	
Contaminant	**General Solid Waste[1]**	**Restricted Solid Waste**
	CT1 (mg/kg)	**CT2 (mg/kg)**
Phenol	288	1152
Polychlorinated Biphenyls	<50[4]	<50[4]
Polycyclic Aromatic Hydrocarbons (total)	200[4]	800[4]
Scheduled Chemicals	<50[4]	<50[4]
Toluene	288	1152
Xylenes (total)	1000	4000
Asbestos	Not present	Not Present

Notes:

1. Values are the same for both general solid waste (putrescible) and general solid waste (non-putrescible)
2. There may be a need for the laboratory to concentrate the sample to achieve the TCLP limit value for benzo(a)pyrene with confidence
3. These limits apply to chromium in the +6 oxidation state only
4. Criteria taken from table for Leachable Concentrations (TCLP) and Specific Contaminant Concentrations (SCC) as no CT criteria available

With regard to natural soil, currently DECCW has not specified any specific assessment criteria for virgin excavated natural material (VENM). Typically, however, natural soils are compared against the National Environment Protection Measure (NEPM) 1999, Schedule B(1) *Guidelines on the Investigation Levels for Soils and Groundwater, Soil Investigation Levels*, *Background Ranges* – for background levels. Note that with respect to organic analytes which have no published background levels, the results will be assessed against their practical quantitation limits (PQL).

6. Specify Acceptable Limits on Decision Errors

In order to ensure the quality of the soil and groundwater data, appropriate and adequate quality assurance and quality control (QA/QC) measures and evaluations should be incorporated into the sampling and testing regime.

A field and laboratory QA/QC regime, comprising the collection and analysis of Intra-laboratory replicate samples was implemented to meet the requirements associated with the following data quality indicators (DQIs).

- conformance with specified holding times;
- accuracy of spiked samples within the laboratory's acceptable range (typically 70-130% for inorganic contaminants and greater for some organic contaminants);
- field and laboratory duplicates and replicates samples will have a precision average of +/- 30% relative percent difference (RPD) for inorganic analytes and +/- 50% RPD for organic analytes; and

- field replicates were collected at a frequency of at least 10% of all samples.

7. Optimise the Design for Obtaining Data

In order to ensure the representativeness of the database, sampling locations:

- were distributed in a broad grid pattern across accessible areas of the Spectator Precinct; and
- were positioned to obtain representative groundwater quality data.

The sampling locations are presented in Drawing 1, Appendix A.

To optimise the investigation, all samples collected were screened using a calibrated photo-ionisation detector (PID). The results of the PID readings are provided in the Bore/Pit Logs (Appendix D). The interpretation of PID values allowed for better assessment of the investigation samples to determine the analytical programme and the need, if any, for further investigation.

Table 8 summarises the data quality indicators (DQIs) and the procedures designed to enable achievement of the DQIs. For reference purposes, relevant sections of the report are also identified.

Table 8: Data Quality Indicators

DQI	Achievement Evaluation Procedure
Documentation completeness	Completion of field and laboratory chain of custody documentation, completion of test bore report sheets in Appendix E and Appendix – D, respectively
Data completeness	Sampling density based on DP's proposal.
Data comparability	Use of NATA certified laboratories, use of consistent sampling techniques (Appendix F).
Data representativeness	Sampling on a systematic and targeted basis to obtain representative samples. (Section 10)
Precision and accuracy for sampling and analysis	Achievement of 30% RPD for inorganic replicate analysis and 50% for organic replicate analysis, acceptable levels for laboratory QC criteria (Appendix F).

Discussion of how the sampling and analysis programme met the DQIs is provided in Appendix F.

10. Sampling and Analytical Rationale

As part of the current assessment, a total of six sampling locations i.e., two test pits and four test bores were utilised to obtain preliminary data pertaining to the contamination status of the site. The test pits and bores were placed in an approximate rough grid-pattern at accessible areas of the proposed development area. Further, noting that as part of the proposed development, excavations in the north-western and southern portions of the site would be extended to nominal depths of 4m bgl,

one test bore in the southern section of the site was extended to a nominal depth of 7.5m bgl with the objective of obtaining data pertaining to groundwater levels and representative groundwater quality at the site. The sampling locations are shown in Drawing 1, Appendix A. As the purpose of the current assessment was to obtain preliminary data on the contamination status of the site and in view of the generally low potential for contamination associated with previous site use, the sampling density is considered appropriate for a preliminary assessment.

In addition to the above, soil samples were also collected from BH2 to nominal depths of 5.5m bgl (i.e., more than 1 metre below the proposed excavation depth) with to the objective of verifying the presence/absence of acid sulphate soils and saline soils at the site. Whilst the site is not located in an area that is prone to either ASS or saline soils (as mentioned in Section 5), soil sampling from BH2 was undertaken to verify the information provided in the published literature.

A total of nine soil samples (plus 1 replicate QA/QC) were analysed for various combinations of the contaminants of concern. In addition, selected samples were extracted and analysed using TCLP (for preliminary waste classification purposes), SPOCAS (to verify the presence/absence of ASS) and pH and electrical conductivity (Ec 1:5 to verify the presence/absence of saline soils) (refer to Table 9).

10.1 Field Quality Assurance and Quality Control (QA/QC)

The field QC procedures for sampling as prescribed in Douglas Partners' *Field Procedures Manual* were followed during the assessment. Field sampling comprised intra-laboratory replicate sampling at a rate of approximately one replicate sample for every ten samples. QA/QC sampling also consisted trip spikes and trip blanks. The comparative results of analysis conducted by DP are summarised in Appendix F.

10.2 Laboratory QA/QC

The analytical laboratories are NATA accredited and are required to conduct in-house QA/QC procedures. These are normally incorporated into every analytical run and include reagent blanks, spike recovery, surrogate recovery and duplicate samples. These results are included in the laboratory reports in Appendix E.

Table 9: Analytical Scheme

Sample ID	Heavy Metals	TPH	BTEX	Phenol	PAH	OPP/ OCP/PCB	Asbestos	TCLP	pH	EC 1:5	SPOCAS
Spectator Precinct Soil											
BH1/ 0.3-0.5	✓	✓	✓	✓	✓	✓	✓		-	-	-
BH2/ 0.3-0.6	✓	✓	✓	✓	-	-	✓	✓	-	-	✓
BD1/ 200810	✓	✓	-	-	-	-	-	-	-	-	-
BH2/ 0.7-1.0	✓	✓	✓	✓	-	-	-	-	-	-	-
BH2/ 1.1-1.5	-	-	-	-	-	-	-	-	✓	✓	-
BH2/ 1.6-2.0	-	-	-	-	-	-	-	-	✓	✓	-
BH2/ 2.1-2.5	-	-	-	-	-	-	-	-	✓	✓	-
BH2/ 2.6-3.0	-	-	-	-	-	-	-	-	✓	✓	-
BH2/ 3.1-3.5	-	-	-	-	-	-	-	-	✓	✓	-
BH2/ 3.6-4.0	-	-	-	-	-	-	-	-	✓	✓	✓
BH2/ 4.1-4.5	✓	✓	✓	✓	-	-	-	-	-	-	-
BH2/ 4.6-5.0	-	-	-	-	-	-	-	-	✓	✓	-
BH2/ 5.1-5.5	-	-	-	-	-	-	-	-	✓	✓	✓
BH3/ 0.3-0.6	✓	✓	✓	✓	✓	✓	✓		-	-	-
BH4/ 0.4-0.6	✓	✓	✓	✓	✓	✓	✓		-	-	-
TP101/ 0-0.3	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-
TP102/ 0-0.3	✓	✓	✓	✓	✓	✓	✓	-	-	-	-
TP102/0.4-0.8	✓	✓	✓	✓	-	-	✓	-	-	-	-
Spectator Precinct - Groundwater											
BH2	✓	✓	✓	✓	✓	✓	-	-	-	-	-

11. Field Work Results

11.1 Field Observations

Filling was encountered at all sampling locations to depths ranging between 0.4 m – 1.1 m bgl. The deepest fill was encountered in the central portion of the site in the vicinity of sampling location BH2 to a depth of 1.1m bgl.

The subsurface profile in the test bores typically comprised pavers/bitumen underlain by roadbase to nominal depths of 0.4m bgl and brown or grey silty sand filling with a trace of gravel to nominal depths ranging between 0.6m – 1.1m bgl. The filling at the test bore locations was underlain by natural brown/white sands. At BH2 groundwater was encountered at a nominal depth of 5.3m bgl

At TP101 (located in the north-western portion of the site), the subsurface profile comprised brown silty sand topsoil filling with traces of rootlets, brick fragments and gravel to a nominal depth of 0.3m bgl underlain by natural grey sands. At TP 102, the subsurface profile comprised brown silty sand topsoil filling with traces of rootlets and gravel to a depth of 0.3m bgl underlain by a profile of red mottled, brown sand filling with some gravel. Natural grey sands were encountered at this test pit at a nominal depth of 1.0m bgl.

11.2 Field Testing Results

11.2.1 Soil

Replicate soil samples collected in plastic bags were allowed to equilibrate under ambient temperatures before screening for Total Photoionisable Compounds (TOPIC) using a calibrated Photoionisation Detector (PID). The PID readings were all <2 ppm and typical of Australian soil background levels.

11.2.2 Groundwater

On 3 September, 2010, BH2 was purged and groundwater samples were collected from this piezometer. The groundwater samples were collected using low-flow sampling techniques after stable readings were obtained for pH, conductivity, dissolved oxygen, turbidity and temperature (presented in Table 10 below).

Table 10: Groundwater Readings Prior to Sampling

pH	Electrical Conductivity (µs/cm)	Dissolved Oxygen (ppm)	Turbidity (NTU)	Temperature (ºC)
BH2				
7.31	543	4.8	over NTU [1]	17.7
7.34	536	4.6	over NTU	17.8
7.39	532	4.49	over NTU	18
7.39	495	4.14	over NTU	17.3

pH	Electrical Conductivity (µs/cm)	Dissolved Oxygen (ppm)	Turbidity (NTU)	Temperature (ºC)
7.39	487	4.38	over NTU	14.2
7.37	474	4.98	803	17.3
7.52	477	7.3	716	17.3
7.54	477	7.66	640	17.3
7.54	477	7.66	640	17.3
7.54	477	7.66	640	17.3

Note: 1 – over NTU = Over instrument limit

11.2.3 Acid Sulphate Soil Screening

The results for pH screening are presented in Table 11. Screening results are for indicative purposes only and no firm criteria are applicable. General comparative values for pH screening are provided by ASS Management Advisory Committee (ASSMAC), however, they may provide a false indication due to the potential presence of inclusions in the soil (e.g. organic matter, shells) that may affect the pH values. In general, however, a substantial drop in pH value typically suggests the potential presence of ASS.

Table 11: Results of Acid Sulphate Soil Screening

Sample Location	Depth (m)	pH_F	pH_{FOX}	pH_F - pH_{FOX}	Strength of Reaction
BH2	0.3-0.6	8.15	5.44	2.71	1
	0.7-1	8.67	6.95	1.72	1
	1.1-1.5	8.51	6.60	1.91	2
	1.6-2	8.56	6.62	1.94	1
	2.1-2.6	8.55	6.88	1.67	2
	2.6-3	7.13	6.04	1.09	2
	3.1-3.5	7.71	6.49	1.22	1
	3.6-4	8.07	6.88	1.19	2
	4.1-4.5	6.64	6.16	0.48	1
	4.6-5	6.61	6.07	0.54	1
	5.1-5.5	6.74	6.42	0.32	2
Indicative Values	-	<4/4-5	<3	≥1	-

Notes:

pH_F	non-oxidised pH (soil in distilled water) measures existing acidity
pH_{FOX}	
1	no or slight reaction
2	moderate reaction
3	vigorous reaction
4	volcanic' reaction
F	bubbling/frothy reaction indicative of organics

Indicative Values	screening/selection criteria for SPOCAS analysis
pH_F <4, pH_F = 4-5	may indicate actual acidity
pH_{FOX} <3	may indicate potential acidity
pH_F - pH_{FOX} ≥1	may indicate PASS

12. Laboratory Testing

The results of the laboratory analysis undertaken are presented in the following tables:

- Table 12: Contamination Assessment Laboratory Results – Soils;
- Table 13: Contamination Assessment Laboratory Results – Groundwater;
- Table 14: Preliminary Salinity Results; and
- Table 15: Preliminary Acid Sulphate Soil Assessment Results.

The full laboratory reports together with the chain of custody and sample receipt information is presented in Appendix E.

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Table 12: Summary of Analytical Results for Soil
(All Results Reported in mg/kg unless otherwise specified)

Sample ID	Fill/ Natural	Heavy Metals											PAH		TPH		Benzene	Toluene	Ethylbenzene	Total Xylene	Total PCB	OCP	OPP	Phenols	Asbestos
		As	Cd	Cr~	Cu	Pb		Hg		Ni		Zn	B(a)P	Total PAH	C6-C9	C10-C36									
		SCC	SCC	SCC	SCC	SCC	TCLP (mg/L)	SCC	TCLP (mg/L)	SCC	TCLP (mg/L)	SCC	SCC	TCLP (mg/L)											
SPECTATOR PRECINCT																									
BH1/ 0.3-0.5	F	<3	<0.3	2.7	2.7	5	-	<0.05	-	1.2	-	16	<0.05	-	<1.77	<20	<120	<0.1	<0.1	<0.1	<0.3	<0.90	<PQL	<PQL	<0.1	No asbestos detected
BH2/ 0.3-0.6	F	<3	<0.3	3.8	50	280	2.1	0.22	-	1.5	-	92	0.07	-	<1.77	<20	<120	<0.1	<0.1	<0.1	<0.3	-	-	-	-	No asbestos detected
BD1/ 200810 [2]	F	<3	<0.3	1.8	34	73	-	0.1	-	<0.5	-	58		-		<20	<120	-	-	-	-	-	-	-	-	-
BH2/ 0.7-1.0	F	<3	<0.3	<0.3	3.3	<1	-	<0.05	-	<0.5	-	15	<0.05	-	<1.77	<20	<120	<0.1	<0.1	<0.1	<0.3	-	-	-	-	-
BH2/ 4.1-4.5	N	<3	<0.3	1.4	1.3	<1	-	<0.05	-	1.4	-	3.3	<0.05	-	<1.77	<20	<120	<0.1	<0.1	<0.1	<0.3	-	-	-	-	-
BH3/ 0.3-0.6	F	<3	<0.3	5.3	6.9	75	-	0.24	-	2.7	-	33	0.07	-	<1.77	<20	<120	<0.1	<0.1	<0.1	<0.3	<0.90	<PQL	<PQL	<0.1	No asbestos detected
BH4/ 0.4-0.6	F	<3	<0.3	<0.3	0.6	<1	-	<0.05	-	<0.5	-	0.91	<0.05	-	<1.77	<20	<120	<0.1	<0.1	<0.1	<0.3	<0.90	<PQL	<PQL	<0.1	No asbestos detected
TP101/ 0-0.3	F	4	0.4	11	33	69	-	0.21	-	5.2	-	75	3.6	<0.5	44.04	<20	200	<0.1	<0.1	<0.1	<0.3	<0.90	<PQL	<PQL	0.6	
TP102/ 0-0.3	F	<3	<0.3	8.1	74	71	-	0.1	-	7.5	-	83	1	-	13.44	<20	131	<0.1	<0.1	<0.1	<0.3	<0.90	<PQL	<PQL	<0.1	No asbestos detected
TP102/ 0.4-0.8	F	<3	<0.3	7.3	18	120	-	0.07	-	1.4	-	94	0.66	-	7.14	<20	<120	<0.1	<0.1	<0.1	<0.3					Chrysotile asbestos detected
QA/QC																										
TB1/ 200810	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	<0.1	<0.1	<0.1	<0.3	-	-	-	-	-
TS/ 200810	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60%	66%	84%	64%	-	-	-	-	-
TB/ 230810	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-	<0.1	<0.1	<0.1	<0.3	-	-	-	-	-
TS/ 230810																	-	90%	83%	84%	86%	-	-	-	-	-
PQL		3	0.3	0.3	0.5	1		0.05		0.5		0.5	0.05		1.77	20	120	0.1	0.1	0.1	0.3	0.9	0.1	0.1	0.1	
SAC		500	100	60%	5000	1500	-	75		3000		35000	5	-	100	65 [1]	1000 [1]	1	1.4	3.1	14	10	/250/1000/50			No Asbestos detected
Maximum values of Specific Contaminant Concentration for classification without TCLP [3]																										
General Solid Waste (non putrescible) (CT1)		100	20	100	ND	100	-	4	-	40		ND	0.8	-	ND	ND	ND	10	288	600	1000	ND	ND	ND	288	No Asbestos Detected
Restricted Solid Waste (CT2)		400	80	400	ND	400	-	16	-	160		ND	3.2	-	ND	ND	ND	40	1152	2400	4000	ND	ND	ND	1152	No Asbestos Detected
Maximum values of Specific Contaminant Concentration for classification with TCLP [4]																										
General Solid Waste [5]		500	100	1900	ND	1500	5	50	0.2	1050	2	ND	10	0.04	200	650	10000	18	518	1080	1800	50	50	ND	518	No Asbestos Detected
Restricted Solid Waste		2000	400	7600	ND	6000	20	200	0.8	4200	8	ND	23	0.16	800	2600	40000	72	2073	4320	7200	50	50	ND	2073	No Asbestos Detected
Background Soil Ranges																										
NEPC 1999 [5]		1-50	1	5-1000	2-100	2-200		0.03		5-500		10-300	<PQL		<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	
ANZECC 1992 [6]		0.2-30	0.04-2	0.5-110	1-190	<2-200		0.001-0.1		2-400		2-180	<PQL		<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	<PQL	

NOTES

SAC	Site Assessment Criteria - Guidelines for the NSW Site Auditor Scheme 2nd edition (2006) Soil Investigation Levels for Urban Redevelopment Sites in NSW Heath-based investigation levels for Commercial/Industrial Landuses
SCC	Specific Contaminant Concentration
1	NSW EPA Service Station Guidelines
2	Represents intralaboratory sample collected from BH2/0.3-0.6
3	Waste Classification Guidelines 2008. Contaminant Threshold Criteria for General Solid Waste Without TCLP (CT1) and Restricted Solid Waste Without TCLP (CT2)
4	Waste Classification Guidelines 2008. Threshold criteria for General Solid Waste and Restricted Solid Waste with TCLP
5	National Environment Protection Measure (NEPM) 1999, Schedule B(1) Guidelines on the Investigation Levels for Soils and Groundwater, Soil Investigation Levels, Background Ranges – for background levels.
6	Australian and New Zealand Environment and Conservation Council/National Health and Medical Research Council (ANZECC/NHMRC): Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (1992), Environmental Soil Quality Guidelines Column A Background (ANZECC A)
TB/	Laboratory prepared soil trip blank
TS/	Laboratory prepared soil trip spike
PQL	Practical Quantitation Limit
BOLD	Exceeds SAC

Table 13: Spectator Precinct, Groundwater Results
(All Results Reported in µg/L Unless Otherwise Specified)

Sample ID	Heavy Metals								PAH			TPH		Benzene	Toluene	Ethylbenzene	Total Xylene	Total PCB	OCP	OPPs	Phenols (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Hardness by calcul
	As	Cd	Cr~	Cu	Pb	Hg	Ni	Zn	B(a)P	Napthalene	Total +ve PAH	C6-C9	C10-C36											
DP 2009 Assessment																								
BH2	<1	<0.1	2	12	<1	<0.1	<1	17	<0.5	<0.5	<PQL	<10	<300	<0.5	<0.5	<0.5	<1.5	<PQL	<PQL	<PQL	<0.01	39	5.4	120
BD1/030910	<1	<0.1	2	12	<1	<0.1	<1	15	<0.5	<0.5	<PQL	-	-	-	-	-	-	-	-	-	-	-	-	-
TS1/030910	-	-	-	-	-	-	-	-	-	-	-	-	-	101%	104%	99%	96%	-	-	-	-	-	-	-
TB/030910	-	-	-	-	-	-	-	-	-	-	-	<40	-	<0.5	<0.5	<0.5	<1.5	-	-	-	-	-	-	-
PQL	4	1	1	1	1		1	1	<0.5	<0.5	0.5	10	250	1	1	1	3	0.004	0.002	0.01	0.01			
GIL	13	0.84	27.4	5.46	25.84	0.6	42.9	31.2	Not specified	16	Not specified	150	600	950	300	140	380	Not specified	0.8/0.01/0.09	Not defined	320			

Notes:

~	All Chromium are assumed to exist in the stable Cr(III) oxidation state, Guidelines for the NSW Site Auditor Scheme (2nd Edition)
PQL	Practical Quantitation Limit
BD1/030910	Intra-laboratory duplicate sample collected at BH2
TS1/030910	Trip Spike
TB/030910	Trip Blank
	Exceeds GIL

Table 14: Preliminary Salinity Results

Test Bore	Sample Depth (m)	pH	Soil Texture Group [after DLWC]	Textural Factor [M] [after DLWC]	EC 1:5 [Lab.] (µS/cm)	ECe [M x EC1:5] (dS/m)	Salinity Class [Richards 1954]	Material type
2	0.3-0.6	9.1	Sandy loam	14	97	1.4	Non Saline	filling – topsoil
	0.7-1.0	7.0	Sand	17	13	0.2	Non Saline	filling – sand
	1.1-1.5	6.5	Sand	17	13	0.2	Non Saline	sand
	1.6-2.0	7.0	Sand	17	18	0.3	Non Saline	sand
	2.1-2.5	7.9	Sand	17	27	0.5	Non Saline	sand
	2.6-3.0	7.1	Sandy loam	14	77	1.1	Non Saline	sand
	3.1-3.5	7.4	Sand	17	40	0.7	Non Saline	sand
	3.6-4.0	7.3	Sand	17	38	0.6	Non Saline	sand
	4.6-5.0	6.4	Sand	17	26	0.4	Non Saline	sand
	5.1-5.5	6.5	Sand	17	23	0.4	Non Saline	sand

Table 15: SPOCAS Results

Sample ID	SPOCAS Results							
	pH_{KCl}	pH_{ox}	Acid Trail (mol H+/tonne)			Sulphur Trail (%)		
			TPA	TAA	TSA	S_p	S_{KCL}	S_{POS}
BH2/0.3-0.6	6.5	6.7	<5	<5	<5	<0.005	<0.005	<0.005
BH2/3.6-4.0	6.6	6	<5	<5	<5	<0.005	<0.005	<0.005
BH2/5.1-5.5	6.1	6.1	<5	<5	<5	<0.005	<0.005	<0.005
Guidelines [2]								
Action Criteria if more than 1000 tonnes disturbed (Coarse Texture - Sands to loamy sands)	-	-	18	-	18	-	-	0.03

13. Discussion

13.1 General

The results of the site history search showed that the site has been used as part of the RRR since 1860. The 'Tea House' and stands were constructed prior to 1930. Modifications to the stands and the remainder of the site between 1970 and 2007 resulted in the present day layout.

As the purpose of the current assessment was to obtain preliminary data on the contamination status, the current assessment comprised soil and groundwater sampling from a total of six sampling locations which is considered to be appropriate for a preliminary contamination assessment.

The results of the field investigations showed that the deepest fill was encountered in the central portion of the site in the vicinity of sampling location BH2 to a depth of 1.1m bgl. Further, the road-tar profile which was seen at the New Day Stalls site was not observed in the current study area. Groundwater was encountered at a nominal depth of 5.33m bgl (RL 26.6m AHD).

The site history and the field observations suggest that, with the exception of the quality of fill placed on the site, the site has a relatively low potential for contamination. Additionally, as the site has undergone modifications since as early as 1860, there may also be a potential for the presence of buried asbestos pipes to be uncovered during bulk excavation works similar to that experienced during the excavation for the Day Stalls site.

13.2 Contamination Assessment - Soil Analytical Results

The analytical results for the soil samples indicate that the concentration of heavy metals, TPH/BTEX, PAHs, PCBs, OCPs/OPPs and phenols in all analysed soil samples were generally low and within the adopted SAC for a commercial/industrial site.

With regard to asbestos, of the nine soil samples analysed, asbestos or respirable asbestos fibres were not detected in eight samples. However, in soil sample TP102/0.4-0.8 which was collected from TP102, asbestos fibres were detected in the form of a 2mm length of a fibre bundle that was found loose in the sample. TP102 was excavated on a lawn located in the eastern section of the site. Further, sample TP102/0.4-0.8 was collected from a profile of filling comprising red mottled, brown sand filling with some gravel which was not observed at any of the other sampling locations in the Spectator Precinct. The red mottled brown sand filling profile at TP102 was underlain by natural grey sands that commenced at a nominal depth of 1.0m bgl. Noting that asbestos or asbestos fibres were not detected at the other sampling locations and the red mottled brown sand filling profile was not observed at any of the other sampling locations, it is considered that the asbestos contamination may be limited to the red mottled brown sand filling present at a nominal depth of 0.3m – 1.0m bgl located in the vicinity of TP102. Therefore, on the basis of the investigation findings, the site can be rendered suitable for the proposed commercial landuse subject to the remediation of the asbestos contaminated soil in the vicinity of TP102.

As the current assessment was preliminary in nature, there is insufficient information to delineate the extent of the asbestos contamination in the vicinity of TP102. Therefore, it is recommended that additional investigations comprising step-out sampling at TP102 should be carried out in the eastern

section of the Spectator Precinct with to the objective of delineating the extent of asbestos contamination.

Subsequent to delineating the extent of the asbestos contamination in the vicinity of TP102, remedial works should be undertaken in the vicinity of TP102 to render the site suitable for the proposed development. Typical remediation options that should be considered are:

1. Removal and disposal of all asbestos contaminated filling material to landfill and validation of the remedial pit to verify the removal of the asbestos contaminated soils. If this option is adopted, a waste classification assessment of the filling material in the vicinity of TP102 would also have to be undertaken. The waste classification should be carried out in accordance with the Department of Environment and Climate Change (DECC) *Waste Classification Guidelines April 2008* (revised 2009).

2. Alternatively, if substantial quantities of asbestos contaminated fill are identified, on-site containment of the contaminated filling would also be a practical remedial option in view of the absence of groundwater in the impacted horizon and the immobile nature of asbestos. This option consists of placing a marker layer (e.g. geofabric) over the identified asbestos contaminated materials, followed by the placement of a permanent capping layer (consisting of either permanent pavement or the placement of a minimum of 0.5 m of verified clean soil/ filling). An Environmental Management Plan (EMP) should be prepared to detail the ongoing management requirements for the encapsulated asbestos contaminated materials which are to be retained on site beneath capping structures. This option will manage potential exposure of site users to asbestos, without the need for bulk excavation and off-site disposal of substantial quantities of asbestos contaminated filling. The cap and contain strategy is endorsed by enHealth (2005)[1].

13.3 Contamination Assessment - Groundwater Analytical Results

The results of the field screening exercise indicated that groundwater is expected to be intercepted at a nominal depth of 5.33m bgl (RL 26.6m AHD) at the Spectator Precinct. The analytical results for the groundwater samples showed that the concentration of TPH/BTEX, PAHs, OCPs/OPPs/PCBs and phenols were either below the laboratory's limit of reporting or were generally low and within the adopted GILs.

With regard to heavy metals, with the exception of copper in sample BH2 (12µg/L), all other heavy metals were either below the laboratory's limit of reporting, or within the adopted GILs. Elevated concentrations of heavy metals such as chromium, copper, nickel and zinc are not uncommon in urbanised areas. The common sources of heavy metals in urban areas include, typically, surface and stormwater runoffs (eg from streets), which infiltrate into the groundwater system and infiltration of effluent water through service leakage (including of pressurised water delivery pipes). Therefore, it is considered that the detected copper exceedance is most probably representative of the regional background levels, and does not represent significant health or environmental impacts. Therefore, based on the analytical results, the groundwater at the site is not considered to be impacted by heavy metal, TPH/BTEX, PAH, OCP/OPP/PCB and phenol contamination and further groundwater assessment is not deemed necessary.

[1] enHealth (2005), *Management of asbestos in the non-occupational environment*. Department of Health and Ageing

Given that dewatering may be required as part of the proposed development, the groundwater may need to be assessed specifically for discharge parameters. In this regard it should be noted that the management of dewatering is the responsibility of the DECCW under the *Water Management Act* 2000. Advice should be sought from the department in regards to licensing requirements. All regulatory requirements relating to dewatering must be met prior to commencement of any dewatering works. Further, it may be necessary to obtain a temporary dewatering license for the duration of the construction works.

13.4 Preliminary Waste Classification Results

It is intended that during the proposed development, wherever possible, the materials generated from bulk excavation works will be reused on site. However some surplus material may be present which may require off site disposal. Therefore, a provisional *in situ* waste classification assessment was conducted as part of the current assessment for the purpose of off-site disposal of any excess material. Classification of the material was generally conducted in accordance with the six step process as set out in the *Waste Classification Guidelines* 2008 (as shown in Table 16).

Table 16: Six Step Waste Classification Process

Step	Comments	Rationale
1. Is it special waste?		Waste not considered to have clinical, or tyre waste.
	TP102 - Yes	In TP102 asbestos fibres were detected in the sample collected from the 0.3-1.0m fill profile. Therefore, the fill material in this profile at TP102 would be pre-classified as Special Waste/Asbestos Waste
	No - TP101, BH1, BH2, BH3 and BH4	At TP101, BH1, BH2, BH3 and BH4, asbestos was not identified visually and was not detected in the remainder of the filling material samples. The potential for asbestos contamination, however, exists. Spoil excavated/generated during excavation/earthworks should be specifically checked for the presence of asbestos. If asbestos is found, then the affected material must be classified as Asbestos Waste.
2. Is it liquid waste?	No	Waste composed of sand, concrete rubble and metal scraps and slag (i.e. no liquids).
3. Is the waste “pre-classified”?	TP102 – Yes	Red mottled brown fill profile in TP102 at a depth of 0.3-1.0m bgl is pre-classified as Asbestos Waste.
	No - TP101, BH1, BH2, BH3 and BH4	Filling material in TP101, BH1, BH2, BH3 and BH4 is not pre-classified.

Step	Comments	Rationale
4. Does the Waste have hazardous waste characteristics	Laboratory Analysis conducted to confirm whether contaminant concentrations were within General Solid Waste Criteria	Waste not observed to/ or considered at risk to contain explosives, gases, flammable solids, oxidising agents, organic peroxides, toxic substances or corrosive substances, waste not observed to contain coal tar, batteries or dangerous goods containers. However, laboratory analysis was carried out to verify the contaminant concentrations
5. Chemical Assessment	Conducted	Refer to Table 12
6. Is the Waste Putrescible?	No	All observed components of the material comprised material pre-classified as non-putrescible (i.e. silty sand and gravel).

Laboratory results were compared to the General Solid Waste Screening Threshold Values (refer to Table 12).

The preliminary analytical results (without TCLP) for the filling material samples collected from the site indicated the following exceedences of the "screening" criteria for General Solid Waste (non-putrescible) without TCLP:

- The concentration of lead in samples BH2/0.3-0.6 (280 mg/kg) and TP102/0.4-0.8 (120 mg/kg), exceeded the threshold criteria (100 mg/kg) for General Solid Waste (non-putrescible) without TCLP; and
- The concentration of B(a)P in samples TP101/0-0.3 (3.6 mg/kg) and TP102/0-0.3 (1 mg/kg) exceeded the threshold criteria (0.8mg/kg) for General Solid Waste (non-putrescible) without TCLP.

As sample BH2/0.3-0.6 (280 mg/kg) showed the highest lead concentration, TCLP tests for lead were carried out on the sample. The analytical results showed that the leachable concentration of lead in sample BH2/0.3-0.6 was 2.1 mg/L which was within the threshold concentration for General Solid Waste (non-putrescible) with TCLP.

With regard to B(a)P, samples TP101/0-0.3 (3.6 mg/kg) and TP102/0-0.3 (1 mg/kg) were collected from similar material types (brown silty sand topsoil filling). Therefore, sample TP101/0-0.3 was considered to be representative of the above-mentioned materials and TCLP tests for B(a)P were carried out on this representative samples. The analytical results showed that the leachable concentration of B(a)P in the sample was below the laboratory's limit if reporting and also within the threshold criteria for General Solid Waste (non-putrescible) with TCLP.

Therefore, on the basis of the total and leachable concentrations of the contaminants, the filling material at sampling locations TP101, BH1, BH2, BH3 and BH4 is provisionally classified as GENERAL SOLID WASTE (NON PUTRESCIBLE) and should be disposed off site to a landfill licensed to receive such waste. At sampling location TP102, asbestos fibres were detected in the soil sample collected from the red mottled, brown silty sand filling present at a depth of 0.3-1.0m bgl. Therefore, the fill material in the vicinity of TP102 is provisionally classified as SPECIAL WASTE (ASBESTOS WASTE) and should be disposed of to a landfill that is licensed to receive such waste.

Whilst asbestos fibres were not detected in the analysed filling material samples collected from TP101, BH1, BH2, BH3 and BH4, in view of the brick fragments observed at TP101, it is prudent that during earthworks, the excavated filling material should be checked for signs of asbestos. If asbestos contamination is found, then the material must be segregated from the general spoil, to be further assessed/waste classified. All asbestos contaminated waste must be classified and disposed of as Special Waste (Asbestos Waste) to a suitably licensed landfill.

The natural grey/yellow/white sands in the test bore/pit logs is considered to be Virgin Excavated Natural material (VENM), on the proviso that the natural, *in situ* soil does not contain discernible signs of contamination and is not cross-contaminated with any non-VENM material.

13.5 Salinity Results

To verify the presence/absence of saline soils at the site, ten soil samples that were collected from BH2 were analysed for pH and electrical conductivity ($EC_{1:5}$). The results of the pH and $EC_{1:5}$ analysis are presented in Table 14 (above). Based on the published mapping and the analytical results it is considered that the soils at the site are not saline.

13.6 Acid Sulphate Soil Results

Based on the acid sulphate soil screening results (Section 11.2.3), three selected soil samples from BH2 were despatched to the laboratory for SPOCAS analysis to verify the presence/absence of acid sulphate soils at the site. The results of the SPOCAS analysis are presented in Table 15 (above). The results of the SPOCAS analysis indicate that acid sulphate soils are not present at BH2. Therefore, based on the published mapping and the SPOCAS results, it is considered that acid sulphate soils are not present at the site.

14. Conclusions

The objective of the current assessment was to provide preliminary data on the contamination status and the presence/absence of ASS and saline soils at the proposed Spectator Precinct. The assessment comprised a review of previous assessments undertaken at the overall RRR, a site history review and intrusive soil (from six sampling locations) and groundwater (from one groundwater monitoring well) investigations at the site.

The site history and the field observations suggest that with the exception of the quality of fill placed on the site, the site has a relatively low potential for contamination. Further, as the site has undergone modifications since as early as 1860, there is also a potential for buried asbestos pipes to be present. Asbestos pipes that may be uncovered during bulk excavation can be managed by the implementation of an Unexpected Asbestos Finds Protocol that can be developed prior to commencement of the construction phase.

Whilst the analytical results for the soil samples showed that the concentration of heavy metals, TPH/BTEX, PAHs, OCP/PCB/OPP and phenols was generally low and within the adopted SAC for a commercial/industrial landuse, asbestos fibres were detected in only one soil sample i.e., TP102/0.4-0.8. This sample which was collected from a fill profile of red mottled, brown sand filling present between the depths of 0.3-1.0m bgl at TP10 was distinct to this sampling location. Therefore, based on the field observations and the analytical results, the red mottled, brown sand filling at TP102 is considered to be contaminated with asbestos. As the red mottled, brown sand filling was only observed in TP102, it is considered that the asbestos contamination is expected to be limited to the immediate vicinity of TP102. As the current assessment was preliminary in nature and comprised soil sampling from only six locations, additional investigations would be required to delineate the horizontal extent of the asbestos contaminated fill. Therefore, it is recommended that step-out sampling should be carried out at sampling location TP102 with the objective of delineating the extent of asbestos contamination. Subsequent to delineating the extent of the asbestos contamination in the vicinity of TP102, remedial works as discussed in Section 13.2 should be undertaken in the vicinity of TP102.

Therefore, on the basis of the investigation findings, the site can be rendered suitable for the proposed commercial landuse subject to the remediation of the asbestos contaminated soil in the vicinity of TP102.

The results of the provisional *in situ* waste classification assessment showed that the filling material in the vicinity of sampling locations TP101, BH1, BH2, BH3 and BH4 is provisionally classified as GENERAL SOLID WASTE (NON PUTRESCIBLE) and should be disposed off site to a landfill licensed to receive such waste. Further, in view of the asbestos fibres detected at sampling location TP102, the red mottled brown silty sand filling present at a depth of 0.3-1.0m bgl in the vicinity of TP102 is provisionally classified as SPECIAL WASTE (ASBESTOS WASTE) and should be disposed of to a landfill that is licensed to receive such waste. During bulk excavation works, if any additional asbestos contamination is found, then the material must be segregated from the general spoil, to be further assessed/waste classified. All asbestos contaminated waste must be classified and disposed of as Special Waste (Asbestos Waste) to a suitably licensed landfill.

The natural grey/yellow/white sands in the test bore logs is considered to be Virgin Excavated Natural material (VENM), on the proviso that the natural, *in situ* soil does not contain discernible signs of contamination and is not cross-contaminated with any non-VENM material.

15. Limitations

Douglas Partners (DP) has prepared this report for a project at the proposed Spectator Precinct located within the Royal Randwick Racecourse, Randwick, NSW in accordance with DP's proposal dated 20 July 2010 (Revised 13 August, 2010) and acceptance received from Mr Daniel Lacey of Australian Jockey Club on 30 July 2010. The report is provided for the exclusive use of the Australian Jockey Club for this project only and for the purpose(s) described in the report. It should not be used for other projects or by a third party. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions only at the specific sampling or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of anthropogenic influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be limited by undetected variations in ground conditions between sampling locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion given in this report.

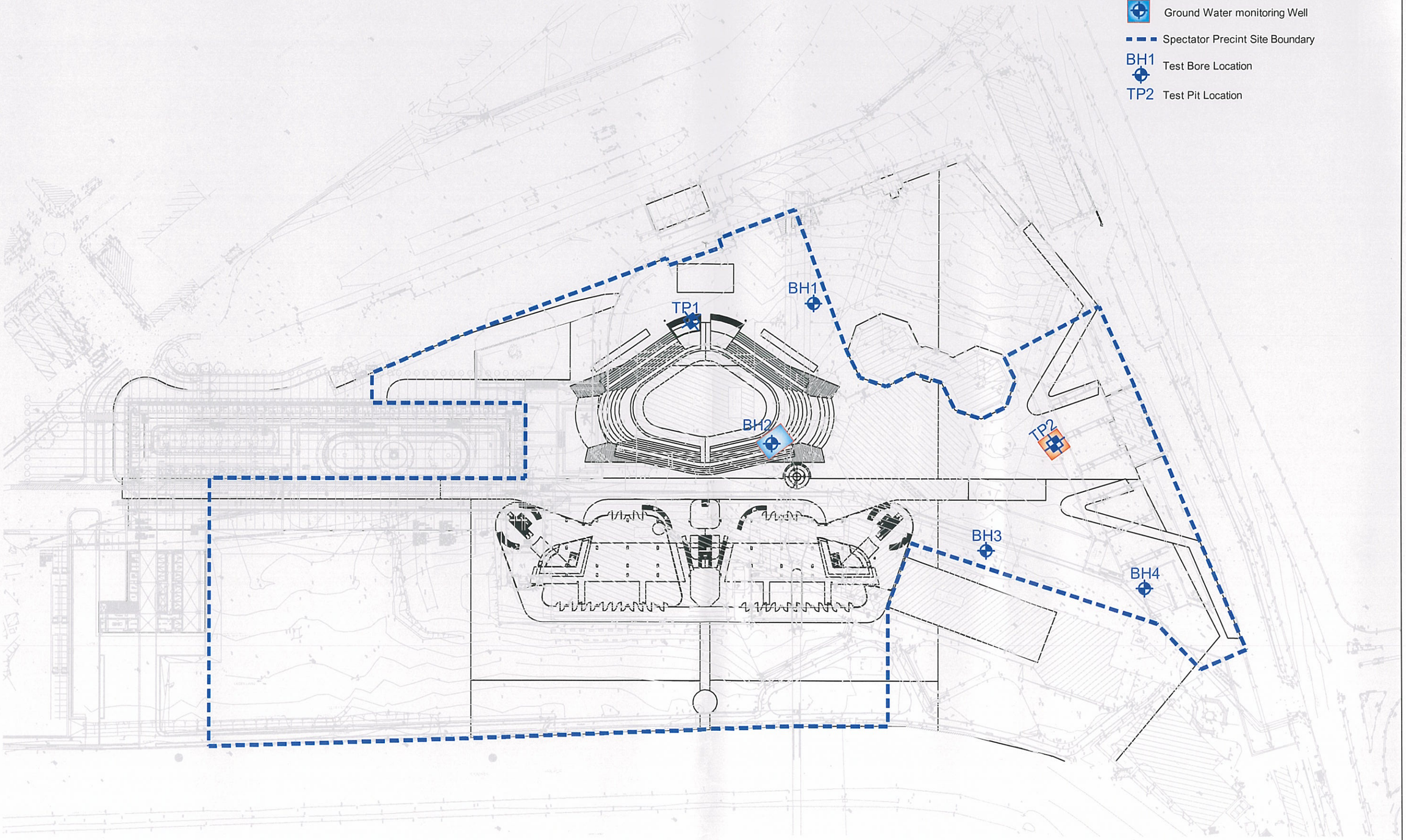
Douglas Partners Pty Ltd

Appendix A

Drawings

LEGEND

- Positive Asbestos detection in 0.4-0.8m Sample
- Ground Water monitoring Well
- Spectator Precint Site Boundary
- BH1 Test Bore Location
- TP2 Test Pit Location



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: AUSTRALIAN JOCKEY CLUB	TITLE: **Sampling Locations, Spectator Precint** **Preliminary Contamination, Salinity and Acid Sulphate Soil Assessment** **Spectator Precint, Royal Randwick Racecourse**	PROJECT No: 71976.01-1
	OFFICE: SYDNEY / DRAWN BY: VOJTA	MAG / ISG / MGA	DRAWING No: 1
	SCALE: As shown / DATE: 17.9.2010		REVISION: A

P:\71976.01 RANDWICK, Pedestrian and Stables Precincts Preliminary Contamination Investigation LR\Drawings\Spectator Pcnt client supplied\71976.01-1.dwg, 17.9.2010 16:24:25

Appendix B

Historical Title Deeds

ACN: 093 398 611
ABN: 61 093 412 474

Peter S. Hopley Pty Limited
Legal Searchers

1 Boronia Avenue
Mount Annan , NSW , 2567
Mobile: 0412 199 304
Fax 9233 4590 (Attn Box 29)

SUMMARY AS TO OWNERS.

Property: - Randwick Race Course

Description: Part Lot 1 D.P. 130234

01.06.1915	Henry Cary Dangar *(Esquire)* Adrian Knox *(Barrister at Law)* Edmund Fosbery *(Member of the Legislative Council)*	Vol 2579 Fol 66
11.12.1917	Adrian Knox *(Barrister at Law)* Edmund Fosbery *(Member of the Legislative Council)*	Vol 2579 Fol 66
09.11.1917	Adrian Knox *(Barrister at Law)* Samuel Hordern *(Esquire)* Richard Halifax Dangar *(Esquire)*	Vol 2579 Fol 66
23.08.1932 ?	Samuel Hordern *(Esquire)* Richard Halifax Dangar *(Esquire)*	Vol 2579 Fol 66
29.07.1932	Samuel Hordern *(Esquire)* Richard Halifax Dangar *(Esquire)* Thomas Lloyd Forster Rutledge *(Grazier)*	Vol 2579 Fol 66
28.03.1941?	Samuel Hordern *(Esquire)* Thomas Lloyd Forster Rutledge *(Grazier)*	Vol 2579 Fol 66
18.03.1941	Samuel Hordern *(Esquire)* Thomas Lloyd Forster Rutledge *(Grazier)* George Main *(Grazier)*	Vol 2579 Fol 66
12.09.1955?	Samuel Hordern *(Esquire)* Thomas Lloyd Forster Rutledge *(Grazier)*	Vol 2579 Fol 66
04.07.1955	Samuel Hordern *(Esquire)* Thomas Lloyd Forster Rutledge *(Grazier)* William McCulloch Gollan *(Member of the Legislative Council)* Maurice Victorian Point *(Grazier)*	Vol 2579 Fol 66

email: grolly1@bigpond.net.au

ACN: 093 398 611
ABN: 61 093 412 474

Peter S. Hopley Pty Limited
Legal Searchers

1 Boronia Avenue
Mount Annan , NSW , 2567
Mobile: 0412 199 304
Fax 9233 4590 (Attn Box 29)

20.08.1963	William McCulloch Gollan *(Member of the Legislative Council)* Maurice Victorian Point *(Grazier)*	Vol 2579 Fol 66
13.10.1980	Sidney George White Robert William Askin Laurie John Ferguson	Vol 2579 Fol 66
21.06.1983	Laurie John Ferguson Tristan Antico Leslie Frederick Bridge	1/130234
07.03.2006	# Leslie Frederick Bridge # Ken Arthur Murray # Paul Francis Patrick Whelan	1/130234

 # Current Registered Proprietors

During the course of our search numerous leases were found to "The Chairman of the Committee of the Australian Jockey Club" going back as far as 1907

email: grolly1@bigpond.net.au

24/2/09

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 1/130234

SEARCH DATE	TIME	EDITION NO	DATE
24/2/2009	8:17 PM	1	7/3/2006

LAND

LOT 1 IN DEPOSITED PLAN 130234
AT RANDWICK
LOCAL GOVERNMENT AREA RANDWICK
PARISH OF ALEXANDRIA COUNTY OF CUMBERLAND
TITLE DIAGRAM DP130234

FIRST SCHEDULE

LESLIE FREDERICK BRIDGE
KEN ARTHUR MURRAY
PAUL FRANCIS PATRICK WHELAN
AS JOINT TENANTS (AP AC117117)

SECOND SCHEDULE (8 NOTIFICATIONS)

1 LAND EXCLUDES MINERALS AND IS SUBJECT TO RESERVATIONS AND CONDITIONS IN FAVOUR OF THE CROWN - SEE CROWN GRANT(S)
2 J758496 EASEMENT FOR WATER SEWERAGE AND DRAINAGE 7.62 WIDE AFFECTING PART OF THE LAND ABOVE DESCRIBED DESIGNATED (A) IN THE TITLE DIAGRAM
3 DP644957 EASEMENT TO DRAIN WATER 4 WIDE APPURTENANT TO THE LAND ABOVE DESCRIBED SEE DP 644957
4 DP644957 EASEMENT TO FLOOD LIMITED BY STRATA 4 WIDE APPURTENANT TO THE LAND ABOVE DESCRIBED SEE DP644957
5 L361810 RESTRICTION ON USER (S.27E(6) MAIN ROADS ACT, 1924) - (LOT5 IN DP236188)
6 T15486 LEASE TO THE SYDNEY COUNTY COUNCIL OF SUBSTATION PREMISES NO.2919 (1ST FLOOR LVL) TOGETHER WITH RIGHTS OF WAY AND EASEMENTS FOR ELECTRICITY PURPOSES. EXPIRES 31.12.1996
7 Z404960 LEASE TO THE SYDNEY COUNTY COUNCIL OF SUBSTATION PREMISES NO.6787 TOGETHER WITH RIGHTS OF WAY AND EASEMENTS FOR ELECTRICITY PURPOSES AS SHOWN IN DP123678. EXPIRES 4.9.2013
8 E452870 LEASE TO THE CHAIRMAN OF THE COMMITTEE OF THE AUSTRALIAN JOCKEY CLUB. EXPIRES 30.6.2042

NOTATIONS

DP1045661 NOTE: PLAN OF PROPOSED EASEMENTS
DP1110270 NOTE: PLAN OF PROPOSED EASEMENT FOR ELECTRICITY AND OTHER

END OF PAGE 1 - CONTINUED OVER

nizam PRINTED ON 24/2/2009

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 1/130234 PAGE 2

NOTATIONS (CONTINUED)

PURPOSES

UNREGISTERED DEALINGS: NIL

*** END OF SEARCH ***

nizam PRINTED ON 24/2/2009

Department of Lands

HELP GUIDE

SIX NSW

Search

Address | Place names | Lot / DP

Lot: 1

Section:

Plan Number: 130234

Get results

Lot ↑↓	Section ↑↓	Plan Number ↑↓
1		130234

Info tool results

Type ↑↓	Details ↑↓

20-0090

PLAN OF PART OF 81.75 ha GRANT BEING LAND IN VOL. 2579 FOL. 66

D.P. 130234

Registered: 20.6.95

C.A.:

Title System: TORRENS

Purpose: DEPARTMENTAL

LGA ~~Mun./Shire/City~~: RANDWICK

Town or Locality: RANDWICK

Parish: ALEXANDRIA

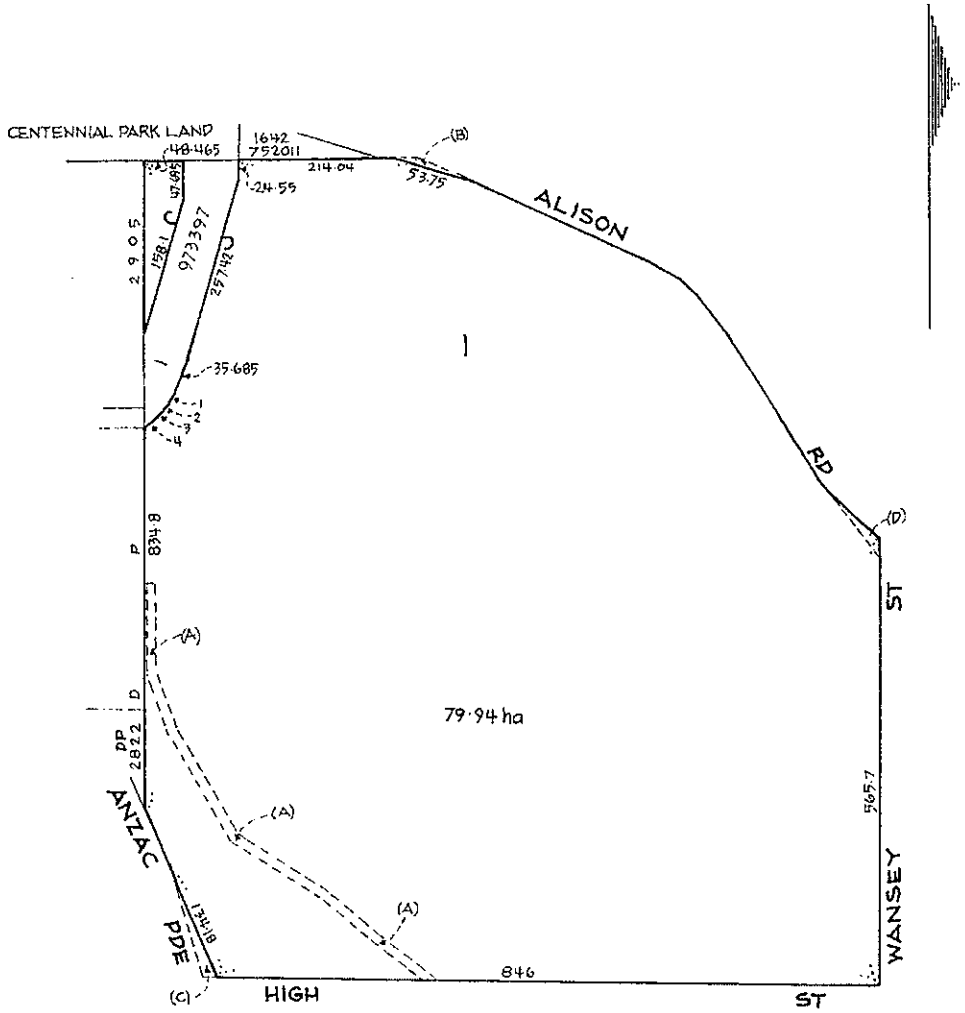
County: CUMBERLAND

Reduction Ratio 1: NTS Lengths are in metres

Ref. Map: U 1845 - 813 #

Last Plan: R10876.1603, R11058.1603, 8375.3000, 3383.3000

B D I O O N



(A) EASEMENT 7·62 WIDE - J 758496
(B) ROAD R 10876·1603
(C) ROAD R 11058·1603
(D) RESTRICTION ON USER VAR. WIDTH - L 361810 (DP 236188)

REFERENCE :

NO.	DISTANCE
1	4·755
2	4·79
3	9·59
4	8·115

NOTES

FULL DIMENSIONS ARE NOT AVAILABLE FOR THE LOT. ANY DIVISION OF THE LAND HEREIN MAY NECESSITATE THE LODGMENT OF A PLAN OF SURVEY.

13859

(C.)

(Reference to last Certificate Volume 1525 Folio 146)

New South Wales.

[CERTIFICATE OF TITLE.]

(Joint Tenancy)
(Order N° A178698)
(Residue after Notification of Resumption N° 679923)

REGISTER BOOK.
VOL. 2579 FOLIO 66
St 7017

CANCELLED [R]
ON ISSUE OF NEW FOLIO 1/13023H.

M18/2114

Henry Cary Dangar Esquire Adrian Knox K.C. Barrister-at-Law and The Honorable Edmund Fosbery Member of the Legislative Council all of Sydney by virtue of Certificate of Title Volume 1525 Folio 146 now surrendered as to Residue after Notification of Resumption N° 679923 are now the proprietors of an Estate in Fee Simple as Joint Tenants subject nevertheless to the reservations and conditions if any contained in the Grant hereinafter referred to and also subject to such encumbrances, liens, and interests as are notified hereon in That piece of land situated in the Municipality of Randwick Parish of Alexandria and County of Cumberland containing One hundred and ninety seven acres two roods thirty six and one half perches or thereabouts as shown in the plan hereon and thereon edged red being the land delineated in the Public Map of the said Parish in the Department of Lands originally granted to Edward Deas Thomson, Richard Jones and William Bede Dalley by Crown Grant dated the fifteenth day of June One thousand eight hundred and sixty three Registered in the Land Titles Office Sydney Volume 1 Folio 46 Exclusively of the land colored yellow in said plan hereon being Four acres one rood three and one half perches resumed by the Chief Commissioner for Railways and Tramways by Notification of Resumption N°679923 the area of which is not included in the above mentioned area of One hundred and ninety seven acres two roods thirty six and one half perches

In Witness whereof I have hereunto signed my name and affixed my Seal this first day of June One thousand nine hundred and fifteen

Signed the 1st day of June 1917 in the presence of

Deputy Registrar General

Notification referred to

Amongst the reservations and conditions contained in the Grant above referred to are the following namely:—

Reservations of Minerals &c

Deputy Registrar General

N° 453221 Lease dated the 31st day of January 1907 from Henry Cary Dangar, Frederick Close Griffiths and Richard Jones to Adrian Knox of Sydney Esquire as Chairman of the Committee of the Australian Jockey Club Produced and entered the 15th day of February 1907 at 10 o'clock in the forenoon

Deputy Registrar General

Subject to the Road of variable width colored red, in the plan hereon the area of which namely 4 3/4 perches is not deducted from the above mentioned statement of area of 197 acres 2 roods 36 1/2 perches

This Road Catalogued R 10876 1603 was resumed under the Public Roads Act 1902 vide Gazette Notice dated the 15th day of May 1912 folio 3121

Deputy Registrar General

No. A351832 NOTICE of DEATH. Proof having been furnished to me of the death of the said Henry Cary Dangar the surviving Joint Tenants Adrian Knox and Edmund Fosbery are now registered sole proprietors of the Land within described.
Produced and entered 11th December 1917
at 12 min. past 2 o'clock in the after noon

REGISTRAR GENERAL

No. A351833 TRANSFER dated 9th November 1917 from the said Adrian Knox and Edmund Fosbery to the said Adrian Knox Samuel Hordern of Sydney Esquire and Richard Halifax Dangar of Newsfield Whitebridge Esquire as Joint Tenants of the land within described.
Produced and entered 11th December 1917
at 12 min. past 2 o'clock in the after noon

REGISTRAR GENERAL

No. A342841 RESUMPTION of land for PUBLIC ROAD. Notice in Government Gazette, dated 25th September 1912 folio 5949 whereby and by operation of the Public Roads Act of 1902, the road colored pink on the plan hereon and shown in plan catalogued R 10058 1603 in the Department of Lands was declared to be a Public Road, and the same has become vested in His Most Gracious Majesty KING GEORGE V.
PRODUCED and ENTERED 5th April 1918, at 10 o'clock in the fore noon

Registrar General

Lease N° 453221 having been surrendered by operation of law the memorial of such Lease is cancelled. Dated 24th February March 1920
Vide A 540328

Registrar General

No. A540328. Lease. Dated 4th February 1920 from the said Adrian Knox, Samuel Hordern and Richard Halifax Dangar To The Chairman of the Committee of the Australian Jockey Club and his Successors in Office

19th February 1920

Produced and entered 4th March 1920 at 12 o'clock in the noon.

REGISTRAR GENERAL

No. C134476 NOTICE of DEATH. Proof having been furnished to me of the death of the said Adrian Knox the surviving Joint Tenants Samuel Hordern and Richard Halifax Dangar are now registered ~~sole~~ proprietors of the Land within-described.

Produced and entered 23rd August 1932 at 10 o'clock in the fore noon.

REGISTRAR GENERAL

No. C134477 TRANSFER dated 29th July 1932 from the said Samuel Hordern and Richard Halifax Dangar to the said Samuel Hordern and Richard Halifax Dangar and Thomas Lloyd Forster Rutledge as joint tenants of the Land within described excluding the roads shown by pink colour on the plan hereon

Produced 11th August 1932 and entered 23rd August 1932 at 10 o'clock in the fore noon.

REGISTRAR GENERAL

Surrender in Law of the within Lease No. A540328 by reason of fresh Lease dated 5th July 1935 No. C354264 Wales 23rd August 1935 Vide C363269.

Registrar General

No. C354264 Lease dated 5th July 1935 from the said Sir Samuel Hordern, Richard Halifax Dangar and Thomas Lloyd Forster Rutledge to the Chairman of the Committee of the Australian Jockey Club and his successors in office of the land within described excluding the roads shown by pink colour on the plan hereon

Produced 17th July 1935 and entered 23rd August 1935 at 3 mins. past 10 o'clock in the fore noon.

Registrar General

No. D11445 NOTICE of DEATH. Proof having been furnished to me of the death of the said Richard Halifax Dangar the surviving Joint Tenants Samuel Hordern and Thomas Lloyd Forster Rutledge are is now registered sole-proprietors of the land within-described excluding roads shown by pink colour on plan hereon

Produced and entered 29th March 1941 at 2 mins. past 10 o'clock in the fore noon.

REGISTRAR GENERAL

No. D11446 TRANSFER dated 13th March 1941 from the said Samuel Hordern and Thomas Lloyd Forster Rutledge to the said Samuel Hordern and Thomas Lloyd Forster Rutledge and George Main of Illalo Graziers as joint Tenants of the land within described excluding the roads shown by pink colour on plan hereon of the land within described

Produced and entered 28th March 1941 at 2 mins. past 10 o'clock in the fore noon.

REGISTRAR GENERAL

Surrender in Law of the within Lease No. C354264 by reason of fresh Lease dated 12th July 1944 No. D871614 Vide D878011

Registrar General

No. D871614 Lease dated 12th July 1944 from the said Thomas Lloyd Forster Rutledge and George Main to The Chairman of the Committee of the Australian Jockey Club and his successors in office of the land within described excluding the roads shown by pink colour on the plan hereon

Produced 4th July 1945 and entered 20th September 1948 at 12 o'clock noon.

Registrar General

No. C332502 NOTICE of DEATH. Proof having been furnished to me of the death of the said George Main the surviving joint tenants Sir Samuel Hordern, Thomas Lloyd Forster Rutledge are now registered ~~sole~~ proprietors of the land within described 15th July 1955

Produced and entered 12th September 1955 at 12 o'clock in the noon.

REGISTRAR GENERAL

No. C332503 TRANSFER dated 4th July 1955 from the said Sir Samuel Hordern and Thomas Lloyd Forster Rutledge to the said Thomas Lloyd Forster Rutledge the Honorable William McCulloch Grazier of Darling Point, Member of the Legislative Assembly and Maurice Grazier of Victorian Point Watsons Bay as joint tenants of the land within described excluding the roads shown by pink colour on plan hereon

Produced 15th July 1955 and entered 12th September 1955 at 12 o'clock in the noon.

REGISTRAR GENERAL

The Honorable William McCulloch Grazier and Maurice Victorian Point, the surviving joint tenants are now registered sole proprietors of the land within described.

See Notice of Death (Sect. [illegible]) No. T40472

Entered 20th August 1963

REGISTRAR GENERAL

Lease No. D871614 has been surrendered by operation of law.

Dee J469606

Entered 20th December 1963

Registrar General

No. J469606 LEASE dated 16th September 1963 to the Chairman of the Committee of the Australian Jockey Club of the land within described excluding roads shown by pink colour on plan hereon

Entered 20th December 1963

REGISTRAR GENERAL

No. J758496 NOTICE OF RESUMPTION

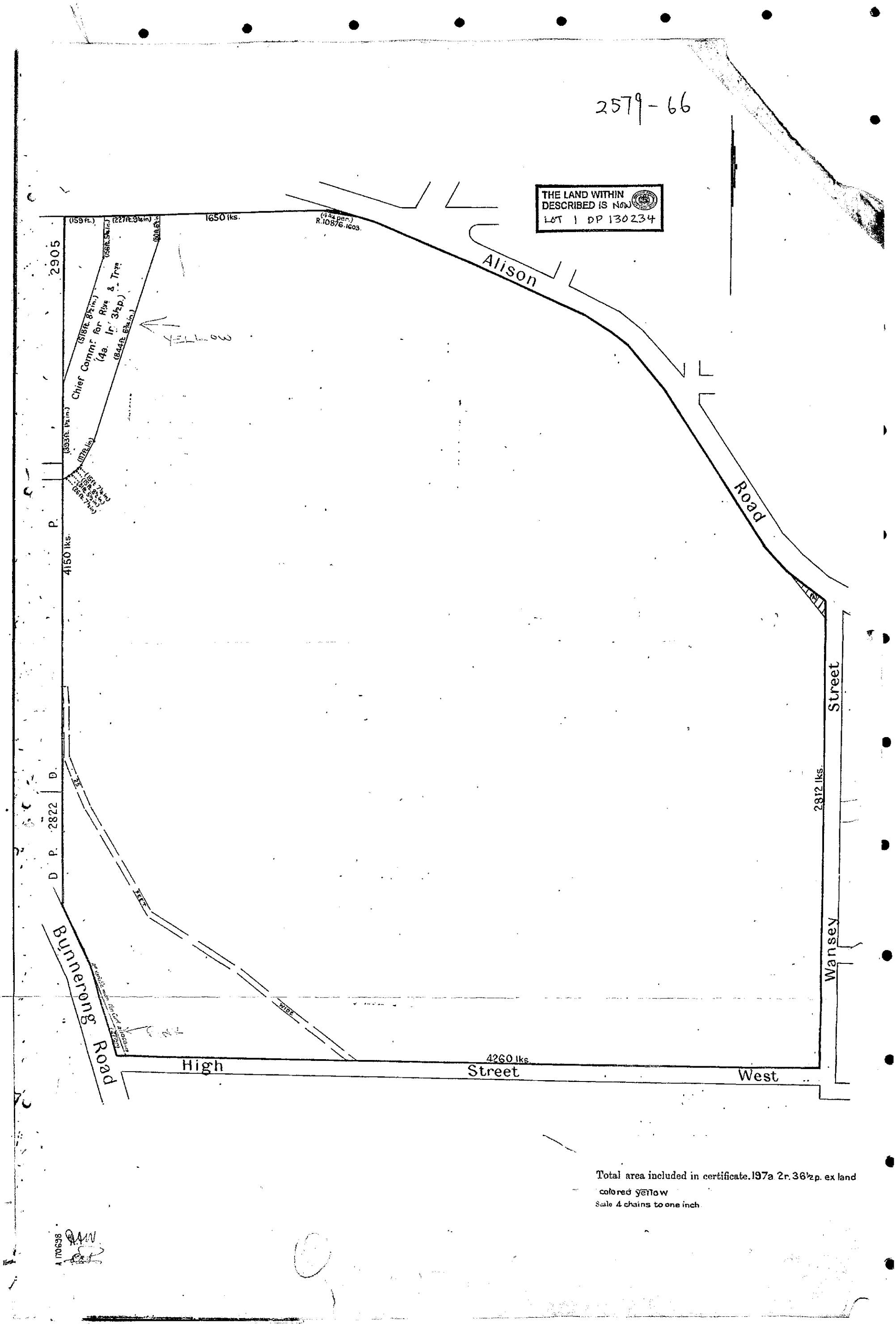
The Metropolitan Water Sewerage and Drainage Board is the proprietor of an easement affecting that part of the land within described shown as 25 feet wide on the plan hereon freed from all other interests.

Entered: 26th October, 1964

Registrar General

2579-66

THE LAND WITHIN DESCRIBED IS NOW LOT 1 DP 130234



Total area included in certificate. 197a 2r. 36½p. ex land colored yellow

Scale 4 chains to one inch

A170638

...n by hatched black designated (B) being Lot 5 DP 236187
...edom is subject to the restrictions on user imposed
...n 27E(6) Main Roads Act 1924-1967
...361810 L361510
...tered 8th May 19 69

REGISTRAR GENERAL

REGISTERED PROPRIETOR Sidney George White
The Honourable Sir Robert William Ashley
and Laurie John Ferguson as joint tenants
By Request S64531 Registered 13-10-1980

REGISTRAR GENERAL

J469606 Lease T15456 Lease to The Sydney County Council of Substation premises No. 2919 (First Floor Level) together with rights of way and easements for electricity purposes over part of the land within described and in Certificate of title Volume 2816 folio 108 Expires 31-12-1996. Registered 12-8-1982.

T15456
SURRENDERED E597314

REGISTRAR GENERAL

REGISTERED PROPRIETOR The Honourable Laurie John Ferguson Sir Tristan Antico and Leslie Frederick Bridge as joint tenants By Request T584486. Registered 23-6-1983

REGISTRAR GENERAL

Z404960 J469606 Lease. Z404960 Sub-Lease to The Sydney Country Council of Substation premises No 6787 together with a right of way and easement for electricity purpose over other parts of the land above described as shown in DP 123678. Expires 4-9-2013. Registered 21-3-1991

SURRENDERED E597314

D.P. 644957 EASEMENT TO DRAIN WATER 4 WIDE APPURTENANT TO THE LAND ABOVE DESCRIBED. Registered 1-8-1991

D.P. 644957 EASEMENT TO FLOOD LIMITED BY STRATA 4 WIDE APPURTENANT TO THE LAND ABOVE DESCRIBED. Registered. 1-8-1991

9-7-1992 ~~E452870 LEASE TO THE CHAIRMAN OF THE COMMITTEE OF THE AUSTRALIAN JOCKEY CLUB EXCLUDING LAND IN RESUMPTION~~

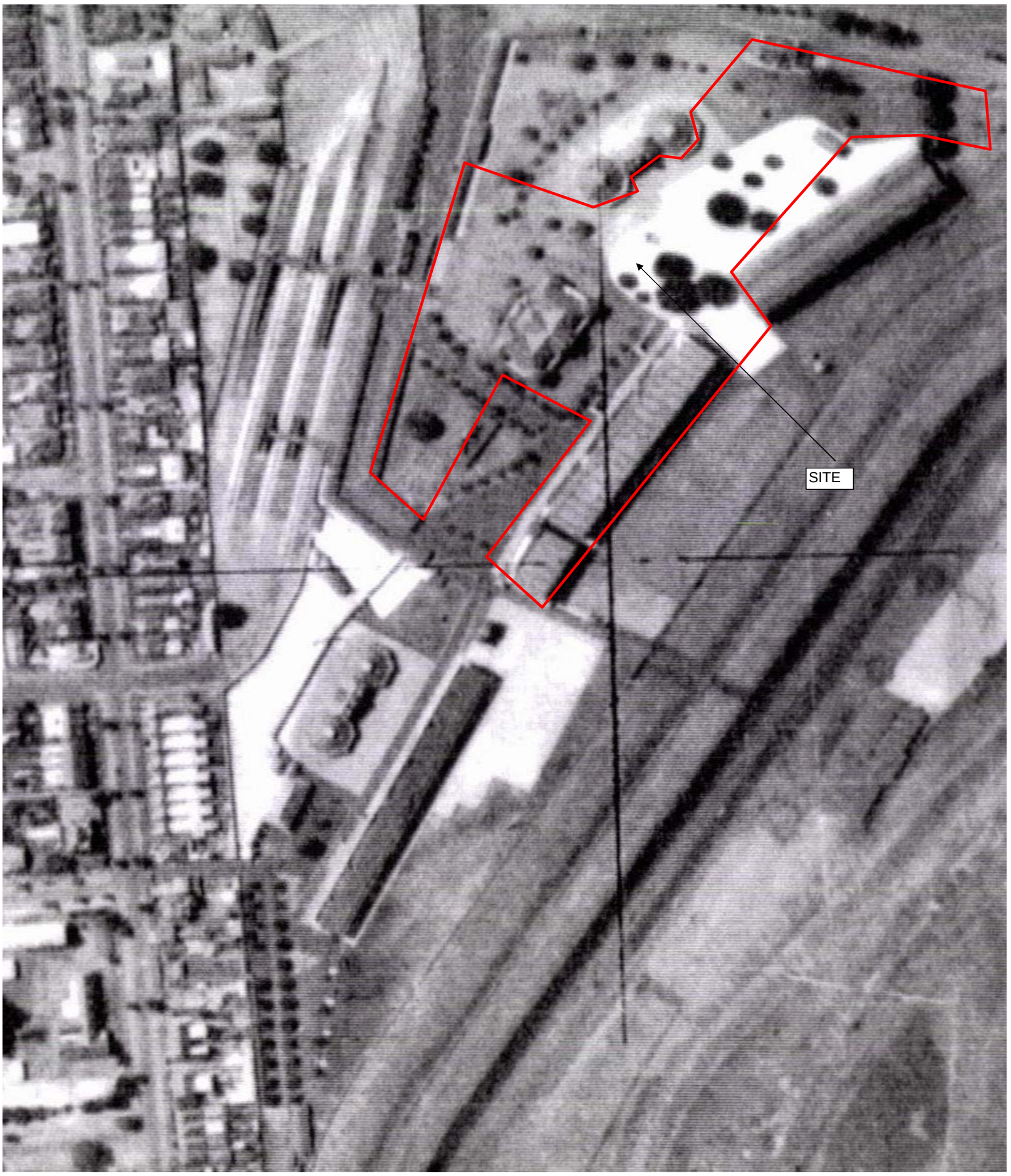
T15486 LEASE TO THE SYDNEY COUNTY COUNCIL OF SUBSTATION PREMISES No. 2919 (FIRST FLOOR LEVEL) TOGETHER WITH RIGHTS OF WAY AND EASEMENTS FOR ELECTRICITY PURPOSES OVER PART OF THE LAND WITHIN DESCRIBED AND IN CERTIFICATE OF TITLE Vol. 2816 Fol. 108. EXPIRES 31-12-1996. REGISTERED 9-7-1992

C.T. 2-9-80 S64531 Regd
C.T. 5,4-82
T15486 Lse
T584486 Lse
Z404960 Sub-Lse
E452870 Lse R
E597314 R

Z404960 LEASE TO THE SYDNEY COUNTY COUNCIL OF SUBSTATION PREMISES No. 6787 TOGETHER WITH A RIGHT OF WAY AND EASEMENT FOR ELECTRICITY PURPOSE OVER OTHER PARTS OF THE LAND ABOVE DESCRIBED AS SHOWN IN DP123678. EXPIRES 4-9-2013. REGISTERED 9-7-1992.

E452870 LEASE TO THE CHAIRMAN OF THE COMMITTEE OF THE AUSTRALIAN JOCKEY CLUB. EXCLUDING LAND IN RESUMPTION A372871. EXPIRES 30-6-2042. REGISTERED 9-7-1992

COMPUTER FOLIO NO FURTHER DEALINGS TO BE REGISTERED.

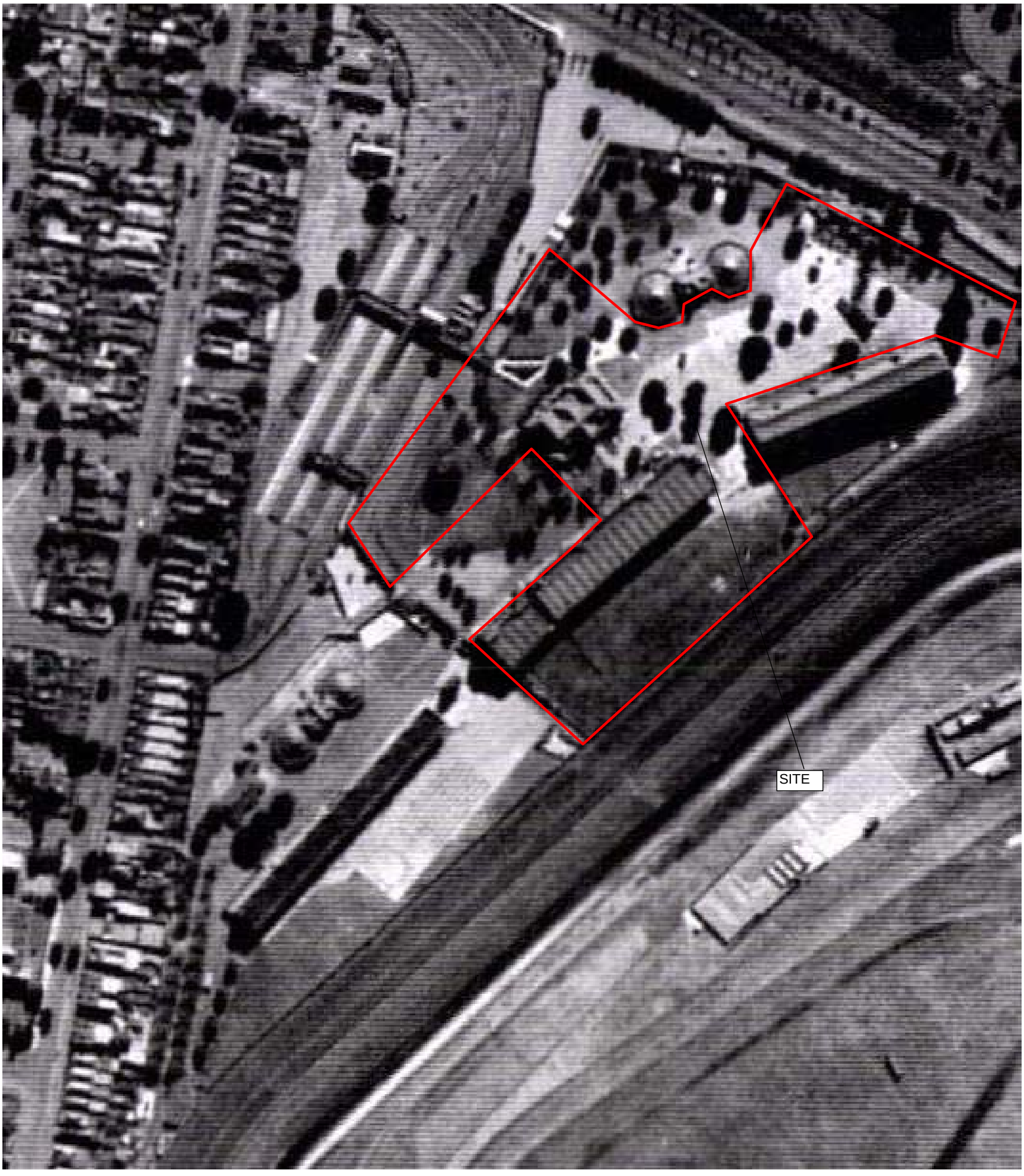


Preliminary Contamination, Salinity and Acid Sulphate Soil Assessment Spectator Precinct	**Project** **71976.01-1**	**September** **2010**	**Plate** **1** **1930 Image**

Douglas Partners
Geotechnics / Environment / Groundwater

Preliminary Contamination, Salinity and Acid Sulphate Soil Assessment Spectator Precinct	**Project** **71976.01-1**	**September** **2010**	**Plate** **2** **1943 Image**

Douglas Partners
Geotechnics | Environment | Groundwater



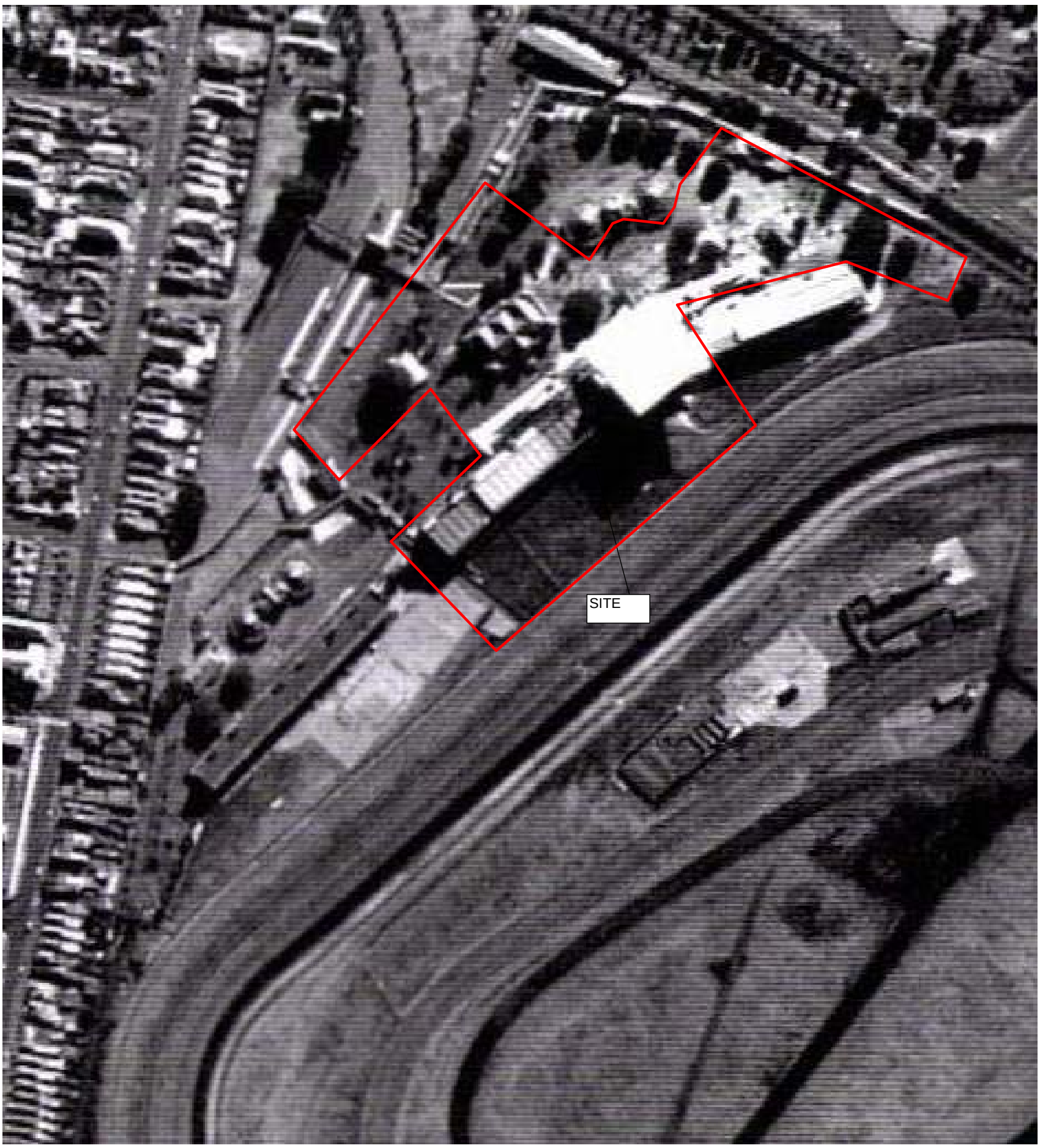
Preliminary Contamination, Salinity and Acid Sulphate Soil Assessment Spectator Precinct	**Project** **71976.01 -1**	**September** **2010**	**Plate** **3** **1951 Image**

Douglas Partners
Geotechnics / Environment / Groundwater

Preliminary Contamination, Salinity and Acid Sulphate Soil Assessment Spectator Precinct	**Project** **71976.01-1**	**S** **2009**	**Plate** **4** **1965 Image**

Douglas Partners
Geotechnics / Environment / Groundwater

N



Preliminary Contamination, Salinity and Acid Sulphate Soil Assessment Spectator Precinct	**Project** **71976.01-1**	**S** **2009**	**Plate** **5** **1970 Image**

Douglas Partners
Geotechnics / Environment / Groundwater

N

Preliminary Contamination, Salinity and Acid Sulphate Soil Assessment Spectator Precinct	**Project** **71976.01-1**	**September** **2010**	**Plate** **6** **1994 Image**

Douglas Partners
Geotechnics / Environment / Groundwater

Preliminary Contamination, Salinity and Acid Sulphate Soil Assessment Spectator Precinct	**Project** **71976.01-1**	**September** **2010**	**Plate** **7** **2000 Image**

Douglas Partners
Geotechnics / Environment / Groundwater

Preliminary Contamination, Salinity and Acid Sulphate Soil Assessment Spectator Precinct	**Project** **71976.01-1**	**September** **2010**	**Plate** **8** **2007 Image**

Douglas Partners
Geotechnics / Environment / Groundwater

Appendix C

WorkCover NSW Records

WORKCOVER
NEW SOUTH WALES

35/003022

ATF

67

Dangerous Goods Licensing
ph (02) 4321 5500 fax (02) 9287 5500

Attn: PAUL BARNES
Licensee: **AUSTRALIAN JOCKEY CLUB**
RANDWICK RACECOURSE, ALISON RD
RANDWICK NSW 2031

LICENCE FOR THE KEEPING OF DANGEROUS GOODS

ISSUED UNDER AND SUBJECT TO THE PROVISIONS OF THE DANGEROUS GOODS ACT, 1975 AND REGULATIONS THEREUNDER

Licence Number 35/003022 **Expiry Date** 1/01/2005 **No. of Depots** 4

Licensee Contact PAUL BARNES Ph. 9663 8465 Fax. 9662 4275

Premises Licensed to Keep Dangerous Goods RANDWICK RACECOURSE
AUSTRALIAN JOCKEY CLUB
ALISON RD RANDWICK 2031

Nature of Site SPORT

Major Supplier of Dangerous Goods UNKNOWN OR OTHER

Emergency Contact for this Site WATCHMEN Ph. 0419 223 660

Site staffing 9 HRS 5 DAYS

Details of Depots

Depot No.	Depot Type	Goods Stored in Depot	Qty
1	UNDERGROUND TANK	Class 3	12000 L
	UN 1203 PETROL		6000 L
2	UNDERGROUND TANK	Class 3	4500 L
	UN 1203 PETROL		2000 L
LPG1	CYLINDER STORE	Class 2.1	250 KG
	UN 1075 PETROLEUM GASES, LIQUEFIED		250 KG
LPG2	CYLINDER(S) IN USE	Class 2.1	450 KG
	UN 1075 PETROLEUM GASES, LIQUEFIED		450 KG

PLEASE RETAIN AS PROOF OF LICENCE
Issued by Workcover Authority of New South Wales on 8 April 2004

WorkCover. **Watching out for you.**

THE NEW SOUTH WALES GOVERNMENT
putting people first by managing better

SCIENTIFIC SERVICES BRANCH
PART A
- 3 DEC 1993
DANGEROUS GOODS

WorkCover Authority

LICENCE TO KEEP DANGEROUS GOODS

(Dangerous Goods Act 1975)

Existing licence, issue 8 c/2S c Davies 11 6 93

Application for new licence, amendment or transfer

EXPIRY : 3.1.95

1. Name of applicant — ACN
   AUSTRALIAN JOCKEY CLUB

2. Site to be licensed
   No | Street
   | ALISON RD (RANDWICK RACECOURSE)
   Suburb/Town | Postcode
   RANDWICK | 2031

3. Previous licence number (if known) 35 00030220

4. Nature of site RACECOURSE

5. Emergency contact on site:
   Phone | Name
   66385210184406 51 | ROD WILLIAMSON — WORKING HOURS; DUTY WATCHMAN — AFTER HOURS

6. Site staffing: Hours per day NINE | Days per week FIVE

7. Major supplier of dangerous goods SHORE PETROLEUM.

8. If new site or significant modification
   Plan stamped by: | Accredited consultant's name: | Date stamped

9. Number of dangerous goods depots at site ONE

10. Trading name or occupier's name
    AUSTRALIAN JOCKEY CLUB

11. Postal address of applicant | Suburb/Town | Postcode
    RANDWICK RACECOURSE - ALISON RD | RANDWICK | 2031

12. Contact for licence enquiries:
    Phone | Fax | Name
    6638521 | 662 2482 | ROD WILLIAMSON

I certify that the details contained in this application (or the accompanying computer disk) are true and correct.

13. Signature of applicant — Date 2/12/93

25 JAN 1994 RW

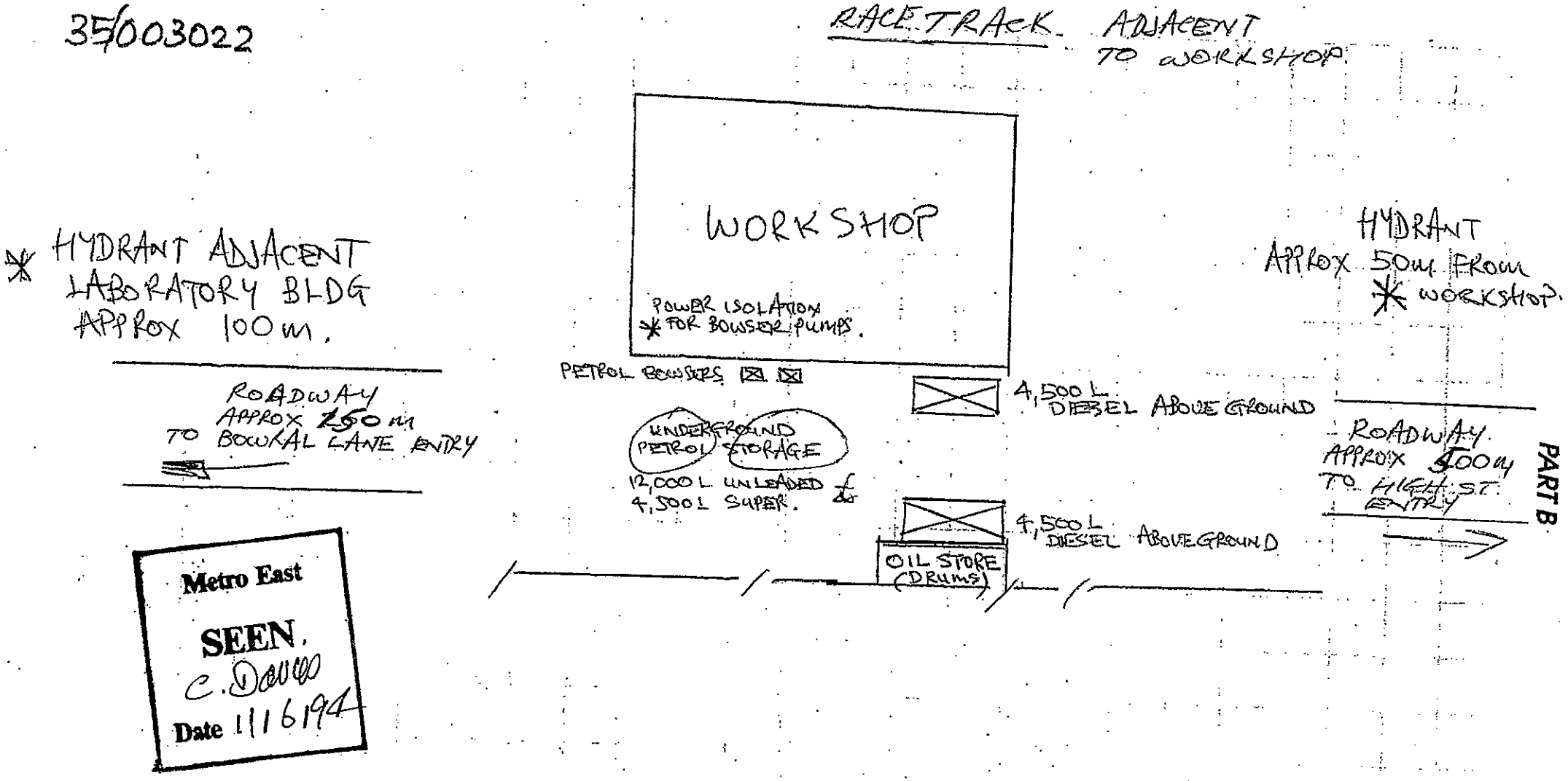
Please complete attached site sketch, depot listing and check sheet (if required) and return to WorkCover Authority in envelope provided.

Form DG1

Site Sketch

Please carefully read the instructions in Part B of the guide before sketching the site.

35/003022



PART C

CHEMICAL STORAGE

Complete 1 section per depot

35/003022

If you have more depots than the space provided, photocopy sufficient sheets first.

Depot number	Type of depot	Class	Licensed maximum storage capacity
1	MECHANICS WORKSHOP	3	15,000 L

UN number	Shipping name	Pkg Class	Group	EPG	Product or common name	Typical quantity	Unit
		3	II		PETROL	16,500	L
		3	III		DIESEL	9,000	L

Depot number	Type of depot	Class	Licensed maximum storage capacity
1	U/G TK	3	12000L

UN number	Shipping name	Pkg Class	Group	EPG	Product or common name	Typical quantity	Unit
1203	Petroleum	3	II	EPG	ULP	6000	L
	Product						

Depot number	Type of depot	Class	Licensed maximum storage capacity
2	U/G TK	3	4500L

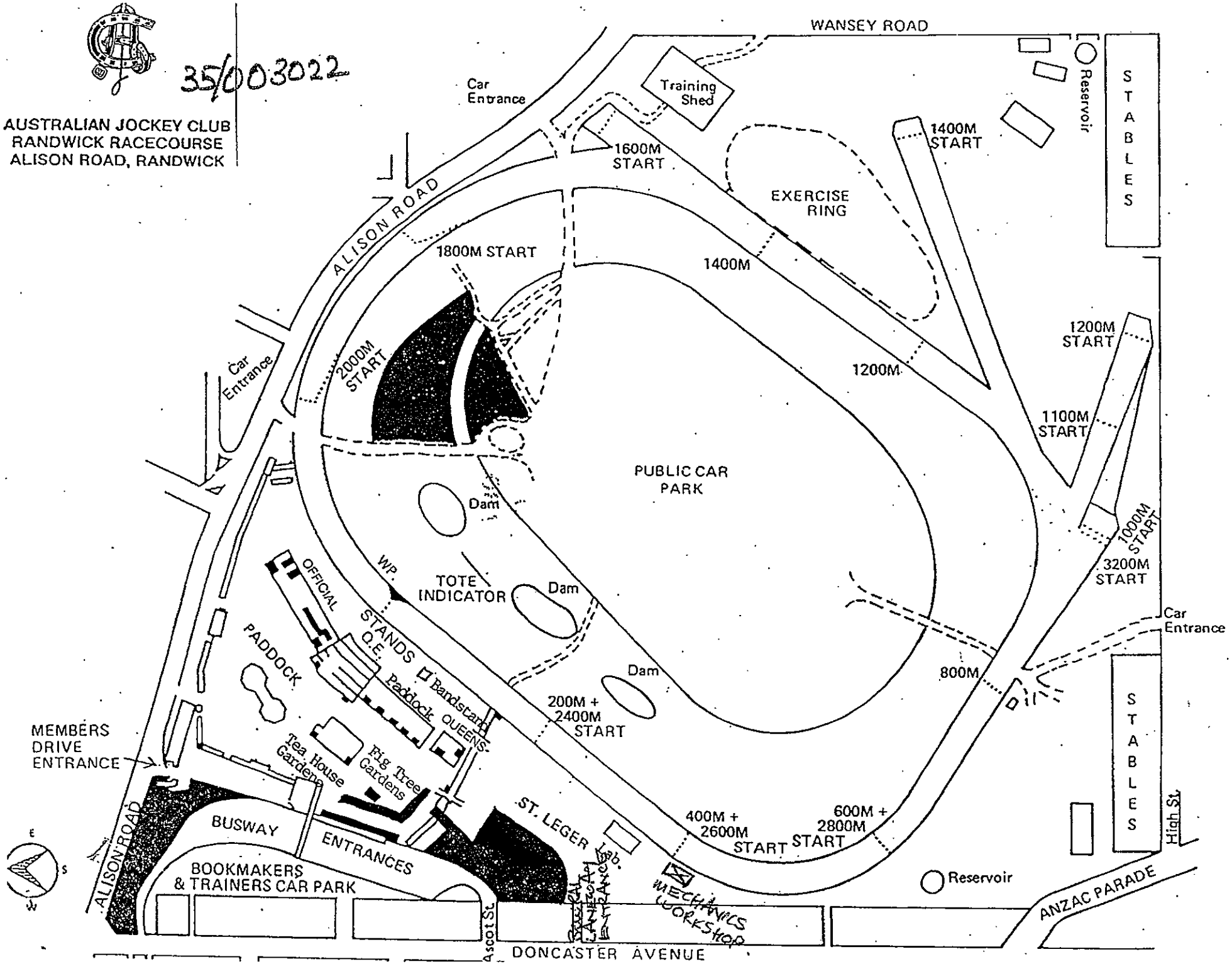
UN number	Shipping name	Pkg Class	Group	EPG	Product or common name	Typical quantity	Unit
1203	Petroleum	3	II	EPG	Super	2000	L
	Product						

Depot number	Type of depot	Class	Licensed maximum storage capacity

UN number	Shipping name	Pkg Class	Group	EPG	Product or common name	Typical quantity	Unit

35/003022

AUSTRALIAN JOCKEY CLUB
RANDWICK RACECOURSE
ALISON ROAD, RANDWICK



AMPOL PETROLEUM LIMITED

A.G.L. CENTRE,
111 PACIFIC HIGHWAY,
NORTH SYDNEY. 2060

BOX 4090, G.P.O., SYDNEY. 2001
TELEPHONE: 929-6222
CABLES: AMPOLCO

Date 24-8-77

JB/sj

The Superintendent,
Dangerous Goods Branch,
Explosives Department,
P.O. Box 846,
DARLINGHURST, N.S.W. 2010

Dear Sir,

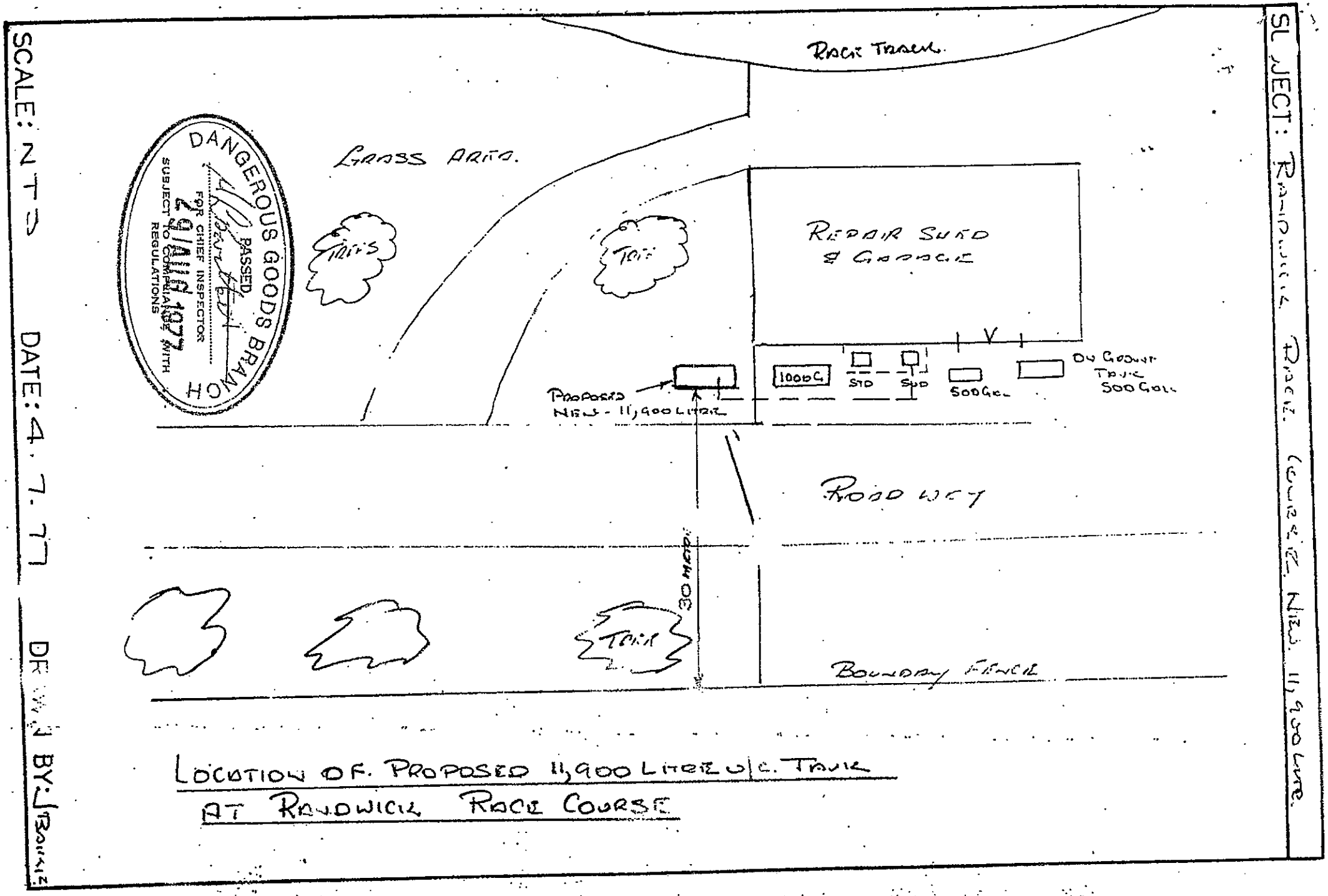
We wish to advise that we will be (installing) (~~removing~~)
11,900 (litre) (gallon) underground storage tank (s)
at the following location :-

RADWICK RACE COURSE
ALISON ROAD
RANDWICK

Yours faithfully,

J. BAIKIE
WORKS SUPERVISOR, N.S.W.

Contractor: BONANZA PTY LTD
31 SHANNON ST
LANE COVE



LOCATION OF PROPOSED 11,900 LITRE U/G TANK AT RANDWICK RACE COURSE

ORM B

INFLAMMABLE LIQUID ACT, 1915

LICENCE No. 03022 01

PPLICATION FOR: REGISTRATION OF PREMISES / STORE LICENCE / AMENDMENT TO REGISTRATION OR LICENCE } FOR THE KEEPING OF INFLAMMABLE LIQUID AND/OR DANGEROUS GOODS.

ame of Occupier	Australian Jockey Club (Surname) (First Names)
rading Name (if any)	
ostal Address	Postcode
ddress of the remises in which the epot or depots are tuated	Randwick Racecourse, Alison Road Randwick. Postcode 2031
ccupation	Horse Racing
ature of Premises	Racecourse.

articulars of construction of depots and maximum quantities of inflammable liquid and/or dangerous goods to be kept any one time.

~~PLEASE SKETCH SITE ON BACK OR ATTACH PLAN~~

Tank or Depot Number	Construction of depots *			Inflammable Liquid		Dangerous Goods						
	Walls	Roof	Floor	Mineral spirit litres	Mineral oil litres	Class 1 litres	Class 2 litres	Class 3 kg	Class 4 m^3	Class 5A# litres	Class 5B# litres	Class 9 litres
1	Underground Tank			12000								
2	✓	✓	✓	5000								
3	✓		✓	2500								
4												
5												
6												
7												
8												
9												
10												
TOTAL												

PUBLIC REVENUE
CASH 16.4.00 (A
(Date) 14/10/77
Receipt No. 460

* If kept in tanks describe depots as underground or aboveground tanks.

Insert water capacity of tanks or cylinders.

Name of Company supplying inflammable liquid Ampol

Have premises previously been licensed? Yes Licence No. 3022-1

If known, state name of previous occupier As above.

Signature of applicant X R. Paul Date 13/10/77

CERTIFICATE OF INSPECTION

I, Cul Williams (A. Marlow) being an Inspector under the Inflammable Liquid Act, 1915, do hereby certify that the premises or store described above does comply with the requirements of that Act and regulations with regard to its situation and construction for the keeping of inflammable liquid and/or dangerous goods in quantity and nature specified.

INFLAMMABLE LIQUID ACT, 1915 (AS AMENDED)

Applicatio for Registration of Premises or Store Licence under Division A. or for the transfer alteration or amendment of any such Registration or Licence, for the keeping of Inflammable Liquid and/or Dangerous Goods, in accordance with the provisions of the Inflammable Liquid Act, 1915 (as amended), for the ensuing year.

Amendment & Renewal C 3872
Increase in Storage.

DIRECTIONS

1. Applications must be forwarded to the Chief Inspector of Inflammable Liquid, Explosives Department, Box R.216, Royal Exchange Sydney, N.S.W. 2000 and must be accompanied by the prescribed fee, as set out hereunder:

Registration of Premises (Fee $3.00 p.a.) – For quantities not exceeding 300 gallons of mineral oil and 100 gallons of mineral spirit, if kept together; or 800 gallons of mineral oil and 100 gallons of mineral spirit, if kept separate depots; or 500 gallons of mineral spirit, if kept in an underground tank depot; or 800 gallons of mineral oil and 500 gallons of mineral spirit, if mineral spirit is kept in an underground tank depot.

In addition to, or in lieu of the above, similar quantities of Dangerous Goods of Classes 1 and 2 may be kept under the like conditions; reading Dangerous Goods of Class 1 for the words Mineral Spirit and Dangerous Goods of Class 2 for the words Mineral Oil.

Store License, Div. A (Fee, $6.50 p.a.) – For quantities in excess of those stated above, but not exceeding 4,000 gallons mineral oil and/or mineral spirit, and/or Dangerous Goods of Classes 1, 2 and 9.

Store License, Div. B (Fee, See Regulation 7) – For quantities exceeding 4,000 gallons of mineral spirit, and/or dangerous goods of Classes 1 and 2, and/or dangerous goods of Class 3.
For the keeping of Dangerous Goods of Classes 3 and/or 4. ($15.00 p.a.).

Fees for the keeping of inflammable liquid and dangerous goods in excess of the above stated quantities and also for Liquid Petroleum Gas storage are set out in Regulation 7.

AMPOL

1. Name of occupier including full christian names. AUSTRALIAN JOCKEY CLUB

2. Trading Name (if any)

3. Locality of the premises in which the depot or depots are situated
   No. or Name RANDWICK RACECOURSE
   Street ALISON ROAD
   Town RANDWICK

4. Postal address Postcode 2031

5. Occupation HORSE RACING

6. Nature of premises (dwelling, garage etc.) ENGINEER'S WORKSHOP

7. Particulars of construction of depots and maximum quantities of inflammable liquid and/or Dangerous Goods to be kept at any one time.

PLEASE ATTACH PLAN OF PREMISES

Depot No.	Construction of depots*			Inflammable liquid		Dangerous goods					
	Walls	Roof	Floor	Mineral spirit gallons	Mineral oil gallons	Class 1 gallons	Class 2 gallons	Class 3 lb	Class 4 cu ft	Class 5A water gal	Class 9 gallons
1	Underground Tanks			1000							
2				500							
3											
4											
5											
6											
7								PUBLIC REVENUE A/			
8								CHQ	$ 6.50		
9											8/1/7
10								(Date) Receipt No.			492

* If product is kept in tanks describe depots as underground or aboveground tanks.

Signature of applicant X
Assistant Manage

Date of application 5th Jan., 1971

CERTIFICATE OF INSPECTION

APPLICATION for Registration of Premises ~~or Store License under Division~~ for the keeping of Inflammable Liquid in accordance with the provisions of the Inflammable Liquid Act, 1915, for the year ending 30th June, 1932.

3022

DIRECTIONS.

1. Applications must be forwarded to the Chief Inspector of Inflammable Liquids, Explosives Department, Department of Mines, Bridge-street, Sydney, and must be accompanied by the statutory fee, as set out hereunder:—

REGISTRATION OF PREMISES (FEE 10s.).—For quantities not exceeding 300 gallons of oil and 100 gallons of spirit, if kept together; or 800 gallons of oil and 100 gallons of spirit, if kept in separate depots; or 500 gallons of spirit, if kept in an underground tank depot; or 800 gallons of oil and 500 gallons of spirit, if spirit is kept in an underground tank depot.

STORE LICENSE, DIV. A (FEE £1).—For quantities in excess of those stated above, but not exceeding 4,000 gallons mineral oil or mineral spirit.

STORE LICENSE, DIV. B (FEE £2).—For quantities exceeding 4,000 gallons.

23 MAR 1932

2. The certificate of inspection on back hereof must be signed by an Inspector under the Inflammable Liquid Act, 1915, or Police Officer, or other officer duly authorised in that behalf, and where the premises are situated outside the Metropolitan Area it is requested that such certificate be obtained prior to forwarding application.

1. Name in full of occupier	A. J. C.
2. Calling	Racing Club
3. Locality of the premises in which the depot or depots are situated	No. or Name Randwick Racecourse Street Allison Road Town Randwick
4. Description of premises ... Racecourse	(Underground Tank outside Gal. Iron and Wood Structure. Gal. Iron Roof.
5. Will mineral spirit (benzine, petrol, &c.) be kept in same depot with mineral oil (kerosene)?	Yes
6. Will mineral oil be completely surrounded by a screen (fireproof) wall?	Gal. Iron Building
7. Will mineral spirit be completely surrounded by a screen (fireproof) wall?	Underground Tank
8. Will mineral oil be kept in a prescribed underground tank depot?	No.
9. Will mineral spirit be kept in a prescribed underground tank depot?	Yes
10. Will mineral spirit in quantities exceeding 3 gallons be kept or used for any industrial purpose?	No.
	State nature of industry.

11. Particulars of construction of depots and quantities of inflammable liquid, &c., to be kept:—

Depot No.	Construction of Depots. Walls.	Roof.	Floor.	Maximum Quantities of Inflammable Liquid to be kept at any one time. Mineral Spirit, Gallons.	Mineral Oil, Gallons.	Nature and Quantity of Other Goods to be kept in Depot (in case of Licensed Store only).
1	Underground Tank	~~Iron~~		500	~~10 gals~~	Nil.
2						
3						
4						

9229

12. Schedule of distances separating depot or depots from protected works (*see* tables on other side):—

Protected Works.	Distance in Feet from Depot. No. 1 to contain not exceeding 500 gallons mineral spirit and 10 gallons mineral oil.	No. 2 to contain not exceeding ... gallons mineral spirit and ... gallons mineral oil.	No. 3 to contain not exceeding ... gallons mineral spirit and ... gallons mineral oil.	No. 4 to contain not exceeding ... gallons mineral spirit and ... gallons mineral oil.
23/3/32 2223				
Building in which any person dwells	200			
Building in which persons are accustomed to assemble for the purposes of public concourse, public religious worship, public entertainment or amusement, education or discussion	300			
Public Offices	500			
Stores (bonded or free, or bonded and free combined) ...	Nil			
Other warehouses	Nil			
Building in which persons are employed for the purpose of any trade or business, and which is not situate on the store	Nil			
Dock, wharf (including any quay, landing-place, landing-stage, jetty, pier, hulk, or other place at which goods are landed, loaded or unloaded), or timber yard,				

Buildings and places comprising the premises.

Storage Depot
Adjoins a Gal.Iron & Wood Structure
with a concrete floor and Gal.Iron roof
or removed from any other buildings
fences and well within our own premises,
he pump of the underground tank being
ixed in the said Gal.Iron building.

dimensions, including those of the pit or lower portion designed to prevent outflow.

Underground Tank

in the open

AUSTRALIAN JOCKEY CLUB.

Signature of Applicant Chas.H. Gopper Secretary

Date of Application 19.3.1932 Postal Address 6 Bligh Street Sydney

CERTIFICATE OF INSPECTION.

I, H.R. Shaw being an Inspector under the Inflammable Liquid Act, 1915, do hereby certify that the premises or store herein referred to and described is suitable with regard to its situation and construction for the safe keeping of inflammable liquid in quantity and nature specified.

Place Sydney Signature of Inspector H.R. Shaw

Date 23/3/32

TABLES SHOWING DISTANCES WHICH UNDER LICENSE MUST SEPARATE PROTECTED WORKS FROM DEPOTS.

TABLE I.—Where Mineral Spirit (with or without Mineral Oil) is to be kept :—

In an underground Tank Depot, in quantity exceeding 500 gallons, but not exceeding—	In an above-ground Tank Depot or other Depot wholly surrounded by a screen wall, in quantity exceeding 100 gallons, but not exceeding—	In an above-ground Tank Depot or other Depot not wholly surrounded by a screen wall in quantity exceeding 100 gallons, but not exceeding—	Distance not less than—
Gallons.	Gallons.	Gallons.	Feet.
2,000.	1,000	250	10
4,000	2,000	500	15
20,000	10,000	2,500	20
40,000	20,000	5,000	30
80,000	40,000	10,000	40
Unlimited.	80,000	20,000	50
	160,000	40,000	75
	Unlimited.	80,000	100
		Unlimited.	150

TABLE II.—Where Mineral Oil only is kept or to be kept :—

In an underground Tank Depot, in quantity exceeding 800 gallons, but not exceeding—	In an above-ground Tank Depot or other Depot wholly surrounded by a screen wall, in quantity exceeding 800 gallons, but not exceeding—	In an above-ground Tank Depot or other Depot not wholly surrounded by a screen wall in quantity exceeding 800 gallons, but not exceeding—	Distance not less than—
Gallons.	Gallons.	Gallons.	Feet.
4,000	2,000	1,000	10
8,000	4,000	2,000	15
40,000	20,000	10,000	20
80,000	40,000	20,000	30
160,000	80,000	40,000	40
Unlimited.	160,000	80,000	50
	Unlimited.	160,000	75
		Unlimited.	100

Provided that the distances shown above may be altered proportionately for intermediate quantities.

Provided, also, that the Chief Inspector may authorise a reduced distance in any case where the full distance above prescribed cannot be observed, but where the natural features of

Appendix D

Test Pit/Bore Logs

TEST PIT LOG

CLIENT: Australian Jockey Club
PROJECT: Contamination Assessment
LOCATION: Randwick Spectator Precinct, Randwick Racecourse, Randwick

SURFACE LEVEL: --
EASTING: 336165.3
NORTHING: 6246758.2
DIP/AZIMUTH: 90°/--

PIT No: TP101
PROJECT No: 71976.01
DATE: 23/8/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	TOPSOIL - brown silty sand with some rootlets and trace brick		D	0.0		PID = <1		
	0.4	SAND - grey sand		D	0.3 0.4		PID = <1		
	1				0.8				1
	1.2	SAND - brown coarse grained sand		D*	1.4		PID = <1		
	2.0	Pit discontinued at 2.0m - target depth reached			1.9				2
	3								3
	4								4
	5								5
	6								6
	7								7
	8								8
	9								9

RIG: Backhoe
LOGGED: NSA
SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Denotes field replicate sample BD1/230810 collected at 1.4-1.9m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Australian Jockey Club
PROJECT: Contamination Assessment
LOCATION: Randwick Spectator Precinct, Randwick Racecourse, Randwick

SURFACE LEVEL: --
EASTING: 336315.4
NORTHING: 6246803.5
DIP/AZIMUTH: 90°/--

PIT No: TP102
PROJECT No: 71976.01
DATE: 23/8/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	TOPSOIL - brown silty sand with some rootlets and trace gravel		A	0.0		PID = <1		
	0.3	FILLING - red mottled brown, sand filling with some gravel		A	0.3 0.4 0.8		PID = <2		
	1.0	SAND - grey sand		A*	1.1 1.5		PID = <2		
	1.7	SAND - brown mottled yellow sand		A	1.7 2.0		PID = <1		
	2.5	Pit discontinued at 2.5m - target depth reached							

RIG: Backhoe
LOGGED: NSA
SURVEY DATUM: MGA94 Zone 56

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Denotes field replicate sample BD2/23081 collected at 1.1-1.6m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Australian Jockey Club
PROJECT: Contamination Assessment
LOCATION: Randwick Spectator Precinct, Randwick Racecourse, Randwick

SURFACE LEVEL: --
EASTING: 336202.4
NORTHING: 6246788.8
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 71976.01
DATE: 20/8/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.1	PAVERS							
	0.3	ROADBASE		A	0.3		PID = <1		
	0.6	FILLING - brown silty sand filling (possibly natural)			0.5				
		SAND - yellow sand							
	1			A	1.0		PID = <1		
					1.5				
	2								
				A	2.5		PID = <1		
	3	3.0			3.0				
		Bore discontinued at 3.0m - target depth reached							
	4								
	5								
	6								
	7								
	8								
	9								

RIG: Bobcat
DRILLER: Steve Gregor
LOGGED: NSA
SURVEY DATUM: MGA94 Zone 56
TYPE OF BORING: Solid flight auger
CASING: Uncased
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Australian Jockey Club
PROJECT: Contamination Assessment
LOCATION: Randwick Spectator Precinct, Randwick Racecourse, Randwick

SURFACE LEVEL: 32.0 AHD
EASTING: 336223.1
NORTHING: 6246740.1
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 71976.01
DATE: 20/8/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
32	0.1	PAVERS							Gatic cover
	0.3	ROADBASE			0.3				
	0.6	FILLING - grey silty sand filling with trace silt		A*	0.6		PID = <1		Backfill
		FILLING - grey sand filling		A	0.7		PID = <1		
31	1				1.0				1
	1.1	SAND - grey to white sand		A	1.1		PID = <1		
					1.5				Bentonite
				A	1.6		PID = <1		
30	2				2.0				2
				A	2.1		PID = <2		
					2.5				
	2.6	SAND - brown peaty sand, moist		A	2.6		PID = <1		
29	3				3.0				3
	3.1	SAND - yellow sand, moist		A	3.1		PID = <1		
					3.5				
				A	3.6		PID = <1		Backfilled with gravel
28	4				4.0				4
				A	4.1		PID = <2		Machine slotted PVC screen
					4.5				
				A	4.6		PID = <2		
27	5				5.0				5
		- saturated at 5.3m		A	5.1		PID = <1	▼	
					5.5				
				A	5.6		PID = <1		End cap
26	6				6.0				6
	7.5	Bore discontinued at 7.5m - target depth reached							
25	7								7
24	8								8
23	9								9

RIG: Bobcat
DRILLER: Steve Gregor
LOGGED: NSA
SURVEY DATUM: MGA94 Zone 56
TYPE OF BORING: Solid flight auger
CASING: Uncased
WATER OBSERVATIONS: Saturated at 5.3m
REMARKS: *Denotes field replicate sample BD1/200810 collected at 0.3-0.6m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Australian Jockey Club
PROJECT: Contamination Assessment
LOCATION: Randwick Spectator Precinct, Randwick Racecourse, Randwick

SURFACE LEVEL: --
EASTING: 336332.1
NORTHING: 6246761.3
DIP/AZIMUTH: 90°/--

BORE No: BH3
PROJECT No: 71976.01
DATE: 20/8/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.1	BITUMEN							
	0.3	ROADBASE							
		FILLING - dark brown, silty sand filling with trace gravel		A	0.3		PID = <1		
	0.8				0.6				
		SAND - grey coarse grained sand			0.9				
	1			A			PID = <1		1
					1.4				
	1.7	SAND - brown mottled yellow sand							
	2								2
					2.5				
				A			PID = <1		
	3	3.0			3.0				3
		Bore discontinued at 3.0m - target depth reached							
	4								4
	5								5
	6								6
	7								7
	8								8
	9								9

RIG: Bobcat
DRILLER: Steve Gregor
LOGGED: NSA
SURVEY DATUM: MGA94 Zone 56
TYPE OF BORING: Solid flight auger
CASING: Uncased
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: Australian Jockey Club
PROJECT: Contamination Assessment
LOCATION: Randwick Spectator Precinct, Randwick Racecourse, Randwick

SURFACE LEVEL: --
EASTING: 336371.6
NORTHING: 6246784.1
DIP/AZIMUTH: 90°/--

BORE No: BH4
PROJECT No: 71976.01
DATE: 20/8/2010
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.1	BITUMEN							
		ROADBASE							
	0.4	FILLING - brown silty sand filling with trace gravel		A	0.4 0.6		PID = <1		
	0.8	SAND - white sand		A	1.0 1.5		PID = <2		
	1.6	SAND - coffee brown sand		A	1.8 2.3		PID = <1		
	2.4	SAND - light brown to yellow sand		A	2.5		PID = <2		
	3.0	Bore discontinued at 3.0m - target depth reached			3.0				

RIG: Bobcat
DRILLER: Steve Gregor
LOGGED: NSA
SURVEY DATUM: MGA94 Zone 56
TYPE OF BORING: Solid flight auger
CASING: Uncased
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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