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28 October 2011

Dear Murray

Royal Randwick Racecourse  
 Spectator Precinct - DGR Report- 0002Utilities Infrastructure\_Issue 2

As part of the Spectator Precinct 75w planning process Arup have been asked to review the current architectural documents listed below and advise the impacts to the recommendations made within the above DGR report.

The buildings form essentially remains the same although it has shortened a little.

Title	Number	Rev
Existing Roof Plan	DA-05	B
Proposed Roof Plan	DA-06	B
Proposed Site Plan	DA-07	B
Proposed Site Elevations	DA-08	B
Previous DOP Scheme Overlay	DA-09	B
Grandstand Basement 1	DA-10	B
Grandstand Ground	DA-11	B
Grandstand Level 1	DA-12	B
Grandstand Level 2	DA-13	B
Grandstand Level 3	DA-14	B
Grandstand Level 4	DA-15	B
Grandstand Level 5	DA-16	B
Grandstand Level 6	DA-17	B
Grandstand Level Plant	DA-18	B
Grandstand Level Roof	DA-19	B
QEII Section A-A (Existing)	DA-20	B
QEII Section A-A (Demolition)	DA-21	B
QEII Section A-A (Proposed)	DA-22	B
Paddock Sect B-B & Link Sect C-C	DA-23	B
Elevation NW-SE	DA-24	B
Elevation SW-NE	DA-25	B

Parade Ring Ground	DA-30	B
Parade Ring Level 1	DA-31	B
Section A-A & B-B	DA-32	B
Section C-C & D-D & E-E	DA-33	B
View Analysis – V2	DA-52	B
View Analysis – V3	DA-53	B
View Analysis – V4	DA-54	B
View Analysis – V6	DA-56	B
View Analysis – V7	DA-57	B
View Analysis – V8	DA-58	B
Cut & Fill Plan	DA-60	B

Having reviewed the above documents we confirm that the new building configuration does not alter the recommendations made within the original DGR report and no amendments are required to the report.

Yours sincerely



Nicholas Howard  
Senior Associate

Australian Jockey Club  
**Spectator Precinct**  
Utilities and Infrastructure Report

220759

Issue 2 | September 2010

Arup  
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This report takes into account the particular instructions and requirements of our client.




It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 220759

**ARUP**

# Document Verification

# ARUP

<b>Job title</b>		Spectator Precinct		<b>Job number</b>		220759	
<b>Document title</b>		Utilities and Infrastructure Report		<b>File reference</b>			
<b>Document ref</b>		220759					
<b>Revision</b>	<b>Date</b>	<b>Filename</b>	0001Utilities Infrastucture.docx				
Draft 1	23/08/10	<b>Description</b>	First draft				
			Prepared by	Checked by	Approved by		
		Name	NL / TR	NH	NH		
		Signature					
Issue 1	17/09/10	<b>Filename</b>	0002Utilities Infrastucture_Issue 1.docx				
		<b>Description</b>	Issue 1				
			Prepared by	Checked by	Approved by		
		Name	NL	NH	NH		
		Signature					
Issue 2	22/09/10	<b>Filename</b>	0002Utilities Infrastucture_Issue 2.docx				
		<b>Description</b>	Issue 2				
			Prepared by	Checked by	Approved by		
		Name	NL	NH	NH		
		Signature					
		<b>Filename</b>					
		<b>Description</b>					
			Prepared by	Checked by	Approved by		
		Name					
		Signature					

Issue Document Verification with Document



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# 1 Executive Summary

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This report has been produced in response to the Director Generals Part 3A Planning requirements MP 10-0097 for the redevelopment of the Spectator Precinct located on the Western side of the Royal Randwick Racecourse property.

It addresses Utilities infrastructure across the Spectator Precinct and specifically responds to the following DGR's:

## ***DGR-12– Utilities and Infrastructure***

- *In consultation with relevant agencies, address the existing capacity and requirements of the development for the provision of utilities including staging of infrastructure works.*
- *The EA shall demonstrate the proposals of work with the stage 1 infrastructure works approved under Major Project Application MP07\_0092 and any variations / inconsistencies are to be fully identified*

The report addresses the following issues in detail:

- The extent and capacity of the statutory infrastructure in the vicinity of the new development,
- The impact of the new building footprints on the routes of the existing infrastructure assets,
- The potential loads the development will have on the existing infrastructure,
- The implications of the relocation, realignment or augmentation of the affected services,
- The existence of easements, and
- The benefits for inclusion of rainwater / bore harvesting

The report's findings indicate that there is a high voltage electrical easement transversing the precinct and a mixture of local water and drainage services which will require alteration to allow the new buildings to be constructed.

Initial discussions with Energy Australia have indicated that adjustments to the easement would be possible.

## Conclusion

In conclusion the new precinct loads have been analysed and the local water and drainage infrastructure requires modest adjustments to satisfy the new requirements of demands and building footprints. The report recommends upgrades to the high voltage infrastructure serving the site from the local zone sub-station.

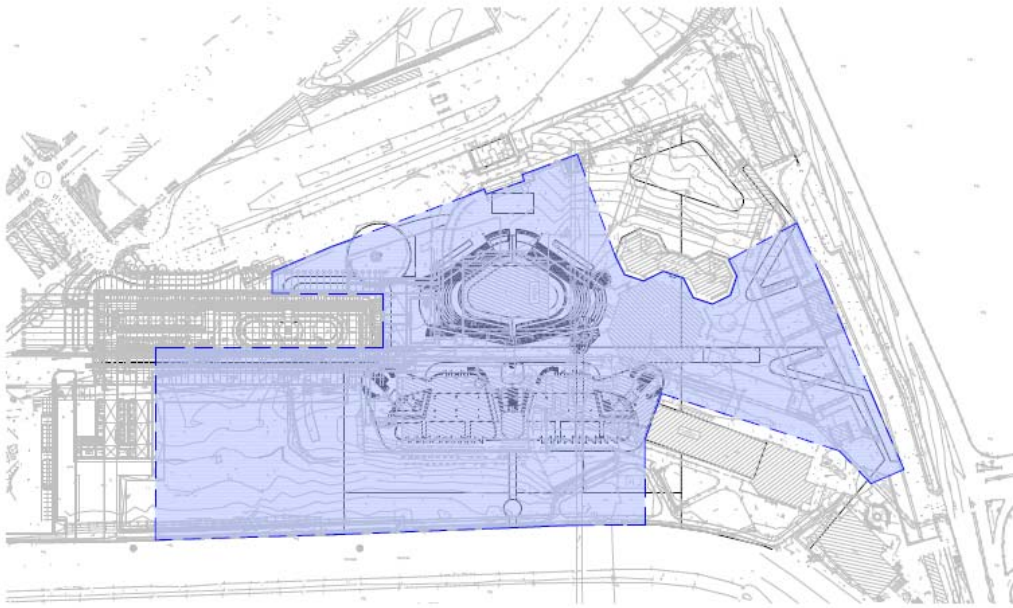
## 2 Introduction

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The redevelopment of the existing Spectator Precinct will see refurbishment of the existing Queen Elizabeth II Grandstand and construction of a new Paddock Grandstand including basement levels, a new parade ring and spectator amenities such as Kiosks and landscaped areas.

This report assesses the impacts of the latest development planning layout on the existing utilities within the proposed site redevelopment boundaries.

The site overlay below shows the spectator precincts location on site near the intersection of Alison road and Doncaster Avenue.



## 3 Potable Water

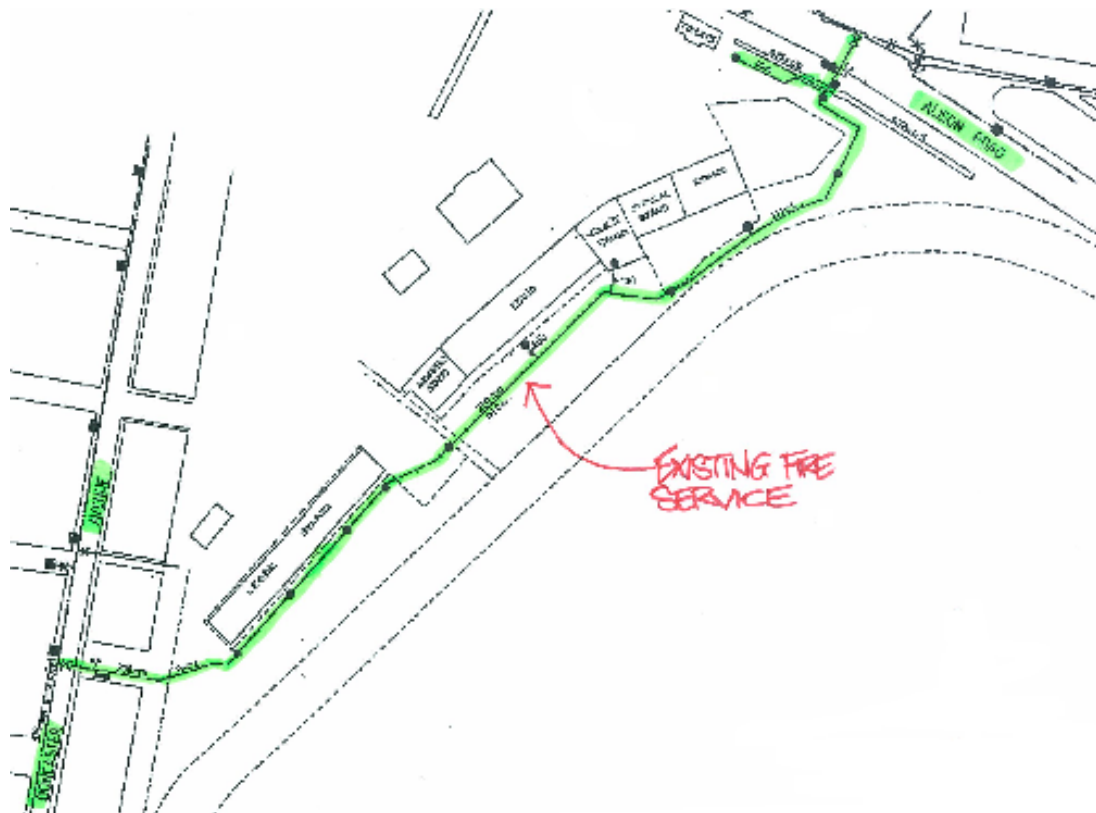
### 3.1.1 Existing Configuration

The North Western corner of the Racecourse property is located on the intersection of Alison Road and Doncaster Avenue. Alison road contains a single  $\varnothing 150\text{mm}$  cast iron cement lined (CICL) water main currently servicing street hydrants, the site and the residential houses located to the East side of Darley Road. It is proposed that this main will be used to service the precincts domestic and fire requirements.

A pressure and flow enquiry for the  $\varnothing 150\text{mm}$  water main within Alison road lodged with Sydney Water confirms the availability of 20L/s flow with a residual mains pressure of 470kPA (refer to Appendix A).

Doncaster Avenue provides two street intersections / access roads adjoining the racecourse property to existing site entries. Ascot Street contains an existing  $\varnothing 150\text{mm}$  cast iron cement lined (CICL) water main capped off in line with the last residential house prior to the entry gate of the car park. Opposite Bowral Street is a non-vehicular laneway which also has an existing  $\varnothing 150\text{mm}$  cast iron cement lined (CICL) water main extending within the Racecourse property.

The properties Fire service supply as indicated in the below diagram is linked with the water main within the laneway opposite Bowral Street and the water main within Alison Road. Both are provided with fire brigade booster assemblies at the boundary.



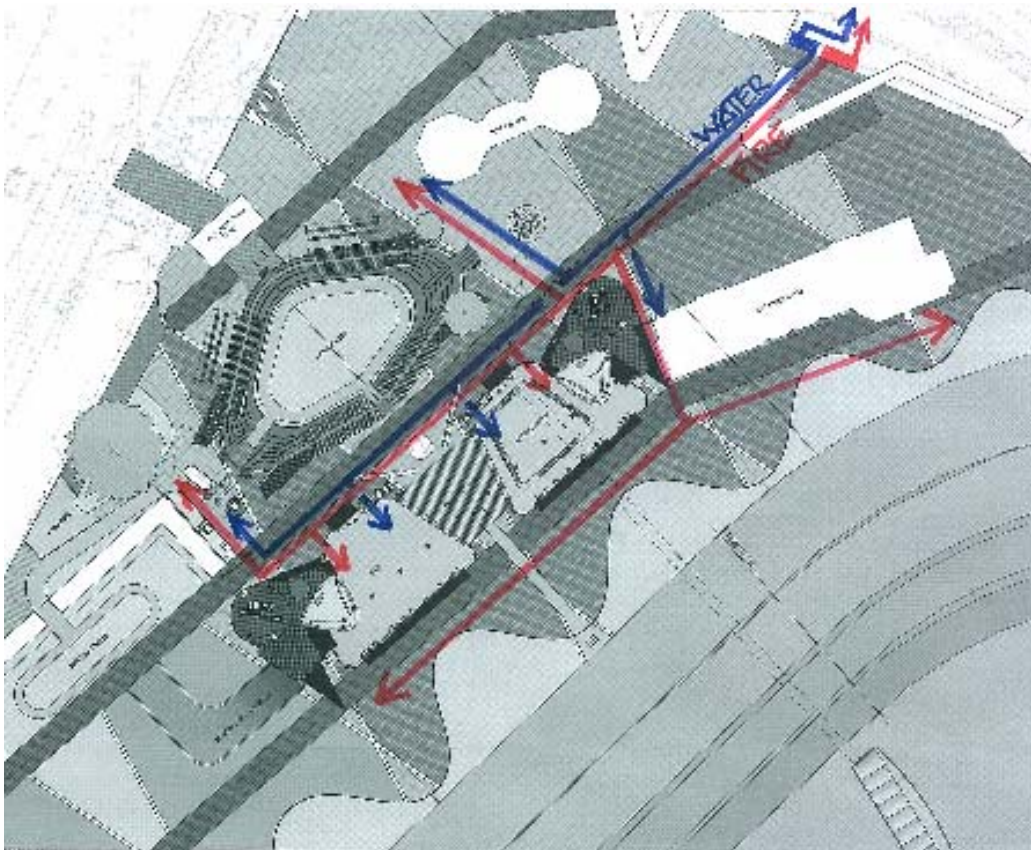
### 3.1.2 Required Alterations

It is envisaged at this stage that no water mains amplification works will be required to the utility mains external to the spectator precinct.

### 3.1.3 Design Proposal

Domestic Potable water usage for the precinct is estimated to be x l/s for potable and 20l/s for fire fighting purposes. A pressure and flow enquiry on the existing  $\varnothing 150\text{mm}$  water main within Alison Road has been lodged with Sydney Water and Arup are currently awaiting the results although it is envisaged to have adequate flow and pressure characteristics for both the domestic and fire fighting requirements of the precinct.

The following image is an indicative services arrangement for the site.



## 4 Gas Supply

### 4.1.1 Existing Configuration

The section of Alison Road between Doncaster Avenue and Darley Road contains a single  $\varnothing 450\text{mm}$  cast iron 7kPa natural gas main. This gas main has been separated from the 210kPa reticulation main at Darley Road. Doncaster Avenue contains a mix of 2kPa and 7kPa mains.

A Connection exists at Ascot Street that extends a 2kPa connection into the racecourse property, it is assumed to provide natural gas at 2kPa to the site.

### 4.1.2 Required Alterations

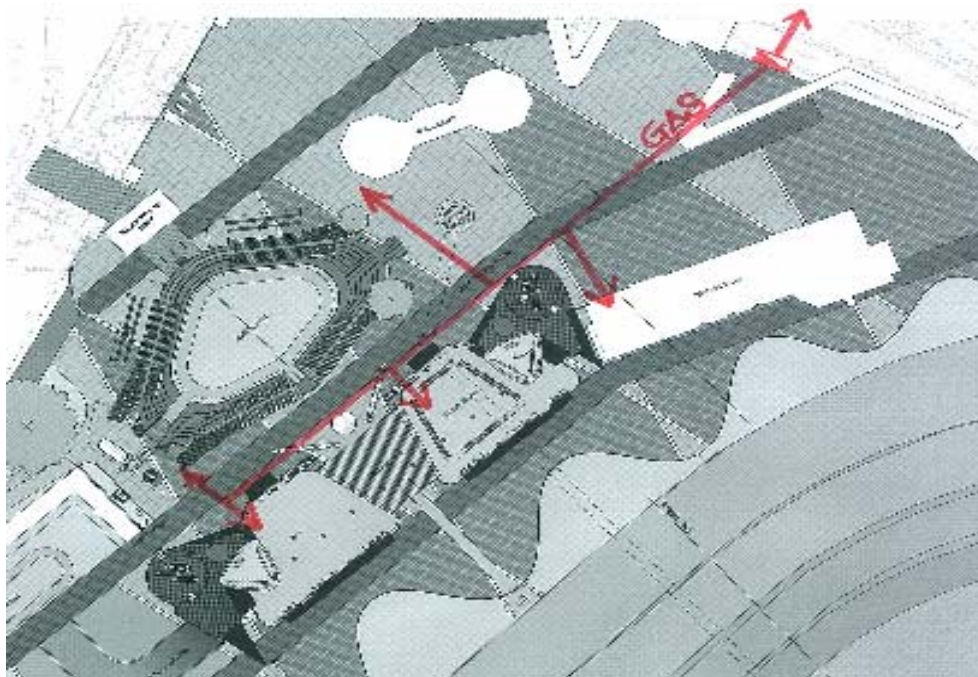
It is envisaged at this stage that no gas main amplification works will be required to the utility mains external to the spectator precinct.

### 4.1.3 Design Proposal

It is proposed to locate a new natural gas connection for this precinct at the Alison Road main entry gates for consistency with other services and to minimise additional required road openings.

Natural gas usage is estimated to be 4 Gigajoules per hour within the precinct to service hot water requirements and commercial kitchen appliances. It is anticipated that this load will be able to be served from the existing utility infrastructure.

The following diagram is an indicative service arrangement for the precinct.



## 5 Stormwater

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### 5.1.1 Existing Configuration

Documents of existing storm water services supplied by Randwick Council and the land surveyor indicate the existence of a major storm water drainage asset transversing the property outside of the precinct redevelopment boundary, discharging from the centennial parklands ponds and entering the property adjacent to the Alison Road and Doncaster Avenue intersection, continuing in a south-westerly direction and exiting the site through a residential property to Doncaster Avenue.

The Webb, McKeown and Associates (WMA) ‘Royal Randwick Racecourse – Stormwater Management Plan’ (RRR-SMP) notes that the storm water drainage provisions within the Spectator Precinct have been previously re-routed during the infill works to the ornamental ponds. Stormwater drainage now bypasses these ponds and drains to the inner and outer storm water detention / infiltration basins located in the south-west corner of the property, overflowing through a ø600mm pipe to the Council drainage network within Anzac Parade.

Refer to Appendix A, Webb, McKeown and Associates (WMA) ‘Royal Randwick Racecourse – Stormwater Management Plan Figure 2

### 5.1.2 Required Alterations

The impervious area of the precinct remains unchanged and no alteration to the existing council stormwater infrastructure is envisaged as being required. The development in terms of runoff, detention and infiltration remains as it is currently with no reconfiguration required.

The Spectator Precinct works will however require local adjustment to the existing internal site storm water drainage system to coordinate with the proposed basement level, parade ring, underground horse tunnels and Pedestrian Boulevard to maintain existing drainage routes to site detention / infiltration basins.

### 5.1.3 Design Proposal

The existing site stormwater system will be reconfigured and rerouted to allow the construction of the new below grade basements, Parade Ring, public areas and link tunnels.

Storm water will be collected via a series of grated inlet pits and discharged to the existing inground storm water drainage network discharging to the existing infield basins for detention and infiltration.

Roofed areas will contribute to rainwater harvesting systems. The exact detail of these systems are to be finalised however these will utilise a mixture of tanks, ponds and borehole extraction as a means of providing water for low grade uses such as wash down, cooling, toilet flushing and irrigation etc.

Existing downpipes where appropriate shall be redirected to the new below ground rainwater storage tank for re-use purposes.

A debris filter and first flush water diverter installed prior to the tank eliminates pollution into the tank and diverts the first flow of roof water carrying dust and debris to the inground storm water drainage system for treatment prior to discharging into the on-site detention basins. All openings into the tank will be protected from mosquitoes and insects by means of stainless steel mesh over tank openings with an aperture size of less than 1mm<sup>2</sup>.

In order to provide adequate pressure to operate toilet cisterns, taps and end usage points, a pressure pump will be required to deliver the desired flow rates. The pump system will be a high efficiency motor type. The pump will be mounted adjacent to each storage tank as required.

A low level alarm in the tank will be provided to enable an automatic domestic water switch over to continue supplying water to required points of usage. An alternative to domestic water would be to supplement this feature with bore water.

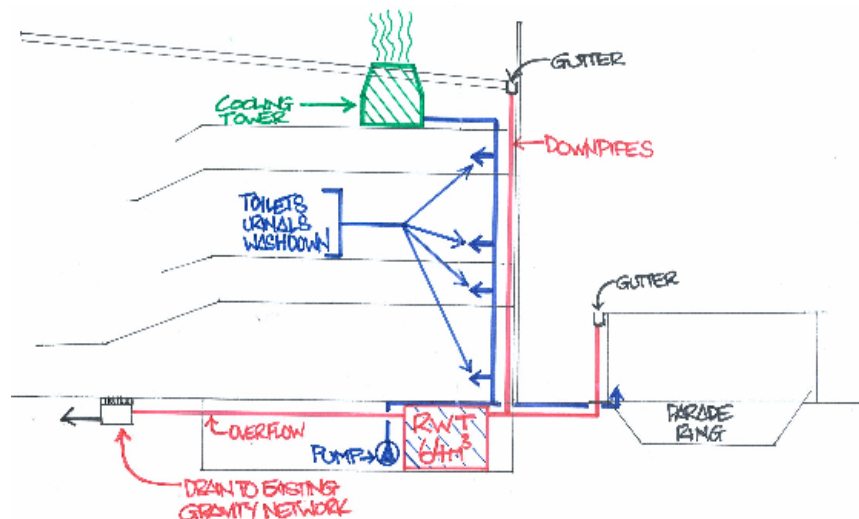
#### 5.1.4 Sustainability Initiatives

Collected rainwater and harvested bore water will be used for:

- WC flushing and;
- Hose tap wash down (internal/external)
- Irrigation requirements surrounding the redeveloped precinct
- Cooling systems

Water conservation measures to be incorporated include:

- WELS 4 star rated fixtures or higher where appropriate
- Dual flush toilets
- Bore Water usage where appropriate
- Rainwater storage / re-use tanks



## 6 Sewer

### 6.1.1 Existing Configuration

Documents of existing sewer mains supplied by Sydney Water through the DBYD service indicate the existence of a  $\varnothing 225\text{mm}$  sewer drainage Side line constructed of mixed materials such as Vitrified Clay (VC) and Cast Iron Cement Lined (CICL) transversing the site in parallel with the High Voltage easement, crossing the site immediately to the west face of the Grandstands continuing in a south-westerly direction and exiting the Property through the non-vehicular laneway opposite Bowral Street to Doncaster Avenue.

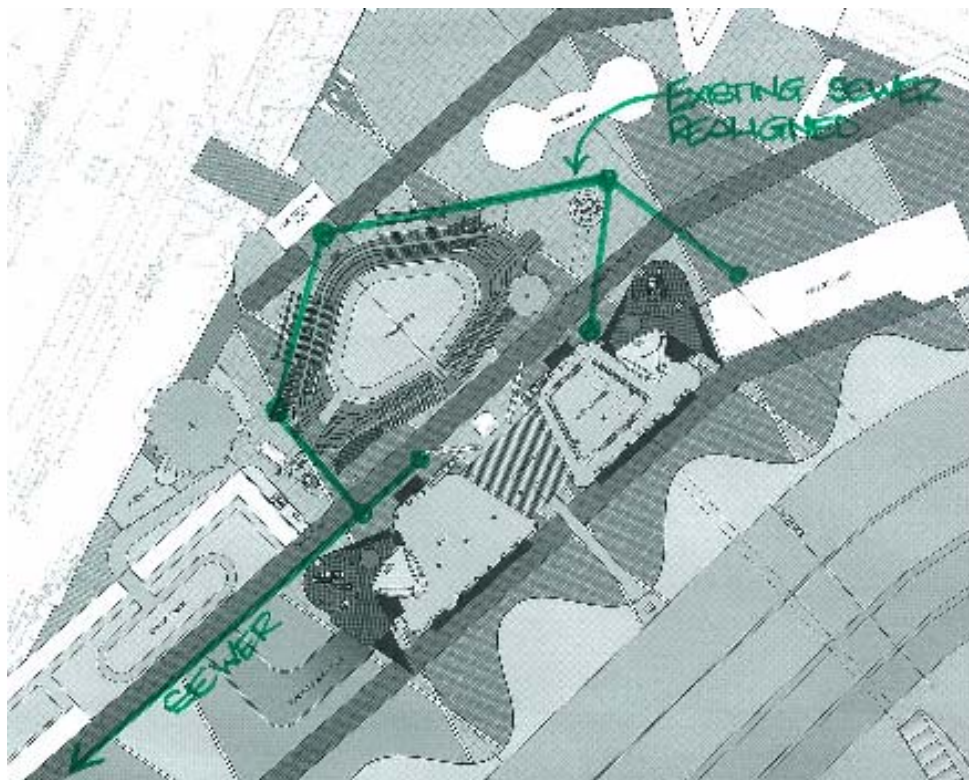
### 6.1.2 Required Alterations

Although no mains amplifications are envisaged the extent of proposed Spectator precinct works will require local adjustment of the sewer sideline and redirection / realignments where the proposed basement and underground horse tunnels linking the parade ring to the race track clash with the existing service.

### 6.1.3 Design Proposal

The design proposal for the sanitary drainage system will maintain existing services to minimise ground works. Gravity connections will be utilised to service any new drainage requirements wherever practicable, below grade services within the basement level may require pump out provisions.

The following image is an indicative plan of proposed services routes.



## 7 Electricity Supply

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### 7.1.1 Power supply to the site

The calculated electrical maximum demand for the Spectator Precinct Stage 1 is 5MVA. In addition to the existing site demand, an additional 2.5MVA power supply is required to the site to cater for the proposed re-development of the existing buildings.

Energy Australia has confirmed that an additional 11kV High Voltage feeder will need to be brought into the site to supply the proposed developments.

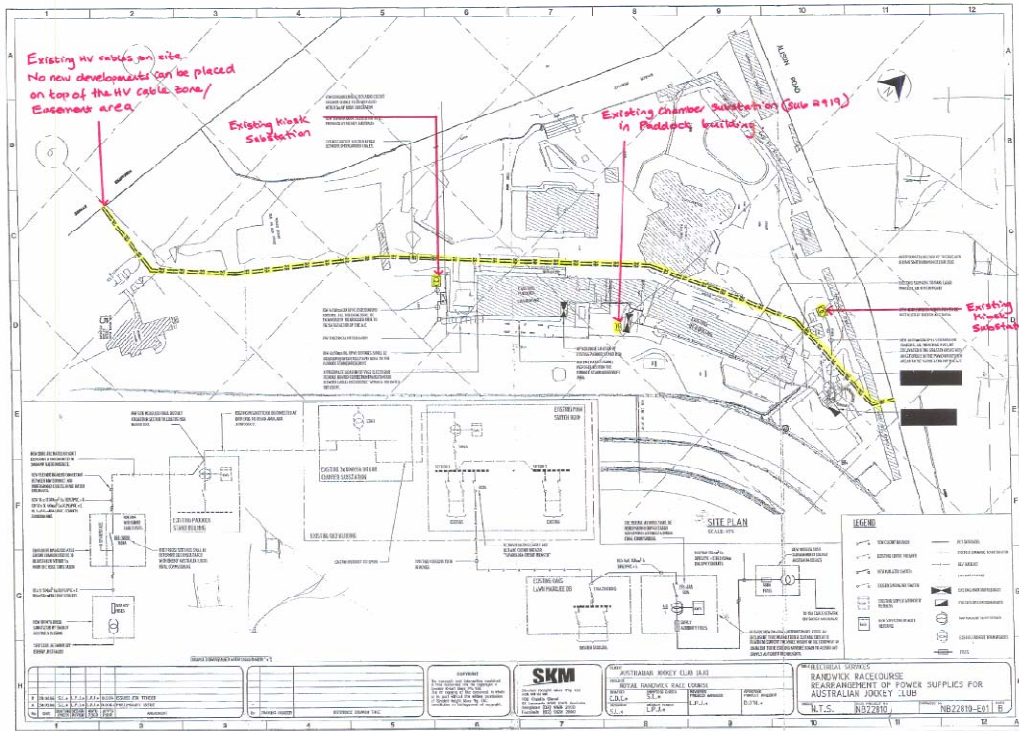
A new chamber substation will be established within one of the buildings to cater for the new site loads.

### 7.1.2 Existing High Voltage distribution on site

The site is served from two Energy Australia zone substations, where the electrical infrastructure within the development is distributed around the site via high voltage underground cables originating from the Energy Australia zone substations.

There are a number of existing substations located on site. These consist of an existing three chamber substation (sub 2919) comprising of 3 x 1000kVA transformers located within the QE 2 Building. There are also an additional three x 1000kVA kiosk substations on site.

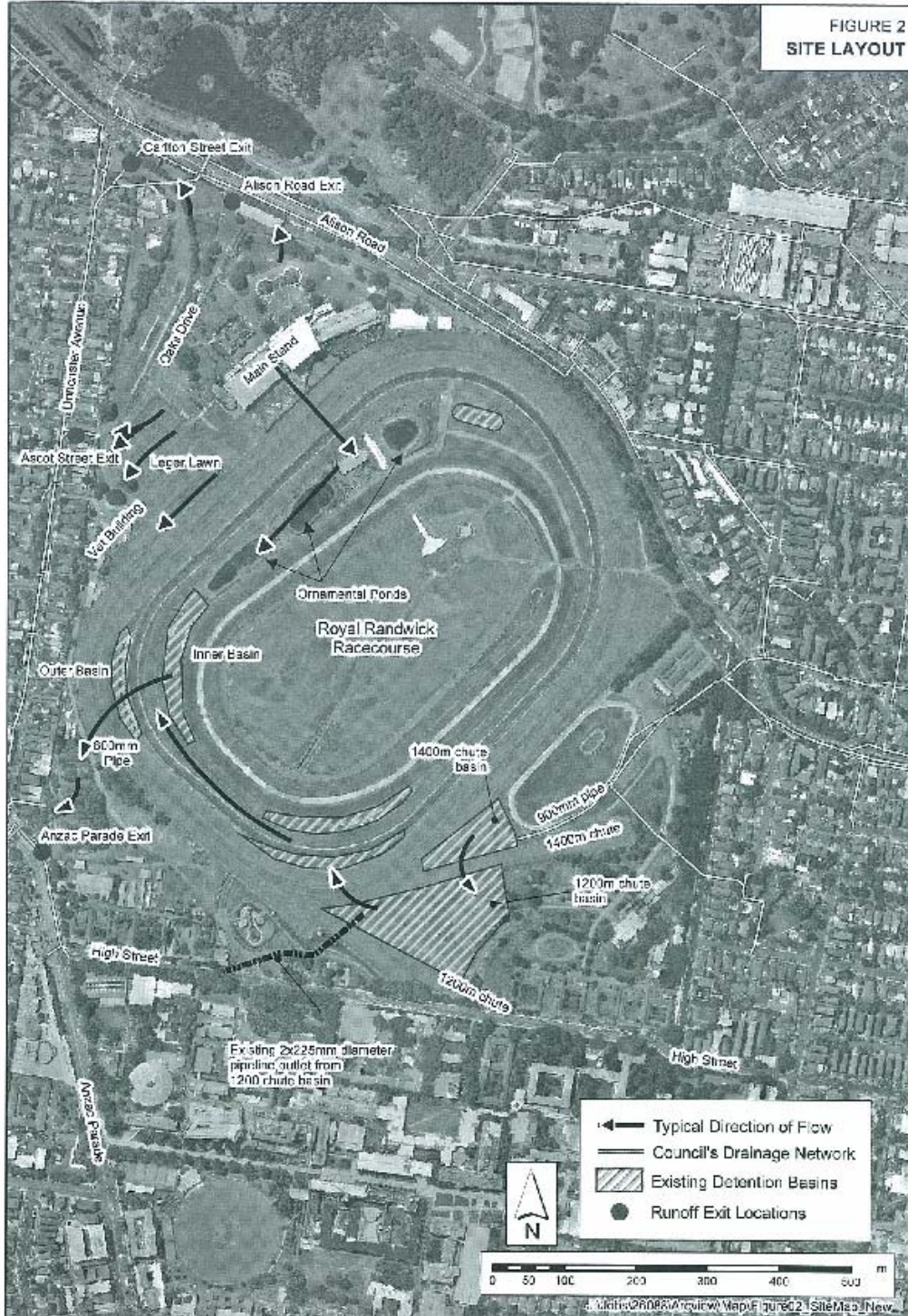
A summary of the existing high voltage cabling and substations within the site is summarised in figure 1.



*Existing high voltage cabling and existing substations within the development*

It is important to note that new developments cannot be established over the existing HV cable zones and associated easements. If any of the existing high voltage cables needs to be relocated to suit the new developments, this will be agreed with Energy Australia.

# 8 Appendix A – WMA RRR-SMP Figure 2



# 9 Appendix B – Pressure Enquiry

## Sydney Statement of Available Pressure and Flow **WATER**

**Arup**  
Level 10, 201 Kent St  
Millers Point, 2000

WMS No: **93286**  
Contact No: 8849-3531  
Fax No: 8849-3111

Attention: **Pedro Afonso**

Date: 07/09/2010

**Pressure & Flow Application Number: 2957179**  
**Your Pressure Inquiry Dated: Wed August 25 2010**  
**Property Address: Randwick Racecourse Alison Rd Randwick 2031**

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

**ASSUMED CONNECTION DETAILS**

Street Name: Alison Rd	Side of Street: West
Distance & Direction from Nearest Cross Street	100 metres North from Wansley Rd
Approximate Ground Level (AHD):	44 metres
Nominal Size of Water Main (DN):	150 mm

**EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT**

<b>Normal Supply Conditions</b>	
Maximum Pressure	66 metre head
Minimum Pressure	46 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	46
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	10	51
	15	49
	20	47
	24	45
	30	41
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	10	42
	15	40
	20	37
	24	35
	30	31
Maximum Permissible Flow	35	26

(Please refer to reverse side for Notes)

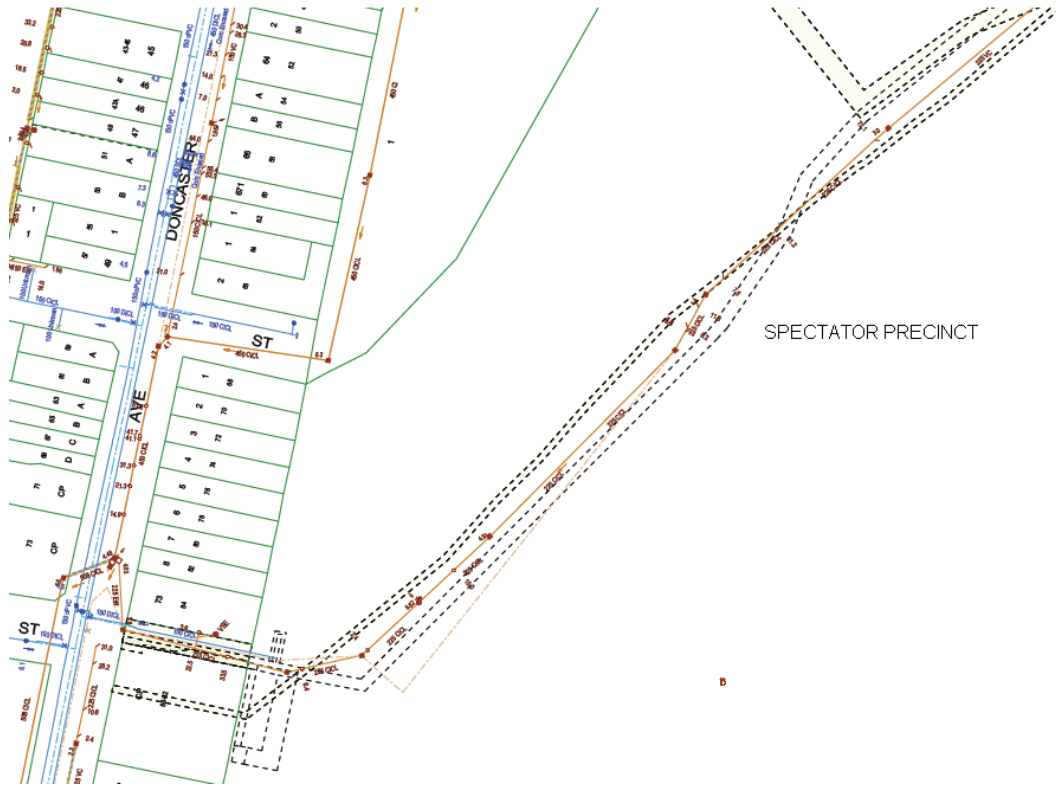


*RW*  
**Robert Wickham**  
Team Leader  
Asset Planning



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Delivering essential and sustainable water services for the benefit of the community

## 10 Appendix C – Services Diagram



Note: Services Diagram not to scale