2

Centennial Park

Landscape & Public Realm Schematic Design Report

REALMstudios

22 September 2014

Project: Centennial Park Strategic Plan

Report Title: Schematic Design Report

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Client Approval: Samantha Stevens

Date: September 22nd 2014

Consultant Team:

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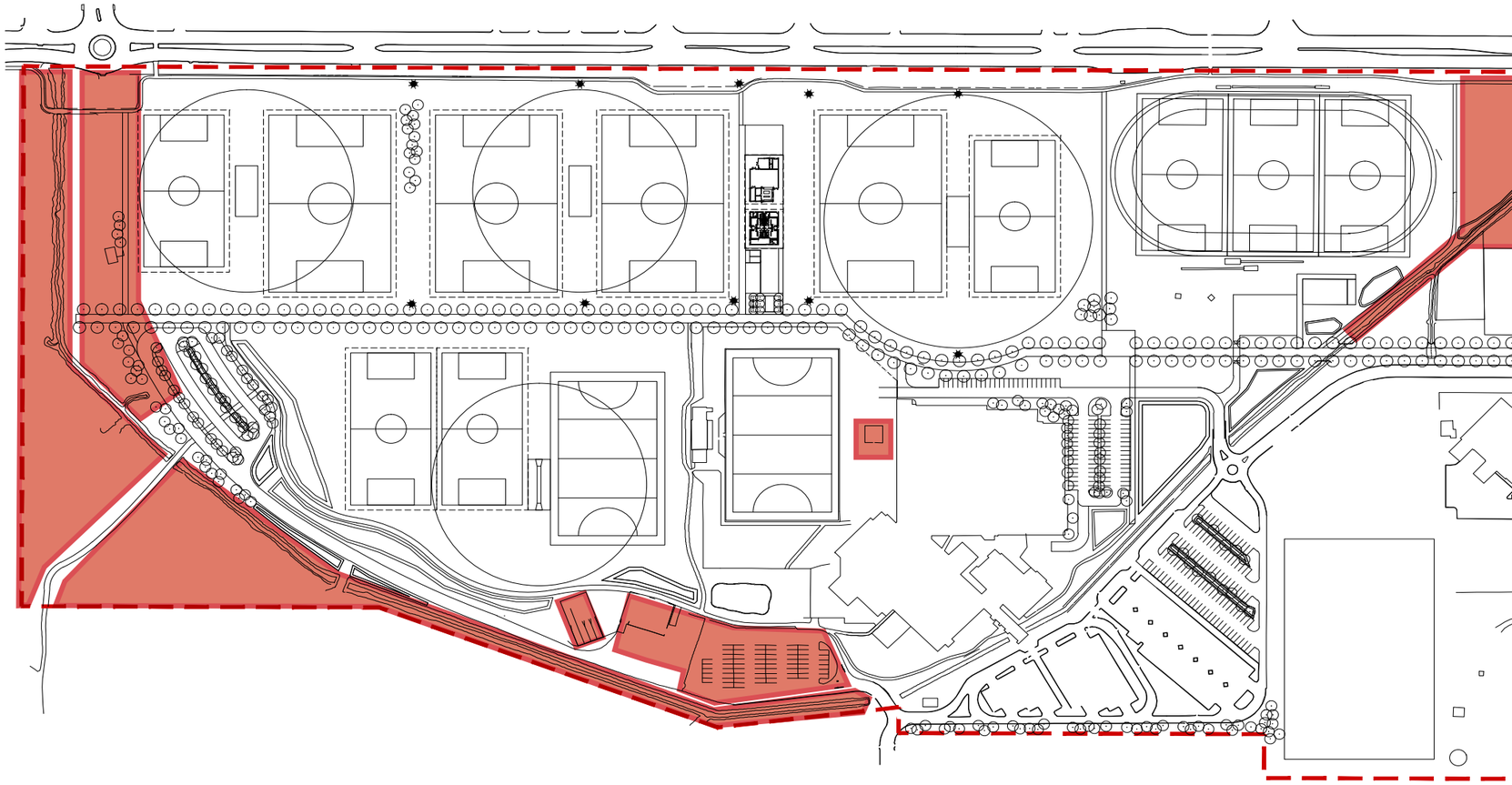
1.0 Introduction

The intent of the Schematic Design phase for Centennial Park is to rationalise the overarching Scheme Development concept to be in line with the overall budget and at the same time to maintain the integrity of the scheme and develop its componentry in further detail.

Whilst reduced in its overall volume from the earlier scheme it remains as a new and legible place of single focus - a contemporary multifunctional parkland environment that clearly expresses its sporting, community and environmental values.

The core attributes of the concept remain, including:

- Precincts associated with particular sporting types i.e. cricket, soccer and AFL, all clearly defined and articulated;
- Clear delineation of pedestrian and vehicular movement systems, defined entry points and signage;
- The central organising element of the promenade;
- Flooding and water management interwoven into the design to mitigate the extremes of water i.e. flood and dryness and to make better provision for increased biodiversity and recreational activities;
- Places for shade and shelter from prevailing winds and rain;
- Landscape types which in themselves create a site legibility, providing immediate clues for the user regarding site program and orientation;



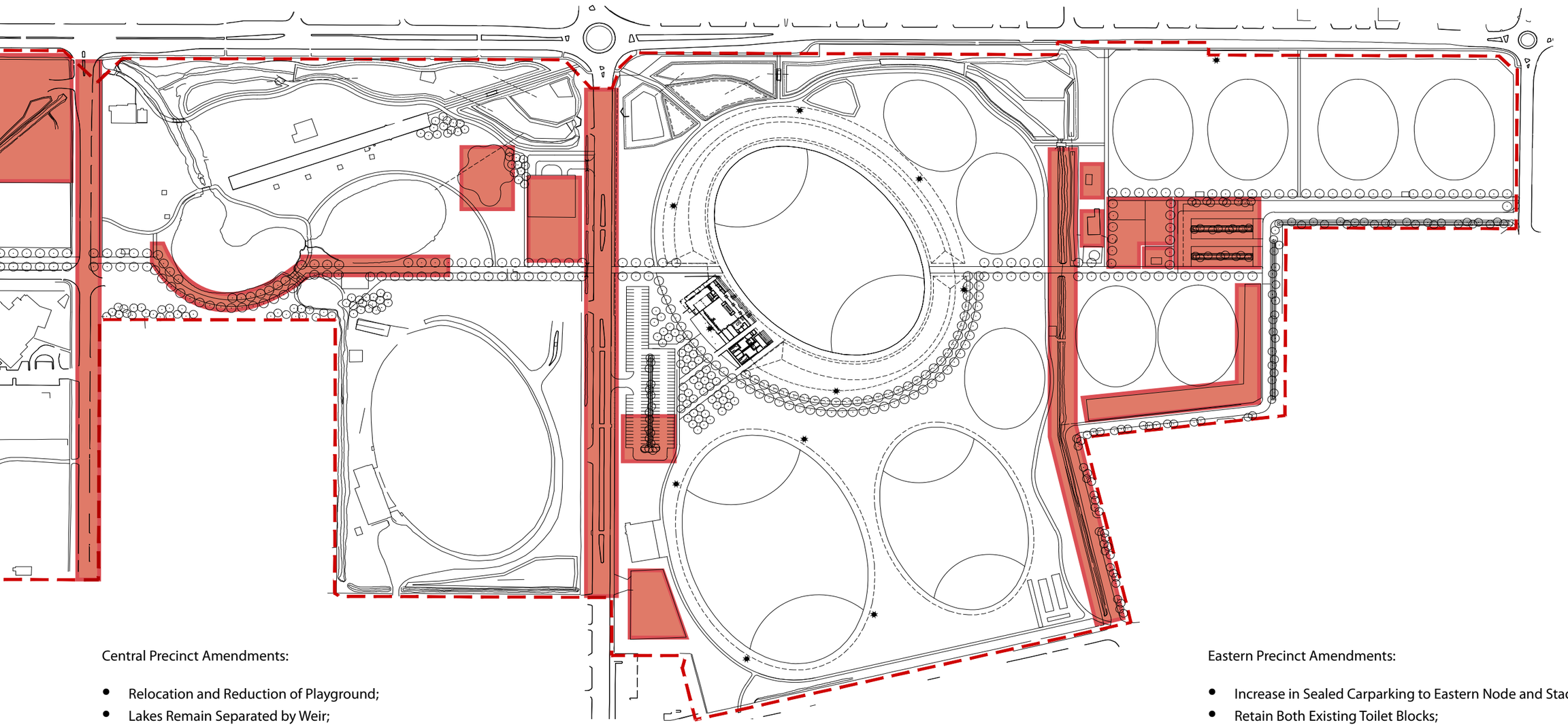
Key Amendments to Scheme Development Plan

General (site-wide) Amendments:

- Reduction of Flood Lighting;
- No Works on North Road;
- Removal of Creek line Works;
- Reduction of Promenade Width to 5m;
- Promenade now asphalt;
- No works Within Road Reserve on Lockyer Avenue & Sanford Road.

Western Precinct Amendments:

- Removal of Western Link Road;
- Retain Existing Carpark to South of Hockey Field;
- Retain Existing Cricket Sheds;
- Retain Existing Toilet Block;
- Retain Existing Maintenance Shed.



Central Precinct Amendments:

- Relocation and Reduction of Playground;
- Lakes Remain Separated by Weir;
- Rationalisation of Promenade Alignment;
- Downspec of Carpark Material.

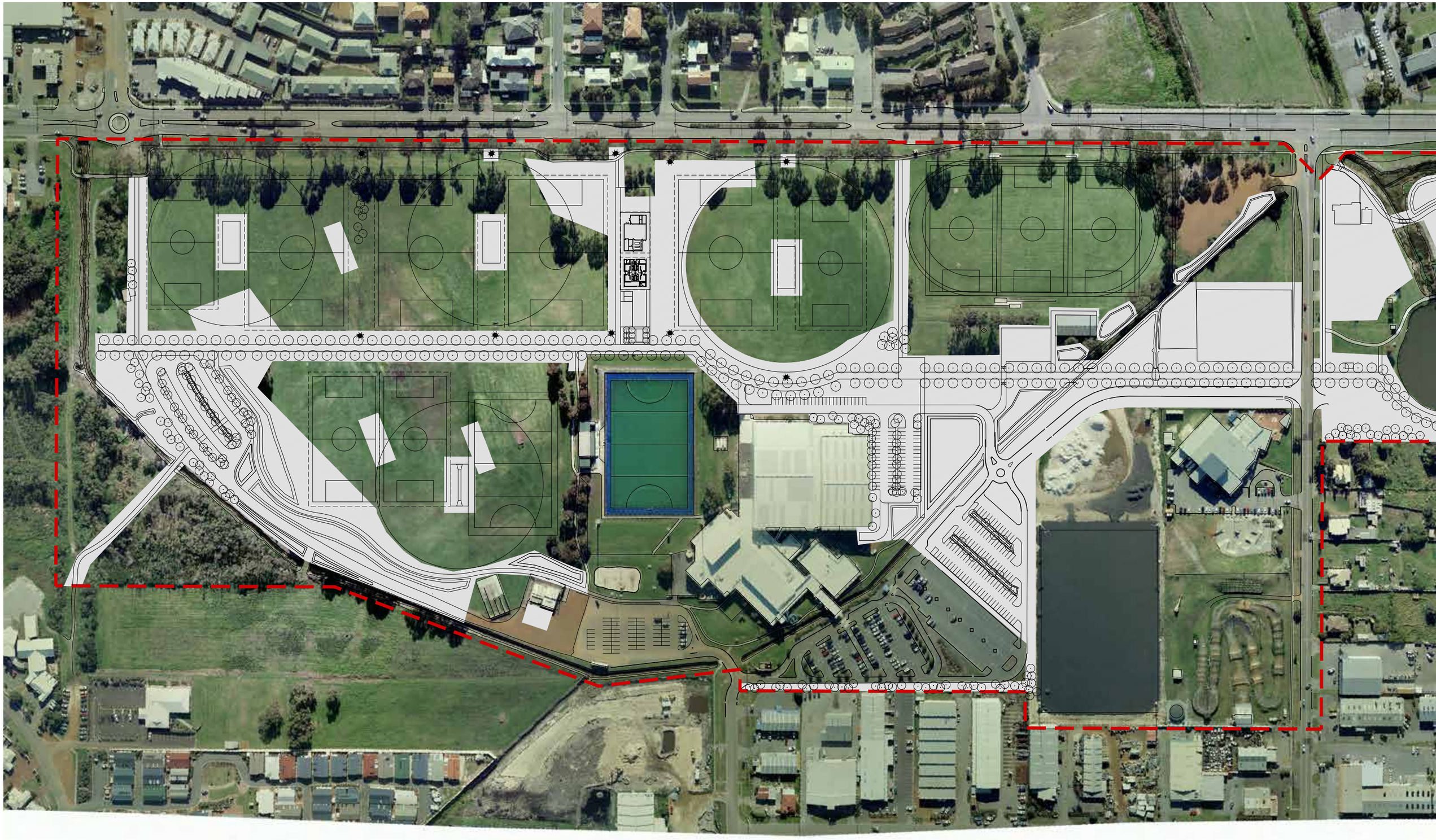
Eastern Precinct Amendments:

- Increase in Sealed Carparking to Eastern Node and Stadium;
- Retain Both Existing Toilet Blocks;
- Retain Existing Storage Sheds;
- Retain Existing 'Cattle Complex' Sheds;
- Retain Existing Open Drain;
- Removal of Existing Club room Building;
- Downspec of Carpark Material.

50m 0m 50m 100m 250m

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2.0 **Extent of Works:** Schematic Design Phase

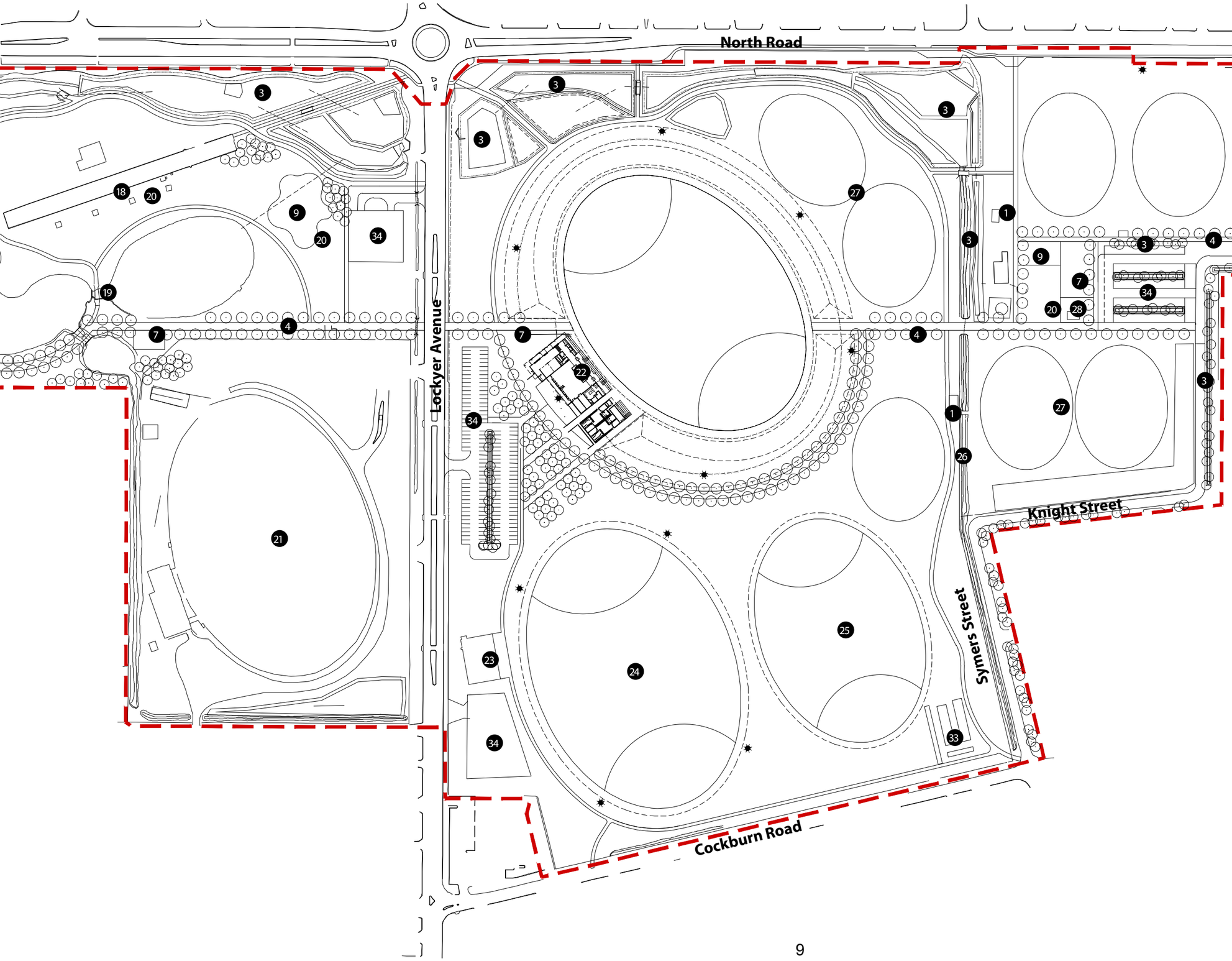




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3.0 Schematic Design Plan





Legend - Significant Features

1. Existing toilet facilities to be retained
2. Cricket Oval and Soccer Pitches
3. Water treatment areas (refer Syrinx SD report)
4. Grand Promenade / Spine
5. New Cricket and Soccer Club rooms
6. Upgraded Premier Cricket Oval and Soccer Pitch
7. Activity nodes on Promenade
8. Existing Hockey Pitch
9. Play spaces (existing + proposed)
10. Albany Leisure and Aquatic Centre
11. Athletics Oval with Junior Soccer
12. Athletics Building
13. Men's shed site (external works)
14. Multi-Use Field (completed)
15. PCYC Building (external site)
16. Skate Park (external site)
17. BMX Track to be upgraded (external site)
18. Retain DFES Fire Training Facility
19. Existing lakes and bridge to be retained
20. Picnic area and facilities
21. Existing Railways AFL Club and Field
22. Premier AFL Oval & Stadium/Club Facilities
23. Community Facility (existing structure retained)
24. Senior AFL Training Oval
25. Junior AFL Oval
26. Existing drain to be retained
27. Aus kick Ovals
28. Existing Junior club rooms to be demolished and new shelter constructed
29. Existing drain to be piped and covered
30. Existing Toilet facilities to be retained
31. Existing Parks & Gardens Ground Staff Facilities to be retained and new shed provided
32. Existing Scout Hall retained
33. Retained "cattle complex"sheds
34. Parking
35. Existing informal link

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4.0 Access & Circulation Strategy

The circulation strategy provides the following:

1. A strong east west promenade, directly linking the facilities in each precinct of Centennial Park;
2. Improved walkability and connectivity
3. Facilitate North to south connections to the City
4. Cater for large events within the Eastern Precinct
5. Recreational / leisure network
6. Simple clear hierarchy aiding navigation

Path Network Hierarchy

The path network is divided into the following hierarchy:

1. Primary - East / West Promenade
   - 5m wide asphalt pathways slightly elevated above surrounding levels
   - Tree lined boulevard highlighting importance of connection
   - Connecting precincts & major facilities
   - Shared path (with controlled vehicle access)
2. Secondary - North / South Linkages
   - 2.5m wide concrete pathways
   - Linking promenade to facilities & beyond
   - Using existing network on Sanford Drive & Lockyer Avenue
   - Connection to Wellington Street (works outside project required)
3. Tertiary - Perimeter Collector
   - Existing concrete path network along North Road
4. Tertiary - Internal Network
   - 2m wide concrete paths
   - Meandering
   - Range of experiences



Relevant extracts from COA bike plan



Route: Primary - Promenade (5m wide asphalt)



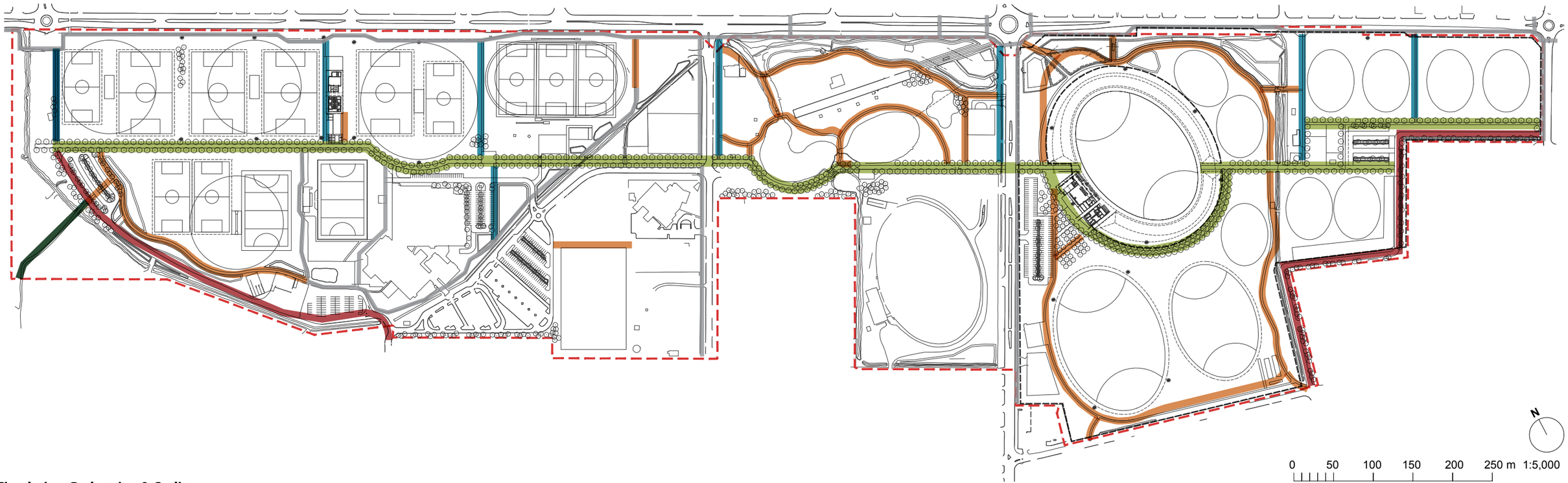
Route: Future conditions



Route: Existing paths retained



Route: Secondary and Minor (brushed concrete)



Circulation: Pedestrian & Cyclist

Legend

- Route: Primary Shared Path - 5m wide asphalt
- Route: Secondary Shared Path- 2.5m wide concrete
- Route: Tertiary Shared Path - 2m wide concrete
- Route: Existing paths retained - various widths and materials
- Route: Existing informal link to be retained (link awaits formal upgrade of promenade)
- Cycle Route on minor (internal) road

5.0 Vehicle Access & Management Strategy

Vehicle access and movement in Centennial Park is currently not restricted to roadways or parking areas. The proposed strategy is to establish zones of restricted traffic access and control. These would be used during events and daily as required to protect infrastructure and playing surfaces but also allow access to overflow and event parking areas.

The aim aesthetically would be to maintain the seeming informal approach by avoiding obvious linear barriers where possible and integrating restrictions into landscape features. Access and movement of vehicles would be controlled through a range of existing features and proposed barrier elements such as:

- Buildings
- Fences (steel mesh type)
- Water bodies, wetlands, ditches & creeks
- Bollards + barriers + urban furniture + features and,
- Plant material

Existing bollards and barriers will be retained in-situ if required. Where existing bollards and barriers are to be removed those in good condition will be identified for reuse. At strategic locations access gates will be provided to allow easy access for maintenance vehicles to service the park. Likewise access points for additional parking areas will be provided.



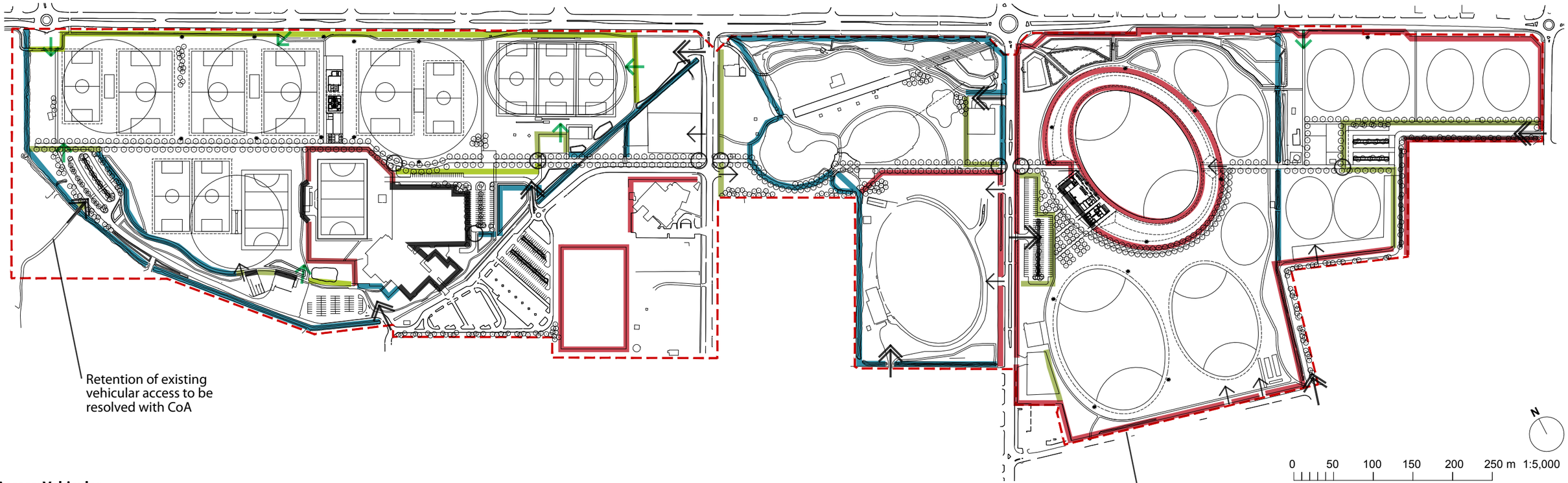
Black PVC coated wire Cyclone Security Chainwire Fencing



Existing barriers retained/ reused



Existing bollards retained/reused



Access: Vehicular

Legend: Barriers

- Cyclone Fencing (some existing)
- Buildings (some existing)
- Waterbodies/Wetlands/Ditches/ Creeks (some existing)
- Bollards + barriers + urban furniture + features & existing trees (some elements existing)

Legend: Entrances

- Generally Unrestricted Access
- Event Access Only - Gated
- Maintenance Access - Gated
- Operable Bollards

Note: Read in conjunction with Parking Strategy (over leaf)

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6.0 Parking Strategy

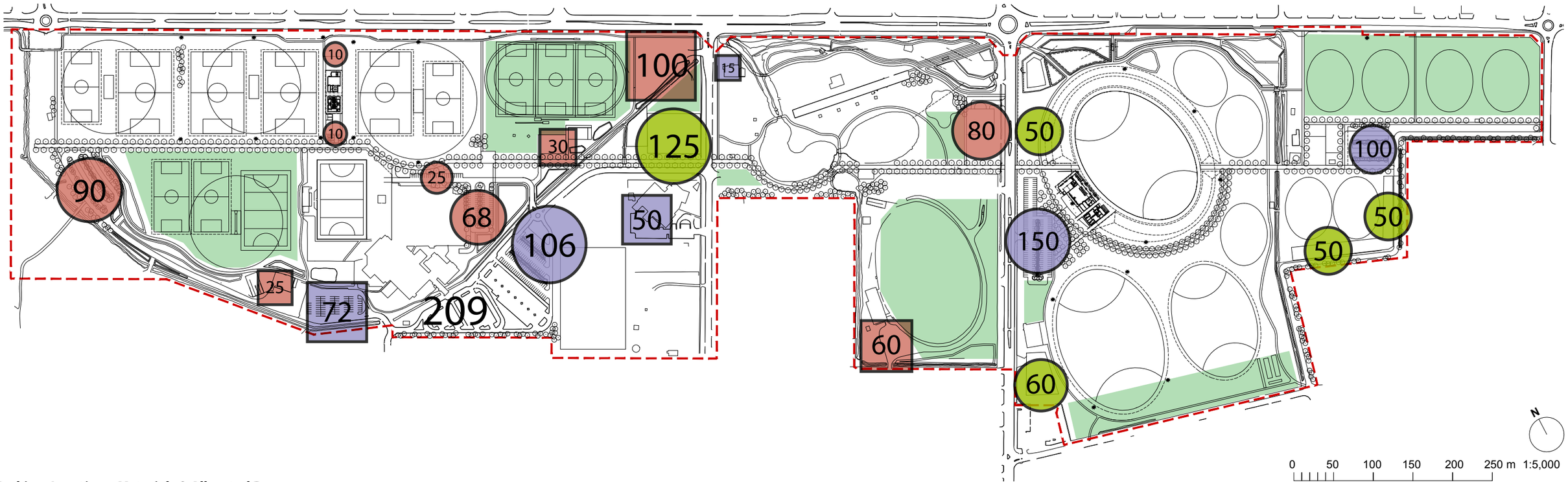
Parking allocation is based on an appreciation of four parking types:

- Formal parking (sealed or unsealed)
- Informal;
- Overflow (turf) and
- Major Event (turf)

The parking numbers achieved for Formal, Overflow and Major Event in the revised Schematic Design plan are shown in the table and diagram opposite.

Informal parking would include verge parking and has not been calculated due to its informal nature. Major Event parking is based on a rate of 30sqm/car of the total area.

Car Park Material	Allocated Parking Bays			
	Western	Central	Eastern	Total
Formal Sealed	437	15	250	**702**
Formal Unsealed	358	140	0	**498**
Overflow (turf)	125	0	210	**335**
Major Event (turf)	1400	1050	1300	**3750**
Total	**1962**	**1205**	**1760**	**4787**



Parking: Locations, Materials & Allocated Bays

Legend

- Existing Car Parking
- Proposed Car Parking
- Formal Sealed Car Parking
- Formal Unsealed Car Parking
- Turf (Overflow) Car Parking
- Major event Car Parking

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7.0 Planting Strategy

The promenade is envisaged as a grand formal deciduous allee reminiscnent of a romantic European promenade. A number of species are potential candidates. The selected species must be readily available, suitable and hardy to the local conditions, be a large tree (over 25m at maturity), have a crown that allows for free movement under and work well in an avenue context at the scale proposed.

The main promenade species should be slightly less 'showy' than that at nodal planting. Nodes are envisioned to be layered in scale and provide a strong, contrasting and dynamic seasonal colour palette. Native plant species suitable for formal hedging are then used to create a sense of enclosure and definition of space at nodes. They double as wind breaks.

Paths north/south intend to break up sporting areas into broad 'rooms' to create a sense of definition between various sport and recreation uses. They are selected for their dense and slightly lower canopy that will assist as a wind break and provide effective cover for spectators in both summer sun and winter rains.

Promenade Avenue Options



Liquidambar styraciflua



Quercus palustris - Pin Oak



Quercus robur - English Oak

Node Feature Planting



Platanus acerifolia



Lagerstroemia indica



Pyrus calleryana Bradford

Paths North/South



Westringia fruticosa hedge



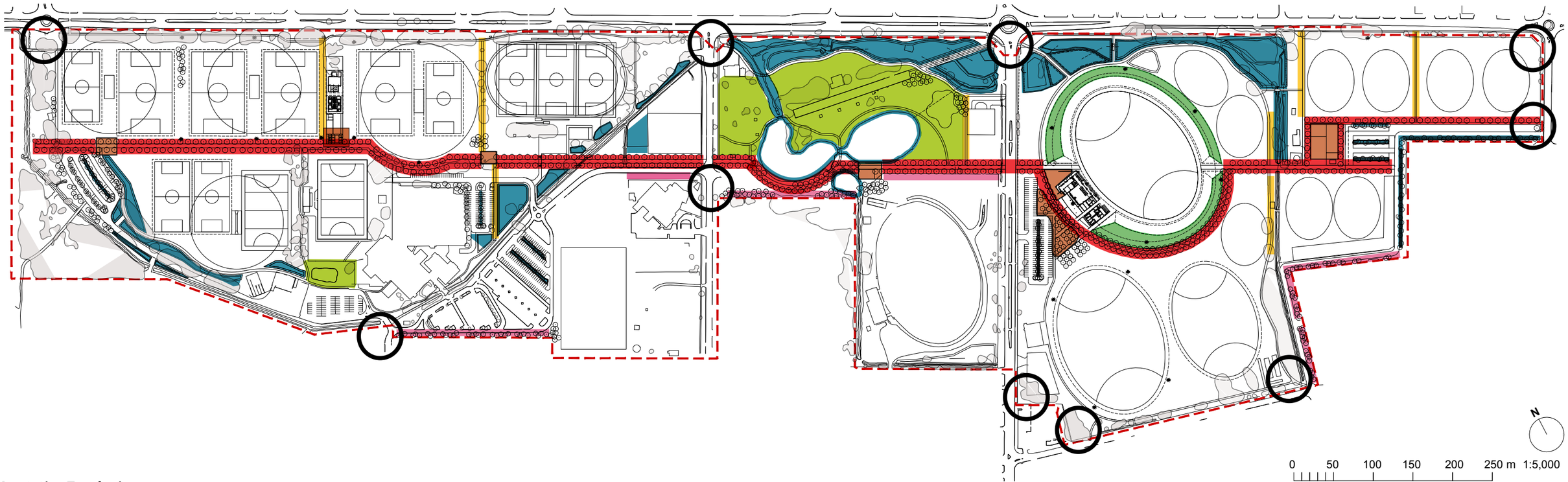
Agonis flexuosa



Adenanthos sericeus hedge



Melaleuca rhaphiophylla



Vegetation Typologies

Legend

- Promenade Avenue
- Node Feature Planting
- Paths North/South
- Playground/Parkland
- Shrub Massing
- Swale Wetland (Ref. Syrinx)
- Screening
- Thresholds

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7.0 Planting Strategy (continued)

Playground/Parkland


Eucalyptus patens


Eucalyptus megacarpa


Boronia stricta


Dampiera leptoclada


Gastrolobium sericeum


Lobelia anceps


Patersonia umbrosa var.


Eucalyptus doratoxylon


Eucalyptus cornuta


Callistemon glaucus


Dasypogon bromeliifolius


Hypocalymma strictum


Hypocalymma strictum


Rhadinothamnus anceps

Shrub Massing


Billardiera fusiformis


Boronia megastigma


Beaufortia sparsa


Dampiera alata

Screening


Callistachys lanceolata


Taxandria juniperina

Threshold


Taxandria parviceps


Hypocalymma cordifolium


Acacia myrtifolia


Lobelia anceps


Eucalyptus conferruminata


Agonis flexuosa


Dampiera leptoclada

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8.0 Landscape Facilities Strategy

Landscape based facilities addressed in this section include:

- Existing Toilets
- Grounds and Maintenance Shed
- Landscape Shelters
- Play Areas
- Exercise Equipment and
- Off-leash Dog Exercise Zone

There are also a number of existing buildings retained for community use including:

- Scout Hall
- DFES building
- Royals Clubrooms
- Existing toilet facilities at each are to be explored for public use.

Provision of new shelters and BBQ facilities are typically associated with the promenade and specifically nodes on the promenade

A variety of existing facilities have been retained in the schematic design in order to manage the budget. Some of these elements are pictured opposite.

Maintenance Sheds

In the short term, and in response to the increasing maintenance requirements of the precinct, it is proposed that the existing Parks and Gardens compound be expanded in its current location. An additional high bay shed of 12x6m with concrete slab will be provided to accommodate secure vehicle/ tractor storage and work shop requirements.



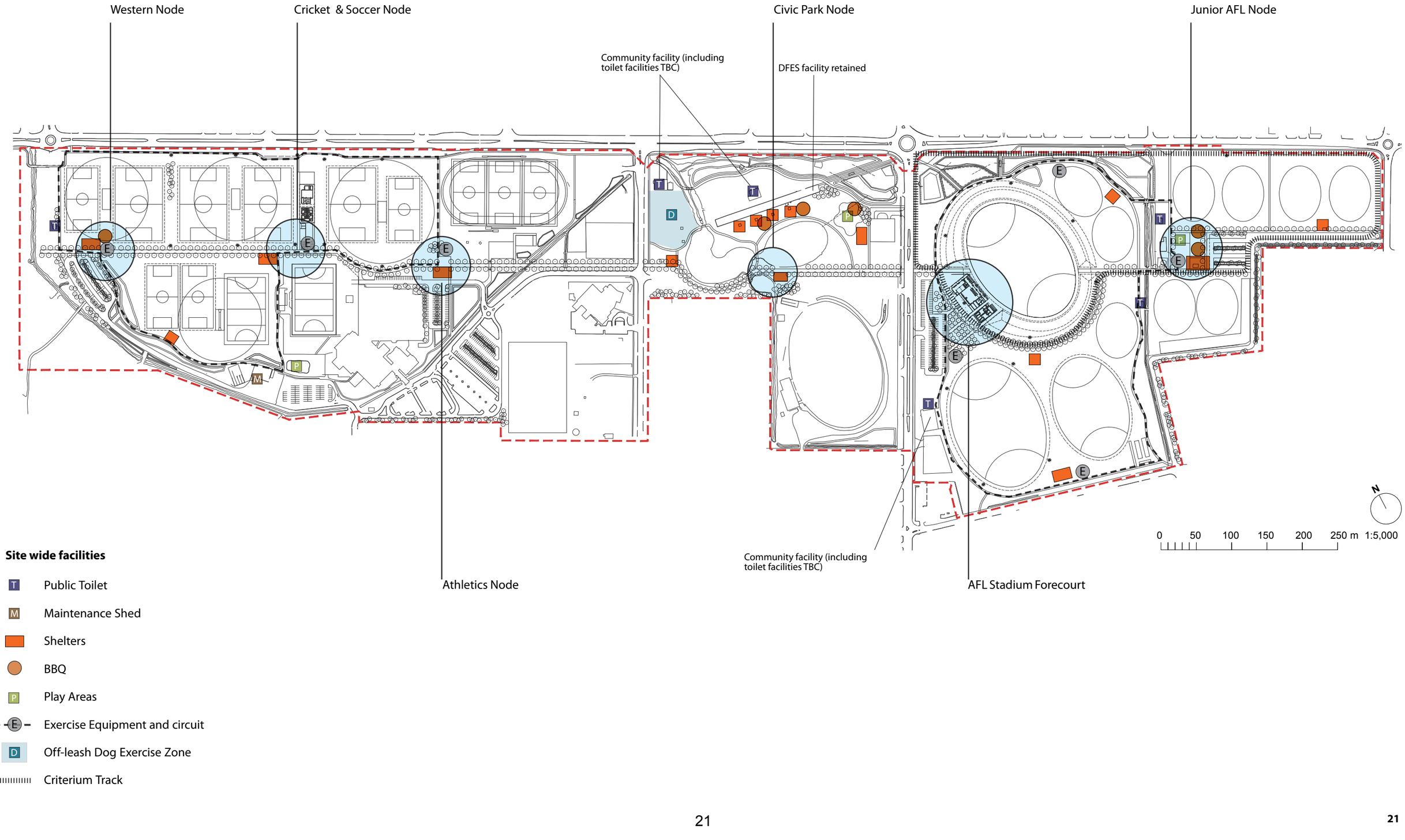








Existing facilities to be retained



Site wide facilities

- Public Toilet
- Maintenance Shed
- Shelters
- BBQ
- Play Areas
- Exercise Equipment and circuit
- Off-leash Dog Exercise Zone
- Criterium Track

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8.0 Landscape Facilities Strategy (continued)

Play

Each of the three precincts will feature an integrated play area. One existing play ground south of the Hockey pitch will be retained to service the western precinct.

In the eastern precinct at the Junior Football and Auskick Node another local scale play ground will be integrated.

The largest playground will be in the central precinct and be of a sub-regional scale with the opportunity to become a regional facility in the future.

The Central playground will feature:

- Creation of a landmark destination for children (focus on specific age range - TBA) and their families.
- Nature based play using locally occuring natural materials and themes to engender a connection with place
- Variety of play experiencies - water play, climbing, exploring, building, soundscapes, spinning & swinging and roll playing
- Integrated with existing elements - shade trees and creekline
- Safe - ensure good sight lines from promenade and
- Close to amenities - parking, shade structures, BBQ's, drinking fountain, toilets (TBC - from either the existing Scout Hall or DFES building).













Exercise Stations

For park produce a comprehensive and quality range of exercise equipment catering for all ages, from children through to senior.

ParkFit is a combination of moving and static stainless steel fitness pieces designed to build a healthy body and healthy life.

The equipment will be located in groups of two components per workstation.



Barbecue (BBQ) Stations

Christie Modular electric BBQ series is recommended. BBQ's are located in three locations



Christie - Modular - Double BBQ



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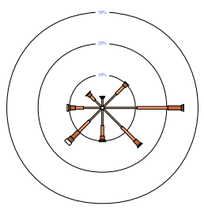
8.0 Landscape Facilities Strategy (continued)

Shelters

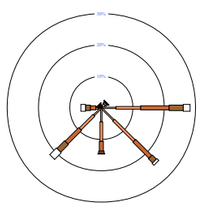
"Yaka' means turtle and 'Yakamia' means place of the turtle in local Aboriginal language. Landscape based shelters will work with the iconic shell of the Long-necked turtle (*Chelodina colliei* previously *C. oblonga*) as a theme for shelter. For more information on the turtle refer to Syrnix's report.

Shelters will provide:

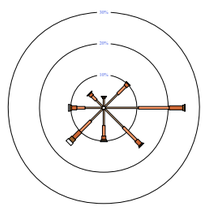
- Weather protection (sun and rain)
- Provide protection from prevailing winds through the incorporation of a wall or vertical shield
- Be flexible to include various facilities and accommodate various functions including:
  - Gathering for small or medium sized groups
  - BBQ and picnic furniture and
  - Spectator viewing
- Through further development the intent is to establish a site responsive design that is scalable, flexible, appropriate for use and fabricated efficiently to meet the budget.



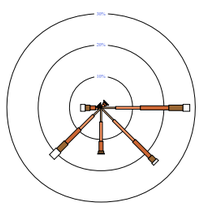
9am January - Predominate wind direction from the east



3pm January - Predominate wind direction from the east / south east



9am July - Predominate wind direction from the east



3pm July - Predominate wind direction from the east / south east





Inspiration in form
Wind shelter tent



Wind and sun shelter



Wind and sun shelter



Wind, sun and rain shelter









Austalian fabrication examples

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9.0 Furniture & Features Strategy

2.07 Furniture & Features Strategy

Two main character zones direct selection of two furniture styles:

- The promenade and
- The parklands

The promenade is conceived as an urban structuring element with a degree of formality. It must also be vibrant and innovative in design and selection of urban furniture. The 'Alkimos' range developed by Mark Cox whilst unknown is available. All materiality is to be disucssed with the City of Albany



Cox Urban Furniture - Alkimos Range - Bench & Bench with back (refer colour)



Cox - Urban Edge - Bin



Fleetwood Bridge Structure

Promenade colour



Cox Urban Furniture - Alkimos Range - Picnic set (refer colour)

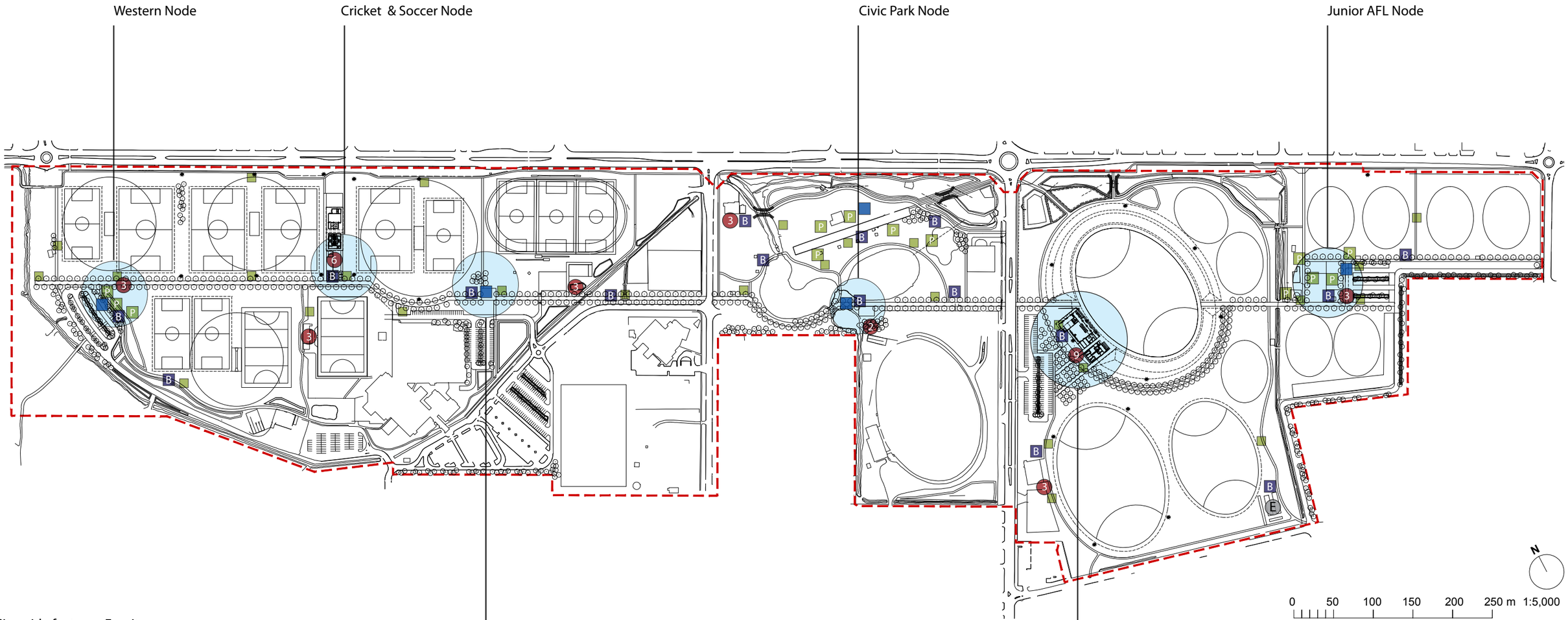


SFA - Semi Bike Stand



Aquafil 2100mm Refill Station and Drinking Fountain

Parkland colour



Site wide features: Furniture

Legend

- 26 x Bench Seat
- 13 x Picnic Seating
- 16 x Bin
- 35 x Bike Racks
- 05 x Drinking Fountains
- Bridges

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10.0 Signage & Artworks Strategy

Wayfinding and legibility is achieved through a combination of intuitive way finding through a clear movement hierarchy and simple signage system.

The strategy proposes three tiers of signage:

- Entry or branding signage which would feature the brand and name: "Centennial Park". Entry signs are typically located at prominent site entries and would be designed for both vehicle and pedestrian viewing;
- Place and Facility Naming Signage. This consistent signage format will assist in formalising places and facilities and tell visitors where they are. Many will be viewable to both vehicle and pedestrians;
- Directional Markers will come in two types:
  - Map based sign for pedestrian orientation (one in each precinct) and
  - Directional markers (likely vehicle and pedestrian types)

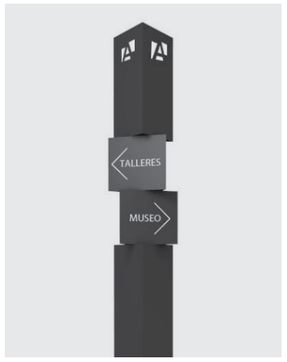
A colourul and dynamic approach is appropriate to create a festive, positive and fun character.

Briefs for artworks are to be coordinated in the next phase.

















Entry / Branding Signage

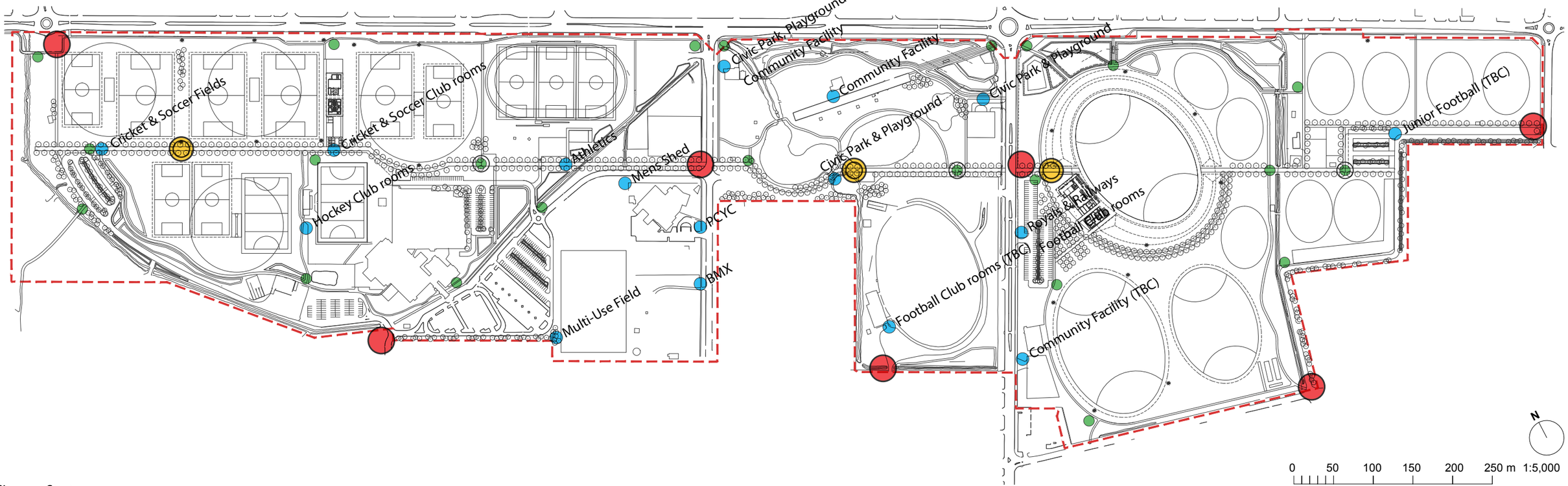








Place and Directional Signage

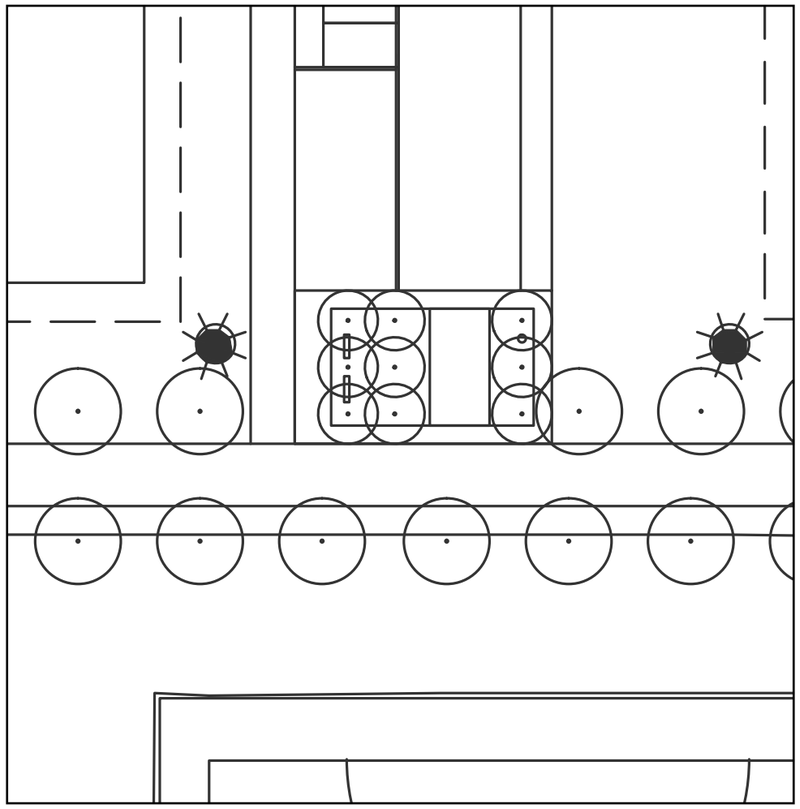


Signage Strategy

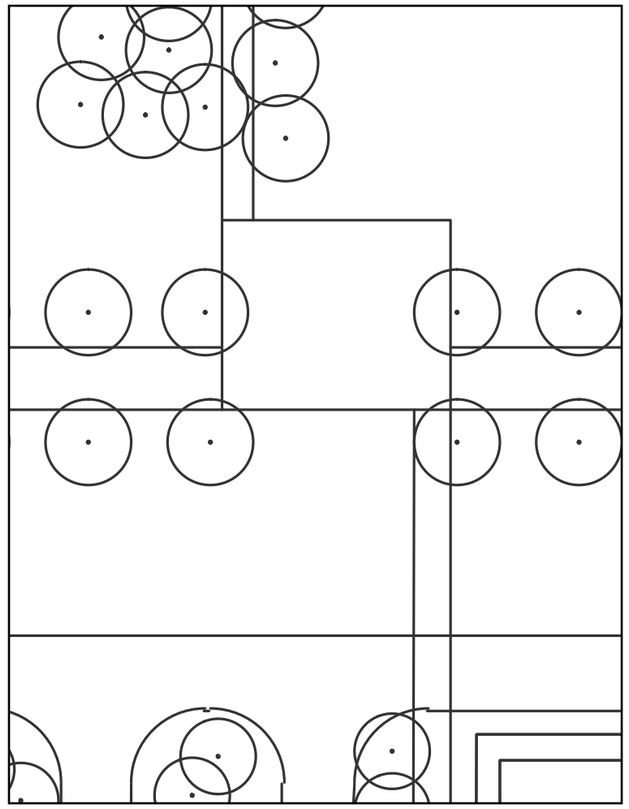
Legend

- Entry: “Centennial Park” Branding Signage
- Precinct: Place and Facility Naming
- Directional: Pointer and Distance Markers
- Directional: Double-sided Markers with Map
- Artwork

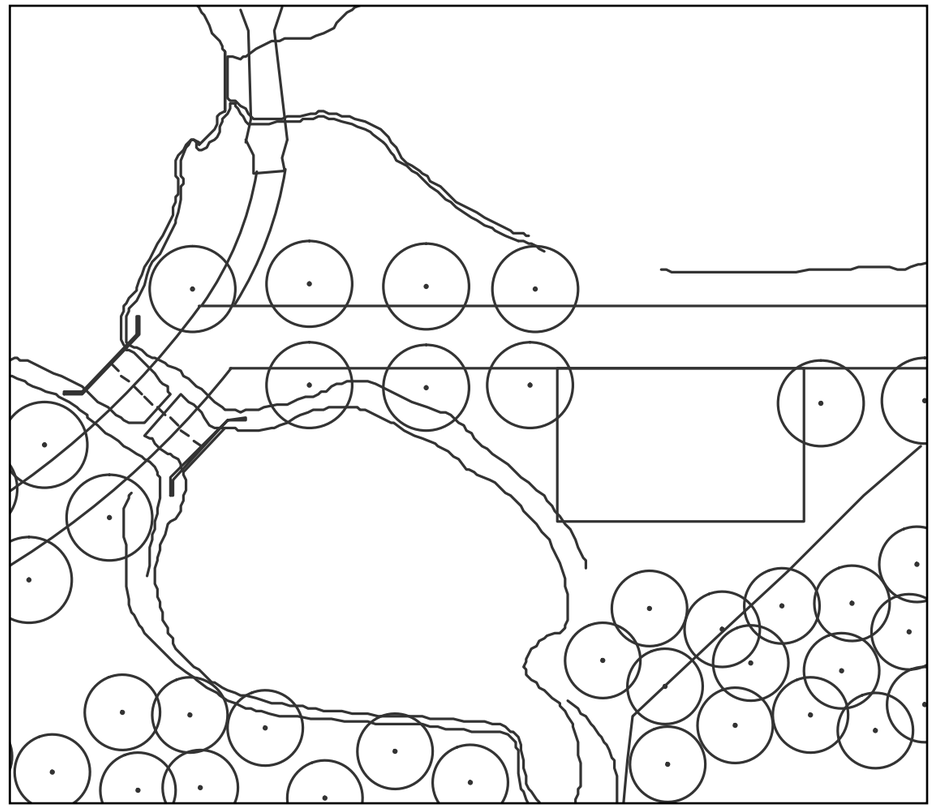
11.0 Detail Area Development: Nodes



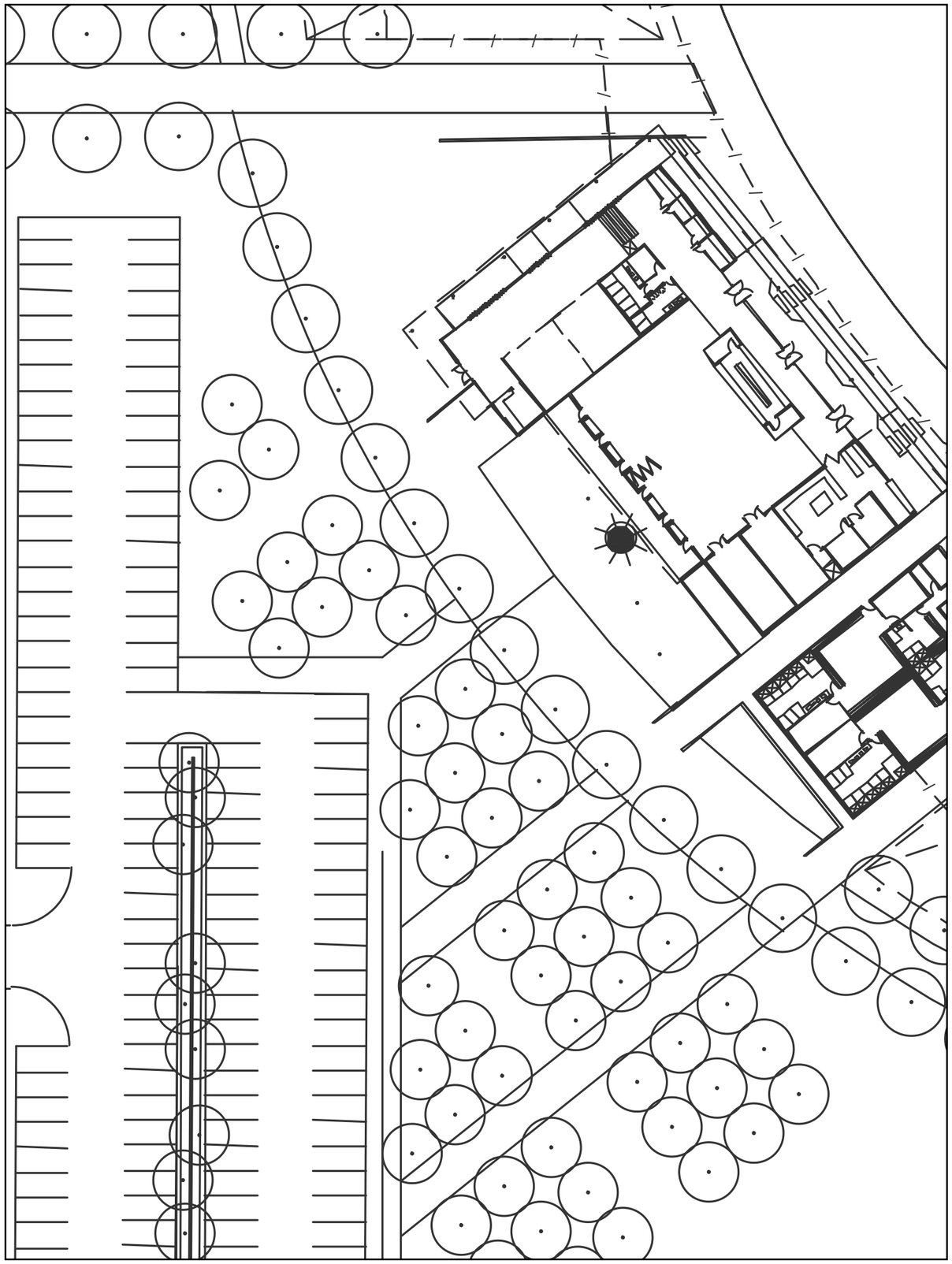
Soccer/Cricket Node



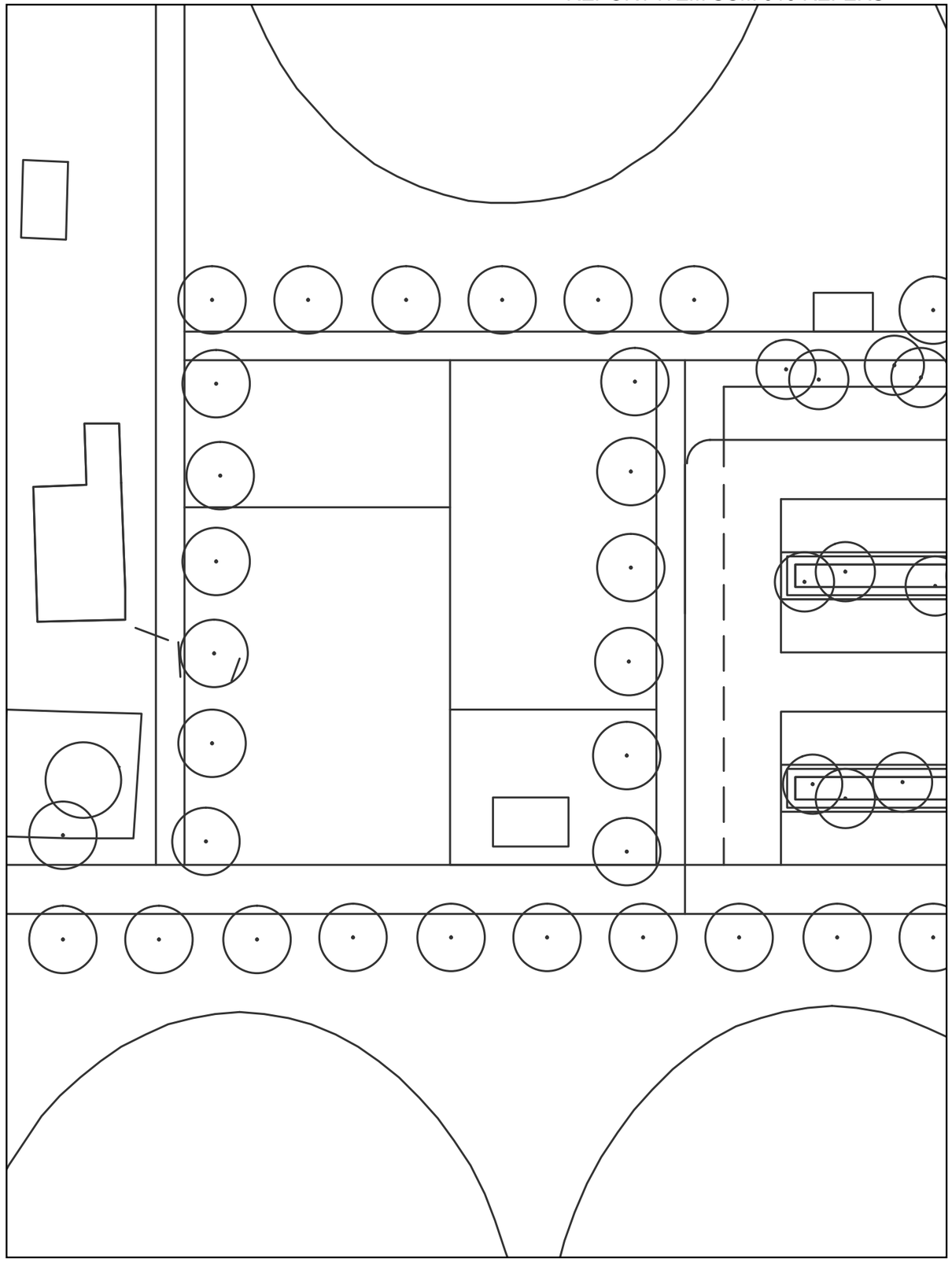
Athletics Node



Civic Park Node



AFL Stadium Forecourt



Junior AFL Node

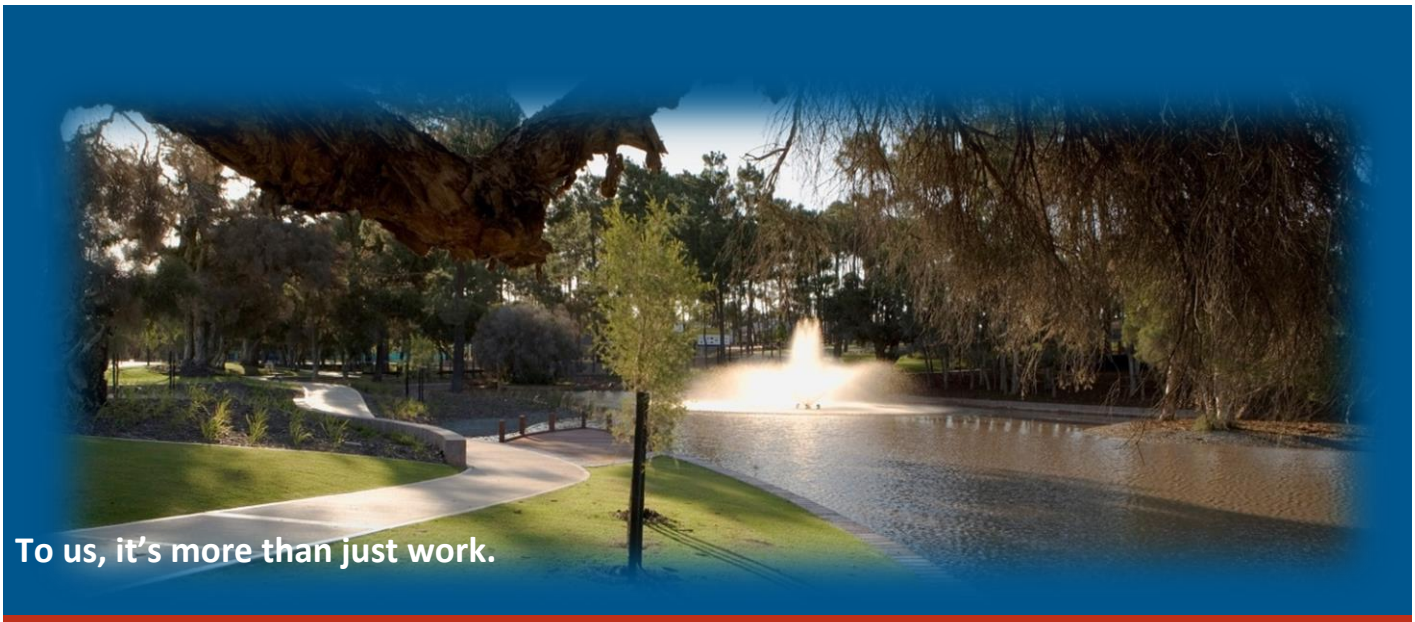
3

Centennial Park

Western Precinct Electrical & Civil Schematic Design Report

Wood & Grieve Engineers

22 September 2014



Centennial Park Sporting Precinct, Albany

Schematic Design Report
Greater Western Precinct
Civil and Electrical

Prepared for:

Mr Ahmad Abas
Gresley Abas

Prepared by:

Fred Wallefeld, Travis Demeza & Rocco Pienaar
Project No. 26689-PER-CE
M:\TECH\26600\89\C_CL_RE_001 SD REPORT WP.DOCX

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WOOD & GRIEVE ENGINEERS

Revision

REVISION	DATE	COMMENT	APPROVED BY
0	22 September 2014	Issued for Client Comment	Travis Demeza

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Centennial Park Sporting Precinct, Albany

1. Introduction

1.1 General

This Schematic Design Report has been prepared at the request of Gresley Abas (GA) on behalf of the City of Albany (COA), for the Centennial Park Sporting Precinct, Albany.

The purpose of this report is to inform the Client of the general intention of the engaged services as proposed by Wood & Grieve Engineers (WGE). Items highlighted in ***bold italics*** represent specific queries and/or project risks that we wish to draw your attention to.

This document serves as the benchmark which our services must achieve. It is also a 'snapshot in time' of the design at the time of writing. Some aspects of the design may have already changed from what is written at the time of issue and this is expected. It is intended that this Schematic Design Report be updated and re-issued, following receipt of comments from the Client.

We request you read this carefully so that you have a clear understanding of the scope of our work.

We would welcome any comments you may have on the information provided in this report.

This document should be read in conjunction with the following Schematic Design Preliminary Drawings, attached within Appendix 1:

- Earthworks & Drainage Arrangement Plan, *26689-PER-C-SK.01 (Rev A)*
- Earthworks & Drainage – Western Precinct – Sheet 1, *26689-PER-C-SK.02 (Rev A)*
- Earthworks & Drainage – Western Precinct – Sheet 2, *26689-PER-C-SK.03 (Rev A)*.

This Schematic Design Report has been prepared based on the following information:

- Preliminary Survey by Whelans July 2014
- GIS information supplied by the COA
- The Scheme Development Report, 24th July 2014 (REALM)
- Schematic Design Scheme ($42 Million), 12th September 2014
- Geotechnical Report by Douglas Partners
- Catchment Plans of upstream conditions (prepared by WGE). Refer to attachments within Appendix 2
- Relevant RFI responses provided by the City of Albany to date.

1.2 Site Location & Project Overview

The 'Western Precinct' is bounded by Wellington Street to the west, Sanford Road to the east, North Road to the north and private property to the south.

In general the precinct wide works comprise of:

- Earthworks and associated stormwater drainage for the:
  - Main Cricket/soccer oval
  - Extension to existing ovals
  - Promenade
  - Proposed pavilion and club facilities.
  - Car parking areas (extent to be confirmed)
- Earthworks for WSUD treatment of oval subsoil leachate;
- Upgrade of existing roads; and
- Installation of sports lighting for the main cricket/soccer oval.

1.3 Safety in Design

Wood and Grieve Engineers operates a Safety in Design (SID) procedure based on "Code of Practice - Safe Design of Buildings & Structures 2008" published by the Commission for Occupational Safety & Health, Western Australia.

Compliance with this Code of Practice will ensure that all designs will be safe to install, operate, maintain and dismantle by appropriately experienced contractors.

Any hazards that cannot be eliminated by design will be identified and the appropriate work practices, protection and work methods required should be formulated by the contractor.

A preliminary safety in design report has been prepared to date for our internal records, and attached within Appendix 3. A final safety in design report will be provided for the client upon completion of the detailed design, prior to tender, and form part of the tender documentation.

1.4 Programme

Review of the current D.W Kolagow & Associates programme (revision 4) identifies the following key milestones pertinent to the Western Precinct Soccer / Cricket Pavilion:

- Schematic Design Deliverable to Client 22 September 2014
- Design Development Deliverable to Client 19 December 2014
- Finalise Contract & Tender Documentation 31 March 2015.

1.5 Budget

At the time of writing, there are still various decisions pending regarding the scope of the works in order to meet budget requirements.

Items WGE suggest to be reviewed in the process include:

1. Removing (or delaying) the construction of new north-south path on the western end of the site. Existing path provides connection to North Road and could be retained.
2. Keeping the existing western access road and car park. Undertake minor upgrades to access road (seal) to improve serviceability and safety, modify and extend carpark to increase capacity but avoid major earthworks and costs associated with full reconstruction, filling of pond and removal of existing bund.
3. Construction of permanent carparking to an asphalt standard pending confirmation of traffic parking volume.

1.6 Checking Procedures

This project falls into Category A as determined by Wood & Grieve Engineers Quality Manual, accordingly all drawings and specifications will be reviewed by the Project Engineer prior to issuing.

2. Critical Issues

The following list itemises the critical issues for the project's services:

2.1 Civil

- Earthworks and drainage to reduce waterlogging and prevent flooding of proposed buildings.
- Upgrade of the existing western access road adjacent to Yakamia Creek to improve safety and amenity.
- Earthworks for the proposed Pavilion.
- Earthworks associated with the extension of the existing cricket ovals.
- Earthworks associated with the construction of the promenade.
- Earthworks associated with the construction of the proposed wetlands.
- Ensuring the protection or relocation of existing services as required to suit the proposed development.
- Modification and/or upgrade of the existing subsoil drainage system as required to accommodate the new works and ensure serviceability of the proposed playing fields.
- Confirmation of 1 in 100 year flood flows and suitability of bunding around ALAC.

2.2 Electrical

- Confirmation of existing Electrical infrastructure to confirm design.

3. Civil Works

3.1 Objectives

- To provide innovative Civil solutions to ensure that the development progresses in a cost efficient, time efficient and safe manner;
- To provide Civil Services of commercial quality with a minimum engineered design life of 20 – 25 years.

3.2 Design Criteria

The Civil services will be undertaken in accordance with the following documents:

- Australian Rainfall & Runoff – 1987;
- Department of Water:- Stormwater Management Manual;
- Australian Standards:- AS 2890.1:2004 – Parking Facilities, Part 1: Off-street car parking, as required;
- Australian Standards:- AS 3798:2007 – Guidelines on earthworks for commercial and residential developments;
- Relevant Local Authority design codes.

3.3 Existing Conditions

3.3.1 Geotechnical Information

A Geotechnical report has been completed for this project by Douglas Partners dated July 2014, based on the investigations conducted by the same on the 25th and 26th of June 2014.

The investigation found subsurface conditions to be generally medium dense fill sand over medium dense in situ sand over coffee rock (between 0.9 to 2.7m).

Groundwater was encountered between 0.75 and 2.3m across the site. Ongoing monitoring of groundwater levels is being conducted as part of the project to better inform detailed design.

The report concludes that the site is generally suitable for the development proposed. General recommendations for site preparations are made and generally related to confirming the compaction of previously placed fill material.

The Geotechnical Report recommends further geotechnical investigation at specific building sites is recommended once the schematic design has been completed. The need for this will be assessed by the team during the detailed design stage.

Excavated materials are generally identified as being suitable for re-use as fill.

3.3.2 Groundwater

Information on groundwater levels, based on site monitoring, has been provided in Appendix 4. Groundwater levels observed to date have fluctuated significantly.

3.3.3 Acid Sulfate Soils

As part of the Douglas Partners Geotechnical Investigation a preliminary acid sulfate soils assessment has been undertaken. The site is identified has being of high risk of containing ASS. It is recommended that once detailed design has been completed, and details of depths and extents of excavation are known, that the need for further investigation and an ASS Management Plan be further assessed.

3.3.4 Existing Building Infrastructure

A plan of existing infrastructure to be removed or retained has been prepared within the Scheme Development Report and is to be confirmed prior to proceeding to detailed design.

3.3.5 Existing In ground Services Infrastructure

Overarching existing in ground services are generally depicted within the Scheme Development Report, however the Schematic Design plans, Appendix 1, depict critical existing in ground infrastructure which has been identified as requiring relocation or protection. Further information with respect to existing services and infrastructure shall be provided during detailed design.

3.4 Scope of Work

The scope of work includes:

- Earthworks related to the extension of the main cricket oval to provide a combined cricket/soccer oval.
- Earthworks related to the construction of the Pavilion.
- Earthworks related to the construction of the Promenade.
- Earthworks related to the construction of the wetlands to treat subsoil leachate.
- Drainage related to the construction of the Pavilion and extension of existing playing.
- Western access road, carparking and associated stormwater drainage.
- Cricket/Soccer Pavilion access road, carparking and associated stormwater drainage.

3.5 Proposed Strategies

The following is our general design intent pertinent to the relevant Civil services.

3.5.1 Cricket/Soccer Pitch and Pavilion

Design of earthworks inclusive of:

- Flood routing of overland flows from 1:100 storm events around the proposed building.
- Cutting, filling and levelling of the existing surface to extend playing fields to accommodate new layout.

Design of drainage infrastructure includes:

- Subsoil drainage to the cricket oval to prevent ponding and waterlogging.
- Removal of the existing sub-surface drainage and pump pit and replacement with a swale, subsoil and discharge to Yakamia Creek via treatment wetlands.
- Drainage of the carpark and access road.

3.5.2 Western Access Road and Soccer Pitch

Design of the earthworks include:

- Removal of the existing gravel carpark. Installation of topsoil and turf.
- Relocation of the existing bund around proposed soccer pitch layout.

Design of drainage infrastructure includes:

- Additional subsoil drainage to the ovals where required to alleviate waterlogging.
- Drainage to the ovals to prevent ponding and waterlogging. To be integrated with treatment wetlands once wetland layout, carpark and access road configuration have been determined.
- Drainage of the carpark and access road.

3.5.3 Promenade

Design of the earthworks include:

- Filling and levelling of the proposed alignment to create a suitable subgrade.

Design of drainage infrastructure includes:

- Culvert to proposed Promenade crossing of open drain.
- Extension of existing culvert to suit Promenade.

3.6 Outstanding Information / Risks

We advise of outstanding information required to commence the Civil design:

- ***Confirmation from detailed traffic analysis with respect to volume of parking and access requirements from traffic consultant.***
- ***Confirmation of the extents of proposed WSUD elements (leachate treatment and wetlands).***
- ***Confirmation of which access roads and carparks are being upgraded or constructed, pending budget constraints.***
- ***Provision of playing field sub-surface drainage as constructed and serviceability information.***
- ***Confirmation about the effectiveness or otherwise of the existing flood prevention bunding around ALAC and need for further works. It is understood that this element has not been subject to a significant storm event and that Barnesby Drive upstream works may have alleviated previous flooding issues.***

We advise of potential risks:

- Variations in sub-surface conditions and potential impact on earthworks costs.
- Variations in groundwater levels from those observed due to climatic variability (dry winter to date).
- Service relocation costs.
- Potential site contamination. We note that recent as-constructed advice suggests that existing subsoil infrastructure within the greater precinct is in fact Asbestos based. Furthermore, due to the varying uses of the development area over the course of time, it is recommended that a desktop Environmental study be undertaken to provide preliminary information relating to site contamination.

3.7 Estimated Earthworks Volumes

Preliminary assessments of critical earthworks volumes include:

- Earthworks associated with the preparation of the pavilion site, filling of nearby pond and increasing of the cricket oval playing surface, approx. **4,400m³ of cut** and **4,000m³ of fill**.
- Earthworks related to the filling of the existing pond on the western boundary, approx. **1,500³ of fill**.

It must be noted that these volumes are preliminary in nature only and are based upon digital survey information which may be subject to greater refinement by the Surveyor. Furthermore, it is important to note that not all areas have been modelled to date and as such some volumes may not be included. Please refer to Appendix 5 for the extent of digital modelling completed to date and their associated volume reports. Additionally, no allowance has been made for the removal of unsuitable material if encountered, imported free draining fill, imported topsoil, roll-out turf depth, volume of aggregate associated with drainage layers or the addition of lime as part of acid sulphate management.

4. Electrical Works

4.1 Objectives

- To provide innovative lighting an general power solutions to ensure that the development progresses in a cost efficient, time efficient and safe manner;
- To provide electrical services that are flexible and adaptable to various user groups.

4.2 Scope of Work

The scope of work includes:

- Sports lighting to proposed sports fields.
- General Area lighting (carparks, walkways, promenade, security).
- Lighting control system(s) including existing hockey and multi-use fields.
- General Power (retic equipment, amenities, maintenance).

4.3 Design Standards, Site Conditions and Constraints

4.3.1 Applicable Standards/Guidelines

The Electrical services design will be undertaken in accordance with the relevant Australian Standards with specific reference to the following:

- AS 2560.2.3 -2007.
- WA Department of Sport and Recreation – “Football/Soccer Recommended lighting levels”.

4.3.2 Existing Infrastructure

Several site visits have been undertaken, and existing services have been documented. This is however of limited value as underground services are largely unknown and could potentially be costly if not accurately identified. Further as constructed information will be required if existing cabling, power points etc are to be incorporated in the design.

4.4 Design Intent

4.4.1 Soccer Fields

Soccer fields (5 of) will be illuminated to a minimum average illuminance of 100 lux. This corresponds to the WA Department of Sport and Recreation Club Competition level. A lower mode of lighting (50 lux) will also be provided for ball and physical training.

The above will typically require 4 x 25m hinged masts with 3-5 luminaires per mast. The premier soccer pitch could possibly be illuminated to a higher level (150-200 lux) depending on Client requirements. Power for the lighting installation will be obtained from the new Site Main Switchboard (North Road, north of Soccer/Cricket pavilion) which, will be upgraded as part of the Soccer/Cricket Pavilion works. A lighting switchboard will be required in a location central to the soccer pitches and lighting control kiosks will be required at the base of some light masts. In order to limit the number of kiosks, lighting ballasts will be installed in mast bases where possible.

The lighting will controlled via a web based control system with user friendly access, billing and scheduling being a priority.

4.4.2 Training Ovals Lighting

The main training areas (south of soccer pitches) will be partially illuminated by means of luminaires mounted on the soccer pitch masts. The number of luminaires will be limited by the available space on the mast headgear as well as the available space in the base of the masts.

The lighting will be controlled via a web based control system.

4.4.3 Existing Hockey and Multi-use fields.

The hockey and general purpose fields have existing lighting provided by 4 x masts per field. Whilst "as-constructed" information has not been provided for these, it is our understanding that the lighting is sufficient and that the facilities are in good condition. If deemed cost effective, these facilities will be retrofitted with a web based lighting control system.

4.4.4 General Lighting

General lighting will consist of a combination of timer and PV controlled post top luminaires and bollard lighting. Consideration will be given to access routes between carparks and user areas, cyclist and/or pedestrian pathways and the East/West Promenade. Solar powered bollard and post top lighting will be considered in areas that are deemed to be too far from a conventional power supply.

In order to progress with the general lighting design we require input with regards to walkways, signage and artwork, carpark locations/capacities and the extent of security lighting that may be required.

4.4.5 General Power

General power will be supplied from the Site Main Switchboard, Pavilion switchboard(s) and lighting control kiosks. Power will typically be reticulated via underground conduit and pits which will be designed to cater for both current power requirements as well as predicted future requirements. Power points (GPO's) will be located on existing structures (buildings, masts etc.) or in underground pits. Bollard type structures will only be considered as a last resort, due to their likelihood of being vandalised.

In order to progress with the general power design, we require advice with regards to future power users within the site.

Appendix 1

Schematic Design Drawings

Appendix 2

WGE Upstream Catchment Plans



PLAN
SCALE 1:4000@A1

LEGEND

CATCHMENT 4	CATCHMENT NUMBER
AREA 25.91	CATCHMENT AREA (Ha)
C10 0.50	RUNOFF COEFFICIENT (10yr ARI)
ToC 22.4	TIME OF CONCENTRATION (min)
Q1 0.716	CATCHMENT OUTLOW (1yr ARI) (m^3/s)
Q5 1.484	CATCHMENT OUTFLOW (5yr ARI) (m^3/s)
PUBLIC ROAD PAVEMENT = 8.3%	ESTIMATED ROAD CATCHMENT (% TOTAL)
97	CATCHMENT OUTFLOW LOCATION ("?" INDICATES OUTFLOW LOCATION IS UNCLEAR)
	CATCHMENT LONGEST FLOW PATH

REV.	DESCRIPTION	DRAWN	VER	APPROVED
B	PERCENTAGE OF PUBLIC ROAD PAVEMENT ADDED	ERM	FW	FW 16/09/14
A	ORIGINAL ISSUE	CNI	FW	FW 18/08/14

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ALBANY PERTH MELBOURNE SYDNEY BRISBANE GOLD COAST BUSSELTON SHENZHEN DARWIN

CLIENT:
CITY OF ALBANY

PROJECT:
CENTENNIAL PARK SPORTING PRECINCT

TITLE:
YAKAMIA CATCHMENT ANALYSIS - SHEET 1 OF 2

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED :	SCALE : A1 @ 1:1000
DESIGNED : F. WALLEFELD	APPROVED FOR TENDER:	DATUM : A.H.D.
DRAWN : C. IDLE	APPROVED FOR CONSTRUCTION :	WAPC : -

PROJECT No.	DRAWING No.	REVISION
26689-PER-C	CA1	B

L:\TECH\26600\89\c Plan Catchments.dgn

A1 @ 1:1000
A3 @ 2000

Appendix 3

Preliminary Safety in Design

WOOD & GRIEVE ENGINEERS

Greater Western Precinct
Centennial Park Sporting Precinct, Albany
Risk Management Report
Civil Services

CCS Strategic c/- Gresley Abas
Attention: Mr Nathan Stride
19 September 2014

PRELIMINARY

Prepared by Travis Demeza Project Number: 26689-PER-C
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Revision

REVISION	DATE	COMMENT	APPROVED BY
0	19/09/2014	Preliminary Issue	Travis Demeza

Introduction

In accordance with the principles of safe design for work, this report documents the key information concerning actions taken to address safety within the (civil) design services on this project.

This report is a record for all people involved in later lifecycle phases of this project and contains details about residual risks that WGE are aware of which may present a health and safety risk beyond the completion of the design phase.

The report details the risks that have been mitigated by virtue of compliance with the applicable codes and standards.

It also details the other risks identified and their status at the completion of the design phase for each of the following phases of the project lifecycle:

Construction and Commissioning

Use for its intended purpose.

Maintenance.

Decommissioning/demolition.

In all instances, our risk assessment is based on the assumption that work will be carried out by competent and experienced Contractors. Where conventional hazards have been identified in this report, they are deemed to be those that competent and experienced contractors would routinely manage. Consequently they are always assigned a risk classification of moderate, the highest acceptable level of risk. Responsibility for engaging competent and experienced Contractors lies with the building owner/developer and should be a critical part of the risk management process of the building owner/developer in selecting all Contractors.

To this end, we note that conventional hazards are not explicitly tracked in this report. Only those hazards that represent an actual or potential risk to this project that are greater than conventional are explicitly dealt with. All other conventional risks are dealt with in a collective and general sense.

Note that this report assesses risks for only those components and elements included in the original design. People using this report at later stages of the project's life must determine if additional elements have been added to the building that may impact on the residual risks noted herein.

Risk ratings have been assessed for each hazard identified generally in accordance with the matrix overleaf. Any hazards with a rating greater than moderate at the completion of the design have their residual risk detailed and the party responsible for managing that risk identified within the Residual Risk Report at the end of this report.

WOOD & GRIEVE ENGINEERS

Risk Management Report and Residual Design Risk Report

In accordance with our obligations under Health and Safety Legislation Wood & Grieve Engineers have undertaken a formal safety in design assessment of our civil design services for this project. The purpose of this process is to mitigate or minimise the Health and Safety hazards inherent in this project at the design stage.

This is the first stage in the integrated risk management process which this legislation mandates. In presenting this report to you Wood & Grieve Engineers has discharged its obligations under the Act and responsibility for completing this integrated process passes to the building developer/owner. If you are unclear as to your responsibilities and liabilities under this Health and Safety Legislation, please contact the author and we will be pleased to advise you further.

We have considered the Health and Safety Hazards specific to this project and site applicable to the engineering discipline detailed above with respect to construction, operation, maintenance and demolition or decommissioning.

The risk management report details a comprehensive list of the hazards that have been considered in this design. Where possible these hazards have been mitigated. Others have been limited to conventional levels that competent persons, experienced in operating in that environment, are routinely able to manage in the course of their work. Others require explicit management requiring specific control measures by particular parties. Finally there may be some risks that remain unresolved at the completion of the design phase. These later two situations are explicitly highlighted, where they occur, in the Residual Risk Report at the end of this document.

The Risk Management Report (RMR) follows a systematic risk management process whereby hazards are identified, the risk of harm associated with these hazards is assessed (likelihood and consequence) and a risk rating is derived. This assessment is reviewed at the completion of the design documentation and any residual risks are identified. The risk rating system used is detailed within the RMR.

At the completion of our safety in design process we advise that there are no hazards with a risk rating greater than moderate for this project. Consequently there are no issues arising from our design that you need to inform any other stakeholders about.

Should you have any queries relating to this process, please contact the undersigned.



Signed by: _____

Risk Rating Matrix

	Consequence				
Likelihood	Insignificant 1	Minor 2	Moderate 3	Significant 4	Major 5
Almost Certain A	Moderate	High	Extreme	Extreme	Extreme
Likely B	Moderate	High	Extreme	Extreme	Extreme
Moderate C	Low	Moderate	High	Extreme	Extreme
Unlikely D	Low	Low	Moderate	High	Extreme
Rare E	Low	Low	Low	Moderate	High

Extreme	Immediate attention required, cease activity
High	Additional controls required to reduce the risk to moderate or below
Moderate	Maximum acceptable level of risk. Additional controls may be implemented to improve.
Low	Risks managed by routine procedures.

Risk Management Report

Civil Services - Land Development

Health and Safety risks eliminated through compliance with relevant Australian Codes and Standards either in the design or as required of the Builder by virtue of the project specification.

HAZARD IDENTIFIED	RELEVANT CODES	RISK RATING	RESIDUAL RISK	RESPONSIBLITY
Dust	DEC Guidelines	M	Dust affecting health or safety	Contractor
Buildings become inundated by stormwater	Australian Rainfall and Runoff / Council Guidelines / IPWEA	M	Persons injured as a result of flooding	Owner
Roads impassable due to flooding preventing evacuation	Australian Rainfall and Runoff / Council Guidelines / IPWEA	L	Persons being trapped by flooding	Owner
Works adjacent or works beneath overhead power	Western Power Guidelines	M	Electrocution	Contractor
Inadequate sight lines provided increasing risk of pedestrian and/or vehicle accidents	AS 1742: Uniform traffic control devices / AustRoads	M	Damage to persons due to collision	Owner
Pavement failure due to inadequate design	Austroads: A guide to the Design of New Pavements for Light Traffic / Council policy / IPWEA	M	Persons injured due to traffic accident	Owner
Earthworks not designed for its intended use	AS 3798: Guidelines on earthworks on residential and commercial developments	M	Building Failure and persons injured	Owner
Inadequate design for pedestrians and people with disabilities	AS 1428: Design for access and mobility	M	Persons injured	Owner
Inadequate signage and traffic management during construction	AS 1742: Uniform traffic control devices	M	Persons injured due to traffic accident	Contractor
Inadequate pavement markings and signage post construction	MRWA Standards / AS1742: Uniform traffic control devices	M	Persons injured due to traffic accident	Owner

Risk Management Report

CONSTRUCTION AND COMMISSIONING

Scope of Risk Assessment	Date	Attending (Name and Position)
Greater Western Precinct	19-Sep-14	Project Engineer - Travis Demeza

	HAZARD IDENTIFIED	PRE-DESIGN RISK RATING			DESIGN MITIGATION	POST-DESIGN RISK RATING			RESIDUAL RISK	RESPONSIBILITY
		LIKELIHOOD	CONSEQUENCE	RISK RATING		LIKELIHOOD	CONSEQUENCE	RISK RATING		
☐	**Hazardous substances specified or produced as part of works coming into contact with persons**									
☐	No hazardous substances have been specified or substances used with conventional risks.				N/A					
☐	**Hazardous substances inherent in the site coming into contact with persons**									
☐	No testing has been done. Contractors should take appropriate precautions.	C	4	E	Contractor's SMP	C	2	M	Persons health affected	Contractor
☐	Asbestos potential in fencing, soils and demolition materials	C	4	E	Contractor's SMP	C	2	M	Persons health affected	Contractor
☐	**Excavations causing damage to persons or property**									
☐	Conventional risks only.									
☐	**Risk of injury due to noise or vibration**									
☐	Conventional risks and plant specified.	C	3	H	Contractor's SMP	E	2	L	Damage to property or persons	Contractor
☐	**Risk of injury due to electrocution/explosion/fire**									
☐	Existing services adjacent/through site not located.	E	5	H	Contractor's SMP	E	4	M	Damage to property or persons	Contractor
☐	Potential for private power not indicated on one-call information or as-constructed plans	D	5	E	Contractor's SMP & Service Authority Liaison	E	4	M	Damage to property or persons	Contractor
☐	Specific works adjacent or works beneath overhead power	D	5	E	Contractor's SMP & Service Authority Liaison	E	4	M	Damage to property or persons	Contractor
☐	Haul road or movement of equipment beneath overhead power	D	5	E	Contractor's SMP & Service Authority Liaison	E	4	M	Damage to property or persons	Contractor
☐	Excavation works adjacent overhead power	D	5	E	Contractor's SMP & Service Authority Liaison	E	4	M	Damage to property or persons	Contractor
☐	**Risk of injury due to vehicle impact**									
☐	Conventional risks only.									
☐	**Risk of injury due to falls**									
☐	Conventional risks only.									
☐	**Risk of Injury due to modification of existing structures**									
☐	Conventional risks only.									
☐	**Risk to safety during lifting and erection of materials**									
☐	Conventional risks only.									
☐	**Working in confined spaces**									
☐	Conventional risks only.									
☐	**Inadequate administration/auditing of safe work practices contributing to breach**									
☐	Coventional administration and auditing.									
☐	**Working in Remote Areas**									
☐	Not applicable.									
☐	**Fatigue**									
☐	Conventional risks only.									

Risk Management Report

USE FOR ITS INTENDED PURPOSE

Scope of Risk Assessment	Date	Attending (Name and Position)
Greater Western Precinct	19-Sep-14	Project Engineer - Travis Demeza

	HAZARD IDENTIFIED	PRE-DESIGN RISK RATING			DESIGN MITIGATION	POST-DESIGN RISK RATING			RESIDUAL RISK	RESPONSIBILITY
		LIKELIHOOD	CONSEQUENCE	RISK RATING		LIKELIHOOD	CONSEQUENCE	RISK RATING		
☐	**Vehicle and/or pedestrian conflicts**									
☐	Conventional risks only									
☐	Inadequate pedestrian/vehicle separation and delineation provided	E	5	H	Adopt Council and Aust. Standards	E	4	M	Damage to persons or property	Owner
☐	Pedestrian crossings not specifically designed.	D	5	E	Seek traffic advice and adopt Aust. Standards	E	4	M	Damage to persons or property	Owner
☐	Road design doesn't consider expected vehicle size and movements.	D	4	H	Prepare vehicle movement plan and signage	E	2	L	Damage to persons or property	Owner
☐	**Injury due to pavement failure**									
☐	Conventional risks only									
☐	**Risk to health from sewer system failure**									
☐	Conventional risks only									
☐	**Risk to health from water system failure**									
☐	Conventional risks only									
☐	**Risks due to stormwater**									
☐	Infrastructure may be damaged due to erosion in flood event.	D	4	H	Consider erosion in design	D	3	M	Damage to persons or property	Owner
☐	Roads may be hazardous after flood event.	D	4	H	Use Australian Rainfall & Runoff and consider signage	D	3	M	Damage to persons or property	Owner
☐	Depth and velocities of flows in open drains excessive	D	5	E	Use Australian Rainfall & Runoff as guide	D	3	M	Damage to persons or property	Owner
☐	Flood storage areas at unsafe depth, slope and/or protection	D	5	E	Use Council standards	D	3	M	Injury to persons	Owner
☐	Permanent water bodies have periphery at unsafe depth, slope and/or protection	D	5	E	Use Council standards	D	3	M	Injury to persons	Owner
☐	Large drainage headwalls are inappropriately protected with covers to restrict entry	D	5	E	Incorporate grated at outlets	D	3	M	Injury to persons	Owner
☐	Discharge structures are not suitably designed for expected velocities	D	3	M	Use Council standards or specifically design	D	2	L	Damage to infrastructure	Owner
☐	Intersections have inadequate drainage contributing to traffic accidents	D	3	M	Evaluate during drainage design	D	2	L	Damage to persons or health	Owner
☐	**Risks due to Fire**									
☐	Conventional risks only									
☐	**Earthworks & retaining walls**									
☐	Earthworks not designed for intended use	D	4	H	Loads to be specified and Council to review as part of Building License	E	4	M	Damage to persons or property	Owner
☐	**Electrocution / Explosion**									
☐	Conventional risks only									

Risk Management Report

MAINTENANCE & SERVICING

Scope of Risk Assessment	Date	Attending (Name and Position)
Greater Western Precinct	19-Sep-14	Project Engineer - Travis Demeza

	HAZARD IDENTIFIED	PRE-DESIGN RISK RATING			DESIGN MITIGATION	POST-DESIGN RISK RATING			RESIDUAL RISK	RESPONSIBILITY
		LIKELIHOOD	CONSEQUENCE	RISK RATING		LIKELIHOOD	CONSEQUENCE	RISK RATING		
☐	**Inadequate pavement design**									
☐	Conventional risks only									
☐	**Risks to health and safety associated with maintaining sewer works**									
☐	Conventional risks only									
☐	**As constructed information on potable or non-potable water inadequate**									
☐	Conventional risks only									
☐	**Risk to health and safety associated with stormwater system**									
☐	Conventional risks only									
☐	**Risks to health and safety associated with maintaining earthworks, retaining walls & sea walls**									
☐	Conventional risks only									
☐	**General**									
☐	Conventional risks only									

Risk Management Report

DEMOLITION

Scope of Risk Assessment	Date	Attending (Name and Position)
Greater Western Precinct	19-Sep-14	Project Engineer - Travis Demeza

		PRE-DESIGN RISK RATING				POST-DESIGN RISK RATING				
	HAZARD IDENTIFIED	LIKELIHOOD	CONSEQUENCE	RISK RATING	DESIGN MITIGATION	LIKELIHOOD	CONSEQUENCE	RISK RATING	RESIDUAL RISK	RESPONSIBILITY
☐	**Risks due to exposure to harmful materials**									
☐	Conventional risks only									

Risk Management Report

Residual Risk Report

Scope of Risk Assessment	Date	(Name and Position)	
Greater Western Precinct	19-Sep-14	Project Engineer - Travis Demeza	

HAZARD IDENTIFIED	POST-DESIGN RISK RATING			RESIDUAL RISK	RESPONSIBILITY
	LIKELIHOOD	CONSEQUENCE	RISK RATING		

Appendix 4

WGE Groundwater Logging Information



Groundwater Monitoring - Centennial Park Sporting Precinct

Name		SP10		SP8		SP7		CPT1		CPT2		CPT3		CPT4		CPT5		CPT6		CPT9	
		RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)
Bore Surface Level		**19.3**	***0***	**17.1**	***0***	**21.5**	***0***	**19.4**	***0***	**20.4**	***0***	**15.4**	***0***	**14.9**	***0***	**17.3**	***0***	**19**	***0***	**17.1**	***0***
Date																					
27/06/2014	Douglas Partners	18.45	*850*	17.1	*0*	20.8	*700*	18.7	*700*	19.6	*800*	14.55	*850*	13.7	*1200*	16.1	*1200*	18.75	*250*	dry	-
25/08/2014	WGE	18.38	*920*	16.97	*130*	20.4	*1100*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1/09/2014	WGE	18.56	*740*	17.08	*20*	20.85	*650*	18.75	*650*	19.63	*770*	14.75	*650*	14.75	*150*	16.34	*960*	18.9	*100*	14.14	*2960*
11/09/2014	WGE	18.51	*790*	17.1	*0*	20.91	*590*	18.82	*580*	19.6	*800*	14.75	*650*	14.77	*130*	16.44	*860*	19	*0*	14.29	*2810*

CADASTRAL SOURCE: Landgate, July 2014.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown December 2013.

82305-d01.dgn

PINPOINT CARTOGRAPHICS (08) 9562 7136

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Gresley Abas Pty Ltd		TITLE: **Location of Tests and Standpipes** **Centennial Park Sporting Precinct** **Albany, WA**
OFFICE: Perth	DRAWN BY: P. Hutchinson	
SCALE: As shown	DATE: 21 Jul 2014	

N
MGA

PROJECT No.: 82305
DRAWING No.: 1
REVISION: A

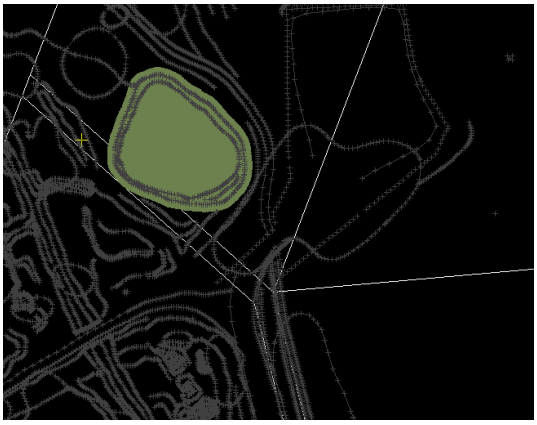
Appendix 5

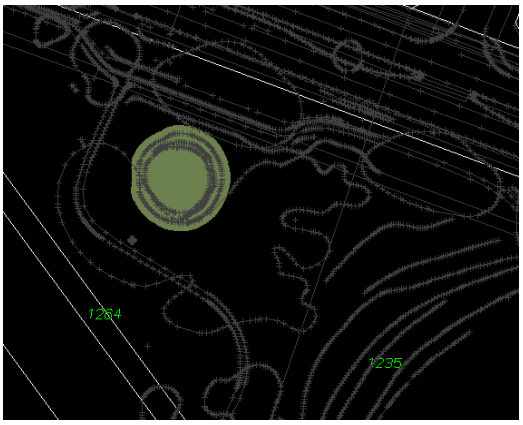
Preliminary Earthworks Modelling Screen Captures

Western Precinct

2 x basin fill

Earthworks: **3100m³ of fill** (total for 2 basins)

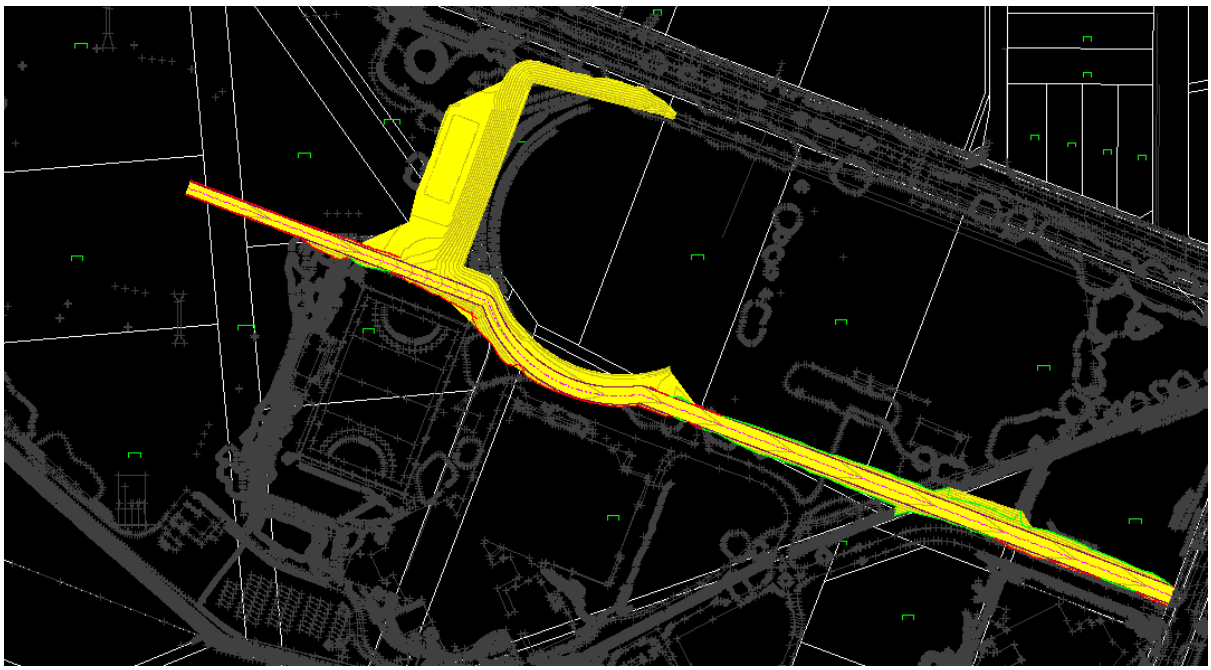




Building pad, expansion of field and swales, promenade

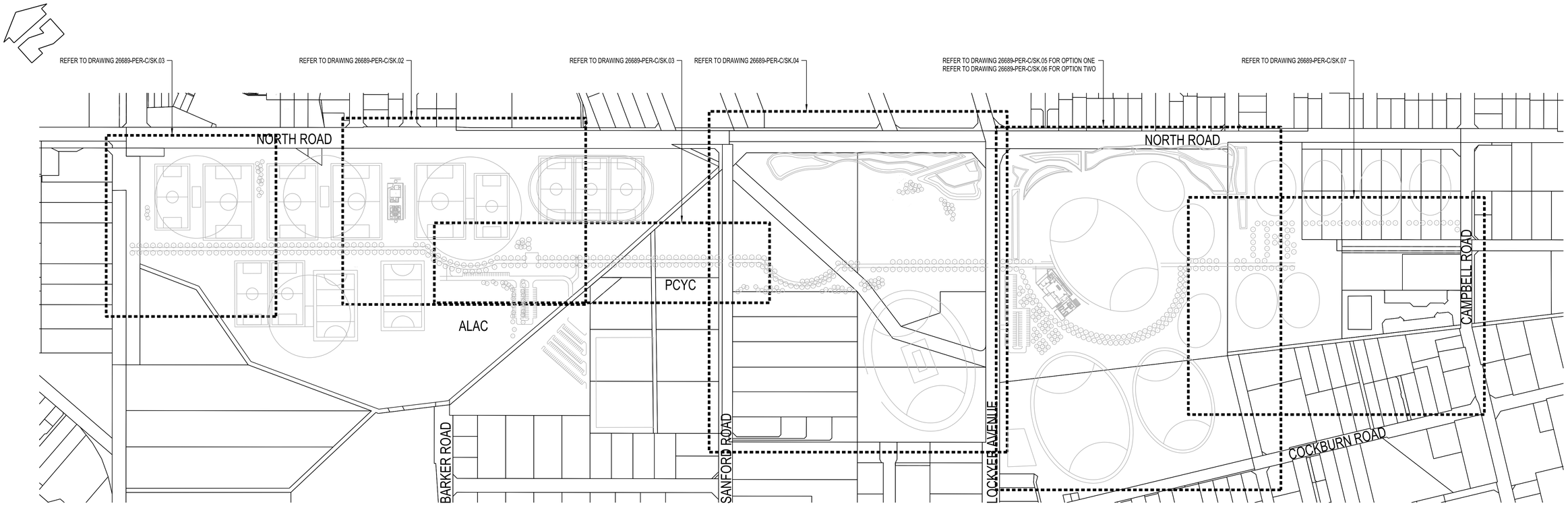
Earthworks: **1780m³ of fill**

4400m³ of cut



Notes:

Assume basins can be filled with cut material. Majority of fill will be imported clean fill. No allowance made for topsoil strip or replacement. Volumes are from existing surface to final design level, including topsoil where applicable.



PLAN
SCALE 1:3000

REV.	DESCRIPTION	DRAWN	VER	APPROVED
A	ORIGINAL ISSUE	CNI	FW	TJD 21/09/14

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GOLD COAST
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SHENZHEN
DARWIN

CLIENT:
CITY OF ALBANY

PROJECT:
CPSP SCHEMATIC DESIGN REPORT

TITLE:
EARTHWORKS AND DRAINAGE ARRANGEMENT PLAN

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED : FW 21/09/2014	SCALE : A1
DESIGNED : CNI	APPROVED FOR TENDER:	DATUM : A.H.D.
DRAWN : CNI	APPROVED FOR CONSTRUCTION :	WAPC : -

PROJECT No.	DRAWING No.	REVISION
26689-PER-C	SK.01	A

DIAL BEFORE YOU DIG www.1100.com.au

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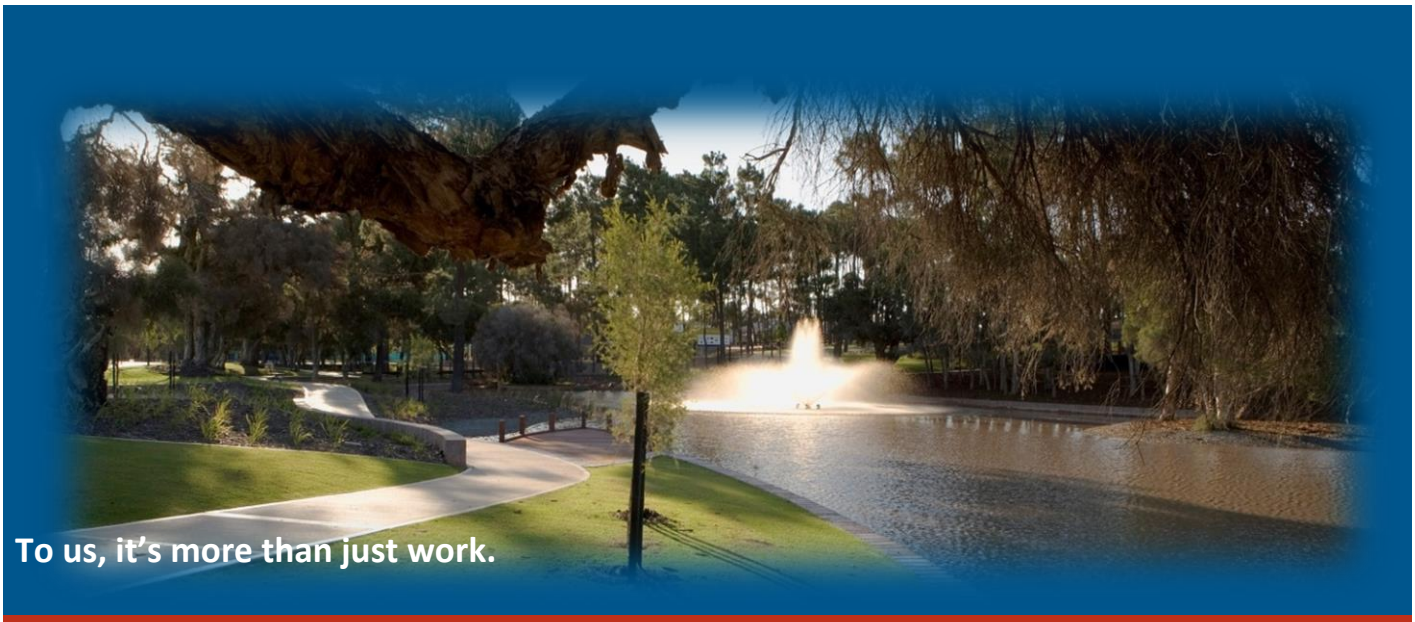
4

Centennial Park

Central & Eastern Precinct Electrical & Civil Schematic Design Report

Wood & Grieve Engineers

22 September 2014



Centennial Park Sporting Precinct, Albany

Schematic Design Report
Greater Central and Eastern Precinct
Civil and Electrical

Prepared for:

Mr Ahmad Abas
Gresley Abas

Prepared by:

Fred Wallefeld, Travis Demeza & Rocco Pienaar
Project No. 26689-PER-CE
M:\TECH\26600\89\C_CL_RE_001 SD REPORT EP.DOCX

Date:
22 September 2014

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WOOD & GRIEVE ENGINEERS

Revision

REVISION	DATE	COMMENT	APPROVED BY
0	22 September 2014	Issued for Client Comment	Travis Demeza

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Centennial Park Sporting Precinct, Albany

1. Introduction

1.1 General

This Schematic Design Report has been prepared at the request of Gresley Abas (GA) on behalf of the City of Albany (COA), for the Centennial Park Sporting Precinct, Albany.

The purpose of this report is to inform the Client of the general intention of the engaged services as proposed by Wood & Grieve Engineers (WGE). Items highlighted in ***bold italics*** represent specific queries and/or project risks that we wish to draw your attention to.

This document serves as the benchmark which our services must achieve. It is also a 'snapshot in time' of the design at the time of writing. Some aspects of the design may have already changed from what is written at the time of issue and this is expected. It is intended that this Schematic Design Report be updated and re-issued, following receipt of comments from the Client.

We request you read this carefully so that you have a clear understanding of the scope of our work.

We would welcome any comments you may have on the information provided in this report.

This document should be read in conjunction with the following Schematic Design Preliminary Drawings, attached within Appendix 1:

- Earthworks & Drainage Arrangement Plan, *26689-PER-C-SK.01 (Rev A)*
- Earthworks & Drainage – Central Precinct, *26689-PER-C-SK.04 (Rev A)*
- Earthworks & Drainage – Eastern Precinct – Sheet 1, *26689-PER-C-SK.05 (Rev A)*
- Earthworks & Drainage – Eastern Precinct – Sheet 2, *26689-PER-C-SK.06 (Rev A)*
- Earthworks & Drainage – Eastern Precinct – Sheet 3, *26689-PER-C-SK.07 (Rev A)*.

This Schematic Design Report has been prepared based on the following information:

- Preliminary Survey by Whelans July 2014
- GIS information supplied by the COA
- The Scheme Development Report, 24th July 2014 (REALM)
- Schematic Design Scheme ($42 Million), 12th September 2014
- Geotechnical Report by Douglas Partners
- COA stormwater modelling of expected flows. Refer to attachments within Appendix 2
- Catchment Plans of upstream conditions (prepared by WGE). Refer to attachments within Appendix 3
- Relevant RFI responses provided by the City of Albany to date.

1.2 Site Location & Project Overview

The 'Eastern Precinct' is bounded by Locker Avenue to the west, North Road to the north, Campbell Road to the east and Cockburn Road to the south.

The project comprises the development of a Football Stadium Pavilion for patronage and public amenity. The proposed building will be connected via the proposed "central spine" and service vehicle access will be provided to the back of house. A designated vehicle parking and a hard landscaped pedestrian promenade will be provided as part of the building. Refer to Schematic Design Reports for the Football Stadium Pavilion for more detailed information in this regard.

In general the precinct wide works comprise of:

- Earthworks and associated stormwater drainage for the:
  - Main AFL oval
  - AFL training oval
  - Junior AFL oval
  - Promenade
- Bunding for spectator viewing and assisting with flood routing around major oval;
- Earthworks for irrigation volume and WSUD treatment of oval subsoil leachate;
- Roadworks and associated stormwater drainage connecting Campbell Road to the proposed Promenade;
- Installation of sports lighting for the main oval and training oval; and
- Electrical works associated with event usage.

1.3 Safety in Design

Wood and Grieve Engineers operates a Safety in Design (SID) procedure based on "Code of Practice - Safe Design of Buildings & Structures 2008" published by the Commission for Occupational Safety & Health, Western Australia.

Compliance with this Code of Practice will ensure that all designs will be safe to install, operate, maintain and dismantle by appropriately experienced contractors.

Any hazards that cannot be eliminated by design will be identified and the appropriate work practices, protection and work methods required should be formulated by the contractor.

A preliminary safety in design report has been prepared to date for our internal records, and attached within Appendix 4. A final safety in design report will be provided for the client upon completion of the detailed design, prior to tender, and form part of the tender documentation.

1.4 Programme

Review of the current D.W Kolagow & Associates programme (Revision 4) identifies the following key milestones pertinent to the Western Precinct Soccer / Cricket Pavilion:

- Schematic Design Deliverable to Client 22 September 2014
- Design Development Deliverable to Client 19 December 2014
- Finalise Contract & Tender Documentation 15 June 2015.

1.5 Budget

At the time of writing, there are still various decisions pending regarding the scope of works in order to meet budget requirements.

Items WGE suggest to be reviewed in the ongoing process include:

1. Delaying the closure and piping of 125m of existing open drain running north from Symers Street to the proposed Promenade. Assumed to be removed from scope, not included in design.
2. Removal of part of the proposed viewing bund (northern semi-circle) and acceptance of very occasional, temporary inundation of part of the playing field and surrounds. Earthworks design for this option is provided.
3. Construction of permanent carparking to an asphalt standard, pending confirmation of traffic parking volume.

1.6 Checking Procedures

This project falls into category A as determined by Wood & Grieve Engineers Quality Manual, accordingly all drawings and specifications will be reviewed by the Project Engineer prior to issuing.

2. Critical Issues

The following list itemises the critical issues for the project's services:

2.1 Civil

- Earthworks and drainage to prevent flooding of the existing Royals building and proposed Stadium and club facilities;
- Upgrade of the existing eastern access road and provision of parking;
- Earthworks for the proposed Stadium and Clubrooms;
- Earthworks associated with the construction of the new oval and promenade;
- Earthworks associated with the construction of the proposed wetlands and rainwater capture infrastructure;
- Ensuring the protection or relocation of existing services as required to suit the proposed development;
- Modification of the existing Water Corporation wastewater lid within proposed junior oval; and;
- Confirmation of 1 in 100 year flood flows – conflicting anecdotal evidence versus modelling analysis provided by COA. Assumptions made with respect to flow location and direction.

2.2 Electrical

- Confirmation of existing Electrical infrastructure to confirm design.
- Confirmation of event power demands and typical usage.

3. Civil Works

3.1 Objectives

- To provide innovative Civil solutions to ensure that the development progresses in a cost efficient, time efficient and safe manner.
- To provide Civil Services of commercial quality with a minimum engineered design life of 20 – 25 years.

3.2 Design Criteria

The Civil services will be undertaken in accordance with the following documents:

- Australian Rainfall & Runoff – 1987;
- Department of Water:- Stormwater Management Manual;
- Australian Standards:- AS 2890.1:2004 – Parking Facilities, Part 1: Off-street car parking, as required;
- Australian Standards:- AS 3798:2007 – Guidelines on earthworks for commercial and residential developments;
- Relevant Local Authority design codes.

3.3 Existing Conditions

3.3.1 Geotechnical Information

A Geotechnical report has been completed for this project by Douglas Partners dated July 2014, based on the investigations conducted by the same on the 25th and 26th of June 2014.

The investigation found subsurface conditions to be generally medium dense fill sand over medium dense in situ sand over coffee rock (between 0.9 to 2.7m).

Groundwater was encountered between 0.75 and 2.3m across the site. Ongoing monitoring of groundwater levels is being conducted as part of the project to better inform detailed design.

The report concludes that the site is generally suitable for the development proposed. General recommendations for site preparations are made and generally related to confirming the compaction of previously placed fill material.

The Geotechnical Report recommends further geotechnical investigation at specific building sites is recommended once the schematic design has been completed. The need for this will be assessed by the team during the detailed design stage.

Excavated materials are generally identified as being suitable for re-use as fill.

3.3.2 Groundwater

Information on groundwater levels, based on site monitoring, has been provided in Appendix 5. Groundwater levels observed to date have fluctuated significantly.

3.3.3 Acid Sulfate Soils

As part of the Douglas Partners Geotechnical Investigation a preliminary acid sulfate soils assessment has been undertaken. The site is identified has being of high risk of containing ASS. It is recommended that once detailed design has been completed, and details of depths and extents of excavation are known, that the need for further investigation and an ASS Management Plan be further assessed.

3.3.4 Existing Building Infrastructure

A plan of existing infrastructure to be removed or retained has been prepared within the Scheme Development Report and is to be confirmed prior to proceeding to detailed design.

3.3.5 Existing In ground Services Infrastructure

Overarching existing in ground services are generally depicted within the Scheme Development Report, however the Schematic Design plans, Appendix 1, depict critical existing in ground infrastructure which has been identified as requiring relocation or protection. Further information with respect to existing services and infrastructure shall be provided during detailed design.

3.4 Scope of Work

The scope of work includes:

- Earthworks related to the construction of the premier AFL oval and stadium.
- Earthworks related to the construction of the Promenade.
- Earthworks related to the construction of stormwater management and irrigation retention volume.
- Drainage related to the construction of the premier AFL oval and stadium.
- Access road and associated stormwater drainage from Campbell Road to Symers Street (including Knight Street).
- AFL stadium carparking and access from Lockyer Avenue.

3.5 Proposed Strategies

The following is our general design intent pertinent to the relevant Civil services:

3.5.1 Premier AFL Oval and Stadium

Design of earthworks inclusive of:

- Flood routing of overland flows from 1:100 storm events around the proposed clubrooms and Stadium/Club facilities. To include filling for Stadium/Club building. Refer to Appendix 6 for preliminary hand sketches relating to flood routing.
- Filling and levelling of the oval to create a suitable playing surface.
- Design of an earth bund approximately 1.5m high with 1:8 slopes to facilitate parked spectator viewing as per general landscape requirements. Bund to be mowable.

Design of drainage infrastructure includes:

- Drainage to the oval surface to prevent ponding and waterlogging.
- Drainage of the carpark and access road.

3.5.2 Training Ovals

Design of the earthworks include:

- Filling and levelling of the ovals to create a suitable playing surface.
- Shaping of overland flood route.

3.5.3 Promenade

Design of the earthworks include:

- Filling and levelling of the proposed alignment to create a suitable subgrade.

3.5.4 Eastern Access Road (Campbell Road to Symers Street)

Design of the earthworks include:

- Cutting or filling as required of the proposed road alignment to create a suitable subgrade.
- Cutting and filling to direct over land flows north from Knight Street to the proposed flood route north of the premier AFL oval.
- Cutting of the existing earth bank adjacent to the rear of Lot 30 Campbell Road in order to move the existing swale east and maximise playing field area.

Design of the drainage includes:

- Culvert to proposed Promenade crossing of open drain.
- Extension of pipe drainage and connection of subsoil from bio retention swales.

3.6 Outstanding Information / Risks

We advise of outstanding information required to commence the Civil design:

- ***Resolution of Schematic Design for the Premier AFL Oval and club rooms (location, extent of viewing bund etc).***
- ***Confirmation from detailed traffic analysis with respect to volume of parking and access requirements from traffic consultant.***
- ***Confirmation of the extent of stormwater runoff capture infrastructure.***
- ***Confirmation of which access roads and carparks are being upgraded or constructed, pending budget constraints.***
- ***Confirmation of what existing infrastructure is being retained or removed.***
- ***Premier Oval turf design and requirements for subgrade preparation and civil earthworks.***

We advise of potential risks:

- Variations in sub-surface conditions and potential impact on earthworks costs.
- Variations in groundwater levels from those observed due to climatic variability (dry winter to date).
- Service relocation costs.
- Potential site contamination. We note that recent as-constructed advice suggests that existing subsoil infrastructure within the greater precinct is in fact Asbestos based. Furthermore, due to the varying

uses of the development area over the course of time, it is recommended that a desktop Environmental study be undertaken to provide preliminary information relating to site contamination.

3.7 Estimated Earthworks Volumes

Preliminary assessments of critical earthworks volumes include:

- Central precinct earthworks associated with the construction of stormwater management and irrigation retention volume, **8,700m³ of cut.**
- Eastern precinct earthworks associated with the construction of stormwater management and irrigation retention volume, **9,350m³ of cut***. ** = From Syrinx design supplied 09 September 2014, since revised. Impact on volumes to be confirmed.*
- Earthworks related to the construction of the premier AFL oval, stadium and Promenade, **23,950m³ of fill** with;
  - 16,370 m³ in bund (approx. 9000 m³ to north of promenade axis);
  - 7,325 m³ in oval and; and
  - 255 m³ in Promenade.

It must be noted that these volumes are preliminary in nature only and are based upon digital survey information which may be subject to greater refinement by the Surveyor. Furthermore, it is important to note that not all areas have been modelled to date and as such some volumes may not be included. Please refer to Appendix 7 for the extent of digital modelling completed to date and their associated volume reports. Additionally, no allowance has been made for the removal of unsuitable material if encountered, imported free draining fill, imported topsoil, roll-out turf depth, volume of aggregate associated with drainage layers or the addition of lime as part of acid sulphate management.

4. Electrical Works

4.1 Objectives

- To provide innovative lighting and general power solutions to ensure that the development progresses in a cost efficient, time efficient and safe manner;
- To provide electrical services that are flexible and adaptable to various user groups, functions and special events.

4.2 Scope of Work

The scope of work includes:

- Sports lighting to main oval, training oval and training field.
- General Area lighting (carparks, special events, security).
- Lighting control system(s) including existing junior soccer lighting.
- Special events power (Ag show, caravan club).

4.3 Design Standards, Site Conditions and Constraints

4.3.1 Applicable Standards/Guidelines

The Electrical services design will be undertaken in accordance with the relevant Australian Standards with specific reference to the following:

- AS 2560.2.3 -2007.
- AFL – Preferred Facility Guidelines for State, Regional and Local Facilities (Aug 2012).

4.3.2 Existing Infrastructure

A plan has been obtained from the City of Albany showing a number of existing power points in the Eastern Precinct. This has insufficient detail and further as-constructed information will be required if existing cabling, power points etc are to be incorporated in the design.

4.4 Design Intent

4.4.1 Premier AFL Oval Lighting

The Premier Oval will ultimately be illuminated in accordance with the requirements for a Professional level competition (min 500lux) and will also have intermediate modes of operation to cater for fitness, practice, match practice and lesser levels of competition.

This will typically require 6 x 35m hinged masts with approx. 15-18 luminaires per mast. Power for the lighting installation will be obtained from the Site Main Switchboard which, together with the Western Power incoming supply, will be upgraded as part of the Football Stadium works. A lighting cabinet may be required near the base of each mast to house the lighting control gear, ballasts and circuit protection.

The lighting will be controlled via a web based control system with user friendly access, billing and scheduling being a priority.

Centennial Park Sporting Precinct, Albany

4.4.2 Training Ovals Lighting

The main training oval (West) will be illuminated to Club competition and match practice level (min 100lux) while the Eastern training oval will be partially illuminated from the same masts on the main training oval.

This will typically require 4 x 25m hinged masts 6-8 luminaires per mast. Power for the lighting installation will be obtained from the Site Main Switchboard, which will provide power to a lighting control cabinet on the Western side of the Main training oval.

The lighting will be controlled via a web based control system.

4.4.3 Junior Soccer Pitch lighting

The junior soccer pitch (North East of Eastern Precinct) has an existing 4 mast lighting arrangement. The standard of lighting is unknown and we note that we are unable to assess the lighting levels without information on the pole heights, luminaire types and modes of operation.

The intention for this pitch is to determine the extent of lighting required by the user group(s), and if deemed necessary, to upgrade the lighting accordingly.

If deemed cost effective, a web based lighting control system will be retrofitted.

4.4.4 Carpark, Area and Security lighting

General lighting will consist of a combination of timer and PV controlled pole mounted luminaires. Consideration will be given to access routes between carparks and user areas, special event requirements and security requirements. Solar powered bollard and post top lighting will be considered in areas that are deemed to be too from a conventional power supply.

In order to progress with the general lighting design we require input with regards to special event lighting requirements.

4.4.5 Special events power

Special events power will be supplied from the Site Main Switchboard, Stadium switchboard(s), and lighting control kiosks. Power will typically be reticulated via underground conduit and pits, and power points will be located on existing structures (buildings, masts etc) or in underground pits. Bollard type structures will only be considered as a last resort, due to their likelihood of being vandalised.

In order to progress with the general power design, we require advice with regards to existing infrastructure as well as special events power requirements.

Appendix 1

Schematic Design Drawings

Appendix 2

City of Albany Stormwater Modelling Information

Fred Wallefeld

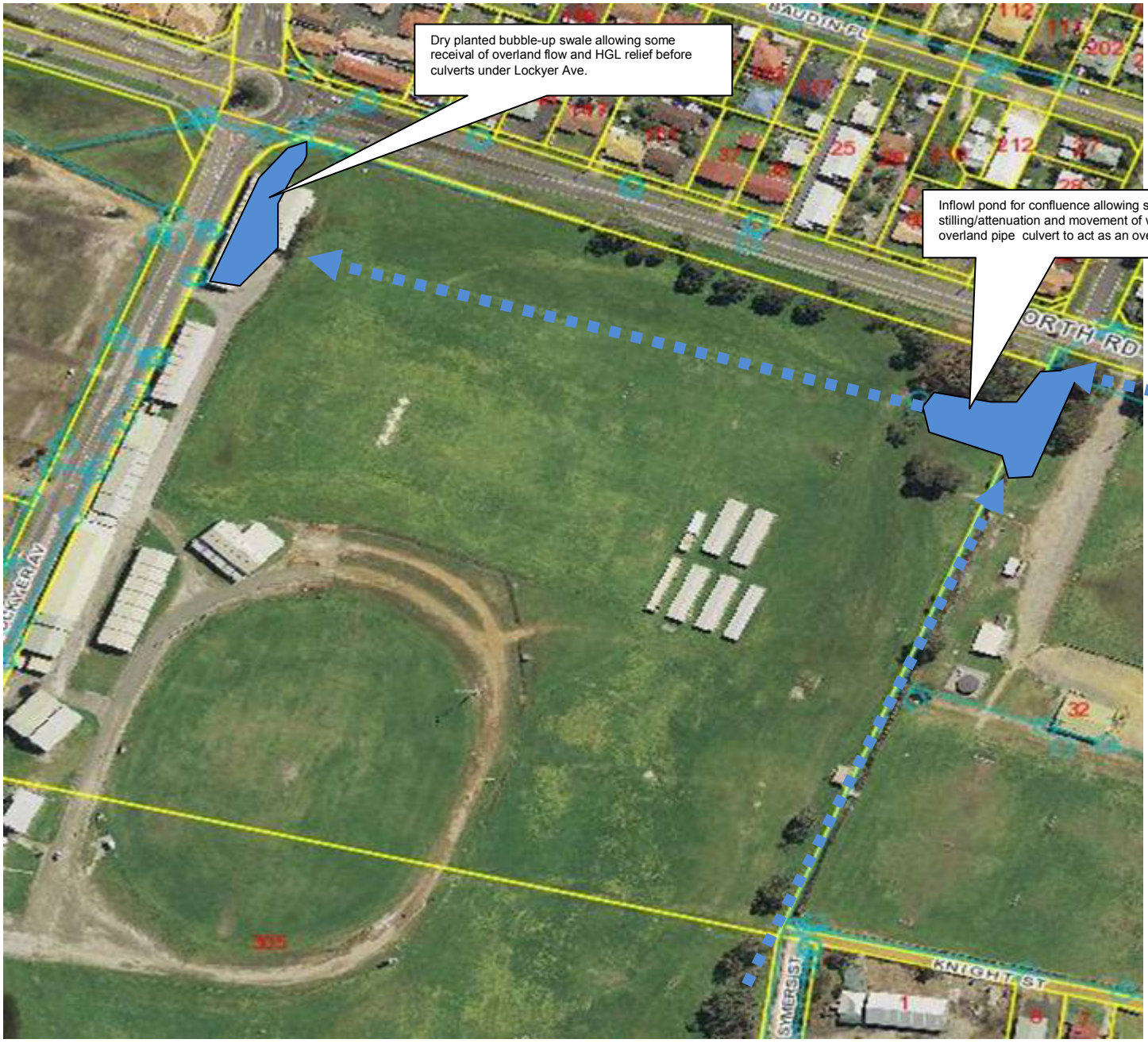
From: Austin Rogerson <austinr@albany.wa.gov.au>
Sent: Friday, 27 June 2014 3:29 PM
To: Travis Demeza; Fred Wallefeld; David King
Subject: Cull Park 5y ARI Model out put
Attachments: Bluff to Cull (pipe).pdf; Soccer (flows).pdf; Soccer (pipe).pdf

Hi Fred and Travis,

Please find the 5year ARI DRAINS model outputs for stormwater into Centennial Precinct at Symers/ Knight and Cull Park (Campbell) as discussed.

I have asked Danny to re run the model with 100y ARI storms and he will hopefully deliver them soon to me or David if next week as I will be on leave from tonight until the 22 July. So if there is any delay in receiving the 100y model please get Dave to follow-up.

Fred - the minuets look fine and I can't add anything except that I had been discussing with OPUS the merits of installing a small open pond at the current confluence of flow at the soccer grounds to receive water and redirect into outflow pipe or overtop in a controlled overland flood route (i.e. weir) see photo., and also the merits of a bubble up swale to ease flooding of culverts and Lockyer Ave at the Lockyer culvert crossing adjacent to the chook sheds. This would be designed to receive overland flows from the upstream (aforementioned) weir head pond. (just considerations)



Austin Rogerson
Senior Civil Engineering Officer Drainage

Tel: (08) 9841 9330
Mobile: 0428 560 632
Fax: (08) 9841 4099

PO Box 484 | Albany | WA | 6331 (39 Mercer Road Walmsley) | www.albany.wa.gov.au

Please consider the environment before printing this email.

From: Danny Burkett [mailto:Danny.Burkett@opus.com.au]
Sent: Tuesday, 10 June 2014 12:45 PM
To: Austin Rogerson; Roger Cations
Subject: Cull Park

Austin,

As discussed, attached are some screen shots from the DRAINS model for this project.



Dr Danny Burkett | Business Manager | Technical Principal (Water) | Opus International Consultants (PCA) Pty Ltd
Phone +61 8 9892 9623 | Mobile +61 428 403 595 | Fax +61 8 9842 6055 | Email Danny.Burkett@opus.com.au
Albany House, 125 York Street, Albany, Western Australia
PO Box 5236, Albany WA 6331, Australia

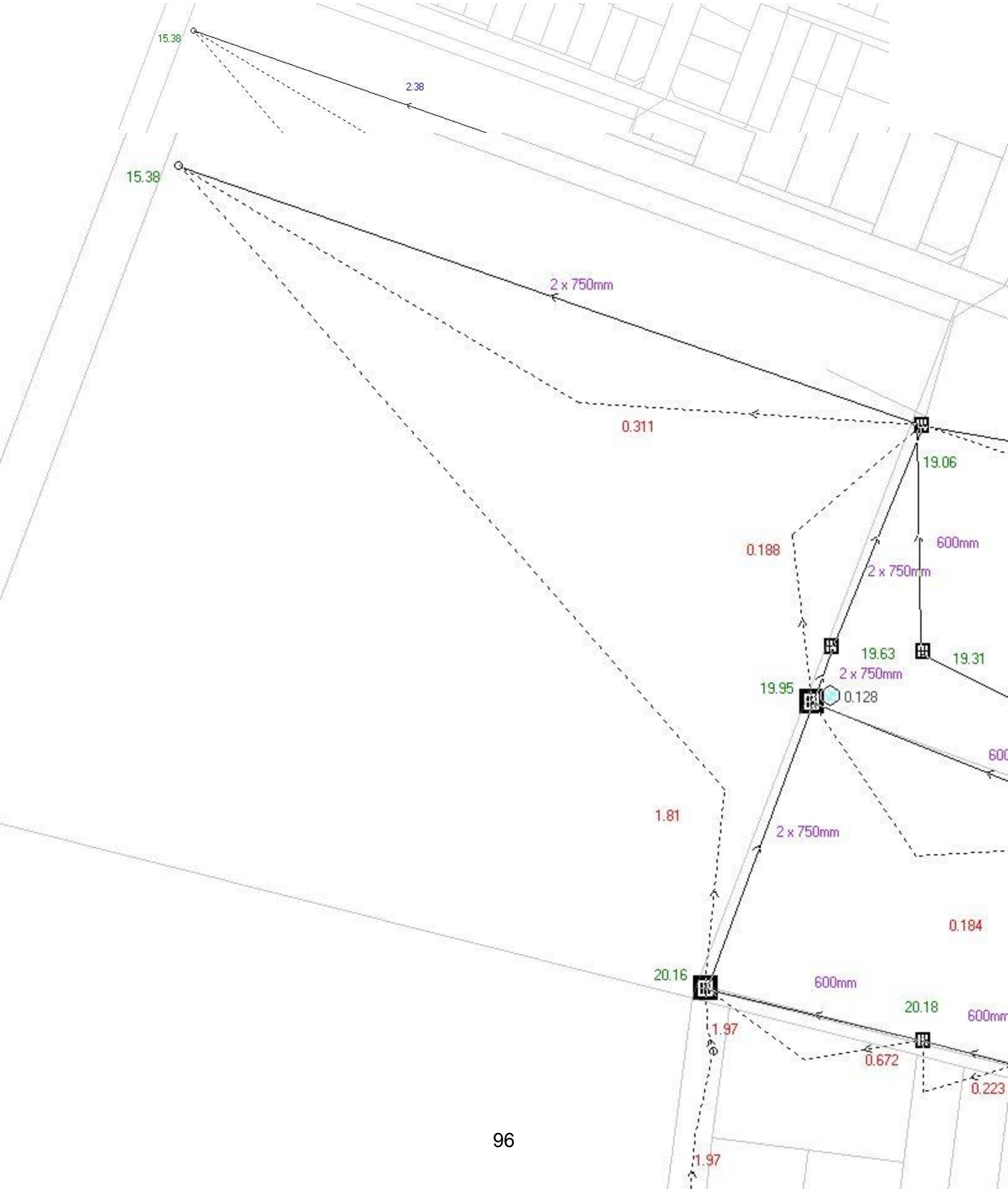
Visit us online: www.opus.com.au



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REPORT ITEM SCM 010 REFERS


15.38
2.38
15.38
2 x 750mm
0.311
19.06
600mm
0.188
2 x 750mm
19.63
19.31
2 x 750mm
19.95
0.128
1.81
2 x 750mm
0.184
20.16
600mm
20.18
600mm
1.97
0.672
0.223
1.97

Appendix 3

WGE Upstream Catchment Plans



PLAN
SCALE 1:4000@A1

LEGEND

CATCHMENT 4	CATCHMENT NUMBER
AREA 25.91	CATCHMENT AREA (Ha)
C10 0.50	RUNOFF COEFFICIENT (10yr ARI)
ToC 22.4	TIME OF CONCENTRATION (min)
Q1 0.716	CATCHMENT OUTLOW (1yr ARI) (m^3/s)
Q5 1.484	CATCHMENT OUTFLOW (5yr ARI) (m^3/s)
PUBLIC ROAD PAVEMENT = 8.3%	ESTIMATED ROAD CATCHMENT (% TOTAL)
97	CATCHMENT OUTFLOW LOCATION ("?" INDICATES OUTFLOW LOCATION IS UNCLEAR)
	CATCHMENT LONGEST FLOW PATH

REV.	DESCRIPTION	DRAWN	VER	APPROVED
B	PERCENTAGE OF PUBLIC ROAD PAVEMENT ADDED	ERM	FW	FW 16/09/14
A	ORIGINAL ISSUE	CNI	FW	FW 18/08/14

WOOD & GRIEVE ENGINEERS
Wood & Grieve Engineers Ltd
A.C.N. 137 999 609
L1, The Terrace Centre
96-102 Stirling Terrace, Albany
Western Australia 6330
Phone: +61 8 9842 3700
Fax: +61 8 9842 1340
Email wge@wge.com.au
Web www.wge.com.au
ALBANY PERTH MELBOURNE SYDNEY BRISBANE GOLD COAST BUSSELTON SHENZHEN DARWIN

CLIENT:
CITY OF ALBANY

PROJECT:
CENTENNIAL PARK SPORTING PRECINCT

TITLE:
YAKAMIA CATCHMENT ANALYSIS - SHEET 1 OF 2

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED :	SCALE :	A1 @ 1:1000
DESIGNED : F. WALLEFELD	APPROVED FOR TENDER:	DATUM :	A.H.D.
DRAWN : C. IDLE	APPROVED FOR CONSTRUCTION :	WAPC :	-

PROJECT No.	DRAWING No.	REVISION
26689-PER-C	CA1	B

L:\TECH\26600\89\c Plan Catchments.dgn

A1 @ 1:1000
A3 @ 1:2000

Appendix 4

Preliminary Safety in Design

WOOD & GRIEVE ENGINEERS

Greater Central & Eastern Precinct
Centennial Park Sporting Precinct, Albany
Risk Management Report
Civil Services

CCS Strategic c/- Gresley Abas
Attention: Mr Nathan Stride
19 September 2014

PRELIMINARY

Prepared by Travis Demeza Project Number: 26689-PER-C
Ground Floor, 226 Adelaide Terrace, Perth WA 6000
Phone (08) 6222 7000 **Fax** (08) 6222 7100 **Email** wge@wge.com.au **Web** www.wge.com.au

Albany Brisbane Busselton Darwin Melbourne Perth Shenzhen Sydney

Revision

REVISION	DATE	COMMENT	APPROVED BY
0	19/09/2014	Preliminary Issue	Travis Demeza

Introduction

In accordance with the principles of safe design for work, this report documents the key information concerning actions taken to address safety within the (civil) design services on this project.

This report is a record for all people involved in later lifecycle phases of this project and contains details about residual risks that WGE are aware of which may present a health and safety risk beyond the completion of the design phase.

The report details the risks that have been mitigated by virtue of compliance with the applicable codes and standards.

It also details the other risks identified and their status at the completion of the design phase for each of the following phases of the project lifecycle:

Construction and Commissioning

Use for its intended purpose.

Maintenance.

Decommissioning/demolition.

In all instances, our risk assessment is based on the assumption that work will be carried out by competent and experienced Contractors. Where conventional hazards have been identified in this report, they are deemed to be those that competent and experienced contractors would routinely manage. Consequently they are always assigned a risk classification of moderate, the highest acceptable level of risk. Responsibility for engaging competent and experienced Contractors lies with the building owner/developer and should be a critical part of the risk management process of the building owner/developer in selecting all Contractors.

To this end, we note that conventional hazards are not explicitly tracked in this report. Only those hazards that represent an actual or potential risk to this project that are greater than conventional are explicitly dealt with. All other conventional risks are dealt with in a collective and general sense.

Note that this report assesses risks for only those components and elements included in the original design. People using this report at later stages of the project's life must determine if additional elements have been added to the building that may impact on the residual risks noted herein.

Risk ratings have been assessed for each hazard identified generally in accordance with the matrix overleaf. Any hazards with a rating greater than moderate at the completion of the design have their residual risk detailed and the party responsible for managing that risk identified within the Residual Risk Report at the end of this report.

WOOD & GRIEVE ENGINEERS

Risk Management Report and Residual Design Risk Report

In accordance with our obligations under Health and Safety Legislation Wood & Grieve Engineers have undertaken a formal safety in design assessment of our civil design services for this project. The purpose of this process is to mitigate or minimise the Health and Safety hazards inherent in this project at the design stage.

This is the first stage in the integrated risk management process which this legislation mandates. In presenting this report to you Wood & Grieve Engineers has discharged its obligations under the Act and responsibility for completing this integrated process passes to the building developer/owner. If you are unclear as to your responsibilities and liabilities under this Health and Safety Legislation, please contact the author and we will be pleased to advise you further.

We have considered the Health and Safety Hazards specific to this project and site applicable to the engineering discipline detailed above with respect to construction, operation, maintenance and demolition or decommissioning.

The risk management report details a comprehensive list of the hazards that have been considered in this design. Where possible these hazards have been mitigated. Others have been limited to conventional levels that competent persons, experienced in operating in that environment, are routinely able to manage in the course of their work. Others require explicit management requiring specific control measures by particular parties. Finally there may be some risks that remain unresolved at the completion of the design phase. These later two situations are explicitly highlighted, where they occur, in the Residual Risk Report at the end of this document.

The Risk Management Report (RMR) follows a systematic risk management process whereby hazards are identified, the risk of harm associated with these hazards is assessed (likelihood and consequence) and a risk rating is derived. This assessment is reviewed at the completion of the design documentation and any residual risks are identified. The risk rating system used is detailed within the RMR.

At the completion of our safety in design process we advise that there are no hazards with a risk rating greater than moderate for this project. Consequently there are no issues arising from our design that you need to inform any other stakeholders about.

Should you have any queries relating to this process, please contact the undersigned.



Signed by: _____

Risk Rating Matrix

	Consequence				
Likelihood	Insignificant 1	Minor 2	Moderate 3	Significant 4	Major 5
Almost Certain A	Moderate	High	Extreme	Extreme	Extreme
Likely B	Moderate	High	Extreme	Extreme	Extreme
Moderate C	Low	Moderate	High	Extreme	Extreme
Unlikely D	Low	Low	Moderate	High	Extreme
Rare E	Low	Low	Low	Moderate	High

Extreme	Immediate attention required, cease activity
High	Additional controls required to reduce the risk to moderate or below
Moderate	Maximum acceptable level of risk. Additional controls may be implemented to improve.
Low	Risks managed by routine procedures.

Risk Management Report

Civil Services - Land Development

Health and Safety risks eliminated through compliance with relevant Australian Codes and Standards either in the design or as required of the Builder by virtue of the project specification.

HAZARD IDENTIFIED	RELEVANT CODES	RISK RATING	RESIDUAL RISK	RESPONSIBLITY
Dust	DEC Guidelines	M	Dust affecting health or safety	Contractor
Buildings become inundated by stormwater	Australian Rainfall and Runoff / Council Guidelines / IPWEA	M	Persons injured as a result of flooding	Owner
Roads impassable due to flooding preventing evacuation	Australian Rainfall and Runoff / Council Guidelines / IPWEA	L	Persons being trapped by flooding	Owner
Works adjacent or works beneath overhead power	Western Power Guidelines	M	Electrocution	Contractor
Inadequate sight lines provided increasing risk of pedestrian and/or vehicle accidents	AS 1742: Uniform traffic control devices / AustRoads	M	Damage to persons due to collision	Owner
Pavement failure due to inadequate design	Austroads: A guide to the Design of New Pavements for Light Traffic / Council policy / IPWEA	M	Persons injured due to traffic accident	Owner
Earthworks not designed for its intended use	AS 3798: Guidelines on earthworks on residential and commercial developments	M	Building Failure and persons injured	Owner
Inadequate design for pedestrians and people with disabilities	AS 1428: Design for access and mobility	M	Persons injured	Owner
Inadequate signage and traffic management during construction	AS 1742: Uniform traffic control devices	M	Persons injured due to traffic accident	Contractor
Inadequate pavement markings and signage post construction	MRWA Standards / AS1742: Uniform traffic control devices	M	Persons injured due to traffic accident	Owner

Risk Management Report

CONSTRUCTION AND COMMISSIONING

Scope of Risk Assessment	Date	Attending (Name and Position)
Greater Central & Eastern Precinct	19-Sep-14	Project Engineer - Travis Demeza

	HAZARD IDENTIFIED	PRE-DESIGN RISK RATING			DESIGN MITIGATION	POST-DESIGN RISK RATING			RESIDUAL RISK	RESPONSIBILITY
		LIKELIHOOD	CONSEQUENCE	RISK RATING		LIKELIHOOD	CONSEQUENCE	RISK RATING		
☐	**Hazardous substances specified or produced as part of works coming into contact with persons**									
☐	No hazardous substances have been specified or substances used with conventional risks.				N/A					
☐	**Hazardous substances inherent in the site coming into contact with persons**									
☐	No testing has been done. Contractors should take appropriate precautions.	C	4	E	Contractor's SMP	C	2	M	Persons health affected	Contractor
☐	Asbestos potential in fencing, soils and demolition materials	C	4	E	Contractor's SMP	C	2	M	Persons health affected	Contractor
☐	**Excavations causing damage to persons or property**									
☐	Conventional risks only.									
☐	**Risk of injury due to noise or vibration**									
☐	Conventional risks and plant specified.	C	3	H	Contractor's SMP	E	2	L	Damage to property or persons	Contractor
☐	**Risk of injury due to electrocution/explosion/fire**									
☐	Existing services adjacent/through site not located.	E	5	H	Contractor's SMP	E	4	M	Damage to property or persons	Contractor
☐	Potential for private power not indicated on one-call information or as-constructed plans	D	5	E	Contractor's SMP & Service Authority Liaison	E	4	M	Damage to property or persons	Contractor
☐	Specific works adjacent or works beneath overhead power	D	5	E	Contractor's SMP & Service Authority Liaison	E	4	M	Damage to property or persons	Contractor
☐	Haul road or movement of equipment beneath overhead power	D	5	E	Contractor's SMP & Service Authority Liaison	E	4	M	Damage to property or persons	Contractor
☐	Excavation works adjacent overhead power	D	5	E	Contractor's SMP & Service Authority Liaison	E	4	M	Damage to property or persons	Contractor
☐	**Risk of injury due to vehicle impact**									
☐	Conventional risks only.									
☐	**Risk of injury due to falls**									
☐	Conventional risks only.									
☐	**Risk of Injury due to modification of existing structures**									
☐	Conventional risks only.									
☐	**Risk to safety during lifting and erection of materials**									
☐	Conventional risks only.									
☐	**Working in confined spaces**									
☐	Conventional risks only.									
☐	**Inadequate administration/auditing of safe work practices contributing to breach**									
☐	Coventional administration and auditing.									
☐	**Working in Remote Areas**									
☐	Not applicable.									
☐	**Fatigue**									
☐	Conventional risks only.									

Risk Management Report

USE FOR ITS INTENDED PURPOSE

Scope of Risk Assessment	Date	Attending (Name and Position)
Greater Central & Eastern Precinct	19-Sep-14	Project Engineer - Travis Demeza

	HAZARD IDENTIFIED	PRE-DESIGN RISK RATING			DESIGN MITIGATION	POST-DESIGN RISK RATING			RESIDUAL RISK	RESPONSIBILITY
		LIKELIHOOD	CONSEQUENCE	RISK RATING		LIKELIHOOD	CONSEQUENCE	RISK RATING		
☐	**Vehicle and/or pedestrian conflicts**									
☐	Conventional risks only									
☐	Inadequate pedestrian/vehicle separation and delineation provided	E	5	H	Adopt Council and Aust. Standards	E	4	M	Damage to persons or property	Owner
☐	Pedestrian crossings not specifically designed.	D	5	E	Seek traffic advice and adopt Aust. Standards	E	4	M	Damage to persons or property	Owner
☐	Road design doesn't consider expected vehicle size and movements.	D	4	H	Prepare vehicle movement plan and signage	E	2	L	Damage to persons or property	Owner
☐	**Injury due to pavement failure**									
☐	Conventional risks only									
☐	**Risk to health from sewer system failure**									
☐	Conventional risks only									
☐	**Risk to health from water system failure**									
☐	Conventional risks only									
☐	**Risks due to stormwater**									
☐	Infrastructure may be damaged due to erosion in flood event.	D	4	H	Consider erosion in design	D	3	M	Damage to persons or property	Owner
☐	Roads may be hazardous after flood event.	D	4	H	Use Australian Rainfall & Runoff and consider signage	D	3	M	Damage to persons or property	Owner
☐	Depth and velocities of flows in open drains excessive	D	5	E	Use Australian Rainfall & Runoff as guide	D	3	M	Damage to persons or property	Owner
☐	Flood storage areas at unsafe depth, slope and/or protection	D	5	E	Use Council standards	D	3	M	Injury to persons	Owner
☐	Permanent water bodies have periphery at unsafe depth, slope and/or protection	D	5	E	Use Council standards	D	3	M	Injury to persons	Owner
☐	Large drainage headwalls are inappropriately protected with covers to restrict entry	D	5	E	Incorporate grated at outlets	D	3	M	Injury to persons	Owner
☐	Discharge structures are not suitably designed for expected velocities	D	3	M	Use Council standards or specifically design	D	2	L	Damage to infrastructure	Owner
☐	Intersections have inadequate drainage contributing to traffic accidents	D	3	M	Evaluate during drainage design	D	2	L	Damage to persons or health	Owner
☐	**Risks due to Fire**									
☐	Conventional risks only									
☐	**Earthworks & retaining walls**									
☐	Earthworks not designed for intended use	D	4	H	Loads to be specified and Council to review as part of Building License	E	4	M	Damage to persons or property	Owner
☐	**Electrocution / Explosion**									
☐	Conventional risks only									

Risk Management Report

MAINTENANCE & SERVICING

Scope of Risk Assessment	Date	Attending (Name and Position)
Greater Central & Eastern Precinct	19-Sep-14	Project Engineer - Travis Demeza

	HAZARD IDENTIFIED	PRE-DESIGN RISK RATING			DESIGN MITIGATION	POST-DESIGN RISK RATING			RESIDUAL RISK	RESPONSIBILITY
		LIKELIHOOD	CONSEQUENCE	RISK RATING		LIKELIHOOD	CONSEQUENCE	RISK RATING		
☐	**Inadequate pavement design**									
☐	Conventional risks only									
☐	**Risks to health and safety associated with maintaining sewer works**									
☐	Conventional risks only									
☐	**As constructed information on potable or non-potable water inadequate**									
☐	Conventional risks only									
☐	**Risk to health and safety associated with stormwater system**									
☐	Conventional risks only									
☐	**Risks to health and safety associated with maintaining earthworks, retaining walls & sea walls**									
☐	Conventional risks only									
☐	**General**									
☐	Conventional risks only									

Risk Management Report

DEMOLITION

Scope of Risk Assessment	Date	Attending (Name and Position)
Greater Central & Eastern Precinct	19-Sep-14	Project Engineer - Travis Demeza

	HAZARD IDENTIFIED	PRE-DESIGN RISK RATING			DESIGN MITIGATION	POST-DESIGN RISK RATING			RESIDUAL RISK	RESPONSIBILITY
		LIKELIHOOD	CONSEQUENCE	RISK RATING		LIKELIHOOD	CONSEQUENCE	RISK RATING		
☐	**Risks due to exposure to harmful materials**									
☐	Conventional risks only									

Risk Management Report

Residual Risk Report

Scope of Risk Assessment	Date	(Name and Position)	
Greater Central & Eastern Precinct	19-Sep-14	Project Engineer - Travis Demeza	

HAZARD IDENTIFIED	POST-DESIGN RISK RATING			RESIDUAL RISK	RESPONSIBILITY
	LIKELIHOOD	CONSEQUENCE	RISK RATING		

Appendix 5

WGE Groundwater Logging Information



Groundwater Monitoring - Centennial Park Sporting Precinct

Name		SP10		SP8		SP7		CPT1		CPT2		CPT3		CPT4		CPT5		CPT6		CPT9	
		RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)	RL (m) to AHD	Depth (mm)
Bore Surface Level		**19.3**	***0***	**17.1**	***0***	**21.5**	***0***	**19.4**	***0***	**20.4**	***0***	**15.4**	***0***	**14.9**	***0***	**17.3**	***0***	**19**	***0***	**17.1**	***0***
Date																					
27/06/2014	Douglas Partners	18.45	*850*	17.1	*0*	20.8	*700*	18.7	*700*	19.6	*800*	14.55	*850*	13.7	*1200*	16.1	*1200*	18.75	*250*	dry	-
25/08/2014	WGE	18.38	*920*	16.97	*130*	20.4	*1100*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1/09/2014	WGE	18.56	*740*	17.08	*20*	20.85	*650*	18.75	*650*	19.63	*770*	14.75	*650*	14.75	*150*	16.34	*960*	18.9	*100*	14.14	*2960*
11/09/2014	WGE	18.51	*790*	17.1	*0*	20.91	*590*	18.82	*580*	19.6	*800*	14.75	*650*	14.77	*130*	16.44	*860*	19	*0*	14.29	*2810*

CADASTRAL SOURCE: Landgate, July 2014.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown December 2013.

82305-d01.dgn

PINPOINT CARTOGRAPHICS (08) 9562 7136

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Gresley Abas Pty Ltd		TITLE: **Location of Tests and Standpipes** **Centennial Park Sporting Precinct** **Albany, WA**
OFFICE: Perth	DRAWN BY: P. Hutchinson	
SCALE: As shown	DATE: 21 Jul 2014	

N
MGA

PROJECT No.: 82305
DRAWING No.: 1
REVISION: A

Appendix 6

Stormwater & Flood Routing Sketches

Approx 1:5 ARI
Q = 1.5m3
Flood path 30m wide and 0.1 deep.
Velocity approx 0.55m/s

Shape wide (approx 30m) grassed overland flood path.

Retain pipe for minor flows (approx 1:1 ARI)

30m

120m

30m

30m

120m

120m

Remove northern bund (approx 9000m3)

Locate FFL 500mm above 1:100 Flood level, approx 750mm above playing field surface. Approx RL 18.00m - 18.50m

1:100 ARI
Q = 30m3
Flood path120m wide and 0.25 deep.
Velocity approx 1.0m/s

REPORT ITEM SCM 010 REFERS

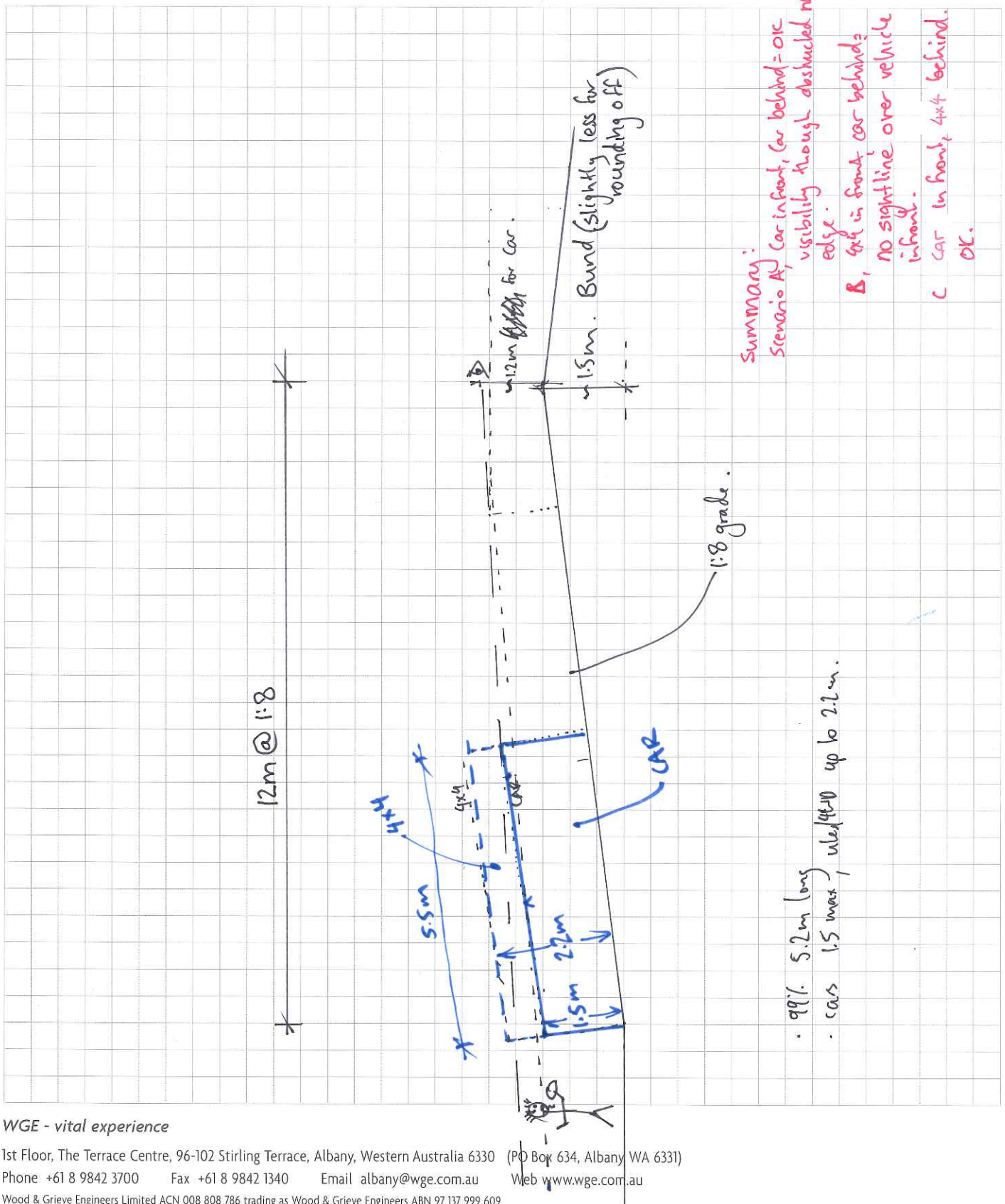
GEN

WOOD & GRIEVE ENGINEERS

CALCULATION SHEET

Project: CPSP Project Number: 26689_PER-C Date: 9/9/2014

Section of project: Main Oval Viewing Bund. By: F. Wallefeld. Page:



REV 06/11

Appendix 7

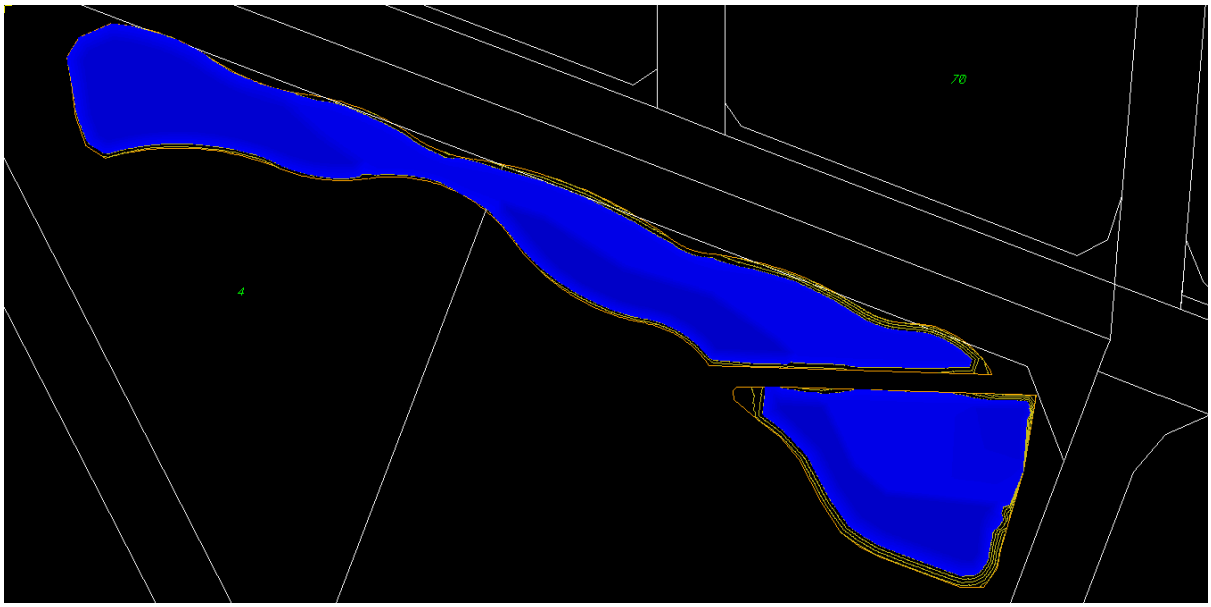
Preliminary Earthworks Modelling Screen Captures

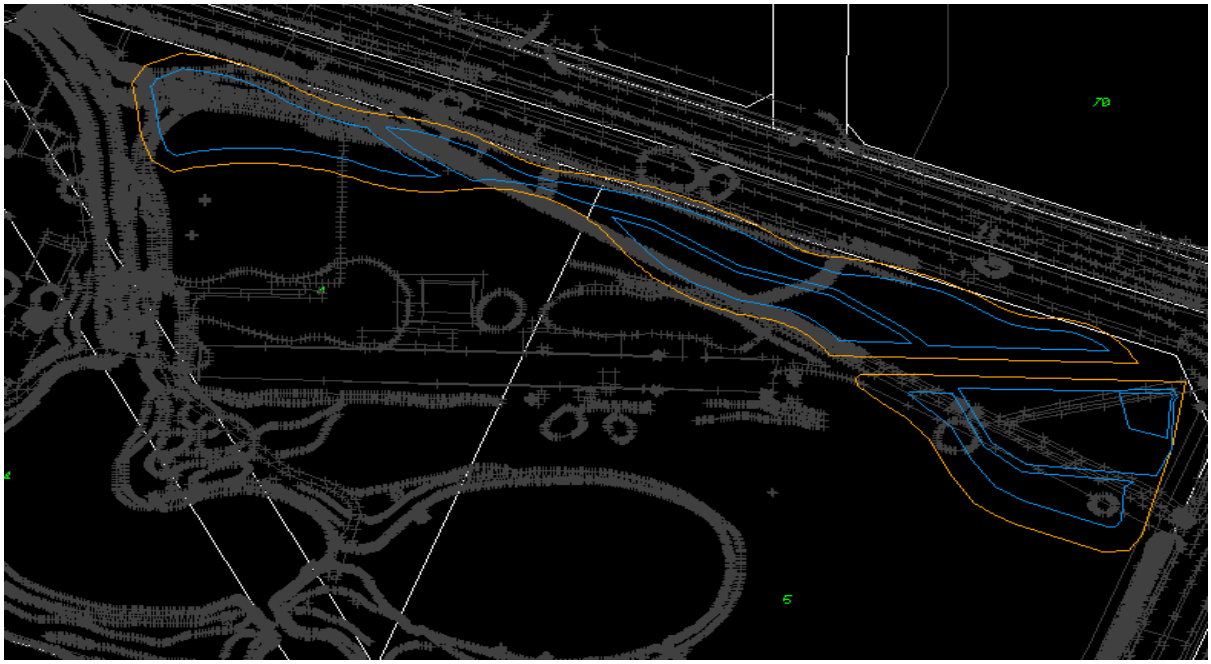
Central Precinct

Stormwater retention, base levels as provided by Syrinx, outer levels tie in with existing ground.

Earthworks: **8700m³ of cut**

Storage Volume (**to 14.50AHD**): 6300m³



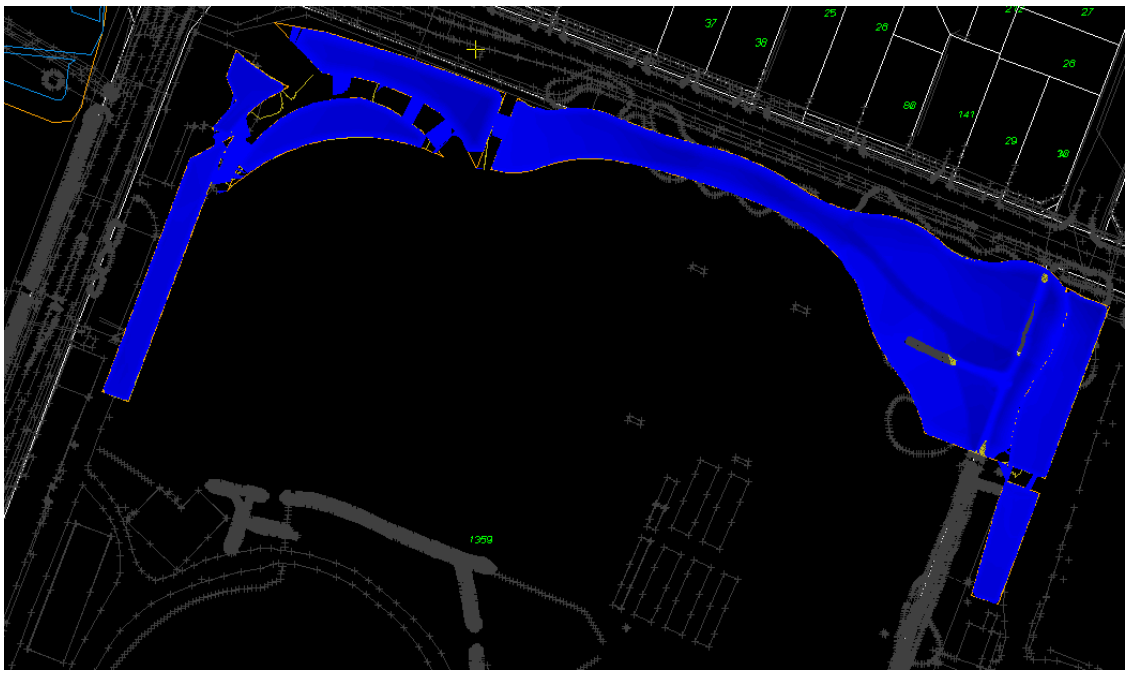


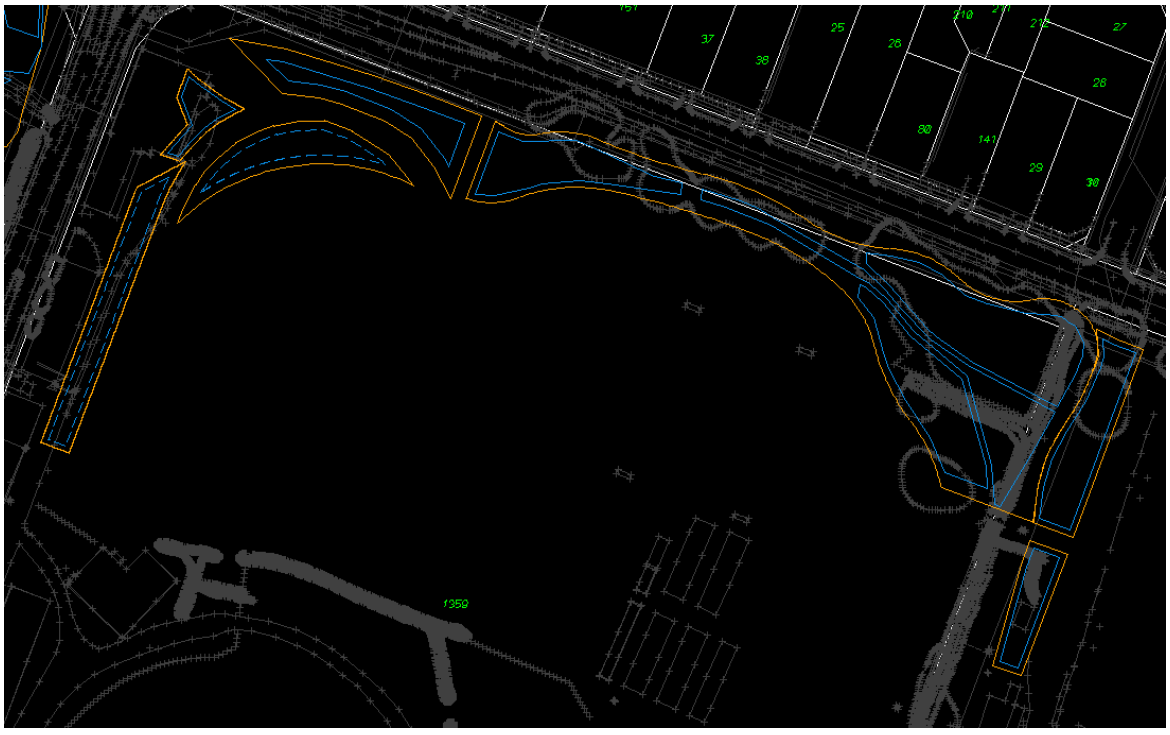
Eastern Precinct

Stormwater retention, base levels as provided by Syrinx, outer levels tie in with existing ground.
Note: the stormwater retention swale design is being adjusted to avoid clash with sewer, earthworks quantities are expected to be similar or slightly less.

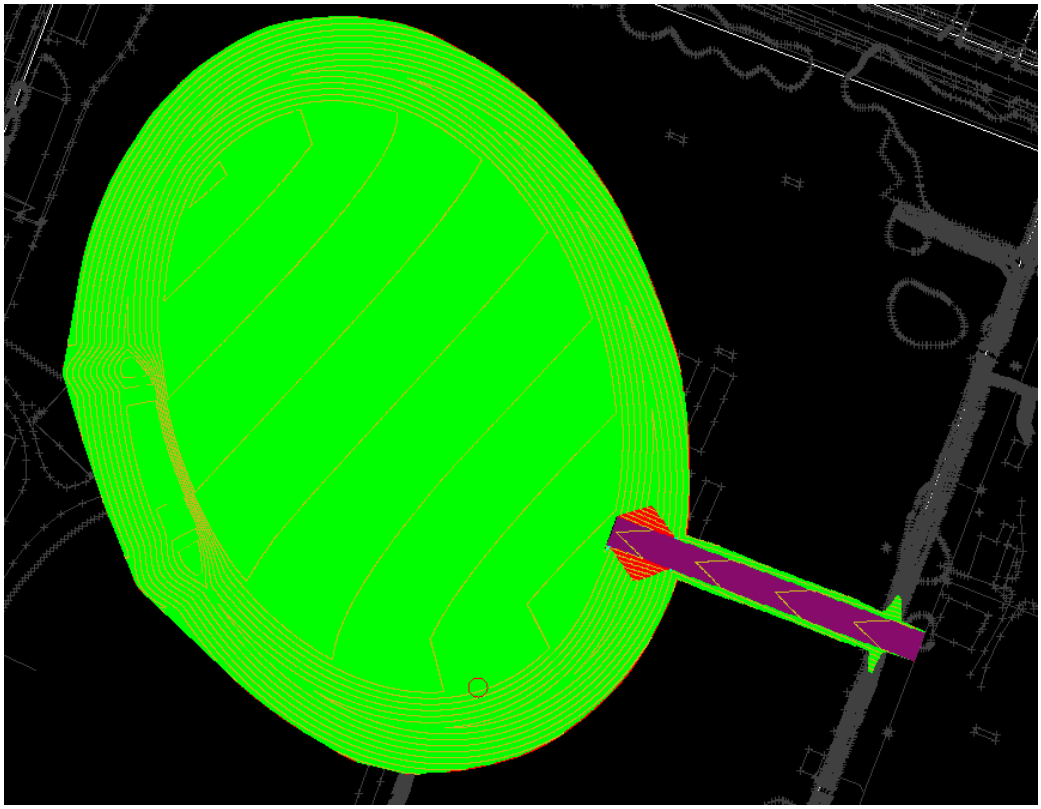
Earthworks: **9350m³ of cut**

Water Storage Volume (various top of water levels assumed– refer to attachments): 5550m³ - Subject to confirmation of weir methodology and flood route capacity.





Main Oval, bund and connecting promenade from the east



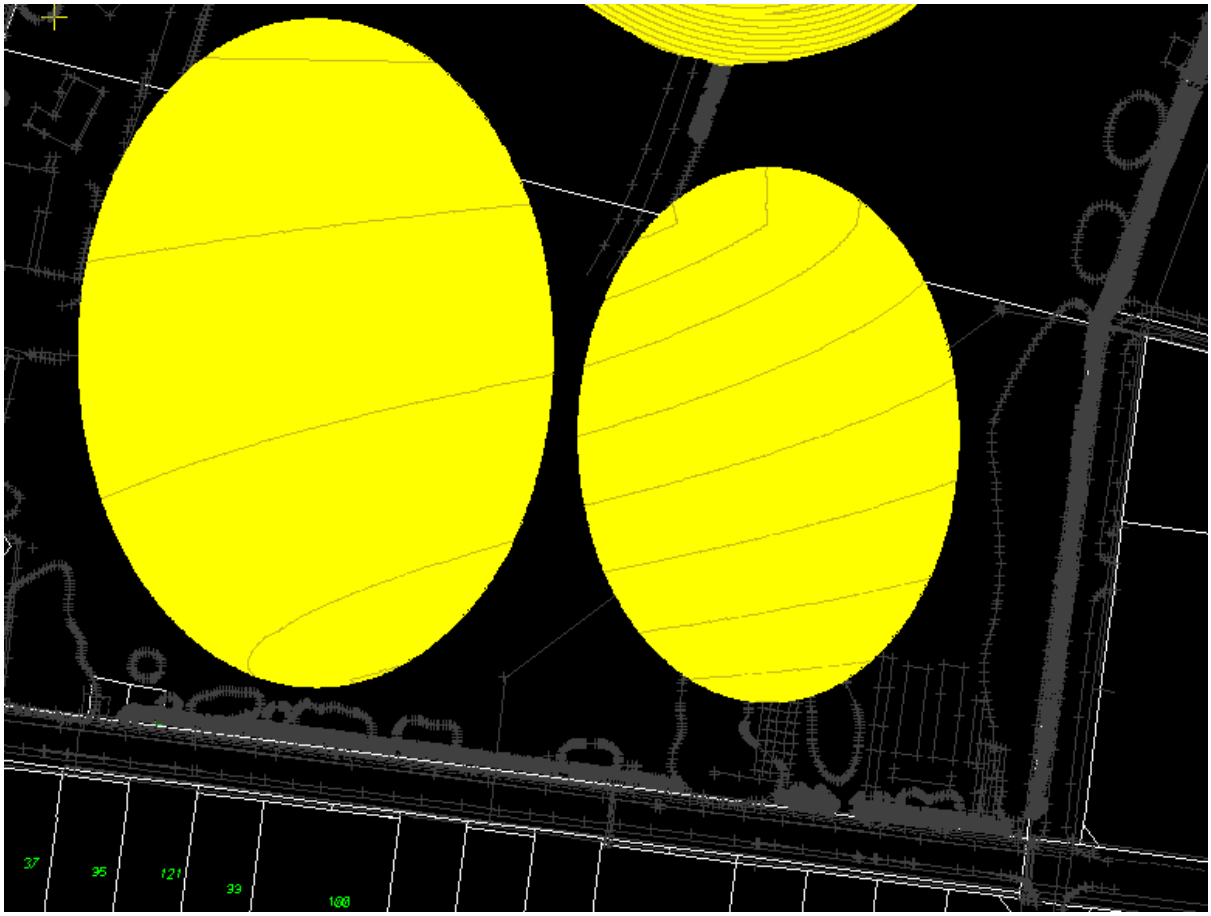
Earthworks: **23950m³ of fill** with;

- 16370 m³ in bund,
- 7325 m³ in oval and
- 255 m³ in Promenade

Also to note:

- Main oval area (playing field, excluding bund) is 19,000m2
- Approximate average fill over main oval (playing field) is 0.38m
- No allowance made for topsoil strip or replacement. Volumes are from existing surface to final design level, including topsoil.
- Playing field design to be confirmed with specialist turf consultant to confirm cut(spoil removal), fill and drainage methodology.
- Assume cut material from stormwater retention basins/swales (central and eastern) can be used as fill for the bund (assume no PASS issues with material at this stage).

Training ovals



Re-grading of existing surface with some fill to provide even slope. No cut to avoid water logging.
Preliminary design only, could be refined to reduce or remove requirement for fill by increasing grade of ovals or by increasing cut to fill.

Western training oval:

- Area 21780m2
- **2343m3 of fill**
- **258m3 of cut**

Eastern training Oval

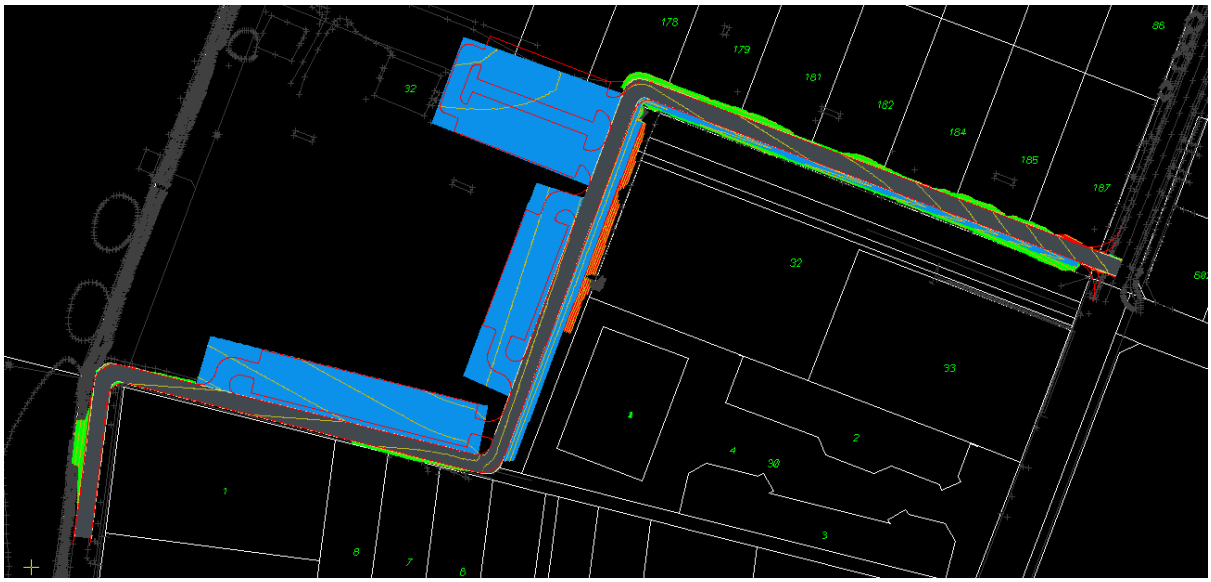
- Area 13900m2
- **2875m3 of fill**
- **187m3 of cut**

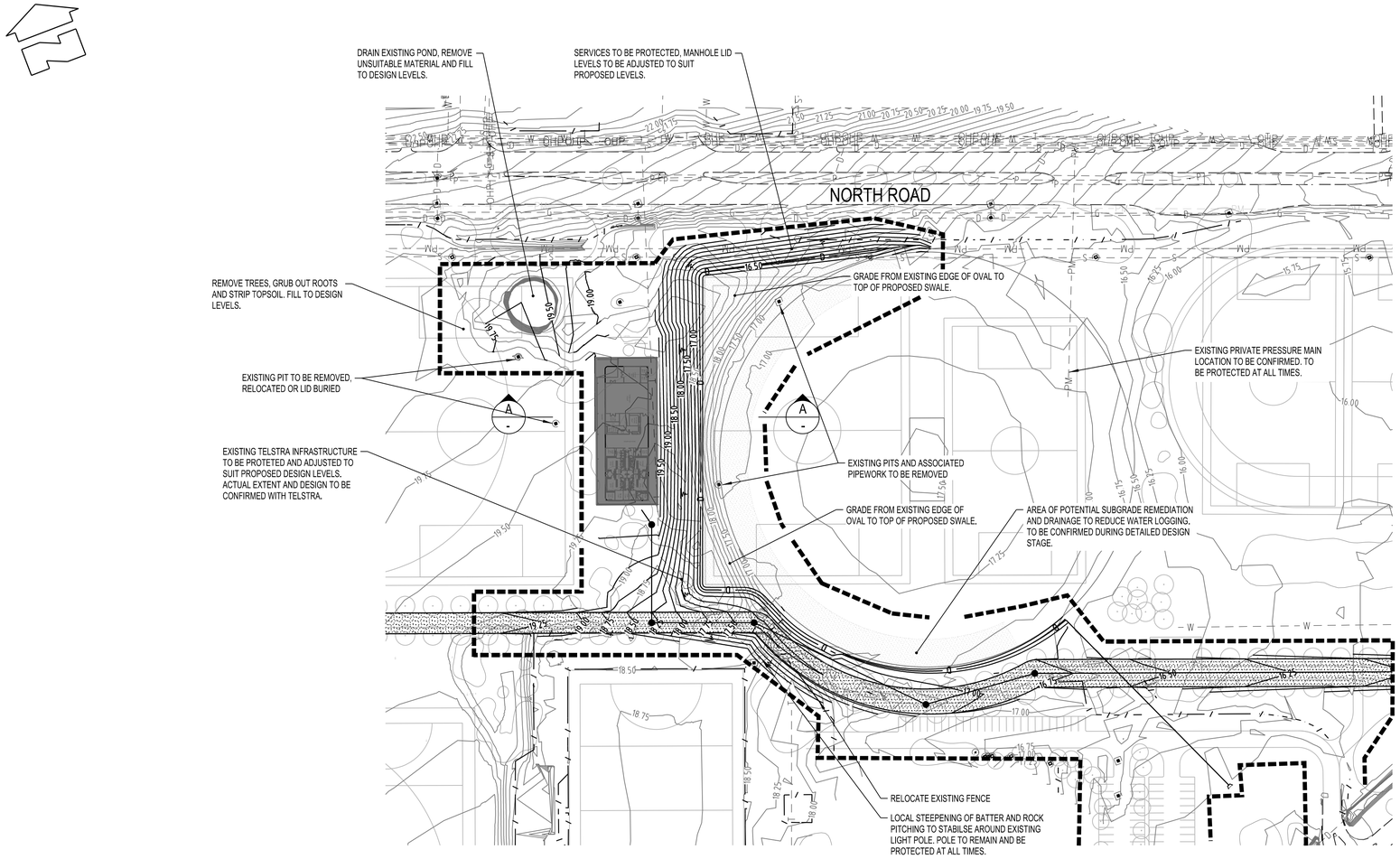
Eastern Precinct Roads

Minor cut and fil largely confined to topsoil strip, box out and pavement material import.

Allow (on top of road works quantities):

- **500m3 cut to spoil**
- **500m3 import clean fill**



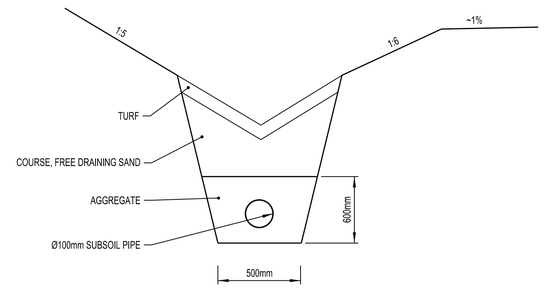


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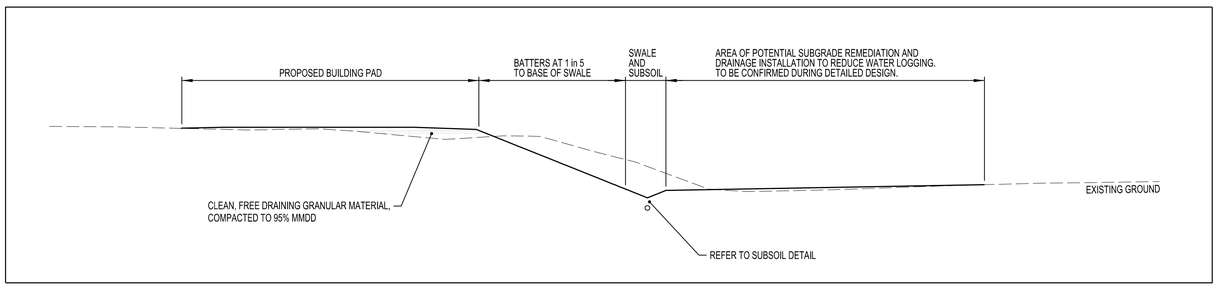
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- EXISTING GAS
- EXISTING POWER
- EXISTING OVERHEAD POWER
- EXISTING SEWER MAIN
- EXISTING SEWER PRESSURE MAIN
- EXISTING DRAINAGE
- EXISTING WATER MAIN
- PROPOSED DRAINAGE (PIPE, MANHOLE, HEADWALL)

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SUBSOIL DETAIL
N.T.S.



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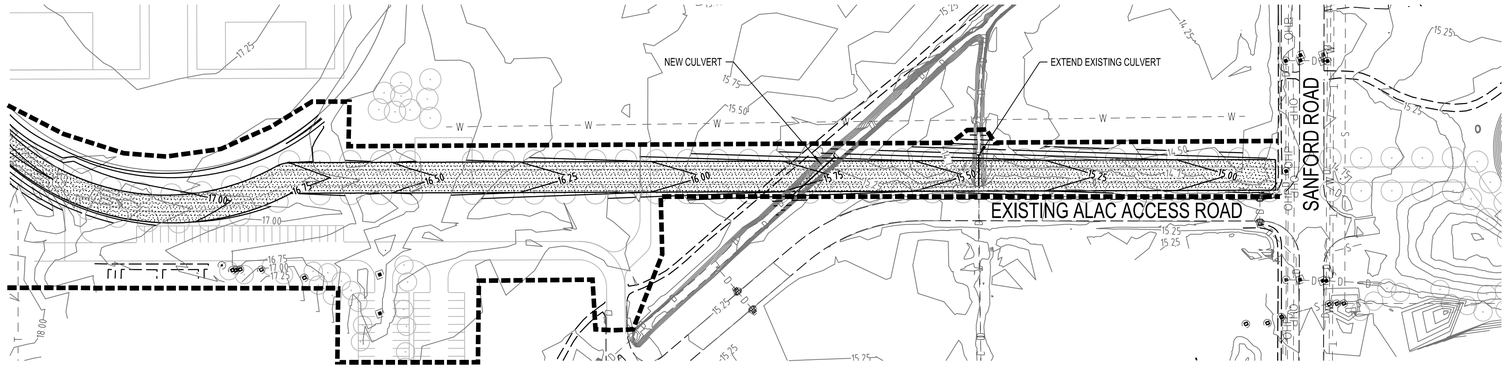
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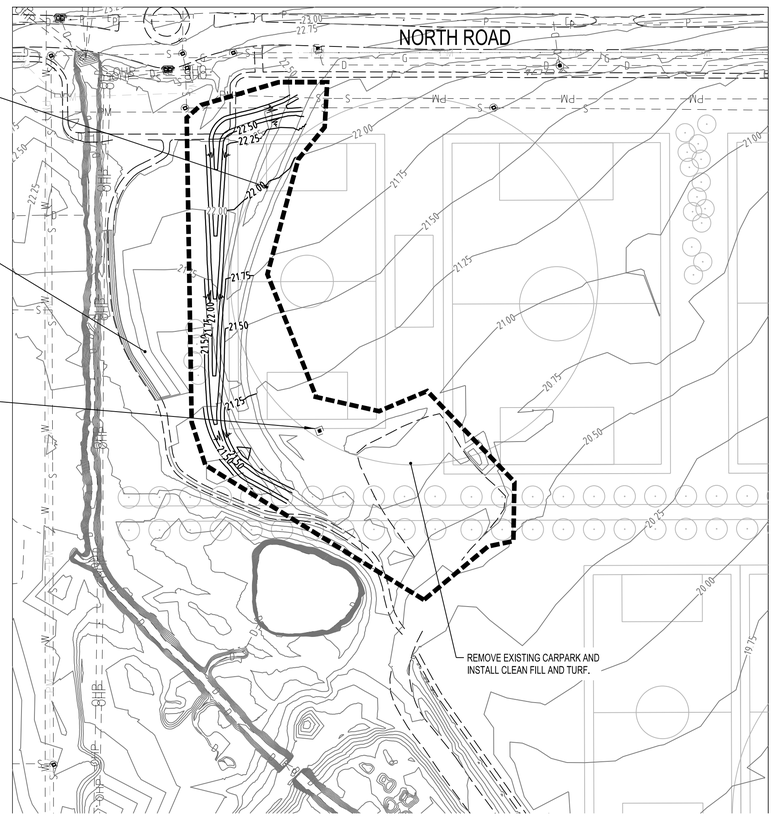
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SCALE 1:1000



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LEGEND

- DESIGN CONTOURS
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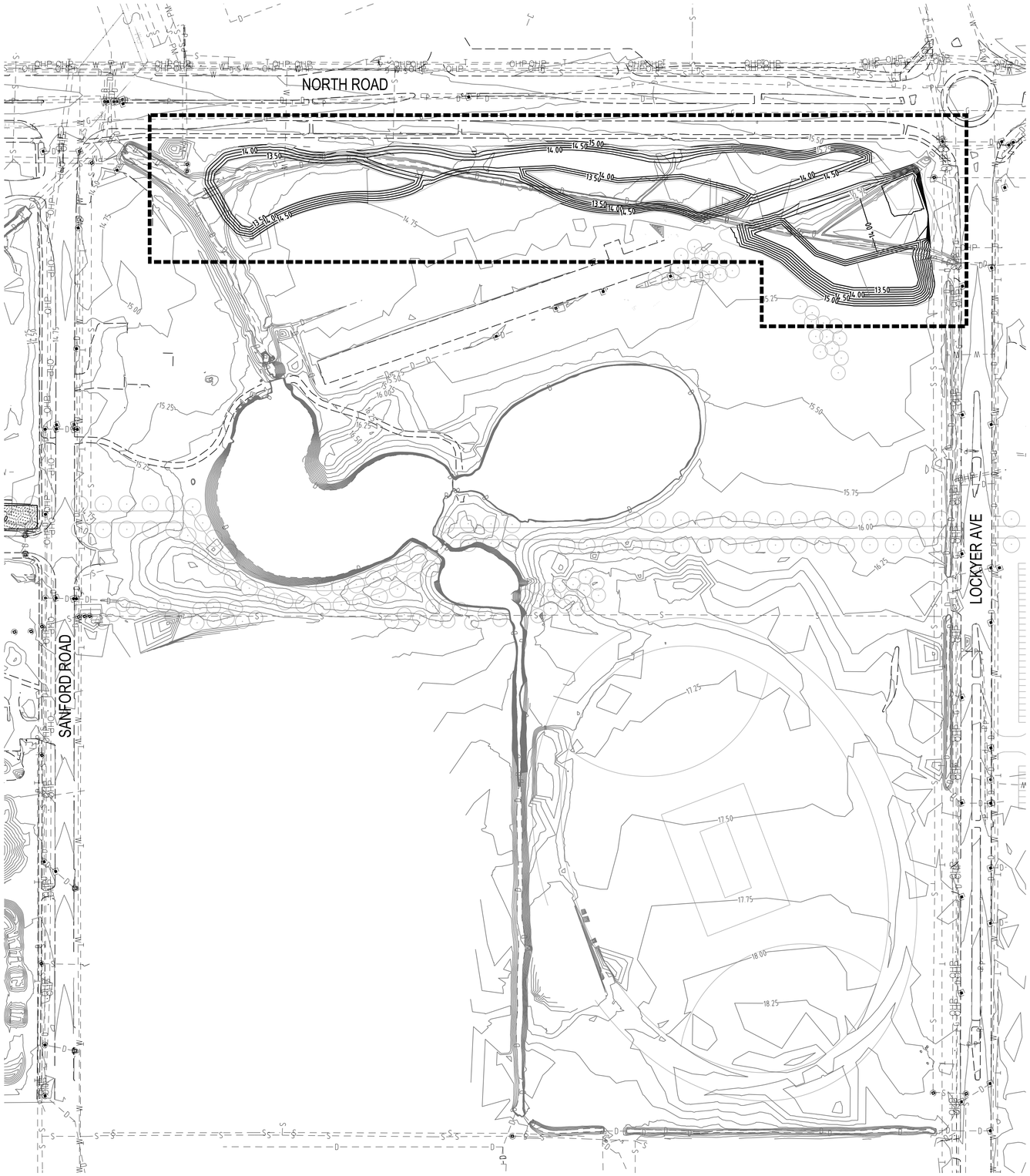
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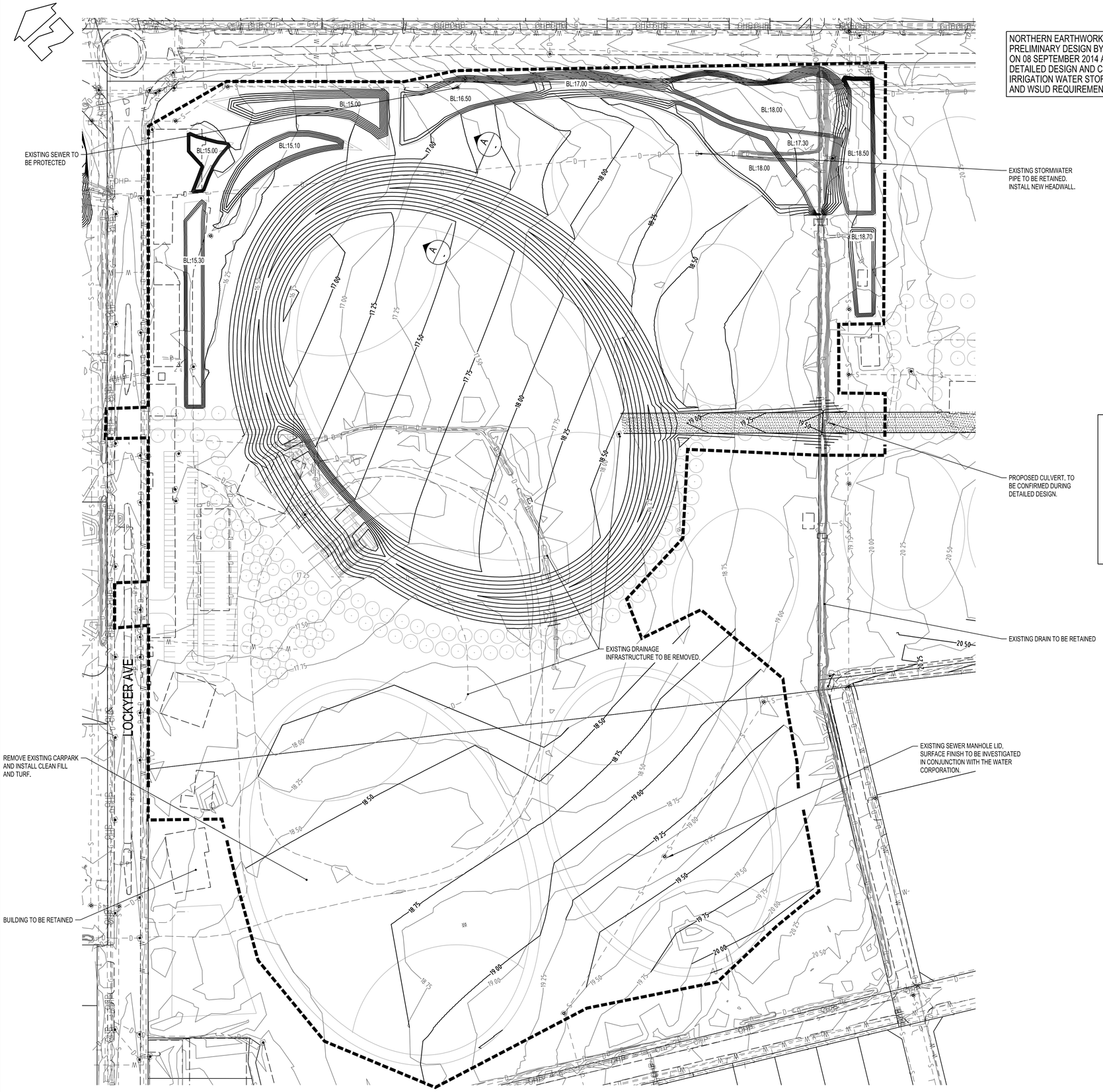
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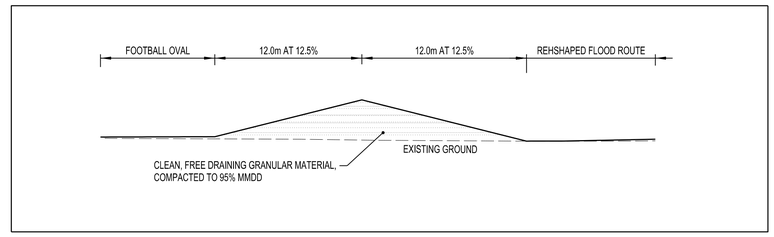
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LEGEND

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- 10.0 — EXISTING CONTOURS
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- PROPOSED ROAD KERB
- EXISTING ROAD KERB
- PROPOSED PROMENADE
- EXISTING TREE LINE
- EXISTING FENCE
- G — EXISTING GAS
- P — EXISTING POWER
- OHP — EXISTING OVERHEAD POWER
- S — EXISTING SEWER MAIN
- PM — EXISTING SEWER PRESSURE MAIN
- D — EXISTING DRAINAGE
- W — EXISTING WATER MAIN
- BL:18.00 — PROPOSED BASIN LEVEL



SECTION A-A
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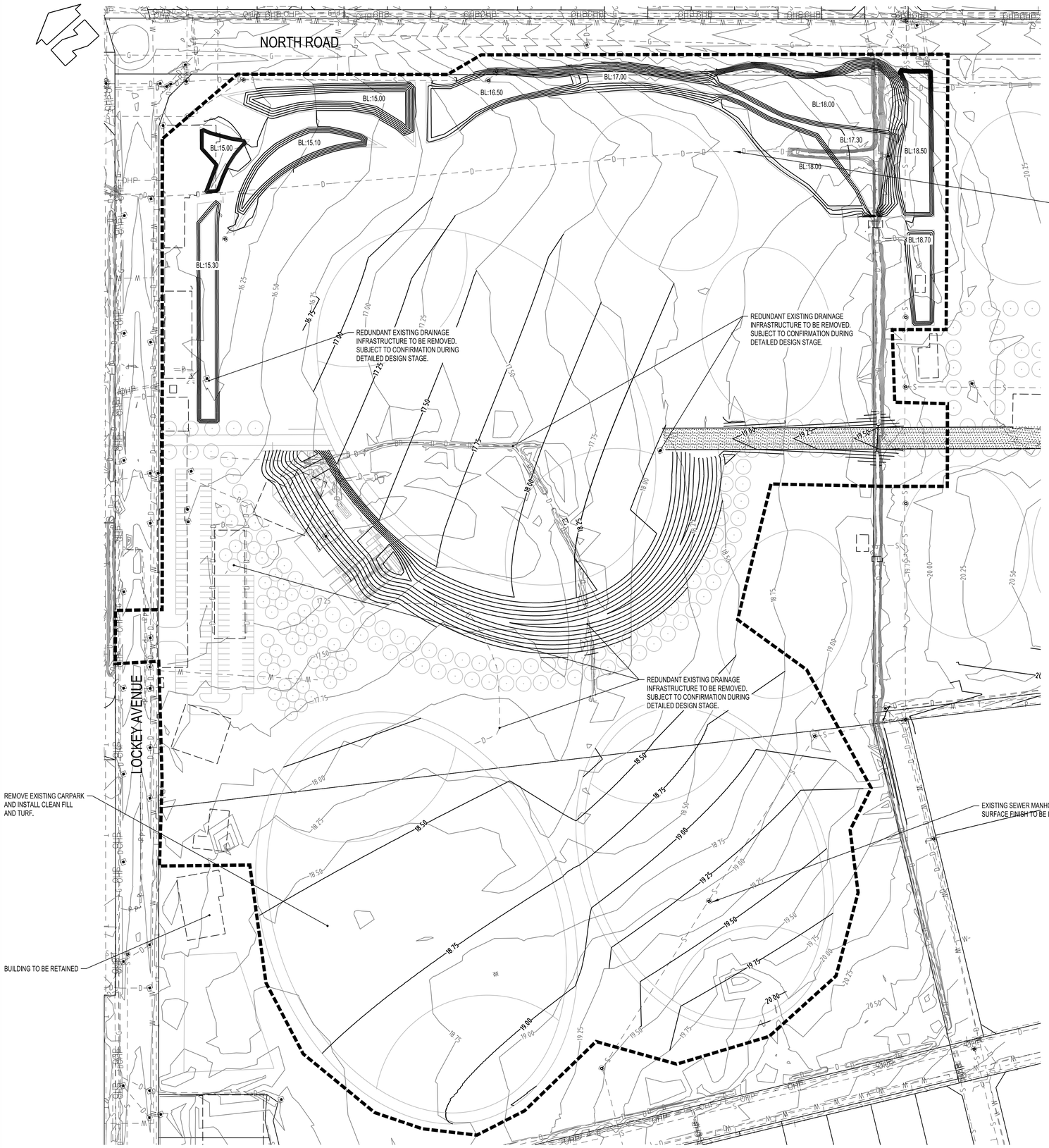
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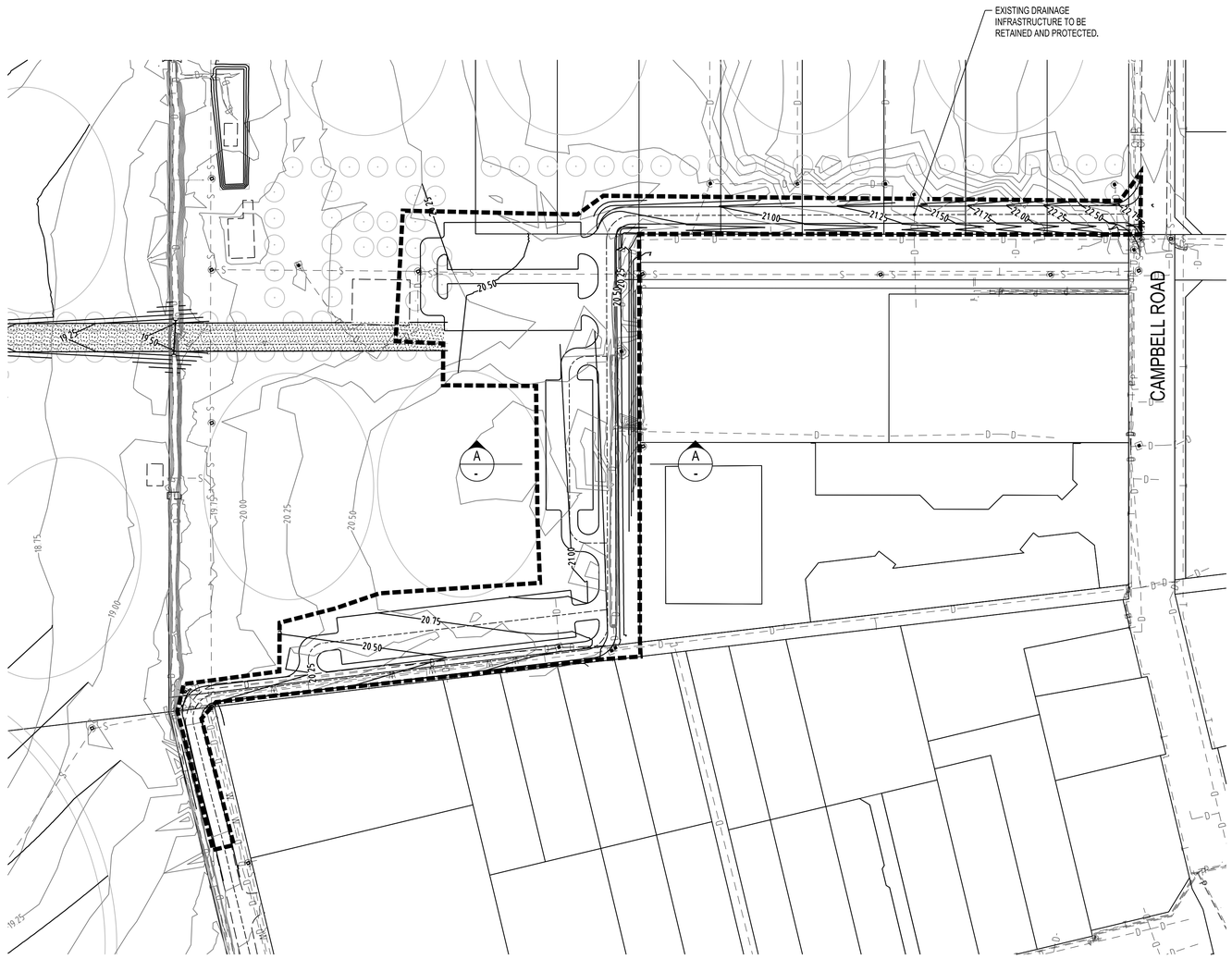
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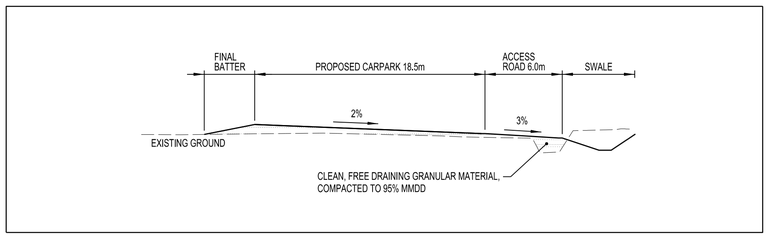
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SECTION A-A
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Centennial Park

Water Management Strategy
Schematic Design Report

Syrinx

TECHNICAL REPORT

CENTENNIAL PARK SPORTING PRECINCT

WATER MANAGEMENT STRATEGY

OCTOBER 2014

FOR
CITY OF ALBANY

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REPORT DETAILS:

Version No.	Date	Author	Reviewer	Comment
1	21.09.2014	TF/SDo/PZ/SH	SH	First Draft to City of Albany
2	03.10.2014	SDo / SH	SH	Revised Draft to City
3	27.10.2014	SDo	SH	Final to City

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LIST OF ABBREVIATION

The following abbreviations have been used in this report.

Abbreviation or acronym	*What It Stands For*
AASS	Actual Acid Sulfate Soils
AASSM	Actual Acid Sulfate Soils Material
AFL	Australian Football League
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment Conservation Council
ARI	Average Recurrence Interval, of a rainfall event
ASS	Acid Sulfate Soils
BGL	Below Ground Level
BMP	Best Management Practice
CPSP	Centennial Park Sporting Precinct
DAA	Department of Aboriginal Affairs
DFES	Department of Fire and Emergency Services
DO	Dissolved Oxygen
DoW	Department of Water
FRP	Filterable Reactive Phosphorus
GPT	Gross Pollutant Trap
GWL	Ground Water Level
HDPE	High Density Polyethylene
LOR	Limit of Reporting
ORP	Oxidation Reduction Potential

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PAH	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soils
PASSM	Potential Acid Sulfate Soils Material
PET	Potential Evapotranspiration
POS	Public Open Space
TDS	Total dissolved solids
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TP	Total Phosphorus
UV	Ultraviolet
WA	Western Australia
WELS	Water Efficiency Labelling and Standards
WGE	Wood and Grieve Engineers
WMS	Water Management Strategy
WSUD	Water Sensitive Urban Design

PART 1: PROJECT BACKGROUND

1.0 INTRODUCTION TO THE CENTENNIAL PARK PROJECT

The Centennial Park Sporting Precinct (herein referred to as CPSP) is located in the City of Albany and is considered a premier regional sporting precinct in the Great Southern catering for indoor and outdoor sports facilities. Established in 1975, the CPSP is rich in sporting history and consists of parklands and sporting reserves. The Precinct houses the Albany Leisure and Aquatic Centre (ALAC) and the Albany Police and Community Youth Centre (PCYC).

City of Albany (the City hereafter) is currently redeveloping the CPSP to provide a venue of outstanding regional quality with sporting and event facilities. The proposed redevelopment will create a contemporary multifunctional parkland environment that clearly expresses its sporting, community and environmental values and addresses the disconnected provision of sports facilities, which resulted from the historical development of the Precinct on an 'as needed' basis, predominantly based on individual sporting group requirements.

According to the Centennial Park Scheme Development Report (Realm Studios, 2014), the overarching objective for the project is to develop an integrated whole-of-site response that makes increased provision for both organised and informal sporting and recreational pursuits and at the same time improves the sites environmental performance. Key objectives for the redevelopment project are:

- Improved Governance Structure
- Redevelopment of Playing Fields and Premier Oval
- New Stadium Arena including premier oval, grandstand, club rooms amenities and event spaces
- Additional (multi-user) Club-Room and Storage Facilities
- Heritage, Cultural and Indigenous consultation and integration
- Integrated Community Play and Recreation Spaces
- Improved site access, shared pathway trail (fitness) connections with integrated wayfinding Signage, Interpretation and Public Art
- Improved Lighting and Electrical Upgrade
- Improved Vehicle Access and Circulation Spaces
- Integrated Landscape and Water Management
- Improved Biodiversity and Natural Habitat
- Improved safety specifically at night

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Syrinx Environmental (Syrinx) has been engaged to provide direction on water management so that the objectives above are achieved during the redevelopment of the CPSP. This Water Management Strategy (WMS) report provides guidance on the development of water related infrastructure within the CPSP.

2.0 INTRODUCTION TO THIS WATER MANAGEMENT STRATEGY

The Centennial Park project involves significant upgrade of recreational facilities within the CPSP and provides a range of opportunities to achieve improved water management outcomes, including the development of water harvest and reuse strategies, Water Sensitive Urban Design (WSUD) initiatives, enhanced stormwater treatment and aquifer recharge via infiltration.

The focus of this WMS is on the development of sustainable water initiatives that:

- Assist with flood mitigation within the CPSP
- Adopt WSUD and green infrastructure principles including integration with biodiversity, landscape, education and recreational function
- Achieve significant scheme and ground water conservation through rainwater and stormwater harvesting, water recycling (where possible) and reuse and by providing a solution to water shortages and water security caused by climate change into the distant future guaranteeing the longevity of CPSP in its current location
- Include environmental sustainability practices in built infrastructure
- Address the water cycle on a whole-of-site basis (Precinct scale and considering external catchments)
- Allow for flexibility at the individual Precinct level to enable site specific and innovative design responses that maintain the individual character of each precinct
- Respond to climate change
- Are flexible/modular to cater for staged growth
- Foster continued innovation through research and collaboration

The key sustainable water initiatives in the design of the CPSP include:

1. Demand Management - Incorporating demand management practices within buildings & landscape to minimise water consumption – .i.e. water efficient fittings and fixtures, hydrozoning, use of appropriate native & endemic vegetation and user education and awareness.
2. Water Recycling / Reuse - Supplementing non-potable demand, both indoor and outdoor, with harvested rainwater/stormwater.
3. Stormwater Management - Integrate stormwater infrastructure within a 'Living Stream' network to provide improvement of water quality and maintenance of ecological water requirements through control and pre-treatment of 'inflow' water off the catchment and

from all stormwater runoff from roads and carparks prior to discharge to Yakamia Creek.

4. Flood Management - Integrate flood management to adequately protect property and life with consideration of catchment management initiatives beyond the site.
5. Groundwater Conservation – Minimising groundwater abstraction and maximising recharge so that a minimum water level is sustained within the development to maintain ecological water demand and limit acidification of organic soils.

2.1 LEGISLATIVE CONTEXT

The components and aspects of the CPSP WMS are regulated by a number of national and state policies and guidelines that provide guidance on specific aspects of water quality protection and management. The key guidelines/plans that provide an overarching framework for the CPSP WMS are:

- The State Water Strategy for Western Australia (Government of WA, 2003)
- The State Planning Policy 2.9 Water Resources (Government of WA, 2006)
- The Better Urban Water Management (BUWM) (WAPC, 2008a)
- Planning Bulletin no. 92, Urban Water Management (WAPC 2008b)
- Stormwater Management Manual for WA (DoW, 2004 -2007)
- The Department of Water Guidelines for the Approval of Non-drinking Water Systems in Western Australia (DoW 2013)
- The Department of Health Guidelines for Non Potable Uses of Recycled Water in Western Australia (DoH 2011)

2.1.1 State Water Strategy for Western Australia

The State Water Strategy objective is to ensure a sustainable water future for all Western Australians. The strategy outlines how this objective can be achieved by 1) Improving water efficiency in all sectors. 2) Achieving significant advances in water reuse. 3) Fostering innovation and research. 4) Planning and developing new sources of water in a timely manner. 5) Protecting the value of our water resources. The strategy recognises the regional diversity of Western Australia and the need for tailor-made measures and targets for different parts of the State.

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2.1.2 State Planning Policy 2.9 Water Resources

The State Planning Policy 2.9 Water Resources outlines the overall vision and framework in which land use planning operates, including dealing sustainably with the natural and water resources. It provides guidance in the planning, protection and management of surface and groundwater catchments, including consideration of availability of water and waterways management, wetlands, waterways, and estuaries and their buffers, and implementation of total water cycle management principles in the land use planning system.

2.1.3 Better Urban Water Management

The Better Urban Water Management (BUWM) document provides guidance on the implementation of State Planning Policy 2.9 Water Resources. Its intent is to facilitate better management and use of urban water resources by ensuring an appropriate level of consideration is given to the total water cycle at each stage of the planning system (Figure 1)

Although not being a legislative requirement for the CPSP redevelopment, under the BUWM framework, water planning at the CPSP falls into the category of Local Water planning. The scope and strategic nature of the local planning strategy provides the foundation for land use decisions in a municipality for the short and medium term.

Based on the BUWM requirements, the local planning strategy should identify objectives for water resource management, together with other environmental, social and economic issues in the local government area, and propose strategies to achieve these objectives.

This Strategy addresses the requirements for water management as outlined in Better Urban Water Management (BUWM) (WAPC, 2008a) at a level commensurate with the current planning detail. It provides guidance for water management at the full CPSP development scale (i.e. local water management strategy). As such the CPSP WMS firstly identifies key objectives for water resource management at the CPSP, together with other environmental, social and economic issues. It also proposes initiatives to be implemented across the site to achieve the water objectives. In addition to these initiatives, rehabilitation of the drainage channels and sections of the Yakamia Creek as ‘Living Streams’ has been incorporated in this strategy to enable integration with future landscape works during redevelopment of the CPSP.

In terms of the WAPC BUWM requirements, the WMS is supported by and draws on the site context analysis carried out as part of this scope of works (Part 2). The context analysis included an assessment of environmental and resource site-specific opportunities and constraints, gap analysis and further key findings. In terms of hydrologic information, the desktop study includes analysis of groundwater levels, flow and availability, groundwater and surface water quality, and environmental water requirements (including waterway/wetland buffers). A broad review of catchment conditions is contained in this document, highlighting

those aspects that are required for the design of the proposed water management initiatives and preparation of local water management strategies/plans at subdivision scale.

2.1.4 Stormwater Management Manual for WA

The Stormwater Management Manual presents a comprehensive approach to management of stormwater in WA, based on the principle that stormwater is a resource – with social, environmental and economic opportunities. The Manual lists nine objectives that relate to the management of stormwater. They are:

1. Water Quality - To maintain or improve the surface and groundwater quality within the development areas relative to pre development conditions.
2. Water Quantity - To maintain the total water cycle balance within development areas relative to the predevelopment conditions.
3. Water Conservation - To maximise the reuse of stormwater.
4. Ecosystem Health - To retain natural drainage systems and protect ecosystem health.
5. Economic Viability - To implement stormwater management systems that are economically viable in the long term.
6. Public Health - To minimise the public risk, including risk of injury or loss of life, to the community.
7. Protection of Property - To protect the built environment from flooding and water logging.
8. Social Values - To ensure that social, aesthetic and cultural values are recognised and maintained when managing stormwater.
9. Development - To ensure the delivery of best practice stormwater management through planning and development of high quality developed areas in accordance with sustainability and precautionary principles.

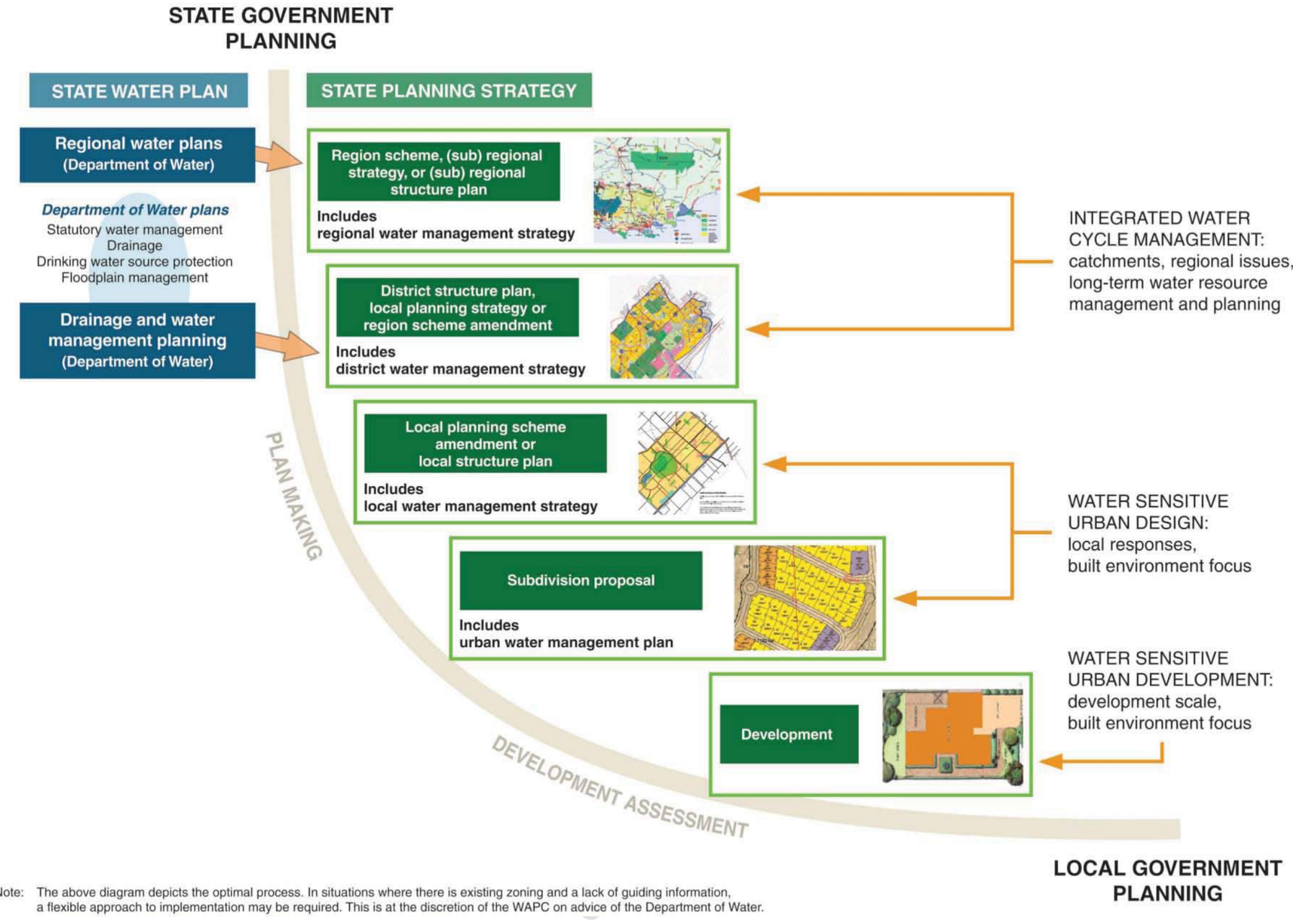
These objectives are based on the following management principles:

- Incorporate water resource issues as early as possible in the land use planning process.
- Address water resource issues at the catchment and sub-catchment level.
- Ensure stormwater management is part of total water cycle and natural resource management.
- Define stormwater quality management objectives in relation to the sustainability of the receiving environment.
- Determine stormwater management objectives through adequate and appropriate community consultation and involvement.
- Ensure stormwater management planning is precautionary, recognises inter-generational equity, conservation of biodiversity and ecological integrity.

- Recognise stormwater as a valuable resource and ensure its protection, conservation and reuse.
- Recognise the need for site specific solutions and implement appropriate non-structural and structural solutions.

These objectives and principles form the basis of the WMS for CPSP and will be achieved through Water sensitive Urban Design measures implemented at a precinct scale.

..



Note: The above diagram depicts the optimal process. In situations where there is existing zoning and a lack of guiding information, a flexible approach to implementation may be required. This is at the discretion of the WAPC on advice of the Department of Water.

Figure 1 The WA planning system (from Better Urban Water Management, WAPC 2008a)

2.1.5 Approval of Non-Drinking Water Systems in Western Australia

The Guideline for the Approval of Non-Drinking Water Systems in Western Australia defines the approval process for the use of non-drinking water, with a focus on urban development. This guideline outlines a step-by-step process which may be taken to establish such a system, including concept planning and design, approvals and implementation. It provides information on the approval-specific requirements for non-drinking water sources to ensure that they are appropriately addressed at the right planning stage.

The DoW approval framework is a 4 stage process that includes:

1. Option evaluation and concept design – Identify source options.
2. Preliminary design – Secure source and identify supply system.
3. Detailed design and approvals – Provide for infrastructure requirements and apply for approvals to use (and supply) a non-drinking water source.
4. Implementation – Obtain approvals to construct (and operate).

The first stage in the development of a non-drinking water system is to consider options and suitability for the source, treatment (depending on intended uses and location), storage (if required) and distribution to supply the needs of the end users. Proponents are encouraged to discuss their preliminary option(s) with the relevant approving agencies early in this stage.

Overarching requirements for Stage 1:

1. Undertake broad-scale water balance to identify non-drinking water needs.
2. Identify available options and develop preliminary non-drinking water concept(s).
3. Consult with relevant approving agencies to seek advice on the proposed concept(s).
4. Demonstrate an understanding of the requirements of relevant regulations.
5. Include the preliminary concept(s) in any required district planning document.

Where requested, the DoW at this stage of the process can provide and coordinate pre approval advice on the proposal from relevant approving agencies.

2.1.6 Other Relevant Guidelines

Additional guidance relevant to this WMS includes:

- Interim guidelines for Developing a Local Water Management Strategy (DoW, 2008),
- Liveable Neighbourhoods (WAPC, 2009),
- Australian Runoff Quality, A guide to Water Sensitive Urban Design (Engineers Australia, 2006) and Australian Rainfall and Runoff, A Guide to Flood Estimation (Engineers Australia, 2001),
- National Water Quality Management Strategy Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) (2006).
- Yakamia Creek Arterial Drainage Plan (Essential Environmental 2014).
- Yakamia /Lange structure plan Water Management Strategy (Essential Environmental, 2014)

PART 2: SITE CONTEXT ANALYSIS

3.0 CONTEXT ANALYSIS OBJECTIVES

The objective of the context analysis is to provide basis for the WMS. This section summarises the key background data and planning assumptions on which the strategy is based.

3.1 EXISTING AND PROPOSED LAND USES

3.1.1 Existing Land Use

The CPSP is located in the City of Albany, flanked by North Road and Albany Highway. The Precinct is approximately 68 hectares in size and comprises 58 lots. While the majority of the land sits under the jurisdiction of the City of Albany, some smaller portions are designated Crown Land but vested with the City for the purpose of Recreation and Drains.

Centennial Park is divided into three separate recreation reserves, each of which contains various major sporting and recreation playing fields and other associated facilities. Whilst all form part of the Centennial Park Sporting Precinct, Sanford Rd separates the Western and Central Precincts and Lockyer Ave separates the Eastern and Central Precincts. The reserves are referred to as the Western, Central and Eastern Precincts.

- **Western Precinct** – Located to the west of the precinct, bounded by North Road, Sanford Road and a commercial precinct that comprises Centennial Park, the Albany Leisure and Aquatic Centre (ALAC) synthetic hockey pitch, turf cricket pitches, an athletics track, multiuse sporting areas for hockey, cricket, tee-ball and soccer, BMX track, skate park and the PCYC building.

- **Central Precinct** - Bounded by North Road, Sanford Road, Lockyer Avenue and a commercial precinct comprising of the Railways Football Club, St John's Croquet, SES, RSL, Scouts and Volunteer Fire Brigade Track. Three interconnected water bodies are located in the Central Precinct, a large lake to the east is fed by bore water and is used by model boat users, this lake overflows into a westerly located kidney shaped irrigation lake (Main Lake), a small stormwater sedimentation basin also feeds into the irrigation lake. The Main irrigation lake overflows into a Living Stream that discharges to the Yakamia Creek.

- **Eastern Precinct** - Bounded by North Road, Lockyer Avenue, Campbell Road and a commercial precinct and comprises Centennial Oval, Albany Agricultural Society, Royals Football Club and soccer, both junior and senior.

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3.1.2 Adjacent Land Use

The land use of immediate surrounding area for each Precinct is detailed below:

Western Precinct – The area to the north of site on the opposite side of North Road is mostly residential with a small park located at the end of Milpara Way and a neighbourhood centre at the north western most corner of site. The western border of site is bounded by residential areas with another small park alongside Wellington Street. The southern border adjoins two special use areas and light industrial use areas. The eastern edge also runs adjacent to light industrial areas and the Central Precinct of Centennial Park.

Central Precinct – The Northern site boundary runs adjacent to a public use area (Council Office), future urban growth areas and existing residences. The southern boundary runs parallel to a light industrial zone with a regional centre/mixed business. Both the eastern and western boundary of this Precinct are flanked by the two other Centennial Park precincts.

Eastern Precinct – The northern boundary of this Precinct adjoins a residential zone while the western boundary runs alongside the Central Precinct boundary and some regional centre/mixed business areas. The eastern boundary is flanked by residences, additional park land with some mixed business/light industrial areas at the south-eastern most corner.

The wider surrounding area consists mainly of a mix of residential, light industry, regional centre/mixed business, and future urban area with a few pockets of caravan/campgrounds, special use areas, hotel/motel, public use areas, local road network and nearby school and cemetery.

The Yakamia Creek transverses the Western Precinct from west to east and forms the site boundary along the western and south western sections of the park. The Creek enters the site on the intersection of North Rd and Barnesby Rd and leaves the site on the intersection of North Rd and Sanford Rd, adjacent to the Central Precinct.

3.1.3 Proposed land use

Under the new Scheme Development Plan (Realm, 2014) for the redevelopment of Centennial Park, the proposed land use and associated structures for each Precinct are detailed below:

Western Precinct – A new grassed hockey field is to be provided immediately west of the existing synthetic pitch. The senior and junior soccer fields are being relocated from the Eastern Precinct to the Western Precinct and will include 4 full sized national competition standard fields and 8 junior fields of varying dimensions. Cricket facilities including the 3 turf wicket blocks and 2 synthetic pitches will be relocated to achieve the optimum number of full size playing fields without overlap.

Central Precinct – The existing DFES Lookout will be removed. The current Australian football field will be retained and used as a major competition facility and training facility for senior clubs in addition to the football fields in the Eastern Precinct.

Eastern Precinct – A large number of existing structures will be removed including the Royal Agricultural Society sheds, Memorial Hall, junior football clubrooms, horse stalls/ cattle yards, and existing storage facilities while both the existing soccer clubrooms and public toilets will be rebuilt with services retained. A new AFL sporting complex will be constructed with an associated stadium building. The junior football facilities will be consolidated into shared playing fields.

Overall changes to land use include:

- Additional (multi-user) club-room and storage facilities
- Heritage, cultural and indigenous consultation and integration
- Integrated community play and recreation spaces
- Improved site access, shared pathway trail (fitness) connections
- Integrated wayfinding, signage, interpretation and public art
- Improved lighting and electrical upgrade
- Improved vehicle access and circulation spaces with designated informal parking in the Western and Eastern Precincts and overflow parking in all precincts.
- Integrated landscape and water management
- Improved biodiversity and natural habitat with revegetated areas
- Improved safety specifically at night.

3.2 PRECINCT USERS

As a major Sporting Precinct within the city of Albany, Centennial Park receives a large number of visitors throughout the year. With the development of the park and improvement of its facilities, the intention is to encourage greater visitor numbers. As such, the projected population is likely to increase.

3.2.1 Existing Users

Sport participants

According to the Community Engagement Report (City of Albany, 2013, the numbers of participants in various sporting activities at Centennial Park are as follows:

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Table 1 Annual participant numbers for various sporting clubs

Sporting Season	2009	2010	2011	2012	2013	Trend
Cricket - Junior	438	346	297	280	330	Declining but experienced an increase this year
Cricket - Senior	180	192	204	204	216	Slight increase
AFL – Junior	974	1058	1068	1063	1101	Increasing
AFL – Senior	350	350	375	400	400	Increasing
Hockey – Junior	445	445	445	470	470	Stable with a slight increase in the last 2 years
Hockey – Senior	225	225	225	225	240	Stable with a slight increase this year
Soccer – Junior	870	949	1121	1150	1448	Increasing
Soccer – Senior		304	288	288		Stable

Note: These figures were provided by the local associations and regional sport development officers. To ensure an even comparison the figures exclude all social adult competitions.

Peak usage of the park is in winter coinciding with AFL, hockey and soccer seasons. There is a distinct seasonality between sport usage, with AFL, hockey and soccer running in autumn (pre-season training) and winter (peak season) and cricket running in spring and summer. The park provides community POS when no sports are run.

Other special events

The Albany Agricultural Show is annually held on site in November with activities taking place in the Eastern Precinct along Lockyer Avenue and on Centennial Oval and surrounds. Approximately 20,000 visitors are expected for the show.

The RAC campground is set up to accommodate the Albany Anzac Centennial Event in November 2014. The campgrounds will be set in the Eastern Precinct and will consist of 586 lots to accommodate up to 3,516 people from 30 October to 3 November 2014. Ten (10) temporary toilet blocks and ten (10) shower blocks are set up either side of the kitchen unit to accommodate the visitors.

4.0 ENVIRONMENTAL CONTEXT

4.1 CLIMATE

4.1.1 Rainfall and Evaporation

The regional climate is characterised as temperate with dry warm summers and cold wet winters. Rainfall is highest during the winter months ranging between 126.6 mm and 143.2 mm compared to the summer months where rainfall ranges between 22.6 mm and 30.1 mm. The average annual rainfall is estimated at 931.5 mm/yr (BOM, Climate Data Online, 2014).

Figure 2 below represents average monthly rainfall data (Albany BOM station number 009500) and monthly pan evaporation data (Albany airport BOM station number 009741) (daily means multiplied by number of days in month) for Albany.

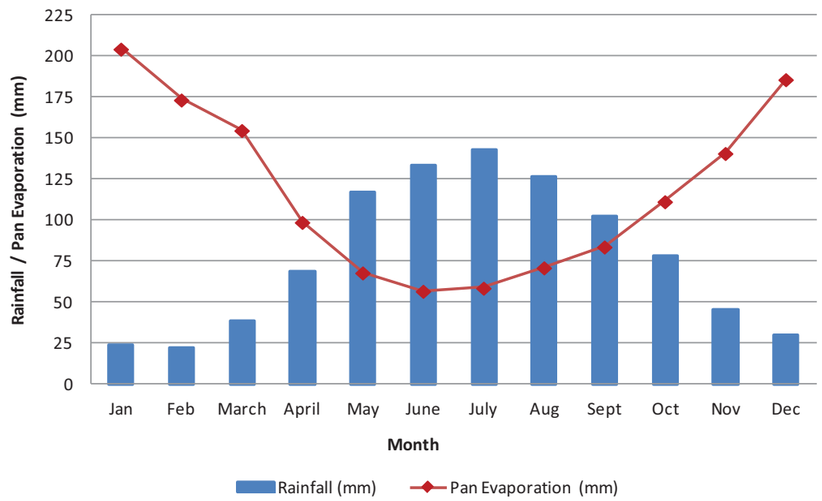


Figure 2 Average monthly rainfall and evaporation in Albany

4.1.2 Wind

Wind speeds are generally high throughout the year, typically varying between 10-20 km/hr in the morning and 10 – 30 km/hr in the afternoon. While wind speeds reach above 30 km/hr during each season, they are greatest during the summer months. Wind direction varies throughout the year with the following predominant wind directions during each season:

- Summer – From the east in early morning and southeast in the afternoon.
- Autumn – From the northwest during the morning and both southeast and southwest in the afternoon
- Winter – From the northwest in the morning and west in the afternoon
- Spring – From the west in the morning and southwest in the afternoon.

The wind data was collected from wind roses generated at Albany Airport (station number 009741) and additional wind speed data collected at Albany (Site number 009500).

4.2 SOILS AND LANDFORM

4.2.1 Topography

Centennial Park is generally a low lying area located at the foot of Mount Melville and Mount Clarence. The site generally slopes downwards from the Western and Eastern Precincts towards the basins in the Central Precinct.

On the Western Precinct, surface levels range from 22.2 mAHD at the northwest boundary to 15 mAHD in the northeast boundary. The Precinct generally slopes in a south easterly direction towards the Yakamia Creek.

Contours in the Central Precinct range from 18 mAHD at the south-east boundary to 14.4 mAHD at the north-west boundary of the site, near the discharge point of the Living Stream to the Yakamia Creek.

The Eastern Precinct generally slopes from east to west, with contours ranging from 23.4 mAHD in the vicinity of Campbell and North Roads to 16 mAHD in the vicinity of Lockyer Avenue and North Road.

4.2.2 Acid Sulfate Soils

Centennial Park sits in an area of high to moderate risk of Acid Sulfate Soils (ASS) occurring within 3.0 m of the natural soil surface. Limited ASS investigations have been carried out between 2012 and 2014. Some shallow soil strata were overlooked with respect to their acidity allowing only assumptions to be made based on their acidity (either potential or actual) through field observations and tests:

- Golder Associates: Preliminary ASS investigations in March 2012 in the Central Precinct (Four (4) soil bores only) south of North Road in between Sanford Road and Lockyer Ave

identified the majority of ASS in PASSM form primarily in clays (Central Precinct located above clay lenses as opposed to coffee rock in Western or Eastern Precincts). PASSM was identified at depths ranging from approximately 13.5 mAHD – 13.25 mAHD. Actual Acid sulfate soils (AASS) were not identified at the four locations.

- Douglas Partners: Undertook preliminary ASS studies as part of concurrent geotechnical investigations in June 2014. ASS field and analysis results reported the following:
  - Confirmation of an extensive Coffee Rock lens across the Western Precinct, with a nominal thickness of approximately 1.0 m and ranging from depths 1.5 – 2.0 mBG (corresponding to 19 mAHD (west) to 13.5 mAHD (central). The coffee rock upper strata position is below average superficial groundwater level and ASS analysis confirms the presence of PASSM, with the majority of net acidity in potential form.
  - Coffee Rock indicating Actual Acidity (AASSM) was also elevated, indicating that the Coffee Rock material may be undergoing oxidation, potentially through exposure via seasonally low groundwater levels.
  - Deep grey and yellow sands, gravelly sands also identified as PASSM material, located approximately 2.0 – 3.0 mBGL, with AASSM also identified within the grey sands at similar depths.
  - Coffee Rock was not confirmed within the initial 3 m of material within the Central Precinct, as clay lenses dominated the soil profile below the superficial groundwater level, with clay material present between 13 mAHD – 14 mAHD to depths greater than 12 mAHD.
- Syrinx Environmental: Syrinx undertook limited ASS sampling as part of a preliminary investigation into the current surface water and sediment material within the existing channel (Please see Figure 4 for sampling locations). The ASS testing was conducted across limited portions of the site where proposed basin(s) were likely to be developed. The ASS results showed the following:
  - Acidic soil conditions identified in the Eastern Precinct (SB01/SB02) in shallow soils ranging from surface to 1.5 mBGL, with AASSM concentrations ranging from 0.014 – 0.14%S. Field pH tests confirmed this acidity.
  - Shallow acidic soil conditions identified within the Central Precinct, located east of the existing detention basins, in the form of both potential and actual acidic soils. ASS analysis at 1.5 mBGL (SB03),

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Acid Sulfate Soils summary:

All preliminary ASS data obtained from Golders Associates, Douglas Partners and Syrinx investigations indicated shallow groundwater conditions between 25 – 27 June 2014, with levels ranging from surface to 1.2 mBGL (17.1mAHD – 13.7 mAHD).

Figure 3 shows the bore locations used in the above mentioned investigations and the depth of clay or coffee rock layers (mAHD) where PASS and ASS material is present or likely present. A potential constraint exists in terms of the confirmation of ASS profile(s) across all precincts, as insufficient ASS analysis results were obtained from the upper soil strata above the coffee rock, clays or standing water level. Some field ASS tests provide an indication that AASSM may be present above the standing groundwater table. Field pH tests across the Central and Eastern Precincts ranged from 4.1 – 5.77 within clayey sand and sandy layers to a maximum drill depth of 1.5 mBGL.

A thin coffee rock layer was also identified between 0.5 – 1.5 mBGL within the eastern portion of the Central Precinct adjacent to Lockyer Avenue, indicating AASSM as well as PASSM, as confirmed by ASS analysis of Coffee Rock across other regions of the precinct.

ASS resides in the form of both PASSM and ASSM in grey sands, stiff or sandy clays and Coffee Rock, below the current groundwater level, with the majority of confirmed ASS (through analysis) within the following precincts:

- Western Precinct: PASSM and AASSM identified between 19 mAHD (west) to – 13.1 mAHD (east). Field acidity tests in the Western Precinct also identified potential for shallower ASS profiles, however this cannot be confirmed.
- Central Precinct: PASSM and ASSM identified between 13.1 mAHD (west) to 14.2 mAHD (east) in clayey sands, clays and brown/grey sands. Coffee Rock was not identified within the Central Precinct, however acidic clays were prevalent.
- Eastern Precinct: PASSM and AASSM identified between 14.1 mAHD (west) and 18.2 mAHD (east), in grey, yellow and brown sands, Coffee Rock lens (beneath Lockyer Avenue) and silty clays.

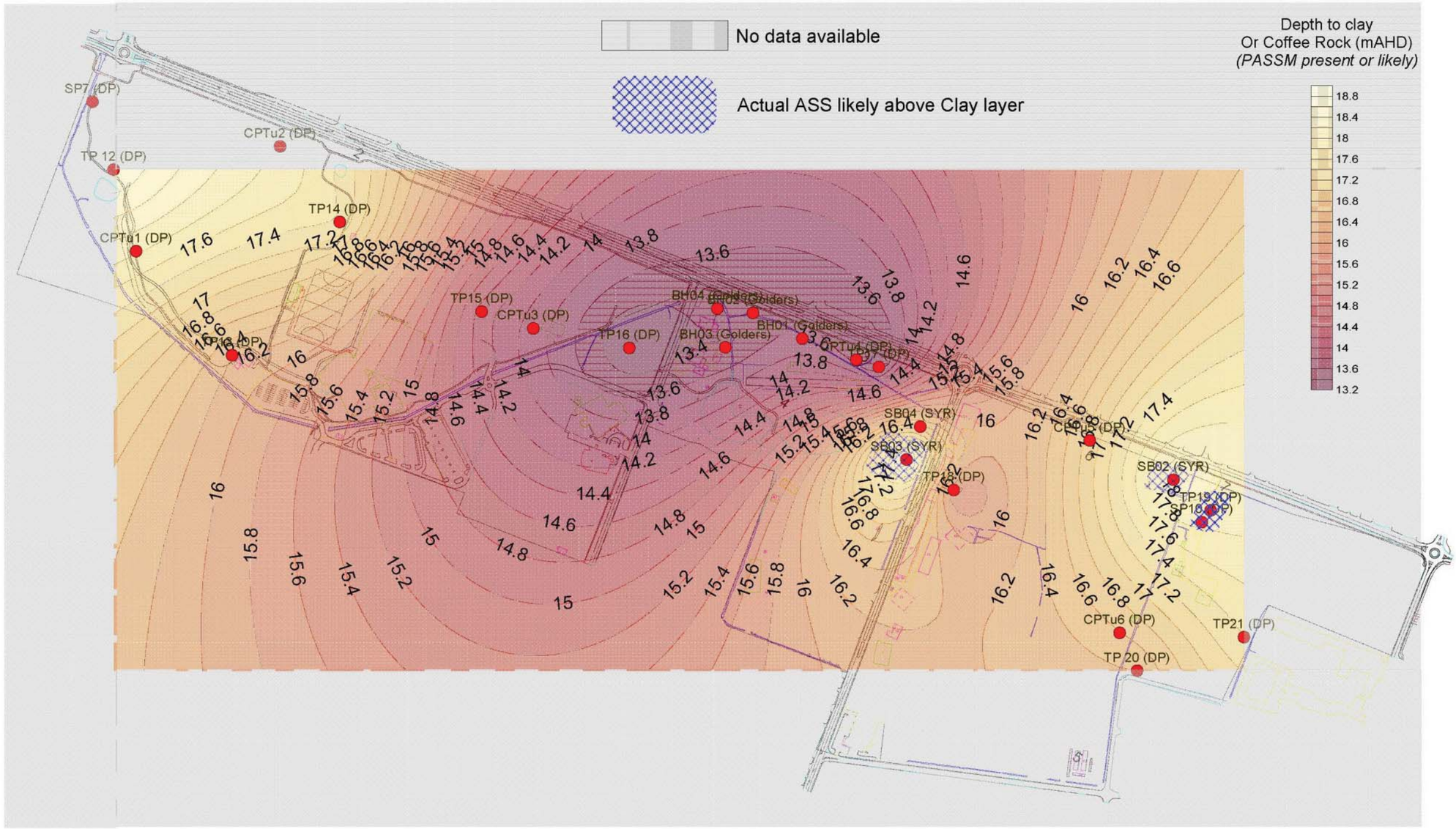


Figure 3 Presence of clay and coffee rock layers (mAHD) indicating likely PASS and ASS occurrence.

4.2.3 Contaminated Sites

The presence of contaminated sites has been identified in the land surrounding Centennial Park. Seven Sites (Table 2) have been identified within the one kilometre radius of Centennial Park Precinct:

Table 2 Contaminated sites within 1km of the CPSP.

Site	Position from Centennial Park	Site Address	Contaminants	Description
1	North, immediately adjacent (opposite) to Central Catchment area	102 North Rd Yakamia WA 6330	PAHs (diesel and fuel products	Remediated – residual contaminants below car park surfaces
2	Approximately 200 m West of Centennial Park (West Precinct)	7 Kelly St Orana WA 6330	Hydrocarbons (petrol or diesel products in soil and groundwater	Remediated – residual contaminants present in soil and groundwater
3	Approximately 200 m West of Centennial Park (West Precinct)	19 Chester Pass Rd Orana WA 6330	Hydrocarbons (petrol or diesel products in soil and groundwater	Remediated – residual contaminants present in soil and groundwater
4	Approximately 600 m west of Centennial Park (West Precinct) boundary	317 Albany Hwy Mount Melville WA 6330	Hydrocarbons (petrol or diesel products in soil and groundwater	Remediation Required – residual contaminants present in soil and groundwater
5	Approximately 300 m south of Centennial Park (West Precinct) boundary	226 Albany Hwy Centennial Park WA 6330	Hydrocarbons (petrol or diesel products in soil and groundwater	Remediated Required – residual contaminants present in soil and groundwater
6	Approximately 700 m south of Centennial Park (Central Precinct) boundary	145 Albany Hwy Mount Melville WA 6330	Hydrocarbons (petrol or diesel products in soil and groundwater	Remediated Required – residual contaminants present in soil and groundwater
7	Approximately 800 m south of Centennial Park (East Precinct)	269 York St Albany WA 6330	Hydrocarbons (petrol or diesel products in soil and groundwater	Remediated Required – residual contaminants present in soil and groundwater

Impacts from former or current groundwater sources

Calculated groundwater flows within the precincts indicate groundwater merging toward the Central Precinct in line with current landform levels. Hydrocarbon impacted groundwater has the potential to migrate offsite in seasonally high groundwater levels in the region. Although local flows indicate convergence to the Central Precinct (and relative to arterial channel surface flows), local groundwater gradients at the “contaminated” or “remediated” sites may show site specific influences oppose to calculated flows within Centennial Park.

Overall, shallow groundwater levels have the potential to migrate contamination from contaminated sites, however attenuation of contaminant plumes of this nature are limited and pose an unlikely risk to additional contaminant mass entering the arterial channels or local groundwater system beneath the precinct.

4.2.4 Sediment Quality

Limited sediment sampling and analysis was conducted within the three precincts as shown in Figure 4. Heavy metal concentrations appear relatively consistent across all three precincts in low concentrations. Field observations identified thin layers of fresh sediment levels within the open channels, as the Western Precinct channels (east of the wetland) comprised semi-hardstand construction as the channel progressed into the Central Precinct.

Field monitoring within the arterial drains did not identify the presence of thick or heavily accumulated sediment deposits, which may indicate that the arterial drains exhibit sufficient flows for sediment or silt “stripping” within the drains during period of high flow.

Moderate surface water flows were observed during the June 2014 sampling event which indicated high potential for sediment stripping of the channel floor and re-suspension/migration along the arterial channels.

Nitrogen concentrations (TN) in sediments ranged from 600 – 750 mg/kg (west), with TN concentration of 840 mg/kg within the Central Precinct channel which runs parallel to North Road. TP concentrations were also constant across all three precincts, ranging from 110 – 230 mg/kg.

Detectable levels of hydrocarbons in the form of PAHs were also present within the Central Precinct. Commonly associated with runoff from car-park or road reserves and PAHs were not identified in the Eastern or Western Precinct open channel sediment samples. The presence of PAHs within this Precinct could be attributed to the slightly lower flows observed in the arterial drains.

Heavy metal concentrations for arsenic, chromium, nickel and zinc in sediment were low (APPENDIX 1) and comparable to naturally occurring background concentrations is surficial sand formations. Field observations indicated very low clay content in sediment within channels, which could be attributed to high flows and velocities through the system where the rate of deposition of silts and fine organic material would be lower than anticipated.

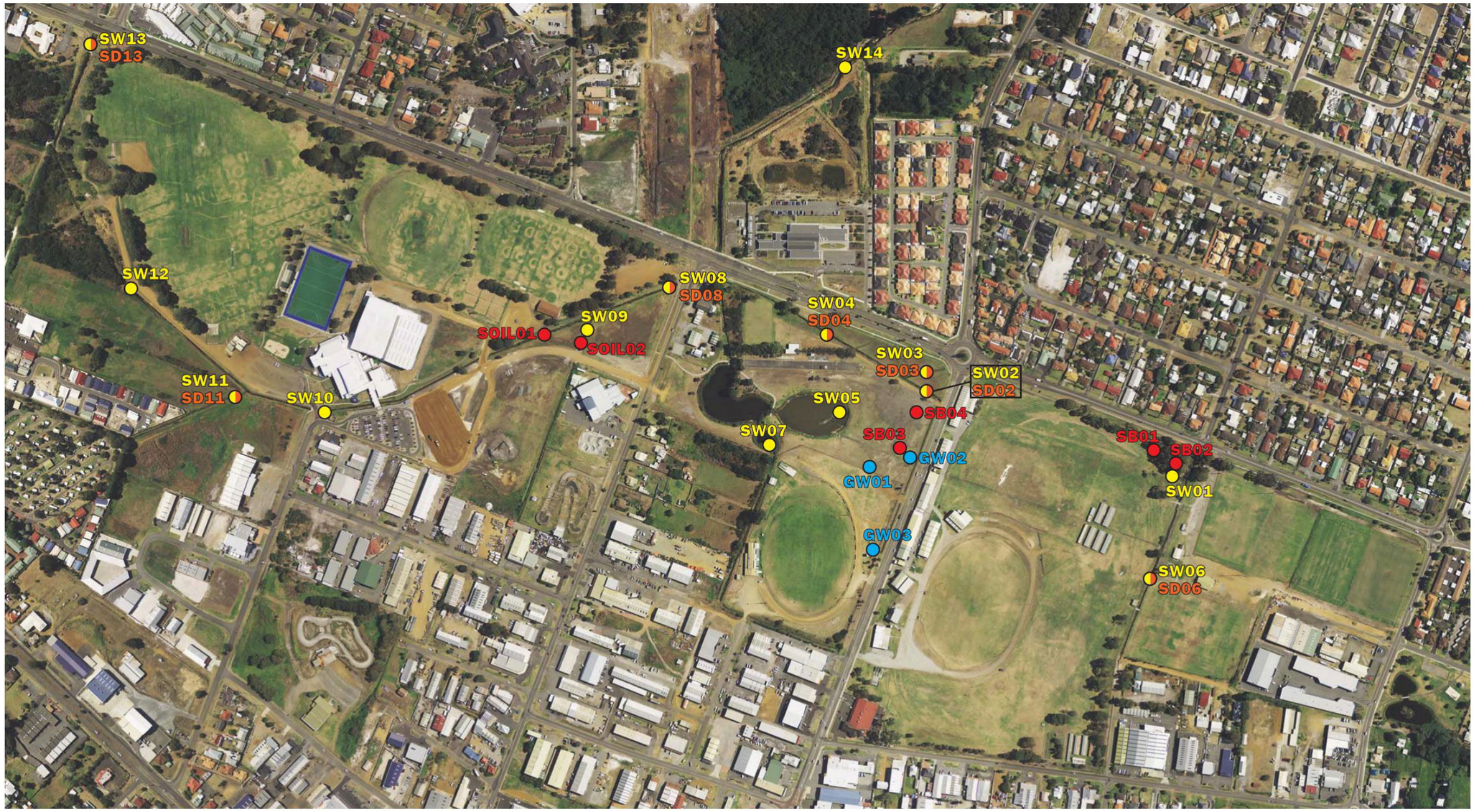


Figure 4 Surface water, groundwater and sediment sampling locations for the Syrinx preliminary site investigations (June 2014).

4.3 GROUNDWATER

4.3.1 Regional Aquifers

The CPSP (and Yakamia catchment) lies within the western section of the Bremer Basin within the unproclaimed Karri groundwater management area. The aquifers present are broadly classified, in order of increasing depth, as (Essential Environmental, 2014):

- Bremer West – Superficial
- Bremer West – Sedimentary
- Bremer West – Fractured Rock

These aquifers are unconfined and salinity generally increases with depth from generally fresh to brackish Superficial Aquifers to the mostly saline Fractured Rock Aquifers (WRC 1997). At the moment there is no requirement for a license to take groundwater in the area as the groundwater area is unproclaimed and the aquifers present are not artesian (Essential Environmental, 2014).

Where present, the superficial aquifers are located in sand and calcarenite dunes along the coast such as those accessed for the Albany town water supply (WRC 2001). Sedimentary aquifers are typically formed in siltstone and although they often have low hydraulic conductivities, and are therefore low yield, they can represent an opportunity for resource development (WRC 1997). Essential Environmental (2014) noted that spongolite aquifers exist within the Yakamia catchment. Spongolite sections of siltstone are generally more permeable, because of their high proportion of fossilized marine sponge material, and where located, if favourable recharge conditions exist, these aquifers can provide good yields of fresh to brackish groundwater resources (Agriculture WA 2000).

4.3.2 Local Aquifers

A spongolite aquifer has been identified as part of the *Albany Regional Sporting Complex - Present and Future Water Requirements* study (Groundwater Resources consultants, 1984). This study shows the spongolite formation has an oval shape and is located in the Central Precinct in the vicinity of the irrigation lakes. The isopach figure in the study shows that the spongolite has a thickness of more than 20 metres in its central portion.

The sustainable extractable groundwater capacity of the spongolite was estimated to be 85,000kL/annum (Groundwater Resources consultants, 1984). It was estimated that 75% of this volume would be generated from groundwater recharge of the spongolite from surrounding lower permeability (and yield) sediments and the remaining 25% would be due to the

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spongolite storage (porosity) itself. By not exceeding the ratio of replenishment and abstraction on a yearly basis, groundwater levels are likely to remain stable from year to year.

4.3.3 Groundwater Levels within the CPSP

Groundwater level data was collated from the existing bores within the CPSP for June and September 2014. Contours in mAHD can be seen in Figure 5 (June 2014 data) and Figure 6 (September 2014 data), which demonstrate an increase in groundwater levels between the two months.

The largest increases in groundwater levels occurred in the Western Precinct and in the Central Precinct adjacent to the basins, with groundwater levels in the Central Precinct going from about 14 mAHD in June 2014, to approximately 15mAHD in September.

Figure 7 shows ground surface levels in mAHD in the CPSP and a cross section of groundwater levels in June and September 2014. It is visible that groundwater levels coincided with surface levels in the vicinity of the Central Precinct in September 2014 (therefore the occurrence of drainage channels to mitigate water logging on site).

Influence of Clays

The influence of clays on groundwater levels within the Central Precinct has the potential to exacerbate the standing water level in this region, as shown in Figure 7. Limited soil investigations demonstrate stiff to silty clay lenses which are present approximately 11 – 14.5 mAHD across the Central Precinct which could act as a semi-confining layer, causing separation or lack of infiltration through this profile into deeper sand lenses.

Current groundwater data indicates that the majority of the superficial groundwater column flows through the superficial layers above the clay or coffee rock lenses which lead to higher subsurface flows or yields which may recharge the basins during wet seasons when groundwater levels are above the basin floors.

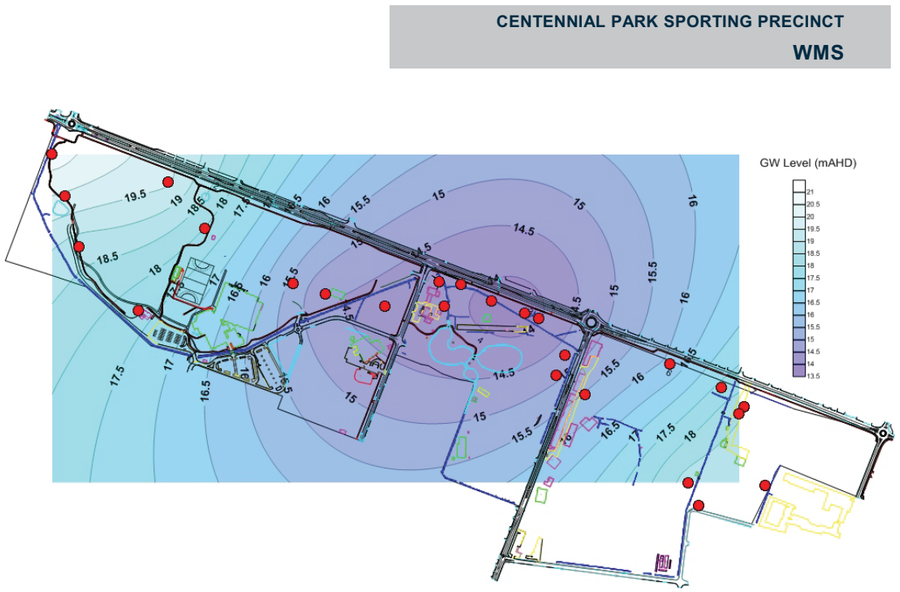


Figure 5 Groundwater contours in the CPSP in June 2014.

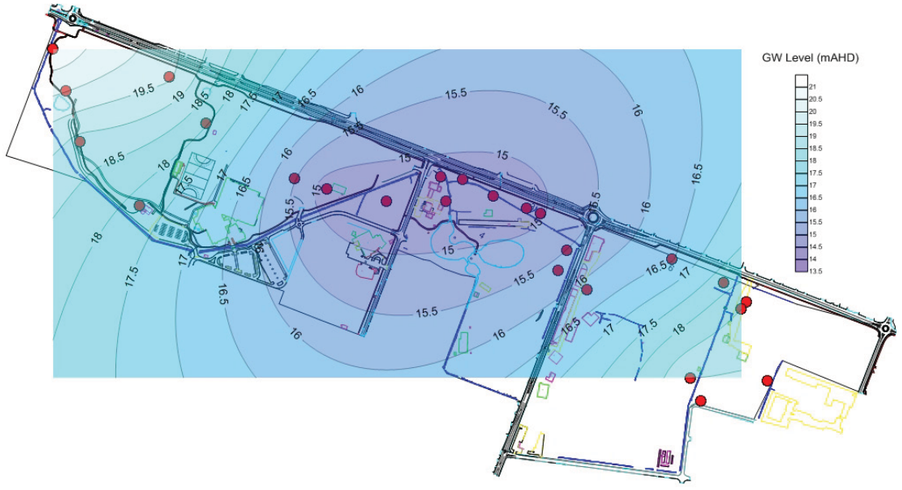


Figure 6 Groundwater contours in the CPSP in September 2014.

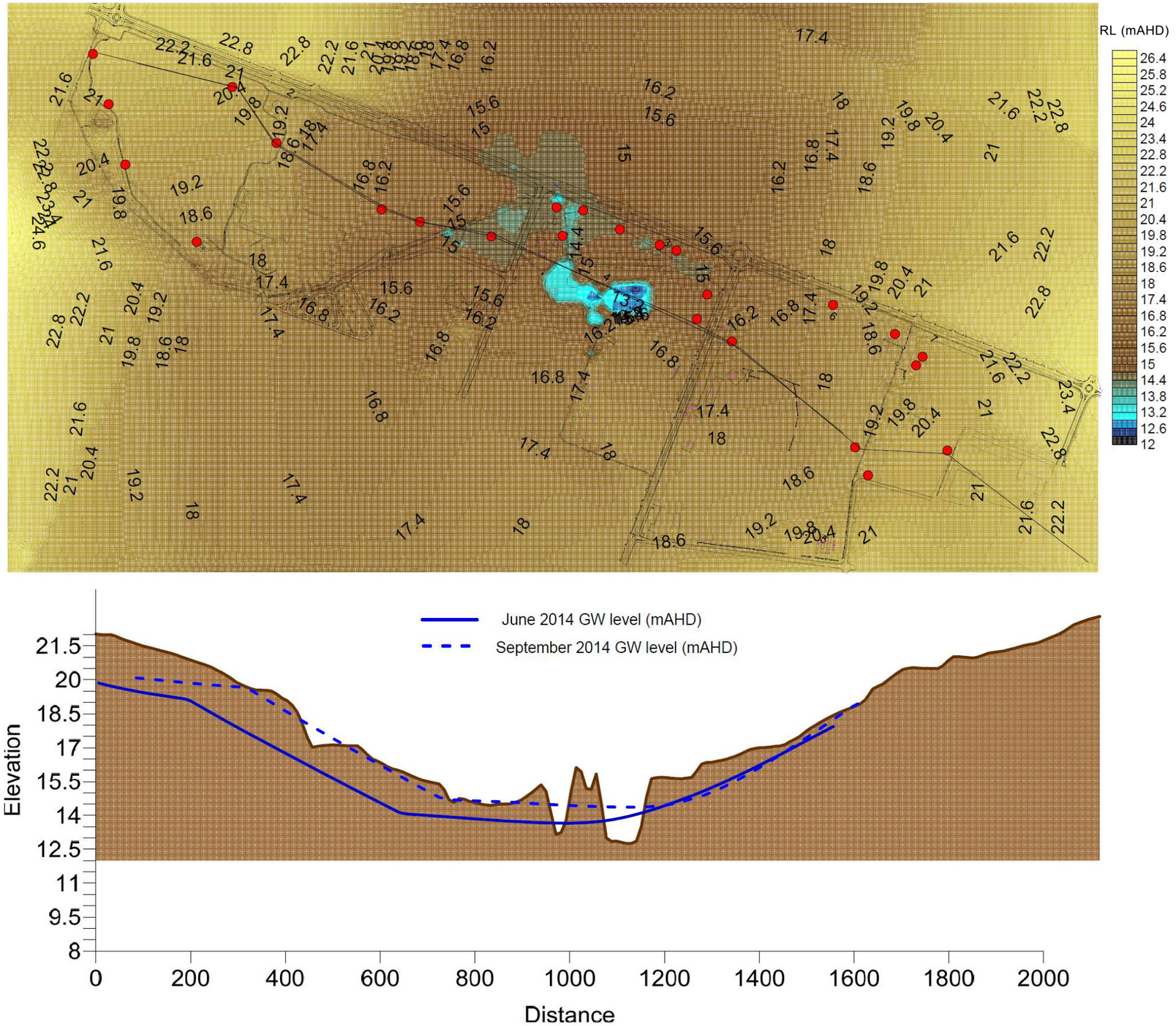


Figure 7 Cross section of surface levels and indicative groundwater levels through the CPSP in June and September 2014

4.3.4 Groundwater Quality

Groundwater sampling was undertaken at limited locations within the Central Precinct due to bore accessibility. Samples were collected from three (3) central irrigation bores (Figure 4).

Field parameter testing demonstrated average TDS concentrations of 825 mg/L, with oxic conditions (DO ranging from 5.74 - 6.97 mg/L), sulphates concentrations were below 130 mg/L with relatively low alkalinity, reporting <45 mg/L across the bore network. TDS values within the Central Precinct were comparable to groundwater values, with TDS ranging from >500 <900 mg/L, indicating either concentration through evaporation or accumulation of expressed groundwater and stormwater catchment quality.

Nutrients (Nitrogen and Phosphorus)

Nitrogen and phosphorus concentrations are shown in Figure 8 and Figure 9, respectively and also summarised in APPENDIX 1. The majority of nitrogen in the groundwater system comprised of organic nitrogen (TKN), with less than 2% of nitrogen mass associated with nitrates or ammonia-N. Phosphate analysis results indicated that approximately 80% of total phosphorus (TP) was phosphate.

Comparison of analysis results to adopted fresh water protection levels indicated that nutrients were below threshold levels with the exception of TP and phosphate, with analysis results reported above ANZECC (Lowland) threshold protection levels.

Heavy Metals

Heavy metal distribution across the bore network appeared similar to surface water concentrations within the drainage arterial network, with dissolved arsenic, cadmium, chromium, copper and nickel reporting equal to or below practical LOR.

Manganese and Iron concentrations were significantly higher than surface water quality with dissolved iron concentrations ranging from 5.1 to 8.3 mg/L and manganese ranging from 0.066 to 0.099 mg/L. Elevated iron and manganese concentrations are common within groundwater systems, however abstraction of the groundwater within the Precinct appears suitable with low acidity, pH and sulphate concentrations.

4.4 SURFACE WATER

4.4.1 Surface Water Quality

Surface water sampling was conducted by through the CPSP by Syrinx scientists on the 24th of June 2014. The surface water sampling was undertaken concurrently with sediment and soil

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quality sampling along the existing arterial drainage channel to establish baseline conditions in lieu of undertaking water quality/treatment options for the development of a Living Stream.

Sampling locations

The sample locations/zones selected for sampling and analysis are shown in Figure 4 and are summarised in Table 3. Catchment areas are synonymous with Wood & Grieve Engineers' (WGE) Yakamia Catchment Analysis Plan (WGE, 2014) (APPENDIX 2), as such Syrinx sampling locations have been grouped within the three Precinct areas.

Table 3 Sample location IDs

Precinct	Water body	Sample ID
Western	Yakamia	SW08, 10, SW12, SW13
	Catchment 6	SW11
	Catchment 14	SW08
Central	Open drain	SW02, SW03, SW04
	Catchment 19	SW07
	East lake	SW05
Eastern	Open drain / Catchment 20	SW01, SW06

Precinct Summary

All precincts reported dissolved oxygen levels greater than 5.5 mg/L and total dissolved solids within the same order of magnitude, ranging from 461 – 799 mg/L, with the highest TDS levels observed within the eastern detention basin, likely to be associated with evaporation and accumulation of surface water.

Redox in surface water appeared limited with respect to reducing conditions, with all ORP values well above 150 mV and below 306 mV, which is relative to very low total recoverable hydrocarbon concentrations observed in the Precinct catchments. Sediment mass and quality also supported the limited reducing presence

Acidity in groundwater was very low (<11mg/L) across all locations relative to the low sulphate concentrations (<35 – 46mg/L) observed across the Precinct and neutral pH conditions. Surface water levels appeared well above any PASSM layers or ASSM layers identified within the Precinct indicating suppression of these ASS layers during the wet period. Seasonally high groundwater levels across the Precinct also confirmed that calculated groundwater levels were above PASSM strata which was primarily associated with the coffee rock or clayey strata identified in all three precincts.

Nutrients (Nitrogen and Phosphorus)

Western, Central and Eastern Precinct Catchments indicated a similar range in total nitrogen concentrations, ranging from 1.7 – 2.3 mg/L. TKN ranged from 1.0 – 1.2 mg/L with the remainder of nitrogen (0.55 – 0.99 mg/L) in the form of nitrate. Ammonia concentrations were minimal with <1% of TN in the form of ammonia.

Nutrients within the eastern detention basin showed concentrations similar to the mentioned above, with groundwater abstraction bores (GW01 – GW03) concentrations reporting lower concentrations than the reported concentrations from the arterial TN, TKN nitrate-N and ammonia-N surface water as shown in Figure 8 below.

Figure 9 also shows TP and phosphate concentration data distribution within the arterial drains and in groundwater. A comparison indicates higher TP and phosphate concentrations in the groundwater system and above ANZECC (2000) trigger values for lowland rivers of the southwest Australia.

Comparison of analysis results to ANZECC (2000) trigger values for lowland rivers of the southwest Australia indicated that TN concentration were all above the 1.2 mg/L trigger value in surface waters and that mean concentrations of TP and phosphate in groundwater were above their respective trigger values of 0.065 mg/L and 0.04 mg/L. Down-gradient quality from the basin indicates TP and phosphate levels below ANZECC trigger values.

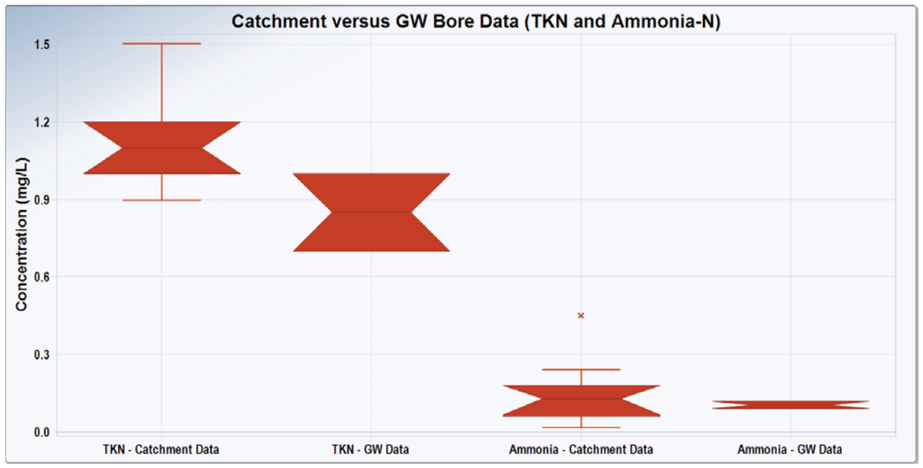


Figure 8 TKN and ammonia concentration data distribution in surface and groundwater within CPSP.

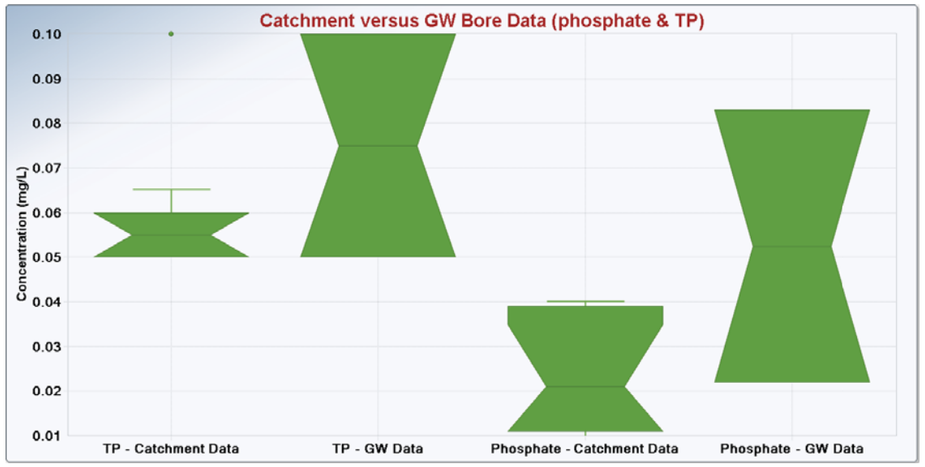


Figure 9 Total phosphorus and phosphate concentration data distribution in surface and groundwater within CPSP.

Heavy Metals

Heavy metal concentrations across the Precinct indicated similar concentrations in all catchments, with arsenic, boron, barium, chromium, copper, nickel and zinc levels in surface water. Lead, selenium, cadmium and cobalt concentrations were reported below low-level reporting limits across all catchments, including the detention basin, groundwater bores and down-gradient of the Centennial Park Precinct.

Dissolved zinc and manganese concentrations reported the highest variability which is likely to be caused by the variability in redox across the sampling locations across the precinct, with redox ranging from 150 – 306 mV.

Dissolved iron concentrations in groundwater ranged from 5.5 – 8.8 mg/L within the Central Precinct bores previously mentioned, comparing to concentrations in surface water ranging from 0.43 (east) to 1.2 mg/L (west). Iron concentrations within the Central detention basin were comparable to arterial surface water concentrations as opposed to groundwater, indicating the detention basin June inflows are likely to comprise surface water with lesser input from expressed groundwater or abstraction inputs.

Whilst dissolved heavy metals concentrations within the surface water arterial drainage system were reported below ANZECC (95% Protection), further, expressed groundwater and groundwater quality is likely to stratify within potentially reducing conditions within deeper zones of the detention basin, allowing surface water and surface sampling most likely to represent catchment inflow conditions.

4.4.2 Drainage and Hydrology

Centennial Park sits within approximately 446 hectares of predominantly urban catchment. The Park is located in a low lying area in the catchment and acts as collection zone for stormwater runoff and shallow groundwater. The CPSP occupies the immediate valley floor of the catchment which is characterised by shallow regolith over impervious granitic basement. The presence of superficial silty and clayey sediments within the Precinct also contributes to the water logging issue on site.

The municipal drainage infrastructure caters for flows up to the peak 5 year ARI event, flows above this are conveyed by overland flow. Analysis of the external catchments discharging to CPSP has been provided by Wood & Grieve Engineers (WGE, 2014) (APPENDIX 2).

Significant drainage lines exist throughout site, either as open drains and piped sections. These drainage lines eventually discharge to the Yakamia creek. Drainage lines also exist around some of the larger sports fields in an attempt to minimise water logging.

Anecdotal evidence suggests that:

- localised areas of Centennial Park are subject to short-term flood inundation in events greater than the peak 5yr ARI;
- several areas of Centennial Park are subject to long-term winter water logging or surface water ponding; and
- there are significant overland flow paths through the Centennial Park to convey events greater than the 1 in 5 ARI events.

Significant existing City of Albany open drains are located (refer Figure 10 for numbering):

1. a) Within Lockyer Avenue, b) behind Railways Football Club and c) south of North Road within the Central Precinct;
2. Adjacent Symers Street, connecting to North Road, and at the rear of commercial land of Knight Street road reserve within the Eastern Precinct.

Significant existing City of Albany stormwater pipe networks are located:

3. Within the multi-use field in the Western Precinct;
4. Along Sanford Road, discharging to the Yakamia Creek;
5. South of North Road between the existing Soccer grounds and Lockyer Avenue in the Eastern Precinct.

Significant overland flood routes for events exceeding the 5 year ARI are located:

6. Over the stormwater pipe south of North Road (4) in the Eastern Precinct;
7. Along Symers Street (2) and turning west towards the north of the Centennial Oval;
8. Along Sanford Road and through the PCYC site in the Western Precinct.

Apart from the drainage channels and the Yakamia Creek, three open water bodies are located within the Central Precinct as follows (refer Figure 10):

9. Model Boat Lake is the large lake to the east. This lake is fed by bore water and is used by model boat users. This lake is aerated and works as an iron drop-out zone for irrigation. This lake overflows via a fixed height weir into the Main Lake
10. Main Lake is the kidney shaped lake located to the west of the Model Boat Lake. It receives overflows from the Model Boat Lake and it is where irrigation water is drawn from.
11. A small stormwater sedimentation basin to the south of the Main Lake also feeds into the Main Lake. This sedimentation basin receives stormwater flows from the drainage channel to the east of the Railways Football club which drains a 109Ha catchment (Catchment 19 in the W&GE Catchment Plan - APPENDIX 2). The Main irrigation lake overflows into a Living Stream (constructed in 2012) that eventually discharges to the Yakamia Creek.

Two additional man-made water bodies are located within the Western Precinct (12 and 13 in Figure 10). These two structures serve no obvious drainage function; in fact it is believed that the existing water body (12) located south of North Road, near Kampong Road, may be increasing the water logging of the main cricket oval due to potential seepage.

The Yakamia Creek is subject to occasional flooding and erosion during some storm events. The maximum flood level height indications from the April 2005 storm event show the southern part of the Western Precinct (near ALAC) was affected by the flooding of the Yakamia Creek, this area is shown as 14 in Figure 10. Also subject to flooding is the area located on the Eastern Precinct adjacent to Symers Street and the commercial area (area 15 in Figure 10). Additional overland flow paths and water logged areas are also shown in the figure.

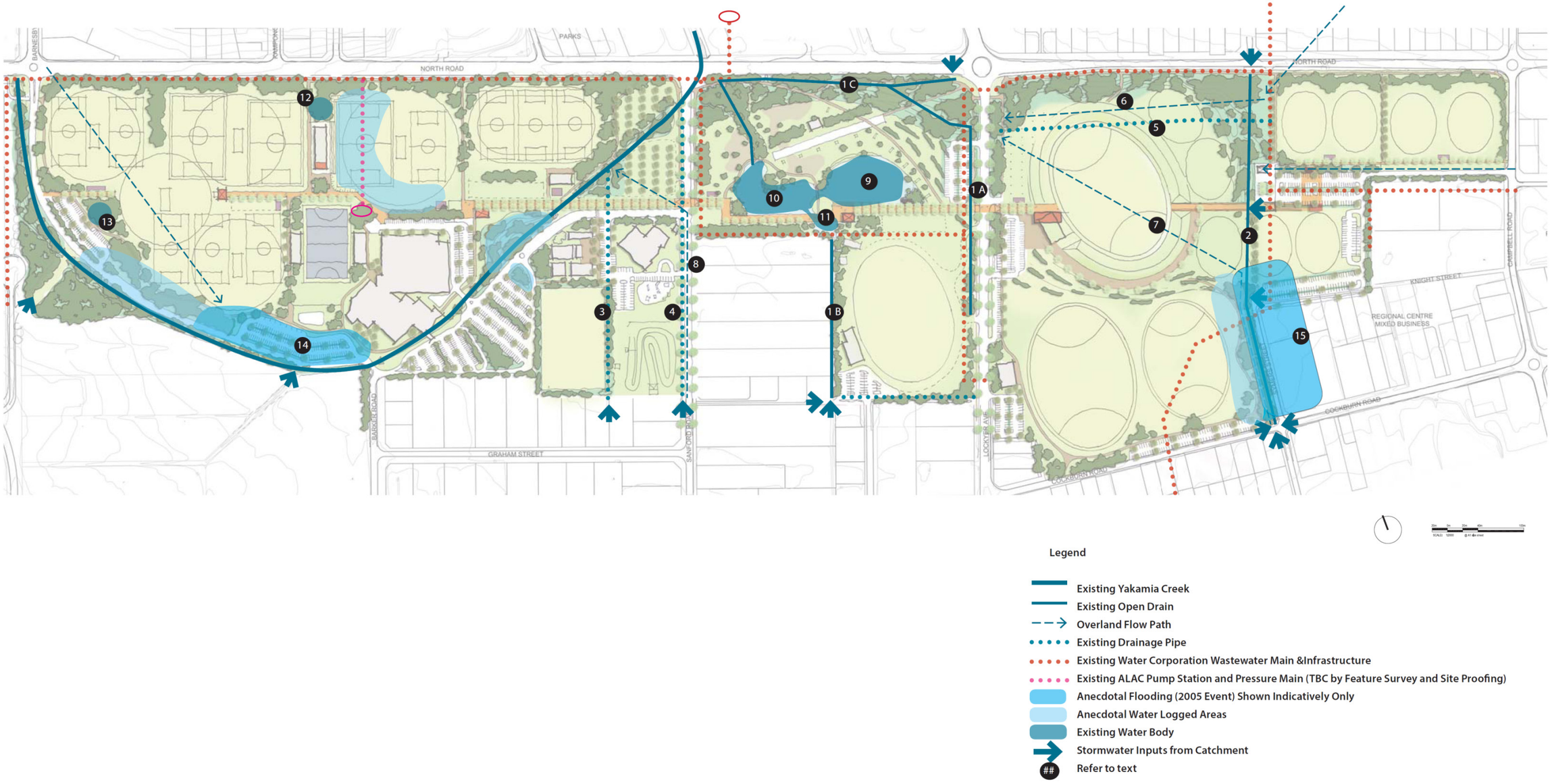


Figure 10 Stormwater and drainage routes in the CPSP.

4.4.3 Yakamia Creek

The CPSP sits within the boundary of the Yakamia Creek Catchment, which is approximately 21km² in total and contains a large proportion of the urban area of Albany (Essential Environmental 2014). The Yakamia Creek transverses the Park's Western Precinct prior to discharging beneath North Road, at Sanford Road, in a northerly direction. Yakamia Creek receives direct stormwater discharge from several minor and major City of Albany stormwater networks prior to ultimately discharging to the Oyster Harbour. According to a water resources background paper prepared by the Department of Environment for the *Lower Great Southern Strategy* (WAPC 2007), it has been estimated that Yakamia Creek discharges approximately 4000 ML per year to Oyster Harbour (Essential Environmental 2014).

According to the Yakamia Creek Arterial Drainage Plan (Essential Environmental 2014), the Yakamia Creek catchment is characterised by substantial seasonal baseflow arising from high ground where there is limited storage capacity in the soils. This baseflow contributes a significant proportion of winter stream flows and limits the receiving capacity of drains and watercourses during large storm events.

In the 1980s the Creek was modified to form a deep linear trapezoidal drain in an attempt to improve drainage through the catchment (Hopkinson 2000, Essential Environmental 2014). The result is that the Creek is also subject to erosion from high velocity surface water flows generated in the upper urban catchment during and immediately following rainfall events. Sediment generation from urban areas during these events can be significant and this has been identified as a contributing factor in historic flooding. Historic flooding has also been attributed to poor management of the downstream catchment, where contributing watercourses have been deepened and straightened to form drains but have not been maintained. Over time these drains have become eroded and subjected to sediment build-up and weed infestation, leading to substantially reduced capacity in artificial drainage channels. This is particular evident in channels within Centennial Park.

4.5 BIODIVERSITY

4.5.1 Vegetation

The native vegetation on site has been cleared almost entirely with only a small remnant patch of vegetation found at the south-west corner of the Western Precinct. This remnant vegetation has been impacted heavily by highly invasive weed species (denoted by * preceding name) including **Acacia longifolia,* **Psoralea pinnata* (African Scrufpea), **Ulex europaeus* (Gorse), **Typha orientalis* (Bullrush) and **Cenchrus clandestinus* (Kikuyu Grass). Nonetheless the native species present provide an indication of as to what the area's natural vegetation would have been in the past.

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In accordance with the regional survey of remnant vegetation in the Albany area (Sandiford and Barret, 2010) the majority of the site would have been covered by *Taxandria juniperina* Closed Forest with perhaps small areas of *Melaleuca rhaphiophylla* / *Melaleuca cuticularis* / *M. preissiana*, Open Woodland, *Homalospermum firmum*/*Callistemon glaucus* Swamp Thicket, *Astartea scoparia* Swamp thicket and *Evandra aristata* Sedgeland. If lakes or larger bodies of water were present in the area it is likely that *Baumea articulata* Closed Sedgeland would have been found on its margins. Provision of historic records by the City will further inform the understanding of the sites condition prior to European settlement.

Taxandria juniperina Closed Forest is found around swamps, freshwater lakes and along drainage lines and the dense canopy of *Taxandria juniperina* is a characteristic of this unit (Sandiford and Barret, 2010). Floristically the understorey is usually depauperate and shrub and sedge layers are often absent or where present not very diverse. *Callistachys lanceolata* is present as a secondary tree stratum and a *Pteridium esculentum* (Bracken Fern) herbland is the dominant ground layer in the remnant bushland on site.

There are a significant number of **Eucalyptus globulus* (Tasmanian Blue Gum) trees along the northern perimeter of the site. An arborist assessment is currently underway to evaluate the structural integrity and life expectancy of existing trees on site. Based on the findings of that report, the extent of retention and the approach to future tree planting will be determined. It is expected that a number of existing trees will be retained to provide shade and maintain tree canopy until new trees are established.

4.5.2 Fauna

Several conservation significant fauna (Baudin's Cockatoo, Carnaby's Black Cockatoo, Red-tailed Black Cockatoo and Western Ring-tail Possum) use native vegetation areas located within a 1 – 2km radius from the site (largely within the Yakamia catchment) which also supports a large diversity of other fauna. Dense, relatively flat and connected canopies have been observed in the past as preferential roosting sites for Carnaby's Cockatoo, one such site being at Lake Seppings which has similar vegetation (*Taxandria juniperina* forest) as would have been present on the CPSP site in the past. Therefore, the opportunity exists within the site to re-introduce fauna (particularly avifauna such as Carnaby's Black Cockatoos) by revegetating with species indigenous to the area.

5.0 WATER / WASTEWATER INFRASTRUCTURE & SERVICES CONTEXT

5.1 EXISTING POTABLE WATER AND SEWER INFRASTRUCUTURE

All major services run along the precinct's surrounding roads: North Road, Sanford Road and Lockyer Avenue. A major sewer line for Albany is located on Sanford Road and North Road.

Existing water and wastewater services are shown in Figure 11. Water Corporation potable water is shown as light blue and Water Corporation sewer is shown as pink. City of Albany drainage is also shown in the figure as dark blue.



Figure 11 Existing potable water (light blue), sewer (pink) and drainage (dark blue) infrastructure in the CPSP and surrounds.

5.2 EXISTING IRRIGATION

5.2.1 Existing Demand

The site is understood to comprise six (6) discrete irrigation zones totalling 32.6 Ha as follows:

- Western Precinct ("Complex area") –12.0 Ha
- New Multi-purpose oval–1.3 Ha
- Railways Oval–2.0 Ha
- Centennial Oval ("Royals") –2.1 Ha
- Eastern Precinct–11.7 Ha
- Existing soccer fields–3.5 Ha

Data relating to existing irrigation use is not currently available thus existing annual irrigation demand has been estimated by Hydroplan (Hydroplan 2014). Based on the irrigation areas above, a total annual demand of 125,492 kL has been estimated and a monthly breakdown provided in Table 4. Irrigation demand peaks in summer months when rainfall is low and PET is high.

Table 4 Monthly breakdown of the estimated current irrigation demand.

	Volume (kL)												
	TOTAL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TOTAL /month	125,492	28,416	23,350	19,137	6,603	-	-	-	-	1,073	7,231	15,053	24,629
TOTAL/ week		6,416	5,837	4,321	1,541	-	-	-	-	250	1,633	3,512	5,561
TOTAL / day		917	834	617	220	-	-	-	-	36	233	502	794

5.2.2 Existing sources

Irrigation water in the CPSP is provided by groundwater and stormwater. Groundwater sources include the superficial aquifer and a discrete spongolite formation located below (20m BGL) the site. The Spongolite formation acts as a drainage sump and is recharged by inflowing groundwater from the surrounding low-permeable materials.

There are five (5) bores located in the Central Precinct and one spear system located in the Eastern Precinct which are currently used for irrigation. A second spear system exists in the Western Precinct however is currently not active. Details of this bore and its former purpose are still unknown.

Four bores (G Bore, Bore 2, Air Bore and Railways Bore) are located on the Spongolite aquifer with combined extraction rate of 834 L/min or 1073 kL/day as reported by HydroPlan. The bore located outside the Spongolite aquifer (Sanford Bore) has a lower yield of 60 L/min or 72 kL/day (Table 5). The current combined production flow rate from the bores is estimated at approximately 15L/s.

The spear system in the Eastern Precinct feeds the Soccer Tank (129kL) which is then used for irrigation of the Soccer grounds on the Eastern Precinct. The yield and depth of this spear system is unknown.

Table 5 CPSP Irrigation bores details and yields.

Production Bores		Year Installed	Depth (m)	Flow Rate	Daily Vol	Weekly Vol
				L/min	kL/day	kL/week
1	G Bore	1982*	28	54	65	454
2	Bore 2	1982*	38.2	570	684	4788
3	Air Bore	2012	28	110	132	924
4	Railways Bore	1982*	38.5	100	120	840
5	Sanford Bore	2011	34.5	60	72	504
Combined Supply (kL)				**894**	**1073**	**7510**

*Note: installation year and depth are estimations from reports provided by City of Albany

A new irrigation system for the multi-use area is currently being developed. This new system includes a new tank (PCYC Tank - with proposed volume of 220kL) and a new bore system. Details of the new bore system were not available at the time of writing.

An open drainage channel west of Railways Oval (i.e. Catchment 19 – refer APPENDIX 2) provides additional water to the irrigation system. Anecdotally, the drain flows year round, however flows reduce in summer months.

There is currently insufficient data to conclude what proportion of the total irrigation demand is met by groundwater and stormwater respectively.

The spongolite basin has an estimated extractable groundwater volume of 85,000kL (Groundwater Resources consultants, 1984), however in order to ensure the sustenance of the system, it is important that recovery tests be conducted. The City has advised of irrigation water shortages in the summer of 2013 /14. It is suspected this is due to both the bores being at capacity (i.e. limiting how much groundwater can be abstracted) as well as the spongolite formation being at capacity (given the estimated current irrigation demand is beyond the sustainable draw based on the conclusions of the study above).

To determine the availability of further groundwater a hydrogeological assessment would need to be undertaken to assess any changes in the spongolite.

5.2.3 Storage & Distribution

Irrigation water is stored in two irrigation lakes in the Central Precinct and within smaller storage tanks across the site.

The Main Lake (Western Lake) has an indicative volume of around 2240kL whilst the Model Boat Lake (Eastern Lake) holds approximately 2520kL. Water from G Bore, Bore 2, Air Bore and Sanford Bore is pumped into the Model Boat Lake (Hydroplan, 2014).

The intention of the weir between the Model Boat Lake and the Main Lake is to ensure the water level in the Model Boat Lake does not drop below a minimum level during abstraction from the Main Lake. The water in Main Lake, which is a mix of stormwater and groundwater, is then pumped for irrigation to the Western Precinct and to supplement storage tanks located across the site.

There are two (2) storage tanks located across the site as follows:

- Railways tank (220kL) for irrigation of Railways Oval.
- Soccer tank (129kL) for irrigation of the existing soccer fields and Eastern Precinct.

The Railways Oval Tank is fed via the Railways bore and the soccer tank via the existing spear system. All storage tanks are supplemented by irrigation water from the irrigation lakes.

It is understood that a new irrigation tank will be constructed at Railways Oval by the City of Albany during 2014. This tank will be filled via a new bore system as reported by City of Albany.

Sprinklers are used across CPSP, except for the Centennial Oval and Railway Oval where a travelling irrigator is used. The sprinkler network in the Western Precinct is understood to be 15-18 years old and approaching the end of their life span however the main lines and pumps serving this area are generally in good condition (Hydroplan 2014). The City has advised (pers. comm. R.Taylor, 5 September 2014) that it does not wish to continue use of the travelling irrigator and irrigation within Railways Oval and Centennial Oval is to be upgraded to an automatic sprinkler network. The City will be undertaking the upgrade of the Railways Oval irrigation in 2014.

5.3 FUTURE IRRIGATION DEMAND

The Scheme Development Plan identified that the areas to be irrigated would increase to 45 Ha and that this would require approximately 208,000KL of irrigation water or approximately a 2,200KL/day supply in peak demand. The report also identified that the water supply to the Centennial Park was not sufficient to meet such demand.

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Following a review of the irrigation areas, the total area to be irrigated is now 39.4 Ha. Considering the new area and a reduction in turf standards from high profile to active during December - February (following a review of the hydrozoning principles that have been incorporated to prioritise irrigation in accordance with a desired turf quality (Hydroplan 2014)), it is estimated that the annual irrigation demand will increase to 174,124kL per year, which is less than that originally estimated but still 48,632kL more than the current demand. This volume will not be distributed evenly throughout the year as irrigation demand will be significantly higher during summer months. Based on a 5 day, 8 hours per day, irrigation window, a nominal daily flow of 1,200 kL will be required in the peak irrigation season, normally associated with January in WA. Based on these estimations, the current water supply is not sufficient to irrigate the three precincts in accordance with the current Scheme Development Plan. The monthly breakdown of irrigation scenarios demand is provided in Table 6.

Table 6 Monthly breakdown of future irrigation demand, existing demand and supply deficit between the two (proposed irrigation reduced between December to February)

PRPOSED IRRIGATION DEMAND

	Volume (kL)												
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
TOTAL / month			1,524	10,245	23,710	31,472	36,731	30,004	31,010	9,428			174,124
TOTAL / week			352	2,364	5,472	7,263	8,476	6,924	7,156	2,176			
TOTAL / day			51	330	790	1,015	1,185	1,072	1,000	314			

EXISTING IRRIGATION DEMAND

	Volume (kL)												
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
TOTAL / month			1,073	7,231	15,053	24,629	28,416	23,350	19,137	6,603			125,492
TOTAL / week			248	1,669	3,474	5,684	6,558	5,388	4,416	1,524			
TOTAL / day			36	233	502	794	917	834	617	220			

SUPPLY DEFICIT BETWEEN EXISTING AND PROPOSED

	Volume (kL)												
	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
TOTAL / month			451	3,014	8,657	6,843	8,315	6,654	11,873	2,825			48,632
TOTAL / week			104	696	1,998	1,579	1,919	1,536	2,740	652			
TOTAL / day			15	97	289	221	268	238	383	94			

5.4 CURRENT SCHEME WATER USE

The following scheme water use information has been provided by the City and is based on Water Corporation billing data. Note that no information has been made available for the PCYC, Athletics, Scouts Hall and Amenities.

5.4.1 ALAC

From 28 November 2013 to 28 May 2014 (three billing periods totalling 181 days), water use in ALAC totalled 12,431KL, this represents an average use of 68.7kL/day. Water use during the three billing periods was similar. Out of this total, approximately 17% was used in the Hockey Club, which equates to an average of 12kL/day. It is understood that approximately 20 kL/week are necessary for the maintenance of the pool filter backwash system, including weekly filter backwash and quarterly preventative maintenance.

5.4.2 Royals Football Clubrooms

From 10 July 2013 to 12 March 2014 (four billing periods totalling 245 days), water use in Royals Clubrooms totalled 116 kL, this represents an average use of 0.47 kL/day. A marked drop in water use was recorded between January and March 2014 (only 6 kL for the period).

5.4.3 Railways Football Clubrooms

From 25 July 2013 to 27 May 2014 (five billing periods totalling 306 days), water use in Railways Clubrooms totalled 347 kL, this represents an average use of 1.13 kL/day. A marked drop in water use was recorded between October 2013 and January 2014 (only 53 kL used in a 119 day period).

5.4.4 Soccer Club

From 11 December 2012 to 9 May 2014 (seven billing periods totalling 514 days), water use in Soccer totalled 807 kL, this represents an average use of 1.57 kL/day. The peak in water use was recorded between September 2013 and November 2013 (312 kL used in a 61 day period) and the lowest consumption was recorded between December 2012 and April 2013, (31 kL in 119 days). Lower usage was also recorded between January and May 2014 (73 kL in 116 days).

5.5 WASTEWATER

All wastewater generated at the CPSP discharges to the Water Corporation sewer network. The wastewater is then conveyed to the Albany wastewater treatment plant (WWTP) for treatment, disposal and reuse in the Albany Tree Farm (Tasmanian Blue-Gum plantation irrigated with treated wastewater from the Albany WWTP).

Wastewater generation within the CPSP in not metered but based on current scheme water use, as discussed in Section 5.4 above, generation throughout the CPSP is likely to be low during summer, when irrigation is mostly needed, and high in winter, when there is no need to

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irrigate. An exception exists for ALAC, which appears to have constant scheme water consumption and therefore likely constant wastewater generation throughout the year, but his is based on limited information (November - May bills only received at the time of writing). Compared to the total irrigation demand and considering the likely seasonality of wastewater production (peak production in winter), wastewater is not believed to represent a cost effective source if treated to irrigation standards (e.g. low exposure risk level, DoH 2011). Additionally, given the environmental sensitivity of the site, including high water table, low permeability soils and presence of the Yakamia Creek, costly nutrient reduction treatment technology would have to be applied to produce fit for purpose irrigation water.

5.6 RECORDED ABORIGINAL HERITAGE SITES

Two Aboriginal Heritage Sites are located within Centennial Park (Figure 12).

The first site, Yakamia Creek (DAA site 24418) has mythical and historical significance within Aboriginal culture. The Creek runs primarily throughout the Western Precinct of the survey area. It begins in the north-east near North Road and travels diagonally south-west towards Barker Road, skirting the front of the Albany Aquatic and Leisure Centre, before travelling south-east, back towards North Road. In most locations the creek does not exceed 5m wide and is approximately 1,270m in length (as measured within the survey area only).

A second heritage site (Railway's Football Club – DAA site 17476) exists within the Central Precinct encompassing the current location of the existing lakes. This site is designated as a place of ceremonial/historical context. The access to both sites is classified as 'open' without restriction.



Figure 12 Registered Aboriginal Heritage Sites within the CPSP.

Should any future development works involve disturbing either site, the City will be required to lodge an application with the Department of Aboriginal Affairs (DAA) under Section 18 of the *Aboriginal Heritage Act 1972*.

The Report on the Aboriginal Heritage Survey of the Centennial Park Sporting Precinct prepared by Deep Woods Surveys (WA) Pty. Ltd makes the following recommendations with respect to undertaking future works at Centennial Park:

- Notify all employees, personnel and contractors of the location and significance of all existing Aboriginal sites located within the Centennial Park Precinct.
- Prior to any disturbance being made within either of the existing recorded extent of DAA heritage sites 17476 (Railway's Football Club), 24418 (Yakamia Creek) or within the new proposed recorded extent of the site, an application under Section 18 of the Aboriginal Heritage Act 1972 should be lodged with the Department of Aboriginal Affairs seeking to have the site boundaries amended to their re-recorded position. Furthermore, it is recommended that consultation with the original informant, Mrs Lynette Knapp, be entered into before and during the Section 18 process and any planned disturbance to the site.
- Further consultation be employed with the local Albany Noongar community on the extent and nature of recognising Noongar occupation, culture and involvement in sport in the area (i.e. through plaques and the naming of walkways, sports grounds, hall of fame, parks etc.).
- All landscaping planned for the Centennial Park Precinct take into account relevant cultural themes based on past land use.
- Monitoring by nominated Traditional Custodians be carried out during any sub-surface disturbance equal to or greater than 1 m below the current ground level, including (but not limited to) works concerning bio-retention ponds and the creation of new artificial lakes.
- Maintain an open-dialogue with the local Traditional Custodians, and if any changes are made to the plans for the Centennial Park Sporting Precinct (as detailed in this report), this must be communicated to the nominated members of the Albany Noongar Community.

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6.0 IMPLICATIONS FOR THE WMS

The site context analysis has identified the following key points that need consideration in the WMS.

The largest non-potable water demand in the CPSP is irrigation water (125,000 m³/yr current *vs* 170,000m³/yr future estimate) with peak demand in December, January and February. Most of irrigation water is groundwater sourced from the spongolite formation with unquantified contribution of surface water from the drain discharging into the Main Lake. A water wise landscape layout (non irrigated areas planted with native vegetation) and efficient and adaptive irrigation system with hydrozoning in turfed areas will be considered as part of the WMS initiatives

Scheme water demand in AFL and Soccer clubrooms is low (average 0.5 - 1.6 m³/d) with peak demand in winter and lowest demand in summer. Scheme water demand at the ALAC is comparatively high (average 69m³/day) and appears constant (from November to May). Implementation of high efficiency fittings and fixtures are to be considered in all new and existing buildings to help decrease scheme water demand. Also, subject to further analysis, rainwater harvesting may represent a suitable scheme water substitution for non-potable uses in new and existing buildings.

Based on the sites' wastewater generation patterns, environmental sensitivity, and presence of the Water Corporation sewer network, on-site wastewater (grey or black water) treatment to produce irrigation water (highest demand) is not believed to be a cost effective solution for new and existing buildings in the CPSP. It is worth noting that largely discounted sewer rates apply for the CPSP buildings given their non-residential 'institutional public' nature. Supply of treated wastewater from the Albany WWTP may be considered in the long term, but higher nutrient reductions at the WWTP would have to be achieved and the costs for piping the water back to CPSP via a third-pipe network taken into account.

Surface waters (which comprise stormwater and a varying contributions of intercepted groundwater) in the drainage channels and Yakamia Creek have concentrations of nitrogen and phosphorus above the ANZECC (2000) trigger values for lowland rivers of the southwest Australia for lightly disturbed ecosystems. These flows require management to reduce impacts to downstream Yakamia Creek and Oyster Harbour Estuary environments. Capture and reuse of these flows as irrigation water represent an opportunity to divert nutrient rich water away from the sensitive receiving environment and to potentially reduce fertilising needs in the CPSP.

Stormwater management, including capture, treatment, reuse, infiltration and safe disposal of excess flows from the CPSP and its external catchment, represents a key aspect of the WMS, as it has the greatest potential to positively impact on the CPSP redevelopment, when compared to other aspects of the whole-of-water cycle management, such as wastewater

treatment and reuse, and when we take into consideration the project budgetary constraints and sporting and landscape priorities. Due to this fact, most of the WMS initiatives described in Part 3 are centred on stormwater management.

Shallow occurrences of ASSM and PASSM in the Eastern and Central Precincts warrant the need for further investigations should excavations be proposed in these areas. Where ASSM and PASSM are confirmed and excavations proposed a site specific ASS management plan will be required.

Surface water run-off discharges to the Yakamia Creek. WSUD measures to intercept, convey, treat and store run-off will be required within close proximity to the Yakamia Creek and thus within the boundary of registered aboriginal heritage sites. The City will be required to lodge an application with the Department of Aboriginal Affairs (DAA) under Section 18 of the Aboriginal Heritage Act 1972. All WSUD measures should take into account cultural themes based on past land use.

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PART 3 WATER MANAGEMENT STRATEGY

7.0 STRATEGY STRUCTURE

As concluded in Part 2, the particular focus of this WMS is on stormwater management using WSUD principles and on potential stormwater treatment, storage and reuse to meet irrigation demand. While wastewater treatment and reuse form part of an integrated WMS, in the case of the CPSP, onsite (or off site) wastewater treatment and reuse have not been considered due to site constraints (e.g. higher user patterns in winter, small contribution to total demand, high groundwater table, low permeability soils, etc.) and budget limitations identified early in the project. Scheme water conservation measures, such as high efficiency fixtures and fittings, and substitution, such as rainwater harvesting for non-potable use in new and existing buildings have been identified as initiatives of this WMS. Collection, treatment and infiltration of stormwater runoff via WSUD measures (swales, living stream, etc.) have been considered in the WMS as means of achieving aquifer recharge passively. Due to space and budgetary constraints, active managed aquifer recharge (MAR), combining stormwater treatment, temporary storage and pumping via injection bores is not covered under this WMS.

Part 3 of this document provides:

- A set of objectives focused on water management and ecosystem protection and enhancement to guide both long term and short term strategies/initiatives for CPSP.
- Assessment of options for best practice stormwater management
- A series of short and long term strategies / initiatives contributing to achieving the design principles over time. Short term equates to those strategies/initiatives that can be delivered within the CPSP project and its budget limitations and long term are those that are implemented at a later date either as parallel or future projects to realise the vision of the Scheme Development plan in full.
- A summary of approvals and further studies or design in the implementation of proposed initiatives.

8.0 OBJECTIVES

The following objectives have been formulated to guide the development of short-term and long-term strategies

Water Management

1. To demonstrate a self-sufficient approach to water management on the site – minimising import and export of water to site by reducing water demand and maximising on-site reuse.
2. To consider the water cycle in a holistic sense that incorporates all types of water present on the site (e.g. rainwater, stormwater, wastewater) and does not recognise the 'artificial 'boundaries of CPSP (Integrated Water Cycle Management).
3. To increase efficiency and effectiveness of water use across all aspects of the CPSP and through its operational 'life':
4. To consider the water cycle as a part of the natural ecosystem cycles including energy, waste, nutrients, biodiversity.
5. To be highly sensitive to the water context of the site (past, current and future).
    - Recognise the limits and sensitivities of Yakamia Creek, the groundwater aquifer and groundwater dependent ecosystems and the water resources within these environments.
    - Recognise, work with and 'celebrate' the historic water bodies and flows present on site, in particular Yakamia Creek.
6. To ensure the play environment is informed by the 'water cycle' and that Centennial Park promotes and integrates water education within all aspects of park life.
7. To invest in new and existing infrastructure consistent with all of the above objectives.
8. To encourage and provide opportunity for integration of new technologies as and when they become available and feasible throughout the life of the development.

Ecosystem Protection & Enhancement

1. To ensure protection, and if possible enhancement, of key sensitive environmental features present on site and in the surrounding receiving environment, including:
    - Protection and enhancement of the Yakamia Creek
    - Protection of groundwater levels and quality
    - Protection of remnant vegetation present on site.
    - To minimise life-of-project environmental impacts (construction, operation):
    - Minimal disturbance to site and regional ecosystems during construction and operation
    - Avoid or minimise impacts on potential areas of acid sulphate soils.
2. To ensure habitat/ecosystem protection & biodiversity enhancement.
3. To ensure the play environment is informed by natural assets and their seasonal variations (water cycle, flowering time, fauna activity) and that Centennial Park provides a setting for diverse informal "play" and educational opportunities.
4. To ensure protection, enhancement and promotion of unique cultural heritage and historic values on-site.
5. To consider and integrate ecosystem protection and biodiversity enhancement principles when designing for optimum site accessibility, safety, and wayfinding.
6. To provide connection with the local and more regional 'neighbourhoods'.

9.0 STORMWATER MANAGEMENT WITHIN THE CPSP

In line with the Stormwater Management Manual for WA, (DoW 2004 - 2007) a range of best management practices can be implemented in the CPSP in order to improve runoff quality and protect the local and downstream environment.

Table 7 shows the range of non-structural and structural control options that can be implemented in the CPSP and Table 8 identifies the potential benefits and applicability of each of these options. These will be discussed in detail in the short term and long term initiatives for the CPSP.

Table 7 Stormwater best management practice options for the CPSP.

			Subcatchments				BMP function			Pollutant addressed				
			Roof	Road and Carparks (sealed)	Roads and Carparks (unsealed)	Turf Areas	Conveyance	Retention	Detention	Sediment / litter	Particulate nutrients	Dissolved nutrients	Dissolved metals	Hydrocarbons
Stormwater BMPs	Non-structural controls	Sediment management		✓	✓	✓								
		Nutrient management		✓	✓	✓								
		Hydrocarbon management		✓	✓									
	Structural controls	Rain water tanks	✓							2	3	3	3	3
		Soakwell / infiltration galleries	✓	✓					✓	1	2	3	3	3
		Ephemeral Infiltration/Detention Basin	✓	✓	✓	✓			✓	1	1	2	2	2
		Permanent retention basin		✓	✓			✓		1	1	2	2	2
		Vegetated swale	✓	✓	✓	✓	✓		✓	1	1	2	2	2
		Bioretention swale		✓	✓	✓	✓	✓	✓	1	1	1	2	2
		Constructed wetland	✓	✓	✓	✓		✓	✓	1	1	1	1	1
		Vegetated buffer strip		✓	✓	✓	✓		✓	1	2	2	2	2
		Gross pollutant trap (GPT)*		✓	✓				✓	1	2	3	3	3
Reuse/disposal Options		Non Potable Internal Reuse	✓											
		Storage and Irrigation of playing fields**	✓	✓	✓	✓								
		Managed Aquifer Recharge following treatment		✓	✓									
		Discharge to Yakamia Creek***	✓	✓	✓	✓								

1	=	provides treatment
2	=	provides some level of treatment
3	=	provides limited or no treatment

* GPTs are effective in removing gross pollutants and sediments but should be implemented in conjunction with other controls.

** Irrigation water quality limit set in accordance with ANZECC (2000) long term irrigation water.

*** Discharge to Yakamia to comply with ANZECC (2000) trigger values for low land rivers of South-West Australia

Table 8 Suitability of structural control measures considered for the CPSP.

	Control Measure*	Potential Benefits	Applicable to	Suitable Site conditions	Unfavourable conditions	Considerations
Clean / small catchments (eg. roof runoff)	**Rainwater Tanks**	Internal reuse Reduced reliance on Scheme Water Reduced runoff generated	Small to large roof catchments (e.g. Stadium/Sheds/ Clubrooms)	Evenly spread rainfall and demand throughout the year	Seasonal rainfall and demand patterns may require larger storage tanks, may not be cost effective	
	Soakwells	Infiltration of runoff close to source Particulate removal Reduction of flows to Yakamia Creek in small frequent events	Small to large roof catchments (e.g. Sheds/Clubrooms)	Sandy soils or soils with higher permeability	Low permeability soils (e.g. clay) High groundwater table	Potential interception of PASSM, AASSM or groundwater during intrusive works**
	Infiltration Basins	Infiltration of runoff close to source Particulate removal Reduction of flows to Yakamia Creek in small frequent events	Small to large roof catchments (e.g. Sheds / Clubrooms) Permeable/grassed areas less prone to fertiliser contamination (e.g. permeable car parks)	Sandy soils or soils with higher permeability Mild slopes (<4%)	Low permeability soils (e.g. clay) High groundwater table Steep slopes	
Dirty / Large catchments (e.g. carparks and playing fields)	**Bioretention Swales / Basins**	Fine and dissolved pollutant removal Streetscape amenity Frequent flood retardation	Playing fields / grassed areas Unsealed roads / Carparks Sealed Roads /	Flat terrain (<2%)	Steep terrain High groundwater table	
	Vegetated Swales	Particulate removal Streetscape amenity Passive irrigation Reduction of flows to Yakamia Creek in small frequent events	Playing fields / grassed areas Sealed roads / Carparks Unsealed roads / Carparks	Mild slopes (<4%)	Steep slopes High groundwater table	
	Dry / Ephemeral Detention Basins	Medium and fine size particulate removal Reduction of flows to Yakamia Creek in small frequent events Frequent flood retardation Wildlife habitat	Playing fields / grassed areas Unsealed roads Sealed Roads	Flat terrain to mild slopes (<4%)	Steep slopes High groundwater table	
	Constructed wetlands (including ephemeral wetlands)	Particulate and dissolved pollutant removal Flood retardation Storage for reuse (irrigation) Wildlife habitat	Large catchment areas(e.g. external catchments)	Flat terrain (<2%)	Steep terrain High groundwater table Acid sulfate soils	

* The selected stormwater treatment measures should complement minor and major drainage infrastructure. Treatment measures must have the flexibility to overflow/bypass to drainage channels, Yakamia Creek to cater for large storm events. Treatment measures can be used in combination in a treatment train arrangement.

** PASSM - Potential acid sulfate soil material. AASSM - Actual acid sulfate soil material (additional soil investigation needed in some locations). Depending on the time of implementation dewatering may be needed.

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9.1 STORMWATER TREATMENT OBJECTIVES

The minimum stormwater quality performance targets to be achieved by the structural control options at the CPSP are included in Table 9 below (Melbourne Water 2005). In accordance with the DoW WSUD Guidelines, treatment areas are sized to detain and treat up to the 1 year 1 hour ARI event, with excess flows conveyed to the stormwater drainage network.

Table 9 Pollutant removal targets to be achieved in the CPSP.

Pollutant	Target reduction
Gross Pollutants	90%
Total Suspended Solids	80%
Total Phosphorus	45%
Total Nitrogen	45%

9.1.1 Receiving Environment Water Quality Targets

Concentrations of nutrients in surface waters in the CPSP were above the ANZECC (2000) trigger values for lowland rivers of the south-west Australia for slightly disturbed ecosystems. For the purpose of this strategy and protection of the Yakamia Creek and downstream Oyster Harbor estuary, the default nutrient, pH and DO trigger values for lowland rivers of the South West Australia (ANZECC 2000) should be used as initial water quality objectives for the Yakamia Creek as follows (Table 10):

Table 10 Water quality objectives for the CPSP Yakamia Creek receiving environment.

Analytes	TP	FRP	TN	NO_x-N	$NH4^+$-N	DO)		pH	
	µg/L	µg/L	µg/L	µg/L	µg/L	(% saturation)			
						lower limit	upper limit	lower limit	upper limit
lowland river	65	40	1200	150	80	80	120	6.5	8

9.2 SPECIFIC OPTION SELECTION

As part of the WMS and based on the site's opportunities and constraints identified during the site context analysis (Part 2) the stormwater structural controls below have been identified to be implemented in the CPSP as short term and long term initiatives:

- Vegetated swales
- Bioretention swales
- Constructed wetlands for stormwater treatment and storage

- Living streams
- Buffer planting
- Gross Pollutant Traps (GPTs)
- Rainwater tanks (in new buildings)

These initiatives and others are discussed in the following sections.

10.0 SHORT-TERM INITIATIVES

10.1 DEMAND MANAGEMENT

10.1.1 Flexible, Adaptive and Efficient Irrigation System

Initiative components

Hydrozoning and efficient scheduling of irrigation are key initiatives to manage water use whilst maintaining a desirable level of playing surface & POS quality.

A flexible and adaptive irrigation system (Refer Irrigation Concept Report (Hydroplan 2014)) will enable the prioritisation of irrigation against preferred hierarchy of irrigation demands on the basis of seasonal usage. The irrigation system will optimise irrigation to the seasonal activities, rainfall, evaporation loss, soil moisture and water availability.

Monitoring of water use and education/awareness programs will also be incorporated within operational and maintenance procedures.

Staging implications

Achieving the hydrozoning principles requires a complete upgrade to the existing irrigation network to ensure water coverage and watering duration is controlled to an optimised hierarchy. Progressive upgrades to the network would need to match stormwater harvesting initiatives to ensure water availability.

10.1.2 Appropriate Vegetation Selection

Initiative components

The design allows for all swales, bio-retention swales, wetlands and native buffer planting areas to be non-irrigated. These landscaping areas will incorporate native and local endemic species that can be maintained without supplementary irrigation.

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An indicative species list for these landscaping zones is provided in Table 12.

Staging implications

Successful implementation of non-irrigated landscaped areas is contingent on planting during supportive climatic conditions, which will vary according to location. In general the planting schedule should follow this rule: dryland areas not subject to inundation should be planted in late autumn and winter and wet areas subject to inundation should be planted in summer.

10.1.3 High Efficiency Fittings & Fixtures in Buildings

Initiative components

Indoor demand management initiatives that will reduce the total water consumption within CPSP facilities include the provision of water efficient appliances and tap fittings within all new and retained buildings as follows:

- Taps - min 5 star Water Efficiency Labelling and Standards (WELS) rating
- Toilet equipment - min 4 star WELS
- Showers - min 3 stars WELS (6L/min)
- Washing machines & dishwashers - min 4 stars WELS

Staging implications

Fittings and fixtures to be initially incorporated within new buildings and progressively within retained buildings as upgrades to facilities is planned. Note: the provision of high efficiency fittings and fixtures is to be assessed during detailed design.

10.2 STORMWATER MANAGEMENT

The WSUD Schematic Design Drawings included in APPENDIX 3 depict the range of stormwater management structural controls selected for the CPSP. The Drawings should be read in conjunction with the text below.

10.2.1 Soil Amendments

Where necessary, landscape areas should utilise a custom/non-standard design to accommodate soil amendments to promote uptake of hydrocarbons and nutrients prior to infiltration. The soil amendments must have a high cation exchange capacity to ensure that nutrients and other contaminants do not infiltrate to groundwater. Possible soil amendments include humate, activated carbon, Zeolite, Phoslock or other substances. The mixing rate for these amendments will need to be determined at a later date.

Where fertilisers are to be applied, only the use of slow-release, low phosphorous fertilisers is supported.

10.2.2 Vegetated Buffers

Vegetated buffers area aligned perpendicular to runoff and intercept stormwater flowing across their surface. The vegetated buffers proposed for CPSP include an amended topsoil and dense vegetation. These components encourage sedimentation and nutrient reduction.

10.2.3 Carpark & Roadside Swales for Conveyance Treatment and Infiltration of Stormwater Run-off

Initiative components

The design includes vegetated swales to target treatment of hydrocarbons, heavy metals and other vehicular pollutants within stormwater run-off prior to infiltration to the groundwater and/or conveyance to the Yakamia Creek. Vegetated carpark and roadside swales consist of an excavated basin that is lined with topsoil and planted with specific vegetation to uptake excess nutrients and metals and assist in biodegrading hydrocarbons from carparks and roadways flows (APPEDIX 3).

Carparks and roadways will grade towards swales to ensure capture of all low flows. Swales have and average depth of 0.5m and a maximum depth of 0.7m (including freeboard). Hydraulic controls ensure an extended detention depth of 0.3m and conveyance of overflows (higher than the 1 year, 1 hour ARI event) to the Yakamia Creek, drainage channels or Living Stream.

Indicative species list is provided in Table 12

Staging implications

Carpark and roadside swales should be implemented in parallel to the construction of all new roads and carparks to ensure all new run-off generated is managed as per best practice.

No irrigation is proposed within the swales, thus planting is best undertaken in late autumn and winter.

10.2.4 Vegetated Swales for the Treatment of Run-off from Playing Fields

Initiative components

The design includes vegetated swales to manage high nutrient loads generated by the addition of fertilizers in the maintenance of playing fields. The vegetated swales are intended

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to treat high nutrient surface run-off from playing fields and will allow for the roots of the vegetation to access nutrient rich groundwater flows.

Vegetated swales are located in currently low lying (and in some cases water logged) areas on site to maximise treatment outcomes. The swales in some areas will contribute to improving the drainage of playing fields (i.e. south-west of Western Precinct) (APPEDIX 3).

Swales will be excavated at a minimum grade of 1 in 4 and lined with topsoil prior to planting. Hydraulic controls will ensure that the winter water table and first flush storm events are detained within the swales with overflows discharging to the Yakamia Creek, drainage channels or Living Stream.

Depth of these swales is typically 0.5m with a maximum detained water level depth of 0.3m. Vegetation in the swales will be suitable for long periods on inundation and have a root zone which will intercept the summer groundwater table.

Staging implications

High nutrient run-off represents an environmental risk to the receiving environment, thus swales need to be implemented in the initial phase of the development. Priority areas are those near high profile and active turf likely subject to higher fertiliser dosing regimes and in areas discharging directly to the Yakamia Creek.

Given these swale are located in close proximity to the Yakamia Creek and existing water bodies, access to implement future creek restoration works associated with stabilisation & restoration of the creek bed may be restricted. Consideration may be given to incorporating limited creek restoration works in parallel to the implementation of the swales to minimise future costs.

Similar to the carpark swales no irrigation is proposed for the playing field swales, thus planting is best undertaken in late autumn and winter.

10.2.5 Bio-retention Swales / Basins Treating Runoff from Playing Fields with Sub – surface Drainage

Initiative components

Bio-retention swales / basins are proposed for the treatment of run-off from playing fields with sub-surface drainage (i.e. the premier AFL oval and potentially in the south-west of Western Precinct). Bio-retention may also be considered as an alternative to vegetated swales (playing field, roadside and carparks) if space is limited.

A bio-retention swale consists of an excavated basin that is filled with engineered growing media and planted with macrophyte species. These components play an important role in

sedimentation (i.e. settling out of sediments and the attached contaminants) and biological uptake and removal of nutrients, heavy metals and hydrocarbons.

Typical details for bio-retention swales proposed for CPSP are provided in the WSUD Schematic Design (APPEDIX 3). The detail incorporates the use of a HDPE liner around the base and sides of the basin to create a saturated zone beneath the growing media. The saturated zone provides additional treatment and promotes plant health in periods of low-rainfall as the water stored in this zone can sustain plants for up to five weeks in dryer periods and helps prevent flushing of contaminants stored in the planting media. Run-off from high profile sport fields contains higher nutrient concentrations thus bio-retention is favoured over open vegetated swales.

Bio-retention swales are sized to accommodate up to the 1 year, 1 hour ARI event (inclusive of surface run-off) with over flows and high flows discharging directly to the Living Stream.

Indicative species mixes for wetland treatment zones are provided in Table 12.

Staging implications

Bio-retention swales are to be implemented in parallel with the construction of the sub-surface drainage systems in ovals.

10.2.6 Harvesting, Treatment & Storage of Catchment Run-off in a Living Stream Network to Offset Irrigation Demand

The Living Stream is a multi-functional landscape corridor that enhances water quality, enables water reuse, encourages education and promotes interactive uses of the site.

This initiative replaces the conventional stormwater drainage infrastructure providing an open green channel network consisting of a vegetated channel, “Living Stream”, and wetland network that provides storage, conveyance, water treatment and water reuse. This network is intended to manage the 5 year ARI event and enables the conveyance of 100 year flood path in the Eastern Precinct.

As a ‘living’ biological system, the Living Stream enables progressive treatment of conveyed stormwater using physical and biological processes. As such, the Living Stream is envisaged to be the ‘spine’ of the entire water management on site that will capture and treat water runoff from the hard surfaces of the buildings, paving and carparks, achieve flood and velocity controls, and allow reuse for irrigation of the POS and playing fields.

Whilst detaining stormwater for irrigation, the location and permeability of the Living Stream will contribute to infiltration and recharge of the groundwater and spongolite formation when groundwater levels are lower (summer), thus promoting aquifer recharge, maintenance of

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ecological flows and the sustainable management of irrigation via stormwater reuse and replenished groundwater.

The aim of the Living Stream is to maximise treatment prior to discharge to the Yakamia Creek, however as the intent is to detain low flows for reuse of water in irrigation, potential elevated nutrient levels (as measured during the site investigation, see Section 4.4.1) are considered acceptable given that the estimated turnover of the irrigation lakes in irrigation season (2-3 days based on the storage volume and demand) is sufficiently high to prevent algal blooms. Additionally, stormwater flows are diluted with groundwater from the bores (as per existing scheme). The higher nutrient content from the additional stormwater flows may contribute to reducing fertiliser use in the playing fields.

The Living Stream is intended not only to serve as an infrastructure component that conveys, treats and stores water, but also is intended to integrate biodiversity, interpretation, and recreational uses and to provide connectivity across the site.

Initiative components

The Living Stream stretches across both the Eastern and Central Precincts as described below and in corresponding Schematic Design Drawings (Drawings 004 and 006, APPEDIX 3).

Central Living Stream

The Central Living Stream receives flows from the broader catchment (Catchment 24, APPENDIX 2), on-site run-off from carparks and POS within the Central Precinct and flows from the Eastern Precinct and its broader catchment area.

Water treatment within the Central Living Stream is targeted at treating flows from Catchment 24 and onsite run-off from POS areas within the precinct. Carpark, road and playing field run-off and flows from the Eastern Precinct will require pre-treatment prior to discharging into this section of the Living Stream. The treatment area required to treat POS run-off and catchment flows (Catchment 24) is in the order of 0.45ha.

A proposed adjustable weir provides the opportunity to maximise detention of flows for treatment and storage in summer and allows winter levels to be lowered so that the system does not negatively impact on water logging. Water storage within the Living Stream is provided by a series of hydraulically linked deep basins. Stored irrigation water is proposed to be supplied by a gravity pipe (subject to further analysis) to the Model Boat Lake.

A gross pollutant trap (GPT) and sedimentation basin is provided at the inflow of catchment 24.

A GPT functions as a pre-treatment for the stormwater system removing litter, vegetation matter and coarse sediment (depending on model). The installation of a GPT can prevent

downstream clogging issues and aids in improving the aesthetics of downstream treatment elements. A sedimentation basin is required to remove sediments at an early stage in the treatment process in order to protect downstream treatment devices, prolong the effective lifespan of the treatment devices, and to minimise associated maintenance costs. Maintenance access will be required to enable periodic removal of sediment build-up.

These flows will be directed initially through a vegetated treatment zone before entering storage basins. Vegetation species within the Living Stream will provide water quality improvement via trapping of particulates, shading of water via embankment planting to reduce water temperature, and provision of aquatic habitat and sufficient plant and root density to facilitate the above processes. Vegetated treatment zones will have an average depth of 0.5m with a maximum depth of 0.7m. Upper embankments will have a minimum grade of 1 in 3. Lower embankments into storage basins will have a maximum grade of 1 in 3 where vegetation is proposed. Vegetated areas are to have a minimum of 0.1 m of topsoil. Erosion control will be required on embankments to provide stabilisation during plant establishment. Pre-treated flows discharging to the Living Stream (or any high flow) should enter via a rock spillway to avoid erosion of embankments. Indicative species mixes for the wetland treatment zones are provided in Table 12.

The base of the storage basins will comprise compacted existing soils to provide some permeability and allow seasonal interaction of the water table whilst maximising storage and deterring plant growth. Rock revetment will be required to stabilise lower sections of basin embankments where vegetation is not desired. The adjustable weir can be lowered to control the volume of water detained within the storage basins in winter. The invert of basins may be set to approximately 0.3m above the summer GWL to allow periodic drying and aerobic degradation of accumulated pollutants and to minimise drainage of groundwater which could potentially contribute to acidification of soils. Lining of the base of storage basins may be desirable to improve amenity when levels are lower in peak summer periods, this will be considered during detailed design stage.

The design of hydraulic controls will facilitate sections of the network to be segregated for maintenance purposes

Eastern Living Stream

The Eastern Living Stream will receive and convey flows from several broader off-site sub-catchments (Catchments 20 to 23, APPENDIX 2) to the Yakamia Creek via the Central Precinct. The Eastern Living Stream will also receive and convey on-site run-off. Run-off from carparks, the premier AFL oval and eastern playing fields (currently soccer fields) will be treated prior to discharging into the Living Stream. Run-off from remaining playing fields and hardstand will be treated within vegetated areas of the Living Stream.

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The Scheme Development shows the Eastern Living Stream extending the full length of the existing N-S open drain. However due to current budget constraints the schematic design of the Eastern Living Stream is limited to the northern boundary and the confluence of inflows of Catchments 20 to 22 (within the existing N-S open drain) and Catchment 23.

The recommended area required to treat run-off from playing fields and external catchments (Catchment 20 to 23) is in the order of 2.8ha. There is insufficient space within the site to adequately treat all flows, thus it is recommended that the City takes into consideration implementation of WSUD to provide further treatment upper in the catchment. Treatment within the northern section of the Eastern Living Stream is sized to treat flows from playing fields and Catchment 23 as well as limited treatment of Catchments 20 to 22. Implementation of the additional component of the Eastern Living Stream would likely be sufficient to address the residual treatment requirements of flows from Catchments 20 & 21. Vegetated treatment zones along the flood route passing through Cull Park could be explored by the City for further water treatment for Catchment 22.

A GPT and sedimentation basin are provided at the inflow of Catchment 23, similar to the ones described above for the Central section. Given the size and discharge locations of Catchments 20 to 22, it is recommended that City considers installation of GPTs for each of these catchments outside of the Living Stream, and upstream of their discharge points into the CPSP drainage channels.

Incoming flows will be directed initially through a vegetated treatment zone (as described for the Central section) before entering open water zones. Treatment zones within the Eastern Precinct will require terracing to integrate with the surrounding topography.

Water levels will be controlled by weirs with pipework facilitating the conveyance of low flows. The design of hydraulic controls shall facilitate sections of the network to be segregated for maintenance purposes. The Eastern Living Stream provides supplementary water storage for reuse in irrigation of POS and playing fields. Supply to Central Precinct will be controlled hydraulically with the maximum supply controlled ultimately by the level set at the adjustable weir in the Central Precinct.

Staging implications

The harvesting of stormwater for reuse in irrigation is intended to meet, at least partially, the deficit between existing irrigation and the proposed increase in demand associated with the upgrade of the sports precinct. The current irrigation supply is understood to be at capacity in peak summer, thus implementation of additional harvesting and storage is required to match the progressive increase in demand.

The wetland areas should be constructed ahead of full storage demand, thus water levels can be kept lower enabling vegetation to establish (avoid drowning) and minimising erosion of embankments.

The scale of revegetation works will require the propagation of plant stock in advance of works. Nursery coordination should ideally begin 10 months prior to implementation.

10.2.7 Living Stream Storage and Stormwater Harvesting Rationale

Catchments

Catchments 20 – 24 all drain to the proposed Living Stream storage zones. Combined, these catchments have an area of approximately 138 hectares largely consisting of residential development and paved surfaces.

Conservatively, catchment areas have been reduced to only include public road pavement areas as these are the only areas that we can be certain that are connected to the piped drainage network. Whilst we know that some private property impervious areas may be connected to the piped drainage system, many of these will instead discharge to rainwater tanks, soakwells or onto lawn or landscaped areas and therefore are not likely to generate any runoff during typical summer rainfall events. Further to this, planning conditions are likely to influence future upgrade of the drainage system to include more source control and reduced runoff rates and volumes.

Total public road pavement areas, as determined by Wood & Grieve Engineers using aerial imagery, is approximately 17.6ha for catchments 20 – 24. A capture efficiency rate of 90% has been applied to the runoff rates.

Storage Availability

Two areas of park space within the Central and Eastern Precincts have been initially identified as areas for combined storage as described above. These proposed storage zones are located within the Living Stream in the north of the site, parallel to North Road. This area is located on existing drainage paths which serve catchments 20 – 24.

Preliminary calculations of the potential available storage indicated that a total of approximately 10,000 m^3 of surface water storage would be available in the area.

Due to the shallow groundwater and likely ASS occurrence, invert levels and therefore storage depths have been kept to above summer ground water levels.

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Water Balance Analysis

The water balance analysis has been based on a 19 year daily rainfall data set for Albany Airport (site Bureau of Meteorology station 009741) from 1994 to 2012. This data set includes daily rainfall in millimetres (mm) as recorded at the weather station. The modelling was run over this period and assumed a constant daily irrigation rate based on monthly predictions, surface water runoff generated through the rainfall data set, and the storage volumes available. When the storage areas are full, surplus surface water runoff bypasses the storage system. At this preliminary stage, evaporation has not been accounted for, however it is unlikely to have a significant impact on the calculations.

The water balance exercise provides a daily analysis of inputs (surface water runoff) and outputs (irrigation demand) with the proposed ponds providing storage. In this way, it can be observed how often irrigation demand can be met by the supply of surface water and what percentage of the surface water is used as irrigation and how much is surplus to requirements.

A storage volume of 3,000m^3 has been used as this reflects an optimal volume for storing water against the surface water available and daily demands. Storage volume can be increased from 3,000m^3 but the gains in reliability are marginal compared to the increase in storage volume (as flows from the catchment are not enough to keep a larger storage full).

A month by month analysis has been undertaken for the months requiring additional irrigation (considering the additional demand of 48,632kL/year as discussed in Section 5.3). A summary of the irrigation demand, reliability of the harvested surface water to meet demand (provided as a percentage of days that supply can meet demand), and surface water supplied for irrigation is presented in Table 11 below.

Should demand need to be completely met, then surface water will need to be supplemented by further groundwater abstraction, particularly for the months of November through to March.

Table 11 Monthly irrigation demand deficit and supply reliability of proposed stormwater harvesting and storage scheme.

Month	Monthly Demand (kL)	Monthly Supply (kL)	Reliability
September	451	451	100%
October	3,014	3,008	97%
November	8,657	6,051	70%
December	6,843	3,992	58%
January	8,315	3,102	37%
February	6,654	2,800	42%
March	11,873	5,045	43%
April	2,825	2,801	99%

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Table 12 Proposed species list for swales, bioretention swales and treatment wetlands in the CPSP.

Family	Plant name	Common name	Wetland Treatment Zone	Vegetated Bio - retention Swales for treating oval runoff	Vegetated Swales for treating playing field runoff	Vegetated Carpark and Road Swales
Myrtaceae	*Agonis flexuosa*	Peppermint□				x
Anarthriaceae	*Anarthria laevis*					x
Proteaceae	*Banksia littoralis*	Swamp Banksia	x			
Proteaceae	*Banksia quercifolia*		x			
Proteaceae	*Banksia occidentalis*	Red Swamp Banksia	x			
Cyperaceae	*Baumea juncea*	Bare Twigrush	x	x	x	x
Myrtaceae	*Beaufortia sparsa*	Swamp Bottlebrush	x	x		x
Pittosporaceae	*Billardiera fusiformis*	Australian Bluebell	x	x	x	
Rutaceae	*Boronia megastigma*	Scented Boronia	x			
Rutaceae	*Boronia stricta*		x			
Myrtaceae	*Callistemon glaucus*		x			
Cyperaceae	*Carex appressa*		x	x	x	x
Cyperaceae	*Carex fascicularis*		x	x	x	x
Cyperaceae	*Carex tereticaulis*		x	x	x	x
Cyperaceae	*Cyathochaeta avenacea*		x			
Goodeniaceae	*Dampiera alata*	Winged-stem Dampiera	x	x	x	x
Goodeniaceae	*Dampiera leptoclada*	Slender-shooted Dampiera	x	x	x	x
Myrtaceae	*Eucalyptus patens*	Swan River Blackbutt	x	x	x	
Cyperaceae	*Evandra aristata*		x			x
Cyperaceae	*Ficinia nodosa*	Knotted Club Rush	x	x	x	x
Proteaceae	*Hakea ceratophylla*	Horned Leaf Hakea	x		x	
Proteaceae	*Hakea linearis*		x		x	
Proteaceae	*Hakea tuberculata*		x			
Proteaceae	*Hakea varia*	Variable-leaved Hakea	x	x	x	
Myrtaceae	*Hypocalymma cordifolium*		x	x	x	
Myrtaceae	*Hypocalymma strictum*		x		x	x
Restionaceae	*Hypolaena exsulca*		x	x	x	
Campanulaceae	*Lobelia anceps*	Angled Lobelia	x	x	x	x
Myrtaceae	*Melaleuca densa*		x			
Myrtaceae	*Melaleuca preissiana*	Moonah	x		x	x
Myrtaceae	*Melaleuca rhaphiophylla*	Swamp Paperbark	x	x	x	x
Iridaceae	*Patersonia umbrosa var. umbrosa*		x	x	x	x
Apiaceae	*Schoenolaena juncea*		x			
Cyperaceae	*Schoenus subfascicularis*		x			
Fabaceae	*Sphaerolobium fornicatum*		x	x	x	
Fabaceae	*Sphaerolobium rostratum*		x	x	x	
Restionaceae	*Stenotalis ramosissima*	Previously Hypoleana and Leptocarpus r.	x	x	x	
Myrtaceae	*Taxandria parviceps*		x	x	x	
Xyridaceae	*Xyris lanata*		x			
Fabaceae	*Acacia hastulata*		x			
Fabaceae	*Acacia myrtifolia*		x			
Anarthriaceae	*Anarthria prolifera*					
Fabaceae	*Aotus intermedia*		x			
Myrtaceae	*Astartea laricifolia*		x	x	x	
Myrtaceae	*Astartea scoparia*		x	x	x	x
Cyperaceae	*Baumea articulata*	Jointed Rush	x			
Cyperaceae	*Baumea rubiginosa*		x	x	x	
Cyperaceae	*Baumea vaginalis*	Sheath Twigrush	x			
Rutaceae	*Boronia crassipes*		x			
Fabaceae	*Callistachys lanceolata*	Wonnich	x	x	x	x
Apiaceae	*Centella asiatica*		x			
Juncaginaceae	*Cycnogeton huegelii*	(Previously:Triglochin huegelii)	x			
Dasypogonaceae	*Dasypogon bromeliifolius*	Pineapple Bush	x			
Myrtaceae	*Eucalyptus doratoxylon*	Spearwood Mallee			x	x
Myrtaceae	*Eucalyptus staeri*	Albany Blackbutt	x	x	x	x
Fabaceae	*Gastrolobium sericeum*		x	x	x	
Myrtaceae	*Homalospermum firmum*		x	x	x	
Cyperaceae	*Lepidosperma effusum*	Spreading Sword-sedge	x			
Cyperaceae	*Lepidosperma striatum*		x			
Restionaceae	*Leptocarpus tenax*	Slender Twine Rush	x	x	x	
Ericaceae	*Leucopogon obovatus*		x			
Restionaceae	*Meeboldina scariosa*		x	x	x	x
Myrtaceae	*Melaleuca cuticularis*	Saltwater Paperbark	x			
Myrtaceae	*Melaleuca pauciflora*		x			
Menyanthaceae	*Ornduffia albiflora*	previously: Villarsia albiflora	x			
Menyanthaceae	*Ornduffia parnassifolia*	Previously: *Villarsia parnassiifolia*	x			
Myrtaceae	*Pericalymma spongiocaule*		x			
Dennstaedtiaceae	*Pteridium esculentum*	Bracken	x			
Rutaceae	*Rhadinothamnus anceps*		x	x	x	x
Myrtaceae	*Taxandria juniperina*		x	x		
Myrtaceae	*Taxandria linearifolia*		x	x	x	

10.3 FUTURE PROOFING NEW BUILDINGS

10.3.1 Plumbing to Allow Rainwater Harvesting for Non-Potable Reuse

Installation of plumbing in new buildings to facilitate connection to rainwater tank for internal non potable reuse should be considered. New buildings (subject to further assessment during detailed design) should include independent pipes for potable water (kitchen taps, water fountains) and non potable water (shower, toilets, laundry, taps in maintenance areas) to allow connection to rainwater tanks. Considering that peak sporting seasons and therefore potential non potable demand coincides with winter (i.e. frequent rainfall), rainwater tanks can be sized cost effectively to cover winter demand rather than the full annual demand.

Rainwater harvesting systems should be coupled with a mains switching management system which automatically reverts back to scheme water when tank levels drop below minimum level.

11.0 LONG –TERM INITIATIVES

11.1 STORMWATER MANAGEMENT AND ENVIRONMENTAL ENHANCEMENT

11.1.1 Expansion of Eastern Living Stream to treat additional broader catchment flows

The Eastern Living Stream should be extended south to enable restoration of the trapezoidal drain and provide additional treatment of flows from catchments 20 -22. Regrading of the banks to safer slopes in this section will allow for more stable, less erosive banks which will be planted with native species. A biodiversity corridor initiative can be created with the connection of the Eastern Living Stream to Cull Park and beyond.

11.1.2 Modification and Enhancement of Existing Drainage Channels in Central Precinct

The drainage channel along Lockyer Avenue connecting to the central Living Stream is to be regraded, and revegetated to allow further treatment of flows and protection of the central Living Stream.

The drainage channel running along the south and west of Railways Oval is to be regraded, reshaped to create a meandering path, include a mix of deep and shallower zones and revegetated with native species. This will provide habitat enhancement, safer batters and additional treatment of flows discharging to the sedimentation basin and Main Lake in the Central Precinct.

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11.1.3 Restoration of the Yakamia Creek Channel and drainage channels in Western Precinct

The unstable and degraded trapezoidal sections of the Yakamia Creek are to be regraded, stabilised with erosion control fabric and revegetated to resemble a living stream. Existing stabilised sections are to be maintained. Additional drainage channels discharging to the Yakamia Creek in the Western Precinct are also to be restored.

11.1.4 Retrofit of existing Carparks to include stormwater management

The existing ALAC carparks drain directly to the Yakamia Creek without treatment. Consideration should be given to retrofitting the drainage of these carparks to include swales or GPTs as to reduce the contaminant loads entering the Yakamia Creek.

11.2 RAINWATER HARVESTING AND USE

Rainwater harvesting from roof areas should be considered and retrofitted in existing buildings that have large non potable demands. This practice would be particularly effective for the ALAC which has a demand of approximately 68KL/day. The harvested rainwater could be easily connected to allow backwash of the swimming pool filter and swimming pool top up. Coupled with a first flush diverter, the collected rain water would require minimum treatment (filtration) for filter back wash and filtration coupled with UV disinfection (or top up at night to allow mixing with chlorine prior to exposure to bathers) for both of these uses. Use of rain water for showers, washing machines and toilets can also be considered in the long term.

12.0 APPROVALS & FURTHER WORK

12.1 REGULATORY REQUIREMENTS BY THE CITY

Non potable water supplies in urban developments in WA are subject to approvals administered through the Department of Water in accordance with the ‘Guidelines for the approval of non-drinking water systems in Western Australia’ (Department of Water, 2013). This process may require separate consultation with all appropriate government agencies and compliance with their respective guidelines. While the CPSP is not a new urban development and consultation with all agencies may not be required, the City shall consult with DoW to ensure that the strategies presented here are compliant with the guidelines. Considering that the City already uses stormwater as a source of irrigation water, the proposed stormwater harvesting strategy does not vary from the current practice but only adds to it with the benefit of providing biological treatment prior to reuse.

Implementation of non-potable rainwater use in new and existing buildings will require consultation and approval by the Department of Health.

Restoration works in the Yakamia Creek and in drainage channels discharging to the Yakamia Creek, including the Living Stream have the potential to cause environmental impacts to the Creek and surrounds due to erosion and disturbance and exposure of acid sulfate soils. Additional acid sulfate soil investigations and a preparation of a management plan will be needed for these works. These will need to be approved by the Department of Environment Regulation. The extent of clearing of native vegetation is to be determined following the anticipated arborist assessment soothe need for a clearing permit cannot be determined at this stage.

Should dewatering be required in order to implement the works and dewatering volumes likely to exceed the threshold of 10L/s and/or a total dewatering period of more than 30 days, a licence to take groundwater will be needed from the DoW. A dewatering management plan will need to be produced to support the licence application.

The City will need to discuss with the DoW the potential for a new bore to be constructed and groundwater to be abstracted to cover additional irrigation demands. Should this be a viable option, applications for a licence to construct a new bore and, a licence to take groundwater may be needed from DoW.

The City will be required to lodge an application with the Department of Aboriginal Affairs (DAA) under Section 18 of the Aboriginal Heritage Act 1972 for works within the boundary of registered aboriginal sites.

12.2 PLANNING / DESIGN REQUIREMENTS AND NEXT STEPS

Below is a summary of key steps in the next design phase of the short-term WSUD initiatives:

- Detailed hydraulic modelling of Living Stream network (using HECRAS) to refine capacity requirements – will require existing survey and planned site level information.
- Water quality modelling.
- Preliminary design of Living Stream (ecological, hydrological, landscape).
- Preliminary swale sizing and design.
- Finalising species lists, nursery coordination and pre-order.

12.3 INFORMATION GAPS TO BE ADDRESSED

The following data is required from the City and the project team to inform design development of the short-term WSUD initiatives:

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- Validation of summer groundwater levels and validation of summer surface water flows.
- Additional ASS investigation in proposed Living Stream area in the Eastern and Central Precincts.
- Determine actual irrigation use and bore use over summer

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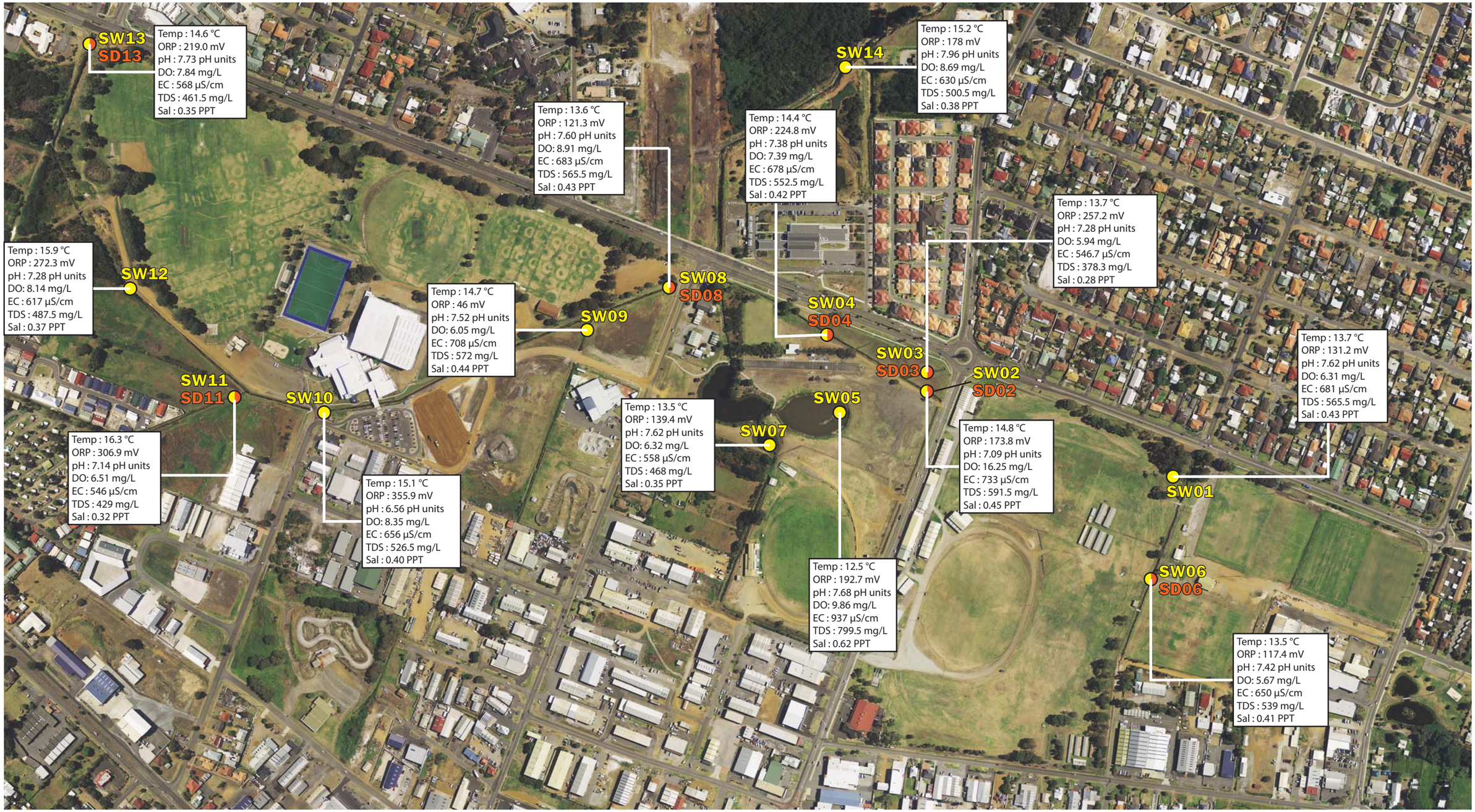
Water and Rivers Commission (2001). *South Coast Water Reserve and Limeburners Creek Catchment Area Water Source Protection Plan – Albany water supply*

WGE (2014) *Yakamia Catchment Analysis Plan*

APPENDICES

CENTENNIAL PARK SPORTING PRECINCT
WMS

APPENDIX 1 Results of Preliminary Surface Water, Groundwater and Sediment Assessment of CPSP.



Note: Refer to report for full data set

LEGEND :

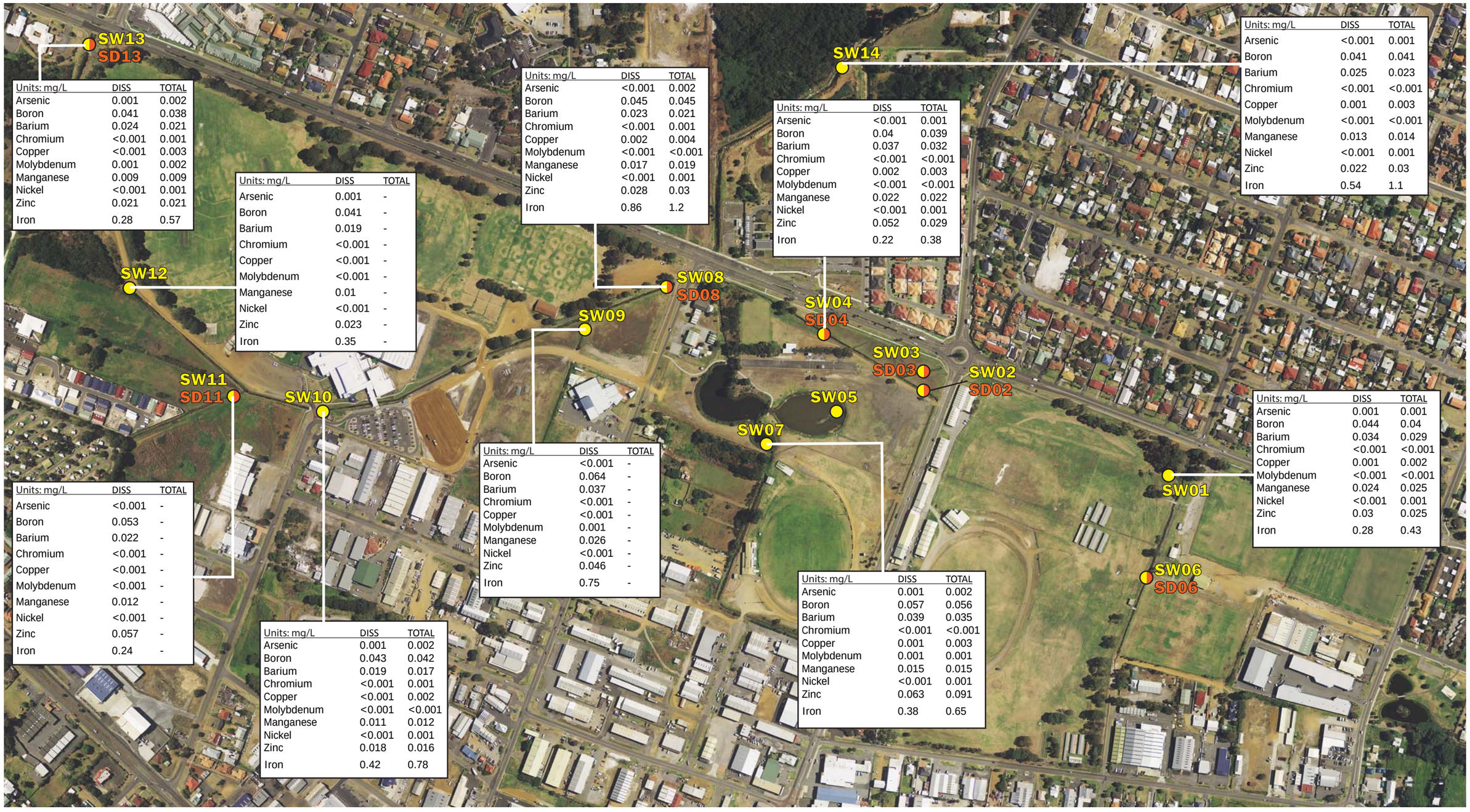
- Surface water sampling location
- Surface water & Sediment sampling location
- Groundwater sampling location (Irrigation bores)
- Soil sampling locations

0m 60m 120m 180m 240m 300m

CLIENT :	City of Albany	DRAWING NAME:	Surface water - Field Results	DATE :	28.07.2013
PROJECT :	CENTENNIAL PARK - Investigations	DRAWING NUMBER:	-	SCALE :	Refer to scale bar
PROJECT NUMBER:	1422	DRAWING REFERENCE :	- 183	DRAWN BY :	AL / AR

SYRINX environmental pl

REPORT ITEM SCM 010 REFERS



Units: mg/L	DISS	TOTAL
Arsenic	0.001	0.002
Boron	0.041	0.038
Barium	0.024	0.021
Chromium	<0.001	0.001
Copper	<0.001	0.003
Molybdenum	0.001	0.002
Manganese	0.009	0.009
Nickel	<0.001	0.001
Zinc	0.021	0.021
Iron	0.28	0.57

Units: mg/L	DISS	TOTAL
Arsenic	0.001	-
Boron	0.041	-
Barium	0.019	-
Chromium	<0.001	-
Copper	<0.001	-
Molybdenum	<0.001	-
Manganese	0.01	-
Nickel	<0.001	-
Zinc	0.023	-
Iron	0.35	-

Units: mg/L	DISS	TOTAL
Arsenic	<0.001	0.002
Boron	0.045	0.045
Barium	0.023	0.021
Chromium	<0.001	0.001
Copper	0.002	0.004
Molybdenum	<0.001	<0.001
Manganese	0.017	0.019
Nickel	<0.001	0.001
Zinc	0.028	0.03
Iron	0.86	1.2

Units: mg/L	DISS	TOTAL
Arsenic	<0.001	0.001
Boron	0.04	0.039
Barium	0.037	0.032
Chromium	<0.001	<0.001
Copper	0.002	0.003
Molybdenum	<0.001	<0.001
Manganese	0.022	0.022
Nickel	<0.001	0.001
Zinc	0.052	0.029
Iron	0.22	0.38

Units: mg/L	DISS	TOTAL
Arsenic	<0.001	0.001
Boron	0.041	0.041
Barium	0.025	0.023
Chromium	<0.001	<0.001
Copper	0.001	0.003
Molybdenum	<0.001	<0.001
Manganese	0.013	0.014
Nickel	<0.001	0.001
Zinc	0.022	0.03
Iron	0.54	1.1

Units: mg/L	DISS	TOTAL
Arsenic	0.001	0.001
Boron	0.044	0.04
Barium	0.034	0.029
Chromium	<0.001	<0.001
Copper	0.001	0.002
Molybdenum	<0.001	<0.001
Manganese	0.024	0.025
Nickel	<0.001	0.001
Zinc	0.03	0.025
Iron	0.28	0.43

Units: mg/L	DISS	TOTAL
Arsenic	<0.001	-
Boron	0.053	-
Barium	0.022	-
Chromium	<0.001	-
Copper	<0.001	-
Molybdenum	<0.001	-
Manganese	0.012	-
Nickel	<0.001	-
Zinc	0.057	-
Iron	0.24	-

Units: mg/L	DISS	TOTAL
Arsenic	<0.001	-
Boron	0.064	-
Barium	0.037	-
Chromium	<0.001	-
Copper	<0.001	-
Molybdenum	0.001	-
Manganese	0.026	-
Nickel	<0.001	-
Zinc	0.046	-
Iron	0.75	-

Units: mg/L	DISS	TOTAL
Arsenic	0.001	0.002
Boron	0.043	0.042
Barium	0.019	0.017
Chromium	<0.001	0.001
Copper	<0.001	0.002
Molybdenum	<0.001	<0.001
Manganese	0.011	0.012
Nickel	<0.001	0.001
Zinc	0.018	0.016
Iron	0.42	0.78

Units: mg/L	DISS	TOTAL
Arsenic	0.001	0.002
Boron	0.057	0.056
Barium	0.039	0.035
Chromium	<0.001	<0.001
Copper	0.001	0.003
Molybdenum	0.001	0.001
Manganese	0.015	0.015
Nickel	<0.001	0.001
Zinc	0.063	0.091
Iron	0.38	0.65

Note: Refer to report for full data set

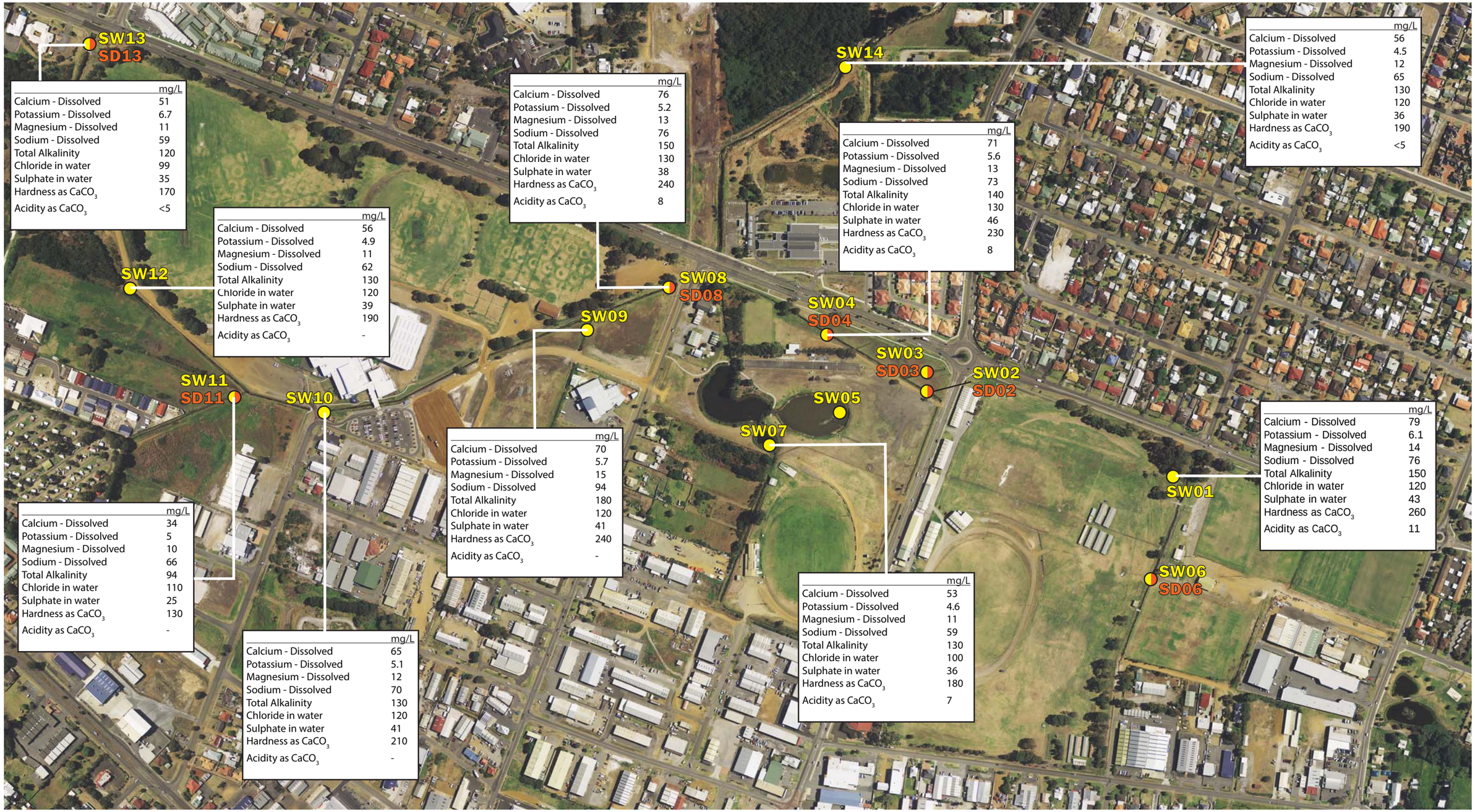
LEGEND :

- Surface water sampling location
- Surface water & Sediment sampling location
- Groundwater sampling location (Irrigation bores)
- Soil sampling locations

0m 60m 120m 180m 240m 300m

CLIENT :	City of Albany	DRAWING NAME:	Surface water - Lab Results (Metals)	DATE :	28.07.2013
PROJECT :	CENTENNIAL PARK - Investigations	DRAWING NUMBER:	-	SCALE :	Refer to scale bar
PROJECT NUMBER:	1422	DRAWING REFERENCE :	- 184	DRAWN BY :	AL / AR

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	mg/L
Calcium - Dissolved	51
Potassium - Dissolved	6.7
Magnesium - Dissolved	11
Sodium - Dissolved	59
Total Alkalinity	120
Chloride in water	99
Sulphate in water	35
Hardness as $CaCO_3$	170
Acidity as $CaCO_3$	<5

	mg/L
Calcium - Dissolved	56
Potassium - Dissolved	4.9
Magnesium - Dissolved	11
Sodium - Dissolved	62
Total Alkalinity	130
Chloride in water	120
Sulphate in water	39
Hardness as $CaCO_3$	190
Acidity as $CaCO_3$	-

	mg/L
Calcium - Dissolved	34
Potassium - Dissolved	5
Magnesium - Dissolved	10
Sodium - Dissolved	66
Total Alkalinity	94
Chloride in water	110
Sulphate in water	25
Hardness as $CaCO_3$	130
Acidity as $CaCO_3$	-

	mg/L
Calcium - Dissolved	65
Potassium - Dissolved	5.1
Magnesium - Dissolved	12
Sodium - Dissolved	70
Total Alkalinity	130
Chloride in water	120
Sulphate in water	41
Hardness as $CaCO_3$	210
Acidity as $CaCO_3$	-

	mg/L
Calcium - Dissolved	70
Potassium - Dissolved	5.7
Magnesium - Dissolved	15
Sodium - Dissolved	94
Total Alkalinity	180
Chloride in water	120
Sulphate in water	41
Hardness as $CaCO_3$	240
Acidity as $CaCO_3$	-

	mg/L
Calcium - Dissolved	76
Potassium - Dissolved	5.2
Magnesium - Dissolved	13
Sodium - Dissolved	76
Total Alkalinity	150
Chloride in water	130
Sulphate in water	38
Hardness as $CaCO_3$	240
Acidity as $CaCO_3$	8

	mg/L
Calcium - Dissolved	71
Potassium - Dissolved	5.6
Magnesium - Dissolved	13
Sodium - Dissolved	73
Total Alkalinity	140
Chloride in water	130
Sulphate in water	46
Hardness as $CaCO_3$	230
Acidity as $CaCO_3$	8

	mg/L
Calcium - Dissolved	53
Potassium - Dissolved	4.6
Magnesium - Dissolved	11
Sodium - Dissolved	59
Total Alkalinity	130
Chloride in water	100
Sulphate in water	36
Hardness as $CaCO_3$	180
Acidity as $CaCO_3$	7

	mg/L
Calcium - Dissolved	56
Potassium - Dissolved	4.5
Magnesium - Dissolved	12
Sodium - Dissolved	65
Total Alkalinity	130
Chloride in water	120
Sulphate in water	36
Hardness as $CaCO_3$	190
Acidity as $CaCO_3$	<5

	mg/L
Calcium - Dissolved	79
Potassium - Dissolved	6.1
Magnesium - Dissolved	14
Sodium - Dissolved	76
Total Alkalinity	150
Chloride in water	120
Sulphate in water	43
Hardness as $CaCO_3$	260
Acidity as $CaCO_3$	11

Note: Refer to report for full data set

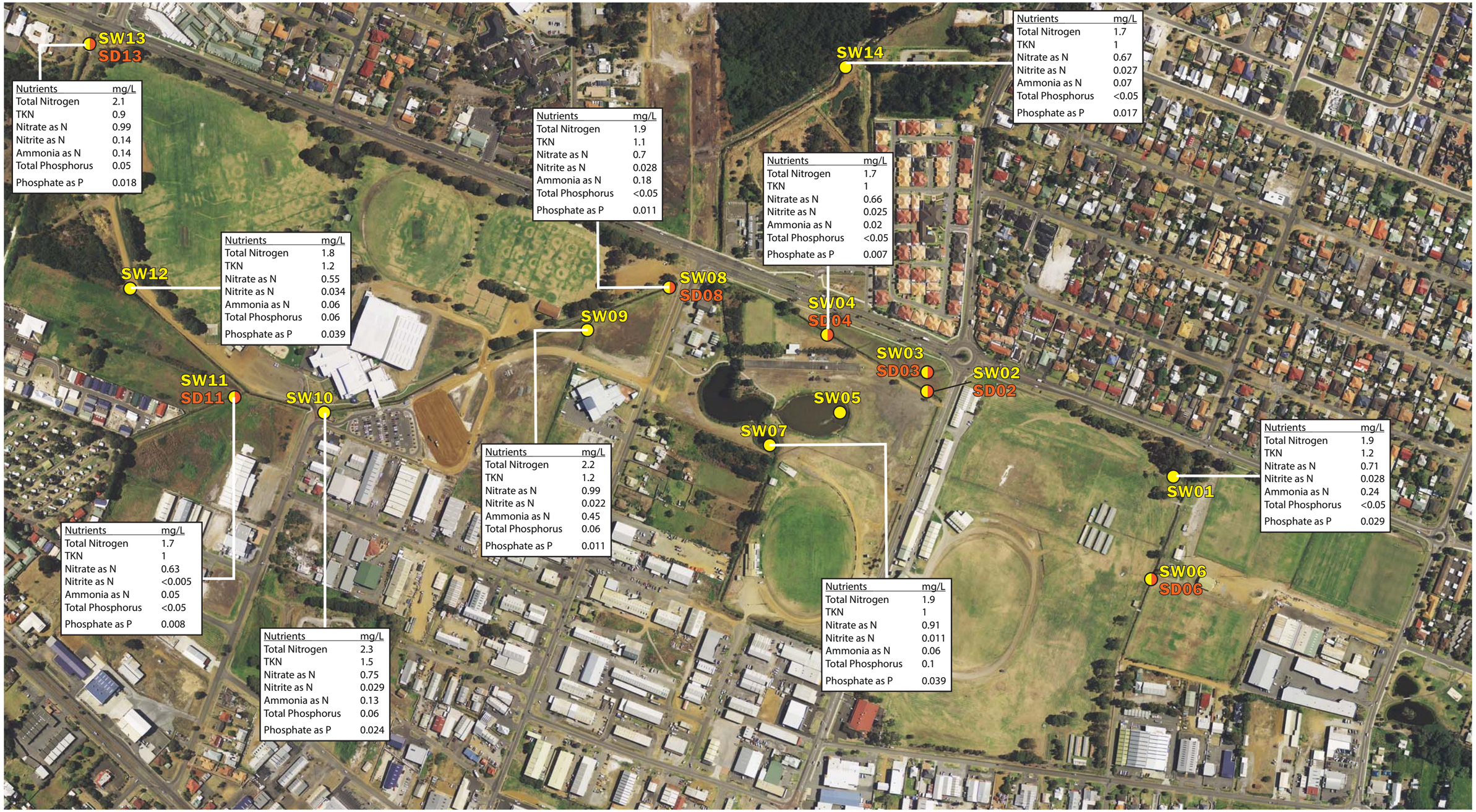
LEGEND :

- Surface water sampling location
- Surface water & Sediment sampling location
- Groundwater sampling location (Irrigation bores)
- Soil sampling locations

0m 60m 120m 180m 240m 300m

CLIENT :	City of Albany	DRAWING NAME:	Surface water - Lab Results (Ionic Balance)	DATE :	28.07.2013
PROJECT :	CENTENNIAL PARK - Investigations	DRAWING NUMBER:	-	SCALE :	Refer to scale bar
PROJECT NUMBER:	1422	DRAWING REFERENCE :	- 185	DRAWN BY :	AL / AR

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Note: Refer to report for full data set

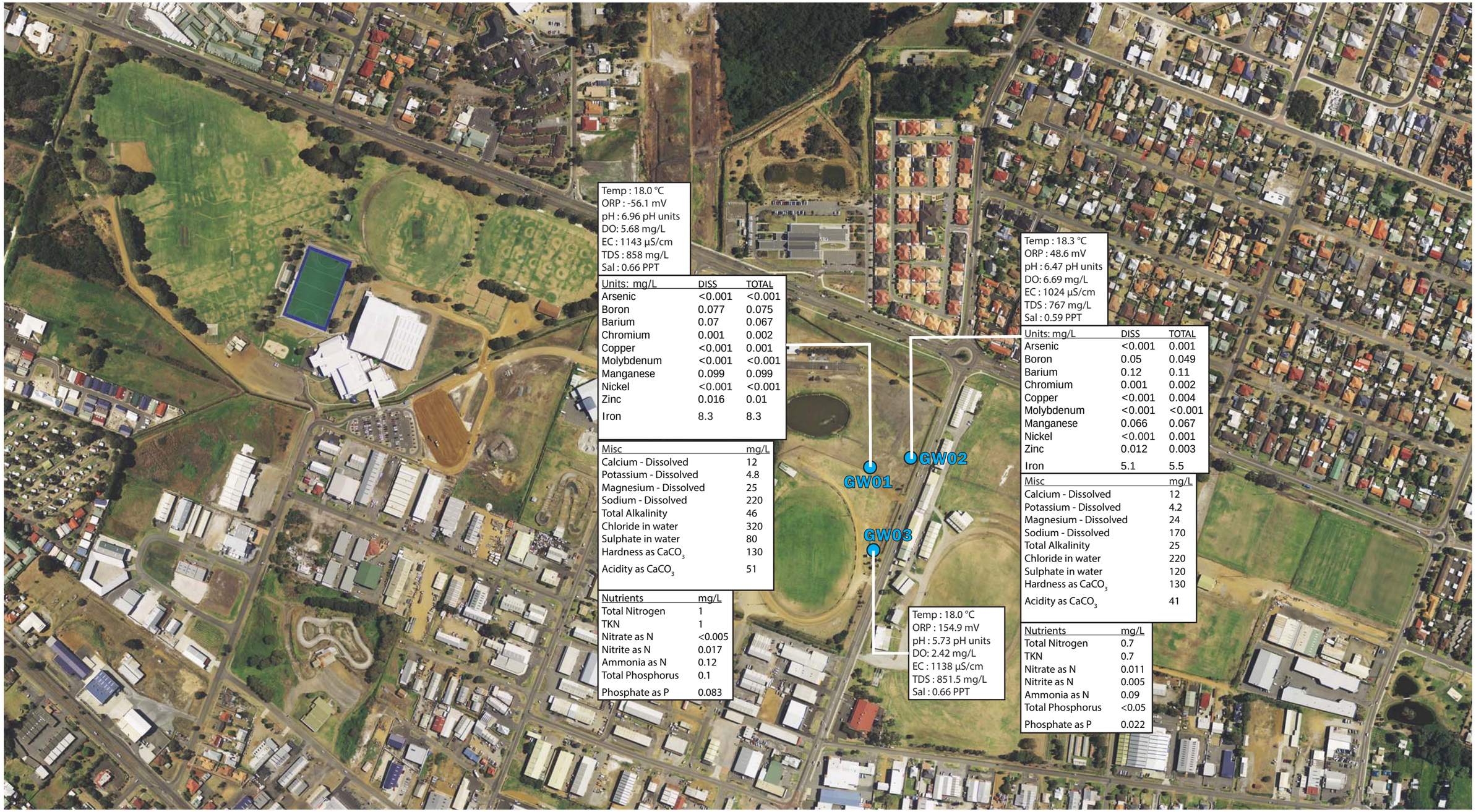
LEGEND :

- Surface water sampling location
- Surface water & Sediment sampling location
- Groundwater sampling location (Irrigation bores)
- Soil sampling locations

0m 60m 120m 180m 240m 300m

CLIENT :	City of Albany	DRAWING NAME:	Surface water - Lab Results (Nutrients)	DATE :	28.07.2013
PROJECT :	CENTENNIAL PARK - Investigations	DRAWING NUMBER:	-	SCALE :	Refer to scale bar
PROJECT NUMBER:	1422	DRAWING REFERENCE :	- 186	DRAWN BY :	AL / AR

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Temp : 18.0 °C
ORP : -56.1 mV
pH : 6.96 pH units
DO: 5.68 mg/L
EC : 1143 µS/cm
TDS : 858 mg/L
Sal : 0.66 PPT

Units: mg/L	DISS	TOTAL
Arsenic	<0.001	<0.001
Boron	0.077	0.075
Barium	0.07	0.067
Chromium	0.001	0.002
Copper	<0.001	0.001
Molybdenum	<0.001	<0.001
Manganese	0.099	0.099
Nickel	<0.001	<0.001
Zinc	0.016	0.01
Iron	8.3	8.3

Misc	mg/L
Calcium - Dissolved	12
Potassium - Dissolved	4.8
Magnesium - Dissolved	25
Sodium - Dissolved	220
Total Alkalinity	46
Chloride in water	320
Sulphate in water	80
Hardness as $CaCO_3$	130
Acidity as $CaCO_3$	51

Nutrients	mg/L
Total Nitrogen	1
TKN	1
Nitrate as N	<0.005
Nitrite as N	0.017
Ammonia as N	0.12
Total Phosphorus	0.1
Phosphate as P	0.083

Temp : 18.3 °C
ORP : 48.6 mV
pH : 6.47 pH units
DO: 6.69 mg/L
EC : 1024 µS/cm
TDS : 767 mg/L
Sal : 0.59 PPT

Units: mg/L	DISS	TOTAL
Arsenic	<0.001	0.001
Boron	0.05	0.049
Barium	0.12	0.11
Chromium	0.001	0.002
Copper	<0.001	0.004
Molybdenum	<0.001	<0.001
Manganese	0.066	0.067
Nickel	<0.001	0.001
Zinc	0.012	0.003
Iron	5.1	5.5

Misc	mg/L
Calcium - Dissolved	12
Potassium - Dissolved	4.2
Magnesium - Dissolved	24
Sodium - Dissolved	170
Total Alkalinity	25
Chloride in water	220
Sulphate in water	120
Hardness as $CaCO_3$	130
Acidity as $CaCO_3$	41

Nutrients	mg/L
Total Nitrogen	0.7
TKN	0.7
Nitrate as N	0.011
Nitrite as N	0.005
Ammonia as N	0.09
Total Phosphorus	<0.05
Phosphate as P	0.022

Temp : 18.0 °C
ORP : 154.9 mV
pH : 5.73 pH units
DO: 2.42 mg/L
EC : 1138 µS/cm
TDS : 851.5 mg/L
Sal : 0.66 PPT

Note: Groundwater results may not be representative of current conditions.
Refer to report for full data set.

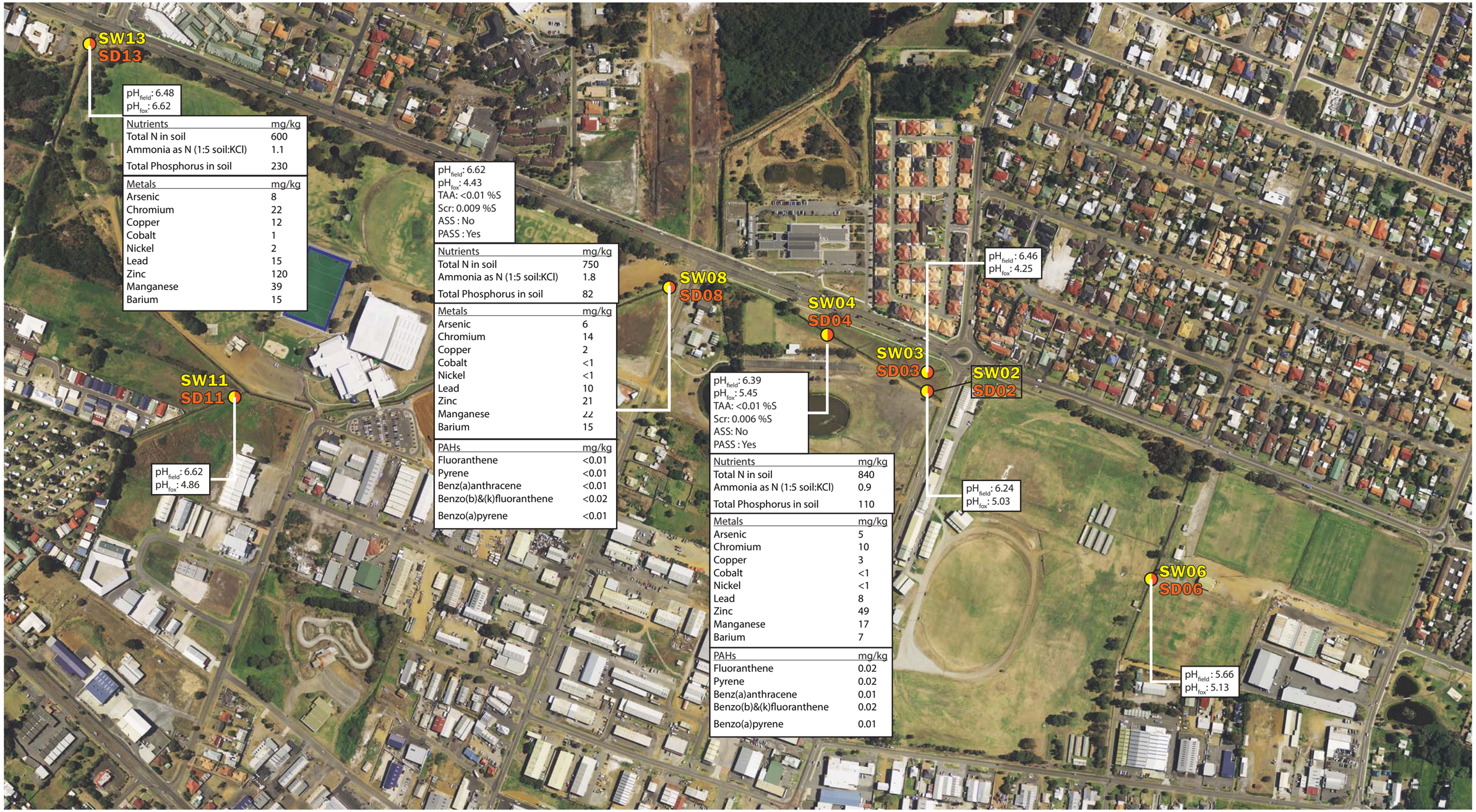
LEGEND :

- Surface water sampling location
- Surface water & Sediment sampling location
- Groundwater sampling location (Irrigation bores)
- Soil sampling locations

0m 60m 120m 180m 240m 300m

CLIENT :	City of Albany	DRAWING NAME:	Groundwater - Field & Lab Results	DATE :	28.07.2013
PROJECT :	CENTENNIAL PARK - Investigations	DRAWING NUMBER:	-	SCALE :	Refer to scale bar
PROJECT NUMBER:	1422	DRAWING REFERENCE :	- 187	DRAWN BY :	AL / AR

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Note: Refer to report for full data set.

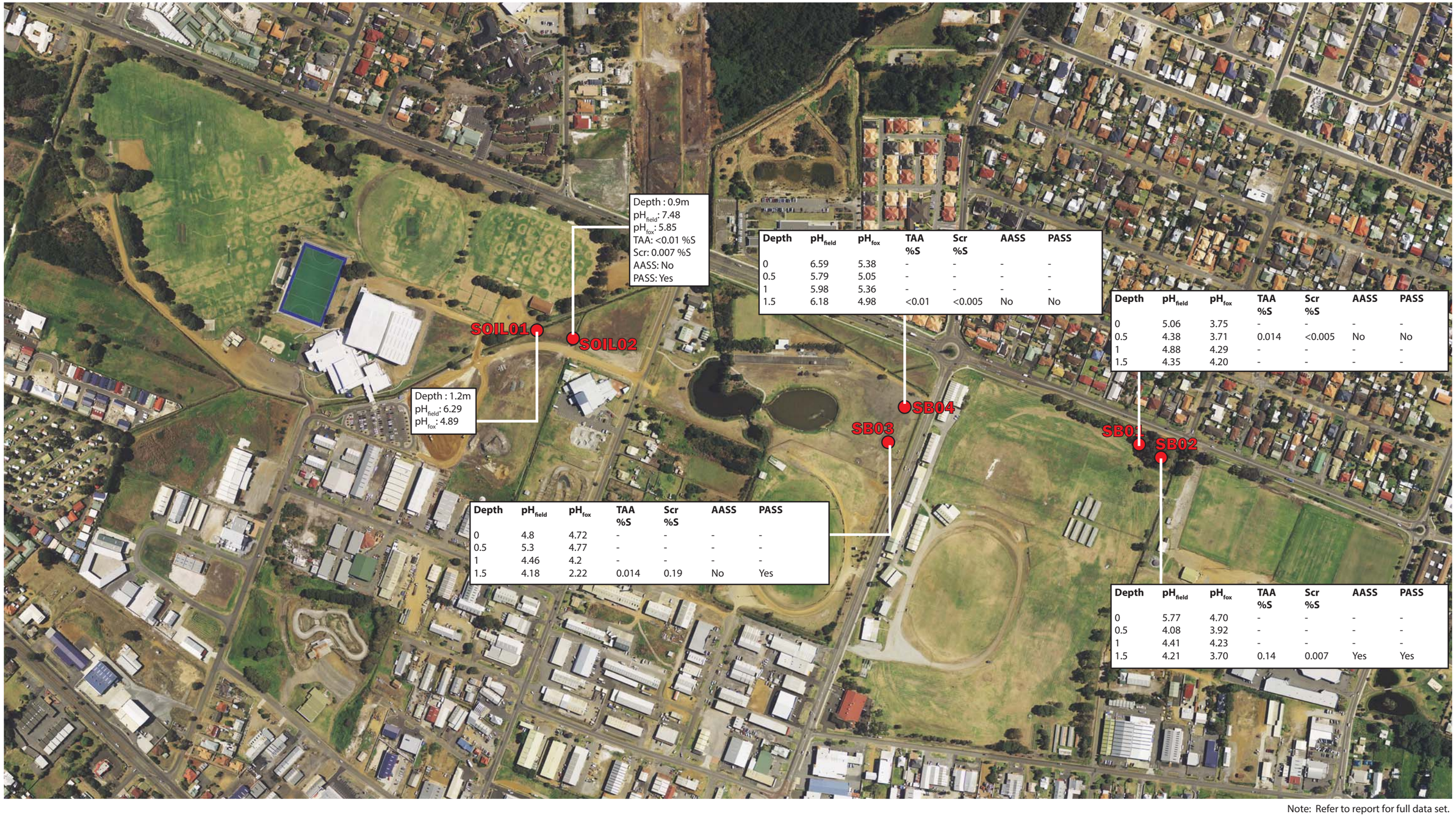
LEGEND :

- Surface water sampling location
- Surface water & Sediment sampling location
- Groundwater sampling location (Irrigation bores)
- Soil sampling locations

0m 60m 120m 180m 240m 300m

CLIENT :	City of Albany	DRAWING NAME:	Sediment - Field & Lab Results	DATE :	28.07.2013
PROJECT :	CENTENNIAL PARK - Investigations	DRAWING NUMBER:	-	SCALE :	Refer to scale bar
PROJECT NUMBER:	1422	DRAWING REFERENCE :	- 188	DRAWN BY :	AL / AR

SYRINX environmental pl



Depth	pH_{field}	pH_{fox}	TAA %S	Scr %S	AASS	PASS
0	6.59	5.38	-	-	-	-
0.5	5.79	5.05	-	-	-	-
1	5.98	5.36	-	-	-	-
1.5	6.18	4.98	<0.01	<0.005	No	No

Depth	pH_{field}	pH_{fox}	TAA %S	Scr %S	AASS	PASS
0	5.06	3.75	-	-	-	-
0.5	4.38	3.71	0.014	<0.005	No	No
1	4.88	4.29	-	-	-	-
1.5	4.35	4.20	-	-	-	-

Depth	pH_{field}	pH_{fox}	TAA %S	Scr %S	AASS	PASS
0	4.8	4.72	-	-	-	-
0.5	5.3	4.77	-	-	-	-
1	4.46	4.2	-	-	-	-
1.5	4.18	2.22	0.014	0.19	No	Yes

Depth	pH_{field}	pH_{fox}	TAA %S	Scr %S	AASS	PASS
0	5.77	4.70	-	-	-	-
0.5	4.08	3.92	-	-	-	-
1	4.41	4.23	-	-	-	-
1.5	4.21	3.70	0.14	0.007	Yes	Yes

Note: Refer to report for full data set.

LEGEND :

- Surface water sampling location
- Surface water & Sediment sampling location
- Groundwater sampling location (Irrigation bores)
- Soil sampling locations

0m 60m 120m 180m 240m 300m

CLIENT :	City of Albany	DRAWING NAME:	Soil - Field & Lab Results
PROJECT :	CENTENNIAL PARK - Investigations	DRAWING NUMBER:	-
PROJECT NUMBER:	1422	DRAWING REFERENCE :	-
			189
DATE :	28.07.2013		
SCALE :	Refer to scale bar		
DRAWN BY :	AL / AR		

SYRINX environmental pl

Sample	Date Sampled	Lab ID	Metals (Total)															
			Arsenic-Total	Boron-Total	Beryllium-Total	Barium-Total	Cadmium-Total	Cobalt-Total	Chromium-Total	Copper-Total	Mercury-Total	Molybdenum-Total	Manganese-Total	Nickel-Total	Lead-Total	Antimony-Total	Selenium-Total	Tin-Total	Zinc-Total
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Freshwater Guidelines			0.013	0.37	-	-	0.0002	-	-	0.0014	0.00006	-	1.9	0.011	0.0034	-	0.005	-	0.008
Eastern Precinct																			
SW01	24/06/2014	152370	**0.001**	**0.04**	**0.0005**	**0.029**	**0.0001**	**0.001**	**0.001**	**0.002**	**0.00005**	**0.001**	**0.025**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.025**
Central Precinct																			
SW04	24/06/2014	152370	**0.001**	**0.039**	**0.0005**	**0.032**	**0.0001**	**0.001**	**0.001**	**0.003**	**0.00005**	**0.001**	**0.022**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.029**
SW07	24/06/2014	152370	**0.002**	**0.056**	**0.0005**	**0.035**	**0.0001**	**0.001**	**0.001**	**0.003**	**0.00005**	**0.001**	**0.015**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.091**
SW09	24/06/2014	152370	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Western Precinct																			
SW11	24/06/2014	152370	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW08	24/06/2014	152370	**0.002**	**0.045**	**0.0005**	**0.021**	**0.0001**	**0.001**	**0.001**	**0.004**	**0.00005**	**0.001**	**0.019**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.03**
SW10	24/06/2014	152370	**0.002**	**0.042**	**0.0005**	**0.017**	**0.0001**	**0.001**	**0.001**	**0.002**	**0.00005**	**0.001**	**0.012**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.016**
SW12	24/06/2014	152370	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SW13	24/06/2014	152370	**0.002**	**0.038**	**0.0005**	**0.021**	**0.0001**	**0.001**	**0.001**	**0.003**	**0.00005**	**0.002**	**0.009**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.021**
Groundwater bores																			
GW01	24/06/2014	152370	**0.001**	**0.075**	**0.0005**	**0.067**	**0.0001**	**0.001**	**0.002**	**0.001**	**0.00005**	**0.001**	**0.099**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.01**
GW02	24/06/2014	152370	**0.001**	**0.049**	**0.0005**	**0.11**	**0.0001**	**0.001**	**0.002**	**0.004**	**0.00005**	**0.001**	**0.067**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.003**
Down-gradient from Centennial Park																			
SW14	24/06/2014	152370	**0.001**	**0.041**	**0.0005**	**0.023**	**0.0001**	**0.001**	**0.001**	**0.003**	**0.00005**	**0.001**	**0.014**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.03**

Notes:

Bolded	Indicates detectable analyte concentrations
Shaded	Groundwater Investigation Levels - Freshwater (NEPM, 2013, based on ANZECC, 2000)
A	Trigger levels for lowland river systems in SW Australia (ANZECC, 2000)

Sample	Date Sampled	Lab ID		Metals (Dissolved)														
			Iron-Total	Arsenic-Dissolved	Boron-Dissolved	Barium-Dissolved	Beryllium-Dissolved	Cadmium-Dissolved	Cobalt-Dissolved	Chromium-Dissolved	Copper-Dissolved	Mercury-Dissolved	Manganese-Dissolved	Molybdenum-Dissolved	Nickel-Dissolved	Lead-Dissolved	Antimony-Dissolved	Selenium-Dissolved	Tin-Dissolved
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Freshwater Guidelines			-	0.013	0.37	-	-	0.0002	-	-	0.0014	0.00006	1.9	-	0.011	0.0034	-	0.005	-
Eastern Precinct																			
SW01	24/06/2014	152370	**0.43**	**0.001**	**0.044**	**0.034**	**0.0005**	**0.0001**	**0.001**	**0.001**	**0.001**	**0.00005**	**0.024**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
Central Precinct																			
SW04	24/06/2014	152370	**0.38**	**0.001**	**0.04**	**0.037**	**0.0005**	**0.0001**	**0.001**	**0.001**	**0.002**	**0.00005**	**0.022**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
SW07	24/06/2014	152370	**0.65**	**0.001**	**0.057**	**0.039**	**0.0005**	**0.0001**	**0.001**	**0.001**	**0.001**	**0.00005**	**0.015**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
SW09	24/06/2014	152370	-	**0.001**	**0.064**	**0.037**	**0.0005**	**0.0001**	**0.001**	**0.001**	**0.001**	**0.00005**	**0.026**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
Western Precinct																			
SW11	24/06/2014	152370	-	**0.001**	**0.053**	**0.022**	**0.0005**	**0.0001**	**0.001**	**0.001**	**0.001**	**0.00005**	**0.012**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
SW08	24/06/2014	152370	**1.2**	**0.001**	**0.045**	**0.023**	**0.0005**	**0.0001**	**0.001**	**0.001**	**0.002**	**0.00005**	**0.017**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
SW10	24/06/2014	152370	**0.78**	**0.001**	**0.043**	**0.019**	**0.0005**	**0.0001**	**0.001**	**0.001**	**0.001**	**0.00005**	**0.011**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
SW12	24/06/2014	152370	-	**0.001**	**0.041**	**0.019**	**0.0005**	**0.0001**	**0.001**	**0.001**	**0.001**	**0.00005**	**0.01**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
SW13	24/06/2014	152370	**0.57**	**0.001**	**0.041**	**0.024**	**0.0005**	**0.0001**	**0.001**	**0.001**	**0.001**	**0.00005**	**0.009**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
Groundwater bores																			
GW01	24/06/2014	152370	**8.3**	**0.001**	**0.077**	**0.07**	**0.0005**	**0.0001**	**0.001**	**0.001**	**0.001**	**0.00005**	**0.099**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
GW02	24/06/2014	152370	**5.5**	**0.001**	**0.05**	**0.12**	**0.0005**	**0.0001**	**0.001**	**0.001**	**0.001**	**0.00005**	**0.066**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
Down-gradient from Centennial Park																			
SW14	24/06/2014	152370	**1.1**	**0.001**	**0.041**	**0.025**	**0.0005**	**0.0001**	**0.001**	**0.001**	**0.001**	**0.00005**	**0.013**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**

Notes:

Bolded	Indicates detectable analyte concentrations
Shaded	Groundwater Investigation Levels - Freshwater (NEPM, 2013, based on ANZECC, 2000)
A	Trigger levels for lowland river systems in SW Australia (ANZECC, 2000)

Sample	Date Sampled	Lab ID			Ionic Balance / Miscellaneous													Nutrients	
			Zinc-Dissolved	Iron-Dissolved	Calcium - Dissolved	Potassium - Dissolved	Magnesium - Dissolved	Sodium - Dissolved	Bicarbonate HCO_3 as $CaCO_3$	Carbonate CO_3^{2-} as $CaCO_3$	Hydroxide OH^- as $CaCO_3$	Total Alkalinity	Chloride in water	Sulphate in water	Hardness as $CaCO_3$	Acidity as $CaCO_3$	Total Cyanide	Total Nitrogen (Total N)	TKN
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	Freshwater Guidelines		0.008	-	-	-	-	-	-	-	-	-	-	-	-	-	0.007	1.2[A]	-
Eastern Precinct																			
SW01	24/06/2014	152370	**0.03**	**0.28**	**79**	**6.1**	**14**	**76**	**150**	**5**	**5**	**150**	**120**	**43**	**260**	**11**	-	**1.9**	**1.2**
Central Precinct																			
SW04	24/06/2014	152370	**0.052**	**0.22**	**71**	**5.6**	**13**	**73**	**140**	**5**	**5**	**140**	**130**	**46**	**230**	**8**	**0.004**	**1.7**	**1**
SW07	24/06/2014	152370	**0.063**	**0.38**	**53**	**4.6**	**11**	**59**	**130**	**5**	**5**	**130**	**100**	**36**	**180**	**7**	-	**1.9**	**1**
SW09	24/06/2014	152370	**0.046**	**0.75**	**70**	**5.7**	**15**	**94**	**180**	**5**	**5**	**180**	**120**	**41**	**240**	-	-	**2.2**	**1.2**
Western Precinct																			
SW11	24/06/2014	152370	**0.057**	**0.24**	**34**	**5**	**10**	**66**	**94**	**5**	**5**	**94**	**110**	**25**	**130**	-	-	**1.7**	**1**
SW08	24/06/2014	152370	**0.028**	**0.86**	**76**	**5.2**	**13**	**76**	**150**	**5**	**5**	**150**	**130**	**38**	**240**	**8**	**0.004**	**1.9**	**1.1**
SW10	24/06/2014	152370	**0.018**	**0.42**	**65**	**5.1**	**12**	**70**	**130**	**5**	**5**	**130**	**120**	**41**	**210**	-	-	**2.3**	**1.5**
SW12	24/06/2014	152370	**0.023**	**0.35**	**56**	**4.9**	**11**	**62**	**130**	**5**	**5**	**130**	**120**	**39**	**190**	-	-	**1.8**	**1.2**
SW13	24/06/2014	152370	**0.021**	**0.28**	**51**	**6.7**	**11**	**59**	**120**	**5**	**5**	**120**	**99**	**35**	**170**	**5**	**0.004**	**2.1**	**0.9**
Groundwater bores																			
GW01	24/06/2014	152370	**0.016**	**8.3**	**12**	**4.8**	**25**	**220**	**46**	**5**	**5**	**46**	**320**	**80**	**130**	**51**	-	**1**	**1**
GW02	24/06/2014	152370	**0.012**	**5.1**	**12**	**4.2**	**24**	**170**	**25**	**5**	**5**	**25**	**220**	**120**	**130**	**41**	-	**0.7**	**0.7**
Down-gradient from Centennial Park																			
SW14	24/06/2014	152370	**0.022**	**0.54**	**56**	**4.5**	**12**	**65**	**130**	**5**	**5**	**130**	**120**	**36**	**190**	**5**	**0.004**	**1.7**	**1**

Notes:

Bolded	Indicates detectable analyte concentrations
Shaded	Groundwater Investigation Levels - Freshwater (NEPM, 2013, based on ANZECC, 2000)
A	Trigger levels for lowland river systems in SW Australia (ANZECC, 2000)

Sample	Date Sampled	Lab ID						TRHs					
			Nitrate as N	Nitrite as N	Ammonia as N	Total Phosphorus	Phosphate as P	TRH C_{10} - C_{14}	TRH C_{15} - C_{28}	TRH C_{29} - C_{36}	TRH >C_{10} - C_{16}	TRH >C_{16} - C_{34}	TRH >C_{34} - C_{40}
			mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Freshwater Guidelines			-	-	0.8[A]	0.065[A]	0.04[A]	-	-	-	-	-	-
Eastern Precinct													
SW01	24/06/2014	152370	**0.71**	**0.028**	**0.24**	**0.05**	**0.029**	-	-	-	-	-	-
Central Precinct													
SW04	24/06/2014	152370	**0.66**	**0.025**	**0.02**	**0.05**	**0.007**	**50**	<100	<100	**50**	<100	<100
SW07	24/06/2014	152370	**0.91**	**0.011**	**0.06**	**0.1**	**0.039**	**50**	<100	<100	**50**	<100	<100
SW09	24/06/2014	152370	**0.99**	**0.022**	**0.45**	**0.06**	**0.011**	-	-	-	-	-	-
Western Precinct													
SW11	24/06/2014	152370	**0.63**	**0.005**	**0.05**	**0.05**	**0.008**	-	-	-	-	-	-
SW08	24/06/2014	152370	**0.7**	**0.028**	**0.18**	**0.05**	**0.011**	**50**	<100	<100	**50**	<100	<100
SW10	24/06/2014	152370	**0.75**	**0.029**	**0.13**	**0.06**	**0.024**	**50**	<100	<100	**50**	<100	<100
SW12	24/06/2014	152370	**0.55**	**0.034**	**0.06**	**0.06**	**0.039**	-	-	-	-	-	-
SW13	24/06/2014	152370	**0.99**	**0.14**	**0.14**	**0.05**	**0.018**	**50**	<100	<100	**50**	<100	<100
Groundwater bores													
GW01	24/06/2014	152370	**0.005**	**0.017**	**0.12**	**0.1**	**0.083**	-	-	-	-	-	-
GW02	24/06/2014	152370	**0.011**	**0.005**	**0.09**	**0.05**	**0.022**	**50**	<100	<100	**50**	<100	<100
Down-gradient from Centennial Park													
SW14	24/06/2014	152370	**0.67**	**0.027**	**0.07**	**0.05**	**0.017**	**50**	<100	<100	**50**	<100	<100

Notes:

Bolded	Indicates detectable analyte concentrations
Shaded	Groundwater Investigation Levels - Freshwater (NEPM, 2013, based on ANZECC, 2000)
A	Trigger levels for lowland river systems in SW Australia (ANZECC, 2000)

Sample	Date Sampled	Lab ID	Nutrients			Metals											
			Total N in soil	Ammonia as N (1:5 soil:KCl)	Total Phosphorus in soil	Arsenic	Cadmium	Chromium	Copper	Cobalt	Mercury	Molybdenum	Nickel	Lead	Selenium	Tin	Zinc
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
		Sediment Guidelines	-	-	-	20	1.5	80	65	-	0.15	-	21	50	-	5	200
SD04	23/06/2014	152372	**840**	**0.9**	**110**	**5**	<0.4	**10**	**3**	<1	<0.1	<1	<1	**8**	<3	<1	**49**
SD08	23/06/2014	152372	**750**	**1.8**	**82**	**6**	<0.4	**14**	**2**	<1	<0.1	<1	<1	**10**	<3	<1	**21**
SD13	23/06/2014	152372	**600**	**1.1**	**230**	**8**	<0.4	**22**	**12**	**1**	<0.1	<1	**2**	**15**	<3	<1	**120**

Notes:

Bolded	Indicates detectable analyte concentration
Shaded	Interim sediment quality guidelines - low trigger values (ANZECC, 20000)

Sample	Date Sampled	Lab ID						PAHs									
			Manganese	Beryllium	Barium	Boron	Antimony	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
		Sediment Guidelines	-	-	-	-	2	-	-	-	-	-	-	0.6	0.665	0.261	-
SD04	23/06/2014	152372	**17**	<1	**7**	<3	<7	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**0.02**	**0.02**	**0.01**	<0.01
SD08	23/06/2014	152372	**22**	<1	**15**	<3	<7	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SD13	23/06/2014	152372	**39**	<1	**15**	<3	<7	-	-	-	-	-	-	-	-	-	-

Notes:

Bolded	Indicates detectable analyte concentration
Shaded	Interim sediment quality guidelines - low trigger values (ANZECC, 20000)

Sample	Date Sampled	Lab ID						ASS Analysis									
			Benzo(b)&(k)fluoranthene	**Benzo(a)pyrene**	**Indeno(1,2,3-cd)pyrene**	**Dibenz(ah)anthracene**	**Benzo(ghi)perylene**	**pH $_{kcl}$**	**TAA**	**S_{KCl}**	**Chromium Reducible Sulfur**	**ANC_{BT}**	**S_{HCl}**	**s-TAA**	**a-Chromium Reducible Sulfur**	**a-ANC_{BT}**	**s-ANC_{BT}**
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	pH units	moles H^+/t	%w/w S	%w/w	% $CaCO_3$	%w/w S	%w/w S	moles H^+/t	moles H^+/t	%w/w S
		Sediment Guidelines	-	0.43	-	-	-	-	-	-	-	-	-	-	-	-	-
SD04	23/06/2014	152372	**0.02**	**0.01**	<0.01	<0.01	<0.01	7.2	<5	NT	0.006	0.3	NT	<0.01	<5	69	0.11
SD08	23/06/2014	152372	<0.02	<0.01	<0.01	<0.01	<0.01	7	<5	NT	0.009	0.4	NT	<0.01	5.6	89	0.14
SD13	23/06/2014	152372	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

Bolded	Indicates detectable analyte concentration
Shaded	Interim sediment quality guidelines - low trigger values (ANZECC, 20000)

Sample	Date Sampled	Lab ID	Fineness Factor	S_{NAS}	a-S_{NAS}	s-S_{NAS}	s-Net Acidity	a-Net Acidity	Liming rate	s-Net Acidity without ANCE	a-Net Acidity without ANCE	Liming rate without ANCE
				%w/w S	moles H^+/t	%w/w S	%w/w S	moles H^+/t	kg $CaCO_3$/t	% w/w S	moles H^+/t	kg $CaCO_3$/t
Sediment Guidelines			-	-	-	-	-	-	-	-	-	-
SD04	23/06/2014	152372	2	NT	NT	NT	<0.005	-31	<0.75	0.006	<10	<0.75
SD08	23/06/2014	152372	2	NT	NT	NT	<0.005	-39	<0.75	0.009	<10	<0.75
SD13	23/06/2014	152372	-	-	-	-	-	-	-	-	-	-

Notes:

Bolded	Indicates detectable analyte concentration
Shaded	Interim sediment quality guidelines - low trigger values (ANZECC, 20000)

APPENDIX 2 CPSP Catchment Analysis (information provided by WGE 2014)



PLAN
SCALE 1:4000@A1

LEGEND

CATCHMENT 4	CATCHMENT NUMBER
AREA 25.91	CATCHMENT AREA (Ha)
C10 0.50	RUNOFF COEFFICIENT (10yr ARI)
ToC 22.4	TIME OF CONCENTRATION (min)
Q1 0.716	CATCHMENT OUTLOW (1yr ARI) (m^3/s)
Q5 1.484	CATCHMENT OUTFLOW (5yr ARI) (m^3/s)
PUBLIC ROAD PAVEMENT = 8.3%	ESTIMATED ROAD CATCHMENT (% TOTAL)
(97)	CATCHMENT OUTFLOW LOCATION ("?" INDICATES OUTFLOW LOCATION IS UNCLEAR)
	CATCHMENT LONGEST FLOW PATH

REV.	DESCRIPTION	DRAWN	VER	APPROVED
B	PERCENTAGE OF PUBLIC ROAD PAVEMENT ADDED	ERM	FW	FW 16/09/14
A	ORIGINAL ISSUE	CNI	FW	FW 18/08/14

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Web www.wge.com.au
ALBANY PERTH MELBOURNE SYDNEY BRISBANE GOLD COAST BUSSELTON SHENZHEN DARWIN

CLIENT:
CITY OF ALBANY

PROJECT:
CENTENNIAL PARK SPORTING PRECINCT

TITLE:
YAKAMIA CATCHMENT ANALYSIS - SHEET 1 OF 2

PRELIMINARY

SECTION: CIVIL SERVICES	VERIFIED :	SCALE :	A1 @ 1:1000
DESIGNED : F. WALLEFELD	APPROVED FOR TENDER:	DATUM :	A.H.D.
DRAWN : C. IDLE	APPROVED FOR CONSTRUCTION :	WAPC :	-

PROJECT No.	DRAWING No.	REVISION
26689-PER-C	CA1	B

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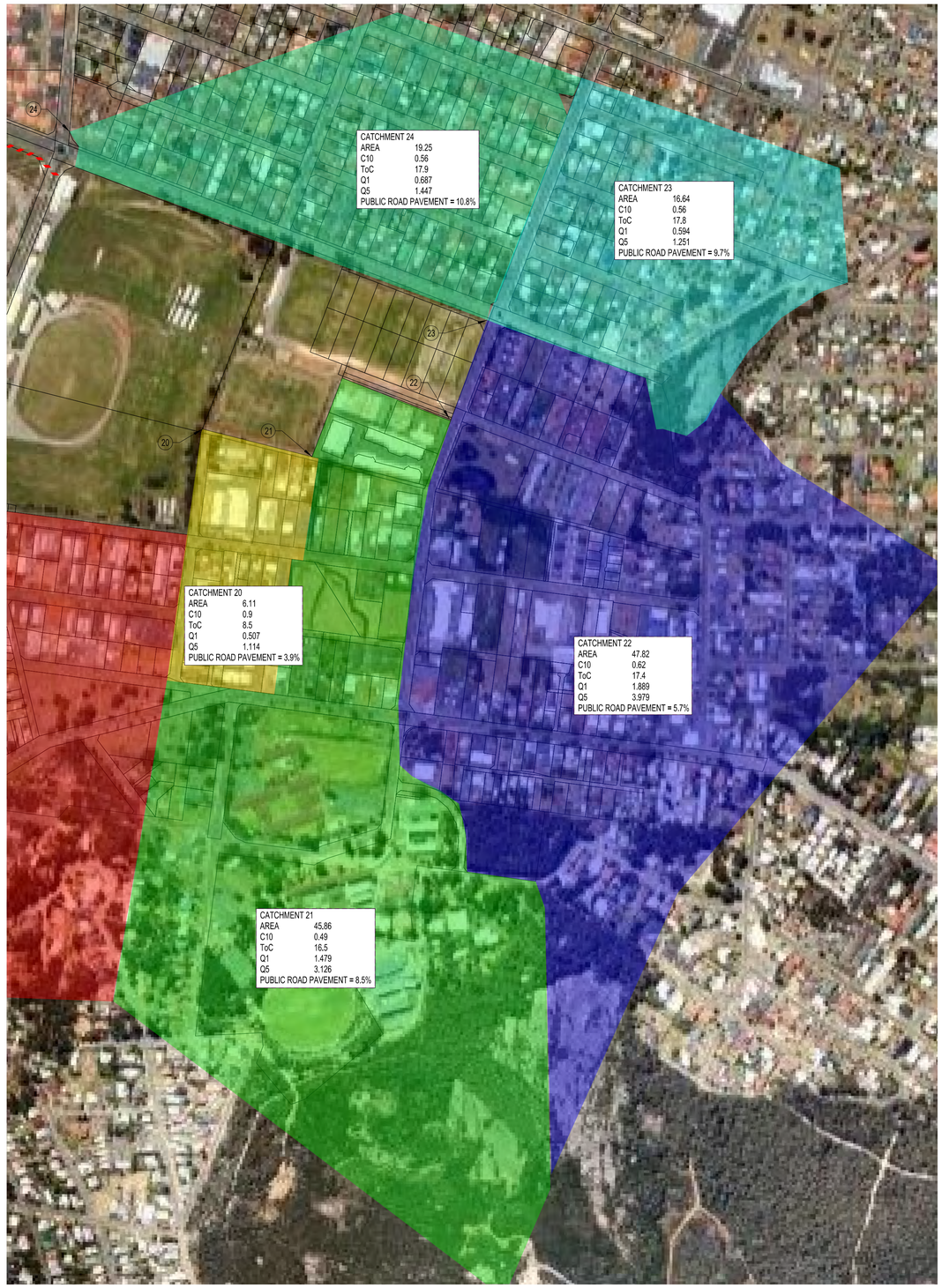
A1 @ 1:1000
A3 @ 1:2000

LEGEND

CATCHMENT 4		CATCHMENT NUMBER
AREA	25.91	CATCHMENT AREA (Ha)
C10	0.50	RUNOFF COEFFICIENT (10yr ARI)
ToC	22.4	TIME OF CONCENTRATION (min)
Q1	0.716	CATCHMENT OUTLOW (1yr ARI) (m^3/s)
Q5	1.484	CATCHMENT OUTFLOW (5yr ARI) (m^3/s)
PUBLIC ROAD PAVEMENT = 8.3%		ESTIMATED ROAD CATCHMENT (% TOTAL)

97 — CATCHMENT OUTFLOW LOCATION ("?" INDICATES OUTFLOW LOCATION IS UNCLEAR)

CATCHMENT LONGEST FLOW PATH



PLAN
SCALE 1:4000@A1

REV.	DESCRIPTION	DRAWN	VER	APPROVED
B	PERCENTAGE OF PUBLIC ROAD PAVEMENT ADDED	ERM	FW	FW 16/09/14
A	ORIGINAL ISSUE	CNI	FW	FW 28/08/14

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BRISBANE
GOLD COAST
BUSSELTON
SHENZHEN
DARWIN

CLIENT:
CITY OF ALBANY
PROJECT:
CENTENNIAL PARK SPORTING PRECINCT
TITLE:
YAKAMIA CATCHMENT ANALYSIS - SHEET 2 OF 2

PRELIMINARY

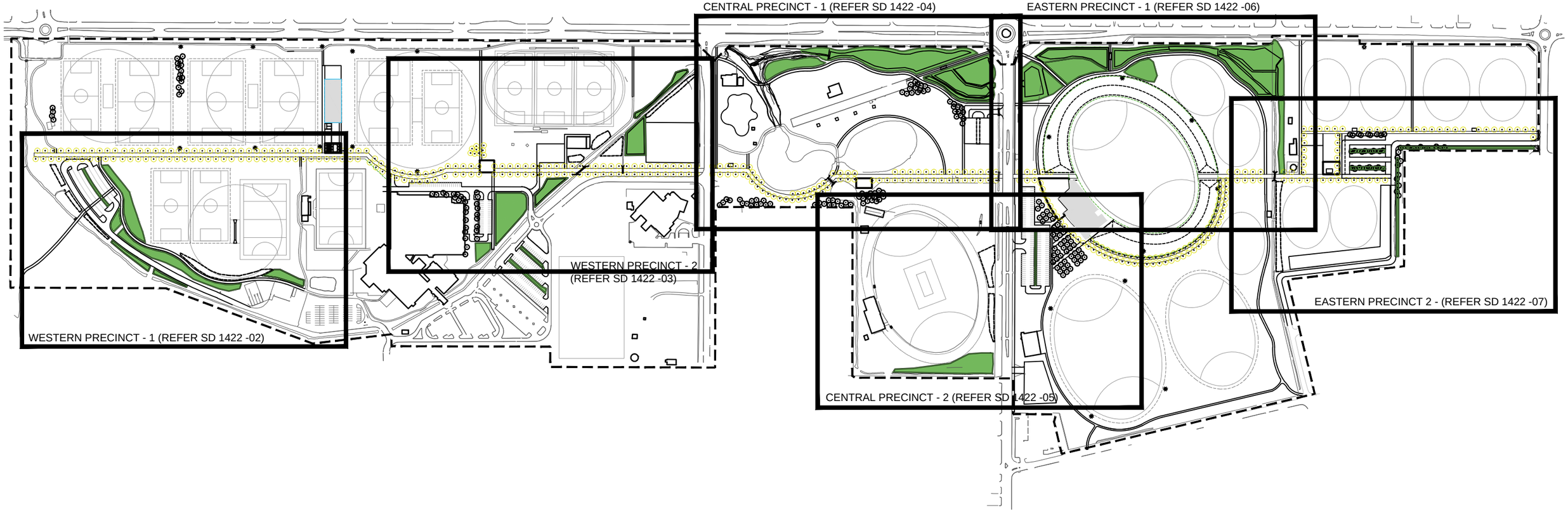
SECTION: CIVIL SERVICES	VERIFIED :	SCALE : A1 @ 1:1000
DESIGNED : F. WALLEFELD	APPROVED FOR TENDER:	DATUM : A.H.D.
DRAWN : C. IDLE	APPROVED FOR CONSTRUCTION :	WAPC : -

PROJECT No.	DRAWING No.	REVISION
26689-PER-C	CA2	B

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A1 @ 1:1000
A3 @ 2000

APPENDIX 3 WSUD Schematic Design Drawings - CPSP



01
01

WSUD GENERAL ARRANGEMENT

SCALE 1:5000

LEGEND

WSUD ELEMENTS

Revision	Description	Design	Drawn	Approved
0	DRAFT SCHEMATIC DESIGN	SH | SD	SH	KM

NORTH

NOTE : DESIGN LEVELS ARE IN mAHD AND INDICATIVE ONLY. GENERAL ARRANGEMENT SUBJECT TO DETAILED HYDRAULIC DESIGN & TREE SURVEY ASSESSMENT

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w www.syrinx.net.au

DATE	19.09.14
SCALE	As Shown
SYR. REF.	1422 - SD
SHEET	A3
DESIGN	[SH | SDo]
DRAWN	[SH]
APPROVED	[KM]
APPROVED	[XX]

CLIENT
CITY OF ALBANY

PROJECT
CENTENNIAL PARK SPORTS PRECINCT

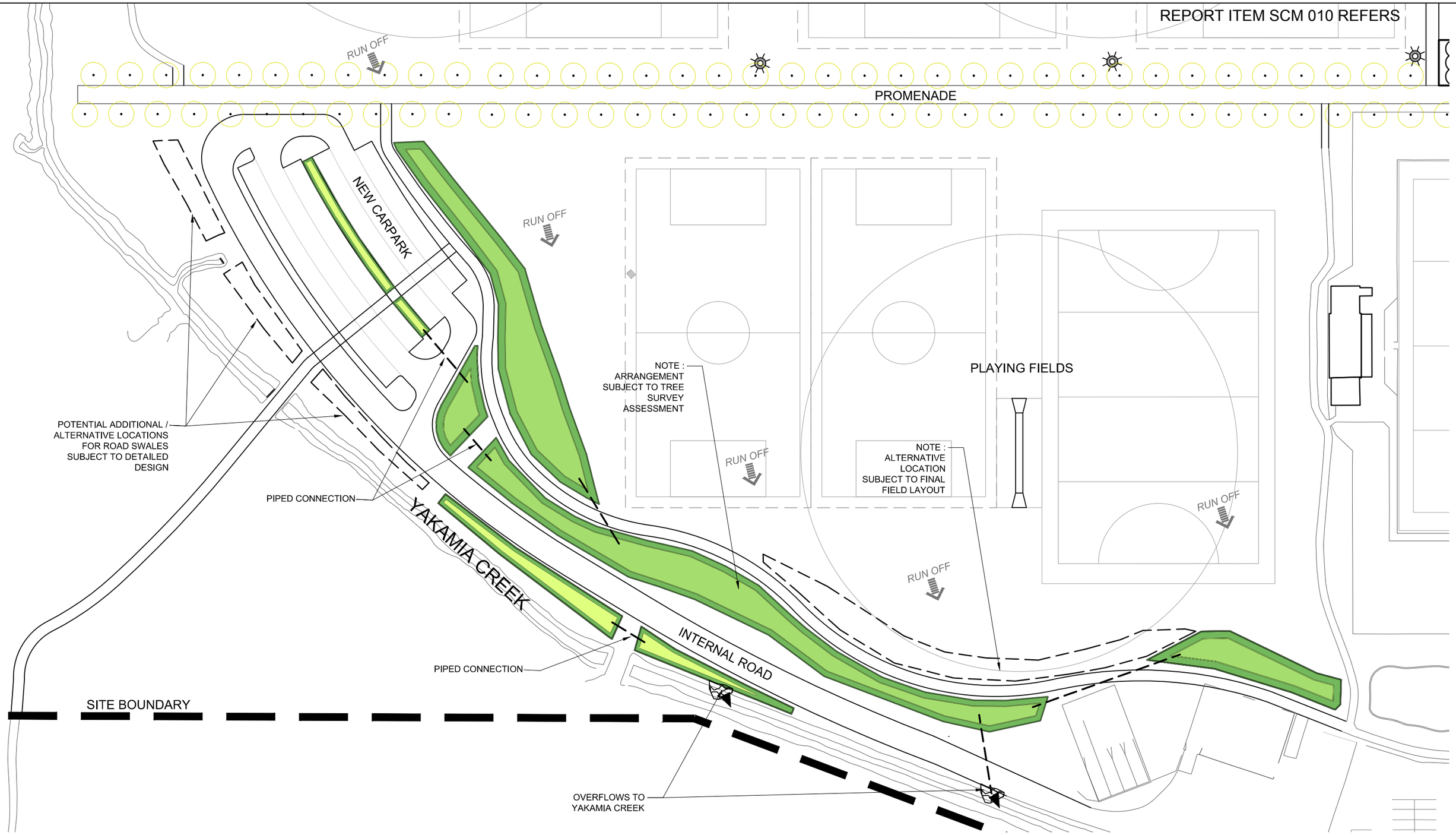
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WSUD - GENERAL ARRANGEMENT

PHASE:	DRAWING NO:	REV.
SD	1422 - 01	0

APPROVED.

REPORT ITEM SCM 010 REFERS



01
02

WSUD GENERAL ARRANGEMENT - WESTERN PRECINCT

SCALE 1:1000

LEGEND

- DEEP ZONE REFER DETAIL 01 | 08
- VEGETATED SWALE (CARPARK | ROAD RUN-OFF) REFER DETAIL 01 | 09
- VEGETATED BIO-RETENTION SWALE (SUB-SURFACE DRAINAGE) REFER DETAIL 01 | 11
- WETLAND TREATMENT ZONE REFER DETAIL 01 | 08
- VEGETATED SWALE (PLAYING FIELD RUN-OFF) REFER DETAIL 01 | 10

Revision	Description	Design	Drawn	Approved
0	DRAFT SCHEMATIC DESIGN	SH | SD	SH	KM

NORTH

NOTE : DESIGN LEVELS ARE IN mAHD AND INDICATIVE ONLY. GENERAL ARRANGEMENT SUBJECT TO DETAILED HYDRAULIC DESIGN & TREE SURVEY ASSESSMENT

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2013

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PLAYING FIELDS

PLAYING FIELDS

SANFORD ROAD

RUN OFF

RUN OFF

RUN OFF

RUN OFF

VEGETATED SWALES ARRANGEMENT & ASSOCIATED INTERFACE WITH YAKAMIA CREEK TBC IN DETAILED DESIGN

LIMITED INTEGRATION WORKS ALONG YAKAMIA CREEK

POTENTIAL STORAGE OF HARVESTED STORMWATER

NEW GRASS OVERFLOW CARPARK

INFLOWS FROM EXTERNAL CATCHMENT

INPUTS FROM SITE DRAINAGE (CRICKET OVAL, CARPARKS, ALAC OVERFLOWS ETC - TBC)

PROMENADE

OVERFLOWS TO YAKAMIA CREEK

NEW CARPARK

LIMITED INTEGRATION WORKS ALONG YAKAMIA CREEK

ALAC

NEW CARPARK

RUN OFF

YAKAMIA CREEK

NEW CARPARK

FUTURE "MEN'S SHED" SITE

PCYC

SITE BOUNDARY

LEGEND

- DEEP ZONE REFER DETAIL 01 | 08
- VEGETATED SWALE (CARPARK | ROAD RUN-OFF) REFER DETAIL 01 | 09
- VEGETATED BIO-RETENTION SWALE (SUB-SURFACE DRAINAGE) REFER DETAIL 01 | 11
- WETLAND TREATMENT ZONE REFER DETAIL 01 | 08
- VEGETATED SWALE (PLAYING FIELD RUN-OFF) REFER DETAIL 01 | 10

01
03

WSUD GENERAL ARRANGEMENT - WESTERN PRECINCT

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NORTH ROAD

SITE BOUNDARY

INTEGRATION WITH EXISTING CoA "LIVING STREAM"

INFLOW FROM EXTERNAL CATCHMENT

INFLOW FROM EXTERNAL CATCHMENT

13.74

14.0

14.6

14.2

13.2

14.75

SEDIMENTATION BASIN

PIPED CONNECTION

14.4

SEDIMENTATION BASIN

14.5

ROCK SPILLWAY

INFLOW FROM EASTERN PRECINCT

ADJUSTABLE WEIR

EXISTING CoA "LIVING STREAM"

CRESTED WEIR & ROCK SPILLWAY TO LIVING STREAM

RUN OFF

RUN OFF

RUN OFF

RUN OFF

RUN OFF

15.25

PARKLAND

SANFORD ROAD

LOCKYER AVENUE

PIPED CONNECTION (LAKE TOP-UP)

PIPED CONNECTION FROM EXISTING SWALE

13.13

CARPARK SWALE TBC

NEW CARPARK

EASTERN LAKE

WESTERN LAKE

PROMENADE

LEGEND

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01
04

WSUD GENERAL ARRANGEMENT - CENTRAL PRECINCT

SCALE 1:1000

Revision	Description	Design	Drawn	Approved
0	DRAFT SCHEMATIC DESIGN	SH | SD	SH	KM

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SD 1422 - 04 0

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REPORT ITEM SCM 010 REFERS

EXISTING OPEN DRAIN

LOCKYER AVENUE

NEW CARPARK

PROMENADE

PLAYING FIELDS

RUN OFF & FLOOD ROUTE

RUN OFF

NOTE : LOCATION SUBJECT TO SITE INSPECTION - POTENTIAL ALTERNATIVE LOCATION BETWEEN LOCKYER AVE & RAILWAYS OVAL

INFLOW FROM EXTERNAL CATCHMENT TO EXISTING OPEN DRAIN

PLAYING FIELDS

SITE BOUNDARY

01
05

WSUD GENERAL ARRANGEMENT - CENTRAL PRECINCT

SCALE 1:1000

LEGEND

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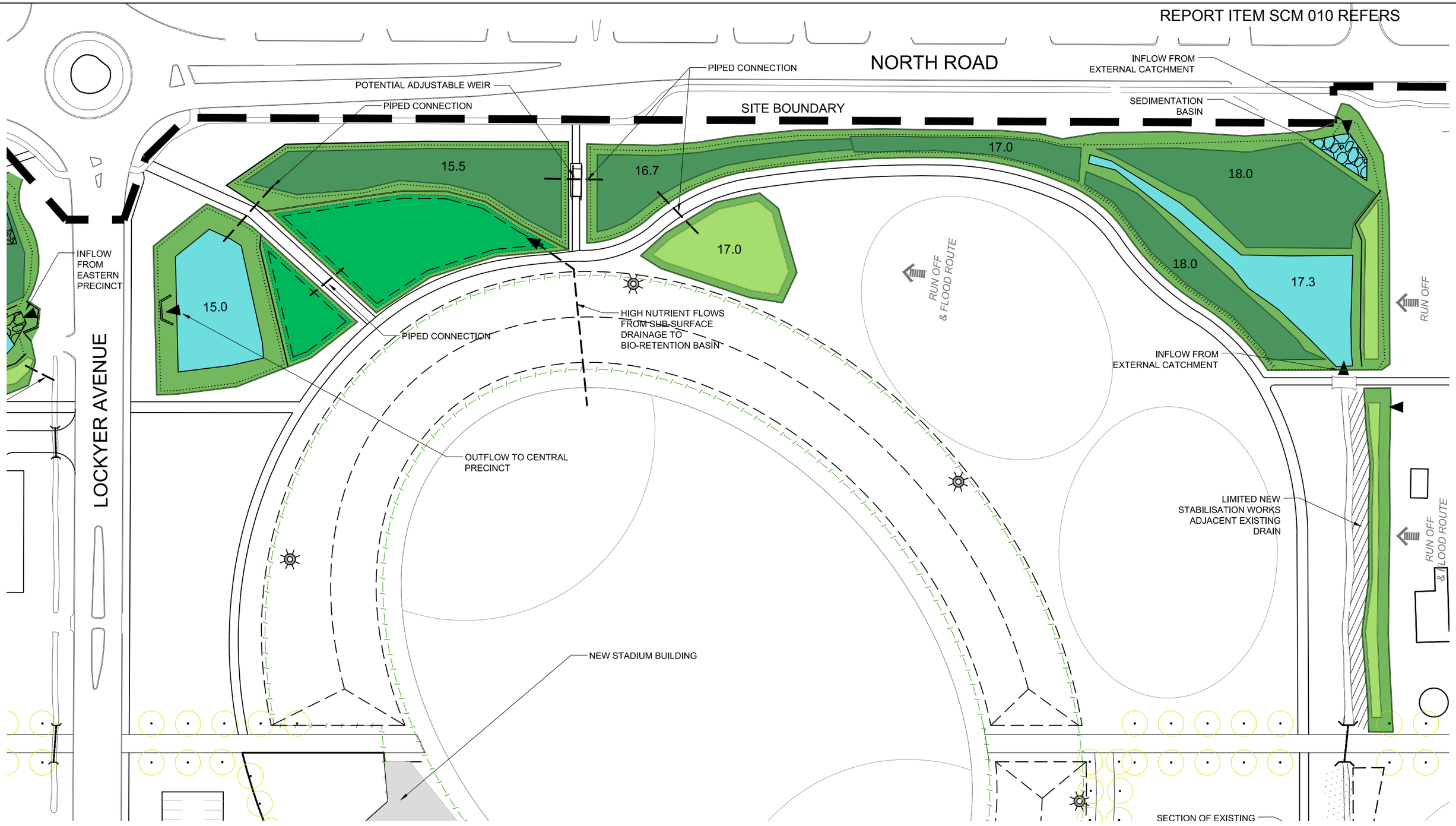
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01
06

WSUD GENERAL ARRANGEMENT - EASTERN PRECINCT

SCALE 1:1000

LEGEND

- DEEP ZONE REFER DETAIL 01 | 08
- VEGETATED SWALE (CARPARK | ROAD RUN-OFF) REFER DETAIL 01 | 09
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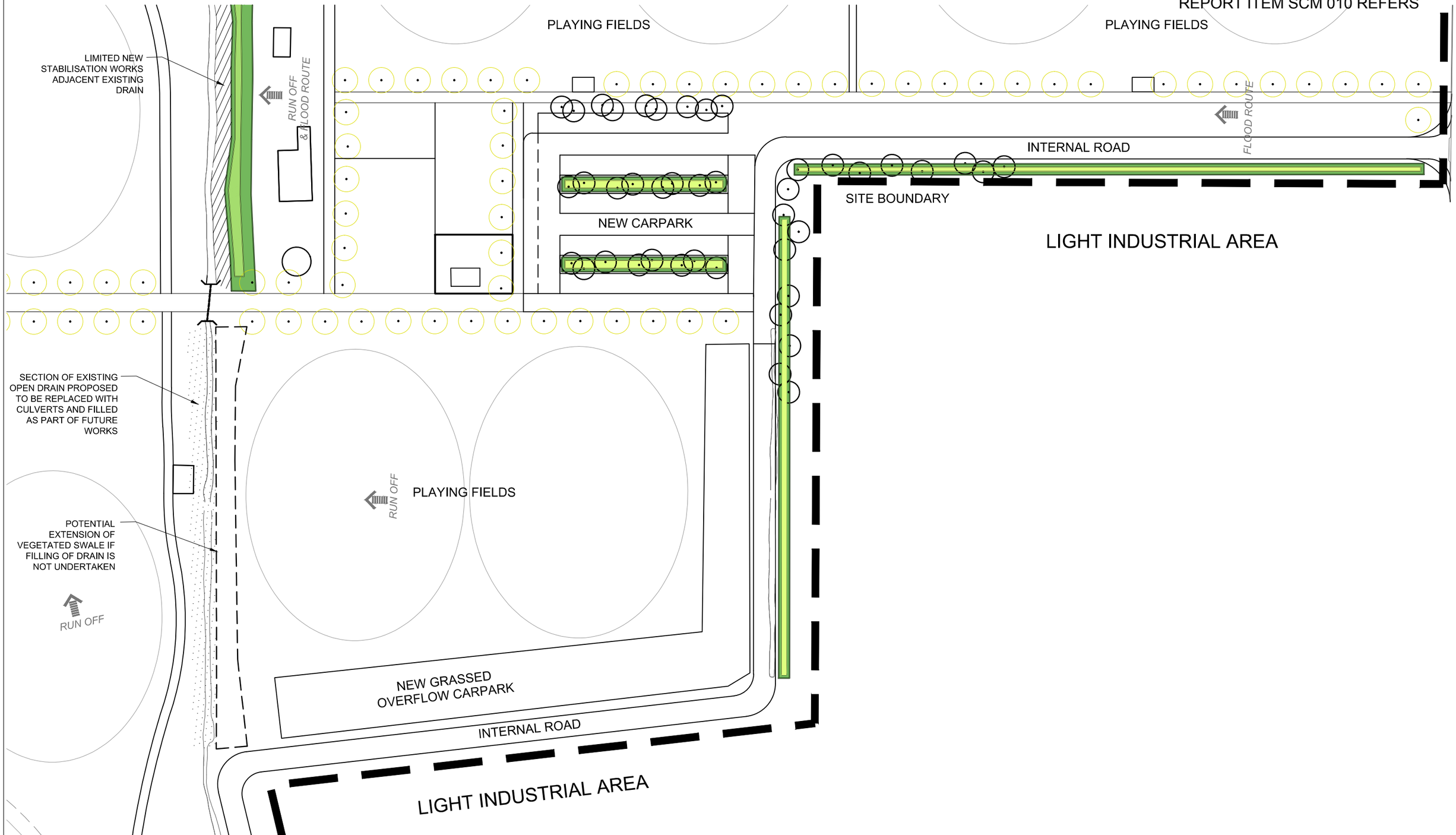
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01
07

WSUD GENERAL ARRANGEMENT - EASTERN PRECINCT

SCALE 1:1000

LEGEND

- DEEP ZONE REFER DETAIL 01 | 08
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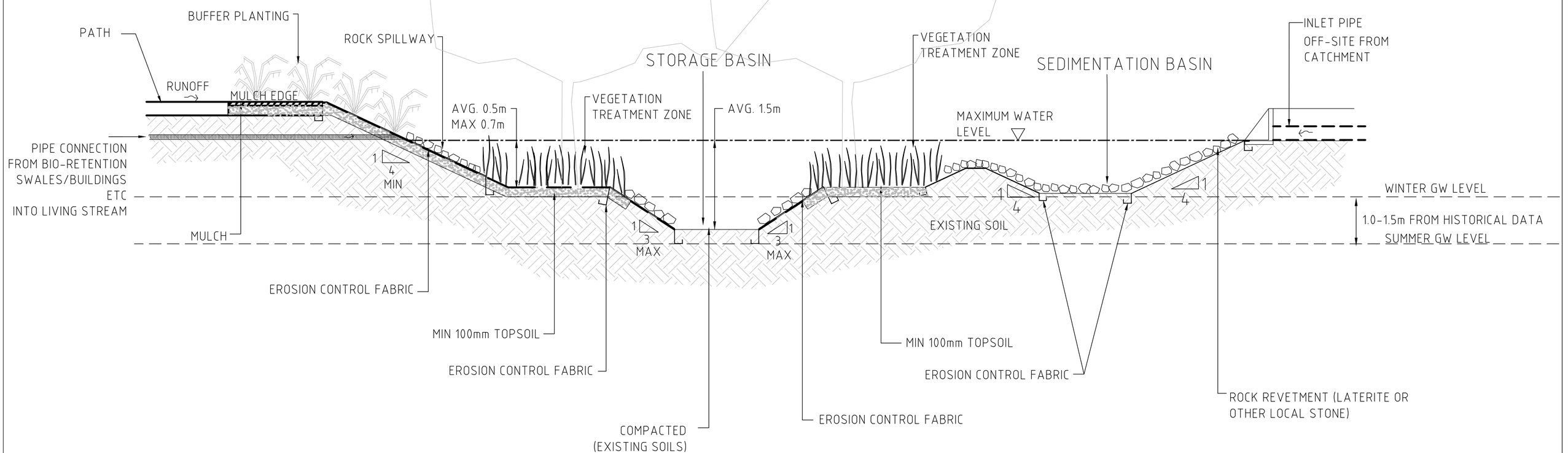
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01
08

LIVING STREAM TYPICAL SECTION

SCALE 1:40

Revision	Description	DRAWN	Approved	DATE
0	DRAFT SCHEMATIC DESIGN	GK		19/09/14

209

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SCALE	AS SHOWN	DRAWN	GK
SYR. REF.	1422	APPROVED	
SHEET	A3	APPROVED	

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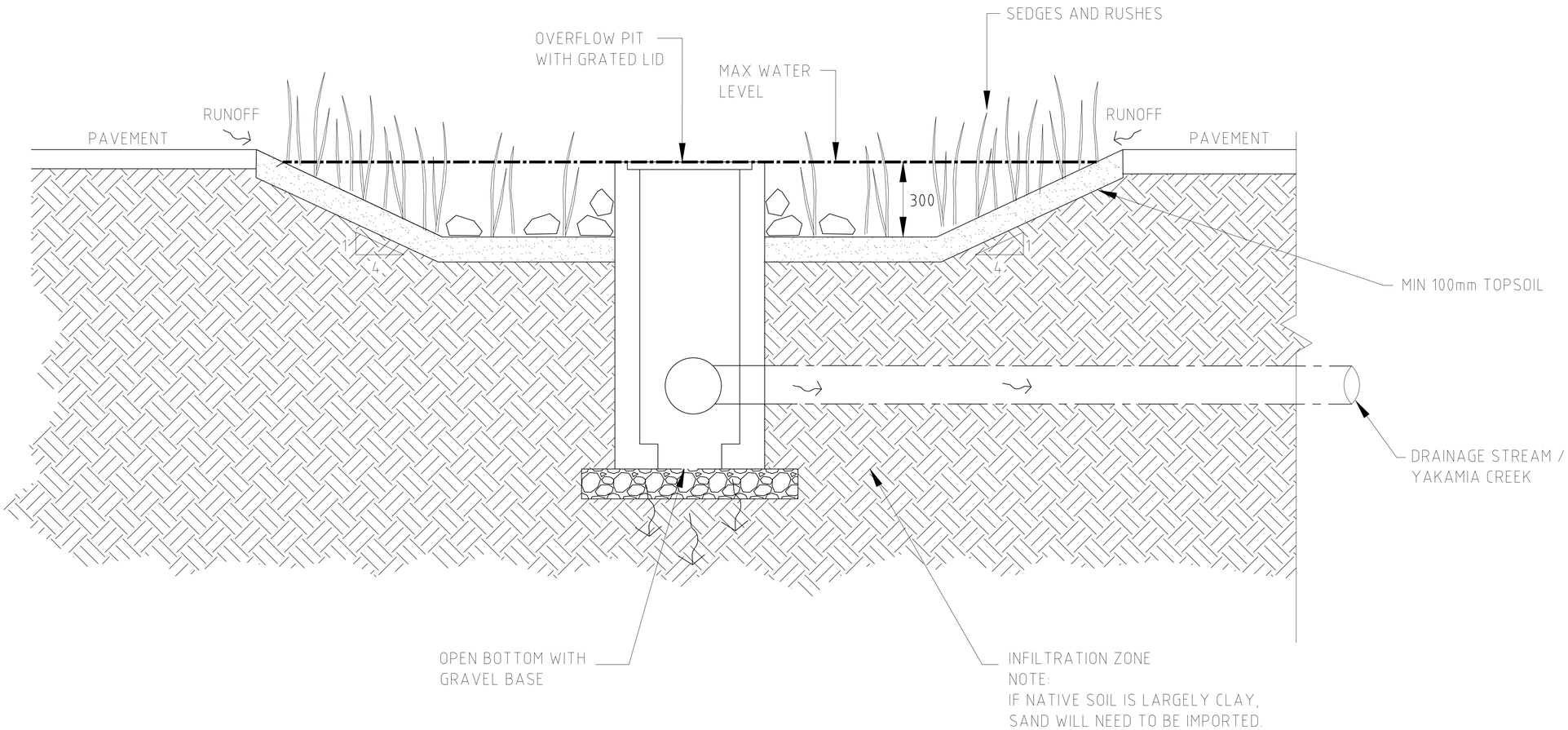
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WSUD - LIVING STREAM CROSS SECTION DETAILS

PHASE :	DRAWING NO:	REV.
SD	1422-08	0

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01
09

VEGETATED SWALE (CARPARK & ROADS) TYPICAL DETAIL

SCALE 1:20

Revision	Description	DRAWN	Approved	DATE
0	DRAFT SCHEMATIC DESIGN	GK		19/09/14

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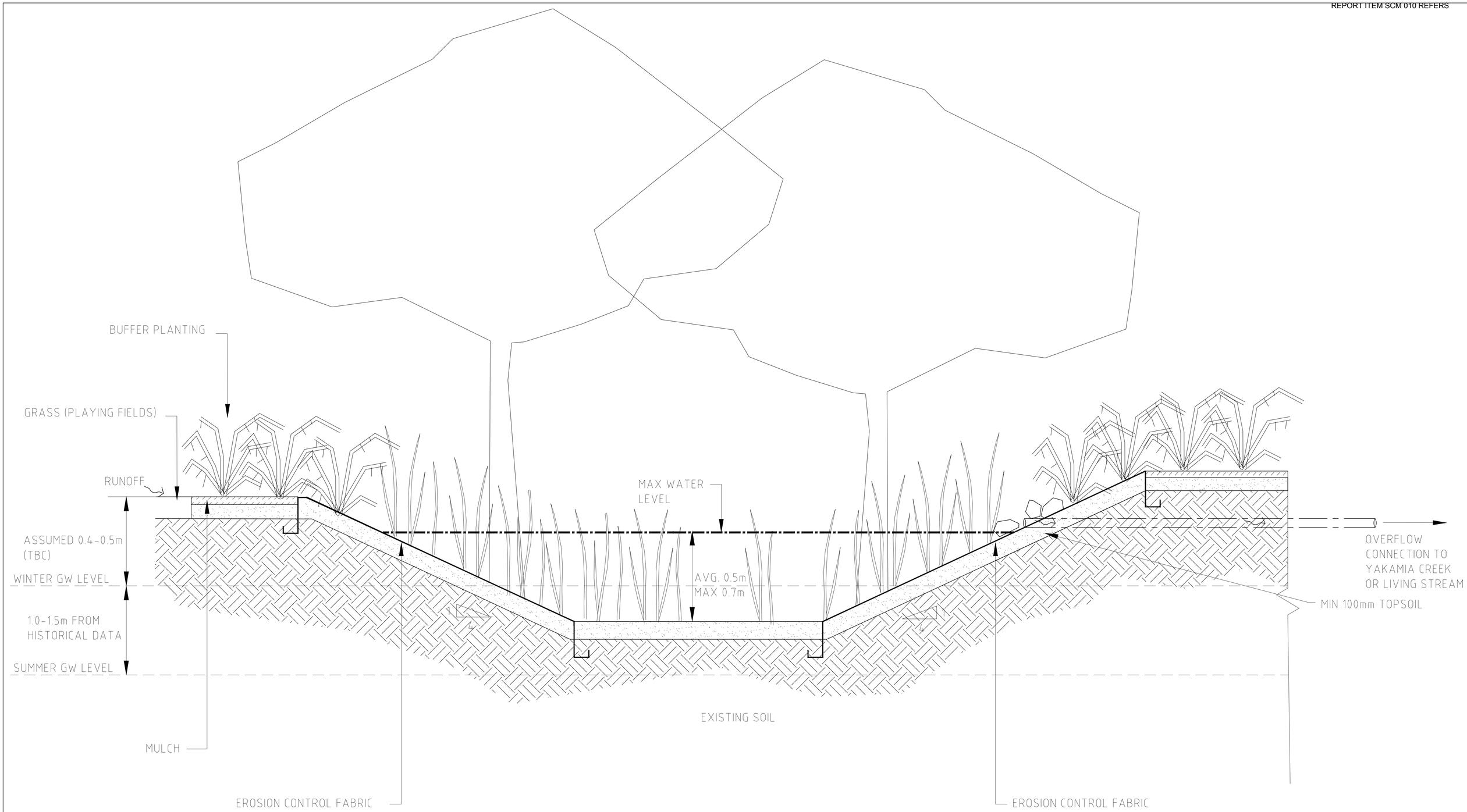
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WSUD - VEGETATED SWALE DETAILS (CARPARK & ROADS)

SHEET:	DRAWING NO:	REV.
SD	1422-09	0

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01
10

VEGETATED SWALE (PLAYING FIELD RUNOFF) TYPICAL DETAILS

SCALE 1:20

Revision	Description	DRAWN	Approved	DATE
0	DRAFT SCHEMATIC DESIGN	GK		19/09/14

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SYR. REF.	1422	APPROVED	
SHEET	A1	APPROVED	

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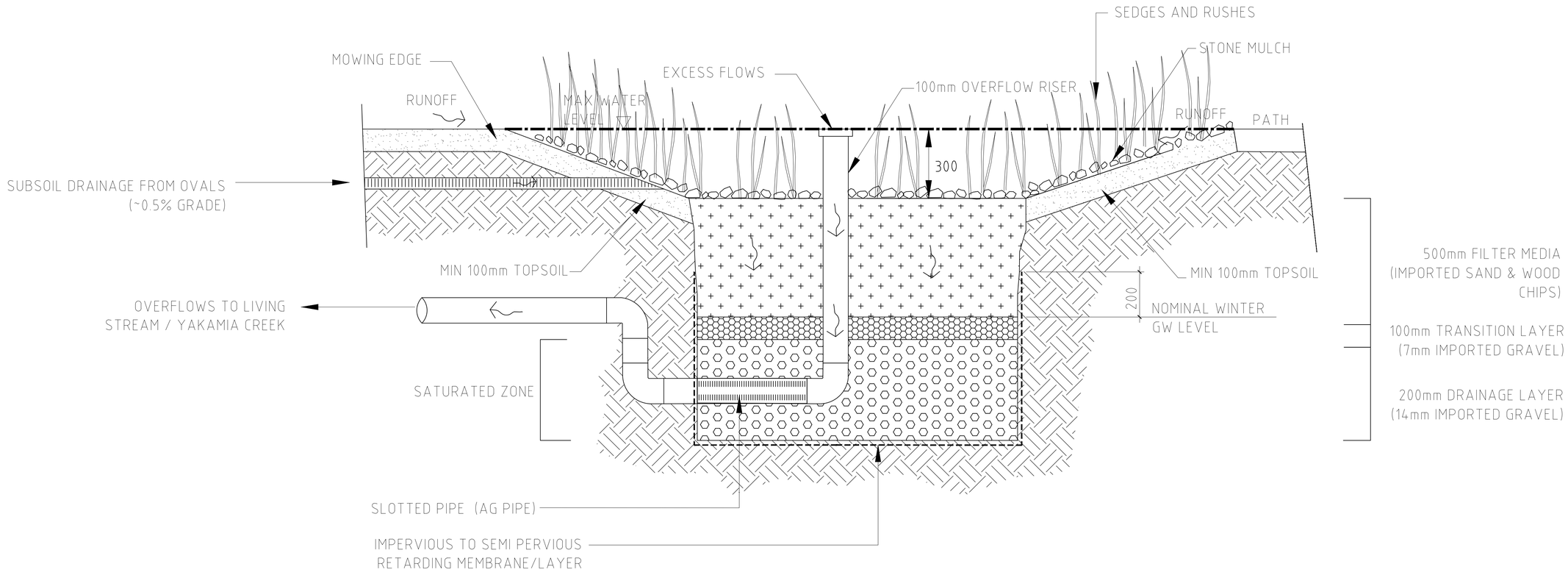
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WSUD - VEGETATED SWALE DETAILS (PLAYING FIELD RUNOFF)

SHEET:	DRAWING NO:	REV.
A1	1422-10	0

APPROVED.



01
11

VEGETATED BIO-RETENTION SWALE TYPICAL DETAIL

SCALE 1:20

Revision	Description	DRAWN	Approved	DATE
0	DRAFT SCHEMATIC DESIGN	GK		19/09/14

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WSUD - BIORETENTION SWALE DETAILS (RUNOFF FROM SUBSOIL DRAINAGE)

SHEET:	DRAWING NO:	REV.
A1	1422-11	0

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6

Centennial Park

Cricket/ Soccer Clubrooms (Western Precinct)

GresleyAbas



Centennial Park - Western Precinct

Cricket/ Soccer Clubrooms - Schematic Design Report



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Appendix 1 - Sub Consultant Reports
Appendix 2 - Stakeholder Presentation Minutes

Record of Issue

Issue	Status	Date	Revision
Issue to CLIENT	SD	22/09/2014	0
Issue for CLIENT REVIEW	DRAFT	08/09/2014	C
Issue for PRICING	DRAFT	28/08/2014	B
Issue to PROJECT TEAM	DRAFT	14/14/2014	A

Cricket/ Soccer Clubrooms - Schematic Design Report



1.0 Introduction

1.1 Project Background

Within the Western Precinct of the Centennial Park sporting precinct the newly adopted masterplan prepared by Coffey Sport and Leisure identified the need for a new facility to service the existing cricket and relocated soccer operations. The new facility proposed by the masterplan was characterised as a double sided facility, centrally located between cricket and soccer's primary fields.

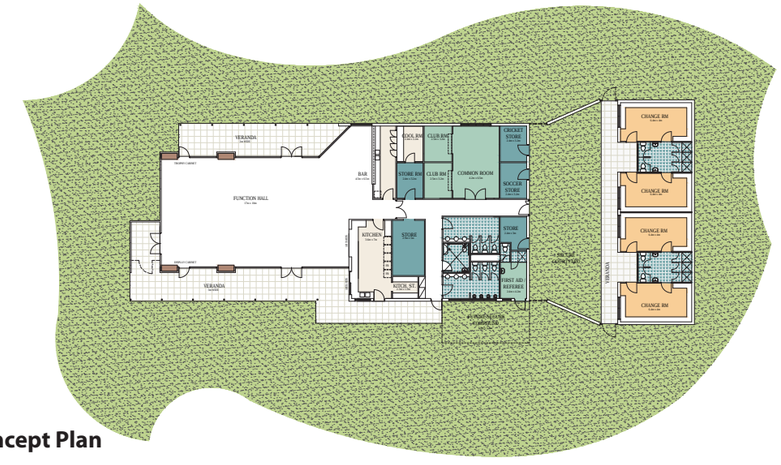
Our recently produced precinct development report has reconfigured the primary playing spaces of both cricket and soccer, but the location and function of the building as described in the report remains the same.

The design and accommodation requirements for this building were dictated by the previous masterplan report, which included a concept plan for the facility produced by H+H Architects. The masterplan costings included an estimate of $2.4M for a building of approximately 860sqm.

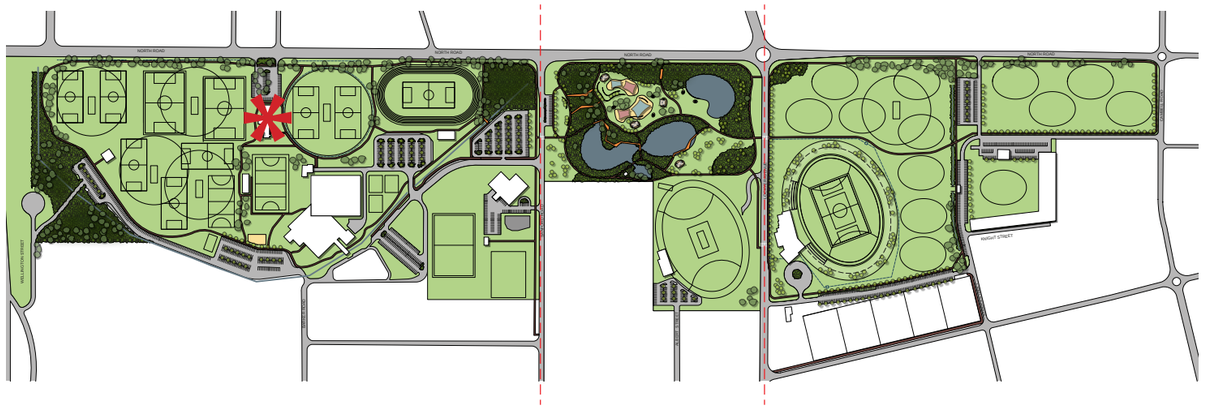
Our project team has subsequently engaged with representatives from the future users of the facility to refine the building requirements and have produced an updated brief to reflect these needs.

This new facility will provide:

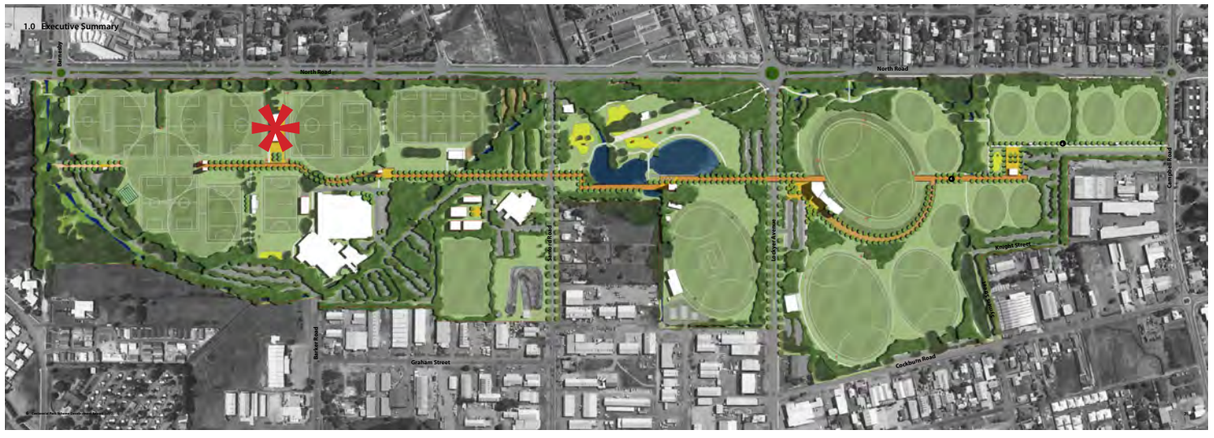
- A facility that meets the requirements of cricket operations that currently occupy the western precinct
- A facility that meets the requirements of soccer operations within the precinct
- A multi-function changeroom to service both cricket and soccer users
- Covered viewing and spectating opportunity to both sides of the facility
- A multi-purpose hall that will cater to both sports uses and other community occupation
- Public toilet facilities for users of the adjacent precinct



H+H Concept Plan



Opus Masterplan 2012



Precinct Development July 2013



1.2 Vision & Philosophy

Our key ambition for this new facility is that it first and foremost complements, enhances and reinforces our strategic vision for the entire precinct. Key outcomes for the built form of the precinct identified during precinct development dictate that new buildings:

- Provide regional class, contemporary sports and community facilities
- Be a supportive structure to the landscape, not distinct from it
- Be responsive to the overall masterplan vision, particularly pedestrian and access needs, wayfinding and branding
- Contribute to a new site character, acknowledge existing buildings but provide a distinct example for future development
- Designed for current use but with future demand in mind allowing for expansion
- Focus on shared use and flexible operation through adaptable layouts
- Minimise potential use conflict of shared facilities by providing safe and distinct areas of use for example, lockable office areas and storage for sports clubs
- Use materials and resilient finishes designed to minimise maintenance and on-going operational cost
- Use passive solar design and ESD principles to lower operational costs
- Design ESD systems to be sensitive to operational requirements, ease of use and passive systems to be of a high priority
- Actively manage storm water runoff

More specifically this new clubroom building will form the major built form focus for the whole of the Western Precinct as distinct from the existing ALAC and Hockey buildings. The importance of its location adjacent north road places importance on the physical presence of the building and seats it as a strong visual sign post for the future developed precinct.

Other key objectives include:

- functionality of design
- compatibility with the local environment
- ease of management
- durability and maintenance minimisation
- design innovation

1.3 Project Consultant Team

A Project Consultant Team (PCT) has been established comprises the following disciplines:

Principal Consultant (Architect):	**Gresley Abas Architects** **Philip Gresley - Project Director** **Ben Price - Senior Designer** **Alex Quin - Project Architect**
Specialist Sub-consultants	
Civil Engineer:	Travis Demeza - Wood & Grieve Engineers
Structural Engineer:	Gary Sollitt - Wood & Grieve Engineers
Mechanical Engineer:	Andrew Wakelam - Wood & Grieve Engineers
Electrical Engineer:	Rocco Pienarr - Wood & Grieve Engineers
Hydraulic Services:	Geoff Moorcroft - Wood & Grieve Engineers
Acoustics:	Imran Khan - Wood & Grieve Engineers
ESD:	Phil Cook - Wood & Grieve Engineers
Landscape Architect:	Damien Pericles - Realm
BCA/ DDA compliance/ Certification:	Paul Da Costa - Code Group

1.4 Stakeholder Consultation Process

In the preparation of this document Gresley Abas has undertaken the following:

Scheme Development Phase

- Brief development through Liason with the City of Albany by CCS Strategic
- Site/ facilities Inspection and client meeting on 04/06/14: Philip Gresley and Ben Price
- Scheme Development Workshop 1 on 11/06/14
- Initial User group briefing session on 3/07/14 with representatives from:
    - Albany Cricket Association/ Junior Cricket Association
    - Southern Districts Junior Football
    - Royals FC
    - Sharks FC
    - Great Southern Soccer Association
    - Department of Sport and Recreation

Schematic Design Phase

- Presentation of draft schematic design development to Client and User groups on 05/09/14.
  Draft architectural designs presented by Philip Gresley and Mark Casserly to the following stakeholders:

Samantha Stevens	City of Albany	Joint Project Manager
Ryan Taylor	City of Albany	Joint Project Manager
Terry Eaton Albany	Cricket Association	
Brent Sheridan	Department of Sport and Recreation	
Mike Moriarty	Albany Junior Cricket Association	
Chris Walker	Albany Senior Soccer Association	
Shelley McDonald	Football West	
Grace Knowlson	Albany Junior Soccer Association	
Jamie Knowlson	Albany Junior Soccer Association	

Minutes of this meeting including user group responses can be found in **appendix 2** of this report



2.0 Project Summary

2.1 Architectural Design

Key strategies for the Western Precinct Clubrooms have been identified in the 2012 masterplan report as:

- Collocation of cricket and soccer to the Western Precinct to take advantage of seasonal operation
- Provide additional community and event space within the precinct that allow the community to meet, interact and conduct programs as considered critical to the long term development and stability of sporting and community groups.

The major briefed objective of this consultancy is to provide full service delivery of facilities to meet these key concept development strategies .The 2012 masterplan report and its accompanying concept floorplan form the basis for our initial brief for a facility to meet these objectives.

Further detailed briefing for a facility that meets these objectives has been developed through liason with community and user groups in conjunction with the City of Albany.

The buildings will need to provide the necessary infrastructure, function and amenity to meet these broad objectives and each structure will need to demonstrate a response to four distinct requirements:

1. **Sports training and competition**
Centennial Park is to be developed first and foremost as a demonstration of excellence in regional standard sporting accommodation. It will provide first class playing facilities with highly attractive and functional off-field amenities for players, officials, administrators, supporters, spectators and the media.

2. Festivals, events and celebrations
Centennial Park is to be developed as a highly versatile and attractive venue for both large and small scale community events. Without compromising the functionality of the sporting facilities, events infrastructure will be designed to allow ready adaptation of the site for exhibitions such as the Albany Agricultural Show, for product displays and launches, for concerts and other entertainment events and for community and civic celebrations.

3. Community development through organised clubs and groups
Inherent in strong communities are strong community organisations. These groups; be they sporting, leisure, creative, cultural, historical, service or intellectually focused; need places to meet, to plan and develop the activity of their interest and to deliver it to the community. The available infrastructure on site will be designed with flexibility in mind and to be available to all interest groups.

4. Community life in a parkland setting
A key to the beauty of Centennial Park is the expanse of green space and parkland it offers. Through careful and innovative WSUD and the integration of Yakamia Creek this parkland will be enhanced by permanent and ephemeral water bodies. Opportunities to enjoy the parkland and the landscaped and beautified elements will be enhanced through the installation of a series of facility nodes. These structures comprising public toilets, drinking fountains, seating and shelters, exersites and playground areas will be critical elements framing the central spine of the park and in knitting the various precincts together. Indeed the branding of the site will be equally reflected in these infrastructure elements as it is in the major buildings on site.

The key architectural design strategies for the facility developed during scheme development are to:

- Provide elevated and tiered viewing to the eastern fields, taking advantage of the natural grade separation
- Provide covered viewing to the fields to the west of the pavilion
- Position the areas that would benefit from solar access to the north of the building, primarily: outdoor kiosk and gathering spaces
- Minimise vehicular access to the building, primary focus on pedestrian access from the spine to the south and from pedestrian links along North Road
- Provide universal access opportunity to the facility from both east and west playing fields
- Acknowledge the key vistas of the building, from both North Road and the pedestrian access from the south by using iconic architectural form
- Provide an equity of access and viewing to both sides (east and west) of the pavilion for spectators, players, umpires and other user groups
- Provide ease of access to storage areas for all playing fields in the precinct
- Take advantage of existing vegetation retention where possible, particularly in gathering areas to north road, also to aid in sense of separation from traffic

2.2 Landscape

The proposed facility is place within existing parkland to North Road. The site is characterised by a number of existing Blue Gum trees forming an attractive copse of vegetation adjacent the road edge and extending into the building site. The building is located to the top of an existing grass berm of approximately 2m which separates the site from the eastern playing field. The eastern playing field will be the premier sporting site for both cricket (summer) and soccer (winter), as such the main aspect of the building is to be viewing east. The grade separation will require careful integration of universal access to allow and equity of use to the lower oval.

Close oval proximity on both the east and western sides will be important to the success of the double sided facility. Albany Cricket has expressed that provision of covered viewing and visual proximity to both sides as critical to the usefulness of the building.

Efforts will be made in the development of the new facility to maximise shade and shelter provision to users of the building, particularly spectators, score keepers and coaches. Where possible, existing trees will be maintained to assist providing an attractive landscape character. The existing copse of trees to North Road provides us an opportunity to focus break out space to the north of the proposed building. This, with availability of solar access and shelter from the prevailing winter south easterlies will allow the development of an attractive outdoor space.

The existing path network to North Road will provide pedestrian access to the facility to the north, but the major pedestrian and service access will ultimately be from the south, from the newly developed pedestrian spine of the precinct. This approach to the building will require clear definition and careful negotiation of existing Hockey infrastructure. For more detailed information please see the precinct wide landscape report.

2.3 Sub Consultant Services

Detailed reports for the following consultant services are included in **Appendix 1** of this document

Mechanical
Electrical
Structural
Civil
Hydraulics
Sustainability
Acoustics
BCA Compliance and Access



3.0 Site

3.1 Title, Site and Zoning
Within the 68 hectare site the building will likely straddle 2 lots identified as crown land (vested with the city), 1235 and 1264.

3.2 Survey Details
A survey has been undertaken on the site and has been made available to Gresley Abas Architects. This has formed the basis of our Site Analysis and is included within our consolidated briefing.

3.3 Geotechnical Report
A geotechnical survey and report has been supplied to the Project Consultant Group and has been reviewed by the Structural and Civil Engineer. The structural and civil design will be based on the information contained within the project design.

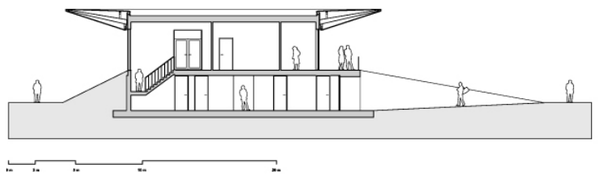


4.0 Architectural Precedents and Inspiration

4.1 Precedent Research

Taken from research into contemporary sports architecture of a similar scale, see below a number of examples that have inspired elements of the building concept design. Their contribution to our design thinking is summarised below.

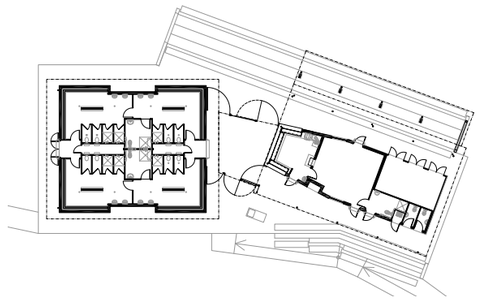




Sports Pavilion, Netherlands | Moederscheim Moonen Architects

Clever use of turf berm to create strong form, functional relationships and optimising space and viewing opportunities on more than one side. Clear and unified architectural material response creates aniconic and immediately recognisable building.





Capel Sports Pavilion | Gresley Abas Architects

Separation of function and change facilities, creation of usable external spaces between built pods. Flexible and configurable change spaces enable maximum usability for the wide variety of sports clubs that use the facility.

4.2 Local Inspiration

Our inspirational touchstone for this facility is the formal idea of the cricket fence.
It was expressed early on in and in previous consultation with the clubs carried out by The City, that the cricket clubs desired to have the typical county cricket, white picket fence around their main playing field. Being a joint use and multi-purpose facility this would impact on the ability for soccer to share their primary field and eastern viewing aspect of the pavilion.

Our concept lifts the idea of the fence from the field and incorporates it into the fascia of the verandahs. This provides shading and shelter to spectators along all sides and allows the equity of field use to both sporting codes whilst producing an iconic and singular presence for the building.

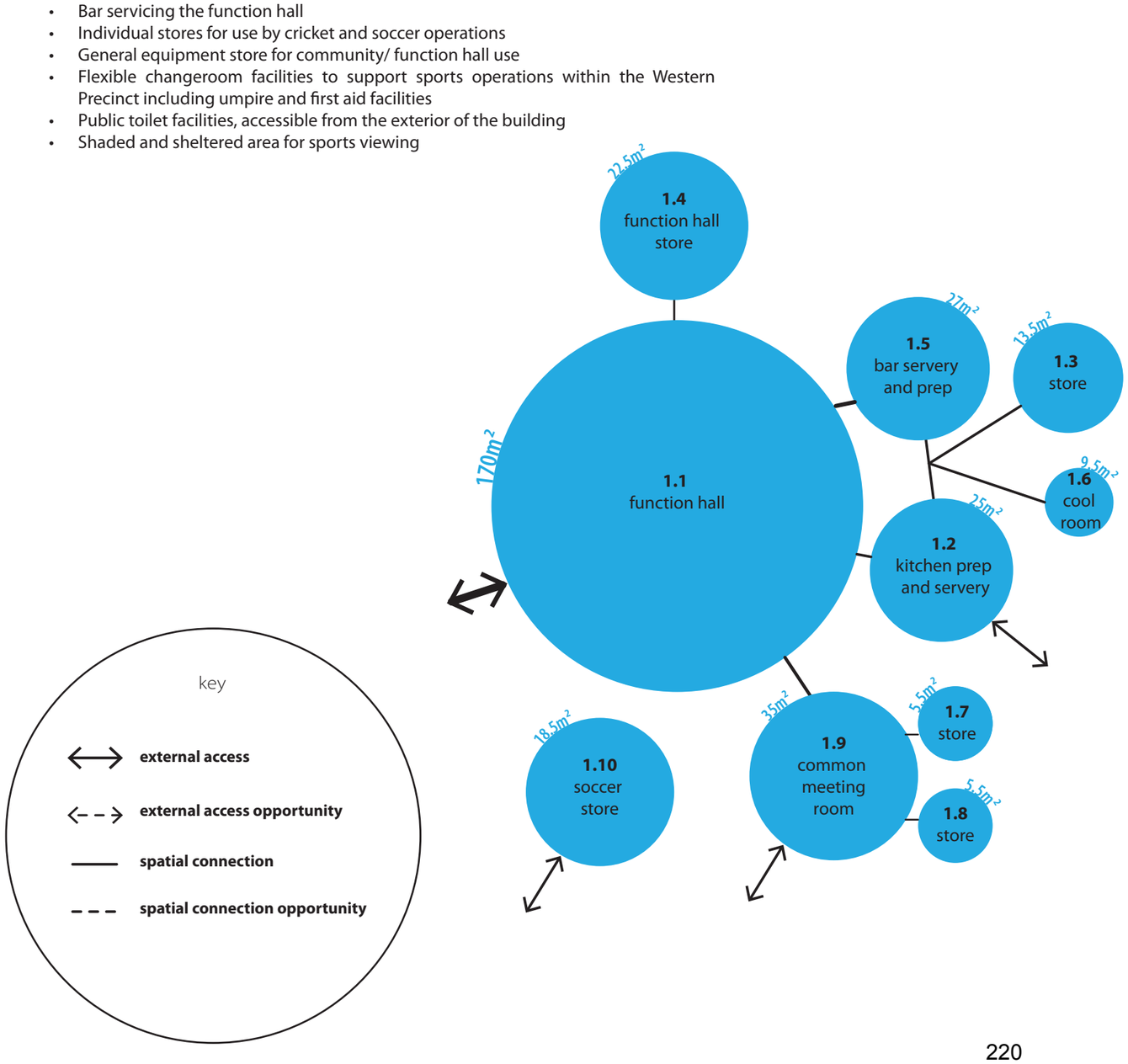


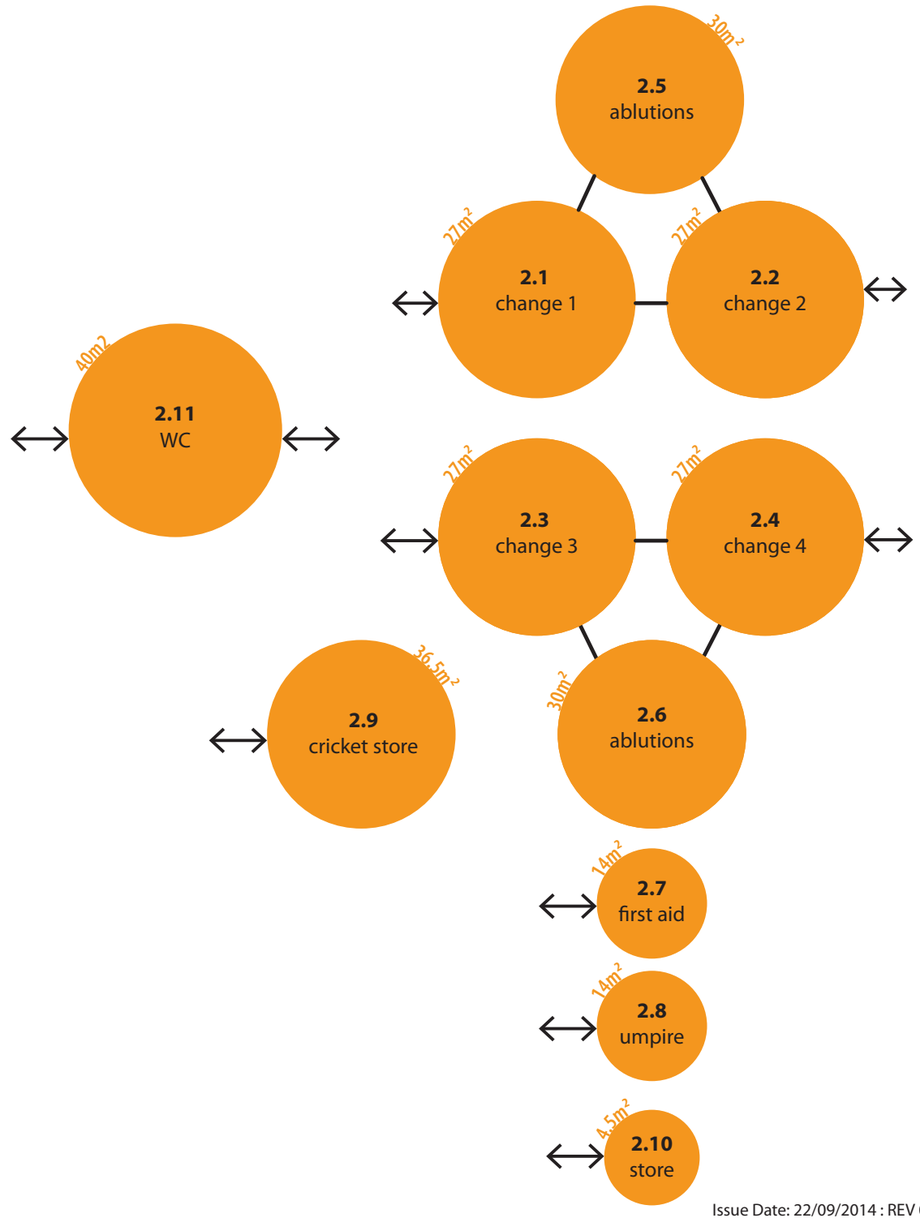


5.0 Building Functions and Spatial Relationships

The key functional elements of the Clubrooms are as follows:

- Function hall for community and sports club use
- Community use meeting space including secure areas for use by cricket and soccer administration accessible from within and outside the facility.
- Kitchen and servery opening out into the main function hall and kiosk facilities servicing the undercover area
- Bar servicing the function hall
- Individual stores for use by cricket and soccer operations
- General equipment store for community/ function hall use
- Flexible changeroom facilities to support sports operations within the Western Precinct including umpire and first aid facilities
- Public toilet facilities, accessible from the exterior of the building
- Shaded and sheltered area for sports viewing







6.0 Schedule of Accommodation

The accommodation schedule as briefed has been developed through the consolidated briefing process.
Areas highlighted in yellow indicate rooms that have either been added to or removed from the original OPUS scheme design.

Centennial Park - Gresley Abas Area Schedule **22/09/2014**

ROOM #	ROOM NAME	DESCRIPTION	OPUS Scheme Areas	Concept design 22/09/14	Difference
	Western Precinct - Cricket/ Soccer Clubrooms			**UFA**	
1.0	**Multipurpose Hall**				
1.1	Function hall		170	170	0
1.2	Kitchen prep and servery		25	25	0
1.3	Kitchen store		4.4	13.5	9.1
1.4	function hall store		14.5	22.5	8
1.5	Bar prep and servery		13.5	27	13.5
1.6	Bar cool room		7.7	9.5	1.8
1.7	Club storage 1		8	5.5	-2.5
1.8	Club storage 2		8	5.5	-2.5
1.9	Common meeting room	Internal and external access, secure storage areas, tea prep and AV	27.3	36	8.7
1.10	Soccer store (external)		7.7	18.5	10.8
	Bar service area	Service area distinct but contained within main hall space	12.5	0	-12.5
	Store room		7.7	0	-7.7
	External Store		7.7	0	-7.7
2.0	**Change Room Block**				
2.1	Changeroom 1	4 changerooms configerable to 2 larger spaces	25.6	27	1.4
2.2	Changeroom 2		25.6	27	1.4
2.3	Changeroom 3		25.6	27	1.4
2.4	Changeroom 4		25.6	27	1.4
2.5	Change ablutions 1		13	30	17
2.6	Change ablutions 2		13	30	17
2.7	First aid room		10	14	4
2.8	Umpire		0	14	14
2.9	Cricket store (external)		7.7	36.5	28.8
2.10	Change store		0	4.5	4.5
2.11	M/F/UA toilets	to be accessible by public	38.5	30	-8.5
		TOTAL INDICATIVE UFA	498.6	600	101.4
		circulation +15%	74.8	0.0	-74.8
		TOTAL INDICATIVE FECA	**573.4**	**600.0**	**26.6**

	External Areas				
	Covered Verandah		153	467	314
		TOTAL EXTERNAL AREA		**467.0**	



7.0 Project Program

A complete draft program has been formulated, please see below for summary of key delivery dates:

Schematic Design	05.09.14
SD cost estimate	24.10.13
SD Approval	26.09.14
Design Development	28.11.14
DD cost estimate	12.12.14
DD Approval	9.01.15
Tender Docs	17.03.15
Tender Award	26.06.15
Construction	2.06.16



8.0 Architectural Drawings

Please see over for the following architectural drawings

SD09 SITE PLAN
SD010 FLOOR PLAN
SD011 ELEVATIONS
SD012 SECTIONS
SD013 SCHEMATIC PERSPECTIVES



Approach Perspective



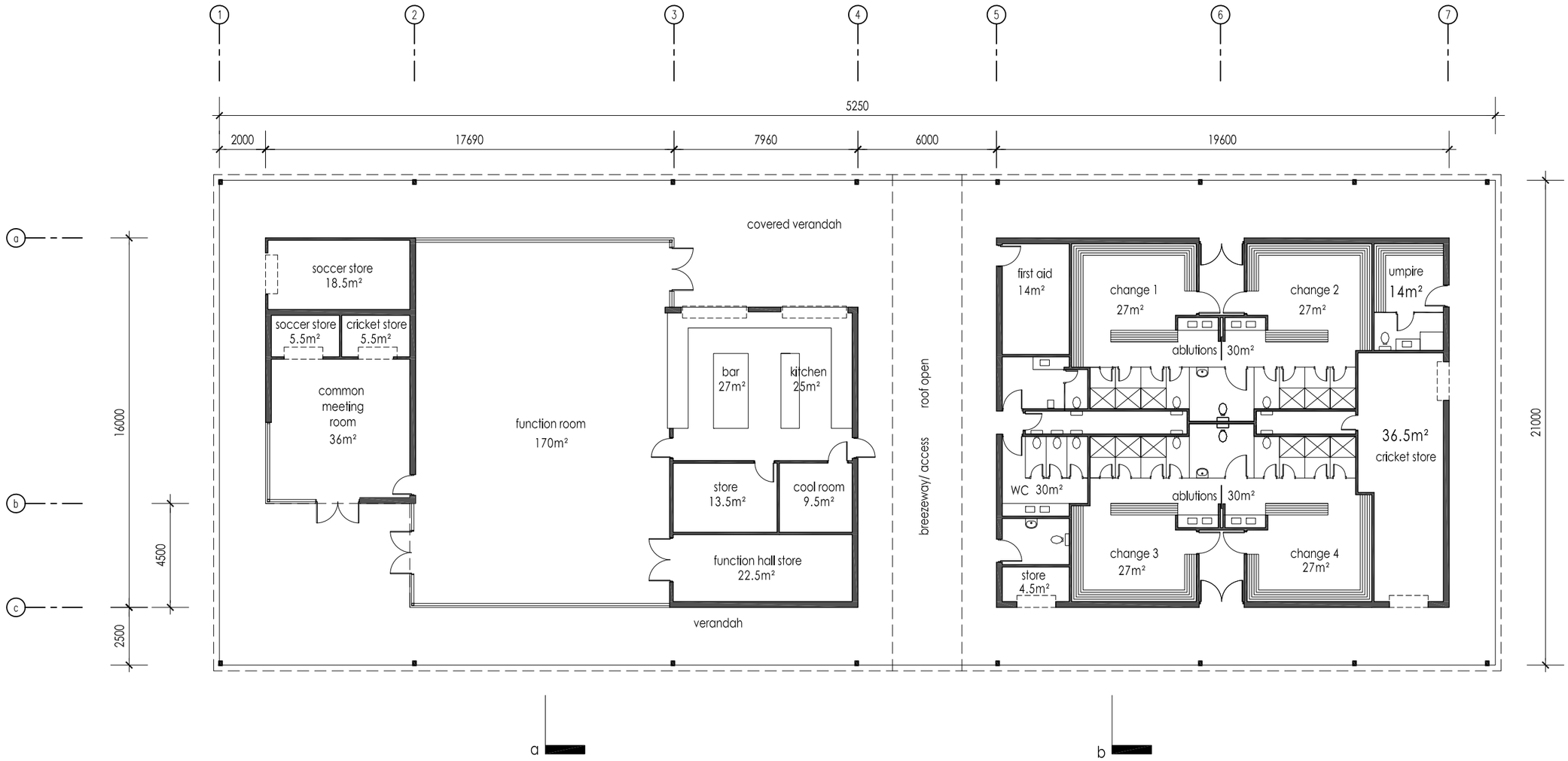
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architecture environment design

Centennial Park - Western Precinct
Cricket/ Soccer Pavilion

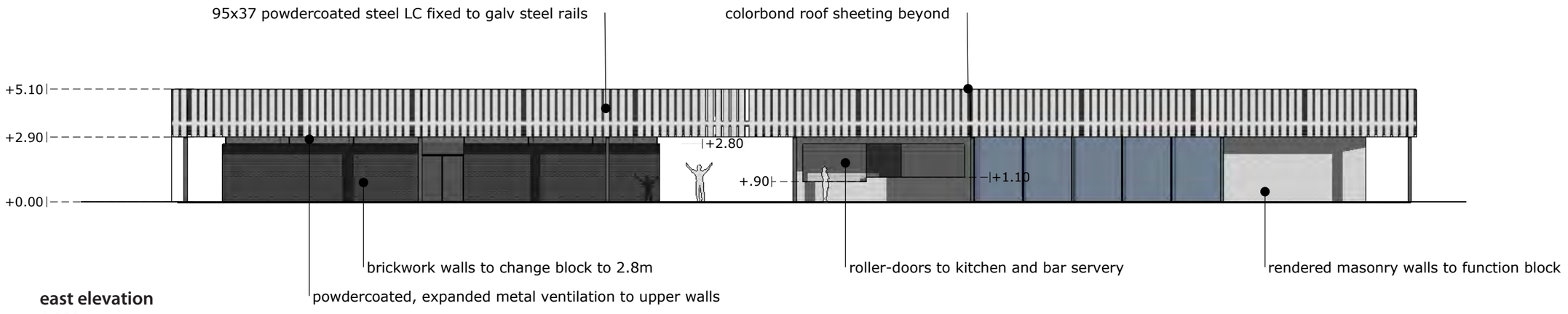
Site Plan
Schematic Design

N

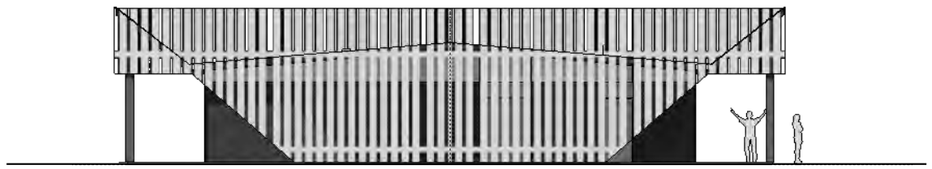
job number: **1411**
issue date: **22/09/14**
revision: **D**
drawing number: **SD09**


1
2
3
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5
6
7
5250
2000
17690
7960
6000
19600
a
b
c
16000
4500
2500
21000
soccer store
18.5m²
soccer store
5.5m²
cricket store
5.5m²
common
meeting
room
36m²
function room
170m²
covered verandah
bar
27m²
kitchen
25m²
store
13.5m²
cool room
9.5m²
function hall store
22.5m²
verandah
breezeway/ access
roof open
first aid
14m²
change 1
27m²
change 2
27m²
umpire
14m²
ablutions
30m²
36.5m²
cricket store
WC
30m²
ablutions
30m²
change 3
27m²
change 4
27m²
store
4.5m²
a
b

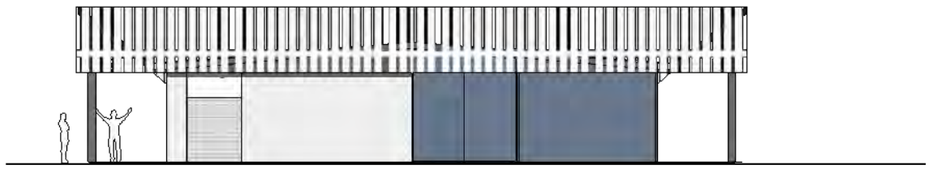
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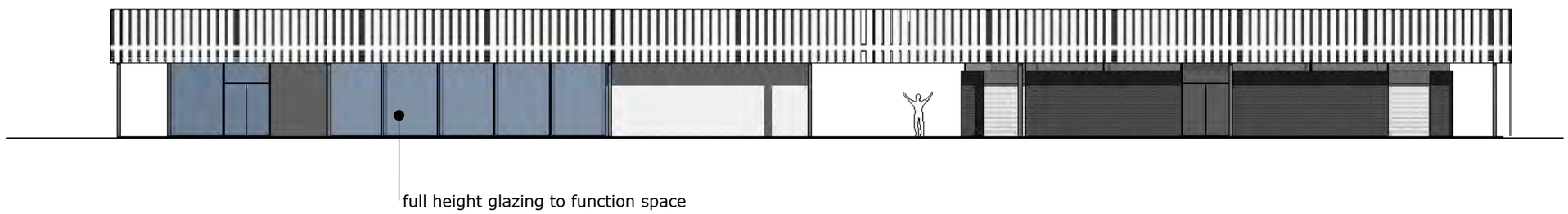
east elevation
1:200



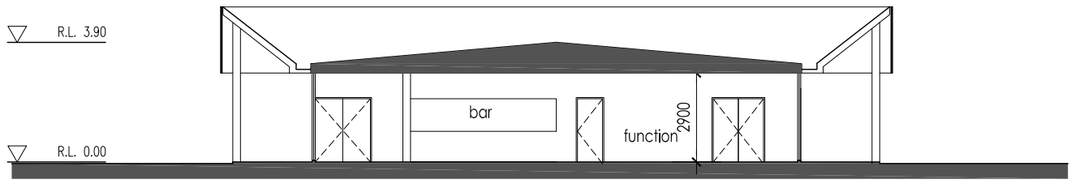
south elevation
1:200



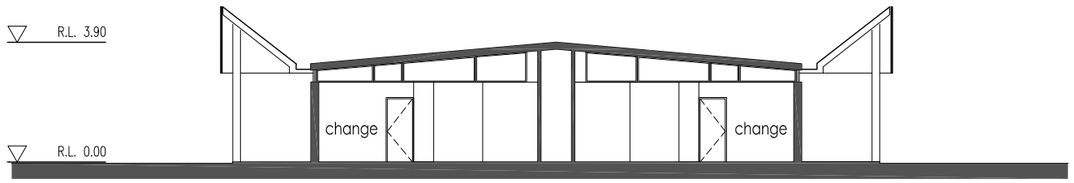
north elevation
1:200



east elevation
1:200



section a
1:200



section b
1:200



playing surface, east



approach, south-east



approach, northwest



Appendix 1 - Sub Consultant Reports

Please see over for a detailed report from the following sub consultant disciplines

Mechanical
Electrical
Structural
Civil
Hydraulics
Sustainability
Acoustics
BCA Compliance and Access



To us, it's more than just work.

Centennial Park Sporting Precinct, Albany

Schematic Design Report

Western Precinct Soccer / Cricket Pavilion

Mechanical, Electrical, Structural, Civil, Hydraulics, Sustainability, and Acoustic Services

Prepared for:

Client Name:
Gresley Abas

Date:
18 September 2014x

Prepared by:

Andrew Wakelam, Rocco Pienaar, Gary Sollitt, Travis Demeza, Jeff Moorcroft, Phillip Cook & Imran Khan

Project No. 26689-PER-MESCHGN
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WOOD & GRIEVE ENGINEERS

Revision

REVISION	DATE	COMMENT	APPROVED BY
0	26/08/2014	DRAFT FOR COMMENT	**TJD**
1	18/09/2014	ISSUED FOR CLIENT COMMENT	**TJD**

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6.5	Unknowns requiring information	2
6.6	Estimated Costings	2
7.	HYDRAULIC SERVICES	1
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9.	ACOUSTIC SERVICES	1
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9.2	Design Criteria	1
9.3	Existing Conditions	5
9.4	Proposed Strategies	5
9.5	Unknowns requiring information	5
9.6	Estimated Costings	5

1. Introduction

1.1 General

This Schematic Design Report for the Appointed Services has been prepared at the request of Gresley Abas for the development of the proposed Soccer / Cricket Pavilion within the Western Precinct of the Centennial Park Sporting Precinct (CPSP) project for the City of Albany.

The purpose of this report is to inform the Client and Architect of the general intention of the engaged services as proposed by Wood & Grieve Engineers. Items highlighted in ***bold italics*** represent specific queries and/or project risks that we wish to draw your attention to.

This document serves as the benchmark which our services must achieve. We request you read this carefully so that you have a clear understanding of the scope of our work.

We would welcome any comments you may have on the information provided in this brief.

It is intended that this Schematic Design Report be updated and re-issued during the documentation phase, following receipt of comments from the Client and Architect.

This Schematic Design Report has been prepared based on the following information:

- Architectural drawings, received to date.
- Project meeting with the Architect and design team.
- Various site investigations (by Civil and Electrical teams at time of writing).
- Dial Before You Dig Information.
- Douglas Partners Geotechnical Report, dated July 2014.
- Whelans Feature Survey, dated 07/07/2014.

Please note we will be proceeding with the documentation of the appointed services works on the basis of this report.

1.2 Safety in Design

Wood and Grieve Engineers operates a Safety in Design (SID) procedure based on “Code of Practice - Safe Design of Buildings & Structures 2008” published by the Commission for Occupational Safety & Health, Western Australia.

Compliance with this Code of Practice will ensure that all designs will be safe to install, operate, maintain and dismantle by appropriately experienced contractors.

Any hazards that cannot be eliminated by design will be identified and the appropriate work practices, protection and work methods required should be formulated by the contractor. Individual discipline specific hazard identification reports will be forthcoming.

Western Precinct Soccer / Cricket Pavilion

1.3 Programme

Review of the current D.W Kolagow & Associates programme (revision 4) identifies the following key milestones pertinent to the Western Precinct Soccer / Cricket Pavilion:

- Schematic Design Deliverable to Client 19 September 2014
- Design Development Deliverable to Client 19 December 2014
- Finalise Contract & Tender Documentation 31 March 2015

1.4 Checking Procedures

This project falls into category A as determined by Wood & Grieve Engineers Quality Manual, accordingly all drawings and specifications will be reviewed by the Project Engineer prior to issuing.

2. Site Location & Project Overview

The proposed site is located within the Western Precinct of the CPSP situated adjacent to North Road, Albany and forms an integral part of the over-arching CPSP Scheme Development.

The proposed building site identified within the Western Precinct for development is bounded to the east and west by existing cricket ovals, to the south by the existing Albany Leisure and Aquatic Centre (ALAC) and to the north by a copse of trees and an existing detention basin. Further to the north is the North Road road reserve, whilst access to the proposed site is achieved by an existing laterite gravel access track to the south.

The site is generally flat, however has approximately 2m of fall to the east to the existing main cricket oval. This existing batter will be subject to bulk earthworks prior to building construction to remediate oval drainage and suit the proposed sporting oval layout. The existing detention basin adjacent to the proposed site will be filled in. These works will form part of the precinct wide Civil contract.

The project comprises the development of a Sports Pavilion for patronage and public amenity. The proposed building will be connected via the proposed "central spine" and service vehicle access will be provided to the back of house. No specific designated vehicle parking will be provided as part of the building.

The building will accommodate the following main elements:

- Function room (approx. 170 m2);
- Meeting room (approx. 36 m2);
- Bar / Kitchen facilities (approx. 52 m2 combined);
- Cool room;
- Changing facilities (5 off, inclusive of Umpire changing facilities);
- Ablutions;
- Various stores (including designated soccer, and cricket);
- Verandah to all building edges.
- First aid room.

Western Precinct Soccer / Cricket Pavilion

3. Mechanical Services

3.1 Objectives

- Provide Mechanical Services to an appropriate standard comparable with other similar standard sports facilities installations.
- Mechanical Services for each area to fulfil its designated function.
- Minimise capital costs whilst still achieving acceptable running and maintenance costs and without reducing the standard of services.

3.2 Design Criteria

The air conditioning systems shall be designed to meet the following design criteria during normal operation with due allowance for solar loads, transmission loads, internal loads, occupancy level and infiltration loads.

All cooling and heating loads may incorporate a design/safety factor of 10%, which is to be added to the calculation of cooling and heating loads.

The design criteria proposed for the mechanical services will be based on the following parameters:

3.2.1 Design Temperatures

External Conditions (Albany)

Summer (maximum)	28.5°C DB	19.2°C WB
Winter (minimum)	6.1°C	

The above ambient temperatures represent the "comfort" design conditions for Albany.

Internal Conditions

Function Room		
Cooling	:	24°C Dry Bulb
Heating	:	21°C Dry Bulb
Control Tolerance	:	Plus or minus 1.5°C at the point of control for heating and cooling
Humidity Control	:	40 - 60% Relative Humidity anticipated by virtue of cooling coil performance but not controlled
Meeting Rooms		
Cooling	:	24°C Dry Bulb
Heating	:	21°C Dry Bulb
Control Tolerance	:	Plus or minus 1.5°C at the point of control for heating and cooling
Humidity Control	:	40 - 60% Relative Humidity anticipated by virtue of cooling coil performance but not controlled

3.2.2 Internal Loads

Function Room

Occupancy	1.5 m²/person
Lights	20 W/m²
Equipment	5 W/m²

Kitchen & Bar Servery

Occupancy	3.5 m²/person
Lights	15 W/m²
Equipment	50 W/m²

Common Meeting Room

Occupancy	1.5 m²/person
Lights	15 W/m²
Equipment	15 W/m²

First Aid Room

Occupancy	3 people
Lights	25 W/m²
Equipment	15 W/m²

Electrical Consultant to confirm above lighting and power figures

3.2.3 Outside Air Flow Rates

Function Room	7.5 l/s/person
Meeting Room & Offices	7.5 l/s/person
First Aid	15 l/s/person

Mechanical air flow rates indicated – alternatively natural ventilation openings may be provided through operable windows etc. in accordance with BCA requirements.

3.2.4 Exhaust Air Rates

All areas shall be provided with mechanical ventilation to achieve minimum exhaust ventilation flow rates in accordance with AS1668.2 – 1991; these rates include, but are not limited to the following:

Commercial Kitchen Hoods :	Compliant with AS 1668.2 Make-up air for commercial kitchen exhaust to be 90% of exhaust rate The kitchen exhaust systems shall be installed in accordance with AS 1668.2-1991.
Toilet Exhaust / Ablutions	The greater of 10 L/s per m^2 or 25 L/s per fixture

3.2.5 Acoustic Criteria

Function Room	45 – 50 dB (A)
First Aid	40 dB (A)
Toilets	50 - 55 dB (A)

3.2.6 Glazing and Building Fabric

Architect to advise Building Fabric.

The following information is required to enable WGE to carry out detailed heat load calculations and equipment selections:

- Floors Total U-Value
- Internal Walls Total U-Value
- External Walls Total U-Value

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- Glazing U-Value and Shading Coefficient
- Roof Total U-Value

3.2.7 Design Standards

Statutory Design Standards

The National Construction Code (NCC) 2014 and in particular the "deemed to satisfy" conditions of:

NCC 2014 Section J3 "Building Sealing"

NCC 2014 Section J5 "Air Conditioning and Ventilation Systems"

NCC 2014 Section J8 "Access for Maintenance"

NCC 2014 Specification J5.2 "Ductwork Insulation and Sealing"

Australian Standards as follows:

AS 1530	Methods for fire tests on building materials, components and structures
AS 1668.1	The use of mechanical Ventilation and Air Conditioning in buildings -Fire and Smoke control in multi-compartment buildings
AS 1668.2	The use of mechanical Ventilation and Air Conditioning in buildings - Mechanical Ventilation in buildings
AS 1677	Refrigerating Systems
AS 1682	Fire Dampers
AS 1851	Maintenance of Fire Protection Systems
AS 3000	SAA Wiring Rules
AS 3666.1&2	Air Handling and Water Systems of Buildings – Microbial Control
AS 4254.1	Flexible Ductwork – Fire resistance & Sealing only.
AS 4254.2	Solid Ductwork – Fire resistance & Sealing only.

Client to advise requirements and guidelines of City of Albany, Water Authority, Waters and Rivers Commission, Fire and Emergency Services Authority, Health Department and Department of Environmental Protection.

Safety in Design Standards

These standards may be referenced in Safety in Design reports; compliance with these standards will eliminate the relevant Health and Safety Risks.

Australian Standards as follows:

AS 1668.1	The use of mechanical Ventilation and Air Conditioning in buildings -Fire and Smoke control in multi-compartment buildings
AS 1668.2	The use of mechanical Ventilation and Air Conditioning in buildings - Mechanical Ventilation in buildings
AS 1677	Refrigerating Systems
AS 3000	SAA Wiring Rules
AS 3666.1&2	Air Handling and Water Systems of Buildings – Microbial Control
AS 2865	Confined Spaces HB213 Guidelines for Working in Confined Space
AS 1894	Storage and Handling of Non-Flammable Cryogenic and Refrigerated Liquids
AS 1940	Storage and Handling of Flammable Combustible Liquids
AS 3500	Plumbing & Drainage Codes

Best Practice Design Standards

These standards will be followed where practical, Client to advise any standards which must be followed.

Australian Standards as follows:

AS 1324	Air Filters for use in air conditioning and general ventilation
AS 2107	Acoustics
AS 3013	Electrical installations, wiring systems for specific applications
AS 4254.1	Flexible Ductwork
AS 4254.2	Solid Ductwork

3.2.8 Alternative Solutions

No alternative solutions are currently proposed to the Deemed-to-Satisfy NCC BCA design requirements.

3.2.9 Local Environment

Mechanical services materials and finishes selection shall reflect the marine environment of Albany and the associated corrosiveness of the ambient environment. E.g. condenser coil fins shall be factory coated with a proprietary marine grade corrosion resistant coating in order to minimize corrosion potential.

3.3 Existing Conditions

Not Applicable.

3.4 Proposed Strategies

Table 1 below provides a guideline of the proposed cooling, heating and exhaust ventilation systems based on current architectural drawings and Wood and Grieves experience.

Where there is no clear direction or the space lends itself to various options for heating, cooling and ventilation, all applicable options have been ticked and require confirmation from the Architect/Client. ***Architect / Client to confirm.***

Area		Cooling Provision			Heating Provision			Ventilation Provision		System Type
		None	*Air Conditioning*	*Evaporative*	*None*	*Air Conditioning*	*Gas*	*Mechanical*	*Passive*	
Function Room & Offices										
	Common Meeting Room		✔			✔		✔ (TBC)		DX
	Function Room		✔			✔		✔ (TBC)		DX
	Function Store	✔			✔				✔	-
	Bar & Kitchen		✔	✔		✔		✔		DX/EC (TBC)
Change Rooms & Ablutions										
	Change 1 to 4	✔			✔			✔		-

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Area		Cooling Provision			Heating Provision			Ventilation Provision		System Type
		None	*Air Conditioning*	*Evaporative*	*None*	*Air Conditioning*	*Gas*	*Mechanical*	*Passive*	
	Cricket Stores	✔			✔				✔	-
	WC	✔			✔			✔		-
	Ablutions	✔			✔			✔		-
	Umpire	✔			✔				✔	-
	First Aid		✔			✔			✔	DX

Table 1: Overview of proposed cooling, heating and ventilation systems.

System Type:

EC : Evaporative cooler unit, ducted to space.
GH : Gas heating unit (power flued, forced convection console type).
DX : Reverse cycle standalone split air conditioning system, offering individual conditioning to each zone; each zone with a dedicated condenser unit.

3.4.1 Common Meeting Room

The Common Meeting Room is facing north with shading from the verandahs and roof feature downstands. Air conditioning to be provided to the room through an above ceiling ducted split type air conditioning unit linked by refrigerant pipework to a roof mounted condensing unit. Preliminary calculations indicate that the roof top condensing unit is typically approx. 104 kg in weight and 1380 h x 950 w x 370 d (horizontal discharge). A 600 deep ceiling void is required to accommodate the air conditioning installation.



Typical Above Ceiling Split Ducted Air Conditioning Unit



Typical Individual Split External Condensing Unit– Horizontal Discharge

3.4.2 Function Room

The Function Room is orientated in an east – west configuration with shading to the glazing from the verandahs and roof feature downstands. Air conditioning to be provided to the room through either:

a) A roof mounted package air conditioning unit ducted to ceiling mounted grilles and diffusers or
b) Two above ceiling ducted split type air conditioning units linked by refrigerant pipework to roof mounted condensing units.

Preliminary calculations indicate the roof mounted packaged unit (option a)to be approx. 1670 l x 1490 w x 1500 h, 516 kg weight. The vertical discharge condensing unit (option b) is 1680 h x 930 w x 765 d, 205 kg weight.

A 600 deep ceiling void is required to accommodate the air conditioning installation.



Typical Roof Top Packaged Unit – Option a)



Typical Individual Split External Condensing Unit – Vertical Discharge

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3.4.3 First Aid Room

This room will be air conditioned by an individual wall mounted split type air conditioning unit linked to a roof mounted condensing unit by refrigerant pipework and have an individual wall mounted controller.

3.4.4 Bar and Kitchen

Kitchen exhaust is provided by a roof mounted exhaust fan ducted from the kitchen exhaust hood (Exhaust hood by kitchen equipment supplier to suit the supplied kitchen equipment). Make-up air to the kitchen would be provided through a roof mounted Evaporative Cooler of nominal size 1150 x 1150 x 860 h. The Evaporative Cooler would be provided with a variable speed drive to vary the make-up air supply to match the variable exhaust air quantity.

Client to confirm the extent of cooking facilities to be provided.



Typical Roof Mounted Evaporative Cooler Unit

3.4.5 Ablution and Change Room Exhaust

An individual toilet exhaust installation is to be provided to the following room groupings:

Change 1, Change 2 and associated ablutions,

Change 3, Change 4 and associated ablutions,

Public WC's

Each ducted exhaust system shall be complete with duct mounted exhaust fans, ductwork, grilles, roof cowl, electrics and controls. Make-up air may be via high level permanent openings or through ceiling transfer grilles. The exhaust systems will be activated either via associated light switches or motion detectors and fitted with an adjustable run on timer to ensure fan operational efficiencies. A 600 deep ceiling void is required to accommodate the ventilation installation.

Preliminary calculations indicate that roof mounted exhaust fan units are 76 kg in weight; 1680 l x 908 w x 675 h



Typical Roof Mounted Toilet Exhaust Fan Unit

3.4.6 BMS Control System

A Building Management Services Control System is not proposed for this building.

Each air conditioning and ventilation system is provided with local controllers.

3.4.7 Works Not Included

The following works do not form part of the documented mechanical scope but will be identified in the mechanical services specification for inclusion by the head contractor:

- Builders work - general items, e.g., attendance, site facilities, openings in walls, roofs and ceilings for air ducts, outlets, grilles, pipes, etc. and sealing of such.
- Supply and installation of ceiling access panels.
- Under-flashing of all roof penetrations.
- Installation of door grilles.
- Supply and installation of external louvres.
- Condenser compounds / AHU enclosures including floor, walls and/or louvred walls.
- Provision of switched power supplies to all mechanical services equipment.
- Provision of tundishes and drain points to air conditioning equipment.
- Provision of water and drainage to evaporative coolers.
- Provision of Kitchen Hood (by specialist kitchen supplier)
- Cold Room and Refrigeration Equipment
- Access stairs/ladders and walkways for mechanical services roof mounted equipment, to Architect's specification.

3.5 Unknowns requiring information

The following items require further clarification:

- Electrical Consultant to confirm above lighting and power figures.
- Architect to advise Building Fabric.
- Client to advise requirements and guidelines of City of Albany, Water Authority, Waters and Rivers Commission, Fire and Emergency Services Authority, Health Department and Department of Environmental Protection.
- Client to advise any standards which must be followed.
- Client to advise any additional areas requiring air conditioning or ventilation.
- Client to confirm the extent of cooking facilities to be provided.

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3.6 Estimated Costings

Note that the above budget estimates are preliminary and are subject to change based on further design development and agreement of mechanical system types.

Please note that budget estimates will be updated as part of the ongoing design development process.

Air conditioning installations to Function Room, Meeting Rooms and First Aid:	$ 80,000
Ventilation to Changing Rooms and WC's	$ 30,000
Kitchen Exhaust and Make-up Installation	$ 30,000
Electrics, MSSB and Controls:	$ 20,000
O & M Manuals, Construction Drawings, Maintenance:	$ 10,000
	$ 170,000

The above figures are exclusive of Preliminaries, Builderswork, GST, Regional Variation, Contingency, Escalation and Kitchen Canopies.

4. Electrical Services

4.1 Objectives

The electrical services will be designed in accordance with best practices in electrical design with a focus on achieving the most cost efficient solution and meeting relevant code requirements.

4.2 Design Criteria

4.2.1 Overview

While the focus of this report is to deliver the Pavilion, electrical services design will be cognisant of the ultimate design master plan and will incorporate the cost effective infrastructure suitable for area lighting, sports lighting, additional built facilities and other power users within the precinct.

The following information has been used by in preparation for this report:

- Site visits throughout July/August 2014
- Gresley Abas Schematic Drawing No SD 01, Rev A dated 20/08/2014
- CCS Strategic Drawing No CP.DEC.1-CCS-01 dated 23/07/2014.

The following guidelines have been referred to in the Schematic Design process and are referenced in this section of the report:

- FIFA Football Stadiums Technical Recommendations and Requirements 4th Edition, 2007 (FIFA)
- Guide to Safety at Sports Grounds 5th Edition, 2008 (Green Guide)
- Free TV Australia Operational Practice OP-31, 2005 (OP-31)
- Free TV Australia Operational Practice OP-32, 2007 (OP-32).

4.2.2 Sustainable Design

The electrical services provided will be in full accordance of any sustainability measures required by the ESD consultant and Client. The suitability of solar panels will be investigated as to whether they will be feasible to install. Other energy efficiency measures proposed to be provided include motion detection for lighting circuits, sub-metering for monitoring of energy consumption, different switching modes for the perimeter, area and pitch lighting and daylight sensors to ensure lighting is not operating when the ambient light level is sufficient.

4.2.3 Code Compliance

The electrical services will be designed in accordance with the following standards and codes:

- BCA 2014 – National Construction Code
- AS 3000:2007 (Amdt 2009) Electrical Installation – Wiring Rules
- AS 1680 – Interior Lighting
- AS1670.1 – Fire Detection and Alarm System
- AS 1670.4 – Emergency Warning and Intercommunication Systems
- AS 2293 – Emergency Evacuation Lighting in Buildings
- AS 1768 – Lightning Protection
- AS 3008.1 – Electrical Installation – Selection of Cables

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- AS 1158 – Lighting for Roads and Public Spaces
- AS 3080 – Telecommunications Installations for Commercial Premises
- WAER – Western Australian Electrical Requirements.

4.3 Existing Conditions

The Western precinct has several existing power supplies supplying a range of facilities/services including ALAC, individual ablution buildings, and hockey facilities. The distances between the existing SMSB (ALAC) and the Soccer/Cricket facilities make it feasible to install a new power supply from the North Road, rather than upgrading the ALAC supply. In order to meet WAER requirements, there will have to be a clear separation between the ALAC/Hockey and Cricket/Soccer zones and zones cannot contain any infrastructure (lights, pumps, ablution buildings) that are supplied from another zone.

4.4 Proposed Strategies

4.4.1 Power Supply

The incoming power will in all likelihood be supplied by the Authority from a district or sole use substation located on North Road, directly North of the proposed pavillion. The substation is likely to consist of HV switchgear and 1 transformer connected to a low voltage frame which feeds the site main switchboard (SMSB).

The maximum power demand (MPD) estimates for main areas throughout the site are as follows:

Item	kVA
Soccer/Cricket Pavilion	120
Pitch Lighting (5 x soccer @100lux)	200
Carparks, Area lighting, retic equip (nominal)	50
Existing infrastructure	50
Total	**420**

4.4.2 Power Supply and Distribution

Power will be supplied to the pavilion through a series of pits and conduits running from the new site main switchboard to each of the local distribution boards. Conduit pathways will have to be resolved in Design Development.

4.4.3 Switchboards

Switchboards will be provided to distribute power throughout the Pavilion. The pavilion will require a switchboard in each of the sections separated by the breezeway. Switchboards will be external rated, aluminium construction with two levels of access for venue staff to operate controls and contractors to work on circuits.

4.4.4 Sub-main Cabling

Submains feeding the switchboards will be XLPE type, rated to the expected ultimate current load and installed in underground conduits.

4.4.5 Lighting

Lighting will be provided to the pavilion verandahs, breezeway, as well as all internal rooms/spaces in accordance with the relevant requirements from the Architect and Client.

Lighting will generally be provided in accordance with AS1680 and will be a combination of linear fluorescent, compact fluorescent, metal halide and LED luminaires best suited to the application.

4.4.6 Lighting Controls

A lighting control system will be provided to control the general lighting throughout the pavilion. The lighting control system will have head end equipment in either of the proposed switchboards and a control panels in a location yet to be determined. The switching philosophy to be developed in design development will be based around motion and daylight detection to ensure the lighting system is energy efficient.

4.4.7 Emergency Lighting

Emergency Lighting will be provided in accordance with AS2293. The emergency lighting system will be provided with standard 90 minute battery backup, however can be upgraded to three hour battery power in accordance with the Green Guide requirement. The system may be powered by individual luminaire batteries or through a centralised UPS system. This will be determined in Design Development.

4.4.8 General Power

General power will be provided for cleaning requirements as well as individual space usage as defined in consultation with the architect.

Hand dryers will be provided to all public toilets.

Three phase power outlet can be provided for temporary Outside Broadcast (OB) van, if required.

Cabling will be reticulated throughout the site on cable trays with removable covers.

4.4.9 Communications

Communications cabling for voice and data networks will be provided within the northern section of the pavilion only. Cabling will be F/UTP Cat6a quality.

4.4.10 MATV System

An MATV system will be provided to reticulate high definition television through limited areas of the Northern section of the building (Bar, Function Room). The MATV system head-end will be located within a communications cabinet.

4.4.11 Video and Broadcast

No allowance is made for a Video and Broadcast system.

4.4.12 Fire Detection and Alarm

Fire detection will be provided in accordance with AS1670.1 as per the fire engineer's report. Fire detection will be in the form of smoke and thermal detectors.

4.4.13 EWIS and Public Address

No allowance has been made for EWIS and PA Systems.

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4.5 Unknowns Requiring Information

4.5.1 As-constructed/Existing Infrastructure

In order to progress the design we require details of all existing electrical infrastructure within the North Western Section of the Western Precinct.

4.5.2 Likely Future Power Users

In order to future proof the design, we require details of likely future infrastructure including maintenance sheds, retic pumps, pump stations etc.

4.6 Estimated Costings

WP Supply (Provisional 420kva)	$150,000
Soccer/Cricket pavilion	99,710
SMSB (420kva)	50,000
Mains Cabling	18,000
BMSB 01	15,000
BMSB 02	10,000
Total Building cost	$342,710

5. Structural Services

5.1 Objectives

- To design a functional space to conform to the intended use for both the cricket and soccer operations.
- To design a functional adaptable open planned facility for a variety of intended usages with maximum future proofing allowance for any adaptation.
- Design to be efficient and economic in concept with a focus on the aesthetic statement of the facility.

5.2 Scope of Work

Reference should be made to our fee submission for a detailed break-up of the extent of our service. We provide a broad outline below.

5.2.1 Services to Be Provided During Design

The following items constitute the Structural scope of works:

- Geotechnical Consultant appointed by the Client and report issued for our review. Additional geotechnical investigation if so required will be advised for the specific location of the building.
- Preparation of design calculation package in accordance with current and relevant Australian Standards and the BCA. The structure will be designed for dead/live loads, fire resistance, durability, wind, earthquake and soil pressure loads, as required.
- Preparation of Structural specification notes included on drawings.
- Design Certification letter at project completion.
- Retaining walls incorporated as part of the building.
- Foundations and floor slabs on grade.
- Suspended floors including support beams and stairs.
- Vertical load bearing elements including columns and walls.
- Lateral load resisting elements including external walls, cores and/or shear walls.
- Roof and canopy elements.

5.2.2 Structural Services – Clarifications

Wood & Grieve Engineers have not yet allowed for the following in our scope of service and fee.

- Cost of geotechnical survey and all materials testing consultant fees.
- All framing specification associated with steel stud framed construction by specialist supplier unless agreed prior to commission.
- Pre-engineered roof truss design and documentation by specialist supplier.
- Shade sail structures by specialist D&C supplier.
- All piling and temporary/permanent boundary ground retention design and documentation by specialist supplier.
- Crane base design unless agreed prior to commission.
- External structural certification. A formal review process in accordance with Wood & Grieves' Quality System will be conducted in-house and has been included in fees unless agreed prior to commission.

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5.3 Design Criteria

The following information provides the basis for the structural design of this project.

5.3.1 Building Classification

The following classifications are suggested as suitable for the following buildings. ***This will need to be confirmed by the BCA consultant:***

- Western Precinct Soccer / Cricket Pavilion Class 9B

5.3.2 Building Importance level

The following importance levels are proposed for each of the buildings. ***This will need to be confirmed by the BCA consultant***:

Structure Description	Importance Level	Average Recurrence Interval (yrs)
Western Precinct Soccer / Cricket Pavilion	Level 2	1 in 500

The determination of design actions (wind, etc.) is based on the above provision.

5.3.3 Fire Resisting Design & Construction

The current configuration for the Western Precinct Soccer / Cricket Pavilion fire-resisting construction is Type C– ref Table C1.1 under the NCC. ***This and the FRL's outlined below will need to be confirmed by the BCA Consultant.***

5.3.4 Geotechnical Conditions

No historic geotechnical information for the site is available, a preliminary intrusive site investigation has been undertaken and a preliminary report issued for review. ***A Final Geotechnical report has not yet been provided to WGE.***

A geotechnical investigation was carried out in July 2014 for the site. Ground conditions vary across the site therefore varying site classifications have been provided across the site. Typically across the site medium-dense sandy fill was encountered which overlays stiff clayey sand and ultimately coffee rock. The geotechnical report recommends that the fill be considered uncontrolled in its current condition and therefore in areas of uncontrolled fill the site be categorized as 'Class P' to AS 2870. ***No record of placement for the filling is available.*** The geotechnical report recommends remediation of the existing uncontrolled fill to achieve a 'Class A' site classification. If the fill was remediated to achieve 'Class A' categorization bearing pressures of 200 kPa for pad and strip footings could be achieved and differential settlements were estimated to be less than 5mm if founded in accordance with the recommendations of the geotechnical report.

To the North-Eastern corner of the Western precinct clay and clayey sand was encountered at shallow depths. The findings of this report classified these areas of site as 'Class S', with an allowable bearing pressure of 200kPa for pad and strip footings.

Groundwater was encounter at most investigation locations, typically 0.75-2.3m below the existing surface level.

The geotechnical report identifies that ***the Risk of Acid Sulphates being encountered across the site is high***.

The following design parameters have been assumed for the design of shallow foundations in the absence of site specific geotechnical data:

The following design parameters have been assumed for the design of shallow foundations in the absence of site specific geotechnical data:

Allowable bearing pressure	:	***200 kPa subject to ground works***
Maximum differential settlements	:	***15mm max***
Site Classification to AS2870:2011	:	S

Any areas of existing ground that are locally disturbed due to installation of underground services and excavation for building foundations should be re-compacted and the achieved compaction re-tested prior to pouring concrete to ensure conformance with the Geotechnical Engineers specification.

5.3.5 Dead Loads (AS1170.1 – 2002)

Light weight roofs (roof sheet, insulation, purlins)	:	0.15 kPa
Floor finishes (Carpet)	:	0.05kPa
Floor finishes (ceramic tiles and bedding to bathrooms)	:	0.60kPa
Ceiling	:	0.15kPa
Services	:	0.15kPa
Assume 150mm thick raft slab	:	3.60 kPa
190mm reinforced blockwork walls	:	4.60 kPa on elevation
150mm Precast Concrete walls	:	3.60 kPa on elevation
Internal studwork partitions	:	0.50 kPa on elevation

5.3.6 Live Loads (AS1170.1 – 2002)

Plant room and storage areas	:	5.0 kPa
General office areas / amenities	:	3.0 kPa
Common areas / stairs / terraces	:	4.0 kPa
Courtyards and other general areas not listed	:	5.0 kPa
Non - trafficable roof live load	:	0.25 kPa
Retaining wall surcharge (where applicable)	:	5.0 kPa

5.3.7 Wind Loads (AS1170.2 2011)

Region	:	A1
Terrain category	:	2.5
Importance category	:	3
Ultimate wind ARI	:	1 in 1000
Regional wind speed (Ultimate), Vr	:	46 m/s
Serviceability wind ARI	:	1 in 25
Regional wind speed (Ultimate), Vr	:	37 m/s
Shielding multiplier, Ms	:	1.0
Topographic multiplier, Mt	:	1.0
Direction multiplier (all directions), Md	:	1.0
Terrain height multiplier, Mz,cat	:	0.94

5.3.8 Earthquake Loads (AS1170.4 – 2007)

Hazard factor, Z	0.09
Site sub-soil class	Ce
Importance level	3

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Design working life	50 years
Earthquake design category	II
Earthquake loading return period	1 in 1000
Probability factor, Kp	1.3

5.3.9 Concrete Structures (AS3600 – 2009)

Internal exposure classification	:	A2
Sub-soil exposure classification	:	A2 ***(tbc with geotechnical engineer)***
External exposure classification	:	B1
Minimum internal concrete strength	:	32MPa
Minimum internal concrete cover	:	25mm
Minimum concrete cover to underside slab on ground	:	40mm
Minimum external concrete strength	:	32MPa
Minimum external concrete cover	:	40mm
Minimum footing concrete strength	:	25MPa
Minimum footing concrete cover	:	50mm

Deflection limits:

Maximum long term foundation settlement (allowable)	<5 mm
Maximum long term differential settlement (allowable)	***TBC***
Maximum foundation rotation (allowable)	span/1000
Long term load factor	0.4
Short term load factor	0.7

Concrete shall be cured for a minimum of 14 days after pouring by an approved proprietary curing agent. Shorter curing periods may be accepted subject to the Structural Engineer's review.

Construction tolerances shall be in accordance with AS3600 and AS3610.

Tolerances	:	3mm maximum deviation from 3m straight edge across floor in any direction.
	:	Joints in floor to be flush.
Finish	:	Steel trowel finish to suit proposed floor covering.
	:	Refer to architect for floor coverings.

5.3.10 Steel Structures (AS4100 – 1998)

All steelwork shall be new and complying with the following minimum grades unless otherwise specified:

Hot-rolled open sections	:	Grade 300Plus
Cold-formed RHS, SHS	:	Grade 450Plus
Cold-formed CHS	:	Grade 350Plus
Flat plates and other assemblies	:	250MPa

Deflection limits:

Eaves lateral deflection limit	column height h / 500
Dead load only deflection limit	span/360
Dead load and short term live load deflection limit	span/300
Serviceability wind load deflection limit	span/300
Glazing frame support under service wind	span / 400

Long term live load factor (roof)	0.0
Short term live load factor (roof)	0.7

The natural frequency of the structure shall be equal to or greater than 2.4Hz in accordance with AS1418.

5.3.11 Steelwork Protection (AS2312-2002)

Atmospheric corrosivity category : Category C - Medium

Corrosion protection systems to have *Extra Long Term Service Life (25+ years*), Protection Systems include:

Hot dip galvanising (HDG), or
Aluminium or zinc-rich paint systems.

The following systems are proposed for treating steelwork:

Internal treatment (painted option)	-	Abrasive blast clean to AS1627.4 Class 2
	-	Red oxide zinc phosphate to 75µm prime
	-	Final coat/s as specified by Architect
	and	
External treatment (painted option)	-	Abrasive blast clean to AS1627.4 Class 2.5
	-	Inorganic zinc silicate (water-borne) to 75µm DFT
	-	Final coat/s as specified by Architect (if not incorporated into above)
	or	
External and internal treatment (galvanised option)	-	HDG600 to 85µm DFT to AS4680
	-	Final coat/s as specified by Architect (if not incorporated into above)
In cavity	-	HDG600 to 85µm DFT to AS4680
Below ground:	-	In addition to above, 2 coats of bitumen based prismatic to 400 microns
Site weld:	-	Power tool clean and painted to same spec as internal/external steelwork
Cast-in items into concrete:	-	Hot dip galvanised
Nuts, washers and bolts:	-	Hot dip galvanised

Any pressed metal products (incl. but not limited to studs, purlins and wall / roof cladding) are to be hot dip galvanised typically and be protected for the applicable corrosivity category. Refer to the manufacturer's specifications for further details.

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Any surface treatment damaged during construction works shall be reinstated in accordance with the above specifications.

5.3.12 Masonry Structures (AS3700 -2011)

All masonry shall be new and comply with the following unless otherwise specified:

All masonry to be bonded with mortar class as follows uno:

I) Within 1km of coast: M4 class mortar (1 cement:0.5 lime:4.5 sand)
II) Otherwise: M3 class mortar (1 cement:1 lime:6 sand)

Min. Unconfined compressive strengths of masonry to be as follows:

III) Brickwork: 12MPa
IV) Blockwork: 12MPa

All masonry should be tied to walls/columns with approved proprietary ties at 350 mm max. centres vertically and 900mm max. centres horizontally (where applicable). Vertical centres may be increased to 400 mm in the case of blockwork uno.

The outer leaf should be tied to the inner leaf of cavity construction with galvanised, type 'a', medium duty wall ties in accordance with the following min requirements:

V) Up to 75mm cavity : 600mm horizontally, 520mm vertically
VI) Over 75mm cavity: 600mm horizontally, 530mm vertically
VII) Within 300mm of lateral supports, openings or vertical movement joints: 300mm vertically

Treatment of wall ties to be as follows:

VIII) Stainless steel: within 1km of large saltwater bodies.
IX) Galvanised: otherwise

Non load bearing masonry built to the underside of slabs over shall be laterally restrained via proprietary head restraint brackets at 400 mm max centres fixed to the soffit of the slab over and built into the perpendicular joints.

The maximum vertical wall joint spacing should comply with the following uno (refer to architectural drawings for exact locations):

Site Classification	**Wall Construction**	**Joint Spacing (m)**
M, M-D, H, H-D	Masonry veneer	7.0
	Sheeted and/or face finished full masonry	6.5
	Rendered or paint finished full masonry	5.5

Vertical movement joints are to be 10mm bridged with proprietary joint ties at 300 mm max centres and filled with a compressible mastic sealant on a backing rod.

5.3.13 Design Standards

All buildings, components of buildings, connections and parts of associated structures (e.g. canopies and verandas) are to be designed to comply with the requirements of the National Construction Code (NCC) and the Australian Standards referenced therein together with appropriate reference to any other available relevant documentation.

The Structural services have been undertaken in accordance with the following documents:

- Local Government Miscellaneous Provisions Act 1960
- Building Regulations 2012
- The National Construction Code / Building Code of Australia 2014

- Town of Claremont guidelines and any other relevant and available local government guidelines
- Relevant Australian Standards including but not limited to:

Standard No	Title
AS 1170.0	Structural Design Actions – General Principles
AS 1170.1	Structural Design Actions – Permanent, Imposed and other Actions
AS 1170.2	Structural Design Actions – Wind Actions
AS 1170.4	Structural Design Actions – Earthquake Actions in Australia.
AS 3600	Concrete Structures
AS 4100	Steel Structures
AS 2312	Guide to the Protection of structural steel against atmospheric corrosion by the use of protective coatings
AS 3700	Masonry Structures
AS 2870	Residential Slabs and Footings
AS 1726	Geotechnical Site Investigations
AS 1562	Design and Installation of Sheet Roof and Wall Cladding
AS 2047	Windows in Buildings
AS 1684	Residential Timber Framed Construction
AS 4600	Cold-Formed Steel Structures
AS 1163	Cold-formed structural steel hollow sections
AS 3679	Structural steel - Hot-rolled bars and sections
AS 1554	Structural steel welding - Welding of steel structures
AS 1252	High strength steel bolts with associated nuts and washers for structural engineering
AS 4678	Earth–retaining structures
AS 1627	Metal Finishing – Preparation and pre-treatment of surfaces
AS 4680	Hot-dip galvanized (Zinc) coatings on fabricated ferrous articles

The above list may not be exhaustive and references should also be made to other standards required to satisfy the functional outcomes stated in the Architectural Design Brief and/or the Town of Claremont guidelines.

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5.4 Proposed Strategies

5.4.1 Foundation

The ground will be treated and prepared in accordance with the geotechnical investigation to ensure long term settlement is controlled. If any forward works is required to attain required ground levels by regarding and importing fill is required this will be dealt with by the Civil Section of this report

Due to the ground conditions stated within the geotechnical investigation we advise the likely foundation system will be a ribbed slab with a 125mm slab with SL82 mesh spaning between the 400mm deep ribs. The ribs will have sufficient reinforcement to compensate the possible movement.

In addition to the ribbed slab strip footings will be located directly under all vertical walls which will be 400 wide x 400 deep. The strips will have sufficient reinforcement to compensate the possible movement.

Isolated pad footings approximately 1200 square x 400 deep will be located directly under steel columns. The pads will have sufficient reinforcement to compensate the possible movement.

The slab to the external veranda will again be a 125mm slab with SL82 mesh but will be stepped down and graded to have falls away from the building to aid drainage.

Please refer to SK003 for foundation schematic design strategy.

5.4.2 Superstructure

The intent is to form this building with a braced steel frame with columns located within the wall build up as not to impede the spaces within the building.

The roof will consist of steel rafters supported on columns and horizontally and vertically braced down to the ground.

The feature veranda is formed with primary columns located at regular centers around the edge of the veranda slab supporting a facial truss and outrigger steel beams tying the feature back to the frame.

No secondary or territory has at this time been developed as well as key details for the feature cladding around the veranda.

Please refer to SK004 for foundation schematic design strategy.

5.4.3 Walls

The intent to ensure robustness is for all walls to be masonry forming this building. The external envelope will be cavity with internal walls to be blockwork. Additional piers and/or wind posts will be required and will be further developed in the next phase of the design.

5.4.4 Building Life Expectancy

The life expectancy of the building required by the end client has been confirmed as 50 years. To achieve this all steelwork must be treated with a suitable level of protection against corrosion which would typically provide a life to first significant maintenance of up to 25 years; an ongoing maintenance regime will be required over the structure's lifetime.

5.5 Unknowns requiring information

Feature facade around the veranda details and support details.

Location for the secondary steel frame to support lightweight detaisl such as cielings wall finishes, lintes.

6. Civil Services

6.1 Objectives

- To provide innovative Civil solutions to ensure that the development progresses to completion in a cost efficient, time efficient and safe manner whilst achieving excellence for the City of Albany;
- To provide Civil Services of commercial quality with a minimum engineered design life of 20 – 25 years.

6.2 Design Criteria

The Civil services will be undertaken in accordance with the following documents:

- Australian Rainfall & Runoff – 1987;
- Department of Water:- Stormwater Management Manual;
- Australian Standards:- AS 2890.1:2004 – Parking Facilities, Part 1: Off-street car parking, as required;
- Australian Standards:- AS 3798:2007 – Guidelines on earthworks for commercial and residential developments;
- Relevant Local Authority design codes.

6.3 Existing Conditions

6.3.1 Geotechnical Information

Douglas Partners undertook a geotechnical investigation for the over-arching CPSP in late June 2014 and provided detailed reporting July 2014. In summary one test pit and one groundwater monitoring bore were located for the proposed building footprint and adjacent main cricket oval. Intrusive testing confirmed our experience of the area that the site generally consists of silty sands over a cemented sand or clay layer at depth. As such, disposal of stormwater on-site via infiltration will be unachievable due to low permeability of the in-situ soils.

Acid Sulphate soils are likely for all excavations associated with the adjacent sporting oval, however are not likely for the building footprint services.

Groundwater was recorded at approximately 2.6m from natural surface within the test pit, whilst generally at the surface of the adjacent, water-logged oval.

6.3.2 Existing Infrastructure

An existing Telstra conduit runs beneath the proposed Pavilion location. It is anticipated that this will be rerouted to suit the proposed development, however this needs to be confirmed with Telstra. It is anticipated that this relocation may cost in the order of $10,000 plus GST.

The existing cricket storage shed and associated bench seating will require demolition.

Existing irrigation will require amendments to suit proposed oval and drainage works.

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6.4 Proposed Strategies

The following is our general design intent pertinent to the relevant Civil services:

- Site stormwater and discharge:
  - infiltration at source will not be achievable due to the assumed nature of the in-situ soils and as such alternative means of stormwater detention / retention will be required. At this stage it is assumed that roof run-off will be attenuated and connected to the existing City of Albany stormwater system adjacent to ALAC. The incorporation of above ground rainwater tanks for stormwater harvesting and re-use will be investigated in conjunction with the Hydraulics and WSUD Consultants, however may not be an economically feasible solution.
  - The adjacent main cricket / soccer ovals will require stormwater remediation to mitigate water-logging during winter. These works will not impost the development of the Pavilion.
  - the 1 in 100 year ARI storm event will be flood routed such that risk of damage to buildings and associated infrastructure is mitigated.
- Earthworks:
  - earthworks will occur as part of the Civil works package. The finished level of bulk earthworks (sand pads) is assumed to be finished floor level (FFL) minus 100mm. This will be confirmed during detailed design.
  - all bearing material will be compacted to 95% MMDD.
  - it is envisaged that a 1 in 5 batter will be provided between the FFL of the building and the main cricket / soccer oval. This batter will be landscaped.
- Access Road and Vehicle Parking Areas:-
  - detailed modelling and design has commenced, based upon the current layout without Traffic Engineer confirmation.

6.5 Unknowns requiring information

Generally the Civil design for the building forms part of the greater precinct wide Civil design. This is at a very preliminary stage of modelling to date and requires further development and consideration. As such, we are of the impression that we have sufficient information to date, however more information may be required as the design is developed. We will provide advice in this regard as needed, however don't anticipate any negative imposts to the Architectural or over-arching design of the Pavilion building.

6.6 Estimated Costings

Telstra relocation	$10,000
Building stormwater	TBA
Earthworks	Part of Civil works
Access	Part of Civil works
Total Building cost	$10,000 excl GST

7. Hydraulic Services

7.1 Objectives

- To provide Hydraulic Services of high standard, comparable with other similar sporting venues.
- To provide Hydraulic Services that minimises initial capital cost (to suit budget constraints) without excessively compromising quality or ongoing maintenance costs.
- To provide Hydraulic Services necessary for each area that fulfils designated function.
- To provide Hydraulic Services of commercial quality with a minimum engineered design life of 20 - 25 years.
- To provide adequate sized Hydraulic Services that allows an acceptable level of flexibility for future development.

7.2 Design Criteria

7.2.1 Design Standards

- Hydraulic services to comply with the Building Code of Australia 2014.
- Hydraulic services to comply with all current statutory requirements and guidelines including City of Albany, Water Authority, Waters and Rivers Commission, Department of Fire and Emergency Services, Health Department and Department of Environmental Protection.
- Hydraulic Services to comply with current Australian Standards where applicable and particularly the following:

AS 3500	:	National Plumbing and Drainage Code incorporating:
Part 1	:	2005 Water Supply
Part 2	:	2006 Sanitary Plumbing and Drainage.
Part 3	:	2006 Stormwater Drainage.
Part 4	:	2005 Heated Water Services.
AS 5601	:	2004 Gas Installations.

7.2.2 Design Criteria

- Hot Water : Storage Temperature (domestic use) minimum 60°C
  : Supply Temperature (domestic use) Maximum 50°C
  : Supply Temperature to disabled facilities maximum 45°C
  : Supply Temperature (kitchen and bar) minimum 72°C

- Stormwater

  Box Gutter Systems : Average recurrence interval (ARI) 1:100 years.
  : Intensity 220.8 mm/hour.
  : Duration 6 minutes.

  Eaves Gutter Systems : Average recurrence interval (ARI) 1:20 years.
  : Intensity 143.0 mm/hour.
  : Duration 6 minutes.

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7.2.3 Occupancy

- In line with the current BCA Report occupancy for calculation purposes has been determined at 200 persons.

7.3 Existing Conditions

- The location, size, capacity and condition of existing services infrastructure within the boundary of each precinct, including sewer, water, fire, and gas is largely unknown. As constructed drawing data (where available) is to be provided by the City of Albany.
- The location, size, and capacity of the relevant authority services infrastructure is known and at this schematic design stage the services are deemed as being able to service the proposed new project.

7.4 Proposed Strategies

- Due to separation of the proposed building into 2 separate building elements under 500m^2 the provision for fire hydrants and hose reels is not required.
- Stormwater drainage to roof gutters will utilize syphonic roof drainage principals which will keep numbers and sizes of downpipes down to a minimum, allow offsetting downpipes to be laid flat, minimizing concealment in ceiling spaces and bulkheads, and allow retrofitting of stormwater harvesting tanks at a later date to be undertaken without significant re-design and re-configuration.
- A separate water supply will be designed to all toilet and urinal fixtures to allow future re-use of stormwater harvesting water to be reticulated without the need for substantial re-design and re-configuration.
- Hot water shall utilize gas continuous flow hot water heaters sized to suit peak changeroom use as well as regular function bar/kitchen use both at game and non-game events.

  Solar will not be considered for the precinct due to potential capital cost, large plant areas, inability to meet peak demand and periodic non-hot water usage.
- Nomination of water efficient fixtures and tapware conforming to WELS (water efficient labelling standards) will be considered.

7.5 Unknowns requiring information

- A-constructed drawing information for existing site services infrastructure for sewer, water, fire, and gas especially for existing buildings in close proximity to proposed new building and existing buildings to be refurbished.

  Information to be sought from Albany City Council.
- ESD initiatives impacting the hydraulic services needs to be determined and advised.
- Site/precinct “water balancing” calculations are being undertaken by Syrinx (Environmental Consultant) the results of which need to be advised so that potential water and energy efficient design strategies can be considered and documented.
- Extent of specialist bar/kitchen equipment and fit-out of these areas is still to be determined and has been excluded from this report together with associated costings. However, base building services to these areas has been included.

7.6 Scope of Work

7.6.1 Sanitary Fixtures and Fittings

- Provision for first grade commercial quality sanitary fixtures, fittings and tapware to the following areas:
  - Staff male/female toilet areas.

- Cleaner's facility.
- Public male/female and disabled toilet areas.
- Male/female changerooms and associated toilet and shower areas.
- Commercial bar and kitchen.
- First aid room.

- Provision of fixtures and tapware conforming to the WELS (Water Efficiency Labelling Standards) which identifies the following maximum flow rates.
  - Showers @ 9-12 ltrs/minute
  - Hand Basins @ 6 ltrs/minute
  - Sinks @ 6 ltrs/minute
  - Toilets @ Dual Flush 6/3 litres(4 1/2 litre available)
  - Urinals @ waterless

  Nomination of sanitary fixtures and tapware will be determined in consultation with the architect for client sign off.

- Provision for all required vandal resistant features to fixtures and tapware.

- **Architect/Client to confirm requirements for the following fixtures:**
  - ***Drinking water fountains.***
  - ***Electronic urinal flushing systems.***
  - ***Waterless urinals.***

- **Fixtures and fittings to be nominated supplied and installed by others as connect only items.**
  - ***Commercial Kitchen and Bar Equipment.***

7.6.2 Sanitary Waste and Drainage

- Provision for the collection of all domestic waste discharges from fixtures and fittings via PVC fixture and branch wastes and including:
  - Toilets.
  - Hand basins.
  - Showers.
  - Urinals.
  - Dishwashers.
  - Kitchen sinks.
  - Drinking fountains.
  - Cleaner's sink.

  Note: Exposed fixture wastes shall be chrome plated copper.
- Provision for all required floor wastes and tundish wastes, maintenance access and inspection openings.
- Provision for all required fire stop collars to services passing through structural slabs, fire walls and floors.
- Provision for all required sanitary waste and drainage ventilation services terminating to atmosphere at roof level.

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- Provision for below ground PVC sanitary drainage services collecting waste discharges from waste stacks, fixture wastes, etc, with gravity connection to the sites sanitary drainage services infrastructure and incorporating all required maintenance and inspection openings.

7.6.3 Industrial Waste and Drainage

- Provision for the collection of all grease waste from kitchen cooking and food preparation areas via fixture wastes from food preparation sinks, hand wash basins, bain maries, coolroom/freezer washdown and condensate waste drains, bucket traps and industrial floor wastes discharging to a 2000 litre capacity filtered grease trap/arrestor.

  Note: Fixture wastes from glass washers, dishwashers and pre-rinse sinks will discharge directly to the domestic sanitary drainage system so that excessive and high temperature waste water discharges bypass the grease trap.
- Provision for a 15mm hose connection tap located within 6m of the grease trap/arrestor to assist maintenance cleaning and complete with required backflow prevention device.
- Provision for a 240 volt, 10 amp, 3 pin weatherproof GPO to be located within 2m of the grease trap/arrestor industrial waste sampling point to assist the Authorities use of sample and monitoring process equipment.
- Provision for independent venting to atmosphere of grease trap/arrestor.

7.6.4 Cold Water Services

- Provision for reticulated cold water supplies to all sanitary fixtures, fittings and tapware as required incorporating all required maintenance isolation valves.
- Provision for all required internal/external hose connection taps to assist general cleaning, wash down and minor landscape irrigation complete with vacuum breakers and all necessary backflow prevention devices.
- Provision for external branch connections terminating in valve boxes for future extension to landscape irrigation systems. Allow for all required backflow prevention devices.

  Architect to confirm landscape irrigation requirements.
- Provision for all required sub-metering via manual reading meters/remote electronic meter reading.

  Client to confirm all sub metering requirements.
- Provision for all required backflow prevention devices to mechanical equipment, hot water units, hose taps, etc.
- Provision for fluid aprons to all tap breaches in walls and ducts.
- Water hammer and its effects are to be eliminated by addressing the following issues:
  - Appropriate design of water service pipework to maintain water velocities to a maximum of 1.5 metres/second.
  - Appropriate use and spacing of pipe supports and fixings.
  - Minimising the specification of quick closing tapware such as ceramic disc, quarter and half turn tapware.
  - Utilising appropriate hammer arrester devices to items such as dishwashers, glasswashers and washing machines.

7.6.5 Hot Water Services

- Provision for hot water heating plant providing hot water to the following areas:
  - Public male/female and disabled toilet amenities including Cleaner's room.
  - Cleaners sink.
  - Male/female changerooms and associated toilet and shower areas.
  - Staff male/female and disabled toilet amenities.
  - Commercial bar and kitchen.
  - First aid rooms.

- Provision for reticulated hot water services with connections to all fixtures and tapware and incorporating all required maintenance isolating valves and temperature control devices.
- Provision for insulation to all reticulated hot water services as required.
- Temperature control devices are to be utilised to restrict hot water temperatures to the following areas:
  - Disabled Facilities - max 45°C
  - Public Toilet Amenities - max 50°C
  - Staff toilet amenities - max 50°C
  - First aid rooms - max 45°C
  - Kitchen and bar hand basins - max 45°C

- Provision for all required backflow prevention devices and temperature relief valves.
- Provision for hot water heating plant comprising the following:
  - Gas continuous flow hot water plant incorporating flow and return circuit and associated hot water circulating pumps.

7.6.6 Fire Hydrant and Hose Reel Services

- It is intended that the overall building will be split and separated into 2 building elements, both being under 500m2 in effective floor area. Therefore, under current BCA requirements the provision for fire hydrants and hose reels is not required.

7.6.7 Mechanical Plant Waste and Water

- Provision for the collection and disposal of all mechanical air conditioning plant condensate waste via all required floor drains, and tundish wastes, with connection to stormwater disposal system and/or grated waste sump boxes as required.
- Provision for all required valved cold water spur connections for mechanical air conditioning plant make up as required.
- *Wood & Grieve Engineers will liaise with mechanical consultant to determine and co-ordinate all mechanical waste points and water points.*

7.6.8 Gas Services

- Provision for reticulated gas services to all gas equipment including:
  - Cooking equipment.
  - Hot water heating plant.

  and complete with all required isolation valves, first and second stage regulation.

- Provision for all required sub-metering via manual reading meters/remote electronic meter reading.

  Client to confirm all sub-metering requirements.

- Provision for emergency gas shut off valving arrangement incorporating immediately accessible manual isolation/electronic solenoid activated emergency stop buttons.

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7.6.9 Stormwater Collection

- Provision of all required eaves/box gutters, gutter sumps, overflows, expansion joints and downpipes shall be made by the roofing contractor and covered in the Architectural documents.

  Wood & Grieve Engineers will assist the architect with minimum size of all required gutters, number and location of downpipes, overflow requirements and expansion joints.

- Provision for syphonic outlets to all box gutters and incorporating traditional overflow relief measures.
- Provision for the collection of all storm water run off from main roof areas, canopies and verandas via internal/external syphonic downpipes terminating at ground level.

7.6.10 Site Services

- Property sewer services incorporating:
  - A 100mm gravity connection to the Authorities main sewer infrastructure located North Road.
- Domestic Cold Water Supplies incorporating:
  - A 50mm connection to the Authorities water main infrastructure located North Road complete with main isolation valve and water master meter.
- Gas Services incorporating:
  - A 100mm connection to the Authorities gas main infrastructure located North Road complete with main isolation valve and gas master meter.
- Fire Services incorporating:
  - Fire hydrant and hose reel provisions are not required for this building and therefore no fire service connection is required.
- Stormwater Drainage incorporating:
  - Collection of stormwater run off at base of downpipes and discharging to the sites stormwater drainage system (undertaken by the civil consultant).

7.6.11 ESD Initiatives

The following ESD Initiatives will be incorporated as part of the hydraulic services documentation:

- Reduction of water consumption utilizing approved limited flow tapware and fixtures in accordance with WELS.
- Sub metering of mechanical services water supplies, back of house areas, landscape irrigation, etc.
- Insulation of all hot water plant and reticulated hot water pipework.

The following ESD initiatives are offered for further architect / client consideration:

- Use of waterless urinals.
- Provision of cold water supply only to public toilet amenities, including toilets and hand basins.
- Collection, storage and re-use of rainwater run off for toilet flushing, landscape irrigation and minor cleaning and washdown.

7.6.12 Headworks

- Wood & Grieve Engineers have pre-calculated the anticipated headworks charges payable for this project which have been included in the current budget estimate.

7.6.13 Work Not Included

- Nomination of sanitary ancillaries (by the Architect).
- Landscape irrigation services.
- Sub-soil drainage.
- Water feature design and documentation.
- Nomination of specialist appliances to commercial bar and kitchen.
- Commercial bar and kitchen fit-out.

7.7 Budget Estimate

Our budget estimate for the scope of work identified above:

• Sanitary Fixtures and Tapware.	$	95,800
• Sanitary Waste and Drainage.	$	29,500
• Industrial Waste and Drainage	$	30,100
• Cold Water services	$	13,200
• Hot Water services	$	27,100
• Gas services	$	8,400
• Fire Hydrants and Hose Reels		Nil
• Mechanical Waste and Water	$	15,200
• Stormwater Collection	$	45,200
• Site Services		
- Sewer	$	22,700
- Water	$	15,500
- Fire		Nil
- Gas	$	12,000
• Headworks		
- Water Authority	$	76,500
- Gas Authority	$	15,000
TOTAL	**$**	**406,200**
• Provisional allowance for stormwater harvesting tanks and pumps	$	62,000

The above budget estimate excludes the following elements:

- Preliminaries.
- Builder's work and associated excavation work.

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- Goods & Services Tax.
- Authority Submission Fees.
- Regional Variation.
- Contingency.
- Escalation.
- Roof plumbing including gutters, gutter sumps, overflows and downpipes (allowed for by Quantity Surveyor).
- Water Authority Building Application fees based on a percentage of the anticipated construction value. Quantity Surveyor to calculate based on $1.10 per $1,000 of construction value.
- Fitout of commercial kitchen and bar areas.

8. Sustainability Services

8.1 Objectives

- Provide Sustainability Services to an appropriate standard comparable with other sports facilities installations.
- Identify sustainability initiatives that should be investigated further for inclusion in the design.
- Review and certify the design against the BCA Section J requirements.

8.2 Design Criteria

All new building elements will be designed to comply with the BCA Section J requirements.

8.3 Existing Conditions

The site is in Climate Zone 6 as defined in BCA Section J. This will impact upon the thermal envelope requirements for this development.

8.4 Proposed Strategies

A JV3 performance approach will be used to demonstrate compliance with the BCA Section J requirements. This will allow for a balancing of the thermal performance of each façade to maximize the amount of glazing facing the sporting arenas.

All sustainability initiatives will be considered to determine the costs and benefits to the project. Additional sustainability initiatives that will be explored throughout the design process include:

- Solar photovoltaic panels.
- High efficiency energy consuming equipment.
- Rainwater / greywater recycling system.
- High performance façade.

8.5 Unknowns requiring information

Once sustainability initiatives have been proposed and the cost benefit analysis has been provided, confirmation will be required to determine the initiatives to be included in the project.

8.6 Estimated Costings

The cost of the glazing and insulation required to achieve BCA Section J compliance will be included within the architectural cost estimates.

The costs for the optional sustainability items will also be included in the costs of the other disciplines. Detailed costs will need to be determined during the detailed design phase and will be very dependent on the cost

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9. Acoustic Services

9.1 Objectives

- Provide Acoustic Services to an appropriate standard comparable with other sports facilities installations.
- Acoustic Services for each area to fulfil its designated function.
- Compliance to applicable Australian Standards and WA Regulations.

9.2 Design Criteria

Under Australian Planning Law, the development is governed by several strains of acoustic legislation which connect together to form a regulatory framework aimed at controlling two main areas of concern in buildings. These concerns are;

- Ingress of extraneous noise into 'sensitive' spaces;
- Noise egress from mechanical plant and on-site activities; and

This report is intended to display the ability of the proposed development design to comply with the relevant acoustic criteria applicable to commercial construction projects, contained within the following Australian Standards and statutory legislation:

- *AS2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors; and*
- *Environmental Protection (Noise) Regulations 1997.*

The combined criteria contained therein aims to guide the development and construction of environments toward base levels of acoustical comfort and amenity, to provide spaces that are functional and able to respond to the changing needs of the community, the economy and the environment

9.2.1 Internal Noise Levels

Internal noise levels due to air conditioning and mechanical ventilation plant and external noise break-in should not exceed the maximum levels recommended in Australian Standard AS 2107:2000 "*Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors*"(AS 2107). This Standard recommends satisfactory and maximum internal noise levels for building interiors based on room designation and location of the development relative to external noise sources.

The relevant internal noise levels recommended in AS 2107:2000 are given

Table 2. It is recommended that mechanical services be designed to achieve 5 dB(A) below these levels so as to allow the combined noise level (including hydraulic plant and other external steady sources) to meet the design levels of AS 2107:2000.

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Table 2: Recommended internal noise levels (AS/NZS 2107:2000)

Type of occupancy/activity	Recommended design sound level, L_{eq} dB(A)	
	Satisfactory	Maximum
Function Hall	45	50
Meeting Rooms	30	40
General Offices	40	45
Toilets / Change Rooms / showers	45	55
Kitchen	45	55
Corridors & Lobbies	45	50

9.2.2 Reverberation Time

Reverberation time (RT) refers to the length of time required for the sound field in a space to decay 60 dB. In simple terms this means the amount of time it takes for sound energy to bounce around a room before being absorbed by the surface finishes and air. Closed spaces that don't have sound absorbent materials have long reverberation times (sports halls), and very absorbent rooms have short reverberation times (movie theatres).

Reverberation time affects how well speech is understood and influences the acoustic ambience of a space. The effect on speech intelligibility is noticeable in a long reverberation-time sports hall, where often a person cannot be understood only 3 to 5 m away. The recommended reverberation times as per AS2107 are indicated in Table 3.

Table 3: Recommended reverberation levels (AS/NZS 2107:2000)

Type of occupancy/activity	Reverberation Time, seconds
Function Hall	Minimize[1)]
Meeting Rooms	0.6 – 0.8
General Offices	0.4 – 0.6
Toilets / Change Rooms / showers	NA
Kitchen	NA
Corridors & Lobbies	0.4 – 0.6

[1)] Note AS 2107:2000 recommends that reverberation times in these spaces should be minimised as far as possible for noise control.

9.2.3 Environmental Noise Criteria

External noise emissions from the development must comply with the Western Australia Department of Environmental Protection document, 'Environmental Protection (Noise) Regulations 1997'. This document sets out the outdoor noise criteria, defined as the levels of noise allowed to be received at adjacent noise-sensitive premises at a particular time of the day or night.

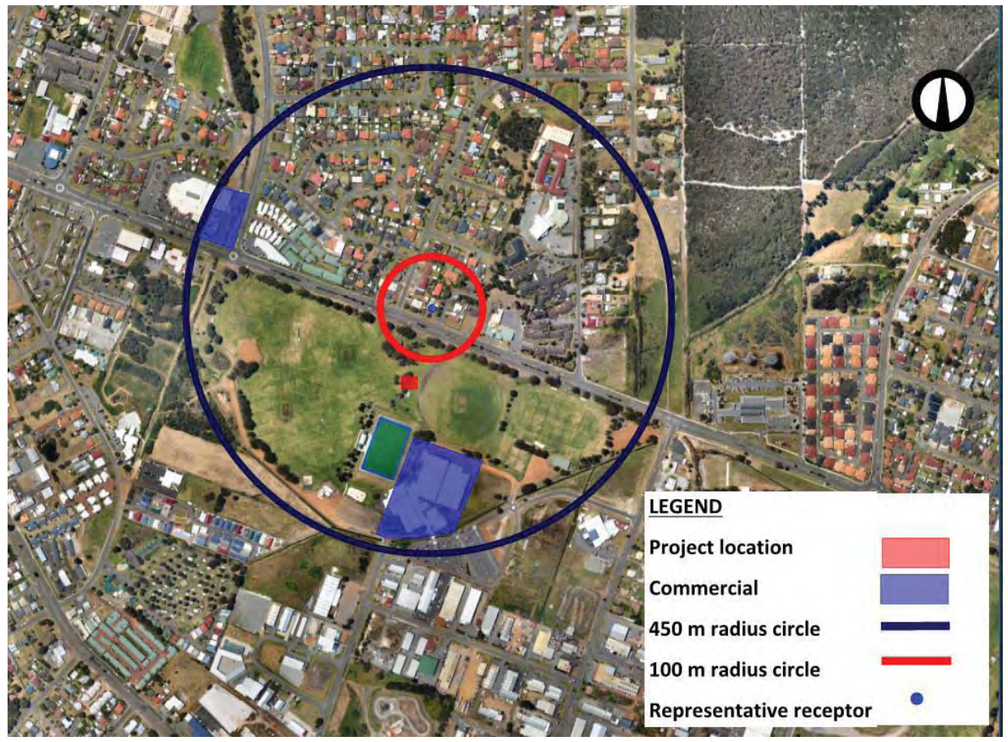
To determine the assigned levels associated with the neighbouring residences of the proposed development, the influencing factor (IF) must be determined. This factor takes into account the amount of industrial and commercial land and the presence of major/secondary roads within a 100 metre radius and a 450 metre radius.

Figure 1 shows an aerial view of the site and the two circles around the site at a radius of 100 metres and 450 metres. Based on the calculation method specified by the WA – DEC Regulations, the influencing factor (IF) is expected to be approximately 0 dB(A). Based on this influencing factor, the calculated assigned levels are presented in

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Table 4.

Figure 1: Influencing Factor (IF) calculation – aerial map



Source: nearmap.com

Table 4: Assigned levels based on calculated influencing factor

Type of premises receiving noise	Time of day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises within 15 metres of a building directly associated with a noise sensitive use	0700 to 1900 hours Monday to Saturday	45	55	65
	0900 to 1900 hours Sunday & public holidays	40	50	65
	1900 to 2200 hours all days	40	50	55
	2200 hours on any day to 0700 hours Monday to Saturday, and 0900 hours Sunday & public holidays	35	45	55
Noise sensitive premises at locations further than 15 metres from a building directly associated with a noise sensitive use	All Hours	60	75	80
Commercial premises	All Hours	60	75	80
Industrial and utility premises	All Hours	65	80	90

The "Environmental Protection (Noise) Regulations 1997 require that "*noise emitted from any premises when received at other premises must not cause, or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind". A noise emission is taken to "significantly contribute to" a level of noise if the noise emission is less than a level which is 5 dB below the assigned level at the point of reception.*

The regulation also requires that the noise character must be "free" of annoying characteristics, namely, tonality, modulation and impulsiveness.

If these characteristics cannot be reasonable and practicably removed, a series of adjustment to the measured levels are required as per Table 5 below.

Table 5: Character adjustments

Adjustment where noise emission is not music these adjustments are cumulative to a maximum of 15 dB			Adjustment where noise emission is music	
Where tonality is present	Where modulation is present	Where impulsiveness is present	Where impulsiveness is not present	Where impulsiveness is present
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

The "Environmental Protection (Noise) Regulations 1997" assigned noise levels only apply at the premises receiving the noise and not to noise within the same site.

These criteria apply to environmental noise emission from plant associated with the development. Noise emissions from this site shall have no tonal, impulsive or modulation characteristics.

Noise from Community Activities

The criteria detailed in section 9.2.3 only applies to the noise emissions from mechanical plant and typical operations of the stadium building at Western Precint.

Western Precinct Soccer / Cricket Pavilion

The WA Environmental Protection (Noise) Regulations 1997, however exempts the noise from 'Community Activities' which includes noise from spectators at organised sporting activities. Any requirements for this exemption will be discussed with Department of Environment Regulation (DER) and City of Albany and detailed in further stages of the project.

9.2.4 Sound Insulation Requirements

The sound insulation requirements for the Western Precinct Soccer / Cricket Pavilion are based on the required degree of speech privacy between rooms. The minimum sound reduction between spaces is detailed in Table 6.

Table 6: Sound insulation requirements

Space/area	R_W
Function Space	55
Meeting Rooms	50-55
Offices	45-50
Change Rooms	45-50
Toilets	45

9.3 Existing Conditions

Not Applicable.

9.4 Proposed Strategies

Not Applicable.

9.5 Unknowns requiring information

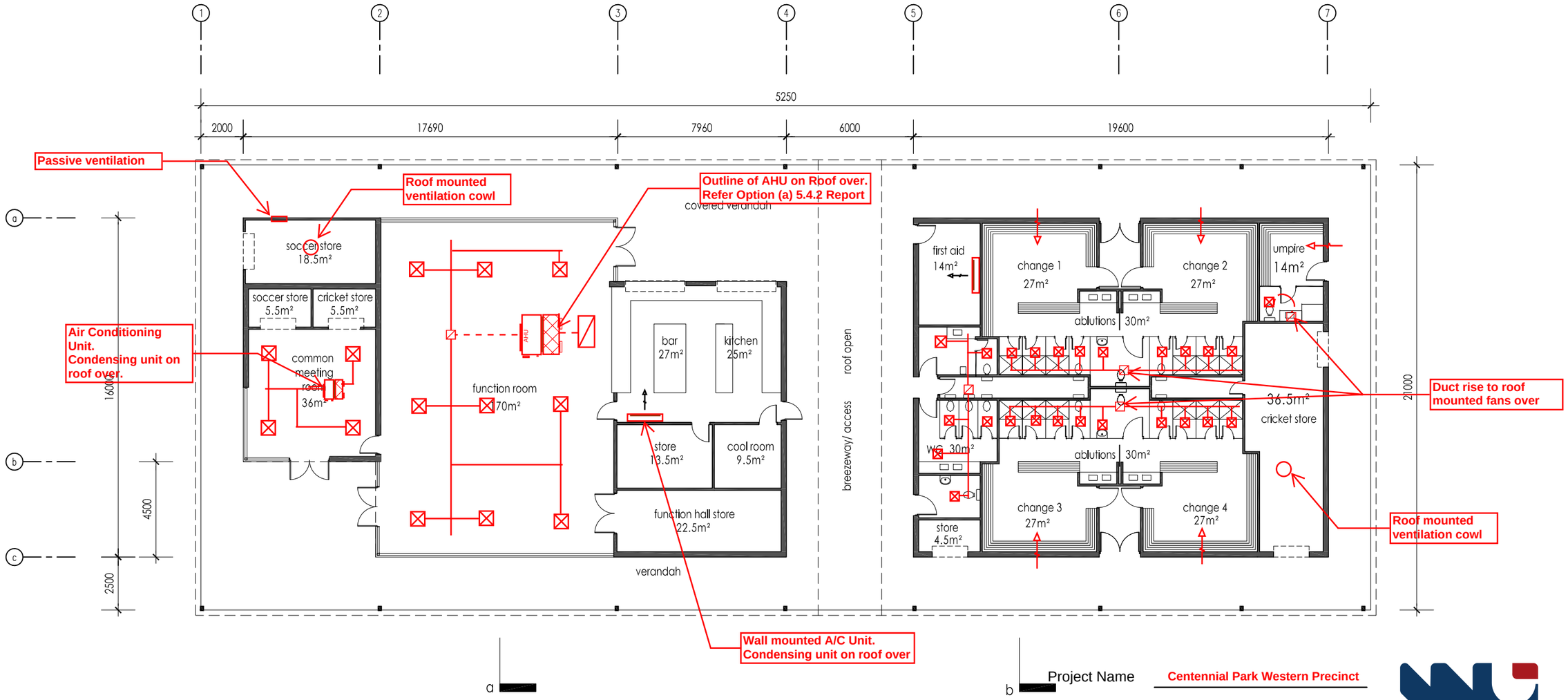
Exemption of noise from the 'Community Activities' and any specific requirements for this exemption, these will be discussed with Department of Environment Regulation (DER) and City of Albany and detailed in further stages of the project.

9.6 Estimated Costings

Not Applicable

Appendix 1 – Mechanical Services Drawings

Appendix 1 – Mechanical Services Drawings



a

b

Project Name	Centennial Park Western Precinct
Project No	
Sketch Title	Mechanical Services Schematic Design
Sketch No	
Date	17/09/2014
By	le.nguyen

WOOD & GRIEVE ENGINEERS
Ground Level
226 Adelaide Terrace
Perth, WA 6000
Phone 08 6222 7000
Fax 08 6222 7100

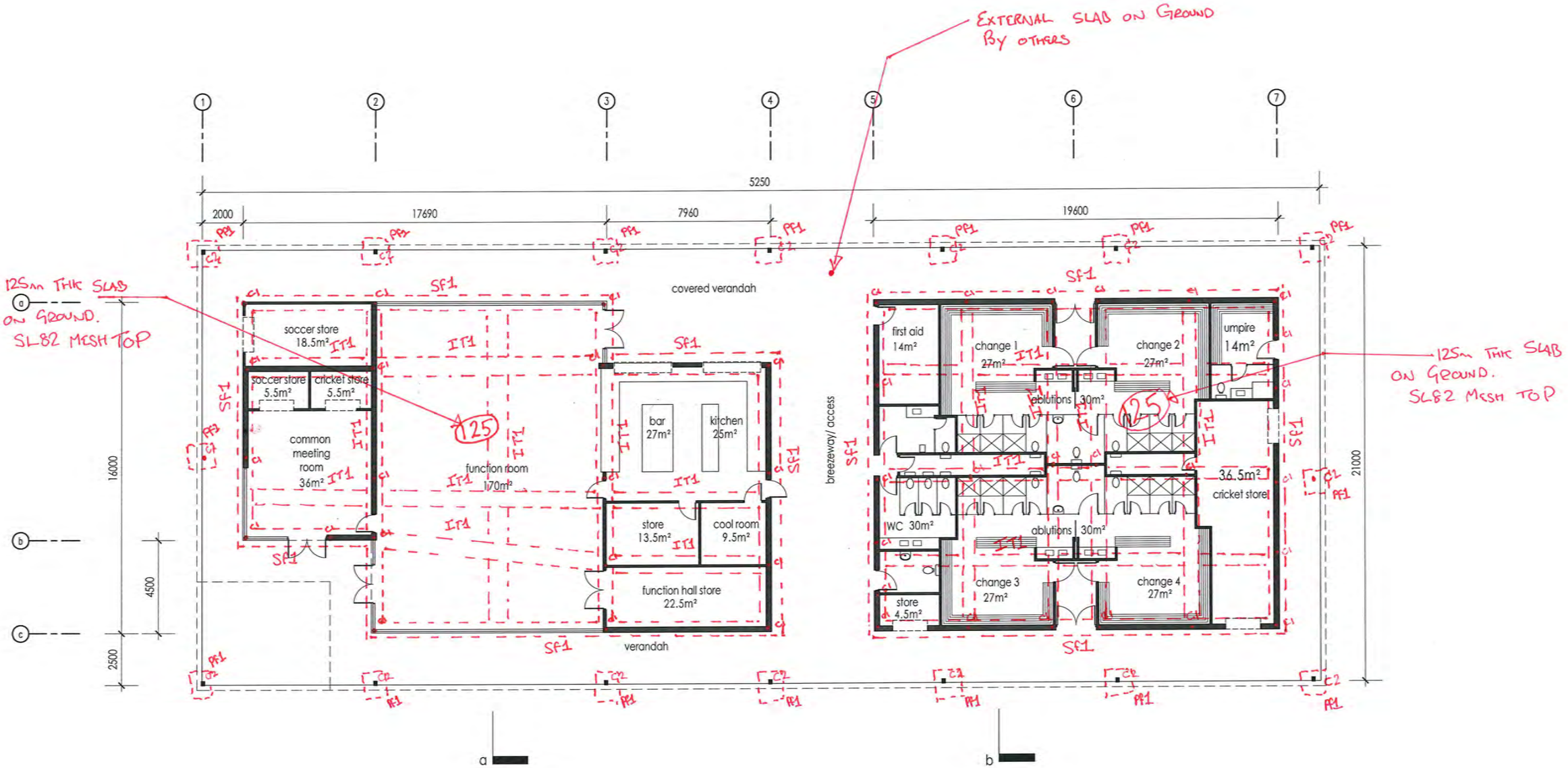
0 1 2 5 10 20

Appendix 2 – Structural Services Drawings

Appendix 2 – Structural Services Drawings

CENTENIAL PARK - PAVILION

FOUNDATION LAYOUT



CONCEPT DESIGN

STRUCTURE SHOWN AS INDICATIVE ONLY. SUBJECT TO DETAILED DESIGN

FOUNDATION SCHEDULE

Pf1 - 1200 x 1200 x 400 DP

Sf1 - 400 w x 400 DP

IT1 - 400 w x 400 DP

gresleyabas
architecture environment design

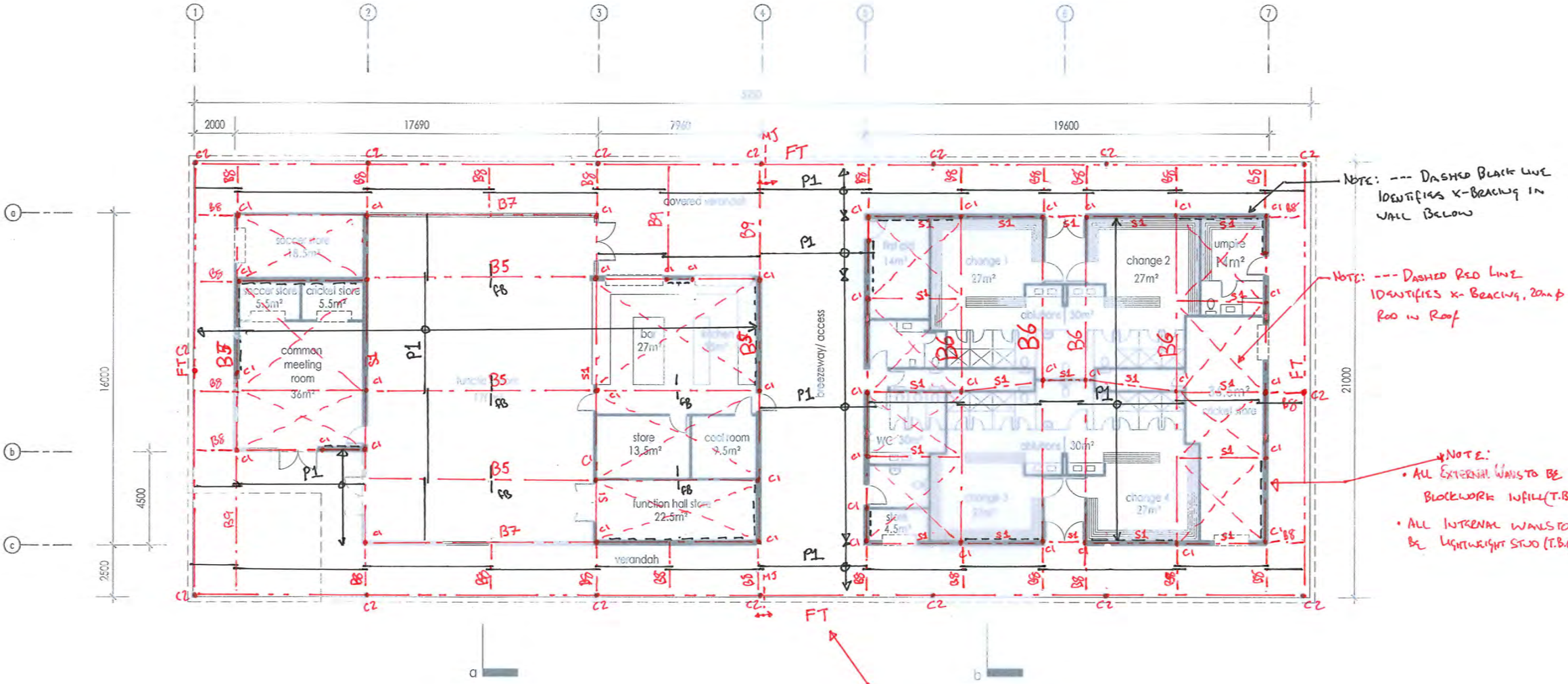
Centennial Park - Western Precinct
257 Cricket/ Soccer Pavilion

Project Name	Centennial Park
Project No	26689-PER-S
Sketch Title	Pavilion - Foundation Layout
Sketch No	S-SK003
Date	9/09/2014
By	James.Lee

WOOD & GRIEVE ENGINEERS
Ground Level
226 Adelaide Terrace
Perth, WA 6000
Phone 08 6222 7000
Fax 08 6222 7100

CENTENIAL PARK - PAVILION

ROOF STRUCTURE



MEMBER SCHEDULE

B5 - 310 UB 40.4
B6 - 310 UB 32.0
B7 - 250 UC 72.9
B8 - 200 UB 18.0
B9 - 250 UB 25.7

C1 - 100 x 5 SHS

P1 - 220015 @ 1200mm c/c

CONCEPT DESIGN

STRUCTURE SHOWN AS INDICATIVE ONLY. SUBJECT TO DETAILED DESIGN

Project Name	Centennial Park
Project No	26689-PER-S
Sketch Title	Pavilion - Roof Structure
Sketch No	S-SK004
Date	9/09/2014
By	James.Lee

WOOD & GRIEVE ENGINEERS
Ground Level
226 Adelaide Terrace
Perth, WA 6000
Phone 08 6222 7000
Fax 08 6222 7100

Schematic Design
BCA Compliance Report

Project:	Albany Centennial Park Sports Precinct
Site Address:	Centennial Park Sporting Precinct, North Road, Centennial Park WA 6330
Client:	Gresley Abas
Our Ref:	14000030
Date:	18 September 2014
Revision:	1

Author	**Reviewed**
Paul.da Costa	Wayne Chant
Associate Director	**Associate Director**
Registration No. 112	**Registration No. 157**

www.codegroup.com.au

EXECUTIVE SUMMARY

The Preliminary BCA Compliance Report and Strategy has been prepared by CODE Building Surveyors for Gresley Abas Architects to outline how the development will comply with the National Construction Code (NCC), Building Code of Australia (BCA) by satisfying the performance requirements of the Building Code of Australia.

The following BCA strategy will outline the key BCA compliance criteria, whilst identifying aspects that will need to be addressed via the Performance provision of the BCA.

BCA Strategy

No major items of non-compliance have been identified as a result of the schematic design NCC BCA assessment. As a result no items have been identified as potentially requiring an alternative solution (fire or otherwise).
The items identified in the schematic BCA review are provided as compliance guidance to assist in the collation and confirm compliance at the next review stage.

INTRODUCTION

The proposal consist of a single store football stadium building with associated change room facilities and a Soccer/Cricket Pavilion at the City of Albany's Centennial Park.

This report has been developed to assist the client and the design team to address any areas of the project scope that require attention in relation to the deemed-to-satisfy provisions of the NCC Building Code of Australia, Volume 1 and Certificate of Design Compliance.

REPORT SCOPE & LIMITATIONS

The extent of the BCA Audit and or certification excludes assessment against the Safety Codes of Practice for "Safe Design of Buildings and Structures" unless formally engaged to undertake this assessment.

CODE Group (CODE) offer this advice based on our knowledge of the building and the information received from the client or client's representative as described in the description of the building and classification listed in the building assessment data. This report is provided to and is to be used by the direct client to CODE and use of this report for any other purpose, project or any changes to the design without further assessment or certification from CODE will invalidate the content of and certification associated with this document. No part of this document may be reproduced in any form or by any means without written permission from CODE. This report is based solely on client instructions, and therefore should not be used by any third party without prior knowledge of such instructions.

All advice provided by CODE is in good faith and the provision of specialist design and certification (alternative design solutions, design and commissioning certificates and reports) by appropriately qualified consultants will be taken on face value. CODE will not be responsible for the accuracy, appropriateness or third party review of information provided for the purpose of determining compliance. CODE will not be held responsible for interpretations of other building surveyors, conditions of development approval or local laws associated with non-BCA matters prior to the submission of a permit application to the local authority.

The extent of this report does not include assessment for stock loss, goodwill, environmental impact (in fire situation), or any loss of trade or business interruption associated directly or indirectly with fire in these premises.

The report does not provide advice on the Access to Premises Standard Legislation, of which will be undertaken by other parties with suitable recommendations for compliance being provided.

BUILDING ASSESSMENT DATA

The building assessment date is used to determine the BCA and risk status of the building.
Permit Authority: City of Albany

Football Stadium Building Building Characteristics (Eastern Precinct)	
Classification	9b
No. of Storeys Contained	1
Rise in Storeys	1
Type of Construction	C
Effective Height	<12m

Soccer/Cricket Pavilions Building Characteristics (Western Precinct)	
Classification	9b
No. of Storeys Contained	1
Rise in Storeys	1
Type of Construction	C
Effective Height	<12m

Notes:

- The estimated population numbers will be developed and articulated as part of the design phase and fire engineering strategy for the development. All future population calculations will be estimated in accordance with Table D1.13 of the BCA or as agreed with the building certifier.
- Carparking areas have been considered ancillary to the use for the purposes of population numbers

BUILDING IMPORTANCE LEVEL

The building Importance Level (IL) must be determined to ensure that the structural engineer includes the probabilities of the design events for safety in their building design.

The Building Importance Level is interpreted to be :

Football Stadium Building Building Characteristics : 3
Soccer/Cricket Pavilions Building : 2

BCA Table B1.2a Importance Levels of Building and Structures.

Importance level	**Building Types**
1	Building or structures presenting a low degree of hazard to life and other property in the case of failure.
2	Building or structures not included in importance level 1, 3 and 4.
3	Building or structures that are designed to contain a large number of people.
4	Building or structures that are essential to pot-disaster recovery or associated with hazardous facilities.

Notes:

- Whilst CODE has estimated the BIL for the building based on the information provided by our client, it is subject to agreement with the structural engineer for its compatibility with the use proposed.
- Occupancy load numbers are determined by BCA D1.13, Number of persons accommodated. If it is intended that the occupants converge for emergency purposes the owner/designer is to provide details.

SAFETY IN DESIGN

The Occupational Safety and Health regulations of 1996 (Part 3.140) require a Designer to provide a Safety Report to the person who commissions the Design for commercial construction projects.

CODE offer a Safety in Design service to Architects and Designers to assist them to meet their legislated obligations under the Work Safety and Health Act.

DFES & GENERAL REQUIREMENTS

Department of Fire & Emergency (DFES)

It should be noted that DFES are referenced in the Building Act and regulations as a commentary body, not an approval authority.

Comment:
Plans and specifications are required to be lodged with DFES 15 business days prior to a Certificate of Design Compliance being issued.

Action:
Once design development has progressed to working drawings stage please provide CODE with one hard copy of Architectural, Electrical, Hydraulic and Mechanical documentation to allow us to lodge to DFES.

Development Approval

Please contact the relevant planning authority for written confirmation of whether development approval is required for the scope of works.
If a development approval (DA) has been issued the design drawings must comply with the approved plans and relevant conditions. A copy of the Development Approval Conditions and Plans are to be provided to Code Group with written confirmation that the proposed design is consistent with DA plans and conditions.

BCA COMPLIANCE REVIEW

The results of this review are preliminary in nature and should not be construed as being a complete list of items for CDC. We can advise that the following BCA compliance issues require resolution and inclusion in documentation lodged for the next stage review.

Legend:
To comply: means proposed works to comply with the BCA
Alternative Solution: Possible alternative solution to address performance requirements
Detail required: means additional detail is required to confirm compliance

Content:

1. **Safe Movement & Egress** Travel Distance, exit widths, stairs, exit lighting
2. **Sanitary & Accessible Facilities** Facility numbers, layout, health requirements
3. **Access for People with Disabilities** Carparking, pathways, circulation, lifts
4. **Fire Compartment & Separation** Fire compartment size, fire walls, openings
5. **Structure & Fire Resistance** Importance Level, wind loadings, fire resistance
6. **Fire Services & Equipment** Hydrants, sprinklers, hose reels, extinguishers
7. **Smoke Hazard Management** Detection & alarm, smoke control & suppression
8. **Health & Amenity** Light & ventilation, ceiling heights
9. **Energy Efficiency** Building Fabric, glazing, services

1 SAFE MOVEMENT & EGRESS

Dimensions of Exits & Paths of Travel to Exits (Part D1.6)
In a required exit or path of travel to an exit the unobstructed height throughout must be not less than 2 m, except the unobstructed height of any doorway may be reduced to not less than 1980 mm; and the unobstructed width of each exit or path of travel to an exit, except for doorways, must be not less than 1m.
Comment:
Ensure one metre minimum width is provided to the Umpire 1 passageway.

Goings and Risers (Part D2.13)
(a) A stairway must have—

- not more than 18 nor less than 2 risers in each flight; and
- going (G), riser (R) and quantity (2R + G) in accordance with Table D2.13; and
- except as permitted by (b) and (c), goings and risers that are constant throughout in one flight; and
- risers which do not have any openings that would allow a 125 mm sphere to pass through

between the treads; and

- (v) treads which have a surface with a slip-resistance classification not less than that listed in Table D2.14 when tested in accordance with AS 4586; or a nosing strip with a slip-resistance classification not less than that listed in Table D2.14 when tested in accordance with AS 4586

Going and riser dimensions to stairways must be in the range of:

Riser (R)		Going (G)		Quantity (2R+G)	
Max	Min	Max	Min	Max	Min
180	115	355	280	700	550

Action:
Riser and going dimensions to be provided on documentation submitted at certificate of design compliance stage.

Balustrades & Other Barriers (Part D2.16)
Balustrades must achieve a compliant height above floor level and incorporate balusters that are compliant with Part D2.16 of the NCC BCA Volume 1.
Action:
Documentation detailing compliant balustrades to be submitted at certificate of design compliance stage.

Emergency Lighting Requirements (Part E4.2)
An emergency lighting system must be installed in every storey of a Class 9b building where the storey has a floor area more than 300 m2—
(i) in every passageway, corridor, hallway, or the like, that is part of the path of travel to an exit; and
(ii) in any room having a floor area more than 100 m2 that does not open to a corridor or space that has emergency lighting or to a road or open space; and
(iii) in every room or space to which there is public access in every storey in a Class 9b building if—

- the floor area in that storey is more than 300 m2; or
- any point on the floor of that storey is more than 20 m from the nearest doorway leading directly to a stairway, ramp, passageway, road or open space; or
- egress from that storey involves a vertical rise within the building of more than 1.5 m, or any vertical rise if the storey concerned does not admit sufficient light; or
- the storey provides a path of travel from any other storey required by (i), (ii) or (iii) to have emergency lighting

Action:
Documentation detailing compliant balustrades to be submitted at certificate of design compliance stage.

Exit Signs (Part E4.5)
An exit sign must be clearly visible to persons approaching the exit, and must be installed on, above or adjacent to each—
(a) door providing direct egress from a storey to—

(i) an enclosed stairway, passageway or ramp serving as a required exit; and
(ii) an external stairway, passageway or ramp serving as a required exit; and
(iii) an external access balcony leading to a required exit; and
(b) door from an enclosed stairway, passageway or ramp at every level of discharge to a road or open space; and
(c) horizontal exit; and
(d) door serving as, or forming part of, a required exit in a storey required to be provided with emergency lighting in accordance with E4.2.
Action:
Details are to be provided from the electrical design engineer detailing exit signage that is compliant with AS2293.1-2005 and is clearly visible at all times when the building is occupied by any person having right of legal entry to the building.

Handrails (Part D2.17)
Handrails must be located as required by Part D2.17 of the NCC BCA Volume 1.
Comment:
Handrails requirements have been identified for the proposed football stadium building to the proposed concrete terraces.
Action:
Documentation demonstration compliance to be provided at Design Certification assessment stage.

Refrigerated Chambers, Strong Rooms and Vaults (Part G1.2)

A refrigerated or cooling chamber which is of sufficient size for a person to enter must have—
(i) a door which is capable of being opened by hand from inside without a key; and
(ii) internal lighting controlled only by a switch which is located adjacent to the entrance doorway inside the chamber, strongroom or vault; and
(iii) an indicator lamp positioned outside the chamber, strongroom or vault which is illuminated when the interior lights required by (a)(ii) are switched on; and
(iv) an alarm that is—
(A) located outside but controllable only from within the chamber, strongroom or vault; and
(B) able to achieve a sound pressure level outside the chamber, strongroom or vault of 90 dB(A) when measured 3 m from the sounding device.

A door required by (a)(i) in a refrigerated or cooling chamber must have a doorway with a clear width of not less than 600 mm and a clear height not less than 1.5 m.
Action:
Details/documentation demonstrating compliance with the above requirements is to be provided.

Seating Area (Public Halls) (H1.4)
In a seating area the gradient of the floor surface must not be steeper than 1 in 8, or the floor must be stepped so that—
(i) a line joining the nosings of consecutive steps does not exceed an angle of 30° to the horizontal; and

(ii) the height of each step in the stepped floor is not more than 600 mm; and
(iii) the height of any opening in such a step is not more than 125 mm; and
If an aisle divides the stepped floor and the difference in level between any 2 consecutive steps—
(i) exceeds 230 mm but not 400 mm — an intermediate step must be provided in the aisle; and
(ii) exceeds 400 mm — 2 equally spaced intermediate steps must be provided in the aisle; and
(iii) the going of intermediate steps must be not less than 270 mm and such as to provide as nearly as practicable equal treads throughout the length of the aisle; and
(c) the clearance between rows of fixed seats used for viewing performing arts, sport or recreational activities must be not less than—
(i) 300 mm if the distance to an aisle is not more than 3.5 m; or
(ii) 500 mm if the distance to an aisle is more than 3.5 m.

Comment:

These requirements are applicable to the open concrete terraced seating areas of the Football Stadium Building.

Action:

Details of the proposed terraces to be provided at design certification assessment stage.

Safe movement and access - Due to the preliminary nature of the review we have not included every BCA clause and the following BCA considerations, where relevant, will need to be included in further design documentation: Pedestrian ramps (D2.10), Goings and risers (D2.13), Landings (D2.14), Thresholds (D2.15), Balustrades or other barriers (D2.16), Handrails (D2.17), Fixed platforms, walkways, stairways and ladders (D2.18), Doorways and doors (D2.19), Operation of latch (D2.21), Re-entry from fire-isolated exits (D2.22), Signs on doors (D2.23), Emergency lighting requirements (E4.2), Design and operation of emergency lighting (E4.4), Exit signs (E4.5), Direction signs (E4.6), Design and operations of exit signs (E4.8)

2 SANITARY & ACCESSIBLE FACILITIES

Facilities in Class 3-9 Buildings (Part F2.3)

Sanitary facilities must be provided in class 9 buildings as required by Part F2.3 of the NCC BCA Volume 1.

Comment:

Sanitary facilities calculations below are based on occupant numbers as advised by Gresley Abas. Facilities specifically provided for sport participants are not included in the calculations below.

Action:

Sanitary facilities to be provided as per tables below.

Required Facilities in Class 3 to 9 buildings (F2.3)

Football Stadium Building

(sports venues or the like)

	Occupants	Closet Pans	Urinals	Washbasins
Male	250	1	3	2
Female	250	5		3
Total	500	6	3	5

Facilities in Class 3 to 9 buildings (F2.3)

Soccer/Cricket Pavilion

(public halls, function rooms or the like)

	Occupants	Closet Pans	Urinals	Washbasins
Male	100	1	2	2
Female	100	3		2
Total	200	4	2	4

Notes:

- Calculation of persons accommodated is to be calculated according to BCA D1.13 if it cannot be more accurately determined by other means. If there are specific design maximum numbers associated with the project they may be used as a basis of calculation.
- Floor areas may be adjusted without ancillary areas such as sanitary facilities, corridors, shelving and or racking layouts in storage areas.
- CODE are not responsible for design occupancy calculation numbers are used in sanitary facility calculations.
- In calculating the number of sanitary facilities to be provided, a unisex facility required for people with a disability may be counted once for each sex.
- A closet pan may be used in place of a urinal.

Sanitary & Accessible Facilities - Due to the preliminary nature of the review we have not included every BCA clause and the following BCA considerations, where relevant, will need to be included in further design documentation: Construction of sanitary compartments (F2.5), Methods of extend of natural lighting (F4.2), Ventilation of rooms (F4.5), Natural ventilation (F4.6)

3 ACCESS FOR PEOPLE WITH DISABILITIES

Please refer to our separate Access Report for this project, completed by a qualified Access Consultant.

4 FIRE COMPARTMENTS & SEPARATION

Comment:

Currently no compartmentation is proposed for the project buildings.
Compartmentation /separation is commonly incorporated in building design to reduce the requirement for fire services and the required type of construction.

5 STRUCTURE & FIRE RESISTANCE

Determination of Individual Actions (B1.2)

AS1170.1 – Permanent & Imposed Actions

To be determined by structural engineer

AS1170.2 – Wind Actions

To be determined by structural engineer appropriate to the wind region

Construction of Buildings in flood hazard areas (B1.6)

Geotechnical engineer to determine whether proposed building is located in an area subject to flooding and advise of the minimum floor level for the building.

Specification C1.1 Fire Resistance Levels

All building elements will need to comply with the FRL's detailed in the appropriate table in Appendix A at the rear of this report.

Structure & Fire Resistance - Due to the preliminary nature of the review we have not included every BCA clause and the following BCA considerations, where relevant, will need to be included in further design documentation:

6 FIRE SERVICES & EQUIPMENT

Fire Hydrant Systems (Part E1.3)

A fire hydrant system must be provided to serve a building having a total floor area greater than 500 m2 where a fire brigade is available to attend a building fire.

Comment:

The fire hydrant system must be installed in accordance with AS 2419.1. This requirement is applicable to Football Stadium Building (Eastern Precinct) only.

Action:

A fire hydrant system will be required to serve all parts of this building. A flow and pressure test should be carried out in the first instance to determine the capacity of the town main to provide the required minimum flow rate and pressure of 10L/s @ 200 kPa for each hydrant (2 minimum). If the town mains cannot provide this level of performance with an allowance of 40 kPa for loss of pressure due to installation of a backflow prevention device,

Fire hose reels (Part E1.4)

A fire hose reel system must be provided to serve any fire compartment with a floor area greater than 500 m2.

The fire hose reel system must—

(i) have fire hose reels installed in accordance with AS 2441; and

Comment:

Fire hose reels are required to service the proposed buildings and are to be in accordance with AS2441.

Action:

Details of a compliant system be included in design documentation.

Fire Services & Equipment - Due to the preliminary nature of the review we have not included every BCA clause and the following BCA considerations, where relevant, will need to be included in further design documentation: Fire Hydrants (E1.3), Fire hose reels (E1.4), Portable fire extinguishers (E1.6, Fire control centres (E1.8) and Fire precautions during construction (E1.9).

7 SMOKE HAZARD MANAGEMENT

Comment:

Due to the use, size and rise in storeys of the proposed buildings, there are no smoke hazard management requirements for this project.

8 HEALTH & AMENITY

Stormwater Drainage (Part F1.1)

Stormwater drainage must comply with AS/NZS 3500.3 and local council requirements.

Action:

Hydraulic services plans will be required showing stormwater disposal at Design Certification assessment stage.

Artificial Lighting (Part F4.4)

Artificial lighting must be provided in required stairways, passageways and ramps; and if natural lighting equivalent to that required by the NCC BCA Part F4.2 is not available , and the periods of occupation of the room will create undue hazard to occupants seeking egress in an emergency then artificial lighting is to be provided to all rooms that are frequently occupied, all spaces required to be accessible , all corridors , lobbies, internal stairways, other circulation spaces and paths of egress.

Comment:

The artificial lighting system is to comply with AS/NZS 1680.0

Action:

Documentation demonstration compliance to be provided at Design Certification assessment stage.

Ventilation of Rooms (Part F4.5)

A habitable room, office, shop, factory, workroom, sanitary compartment, bathroom, shower room, laundry and any other room occupied by a person for any purpose must have—

(a) natural ventilation complying with Part F4.6; or

(b) a mechanical ventilation or air-conditioning system complying with AS 1668.2 and AS/NZS 3666.1.

Action:

Documentation demonstration compliance to be provided at Design Certification assessment stage.

Kitchen Local Exhaust Ventilation
A commercial kitchen must be provided with a kitchen exhaust hood complying with AS/NZS 1668.1 and AS1668.2 where -
a) any cooking apparatus has -
i) a total maximum electrical power input exceeding 8kW; or
ii) a total gas power input exceeding 29MJ/h; or
b) the toatl maximum power input to more than on apparatus exceeds-
i) 0.5kW electrical power; or
ii) 1.8 MJ gas;
per sqm of floor area.
Action:
Documentation demonstration compliance to be provided at Design Certification assessment stage.

Health & Amenity - Due to the preliminary nature of the review we have not included every BCA clause and the following BCA considerations, where relevant, will need to be included in further design documentation:
External above ground membranes (F1.4), Roof coverings (F1.5), Sarking (F1.6), Waterproofing of wet areas in buildings (F1.7), Damp-proofing (F1.9),Damp-proofing of floors on the ground (F1.10), Provision of floor wastes (F1.11), Sub-floor ventilation (F1.12), Glazed assemblies (F1.13), Height of rooms and other spaces (F3.1),

9 ENERGY EFFICIENCY – SECTION J

Building Fabric & Glazing (Part J1,2 & 3)
Building Fabric and Glazing elements are to comply with the energy efficiency requirements of the BCA
Action:
Compliance with the above requirements is to be provided through a Energy Efficiency Compliance report.

Air Conditioning and Ventilation Systems (Part J5)
Air-conditioning and ventilation systems are to comply with the energy efficiency requirements identified in Part J5 of the BCA.
Action:
Documentation demonstration compliance to be provided at Design Certification assessment stage.

Artificial Lighting and Power (Part J6)
Artificial lighting and power are to comply with the energy efficiency requirements identified in Part J6 of the BCA.
Action:
Documentation demonstration compliance to be provided at Design Certification assessment stage.

DRAWINGS

This report has been prepared based on the review of the following Architectural plans prepared by Gresley Abas Architects.

Drawing No.	Title	Revision	Date
1411 - SD01	Football Stadium Building Floor Plan - Schematic Design	B	22/08/2014
1411 - SD01	Soccer/Cricket Pavilion Floor Plan - Schematic Design	B	22/08/2014

REFERENCES

- Australian Building Codes Board, National Construction Code (2014), Building Code of Australia, Volume 1
- Australian Building Codes Board, National Construction Code (2014), Building Code of Australia, Volume 2
- Australian Building Codes Board, National Construction Code (2014), Guide to the Building Code of Australia, Class 2-9 Buildings
- Australian Standards: AS1428.1-2009 Design of Access and Mobility, Part 1: General Requirements for Access – New Building work

APPENDICES

Appendix A: Fire Resistance Levels
Appendix B: Essential Safety - Design and Installation
Appendix C: List of Requirements

Appendix A: Fire Resistance Levels

Table 5 Type C Construction: FRL of Building Elements (in minutes)

BUILDING ELEMENT	Class 2,3 or 4 part	5,7a or 9	6	7b or 8
EXTERNAL WALL (including any column and other building element incorporated therein) or other external building element, where the distance from any fire-source feature to which it is exposed is—				
For loadbearing parts—				
Less than 1.5 m	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90
1.5 to less than 3 m	–/–/–	60/ 60/ 60	60/ 60/ 60	60/ 60/ 60
3 m or more	–/–/–	–/–/–	–/–/–	–/–/–
For non-loadbearing parts—				
Less than 1.5 m	–/ 90/ 90	–/120/120	–/180/180	–/240/240
1.5 to less than 3 m	–/ 60/ 30	–/ 90/ 60	–/120/ 90	–/180/120
3 m or more	–/–/–	–/–/–	–/–/–	–/–/–
EXTERNAL COLUMN not incorporated in an external wall, where the distance from any firesource feature to which it is exposed is—				
Less than 1.5 m	90/–/–	90/–/–	90/–/–	90/–/–
1.5 to less than 3 m	–/–/–	60/–/–	60/–/–	60/–/–
3 m or more	–/–/–	–/–/–	–/–/–	–/–/–
COMMON WALLS and FIRE WALLS	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90
INTERNAL WALLS				
Bounding public corridors, public lobbies and the like—	60 / 60/ 60	–/–/–	–/–/–	–/–/–
Between or bounding sole-occupancy units—	60 / 60/ 60	–/–/–	–/–/–	–/–/–
Bounding a stair if required to be rated—	60/ 60/ 60	60/ 60/ 60	60/ 60/ 60	60/ 60/ 60
ROOFS	–/–/–	–/–/–	–/–/–	–/–/–

Appendix B: Essential Safety - Design & Installation Standards

The following safety measures to be installed in the proposed building are to be designed and installed to comply with the Building Code of Australia and referenced Standards unless forming part of an alternative solution. The applicable year of the adopted standards reflect those adopted by the BCA at the time of lodgement of the Building Permit Application.

Requirement	BCA Reference	Standard
Access for people with disabilities	Part D3	AS 1428.1 - 2009
Accessible Facilities, facilities, signage	D3.6	AS 1428.1 - 2009
Accessible Parking	D3.5	AS 2890.1 -
Automatic Fail Safe Devices	D2.21	
Automatic Fire Detection System	BCA Spec. E2.2a	AS/NZS 1668.1
Car park Ventilation	F4.11	AS 1668.2
Emergency Lighting	E4.2, E4.4	AS/NZS 2293.1
EWIS (SSISEP)	E4.9	AS 1670.4 – 2004
Exit signs	E4.5, 4.6, 4.7	AS/NZS 2293.1
Exit Doors (power operated)	D2.19(b)	
Fire Hazard Properties	Spec C1.10	AS 1530, AS 4254, AS 1735.2
Fire Resisting Construction	Spec C1.1	AS 1530
Fire Doors	Spec C3.4	AS/NZS 1905.1
Fire Stopping Systems	C3.15	AS 1530.4, AS 4072.1
Fire Hydrant System	E1.3	AS 2419.1
Fire Hose Reels	E1.4	AS 2441.1
Fire & Smoke Alarms	Table E2.2 & Spec E2.2	AS 1670.1
Fire Service Controls	E3.7	AS 1735.1
Glazed Assemblies	B1.4	AS 2047
Glass	B1.4	AS 1288
Latches	D2.21	
Lift Facilities	E3.6	AS 1735.12
Lightweight Construction	C1.8	AS 1530.3 – 1999
Mechanical Ventilation & Air Conditioning Systems	E2.2	AS/NZS 1668.1 & AS 1668.2
Non-combustible materials	C1.12	AS 1530
Portable Fire Extinguishers	E1.6	AS 2444 – 2001
Power operated doors	D2.19	
Pressurising Systems	E2.2	AS/NZS 1668.1 -1998
Structural Provisions	Part B1	as per BCA Part B1
Smoke Hazard Management	Table E2.2a	AS/NZS 1668.1
Sound Transmission	Part F5	AS/NZS 1276.1 / ISO 717.1
Tactile Indicators	D3.8	AS1428.1

Appendix C: List of Design Documentation

Prior to assessment of
Before we can allocate resources to your project we need the following information:

PRELIM & BCA STRATEGY	Scaled PDF drawings
	Copy of relevant development approvals
	Copies of other relevant approvals
DFES SUBMISSION	Fire Services Drawings
DESIGN CERTIFICATION	Architectural working drawings
	Document transmittal listing all current drawings for CDC
	2 full sets of drawings (to scale) and supportive documentation Structural engineering drawings & certification Hydraulic consultants drawings & certification Mechanical consultants drawings & certification Electrical consultant drawings & certification Energy efficiency report Geotechnical report Acoustic report where relevant
PERMIT COORDINATION	Completed and signed Form BA01 Certified Building Permit Application Form for lodgement Applicable council fees and taxes (cheque or credit card authorisation)

Schematic Design Access Report

Project:	Albany Centennial Park Sports Precinct
Site Address:	Centennial Park Sporting Precinct, North Road, Centennial Park WA 6330
Client	Gresley Abas
Our Ref:	14000030
Date:	25 Aug 2014
Revision:	0

Author

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Reviewed

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Associate Director
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EXECUTIVE SUMMARY

The Schematic BCA Access Report and Strategy has been prepared by CODE Access Consultants for Gresley Abas Architects to outline how the development will comply with the National Construction Code (NCC) and Building Code of Australia 2013 (BCA) by satisfying the performance requirements of parts D3 Access for People with a Disability, E3.6 Passenger Lifts and F2.4 Accessible Sanitary Facilities of the Building Code of Australia 2013.

The following BCA strategy will outline the key BCA Access provisions compliance criteria, while identifying aspects that will need to be addressed via the Performance provision of the BCA.

DISABILITY ACCESS STRATEGY

WESTERN PRECINCT

- Provide step free transitions to and through the veranda and buildings.
- Widen doorways at areas marked on the drawings to achieve 850mm door opening width.
- Increase external latch clearances to 660mm at ablutions area leading into each unisex accessible facility and internal latch to 530mm at change rooms 1-4 for an exit from the areas.
- Provide appropriate wheelchair turning spaces leading into change rooms 1-4.
- Reduce cubicle width at one ambulant WC and swing both ambulant doors outwards to achieve doorway and pan circulation spaces.
- Provide an accessible shower in each unisex accessible facility and ensure configuration of the facility as a whole complies.

EASTERN PRECINCT

- Provide accessible features on all stairways throughout the building an external environment (including handrails at each side with extensions at top and bottom, contrasting nosings and tactile ground surface indicators).
- Widen doorways at areas marked on the drawings to achieve 850mm door opening width.
- Provide 110mm hinge clearance at the terrace area leading into the function space.
- Increase the corridor length to 1240mm at the amenity area (entry to UAT).
- Increase internal latch clearance within the umpire 1 and ablution areas to 530mm.
- Increase external ramp landing space to 1200mm at the intermediate landing.
- Provide appropriate wheelchair turning spaces leading to umpire 1 to 1500x1500mm (with permitted 500x500mm internal truncations).
- Make provision for wheelchair seating spaces at the tiered viewing area.
- Include hearing augmentation provisions where inbuilt amplification system/s are installed for people with hearing impairment.

INTRODUCTION

The proposal consists of a single story football stadium building with associated change room facilities and a Soccer/Cricket Pavilion at the City of Albany's centennial park.

This report has been developed to assist the client and the design team to address any areas of the project scope that require attention in relation to the deemed-to-satisfy provisions of the NCC Building Code of Australia, Volume 1 and Certificate of Design Compliance.

REPORT SCOPE & LIMITATIONS

This benchmark for this BCA Access Preliminary Report is the Building Code of Australia, Australian Standards 1428.1, 1428.4.1, 2890.6 and 1735.12 as well as some additional considerations to improve general access to the facility. It provides an overview of the key access issues to consider in the design of the facility to provide improved access for all users.

CODE Group (CODE) offer this advice based on our knowledge of the building and the information received from the client or client's representative as described in the description of the building and classification listed in the building assessment data. This report is provided to and is to be used by the direct client to CODE and use of this report for any other purpose, project or any changes to the design without further assessment or certification from CODE will invalidate the content of and certification associated with this document. No part of this document may be reproduced in any form or by any means without written permission from CODE. This report is based solely on client instructions, and therefore should not be used by any third party without prior knowledge of such instructions.

All advice provided by CODE is in good faith and the provision of specialist design and certification (alternative design solutions, design and commissioning certificates and reports) by appropriately qualified consultants will be taken on face value. CODE will not be responsible for the accuracy, appropriateness or third party review of information provided for the purpose of determining compliance. CODE will not be held responsible for interpretations of other building surveyors or access consultants, conditions of development approval or local laws associated with non-BCA matters prior to the submission of a permit application to the local authority.

BUILDING ASSESSMENT DATA

The building assessment data is used to determine the general building access requirements and the parts within that are required to be accessible in accordance with the Building Code of Australia.

Permit Authority: City of Albany

	Building characteristics
Classification	9b
Rise in Storeys	1

BCA COMPLIANCE REVIEW

The results of this review are preliminary in nature and should not be construed as being a complete list of items for CDC. We can advise that the following BCA Access provisions require resolution and inclusion in documentation lodged for the next stage review.

Content:

1. ACCESS REQUIREMENTS FOR PEOPLE WITH A DISABILITY
1.1 BUILDING CODE OF AUSTRALIA 2013 Volume One
Part D3.2 Access to buildings
Part D3.3 Parts of buildings to be accessible
Part D3.7 Hearing Augmentation
Part D3.8 Tactile Indicators
Part D3.9 Wheelchair seating spaces
Part E3.6 Passenger lifts
Part F2.4 Accessible sanitary facilities
1.2 AUSTRALIAN STANDARD 1428.1 2009 General access req's-new building work
Clause 6 Continuous accessible paths of travel
Clause 10 Ramps & landings
Clause 11 Stairways
Clause 13 Doorways, doors and circulation spaces at doorways
Clause 15/16 Sanitary facilities for people with disabilities

1 ACCESS REQUIREMENTS FOR PEOPLE WITH A DISABILITY

New buildings and buildings that undergo significant modification require inclusion of Access provisions in line with the federal Disability Discrimination Act (DDA).

1.1 BUILDING CODE OF AUSTRALIA 2013 V1

D3.2 Access to the Buildings

(a) An accessway must be provided to the principal pedestrian entrance—
(i) from the main points of the pedestrian entries at the allotment boundary; and
(ii) from another accessible building connected by a pedestrian link; and
(iii) from any required accessible carparking space on the allotment.

Comments:
Ensure accessible pathways are provided to each building from the main pedestrian entry points at each precinct and from accessible carparking bays and between buildings in accordance with clause 6 and 10 section 1.2 below.

D3.3 Parts of the Building to be Accessible

In a building required to be accessible—
(a) every ramp and stairway, except for ramps and stairways in areas exempted by D3.4, must comply with—
(i) for a ramp, except a fire-isolated ramp, clause 10 of AS 1428.1 ; and
(ii) for a stairway, except a fire-isolated stairway , clause 11 of AS 1428.1 ; and
(b) every passenger lift must comply with E3.6; and

Comment:
Ramps and stairways are required to comply with clause 10 and 11 section 1.2 below.

D3.7 Hearing Augmentation

(a) A hearing augmentation system must be provided where an inbuilt amplification system, other than one used only for emergency warning, is installed—
(i) in a room in a Class 9b building; or
(ii) in an auditorium, conference room, meeting room or room for judicatory purposes; or
(iii) at any ticket office, teller's booth, reception area or the like, where the public is screened from the service provider.
(b) If a hearing augmentation system required by (a) is—
(i) an induction loop, it must be provided to not less than 80% of the floor area of the room or space served by the inbuilt amplification system; or
(ii) a system requiring the use of receivers or the like, it must be available to not less than 95% of the floor area of the room or space served by the inbuilt amplification system, and the number of receivers provided must not be less than—
(A) if the room or space accommodates up to 500 persons, 1 receiver for every 25

persons or part thereof, or 2 receivers, whichever is the greater; and
(B) if the room or space accommodates more than 500 persons but not more than 1000 persons, 20 receivers plus 1 receiver for every 33 persons or part thereof in excess of 500 persons; and
(C) if the room or space accommodates more than 1000 persons but not more than 2000 persons, 35 receivers plus 1 receiver for every 50 persons or part thereof in excess of 1000 persons; and
(D) if the room or space accommodates more than 2000 persons, 55 receivers plus 1 receiver for every 100 persons or part thereof in excess of 2000 persons.
(c) The number of persons accommodated in the room or space served by an inbuilt amplification system must be calculated according to D1.13.
(d) Any screen or scoreboard associated with a Class 9b building and capable of displaying public announcements must be capable of supplementing any public address system, other than a public address system used for emergency warning purposes only.

Comment:
If an inbuilt amplification system is installed within any room, reception area or the like, a hearing augmentation system is required in accordance with clause D3.7 above.

D3.8 Tactile Indicators

(a) For a building required to be accessible, tactile ground surface indicators must be provided to warn people who are blind or vision impaired that they are approaching—
(i) a stairway, other than a fire-isolated stairway ; and
(iv) a ramp other than a fire-isolated ramp, step ramp, kerb ramp ; and
(v) in the absence of a suitable barrier—
(A) an overhead obstruction less than 2 m above floor level, other than a doorway.
(b) Tactile ground surface indicators required by (a) must comply with sections 1 and 2 of AS/NZS 1428.4.1 .

Comment:
Includes tactile ground surface indicators on ramps and stairs in accordance with clause 10 and 11 section 1.2 below.

D3.9 Wheelchair Seating Spaces

Where fixed seating is provided in a Class 9b assembly building, wheelchair seating spaces complying with AS 1428.1 must be provided in accordance with the following:
(a) The number and grouping of wheelchair seating spaces must be in accordance with Table D3.9 of the BCA.

Comment:
The tiered viewing area incorporates fixed seating and where this fixed seating is available to the public and staff, provision for wheelchair seating spaces is required to be provided for people with disabilities in accordance with the Building Code of Australia and AS 1428.1 2009.

Action:
1. Confirm total no of fixed seats available at the Eastern Precinct. We can advise of the number of wheelchair spaces required on receipt of total seating spaces.

E3.6 Passenger Lifts

In an accessible building, every passenger lift must—
(a) be one of the types identified in Table E3.6a, subject to the limitations on use specified in the Table; and
(b) have accessible features in accordance with Table E3.6b; and
(c) not rely on a constant pressure device for its operation if the lift car is fully enclosed.

Action:
1. Provide passenger lift specification at the next stage for review.

F2.4 Accessible Sanitary Facilities

In a building required to be accessible—
(a) accessible unisex sanitary compartments must be provided in accessible parts of the building in accordance with Table F2.4(a); and
(b) accessible unisex showers must be provided in accordance with Table F2.4(b); and
(c) at each bank of toilets where there is one or more toilets in addition to an accessible unisex sanitary compartment at that bank of toilets, a sanitary compartment suitable for a person with an ambulant disability in accordance with AS 1428.1 must be provided for use by males and females; and
(d) an accessible unisex sanitary compartment must contain a closet pan, washbasin, shelf or bench top and adequate means of disposal of sanitary towels; and
(e) the circulation spaces, fixtures and fittings of all accessible sanitary facilities provided in accordance with Table F2.4(a) and Table F2.4(b) must comply with the requirements of AS 1428.1.

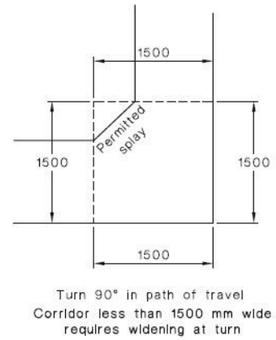
Comment:
Ensure facilities provided for people with disabilities comply with the above provisions and the provisions contained in clause 15/16 section 1.2 below.

1.2 AUSTRALIAN STANDARD 1428.1 2009

Continuous accessible path of travel (Clause 6)

The accessible path of travel from the main pedestrian entry points at each precinct and accessible parking bays at each location must be step free, slip resistant and incorporate appropriate gradients (max 1:20 with landings every 15m, 1:33 require landings every 25m).

Turning spaces 60° to 90°
A turning space of 1500mm wide x 1500mm deep is required with permitted internal truncations of 500 x 500mm on the accessible pathway.



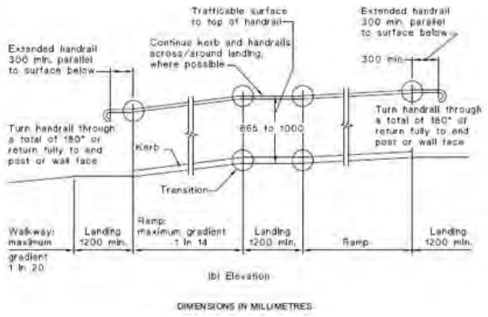
Circulation space required for a 30°- 90° turn

Comments:
The turning space at change rooms 1 & 2 at the western precinct is insufficient for a person using a mobility disability to gain access through the area at the western precinct.
The turning space outside the umpire room 1 within the eastern precinct is insufficient.
Actions:
1. Ensure a step free entry to and through buildings opn the accessible path of travel.
2. Increase the turning space on the path of travel at change rooms 1 -4 (western precinct) to achieve 1500mm x 1500mm with permitted truncation (500 x 500mm internally).
3. Increase internal latch clearances to 530mm at change 1-4 for an exit from each change room within the western precinct.
4. Remove the barrier that impedes on the latch clearance at each unisex accessible facility within change rooms in the western precinct to achieve 660mm at latch.
5. Increase the turning space outside umpire 1 (eastern precinct) to achieve 1500mm x 1500mm with permitted truncation (500 x 500mm internally).
6. Increase internal latch clearance to 530mm within the umpire 1 at the eastern precinct.
7. Increase internal latch clearances to 530mm and external latch clearances to 510mm at both ablutions areas within the eastern precinct.
8. Increase corridor length at the amenity area located beside the bar/function space to 1240mm for an entry to the room adjacent to the WC (UAT).
9. Increase hinge clearance at the terrace to 110mm for an entry to the function space at marked location on the drawings.

Ramps & landings (Clause 10)

Ramps
1:14 ramp gradients require landings every 9m, 1:19 ramp gradients require landings every 14m. Ramps are required to have handrails at each side with 300mm extensions at the top and bottom, kerbs and tactile ground surface indicators at the top, bottom and intermediate landings (where handrails are non-continuous).

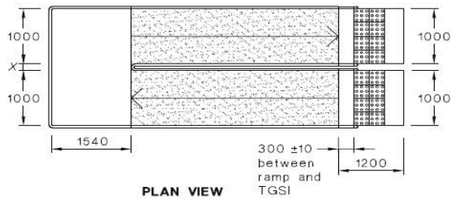
Ramp landings
The landings at the top, bottom and intermediate landings on the ramp are required to be sufficient in length and width to allow a person using a mobility to utilise the ramp independently.



Pedestrian Ramp with handrails & kerbs.

Comment:
The intermediate ramp landing space is insufficient in length.

Action:
1. Provide ramp detail with elevation for review at design development stage.
2. Increase landing length to 1200mm at the intermediate landing.
3. Incorporate tactile ground surface indicators at the top, bottom and intermediate landing if the handrail is non-continuous.
4. Install handrails at each side of the ramp with 300mm extensions at the top and bottom.
5. Provide kerbs at each side of the ramp in accordance with clause 10.3 (j) of AS 1428.1 2009.



Ramp and landing - 180 degree turn

Stairways (Clause 11)

All stairways throughout are required to be accessible (two handrails 865-1000mm high with extensions at the top and bottom, tactile ground surface indicators and contrasting stair nosings).

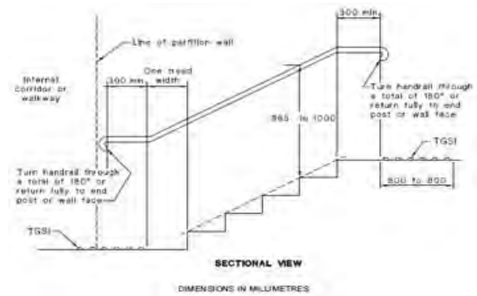


FIGURE 26(B) STAIRWAY LOCATION AND HANDRAIL EXTENSIONS AT END OF STAIRWAY OTHER THAN AT LINE OF BOUNDARY

Stairs with handrails and tactiles

Comment:
Stairways throughout require accessible features such as handrails at each side with extensions at the top and bottom, contrasting stair nosings and tactiles at the top and bottom.

Action
1. Provide stair detail for review at design development stage.

Doorways, doors and circulation spaces at doorways (Clause 13)

Doorway opening widths
Doorways on the path of travel require a minimum opening width to allow a person with a mobility aid to transition through rooms and areas with ease.

Doorway circulation spaces
Doorway circulation spaces on the accessible path of travel are required to comply with clause 13.3 of AS 1428.1.

Comments:
There are doorways throughout both buildings that have insufficient widths for a person with a mobility disability.
The western precinct change room leading through to the amenity area incorporates a barrier at latch of each UAT door for entry to the facilities at change room 1-2 and change room 3-4 UAT.

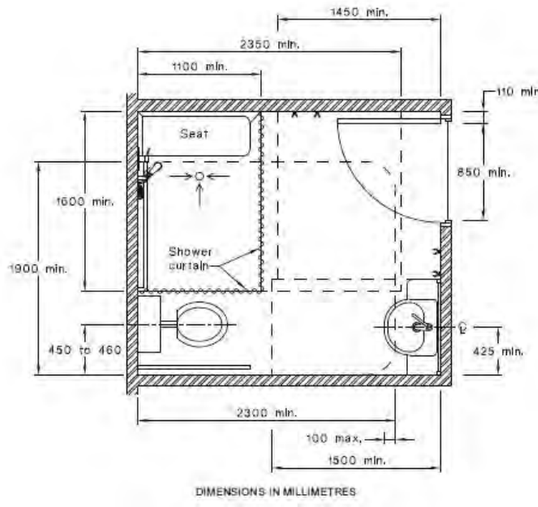
Actions:
1. Increase door opening widths on the accessible path of travel throughout the two buildings as per the areas marked on the drawings (red line at doorways that require increasing).
2. Increase doorways circulation spaces within both buildings at marked areas on the drawings.

Sanitary facilities for people with a disability (Clause 15/16)

Unisex accessible sanitary facilities
Unisex accessible sanitary facilities are required to comply with clause 15 & 16 of AS 1428.1 2009.

Ambulant facilities
Where an additional sanitary facility is provided in addition to a unisex accessible facility, provision for a facility for a person with an ambulant disability is required for use by both sexes.

Accessible showers
Accessible showers are required within buildings where showers are available for able bodied persons and in accordance with F2.4 of the Building Code of Australia.. We suggest incorporating an accessible shower within each unisex accessible sanitary facility at each change room area within the western precinct.



Combination shower & unisex accessible facility

Comments:
Ambulant cubicles facilities require decreasing and a change of door swing (swing outwards) to achieve appropriate pan circulation and door circulation space within the facilities for both sexes.
There are showers available for able bodied people, however there is no provision for accessible showers at the western precinct amenities.

Actions:
1. Ensure pan projections achieve between 790-810mm from rear walls in both buildings.

2. Decrease the width in one ambulant cubicle and swing both ambulant doors outwards in the western precinct to achieve 900-920mm widths and 900mm lengths.
3. Provide accessible showers in each unisex accessible facility within the western precinct. Suggest including within each unisex accessible sanitary facility in the western precinct.

DRAWINGS

This report has been prepared based on the review of the following Architectural plans prepared by Gresley Abas.

Drawing No.	Revision	Date
SD 01 (Eastern Precinct)	B	22.08.2014
SD 01 (Western Precinct)	B	22.08.2014

REFERENCES

- Australian Building Codes Board, National Construction Code (2013), Building Code of Australia, Volume 1.
- Australian Building Codes Board, National Construction Code (2013), Guide to the Building Code of Australia, Class 2-9 Buildings.
- Australian Standards 1428.1-2009 Design of Access and Mobility, Part 1: General Requirements for Access – New Building work.
- AS 1428.4.1:2009 Design for access and mobility – Part 4.1: Means to assist the orientation of people with vision impairment – Tactile ground surface indicators (incorporating Amendment No. 1) referenced by the NCC and therefore mandatory requirements which impact on new building design.
- AS 2890.6:2009 Off-street parking for people with disabilities referenced by the NCC and therefore mandatory requirements which impact on new building design.

REPORT ITEM SCM 010 REFERS

APPENDICES

Appendix A: Terminology

Appendix A: Terminology

For the purpose of this report, the definitions below apply.

Accessible means having features to enable use by people with a disability.

Accessway means a continuous accessible path of travel to, into or within a building.
An accessway is required to be provided to the building from:

(i) From the main points of a pedestrian entry at the allotment boundary; and
(ii) From another accessible building connected by a pedestrian link; and
(iii) From any required accessible carparking space on the allotment.

Circulation space means a clear unobstructed area, to enable persons using mobility aids to manoeuvre.

Encroachment means the intrusion of a building component, fixture or fitment into a continuous accessible path of travel or circulation space.

Grabrail means a rail used to give a steadying or stabilizing assistance to a person engaged in a particular function.

Handrail means a rail used in circulation areas such as corridors, passageways, ramps and stairways to assist in continuous movement.

Kerb means a side barrier to a trafficable or accessible pedestrian surface.

Landing means a resting place on a path of travel.

Luminance contrast means the light reflected from on surface or component, compared to the light reflected from another surface or component.

People with ambulant disabilities means people who have a mobility disability but are able to walk.

Ramp means an inclined surface on a continuous accessible path of travel between two landings with a gradient steeper than 1:20 but not steeper then 1:14.

Tactile ground surface indicators (TGSI's) means truncated cones and / or bars installed on the ground or floor surface, designed to provide pedestrians who are blind or vision-impaired with warning or directional orientation information.



Appendix 2 - Stakeholder Presentation Minutes

Notes from Meetings held in Albany on 5 September 2014 with Sporting Clubs

General attendance at all meetings:

Mark Casserly	CCS Strategic	Project Director
Philip Gresley	Gresley Abas Architects	Project Architect
Samantha Stevens	City of Albany	Joint Project Manager
Ryan Taylor	City of Albany	Joint Project Manager

Meeting with Soccer and Cricket Representatives

Club Attendees

Terry Eaton	Albany Cricket Association
Brent Sheridan	Department of Sport and Recreation
Mike Moriarty	Albany Junior Cricket Association
Chris Walker	Albany Senior Soccer Association
Shelley McDonald	Football West
Grace Knowlson	Albany Junior Soccer Association
Jamie Knowlson	Albany Junior Soccer Association

Introductions made

Overview by Phil Gresley

Note the existing cricket store to be incorporated into the new building

Key features are function room with kitchen and bar

Not just a standard pavilion – needs to be a bit special within the Centennial Park project – which is to create a play to ‘play’.

Phil showed examples of existing structures elsewhere including:

Lark Hill, Mt Barker, Capel, Templestowe, Rotterdam, Zurich, Court on wall,

Walk through lessons learned

Identified built form key objectives

4 distinct requirements articulated

Showed scheme development and then schematic design

Brief development relationship diagram

Showed comparison between Opus area allocations and current area allocations

Questions:

Q. Will the picket fence feature element on the building also be demonstrated elsewhere on the site?

A: Perhaps as a feature element but not as a full playing field fence.

Q: Can a car access the cricket store to cricket store?

A: Standard vehicle with tow bar access provided across fire service access hardstand to building. Please provide photographs and dimensions of existing covers trailer

Q: Where will soccer goals be stored off-season or for summer season activity

A: off –site or elsewhere within the precinct – but not in the pavilion

Q: What height will the soccer store be?

A: A minimum of 2.7m

Q: Can soccer installed existing cages into the store

A: please provide details of storage requirements and dimensions of existing storage gear

Q: Function room size was discussed at length – what is the current size

A: Comparative analysis show both schemes at 170m2

Q: What accommodation is there for memorabilia? Soccer currently has 4 glass cabinets display cases

A: Clubs to work together to address display requirements and provide feedback. Also to provide a bulkhead over the glass faces eat and west for additional display plus over bar. These spaces to be specified.

Q: Can we have powered sheltered area for cricket scorers

A: provide more detailed comments of requirements

Q: Kitchen detail – is this a blank canvas?

A: At this stage yes, please provide detailed response to kitchen and bar layout. Submissions required back by 19 September or as quickly as possible

7

Centennial Park

Stadium Building (Eastern Precinct)

GresleyAbas

22 September 2014

Centennial Park - Eastern Precinct

Stadium Building - Schematic Design Report



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Appendix 1 - Sub Consultant Reports

Appendix 2 - Stakeholder Presentation Minutes

Appendix 3 - Preliminary Show Layout

Record of Issue

Issue	Status	Date	Revision
Issue to CLIENT	SD	22/09/2014	0
Issue for CLIENT REVIEW	DRAFT	08/09/2014	C
Issue for PRICING	DRAFT	28/08/2014	B
Issue to PROJECT TEAM	DRAFT	14/14/2014	A

Stadium Building - Schematic Design Report



1.0 Introduction

1.1 Project Background

Within the Western Precinct of the Centennial Park sporting precinct the recently adopted masterplan prepared by Coffey Sport and Leisure identified the opportunity to develop a co-located premier multipurpose facility to service both community event and football needs. The concept plan by Opus located the new building adjacent the old Royals FC clubrooms.

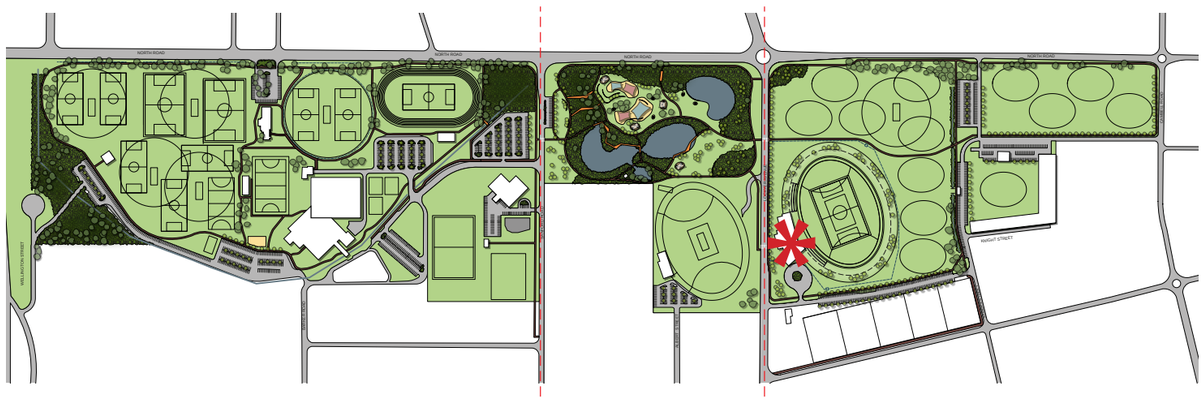
Our recently produced precinct development report identified the benefit to the playing space in moving the new building to the north of the site, including the creation of another full size field for away team warm-up usage.

The design and accommodation requirements for this building were dictated by the previous masterplan report, which included a concept plan for the facility produced by Avoca Design. The masterplan costings included an estimate of $5.8M for a building of approximately 1542sqm (FECA).

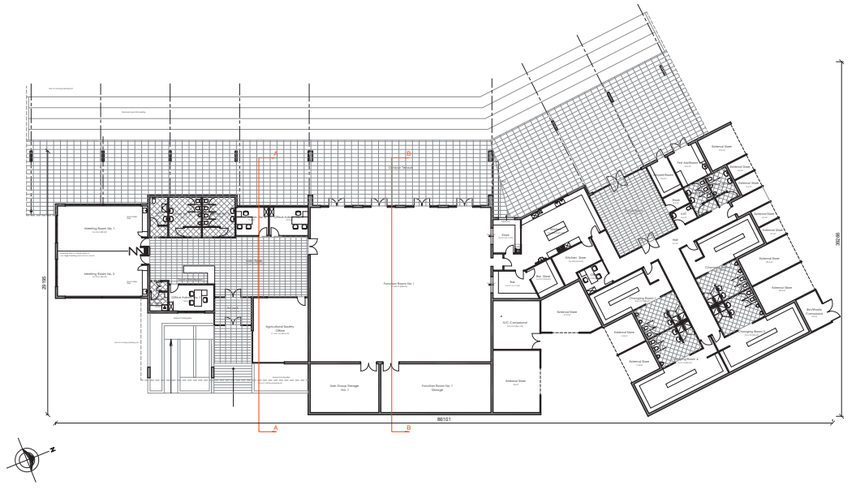
Our project team has subsequently engaged with representatives from the future users of the facility to refine the building requirements and have produced an updated brief to reflect these needs.

This new facility will provide:

- A facility that meets the requirements both Royals and Sharks football operations
- A multiuse community facility with a variety of hire opportunity and facility size
- A multi-function changeroom to service football and oval users
- Covered viewing and spectating opportunity to the main oval



Opus Masterplan 2012



Avoca Design Concept Plan



Precinct Development July 2013



1.2 Vision & Philosophy

Our key ambition for this new facility is that it first and foremost complements, enhances and reinforces our strategic vision for the entire precinct. Key outcomes for the built form of the precinct identified during precinct development dictate that new buildings:

- Provide regional class, contemporary sports and community facilities
- Be a supportive structure to the landscape, not distinct from it
- Be responsive to the overall masterplan vision, particularly pedestrian and access needs, wayfinding and branding
- Contribute to a new site character, acknowledge existing buildings but provide a distinct example for future development
- Designed for current use but with future demand in mind allowing for expansion
- Focus on shared use and flexible operation through adaptable layouts
- Minimise potential use conflict of shared facilities by providing safe and distinct areas of use for example, lockable office areas and storage for sports clubs
- Use materials and resilient finishes designed to minimise maintenance and on-going operational cost
- Use passive solar design and ESD principles to lower operational costs
- Design ESD systems to be sensitive to operational requirements, ease of use and passive systems to be of a high priority
- Actively manage storm water runoff

More specifically this new stadium building will be the premier facility within Centennial Park, forming the heart of major community and sporting events.

Other key objectives include:

- functionality of design
- compatibility with the local environment
- ease of management
- durability and maintenance minimisation
- design innovation

1.3 Project Consultant Team

A Project Consultant Team (PCT) has been established comprises the following disciplines:

Principal Consultant (Architect):	**Gresley Abas Architects** **Philip Gresley - Project Director** **Ben Price - Senior Designer** **Alex Quin - Project Architect**
Specialist Sub-consultants	
Civil Engineer:	Travis Demeza - Wood & Grieve Engineers
Structural Engineer:	Gary Sollitt - Wood & Grieve Engineers
Mechanical Engineer:	Andrew Wakelam - Wood & Grieve Engineers
Electrical Engineer:	Rocco Pienarr - Wood & Grieve Engineers
Hydraulic Services:	Geoff Moorcroft - Wood & Grieve Engineers
Acoustics:	Imran Khan - Wood & Grieve Engineers
ESD:	Phil Cook - Wood & Grieve Engineers
Landscape Architect:	Damien Pericles - Realm
BCA/ DDA compliance/ Certification:	Paul Da Costa - Code Group

1.4 Stakeholder Consultation process

In the preparation of this document Gresley Abas has undertaken the following:

Scheme Development Phase

- Brief development through Liaison with the City of Albany by CCS Strategic
- Site/ facilities Inspection and client meeting on 04/06/14: Philip Gresley and Ben Price
- Scheme Development Workshop 1 on 11/06/14
- Initial User group briefing session on 3/07/14 with representatives from:
    - Albany Cricket Association/ Junior Cricket Association
    - Southern Districts Junior Football
    - Royals FC
    - Sharks FC
    - Great Southern Soccer Association
    - Department of Sport and Recreation

Schematic Design Phase

- Meeting with Paul Lekias from Western Australian Football Commission on 12/08/14
  Meeting to discuss WAFL and pre-season AFL requirements, all requirements are reflected in the final design of the change and event facilities.

- Presentation of draft schematic design development to Client and User groups on 05/09/14.
  Draft architectural designs presented by Philip Gresley and Mark Casserly to the following stakeholders:

Samantha Stevens	City of Albany	Joint Project Manager
Ryan Taylor	City of Albany	Joint Project Manager
Phil Mellon	Sharks Football Club	
Mitch Curnow	Royals Football Club	
David Flick	Royals Football Club	
Rob Marks		
Rick Minane		
Mick O'Dea	Albany Junior Football Association	
Basil Worner	independent advisor – ex DSR	

Minutes of this meeting including user group responses can be found in **appendix 2** of this report

Stadium Building - Schematic Design Report



2.0 Project Summary

2.1 Architectural Design

Key strategies for the Eastern Precinct Building have been identified in the 2012 masterplan report as the creation of:

- ..a multipurpose community facility that includes a commercial kitchen, community function areas that can cater up to 200 pax, a multi-use flooring suitable for various activities such as dancing, table tennis etc, administration areas for community groups, function and community use ablutions amenities and improved grandstand seating and viewing for various activities including sporting events.

The major briefed objective of this consultancy is to provide full service delivery of facilities to meet these key concept development strategies as further developed by our Precinct Development Report. The 2012 masterplan report and its accompanying concept floorplan form the basis for our initial brief for a facility to meet these objectives.

Further detailed briefing has been developed through liason with community and user groups in conjunction with the City of Albany.

The building will need to provide the necessary infrastructure, function and amenity to meet these broad objectives and aims to demonstrate a response, where appropriate, to the four distinct requirements outlined by our Scheme Development Report:

1. **Sports training and competition**
Centennial Park is to be developed first and foremost as a demonstration of excellence in regional standard sporting accommodation. It will provide first class playing facilities with highly attractive and functional off-field amenities for players, officials, administrators, supporters, spectators and the media.

2. Festivals, events and celebrations
Centennial Park is to be developed as a highly versatile and attractive venue for both large and small scale community events. Without compromising the functionality of the sporting facilities, events infrastructure will be designed to allow ready adaptation of the site for exhibitions such as the Albany Agricultural Show, for product displays and launches, for concerts and other entertainment events and for community and civic celebrations.

3. Community development through organised clubs and groups
Inherent in strong communities are strong community organisations. These groups; be they sporting, leisure, creative, cultural, historical, service or intellectually focused; need places to meet, to plan and develop the activity of their interest and to deliver it to the community. The available infrastructure on site will be designed with flexibility in mind and to be available to all interest groups.

4. Community life in a parkland setting
A key to the beauty of Centennial Park is the expanse of green space and parkland it offers. Through careful and innovative WSUD and the integration of Yakamia Creek this parkland will be enhanced by permanent and ephemeral water bodies. Opportunities to enjoy the parkland and the landscaped and beautified elements will be enhanced through the installation of a series of facility nodes. These structures comprising public toilets, drinking fountains, seating and shelters, exersites and playground areas will be critical elements framing the central spine of the park and in knitting the various precincts together. Indeed the branding of the site will be equally reflected in these infrastructure elements as it is in the major buildings on site.

The key architectural design strategies for the facility developed during Scheme Development are to:

- Stadium building located on the centre-line of the proposed field to maximise viewing focus
- Stadium building provides shelter to spectators from prevailing south westerly winds
- Separation of community use spaces and football operations through building orientation and configuration whilst maintaining flexibility and usage overlap
- Acknowledge the key vistas of the building, from both Lockyer Avenue, pedestrian access spine and plaza space, focusing public entry to community use areas from the plaza space
- Use the building elements to frame the pedestrian promenade and oval entry to the west
- Provide formalised, tiered seating to areas adjacent the building, acknowledging the potential for future expansion of tiered space

2.2 Landscape

The proposed building is located on the site of the existing building used by junior football. The existing context of the building will largely be re-formed post demolition of the existing structures along Lockyer Ave. The main pedestrian access to the facility and oval will be along the pedestrian spine (east and west). The facility entry itself addresses Lockyer Ave and the new carpark. The main function areas of the building are raised 1.5m from finished ground level, matching into the high point of the grass berming of the oval. This provides an elevated viewing opportunity focused along the centre line of the football oval.

The paved forecourt at the entry of the building is designed to function as pre-entry gathering space as well as a function space in its own right. There is potential for community events running within the new building to spill out into the pedestrian area to the west, occupying both the paved node, spine and carpark.

Grass embankments meet the walls of the facility to the west, grounding the building in the landscape context, emphasising the conceptual touchstone of granite boulder and rock formations of greater Albany. A series of brightly coloured flag poles are located in one embankment, placed to resemble football goals, bringing the element of play into the building.

The Eastern Precinct as a whole will service as the primary event venue within Centennial Park. Consideration has been given to incorporate the Agricultural Show layout within the precinct, refer **Appendix 2** for preliminary show layout concepts. For more detailed information about the precinct context please see the precinct wide landscape report.

2.3 Sub Consultant Services

Detailed reports for the following consultant services are included in **Appendix 1** of this document

Mechanical
Electrical
Structural
Civil
Hydraulics
Sustainability
Acoustics
BCA Compliance and Access



3.0 Site

3.1 Title, Site and Zoning
Within the 68 hectare site the building will occupy lot 1359.

3.2 Survey Details
A survey has been undertaken on the site and has been made available to Gresley Abas Architects. This has formed the basis of our Site Analysis and is included within our consolidated briefing.

3.3 Geotechnical Report
A geotechnical survey and report has been supplied to the Project Consultant Group and has been reviewed by the Structural and Civil Engineer. The structural and civil design will be based on the information contained within the project design.



4.0 Architectural Precedents and Inspiration

4.1 Precedent Research

Taken from research into contemporary sports architecture of a similar scale, see below a number of examples that have inspired elements of the building concept design. Their contribution to our design thinking is summarised below.







Heerenscurli Sports Facilities, Zurich | Durig AG

Simple construction with bold forms and colours create a striking and functional design.

Grand Parquet Fontainebleau | Joly Loiret Architects

Integrated design of seating elements in embankment.



Stade - Duvauchelle, Créteil | Atelier Du Pont

Bold and simple forms with hard wearing materials and strong colours help to create a strong landmark with visual presence whilst ensuring usability, low maintenance and ease of construction.

Estadio Borregos, Mexico | Arkylab

Combination grass and concrete tiered seating with partial covered zones. Integration of landscape into the design of the stadium building, blurring the line between the landscape and building form.

4.2 Local Inspiration

Our inspirational touchstone for this facility is the granite formations of greater Albany.
Their form, their enduring and sheltering nature have contributed to how we view this building within the landscape of the Eastern Precinct. Its important that we take what is appropriate from the landscape context, whilst not producing a building that brings with it a dark or imposing quality. Colour is used throughout and will be drawn from the local club colours, the local vegetation and architecture.





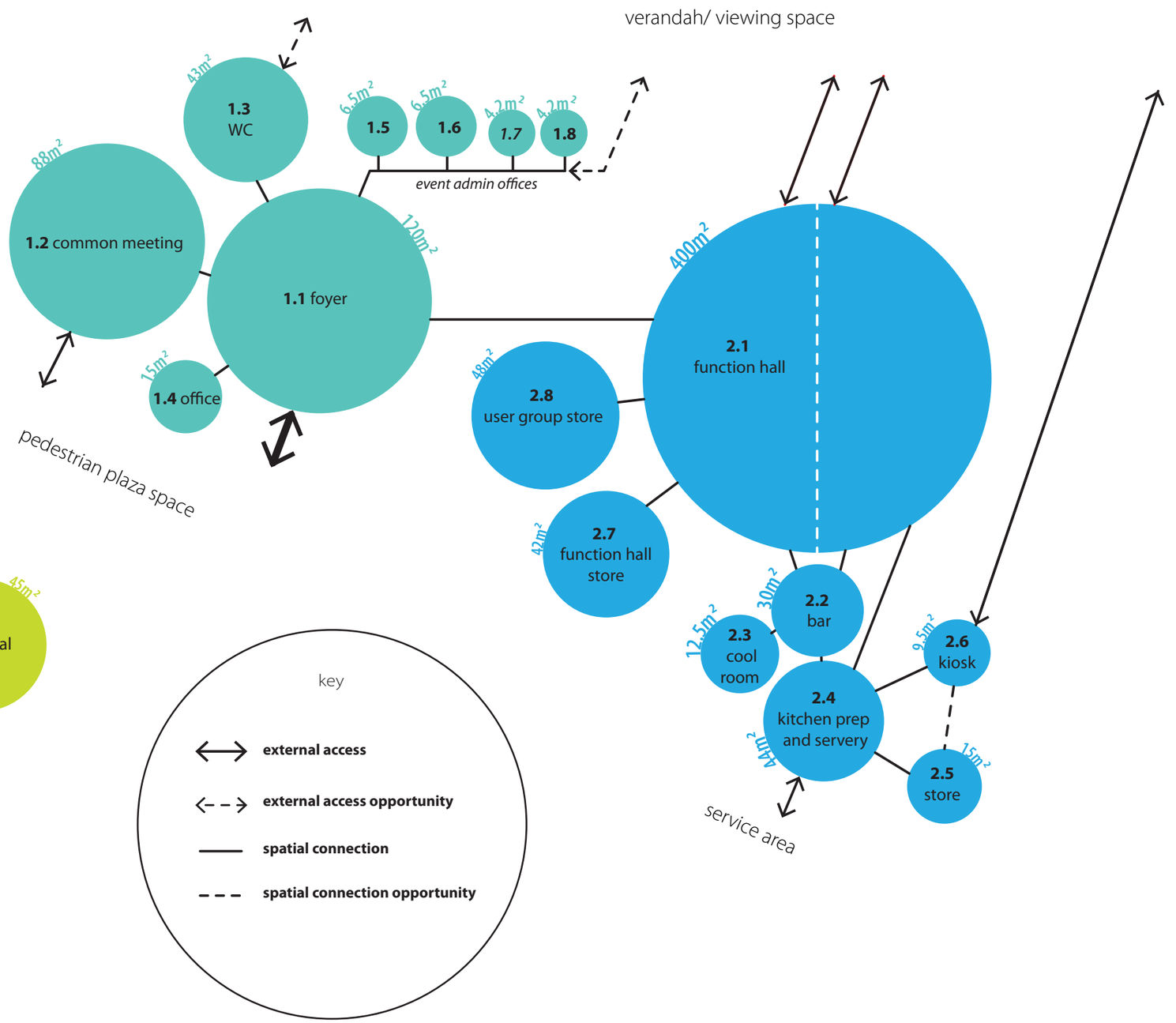
5.0 Building Functions and Spatial Relationships

The key functional elements of the stadium building are as follows:

Community and Event Space
- Community use meeting space divisible for smaller meeting functions
- Large foyer space that can be used as a community event space ie small exhibition space
- Lettable office spaces doubling as viewing space for event operations ie time keeping/ scoring for WAFL/ pre-season AFL
- Permanent office space for City staff use

Community and Club Function Space
- Large, flexible function hall (to be operated by the football clubs) of 400m², divisible for use as 200m² individual social room
- Bar and kitchen servicing the large function space (single operator)
- Ancillary kiosk to service the viewing verandah and seating terraces
- General equipment store for function hall use
- Permanent storage for user groups, divisible and secure storage for community clubs and football

Changeroom and Football Operations
- 2 changeroom spaces including a trainers/ first aid room, property room and office for each club
- 2 umpire change spaces
- Large external storage divisible and secure for use by football clubs



Stadium Building - Schematic Design Report



6.0 Schedule of Accommodation

The accommodation schedule as briefed has been developed through the consolidated briefing process.

ROOM #	ROOM NAME	DESCRIPTION	OPUS Scheme Areas	Schematic Design 22/09/14	Difference from opus
	Eastern Precinct Stadium Building			**UFA**	
1.0	**Community and Event Admin**				
1.1	Foyer/ Small gallery and event space	Serves as function and community entry and also usable as community space in itself	103.4	120	16.6
1.2	Common Meeting Room	Meeting room divisible into 2 equal size spaces of 50sqm	100	88	-12
1.3	M/F/UA toilets	(To be confirmed by BCA consultant)	33.4	43	9.6
1.4	Office Admin	Permanent City Staff use	13.3	15	1.7
1.5	Event Office 1	Seating for 6 people with view of oval, to be used as coach box/ event administration	11.2	6.5	-4.7
1.6	Event Office 2, junior football office	Seating for 6 people with view of oval, to be used as coach box/ event administration	14.5	6.5	-8
1.7	Event Office 3	Seating for 4 people with view of oval, to be used as time keeping and scoring/ event administration	8.3	4.2	-4.1
1.8	Event Office 4	Seating for 3 people with view of oval, to be used as time keeping and scoring/ event administration	0	4.2	4.2
1.9	Cleaners Store		4.2	4.2	0
	Agricultural Society Office		43	0	-43
	Airlock		12	0	-12
2.1	Function Hall	Function hall for community use with ability to divide the space into 2x 200sqm equal club function spaces	340	400	60
2.2	Bar	Able to service 2 sides of function space when required	11.1	30	18.9
2.3	Bar Cool Rooms		0	12.5	12.5
2.4	Kitchen Prep and Servery		51	44	-7
2.5	Kitchen Store		14.4	15	0.6
2.6	Kiosk	Servery to undercover outdoor area linked to kitchen operations	11.1	9.5	-1.6
2.7	Function Hall Store		40	42	2
2.8	User Group Store		63	48	-15
2.9	Bar Store		10.5	0	-10.5
3.1	Changeroom 1				
3.11	Open changeroom area	including hanging/ bench space for 30	30	62	32
3.12	Ablutions	6 shower stalls with 2 pans, 1 urinal	18	35	17
3.13	Trainers/ First Aid room		0	17	17
3.14	Property Room and office	Secure club use including desk and office facility	0	18	18
3.2	Changeroom 2				
3.21	Open changeroom area	including hanging/ bench space for 30	30	62	32
3.22	Ablutions	6 shower stalls with 2 pans, 1 urinal	18	35	17
3.23	Trainers/ First Aid room		13.5	17	3.5
3.24	Property Room and office	Secure club use including desk and office facility	0	18	18
3.3	Umpire room1	Bench and hanging provision for 14, including ablutions	9.6	21	11.4
3.4	Umpire room2	Bench and hanging provision for 14, including ablutions	0	26.5	26.5
3.5	External Store	Club use, divisible and usable by both clubs	27.2	45	17.8
3.6	F/ UA toilet		4.4	7.8	3.4
3.7	M toilet		0	4.5	4.5
	Changeroom 3		30	0	-30
	Abultions		18	0	-18
	Changeroom 4		30	0	-30
	Abultions		18	0	-18
	External Store 2		36	0	-36
	External Store 3	Fenced Recess in plan	11.8	0	-11.8
	External Store 4	Fenced Recess in plan	11.8	0	-11.8
	External Store 5	Fenced Recess in plan	20.4	0	-20.4
	External Store 6	Fenced Recess in plan	20.4	0	-20.4
	External Store 7	Fenced Recess in plan	4.7	0	-4.7
	External Store 8	Fenced Recess in plan	4.7	0	-4.7
	External Store 9	Fenced Recess in plan	4.6	0	-4.6
	External Store 10	Fenced Recess in plan	4.6	0	-4.6
	External Store 11	Fenced Recess in plan	15.5	0	-15.5
	Speical Room		51	0	-51

1.0	**Community and Event Admin**		**331.3**	**291.6**	**-39.7**
2.0	**Community and Club Function Space**		**530.6**	**601**	**70.4**
3.0	**Changerooms and Football Operations**		**384.2**	**236.8**	**-147.4**
		TOTAL INDICATIVE UFA	**1246.1**	**1129.4**	**-116.7**
		circulation +15%	186.9	55.0	-131.9
		TOTAL INDICATIVE FECA	**1433.0**	**1184.4**	**-248.6**

	External Areas				
	AC Compund (plant)		28.1	28	0
	Covered, tiered Seating space for 200 people		315	90	-225
	Uncovered, tiered seating space for 300 people		0	135	135
	Verandah area including function space terrace		520	220	-300
	Players dug-outs	sheltered space with benches for 22 each		55	55
		TOTAL EXTERNAL AREA	**863.1**	**528.0**	**-335.0**

Areas highlighted in yellow indicate rooms that have either been added to or removed from the original OPUS scheme design.



7.0 Project Program

A complete draft program has been formulated, please see below for summary of key delivery dates:

Schematic Design	05.09.14
SD cost estimate	24.10.13
SD Approval	26.09.14
Design Development	28.11.14
DD cost estimate	12.12.14
DD Approval	9.01.15
Tender Docs	29.05.15
Tender Award	04.09.15
Construction	17.06.16



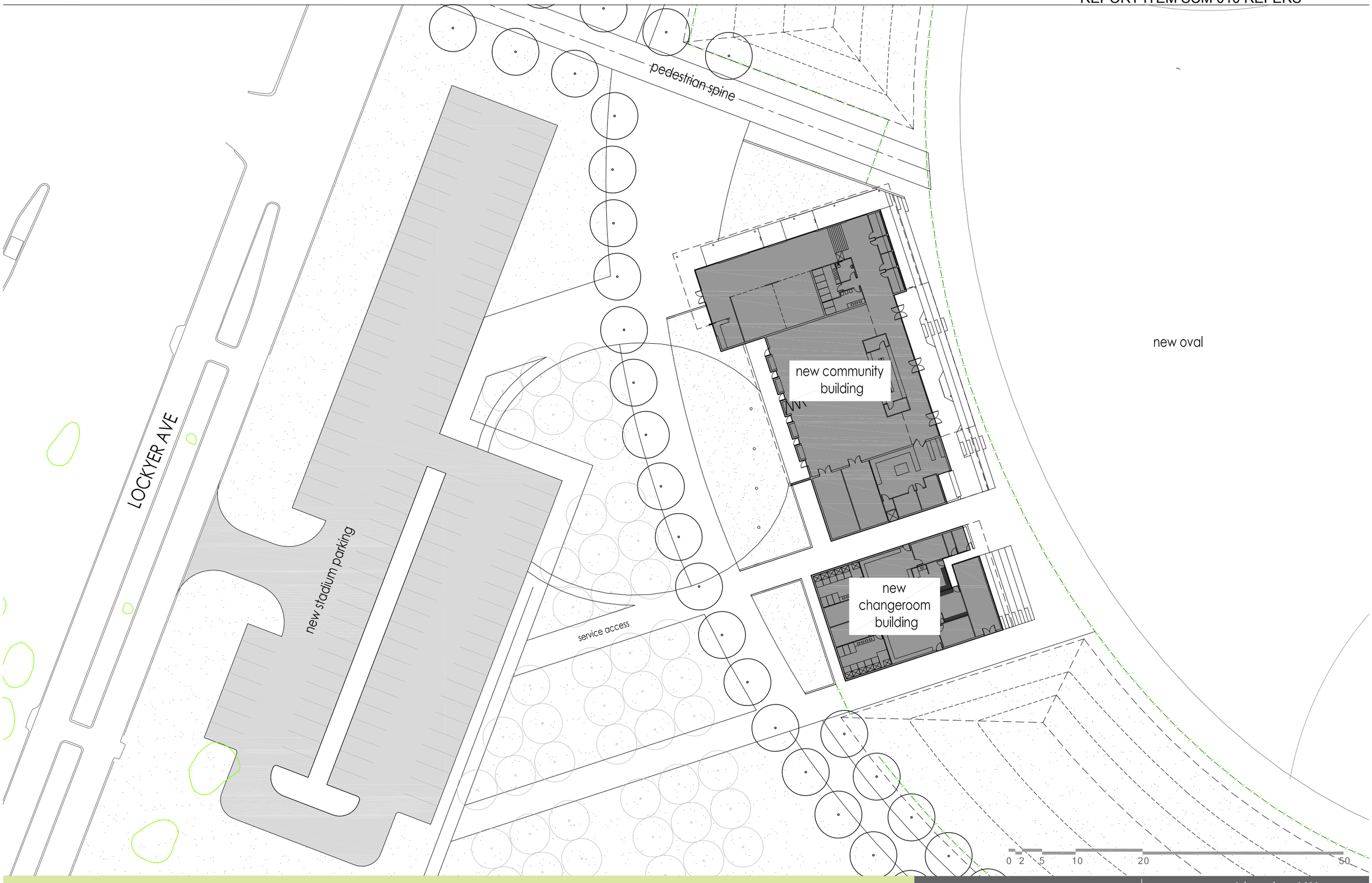
8.0 Architectural Drawings

Please see over for the following architectural drawings

SD02 SITE PLAN
SD03 FLOOR PLAN
CD04-05 ELEVATIONS
CD06 SECTIONS
CD07 SCHEMATIC PERSPECTIVES



Approach Perspective



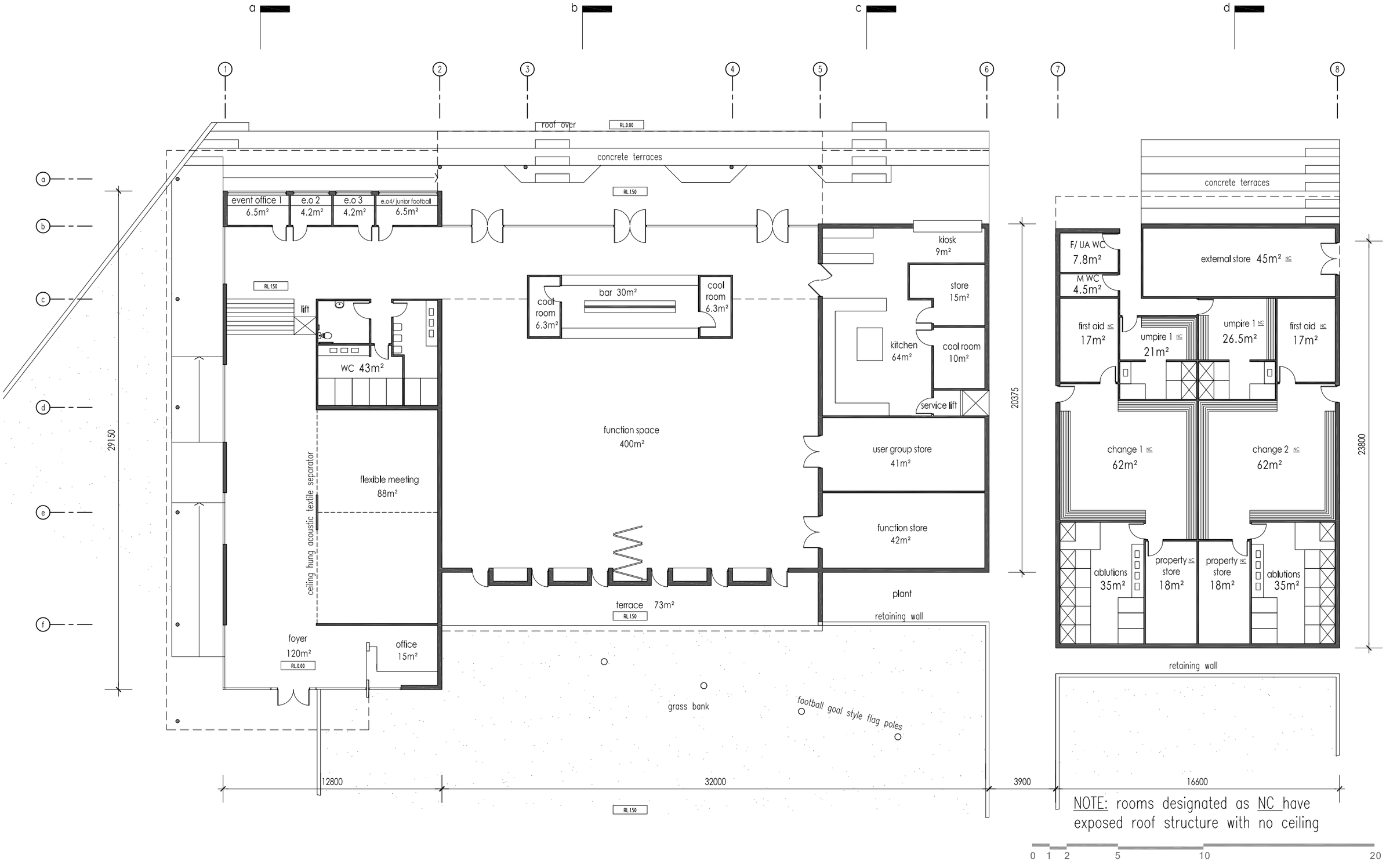
gresleyabas
architecture environment design

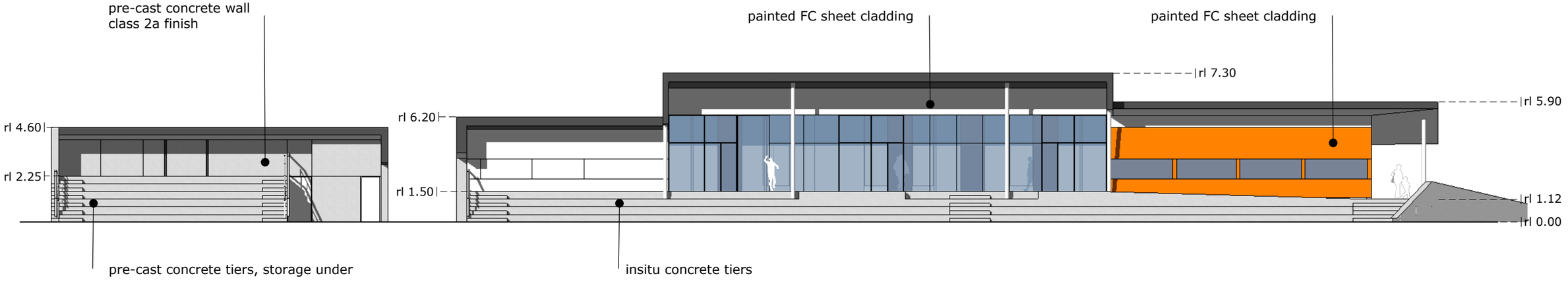
Centennial Park - Eastern Precinct
Football Stadium Building

Site Plan
Schematic Design

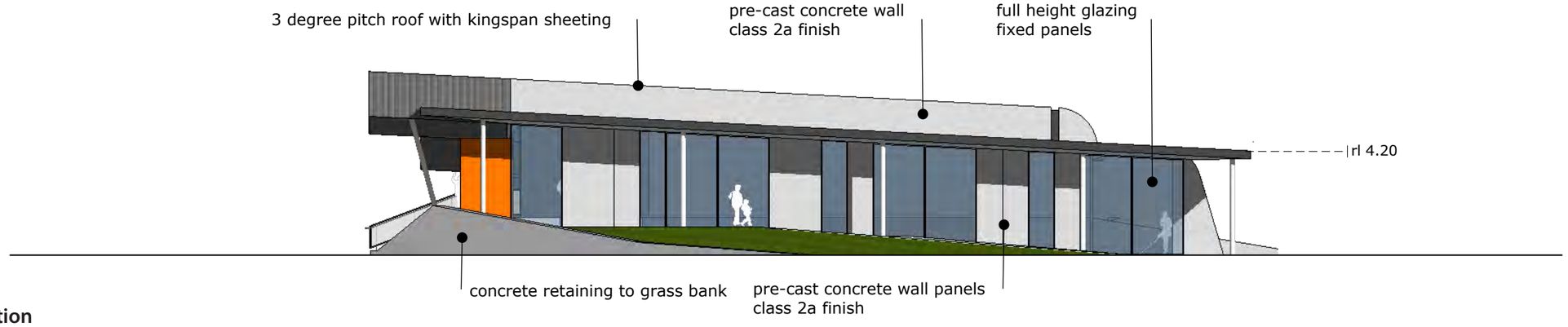
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job number: **1411**
issue date: **22/09/14**
revision: **D**
drawing number: **SD02**

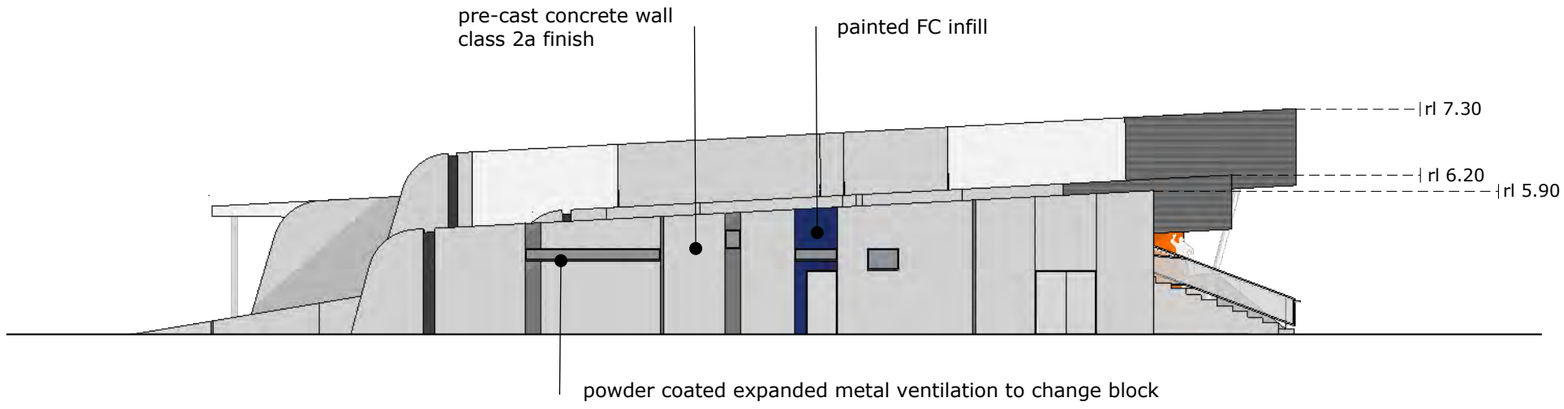

a
b
c
d
1
2
3
4
5
6
7
8
roof over
RL 0.00
concrete terraces
RL 1.50
event office 1
6.5m²
e.o 2
4.2m²
e.o 3
4.2m²
e.o4/ junior football
6.5m²
lift
WC 43m²
cool room 6.3m²
bar 30m²
cool room 6.3m²
kiosk
9m²
store
15m²
kitchen
64m²
cool room
10m²
service lift
function space
400m²
user group store
41m²
function store
42m²
flexible meeting
88m²
ceiling hung acoustic textile separator
terrace 73m²
RL 1.50
plant
retaining wall
foyer
120m²
RL 0.00
office
15m²
grass bank
football goal style flag poles
29150
20375
23800
12800
32000
3900
16600
concrete terraces
F/ UA WC
7.8m²
M WC
4.5m²
external store 45m² NC
first aid NC
17m²
umpire 1 NC
21m²
umpire 1 NC
26.5m²
first aid NC
17m²
change 1 NC
62m²
change 2 NC
62m²
ablutions
35m²
property NC
store
18m²
property NC
store
18m²
ablutions
35m²
retaining wall
NOTE: rooms designated as NC have exposed roof structure with no ceiling
0 1 2 5 10 20



east elevation
1:200



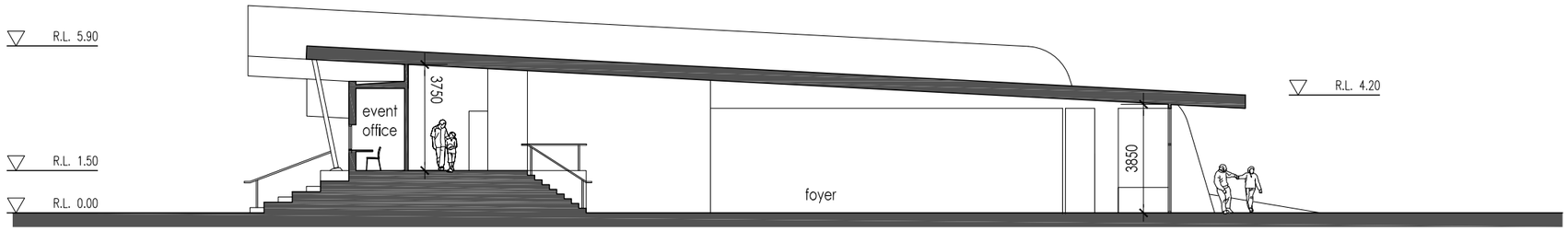
north elevation
1:200



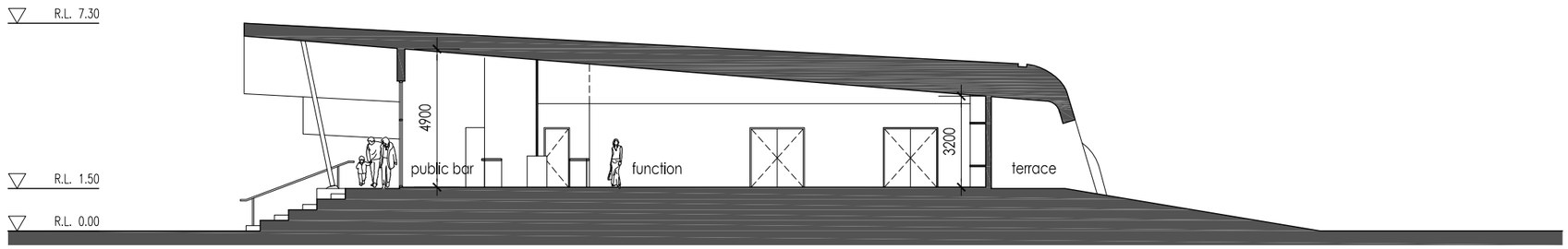
south elevation
1:200



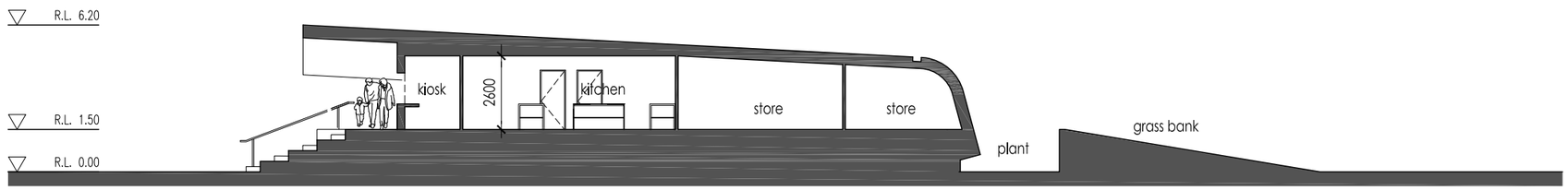
west elevation
1:200



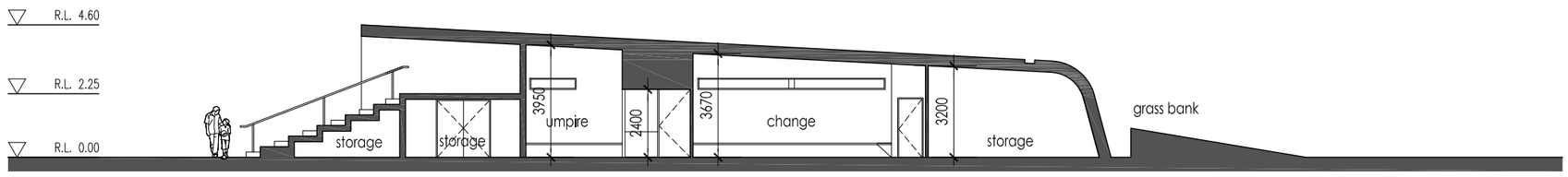
section a
1:200



section b
1:200



section c
1:200



section d
1:200



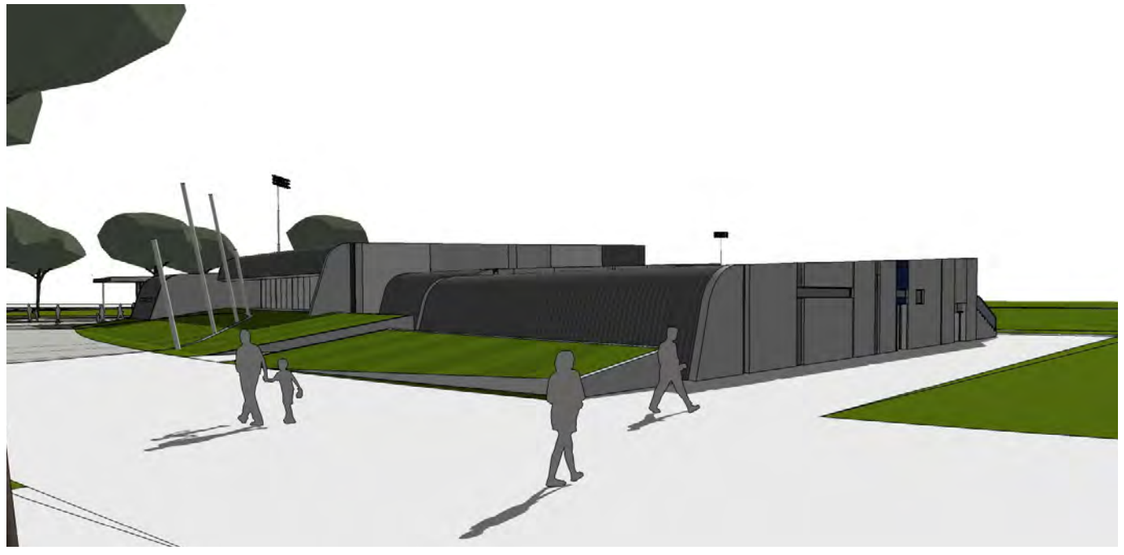
aerial, west



approach, north-west



oval, north-east



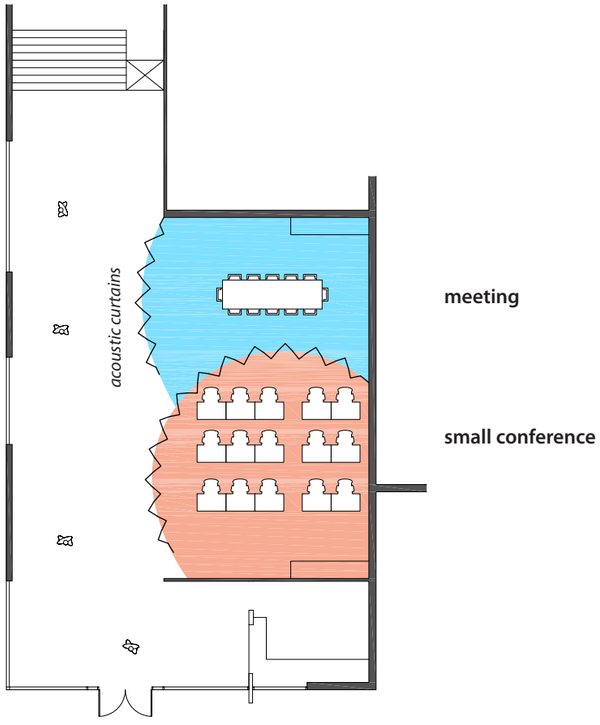
approach, south-west



9.0 Flexibility

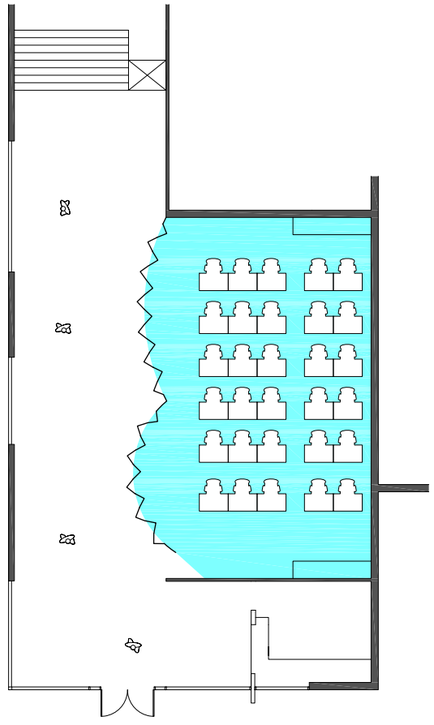
In order to meet the operational needs that will arise through joint club management and community use, careful consideration and planning has been deployed in the design of the community use spaces in the facility. The following diagrams illustrate the potential event and use scenarios for the community use spaces. These were presented to the football clubs on 5th of September 2014, receiving a positive response from the primary user group. Minutes and attendees are detailed in **appendix 2** of this report.

9.1 Foyer and meeting room spaces



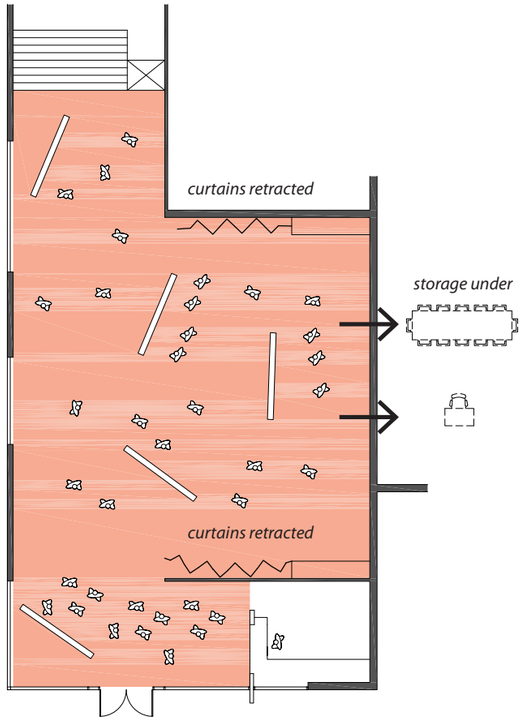
meeting

small conference



medium conference

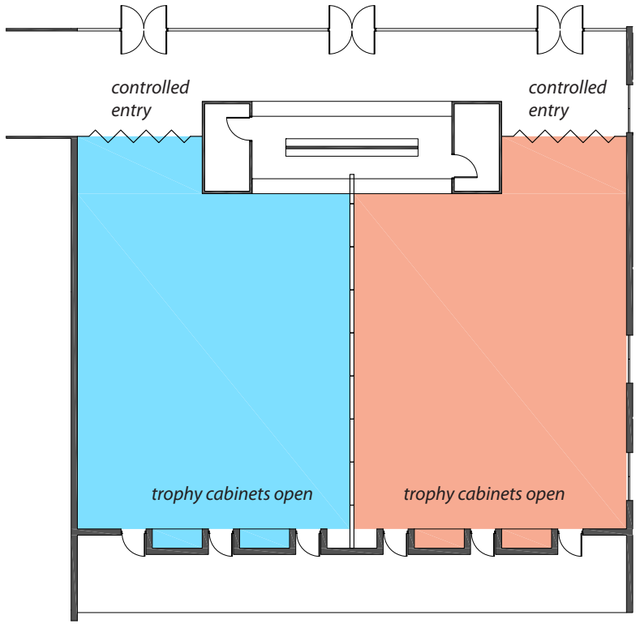
large open gallery event



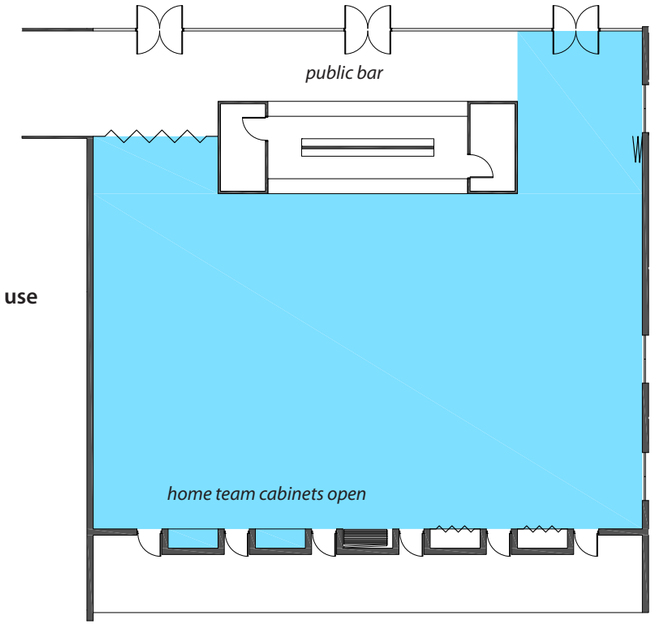


9.2 Main function room

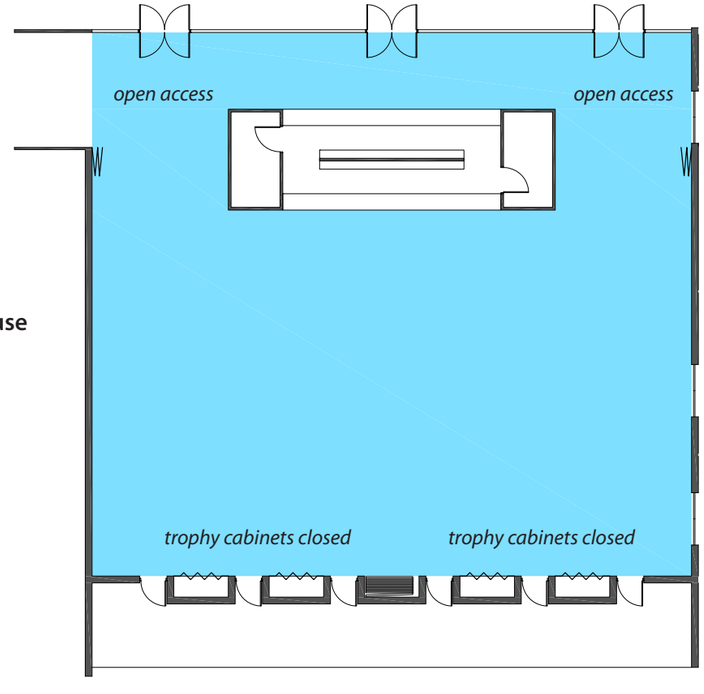
joint club use



home team use
game day



community use
function





Appendix 1 - Sub Consultant Reports

Please see over for a detailed report from the following sub consultant disciplines

Mechanical
Electrical
Structural
Civil
Hydraulics
Sustainability
Acoustics
BCA Compliance and Access



To us, it's more than just work.

Centennial Park Sporting Precinct, Albany

Schematic Design Report
Eastern Precinct Football Stadium
Mechanical, Electrical, Structural, Civil, Hydraulics, Sustainability, and Acoustic Services

Prepared for:	Prepared by:
Client Name: Gresley Abas	**Andrew Wakelam, Rocco Pienaar, Gary Sollitt, Travis Demeza, Jeff Moorcroft, Phillip Cook & Imran Khan** Project No. 26689-PER-MESCHGN M:\TECH\26600\89\DD_MESCHGN_002_EPFS.DOCX
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WOOD & GRIEVE ENGINEERS

Revision

REVISION	DATE	COMMENT	APPROVED BY
0	25/08/2014	DRAFT FOR COMMENT	**TJD**
1	18/09/2014	ISSUED FOR CLIENT COMMENT	**TJD**

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1. Introduction

1.1 General

This Schematic Design Report for the Appointed Services has been prepared at the request of Gresley Abas for the development of the proposed Football Stadium within the Eastern Precinct of the Centennial Park Sporting Precinct (CPSP) project for the City of Albany.

The purpose of this report is to inform the Client and Architect of the general intention of the engaged services as proposed by Wood & Grieve Engineers. Items highlighted in ***bold italics*** represent specific queries and/or project risks that we wish to draw your attention to.

This document serves as the benchmark which our services must achieve. We request you read this carefully so that you have a clear understanding of the scope of our work.

We would welcome any comments you may have on the information provided in this brief.

It is intended that this Schematic Design Report be updated and re-issued during the documentation phase, following receipt of comments from the Client and Architect.

This Schematic Design Report has been prepared based on the following information:

- Architectural drawings, received to date.
- Project meeting with the Architect and design team.
- Various site investigations (by Civil and Electrical teams at time of writing).
- Dial Before You Dig Information.
- Douglas Partners Geotechnical Report, dated July 2014.
- Whelans Feature Survey, dated 07/07/2014.

Please note we will be proceeding with the documentation of the appointed services works on the basis of this report.

1.2 Safety in Design

Wood and Grieve Engineers operates a Safety in Design (SID) procedure based on “Code of Practice - Safe Design of Buildings & Structures 2008” published by the Commission for Occupational Safety & Health, Western Australia.

Compliance with this Code of Practice will ensure that all designs will be safe to install, operate, maintain and dismantle by appropriately experienced contractors.

Any hazards that cannot be eliminated by design will be identified and the appropriate work practices, protection and work methods required should be formulated by the contractor. Individual discipline specific hazard identification reports will be forthcoming.

Eastern Precinct Football Stadium

1.3 Programme

Review of the current D.W Kolagow & Associates programme (revision 4) identifies the following key milestones pertinent to the Western Precinct Soccer / Cricket Pavilion:

- Schematic Design Deliverable to Client 19 September 2014
- Design Development Deliverable to Client 19 December 2014
- Finalise Contract & Tender Documentation 15 June 2015

1.4 Checking Procedures

This project falls into category A as determined by Wood & Grieve Engineers Quality Manual, accordingly all drawings and specifications will be reviewed by the Project Engineer prior to issuing.

2. Site Location & Project Overview

The proposed site is located within the Eastern Precinct of the CPSP situated adjacent to Lockyer Avenue, Albany and forms an integral part of the over-arching CPSP Scheme Development.

The proposed building site identified within the Eastern Precinct for development is bounded to the east and south by existing sporting ovals, to the west by Lockyer Avenue road reserve and to the north by an existing stormwater overland flood route and North Road road reserve.

The site is generally flat, with gentle fall from the east to west. The site will be subject to bulk earthworks, forming part of the over-arching Civil works package, to ensure satisfactory freeboard to the 1 in 100 year flood routes.

The project comprises the development of a Football Stadium Pavilion for patronage and public amenity. The proposed building will be connected via the proposed "central spine" and service vehicle access will be provided to the back of house. A designated vehicle parking and a hard landscaped pedestrian promenade will be provided as part of the building.

The building will accommodate the following main elements:

- Function room (approx. 400 m2);
- Meeting rooms and office (approx. 103 m2 combined);
- Bar, Kitchen and Kiosk facilities;
- Cool room(s);
- Changing facilities (3 of, inclusive of Umpire changing facilities);
- Ablutions;
- Various stores;
- Foyer;
- Concrete terraces for spectator viewing.

Eastern Precinct Football Stadium

3. Mechanical Services

3.1 Objectives

- Provide Mechanical Services to an appropriate standard comparable with other sports facilities installations.
- Mechanical Services for each area to fulfil its designated function.
- Minimise capital costs whilst still achieving acceptable running and maintenance costs and without reducing the standard of services.

3.2 Design Criteria

The air conditioning systems shall be designed to meet the following design criteria during normal operation with due allowance for solar loads, transmission loads, internal loads, occupancy level and infiltration loads.

All cooling and heating loads may incorporate a design/safety factor of 10%, which is to be added to the calculation of cooling and heating loads.

The design criteria proposed for the mechanical services will be based on the following parameters:

3.2.1 Design Temperatures

External Conditions (Albany)

Summer (maximum)	28.5°C DB	19.2°C WB
Winter (minimum)	6.1°C	

The above ambient temperatures represent the "comfort" design conditions for Albany.

Internal Conditions

Function Hall

Cooling	:	24°C Dry Bulb
Heating	:	21°C Dry Bulb
Control Tolerance	:	Plus or minus 1.5°C at the point of control for heating and cooling
Humidity Control	:	40 - 60% Relative Humidity anticipated by virtue of cooling coil performance but not controlled

Event Admin Rooms, Offices, Foyer and First Aid

Cooling	:	24°C Dry Bulb
Heating	:	21°C Dry Bulb
Control Tolerance	:	Plus or minus 1.5°C at the point of control for heating and cooling
Humidity Control	:	40 - 60% Relative Humidity anticipated by virtue of cooling coil performance but not controlled

3.2.2 Internal Loads

Function Room

Occupancy	1.5 m²/person
Lights	20 W/m²
Equipment	5 W/m²

Kitchen

Occupancy	3.5 m²/person
Lights	15 W/m²
Equipment	50 W/m²

Meeting Rooms

Occupancy	1.5 m²/person
Lights	15 W/m²
Equipment	15 W/m²

Event Admin, Office, First Aid Room

Occupancy	10 m²/person (minimum 2 people)
Lights	25 W/m²
Equipment	15 W/m²

Foyer

Lights	15 W/m²
Equipment	5 W/m²

Electrical Consultant to confirm above lighting and power figures

3.2.3 Outside Air Flow Rates

Function Hall	7.5 l/s/person
Meeting Rooms	7.5 l/s/person
Event Admin & Office	7.5 l/s/person
First Aid	15 l/s/person
Foyer	1 L/sec per m² floor area

Mechanical air flow rates indicated – alternatively natural ventilation openings may be provided through operable windows etc. in accordance with BCA requirements.

3.2.4 Exhaust Air Rates

All areas shall be provided with mechanical ventilation to achieve minimum exhaust ventilation flow rates in accordance with AS1668.2 – 1991; these rates include, but are not limited to the following:

Commercial Kitchen Hoods :	Compliant with AS 1668.2 Make-up air for commercial kitchen exhaust to be 90% of exhaust rate The kitchen exhaust systems shall be installed in accordance with AS 1668.2-1991.
Toilet Exhaust /Ablutions	The greater of 10 L/s per m^2 or 25 L/s per fixture

3.2.5 Acoustic Criteria

Function Hall	45 – 50 dB (A)
Meeting Rooms	30 – 40 dB (A)
Event Admin & Office	40 dB (A)
Toilets	50 - 55 dB (A)

3.2.6 Glazing and Building Fabric

Architect to advise Building Fabric.

Eastern Precinct Football Stadium

The following information is required to enable WGE to carry out detailed heat load calculations and equipment selections:

- Floors Total U-Value
- Internal Walls Total U-Value
- External Walls Total U-Value
- Glazing U-Value and Shading Coefficient
- Roof Total U-Value

3.2.7 Design Standards

Statutory Design Standards

The National Construction Code (NCC) 2014 and in particular the “deemed to satisfy” conditions of:

NCC 2014 Section J3 “Building Sealing”

NCC 2014 Section J5 “Air Conditioning and Ventilation Systems”

NCC 2014 Section J8 “Access for Maintenance”

NCC 2014 Specification J5.2 “Ductwork Insulation and Sealing”

Australian Standards as follows:

AS 1530	Methods for fire tests on building materials, components and structures
AS 1668.1	The use of mechanical Ventilation and Air Conditioning in buildings -Fire and Smoke control in multi-compartment buildings
AS 1668.2	The use of mechanical Ventilation and Air Conditioning in buildings - Mechanical Ventilation in buildings
AS 1677	Refrigerating Systems
AS 1682	Fire Dampers
AS 1851	Maintenance of Fire Protection Systems
AS 3000	SAA Wiring Rules
AS 3666.1&2	Air Handling and Water Systems of Buildings – Microbial Control
AS 4254.1	Flexible Ductwork – Fire resistance & Sealing only.
AS 4254.2	Solid Ductwork – Fire resistance & Sealing only.

Client to advise requirements and guidelines of City of Albany, Water Authority, Waters and Rivers Commission, Fire and Emergency Services Authority, Health Department and Department of Environmental Protection.

Safety in Design Standards

These standards may be referenced in Safety in Design reports; compliance with these standards will eliminate the relevant Health and Safety Risks.

Australian Standards as follows:

AS 1668.1	The use of mechanical Ventilation and Air Conditioning in buildings -Fire and Smoke control in multi-compartment buildings
AS 1668.2	The use of mechanical Ventilation and Air Conditioning in buildings - Mechanical Ventilation in buildings
AS 1677	Refrigerating Systems
AS 3000	SAA Wiring Rules
AS 3666.1&2	Air Handling and Water Systems of Buildings – Microbial Control
AS 2865	Confined Spaces HB213 Guidelines for Working in Confined Space
AS 1894	Storage and Handling of Non-Flammable Cryogenic and Refrigerated Liquids

AS 1940	Storage and Handling of Flammable Combustible Liquids
AS 3500	Plumbing & Drainage Codes

Best Practice Design Standards

These standards will be followed where practical, Client to advise any standards which must be followed.

Australian Standards as follows:

AS 1324	Air Filters for use in air conditioning and general ventilation
AS 2107	Acoustics
AS 3013	Electrical installations, wiring systems for specific applications
AS 4254.1	Flexible Ductwork
AS 4254.2	Solid Ductwork

3.2.8 Alternative Solutions

No alternative Solutions are currently proposed to the Deemed-to-Satisfy NCC BCA design requirements.

3.2.9 Local Environment

Mechanical services materials and finishes selection shall reflect the marine environment of Albany and the associated corrosiveness of the ambient environment. Aluminium condenser coil fins shall be factory coated with a proprietary marine grade corrosion resistant coating in order to minimize corrosion potential.

3.3 Existing Conditions

Not Applicable.

3.4 Proposed Strategies

Table 1 below provides a guideline of the proposed cooling, heating and exhaust ventilation systems based on current architectural drawings and Wood and Grieves experience.

Where there is no clear direction or the space lends itself to various options for heating, cooling and ventilation, all applicable options have been ticked and require confirmation from the Architect/Client. ***Architect/Client to confirm.***

Area		Cooling Provision			Heating Provision			Ventilation Provision		System Type
		None	*Air Conditioning*	*Evaporative*	*None*	*Air Conditioning*	*Gas*	*Mechanical*	*Passive*	
Function Space										
	Meeting Room		✔			✔		✔ (TBC)		VRV
	Event Admin		✔			✔			✔	VRV
	Foyer		✔			✔		✔ (TBC)		DX
	Office / Reception		✔			✔		✔ (TBC)		DX
	Function Space		✔			✔		✔		DX
	Kitchen			✔				✔		DX
	Function & User Group Stores	✔			✔				✔	

Eastern Precinct Football Stadium

Area		Cooling Provision			Heating Provision			Ventilation Provision		System Type
		None	*Air Conditioning*	*Evaporative*	*None*	*Air Conditioning*	*Gas*	*Mechanical*	*Passive*	
Change Rooms & Ablutions										
	Change 1 and 2	✔			✔			✔		-
	External Store	✔			✔				✔	-
	Umpires 1 and 2	✔			✔			✔		-
	UA WC	✔			✔			✔		-
	Ablutions	✔			✔			✔		-
	Property Stores	✔			✔				✔	-
	First Aid Rooms		✔			✔			✔	DX

Table 1: Overview of proposed cooling, heating and ventilation systems.

System Type:

EC : Evaporative cooler unit, ducted to space.
DX : Reverse cycle standalone split air conditioning system, offering individual conditioning to each zone; each zone with a dedicated condenser unit.
VRV : Variable Refrigeration Volume air conditioning system, offering individual conditioning to each zone; multiple zones with a single condenser unit.

Client to advise any additional areas requiring air conditioning or ventilation.

3.4.1 Meeting Rooms

The Meeting Rooms are at the north end of the building accessible from the foyer. Air conditioning to be provided to the rooms through above ceiling ducted VRV type air conditioning units linked by refrigerant pipework to a common condensing unit located in the plant enclosure to the rear of the function hall store.

If outside air is provided mechanically, then in ceiling heat recovery ventilators (HRV) may be provided to pre-condition the required air quantity prior to distribution to the room. Room CO_2 sensors will control the heat recovery ventilator operation to maintain air quality and minimize operation costs. A 600 deep ceiling void is required to accommodate the air conditioning installation.



Typical Above Ceiling VRV Ducted Air Conditioning Unit



Typical Individual Split External Condensing Unit.



Typical In Ceiling Heat Recovery Unit.

3.4.2 Event Admin Offices

The four event admin offices are located on the pitch side of the building distant from a suitable location for condensing units. Each room will therefore be conditioned by a wall mounted air conditioning unit linked by refrigerant pipework to a single VRV condensing unit located in the plant enclosure to the rear of the function hall store. Each room will have an individual controller and outside air to each room may be provided by operable windows, permanent openings or ducted via a mechanical system.

3.4.3 Function Hall

The Function Hall has extensive east facing glazing overlooking the oval with shading provided by the roof overhang. Folding partitions allow the room to be divided into three areas to suit usage. Economic air conditioning selection will follow the partition layout to provide:

- An eternal zone along the glazing.
- A north internal zone,
- A south internal zone.

Air conditioned will be via above ceiling ducted VRV type air conditioning units linked by refrigerant pipework to a condensing unit located in the plant enclosure to the rear of the function hall store.

Based on a floor area of 400 m² the function hall could have an occupancy of up to 265 people. We would request the occupancy rates be confirmed for accurate plant sizing. If outside air is provided mechanically then in ceiling heat recovery ventilators (HRV) may be provided to pre-condition the required outside air quantity prior to distribution to the different zones. Room CO_2 sensors will control the heat recovery ventilator operation to maintain air quality and minimize operation costs. A 600 deep ceiling void is required to accommodate the air conditioning installation.



Typical Above Ceiling VRV Ducted Air Conditioning Unit



Typical External VRV Condensing Unit.



Typical In Ceiling Heat Recovery Unit.

3.4.4 First Aid Rooms

Each of these rooms to be air conditioned by an individual wall mounted split type air conditioning unit linked to a condensing unit by refrigerant pipework. Each room to have an individual wall mounted controller.

3.4.5 Kitchen

A kitchen exhaust fan will be ducted from an exhaust hood (Exhaust hood to be provided by the kitchen equipment supplier to suit the supplied kitchen equipment). The kitchen exhaust, if required to discharge horizontally through a high level louvre or similar will probably require UV and ozone air purification to remove grease and odours. Alternatively, vertical discharge may be provided without the need for UV and ozone treatment. Make-up air to the kitchen would be provided through an Evaporative Cooler of nominal size 1150 x 1150 x 860 h located in the plant enclosure to the rear of the function hall store. The Evaporative Cooler would be provided with a variable speed drive to vary the make-up air supply to match the variable exhaust air quantity and make-up air will be ducted across the User Group Store to the Kitchen.

A 600 deep ceiling void is required to accommodate the ventilation installation.

Client to confirm the extent of cooking facilities to be provided.



Typical Evaporative Cooler Unit.

3.4.6 Ablution and Change Room Exhaust

Individual toilet exhaust installations to be provided to the following room groupings:

Change 1 and associated ablutions,

Change 2 and associated ablutions,

Public WC's and UA WC

Each ducted exhaust system shall be complete with duct mounted exhaust fans, ductwork, grilles, roof cowl, electrics and controls. Make-up air will be via high level permanent openings or through ceiling transfer grilles. The exhaust systems will be activated either via associated light switches or motion detectors and fitted with an adjustable run on timer to ensure fan operational efficiencies.

A 600 deep ceiling void is required to accommodate the ventilation installation.

Preliminary calculations indicate that roof mounted exhaust fan units are 76 kg in weight; 1680 l x 908 w x 675 h

Eastern Precinct Football Stadium



Typical Roof Mounted Toilet Exhaust Fan Unit

3.4.7 BMS Control System

A Building Management Services Control System is not proposed for this building. Each air conditioning unit/system is provided with local controllers.

3.4.8 Works Not Included

The following works do not form part of the documented mechanical scope but will be identified in the mechanical services specification for inclusion by the head contractor:

- Builders work - general items, e.g., attendance, site facilities, openings in walls and ceilings for air ducts, outlets, grilles, pipes, etc. and sealing of such.
- Supply and installation of ceiling access panels.
- Under-flashing of all roof penetrations.
- Installation of door grilles.
- Supply and installation of external louvres.
- Condenser compounds / AHU enclosures including floor, walls and/or louvred walls.
- Provision of switched power supplies to all mechanical services equipment.
- Provision of tundishes and drain points to air conditioning equipment.
- Provision of water and drainage to evaporative coolers.
- Provision of Kitchen Hood (by specialist kitchen supplier
- Cold Room and Refrigeration Equipment
- Access stairs/ladders and walkways for mechanical services equipment, to Architect's specification.

3.5 Unknowns requiring information

The following items require further clarification:

- Electrical Consultant to confirm above lighting and power figures
- Architect to advise Building Fabric.
- Client to advise requirements and guidelines of City of Albany, Water Authority, Waters and Rivers Commission, Fire and Emergency Services Authority, Health Department and Department of Environmental Protection.
- Client to advise any standards which must be followed.
- Client to advise any additional areas requiring air conditioning or ventilation.
- Client to confirm the extent of cooking facilities to be provided.

3.6 Estimated Costings

Note that the above budget estimates are preliminary and are subject to change based on further design development and agreement of mechanical system types.
Please note that budget estimates will be updated as part of the ongoing design development process.

Air conditioning installations to Function Room, Meeting Rooms and First Aid:	$ 245,000
Kitchen exhaust and Make-up air installations:	$ 45,000
Ventilation to Changing Rooms and WC's	$ 30,000
Electrics, MSSB and Controls:	$ 25,000
O & M Manuals, Construction Drawings, Maintenance:	$ 15,000
	$ 360,000

The above figures are exclusive of Preliminaries, Builderswork, GST, Regional Variation, Contingency, Escalation and Kitchen Canopies.

Eastern Precinct Football Stadium

4. Electrical Services

4.1 Objectives

The electrical services will be designed in accordance with best practices in electrical design with a focus on achieving the most cost efficient solution and meeting relevant code requirements.

4.2 Design Criteria

4.2.1 Overview

While the focus of this report is to deliver the Stadium, electrical services design will be cognisant of the ultimate design master plan and will incorporate the cost effective infrastructure suitable for area lighting, sports lighting, additional built facilities and other power users within the precinct.

The following information has been used by in preparation for this report:

- Site visits throughout July/August 2014
- Gresley Abas Schematic Drawing No SD 01, Rev A dated 20/08/2014
- CCS Strategic Drawing No CP.DEC.1-CCS-01 dated 23/07/2014.

The following guidelines have been referred to in the Schematic Design process and are referenced in this section of the report.

- FIFA Football Stadiums Technical Recommendations and Requirements 4th Edition, 2007 (FIFA)
- Guide to Safety at Sports Grounds 5th Edition, 2008 (Green Guide)
- Free TV Australia Operational Practice OP-31, 2005 (OP-31)
- Free TV Australia Operational Practice OP-32, 2007 (OP-32).

4.2.2 Sustainable Design

The electrical services provided will be in full accordance of any sustainability measures required by the ESD consultant and Client. The suitability of solar panels will be investigated as to whether they will be feasible to install. Other energy efficiency measures proposed to be provided include motion detection for lighting circuits, sub-metering for monitoring of energy consumption, different switching modes for the perimeter, area and pitch lighting and daylight sensors to ensure lighting is not operating when the ambient light level is sufficient.

4.2.3 Code Compliance

The electrical services will be designed in accordance with the following standards and codes:

- BCA 2014 – National Construction Code
- AS 3000:2007 (Amdt 2009) Electrical Installation – Wiring Rules
- AS 1680 – Interior Lighting
- AS1670.1 – Fire Detection and Alarm System
- AS 1670.4 – Emergency Warning and Intercommunication Systems
- AS 2293 – Emergency Evacuation Lighting in Buildings
- AS 1768 – Lightning Protection
- AS 3008.1 – Electrical Installation – Selection of Cables

- AS 1158 – Lighting for Roads and Public Spaces
- AS 3080 – Telecommunications Installations for Commercial Premises
- WAER – Western Australian Electrical Requirements.

4.3 Existing Conditions

The Eastern precinct has 2 x existing power supplies, 1 to the Western Portion (Main pavilion), and 1 to the soccer facilities at the North Eastern end of the precinct. It is our understanding the existing soccer facilities will remain but that all existing buildings in the remainder of the precinct will be demolished. The existing WP supply (Lockyer Avenue) has limited capacity and the existing equipment is in very poor condition. This supply will be removed and replaced with a new underground service of sufficient capacity for the Stadium building as well as the sports and area lighting.

4.4 Proposed Strategies

4.4.1 Power Supply

The incoming power will in all likelihood be supplied by the Authority from a district or sole use substation located on Lockyer Avenue. The substation is likely to consist of HV switchgear and 1 transformer connected to a low voltage frame which feeds the site main switchboard (SMSB).

The maximum power demand (MPD) estimates for main areas throughout the site are as follows:

Item	kVA
Stadium Building	180
Pitch Lighting (5 x soccer @100lux)	350
Carparks, Area lighting, retic equip, clubhouse (nominal)	70
Special events Power (Ag show etc)	50
Total	**650**

4.4.2 Power Supply and Distribution

Power will be supplied to the stadium, a series of pits and conduits running from the new site main switchboard to each of the local distribution boards. Conduit pathways will be resolved in Design Development.

4.4.3 Switchboards

Switchboards will be provided to distribute power throughout the Stadium. The stadium will require a switchboard in each of the Northern and southern portions of the facility. Switchboards will be external rated, aluminium construction with two levels of access for venue staff to operate controls and contractors to work on circuits.

4.4.4 Sub-main Cabling

Sub-mains feeding the switchboards will be XLPE type, rated to the expected ultimate current load and installed in underground conduits.

4.4.5 Lighting

Lighting will be provided to the stadium seating, verandahs, passages, as well as all internal rooms/spaces in accordance with the relevant requirements from the Architect and Client.

Eastern Precinct Football Stadium

Lighting will generally be provided in accordance with AS1680 and will be a combination of linear fluorescent, compact fluorescent, metal halide and LED luminaires best suited to the application.

4.4.6 Lighting Controls

A lighting control system will be provided to control the general lighting throughout the stadium. The lighting control system will have head end equipment in either of the proposed switchboards and a control panel in a location yet to be determined. The switching philosophy to be developed in design development will be based around motion and daylight detection to ensure the lighting system is energy efficient.

4.4.7 Emergency Lighting

Emergency Lighting will be provided in accordance with AS2293. The emergency lighting system will be provided with standard 90 minute battery backup, however can be upgraded to three hour battery power in accordance with the Green Guide requirement. The system may be powered by individual luminaire batteries or through a centralised UPS system. This will be determined in Design Development.

4.4.8 General Power

General power will be provided for cleaning requirements as well as individual space usage as defined in consultation with the architect.

Hand dryers will be provided to all public toilets.

Three phase power outlet can be provided for temporary Outside Broadcast (OB) van, if required.

Cabling will be reticulated throughout the site on cable trays with removable covers.

4.4.9 Communications

Communications cabling for voice and data networks will be provided within the northern section of the pavilion only. Cabling will be F/UTP Cat6a quality.

4.4.10 MATV System

An MATV system will be provided to reticulate high definition television through limited areas of the Northern section of the building (Function Hall, Community meeting Room, Foyer). The MATV system head-end will be located within a communications cabinet.

4.4.11 Video and Broadcast

No allowance is made for a Video and Broadcast system.

4.4.12 Fire Detection and Alarm

Fire detection will be provided in accordance with AS1670.1 as per the fire engineer's report. Fire detection will be in the form of smoke and thermal detectors.

4.4.13 WIS and Public Address

No allowance has been made for EWIS and PA Systems.

4.5 Unknowns requiring information

4.5.1 As-constructed/Existing Infrastructure

In order to progress the design we require details of all existing electrical infrastructure within the Eastern Precinct. This includes special event power points, retic pumps, lighting etc

4.5.2 Likely Future Power Users

In order to future proof the design, we require details of likely future infrastructure including maintenance sheds, retic pumps, pump stations, special events requirements etc.

4.6 Estimated Costings

WP Supply (Provisional 420kva)	$230,000
Football Stadium	225,820
SMSB (650kva)	50,000
Mains	25,000
BMSB 01	15,000
BMSB 02	10,000
Total Building cost	$555,820

Eastern Precinct Football Stadium

5. Structural Services

5.1 Objectives

- To design a functional space to conform to the intended use for both the Royals and Sharks football operations.
- To design a functional adaptable open planned facility for a variety of intended usages with maximum future proofing allowance for any adaptation.
- Design to be efficient and economic in concept with a focus on the aesthetic statement of the facility.

5.2 Scope of Work

Reference should be made to our fee submission for a detailed break-up of the extent of our service. We provide a broad outline below.

5.2.1 Services to Be Provided During Design

The following items constitute the Structural scope of works:

- Geotechnical Consultant appointed by the Client and report issued for our review. Additional geotechnical investigation if so required will be advised for the specific location of the building.
- Preparation of design calculation package in accordance with current and relevant Australian Standards and the BCA. The structure will be designed for dead/live loads, fire resistance, durability, wind, earthquake and soil pressure loads, as required.
- Preparation of Structural specification notes included on drawings.
- Design Certification letter at project completion.
- Retaining walls incorporated as part of the building including lift over-run pits.
- Foundations and floor slabs on grade.
- Suspended floors including support beams and stairs.
- Vertical load bearing elements including columns and walls.
- Lateral load resisting elements including external walls, cores and/or shear walls.
- Roof and canopy elements.

5.2.2 Structural Services – Clarifications

Wood & Grieve Engineers have not yet allowed for the following in our scope of service and fee.

- Cost of geotechnical survey and all materials testing consultant fees.
- All framing specification associated with steel stud framed construction by specialist supplier unless agreed prior to commission.
- Pre-engineered roof truss design and documentation by specialist supplier.
- Shade sail structures by specialist D&C supplier.
- All piling and temporary/permanent boundary ground retention design and documentation by specialist supplier.
- Crane base design unless agreed prior to commission.
- External structural certification. A formal review process in accordance with Wood & Grieves' Quality System will be conducted in-house and has been included in fees unless agreed prior to commission.

5.3 Design Criteria

The following information provides the basis for the structural design of this project.

5.3.1 Building Classification

The following classifications are suggested as suitable for the following buildings. ***This will need to be confirmed by the BCA consultant:***

- Stadium Building – Eastern Precinct Class 9B

5.3.2 Building Importance level

The following importance levels are proposed for each of the buildings. ***This will need to be confirmed by the BCA consultant***:

Structure Description	Importance Level	Average Recurrence Interval (yrs)
Stadium Building – Eastern Precinct	Level 2	1 in 500 yrs

The determination of design actions (wind, etc.) is based on the above provision.

5.3.3 Fire Resisting Design & Construction

The current configuration for the Stadium Building – Eastern Precinct fire-resisting construction is Type C– ref Table C1.1 under the NCC. ***This and the FRL's outlined below will need to be confirmed by the BCA Consultant.***

5.3.4 Geotechnical Conditions

No historic geotechnical information for the site is available, a preliminary intrusive site investigation has been undertaken and a preliminary report issued for review. ***A Final Geotechnical report has not yet been provided to WGE.***

A geotechnical investigation was carried out in July 2014 for the site. Ground conditions vary across the site therefore varying site classifications have been provided across the site. Typically across the site medium-dense sandy fill was encountered which overlays stiff clayey sand and ultimately coffee rock. The geotechnical report recommends that the fill be considered uncontrolled in its current condition and therefore in areas of uncontrolled fill the site be categorized as 'Class P' to AS 2870. ***No record of placement for the filling is available.*** The geotechnical report recommends remediation of the existing uncontrolled fill to achieve a 'Class A' site classification. If the fill was remediated to achieve 'Class A' categorization bearing pressures of 200 kPa for pad and strip footings could be achieved and differential settlements were estimated to be less than 5mm if founded in accordance with the recommendations of the geotechnical report.

To the North-Eastern corner of the Western precinct clay and clayey sand was encountered at shallow depths. The findings of this report classified these areas of site as 'Class S', with an allowable bearing pressure of 200kPa for pad and strip footings.

Groundwater was encounter at most investigation locations, typically 0.75-2.3m below the existing surface level.
The geotechnical report identifies that ***the Risk of Acid Sulphates being encountered across the site is high***.

The following design parameters have been assumed for the design of shallow foundations in the absence of site specific geotechnical data:

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Allowable bearing pressure	:	***200 kPa subject to ground works***
Maximum differential settlements	:	***15mm max***
Site Classification to AS2870:2011	:	S

Any areas of existing ground that are locally disturbed due to installation of underground services and excavation for building foundations should be re-compacted and the achieved compaction re-tested prior to pouring concrete to ensure conformance with the Geotechnical Engineers specification.

5.3.5 Dead Loads (AS1170.1 – 2002)

Light weight roofs (roof sheet, insulation, purlins)	:	0.15 kPa
Floor finishes (Carpet)	:	0.05kPa
Floor finishes (ceramic tiles and bedding to bathrooms)	:	0.60kPa
Ceiling	:	0.15kPa
Services	:	0.15kPa
Assume 150mm thick raft slab	:	3.60 kPa
190mm reinforced blockwork walls	:	4.60 kPa on elevation
150mm Precast Concrete walls	:	3.60 kPa on elevation
Internal studwork partitions	:	0.50 kPa on elevation

5.3.6 Live Loads (AS1170.1 – 2002)

Plant room and storage areas	:	5.0 kPa
General office areas / amenities	:	3.0 kPa
Common areas / stairs / terraces	:	4.0 kPa
Courtyards and other general areas not listed	:	5.0 kPa
Non - trafficable roof live load	:	0.25 kPa
Retaining wall surcharge (where applicable)	:	5.0 kPa

5.3.7 Wind Loads (AS1170.2 2011)

Region	:	A1
Terrain category	:	2.5
Importance category	:	3
Ultimate wind ARI	:	1 in 1000
Regional wind speed (Ultimate), Vr	:	46 m/s
Serviceability wind ARI	:	1 in 25
Regional wind speed (Ultimate), Vr	:	37 m/s
Shielding multiplier, Ms	:	1.0
Topographic multiplier, Mt	:	1.0
Direction multiplier (all directions), Md	:	1.0
Terrain height multiplier, Mz,cat	:	0.94

5.3.8 Earthquake Loads (AS1170.4 – 2007)

Hazard factor, Z	0.09
Site sub-soil class	Ce
Importance level	3
Design working life	50 years
Earthquake design category	II
Earthquake loading return period	1 in 1000
Probability factor, Kp	1.3

5.3.9 Concrete Structures (AS3600 – 2009)

Internal exposure classification	:	A2
Sub-soil exposure classification	:	A2 ***(tbc with geotechnical engineer)***
External exposure classification	:	B1
Minimum internal concrete strength	:	32MPa
Minimum internal concrete cover	:	25mm
Minimum concrete cover to underside slab on ground	:	40mm
Minimum external concrete strength	:	32MPa
Minimum external concrete cover	:	40mm
Minimum footing concrete strength	:	25MPa
Minimum footing concrete cover	:	50mm

Deflection limits:

Maximum long term foundation settlement (allowable)	<5 mm
Maximum long term differential settlement (allowable)	***TBC***
Maximum foundation rotation (allowable)	span/1000
Long term load factor	0.4
Short term load factor	0.7

Concrete shall be cured for a minimum of 14 days after pouring by an approved proprietary curing agent. Shorter curing periods may be accepted subject to the Structural Engineer's review.

Construction tolerances shall be in accordance with AS3600 and AS3610.

Tolerances	:	3mm maximum deviation from 3m straight edge across floor in any direction.
	:	Joints in floor to be flush.
Finish	:	Steel trowel finish to suit proposed floor covering.
	:	Refer to architect for floor coverings.

5.3.10 Steel Structures (AS4100 – 1998)

All steelwork shall be new and complying with the following minimum grades unless otherwise specified:

Hot-rolled open sections	:	Grade 300Plus
Cold-formed RHS, SHS	:	Grade 450Plus
Cold-formed CHS	:	Grade 350Plus
Flat plates and other assemblies	:	250MPa

Deflection limits:

Eaves lateral deflection limit	column height h / 500
Dead load only deflection limit	span/360
Dead load and short term live load deflection limit	span/300
Serviceability wind load deflection limit	span/300
Glazing frame support under service wind	span / 400
Long term live load factor (roof)	0.0
Short term live load factor (roof)	0.7

The natural frequency of the structure shall be equal to or greater than 2.4Hz in accordance with AS1418.

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5.3.11 Steelwork Protection (AS2312-2002)

Atmospheric corrosivity category : Category C - Medium

Corrosion protection systems to have *Extra Long Term Service Life (25+ years*), Protection Systems include:

Hot dip galvanising (HDG), or
Aluminium or zinc-rich paint systems.

The following systems are proposed for treating steelwork:

Internal treatment (painted option)	-	Abrasive blast clean to AS1627.4 Class 2
	-	Red oxide zinc phosphate to 75µm prime
	-	Final coat/s as specified by Architect
and		
External treatment (painted option)	-	Abrasive blast clean to AS1627.4 Class 2.5
	-	Inorganic zinc silicate (water-borne) to 75µm DFT
	-	Final coat/s as specified by Architect (if not incorporated into above)
or		
External and internal treatment (galvanised option)	-	HDG600 to 85µm DFT to AS4680
	-	Final coat/s as specified by Architect (if not incorporated into above)
In cavity	-	HDG600 to 85µm DFT to AS4680
Below ground:	-	In addition to above, 2 coats of bitumen based prismatic to 400 microns
Site weld:	-	Power tool clean and painted to same spec as internal/external steelwork
Cast-in items into concrete:	-	Hot dip galvanised
Nuts, washers and bolts:	-	Hot dip galvanised

Any pressed metal products (incl. but not limited to studs, purlins and wall / roof cladding) are to be hot dip galvanised typically and be protected for the applicable corrosivity category. Refer to the manufacturer's specifications for further details.

Any surface treatment damaged during construction works shall be reinstated in accordance with the above specifications.

5.3.12 Masonry Structures (AS3700 -2011)

All masonry shall be new and comply with the following unless otherwise specified:

All masonry to be bonded with mortar class as follows uno:

I) Within 1km of coast: M4 class mortar (1 cement:0.5 lime:4.5 sand)
II) Otherwise: M3 class mortar (1 cement:1 lime:6 sand)

Min. Unconfined compressive strengths of masonry to be as follows:

III) Brickwork: 12MPa
IV) Blockwork: 12MPa

All masonry should be tied to walls/columns with approved proprietary ties at 350 mm max. centres vertically and 900mm max. centres horizontally (where applicable). Vertical centres may be increased to 400 mm in the case of blockwork uno.

The outer leaf should be tied to the inner leaf of cavity construction with galvanised, type 'a', medium duty wall ties in accordance with the following min requirements:

V) Up to 75mm cavity : 600mm horizontally, 520mm vertically
VI) Over 75mm cavity: 600mm horizontally, 530mm vertically
VII) Within 300mm of lateral supports, openings or vertical movement joints: 300mm vertically

Treatment of wall ties to be as follows:

VIII) Stainless steel: within 1km of large saltwater bodies.
IX) Galvanised: otherwise

Non load bearing masonry built to the underside of slabs over shall be laterally restrained via proprietary head restraint brackets at 400 mm max centres fixed to the soffit of the slab over and built into the perpendicular joints.

The maximum vertical wall joint spacing should comply with the following uno (refer to architectural drawings for exact locations):

Site Classification	Wall Construction	Joint Spacing (m)
M, M-D, H, H-D	Masonry veneer	7.0
	Sheeted and/or face finished full masonry	6.5
	Rendered or paint finished full masonry	5.5

Vertical movement joints are to be 10mm bridged with proprietary joint ties at 300 mm max centres and filled with a compressible mastic sealant on a backing rod.

5.3.13 Design Standards

All buildings, components of buildings, connections and parts of associated structures (e.g. canopies and verandas) are to be designed to comply with the requirements of the National Construction Code (NCC) and the Australian Standards referenced therein together with appropriate reference to any other available relevant documentation.

The Structural services have been undertaken in accordance with the following documents:

- Local Government Miscellaneous Provisions Act 1960
- Building Regulations 2012
- The National Construction Code / Building Code of Australia 2014
- Town of Claremont guidelines and any other relevant and available local government guidelines
- Relevant Australian Standards including but not limited to:

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Standard No	Title
AS 1170.0	Structural Design Actions – General Principles
AS 1170.1	Structural Design Actions – Permanent, Imposed and other Actions
AS 1170.2	Structural Design Actions – Wind Actions
AS 1170.4	Structural Design Actions – Earthquake Actions in Australia.
AS 3600	Concrete Structures
AS 4100	Steel Structures
AS 2312	Guide to the Protection of structural steel against atmospheric corrosion by the use of protective coatings
AS 3700	Masonry Structures
AS 2870	Residential Slabs and Footings
AS 1726	Geotechnical Site Investigations
AS 1562	Design and Installation of Sheet Roof and Wall Cladding
AS 2047	Windows in Buildings
AS 1684	Residential Timber Framed Construction
AS 4600	Cold-Formed Steel Structures
AS 1163	Cold-formed structural steel hollow sections
AS 3679	Structural steel - Hot-rolled bars and sections
AS 1554	Structural steel welding - Welding of steel structures
AS 1252	High strength steel bolts with associated nuts and washers for structural engineering
AS 4678	Earth–retaining structures
AS 1627	Metal Finishing – Preparation and pre-treatment of surfaces
AS 4680	Hot-dip galvanized (Zinc) coatings on fabricated ferrous articles

The above list may not be exhaustive and references should also be made to other standards required to satisfy the functional outcomes stated in the Architectural Design Brief and/or the Town of Claremont guidelines.

5.4 Proposed Strategies

5.4.1 Foundation

The ground will be treated and prepared in accordance with the geotechnical investigation to ensure long term settlement is controlled. If any forward works is required to attain required ground levels by regarding and importing fill is required this will be dealt with by the Civil Section of this report

Due to the ground conditions stated within the geotechnical investigation we advise the likely foundation system will be a ribbed slab with a 125mm slab with SL82 mesh spaning between the 400mm deep ribs. The ribs will have sufficient reinforcement to compensate the possible movement.

In addition to the ribbed slab strip footings will be located directly under all vertical walls which will be 400 wide x 400 deep. The strips will have sufficient reinforcement to compensate the possible movement.

Isolated pad footings approximately 1200 square x 400 deep will be located directly under steel columns. The pads will have sufficient reinforcement to compensate the possible movement.

The slab to the external veranda will again be a 125mm slab with SL82 mesh but will be stepped down and graded to have falls away from the building to aid drainage.

Please refer to SK001 for foundation schematic design strategy.

5.4.2 Superstructure

The intent is to form this building with a braced steel frame with columns located within the wall build up as not to impede the spaces within the building.

The roof will consist of steel rafters supported on columns and horizontally and vertically braced down to the ground.

The intent is for the viewing stand to be minimized for columns or columns located in strategic areas as not to impede the viewing to the pitch.

The front veranda is to be formed with a facial truss spanning between cantilevered steel sections supported on setback columns.

No secondary or territory has at this time been developed as well as key details for the feature cladding around the veranda.

The seating will be concrete formed. The key decision is if this will be precast or cast insitu on site. This will be driven by available resources and costs.

Please refer to SK002 for foundation schematic design strategy.

5.4.3 Walls

Due to the level differences around this building a number of retaining walls will be required. These will be formed using either core filled block work or concrete precast panels. This is yet to be determined due to costs and local availability

Some internal walls may remain as blockwork or concrete due to robustness. Alternatively isolated walls could be lightweight walls pending further review of client brief compliance.

5.4.4 Building Life Expectancy

The life expectancy of the building required by the end client has been confirmed as 50 years. To achieve this all steelwork must be treated with a suitable level of protection against corrosion which would typically provide a life to first significant maintenance of up to 25 years; an ongoing maintenance regime will be required over the structure's lifetime.

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5.5 Unknowns requiring information

Requirements for nonstructural secondary steel work will be further developed.

6. Civil Services

6.1 Objectives

- To provide innovative Civil solutions to ensure that the development progresses to completion in a cost efficient, time efficient and safe manner whilst achieving excellence for the City of Albany;
- To provide Civil Services of commercial quality with a minimum engineered design life of 20 – 25 years.

6.2 Design Criteria

The Civil services will be undertaken in accordance with the following documents:

- Australian Rainfall & Runoff – 1987;
- Department of Water:- Stormwater Management Manual;
- Australian Standards:- AS 2890.1:2004 – Parking Facilities, Part 1: Off-street car parking, as required;
- Australian Standards:- AS 3798:2007 – Guidelines on earthworks for commercial and residential developments;
- Relevant Local Authority design codes.

6.3 Existing Conditions

6.3.1 Geotechnical Information

Douglas Partners undertook a geotechnical investigation for the over-arching CPSP in late June 2014 and provided detailed reporting July 2014. In summary one test pit was located for the proposed building footprint. Intrusive testing confirmed our experience of the area that the site generally consists of silty sands over a cemented sand or clay layer at depth. As such, disposal of stormwater on-site via infiltration will be unachievable due to low permeability of the in-situ soils.

Acid Sulphate soils are not likely for the building footprint services.

Groundwater was recorded at approximately 2.2m from natural surface within the test pit.

6.3.2 Existing Infrastructure

No known existing infrastructure exists within the proposed stadium footprint.

Existing Agriculture buildings will be demolished to suit the development.

6.4 Proposed Strategies

The following is our general design intent pertinent to the relevant Civil services:

- Site stormwater and discharge:
  - infiltration at source will not be achievable due to the assumed nature of the in-situ soils and as such alternative means of stormwater detention / retention will be required. At this stage it is assumed that roof run-off will be attenuated and connected to the existing City of Albany stormwater system within Lockyer Avenue or to the north of site. The incorporation of above ground rainwater tanks for stormwater harvesting and re-use will be investigated in conjunction with the Hydraulics and WSUD Consultants, however may not be an economically feasible solution.
  - the 1 in 100 year ARI storm event will be flood routed such that risk of damage to buildings and associated infrastructure is mitigated.

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- Earthworks:
  - earthworks will occur as part of the Civil works package. The finished level of bulk earthworks (sand pads) is assumed to be finished floor level (FFL) minus 100mm. This will be confirmed during detailed design. It is anticipated that minor earthworks will be required during the construction of the building.
  - all bearing material will be compacted to 95% MMDD.
- Access Road and Vehicle Parking Areas:-
  - detailed modelling and design has commenced, based upon the current layout without Traffic Engineer confirmation.

6.5 Unknowns requiring information

Generally the Civil design for the building forms part of the greater precinct wide Civil design. This is at a very preliminary stage of modelling to date and requires further development and consideration. As such, we are of the impression that we have sufficient information to date, however more information may be required as the design is developed. We will provide advice in this regard as needed, however don't anticipate any negative imposts to the Architectural or over-arching design of the Pavilion building.

6.6 Estimated Costings

Building stormwater	TBA
Earthworks	Part of Civil works
Access	Part of Civil works
Total Building cost	$0 excl GST

7. Hydraulic Services

7.1 Objectives

- To provide Hydraulic Services of high standard, comparable with other similar sporting venues.
- To provide Hydraulic Services that minimises initial capital cost (to suit budget constraints) without excessively compromising quality or ongoing maintenance costs.
- To provide Hydraulic Services necessary for each area that fulfils designated function.
- To provide Hydraulic Services of commercial quality with a minimum engineered design life of 20 - 25 years.
- To provide adequate sized Hydraulic Services that allows an acceptable level of flexibility for future development.

7.2 Design Criteria

7.2.1 Design Standards

- Hydraulic services to comply with the Building Code of Australia 2014.
- Hydraulic services to comply with all current statutory requirements and guidelines including City of Albany, Water Authority, Waters and Rivers Commission, Department of Fire and Emergency Services, Health Department and Department of Environmental Protection.
- Hydraulic Services to comply with current Australian Standards where applicable and particularly the following:

AS 3500	:	National Plumbing and Drainage Code incorporating:
Part 1	:	2005 Water Supply
Part 2	:	2006 Sanitary Plumbing and Drainage.
Part 3	:	2006 Stormwater Drainage.
Part 4	:	2005 Heated Water Services.
AS 2419	:	2007 Fire Hydrant Installations.
AS 2441	:	2009 Fire Hose Reel Installations.
AS 5601	:	2004 Gas Installations.

7.2.2 Design Criteria

- Hot Water

	:	Storage Temperature (domestic use) minimum 60°C
	:	Supply Temperature (domestic use) Maximum 50°C
	:	Supply Temperature to disabled facilities maximum 45°C
	:	Supply Temperature (kitchen and bar) minimum 72°C

- Stormwater

Box Gutter Systems	:	Average recurrence interval (ARI) 1:100 years.
	:	Intensity 220.8 mm/hour.
	:	Duration 6 minutes.
Eaves Gutter Systems	:	Average recurrence interval (ARI) 1:20 years.
	:	Intensity 143.0 mm/hour.
	:	Duration 6 minutes.

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7.2.3 Occupancy

- In line with the current BCA Report occupancy for calculation purposes has been identified at 500 persons.

7.3 Existing Conditions

- The location, size, capacity and condition of existing services infrastructure within the boundary of each precinct, including sewer, water, fire, and gas is largely unknown. As constructed drawing data (where available) is to be provided by the City of Albany.
- The location, size, and capacity of the relevant authority services infrastructure is known and at this schematic design stage the services are deemed as being able to service the proposed new project.

7.4 Proposed Strategies

- Fire hydrant and hose reel services utilizing available flow and pressure off the water mains without the need for pumps and tanks. Recent testing of the water mains infrastructure indicates that adequate flow and pressure is available for firefighting services.
- Stormwater drainage to roof gutters will utilize syphonic roof drainage principals which will keep numbers and sizes of downpipes down to a minimum, allow offsetting downpipes to be laid flat, minimizing concealment in ceiling spaces and bulkheads, and allow retrofitting of stormwater harvesting tanks at a later date to be undertaken without significant re-design and re-configuration.
- A separate water supply will be designed to all toilet and urinal fixtures to allow future re-use of stormwater harvesting water to be reticulated without the need for substantial re-design and re-configuration.
- Hot water shall utilize gas continuous flow hot water heaters sized to suit peak changeroom use as well as regular function bar/kitchen use both at game and non-game events.

  Solar will not be considered for the precinct due to potential capital cost, large plant areas, inability to meet peak demand and periodic non-hot water usage.
- Nomination of water efficient fixtures and tapware conforming to WELS (water efficient labelling standards) will be considered.

7.5 Unknowns requiring information

- A-constructed drawing information for existing site services infrastructure for sewer, water, fire, and gas especially for existing buildings in close proximity to proposed new building and existing buildings to be refurbished.

  Information to be sought from Albany City Council.
- Detailed site feature survey to be provided.
- Geotech survey report to be provided.
- ESD initiatives impacting the hydraulic services needs to be determined and advised.
- Site/precinct “water balancing” calculations are being undertaken by Syrinx (Environmental Consultant) the results of which need to be advised so that potential water and energy efficient design strategies can be considered and documented.
- Extent of specialist bar/kitchen equipment and fit-out of these areas is still to be determined and has been excluded from this report together with associated costings. However, base building services to these areas has been included.

7.6 Scope of Work

7.6.1 Sanitary Fixtures and Fittings

- Provision for first grade commercial quality sanitary fixtures, fittings and tapware to the following areas:
  - Staff male/female toilet areas.
  - Cleaner's facility.
  - Public male/female and disabled toilet areas.
  - Male/female changerooms and associated toilet and shower areas.
  - Commercial bar and kitchen.
  - First aid room.

- Provision of fixtures and tapware conforming to the WELS (Water Efficiency Labelling Standards) which identifies the following maximum flow rates.
  - Showers @ 9-12 ltrs/minute
  - Hand Basins @ 6 ltrs/minute
  - Sinks @ 6 ltrs/minute
  - Toilets @ Dual Flush 6/3 litres(4 1/2 litre available)
  - Urinals @ waterless

  Nomination of sanitary fixtures and tapware will be determined in consultation with the architect for client sign off.

- Provision for all required vandal resistant features to fixtures and tapware.

- **Architect/Client to confirm requirements for the following fixtures:**
  - ***Drinking water fountains.***
  - ***Electronic urinal flushing systems.***
  - ***Waterless urinals.***

- **Fixtures and fittings to be nominated supplied and installed by others as connect only items.**
  - ***Commercial Kitchen and Bar Equipment.***

7.6.2 Sanitary Waste and Drainage

- Provision for the collection of all domestic waste discharges from fixtures and fittings via PVC fixture and branch wastes and including:
  - Toilets.
  - Hand basins.
  - Showers.
  - Urinals.
  - Dishwashers.
  - Kitchen sinks.
  - Drinking fountains.
  - Cleaner's sink.

  Note: Exposed fixture wastes shall be chrome plated copper.

- Provision for all required floor wastes and tundish wastes, maintenance access and inspection openings.
- Provision for all required fire stop collars to services passing through structural slabs, fire walls and floors.
- Provision for all required sanitary waste and drainage ventilation services terminating to atmosphere at roof level.
- Provision for below ground PVC sanitary drainage services collecting waste discharges from waste stacks, fixture wastes, etc, with gravity connection to the sites sanitary drainage services infrastructure and incorporating all required maintenance and inspection openings.

7.6.3 Industrial Waste and Drainage

- Provision for the collection of all grease waste from kitchen cooking and food preparation areas via fixture wastes from food preparation sinks, hand wash basins, bain maries, coolroom/freezer washdown and condensate waste drains, bucket traps and industrial floor wastes discharging to a 2000 litre capacity filtered grease trap/arrestor.

  Note: Fixture wastes from glass washers, dishwashers and pre-rinse sinks will discharge directly to the domestic sanitary drainage system so that excessive and high temperature waste water discharges bypass the grease trap.
- Provision for a 15mm hose connection tap located within 6m of the grease trap/arrestor to assist maintenance cleaning and complete with required backflow prevention device.
- Provision for a 240 volt, 10 amp, 3 pin weatherproof GPO to be located within 2m of the grease trap/arrestor industrial waste sampling point to assist the Authorities use of sample and monitoring process equipment.
- Provision for independent venting to atmosphere of grease trap/arrestor.

7.6.4 Cold Water Services

- Provision for reticulated cold water supplies to all sanitary fixtures, fittings and tapware as required incorporating all required maintenance isolation valves.
- Provision for all required internal/external hose connection taps to assist general cleaning, wash down and minor landscape irrigation complete with vacuum breakers and all necessary backflow prevention devices.
- Provision for external branch connections terminating in valve boxes for future extension to landscape irrigation systems. Allow for all required backflow prevention devices.

  Architect to confirm landscape irrigation requirements.
- Provision for all required sub-metering via manual reading meters/remote electronic meter reading.

  Client to confirm all sub metering requirements.
- Provision for all required backflow prevention devices to mechanical equipment, hot water units, hose taps, etc.
- Provision for fluid aprons to all tap breaches in walls and ducts.
- Water hammer and its effects are to be eliminated by addressing the following issues:
  - Appropriate design of water service pipework to maintain water velocities to a maximum of 1.5 metres/second.
  - Appropriate use and spacing of pipe supports and fixings.
  - Minimising the specification of quick closing tapware such as ceramic disc, quarter and half turn tapware.
  - Utilising appropriate hammer arrester devices to items such as dishwashers, glasswashers and washing machines.

7.6.5 Hot Water Services

- Provision for hot water heating plant providing hot water to the following areas:
  - Public male/female and disabled toilet amenities including Cleaner's room.
  - Cleaners sink.
  - Male/female changerooms and associated toilet and shower areas.

- Staff male/female and disabled toilet amenities.
- Commercial bar and kitchen.
- First aid rooms.

- Provision for reticulated hot water services with connections to all fixtures and tapware and incorporating all required maintenance isolating valves and temperature control devices.
- Provision for insulation to all reticulated hot water services as required.
- Temperature control devices are to be utilised to restrict hot water temperatures to the following areas:

-	Disabled Facilities	-	max 45°C
-	Public Toilet Amenities	-	max 50°C
-	Staff toilet amenities	-	max 50°C
-	First aid rooms	-	max 45°C
-	Kitchen and bar hand basins	-	max 45°C

- Provision for all required backflow prevention devices and temperature relief valves.
- Provision for hot water heating plant comprising the following:
  - Gas continuous flow hot water plant incorporating flow and return circuit and associated hot water circulating pumps.

7.6.6 Fire Hydrant and Hose Reel Services

- Provision for all required fire hose reels providing first aid Fire Fighting Protection to all areas and located within 4m of a fire exit and allowing full coverage from a 4m hose stream issuing from a 36m fire hose and nozzle.
- Provision for all required external fire hydrants providing building protection and located a minimum of 10m from the building structure, within 20m of hardstand area and allowing full coverage from a 10m hose stream issuing from a 60m hose and nozzle.
- Provision for reticulated fire hose reel services complete with identification to all internal fire hose reel locations.

  Note: Our commission for the project allows for the design of wet fire services nominated in accordance with the "Deemed to Satisfy" requirements of the BCA. Any move away from the "Deemed to Satisfy" provisions will require the input from a certified Fire Engineer under an "Alternate Solution" commission.

7.6.7 Mechanical Plant Waste and Water

- Provision for the collection and disposal of all mechanical air conditioning plant condensate waste via all required floor drains, and tundish wastes, with connection to stormwater disposal system and/or grated waste sump boxes as required.
- Provision for all required valved cold water spur connections for mechanical air conditioning plant make up as required.
- *Wood & Grieve Engineers will liaise with mechanical consultant to determine and co-ordinate all mechanical waste points and water points.*

7.6.8 Gas Services

- Provision for reticulated gas services to all gas equipment including:
  - Cooking equipment.
  - Hot water heating plant.

  and complete with all required isolation valves, first and second stage regulation.

- Provision for all required sub-metering via manual reading meters/remote electronic meter reading.

Eastern Precinct Football Stadium

Client to confirm all sub-metering requirements.

- Provision for emergency gas shut off valving arrangement incorporating immediately accessible manual isolation/electronic solenoid activated emergency stop buttons.

7.6.9 Stormwater Collection

- Provision of all required eaves/box gutters, gutter sumps, overflows, expansion joints and downpipes shall be made by the roofing contractor and covered in the Architectural documents.

  Wood & Grieve Engineers will assist the architect with minimum size of all required gutters, number and location of downpipes, overflow requirements and expansion joints.
- Provision for syphonic outlets to all box gutters and incorporating traditional overflow relief measures.
- Provision for the collection of all storm water run off from main roof areas, canopies and verandas via internal/external syphonic downpipes terminating at ground level.

7.6.10 Site Services

- Property sewer services incorporating:
  - A 100mm gravity connection to the Authorities main sewer infrastructure located Lockyer Avenue.
- Domestic Cold Water Supplies incorporating:
  - A 50mm connection to the Authorities water main infrastructure located Lockyer Avenue complete with main isolation valve and water master meter.
- Gas Services incorporating:
  - A 100mm connection to the Authorities gas main infrastructure located Lockyer Avenue complete with main isolation valve and gas master meter.
- Fire Services incorporating:
  - A 100mm connection to the Authorities water main infrastructure located Lockyer Avenue complete with main isolation valve, backflow prevention and water meter.
  - Provision for a 100mm/150mm brigade booster set in cabinet 2000L x 1500H x 600D (clear internal dimensions).
- Stormwater Drainage incorporating:
  - Collection of stormwater run off at base of downpipes and discharging to the sites stormwater drainage system (undertaken by the civil consultant).

7.6.11 ESD Initiatives

The following ESD Initiatives will be incorporated as part of the hydraulic services documentation:

- Reduction of water consumption utilizing approved limited flow tapware and fixtures in accordance with WELS.
- Sub metering of mechanical services water supplies, back of house areas, landscape irrigation, etc.
- Insulation of all hot water plant and reticulated hot water pipework.

The following ESD initiatives are offered for further architect / client consideration:

- Use of waterless urinals.
- Provision of cold water supply only to public toilet amenities, including toilets and hand basins.
- Collection, storage and re-use of rainwater run off for toilet flushing, landscape irrigation and minor cleaning and washdown.

7.6.12 Headworks

- Wood & Grieve Engineers have pre-calculated the anticipated headworks charges payable for this project which have been included in the current budget estimate.

7.6.13 Work Not Included

- Nomination of sanitary ancillaries (by the Architect).
- Landscape irrigation services.
- Sub-soil drainage.
- Water feature design and documentation.
- Nomination of specialist appliances to commercial bar and kitchen.
- Commercial bar and kitchen fit-out.

7.7 Budget Estimate

Our budget estimate for the scope of work identified above:

• Sanitary Fixtures and Tapware.	$	137,800
• Sanitary Waste and Drainage.	$	37,600
• Industrial Waste and Drainage	$	31,100
• Cold Water services	$	20,000
• Hot Water services	$	44,100
• Gas services	$	11,400
• Fire Hydrants and Hose Reels	$	28,000
• Mechanical Waste and Water	$	25,800
• Stormwater Collection	$	41,600
• Site Services		
- Sewer	$	35,700
- Water	$	11,700
- Fire	$	34,600
- Gas	$	8,500
• Headworks		
- Water Authority	$	105,200
- Gas Authority	$	18,000
TOTAL	**$**	**591,100**
• Provisional allowance for stormwater harvesting tanks and pumps	$	74,000

The above budget estimate excludes the following elements:

- Preliminaries.
- Builder's work and associated excavation work.
- Goods & Services Tax.
- Authority Submission Fees.

Eastern Precinct Football Stadium

- Regional Variation.
- Contingency.
- Escalation.
- Roof plumbing including gutters, gutter sumps, overflows and downpipes (allowed for by Quantity Surveyor).
- Water Authority Building Application fees based on a percentage of the anticipated construction value. Quantity Surveyor to calculate based on $1.10 per $1,000 of construction value.
- Fitout of commercial kitchen and bar areas.

8. Sustainability Services

8.1 Objectives

- Provide Sustainability Services to an appropriate standard comparable with other sports facilities installations.
- Identify sustainability initiatives that should be investigated further for inclusion in the design.
- Review and certify the design against the BCA Section J requirements.

8.2 Design Criteria

All new building elements will be designed to comply with the BCA Section J requirements.

8.3 Existing Conditions

The site is in Climate Zone 6 as defined in BCA Section J. This will impact upon the thermal envelope requirements for this development.

8.4 Proposed Strategies

A JV3 performance approach will be used to demonstrate compliance with the BCA Section J requirements. This will allow for a balancing of the thermal performance of each façade to maximize the amount of glazing facing the sporting arenas.

All sustainability initiatives will be considered to determine the costs and benefits to the project. Additional sustainability initiatives that will be explored throughout the design process include:

- Solar photovoltaic panels.
- High efficiency energy consuming equipment.
- Rainwater / greywater recycling system.
- High performance façade.

8.5 Unknowns requiring information

Once sustainability initiatives have been proposed and the cost benefit analysis has been provided, confirmation will be required to determine the initiatives to be included in the project.

8.6 Estimated Costings

The cost of the glazing and insulation required to achieve BCA Section J compliance will be included within the architectural cost estimates.

The costs for the optional sustainability items will also be included in the costs of the other disciplines. Detailed costs will need to be determined during the detailed design phase and will be very dependent on the cost / benefit analysis and the funding opportunities for these initiatives.

Eastern Precinct Football Stadium

9. Acoustic Services

9.1 Objectives

- Provide Acoustic Services to an appropriate standard comparable with other sports facilities installations.
- Acoustic Services for each area to fulfil its designated function.
- Compliance to applicable Australian Standards and WA Regulations.

9.2 Design Criteria

Under Australian Planning Law, the development is governed by several strains of acoustic legislation which connect together to form a regulatory framework aimed at controlling two main areas of concern in buildings. These concerns are;

- Ingress of extraneous noise into 'sensitive' spaces;
- Noise egress from mechanical plant and on-site activities; and

This report is intended to display the ability of the proposed development design to comply with the relevant acoustic criteria applicable to commercial construction projects, contained within the following Australian Standards and statutory legislation:

- *AS2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors; and*
- *Environmental Protection (Noise) Regulations 1997.*

The combined criteria contained therein aims to guide the development and construction of environments toward base levels of acoustical comfort and amenity, to provide spaces that are functional and able to respond to the changing needs of the community, the economy and the environment

9.2.1 Internal Noise Levels

Internal noise levels due to air conditioning and mechanical ventilation plant and external noise break-in should not exceed the maximum levels recommended in Australian Standard AS 2107:2000 "*Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors*"(AS 2107). This Standard recommends satisfactory and maximum internal noise levels for building interiors based on room designation and location of the development relative to external noise sources.

The relevant internal noise levels recommended in AS 2107:2000 are given Table 2. It is recommended that mechanical services be designed to achieve 5 dB(A) below these levels so as to allow the combined noise level (including hydraulic plant and other external steady sources) to meet the design levels of AS 2107:2000.

Table 2: Recommended internal noise levels (AS/NZS 2107:2000)

Type of occupancy/activity	Recommended design sound level, L_{eq} dB(A)	
	Satisfactory	Maximum
Function Hall	45	50
Meeting Rooms	30	40
General Offices	40	45
Toilets / Change Rooms / showers	45	55

Kitchen	45	55
Corridors & Lobbies	45	50

9.2.2 Reverberation Time

Reverberation time (RT) refers to the length of time required for the sound field in a space to decay 60 dB. In simple terms this means the amount of time it takes for sound energy to bounce around a room before being absorbed by the surface finishes and air. Closed spaces that don't have sound absorbent materials have long reverberation times (sports halls), and very absorbent rooms have short reverberation times (movie theatres).

Reverberation time affects how well speech is understood and influences the acoustic ambience of a space. The effect on speech intelligibility is noticeable in a long reverberation-time sports hall, where often a person cannot be understood only 3 to 5 m away. The recommended reverberation times as per AS2107 are indicated in Table 3.

Table 3: Recommended reverberation levels (AS/NZS 2107:2000)

Type of occupancy/activity	Reverberation Time, seconds
Function Hall	Minimize[1)]
Meeting Rooms	0.6 – 0.8
General Offices	0.4 – 0.6
Toilets / Change Rooms / showers	NA
Kitchen	NA
Corridors & Lobbies	0.4 – 0.6

[1)] Note AS 2107:2000 recommends that reverberation times in these spaces should be minimised as far as possible for noise control.

9.2.3 Environmental Noise Criteria

External noise emissions from the development must comply with the Western Australia Department of Environmental Protection document, 'Environmental Protection (Noise) Regulations 1997'. This document sets out the outdoor noise criteria, defined as the levels of noise allowed to be received at adjacent noise-sensitive premises at a particular time of the day or night.

To determine the assigned levels associated with the neighbouring residences of the proposed development, the influencing factor (IF) must be determined. This factor takes into account the amount of industrial and commercial land and the presence of major/secondary roads within a 100 metre radius and a 450 metre radius.

Figure 1 shows an aerial view of the site and the two circles around the site at a radius of 100 metres and 450 metres. Based on the calculation method specified by the WA – DEC Regulations, the influencing factor (IF) is expected to be approximately 0 dB(A). Based on this influencing factor, the calculated assigned levels are presented in Table 4.

Figure 1: Influencing Factor (IF) calculation – aerial map

Eastern Precinct Football Stadium



Source: nearmap.com

Table 4: Assigned levels based on calculated influencing factor

Type of premises receiving noise	Time of day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises within 15 metres of a building directly associated with a noise sensitive use	0700 to 1900 hours Monday to Saturday	45	55	65
	0900 to 1900 hours Sunday & public holidays	40	50	65
	1900 to 2200 hours all days	40	50	55
	2200 hours on any day to 0700 hours Monday to Saturday, and 0900 hours Sunday & public holidays	35	45	55
Noise sensitive premises at locations further than 15 metres from a building directly associated with a noise sensitive use	All Hours	60	75	80
Commercial premises	All Hours	60	75	80
Industrial and utility premises	All Hours	65	80	90

The "Environmental Protection (Noise) Regulations 1997 require that "*noise emitted from any premises when received at other premises must not cause, or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind". A noise emission is taken to "significantly contribute to" a level of noise if the noise emission is less than a level which is 5 dB below the assigned level at the point of reception.*

The regulation also requires that the noise character must be "free" of annoying characteristics, namely, tonality, modulation and impulsiveness.

If these characteristics cannot be reasonable and practicably removed, a series of adjustment to the measured levels are required as per Table 5 below.

Table 5: Character adjustments

Adjustment where noise emission is not music these adjustments are cumulative to a maximum of 15 dB			Adjustment where noise emission is music	
Where tonality is present	**Where modulation is present**	**Where impulsiveness is present**	**Where impulsiveness is not present**	**Where impulsiveness is present**
+ 5 dB	+ 5 dB	+ 10 dB	+ 10 dB	+ 15 dB

The "Environmental Protection (Noise) Regulations 1997" assigned noise levels only apply at the premises receiving the noise and not to noise within the same site.

These criteria apply to environmental noise emission from plant associated with the development. Noise emissions from this site shall have no tonal, impulsive or modulation characteristics.

Noise from Community Activities

The criteria detailed in section 9.2.3 only applies to the noise emissions from mechanical plant and typical operations of the stadium building at Eastern Precint.

The WA Environmental Protection (Noise) Regulations 1997, however exempts the noise from 'Community Activities' which includes noise from spectators at organised sporting activities. Any requirements for this exemption will be discussed with Department of Environment Regulation (DER) and City of Albany and detailed in further stages of the project.

9.2.4 Sound Insulation Requirements

The sound insulation requirements for the Eastern Precint Football Stadium are based on the required degree of speech privacy between rooms. The minimum sound reduction between spaces is detailed in Table 6.

Table 6: Sound insulation requirements

Space/area	R_W
Function Space	55
Meeting Rooms	50-55
Offices	45-50
Change Rooms	45-50
Toilets	45

9.3 Existing Conditions

Not Applicable.

9.4 Proposed Strategies

Not Applicable.

Eastern Precinct Football Stadium

9.5 Unknowns requiring information

Exemption of noise from the 'Community Activities' and any specific requirements for this exemption, these will be discussed with Department of Environment Regulation (DER) and City of Albany and detailed in further stages of the project.

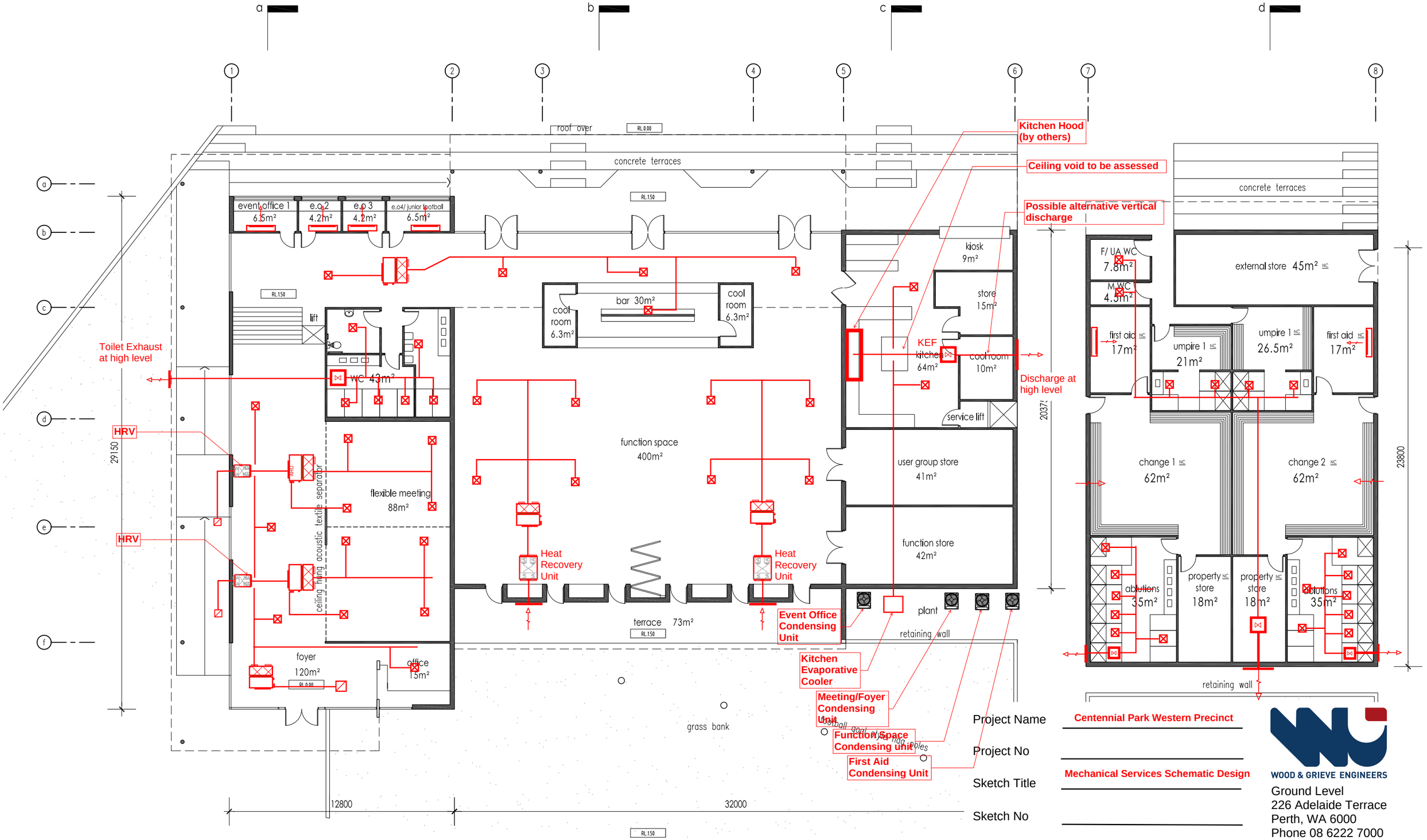
9.6 Estimated Costings

Not Applicable.

Appendix 1 – Mechanical Services Drawings

Appendix 1 – Mechanical Services Drawings

REPORT ITEM SCM 010 REFERS



Project Name	Centennial Park Western Precinct
Project No	
Sketch Title	Mechanical Services Schematic Design
Sketch No	
Date 17/09/2014	By le.nguyen

WOOD & GRIEVE ENGINEERS
Ground Level
226 Adelaide Terrace
Perth, WA 6000
Phone 08 6222 7000
Fax 08 6222 7100

0 1 2 5 10 20

Appendix 2 – Structural Services Drawings

Appendix 2 – Structural Services Drawings

CENTENIAL PARK - STADIUM

FOUNDATION LAYOUT

TIERED STEPS CAN BE:
- SUSPENDED PRECAST SEATING
- SLAB ON GROUND (SHOWN)

(T.B.C.)

WALL SCHEDULE
= U2 - 190mm CORE FILLED CONC BLOCK (BELOW)
NOTE: FOR WALLS ABOVE SEE S-SK002

EITHER:
- SUSPENDED PRECAST CONCRETE SEATING
- CONC SLAB ON GROUND TO FORM TIERED SEATING (T.B.C.)

Refer to S-SK002 FOR STRUCTURE OVER (WALLS, BEAMS ETC.)

roof over RL 8.00

concrete terraces RL 1.50

event office 1 6.5m² | e.o 2 4.2m² | e.o 3 4.2m² | event office 4 6.5m²

lift

WC 43m²

cool room 6.3m²

bar 30m²

cool room 6.3m²

kiosk 9.5m²

store 15m²

kitchen 44m²

cool room 10m²

service lift

function space 400m²

user group store 48m²

function store 42m²

plant

retaining wall

flexible meeting 88m²

ceiling hung acoustic textile separator

terrace 73m² RL 1.50

foyer 120m² RL 0.00

office 15m²

grass bank

football goal style flag poles

concrete terraces

external store 45m² NC

UA WC 10m²

first aid NC 17m²

umpire 1 NC 21m²

umpire 1 NC 26.5m²

first aid NC 17m²

change 1 NC 62m²

change 2 NC 62m²

ablutions 35m²

property NC store 18m²

property NC store 18m²

ablutions 35m²

retaining wall

12.5mm THK SLAB ON GROUND SL82 MESH TOP

29150

20375

23800

12800

32000

FOUNDATION SCHEDULE

Pf1 - 1200 x 1200 x 400 Dp

Sf1 - 400 w x 400 Dp

It1 - 400 w x 400 Dp

CONCEPT DESIGN
STRUCTURE SHOWN AS INDICATIVE ONLY. SUBJECT TO DETAILED DESIGN

Project Name	Centennial Park
Project No	26689-PER-S
Sketch Title	Stadium - Foundation Layout
Sketch No	S-SK001
Date	9/09/2014
By	James.Lee

WOOD & GRIEVE ENGINEERS
Ground Level
226 Adelaide Terrace
Perth, WA 6000
Phone 08 6222 7000
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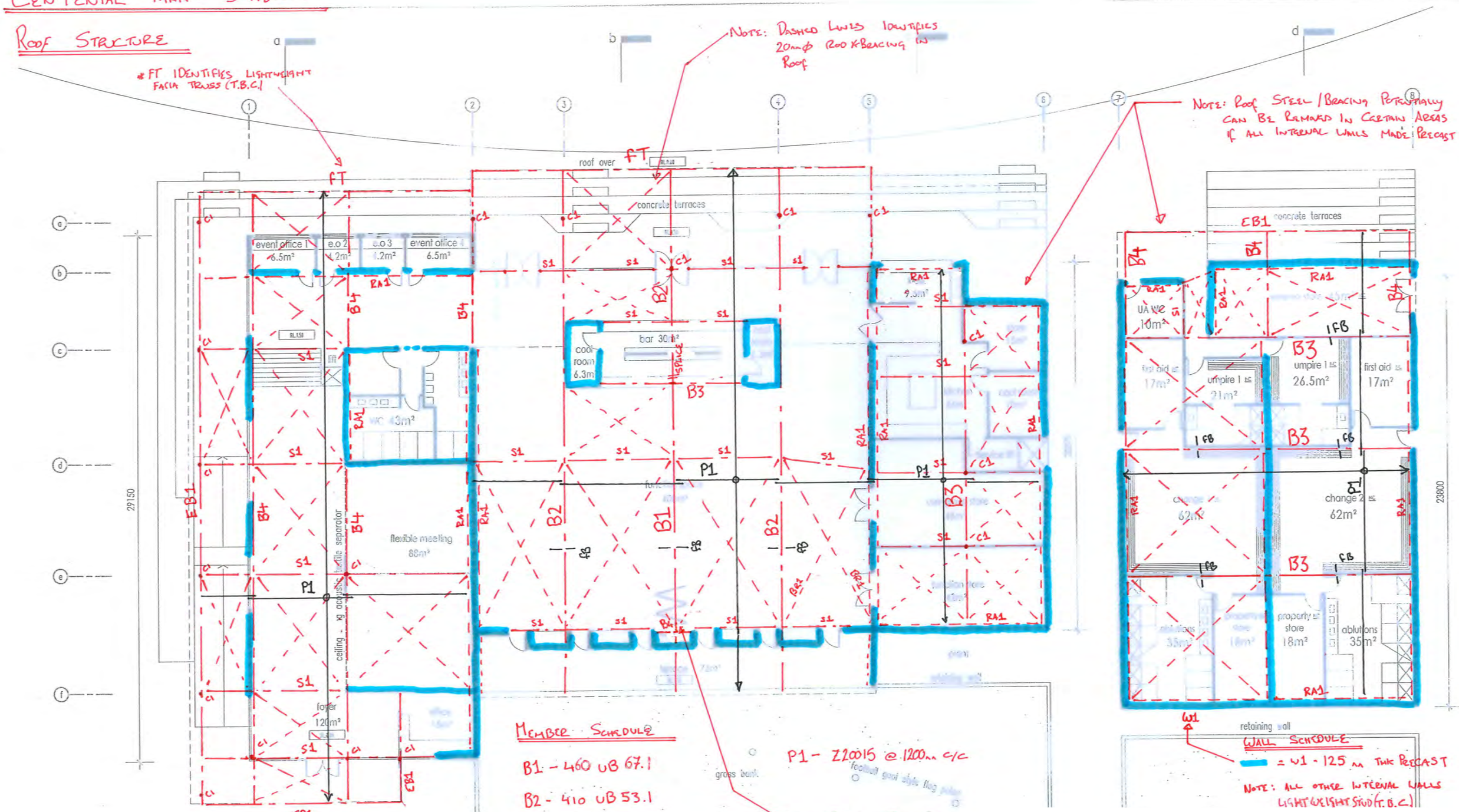
CENTENIAL PARK - STADIUM

ROOF STRUCTURE

* FT IDENTIFIES LIGHTWEIGHT FACIA TRUSS (T.B.C.)

NOTE: DASHED LINES IDENTIFIES 20mmφ ROD X-BRACING IN ROOF

NOTE: ROOF STEEL / BRACING POTENTIALLY CAN BE REMOVED IN CERTAIN AREAS IF ALL INTERNAL WALLS MADE PRECAST



MEMBER SCHEDULE

B1 - 460 UB 67.1

B2 - 410 UB 53.1

B3 - 250 UB 31.4

B4 - 250 UB 25.7

EB1 - 300 PFC

C1 - 100x5 SHS

S1 - 100x5 SHS

P1 - Z20015 @ 1200mm c/c

NOTE: PARTITION WEIGHT OF 50 kg/m ASSUMED

WALL SCHEDULE

W1 - 125 mm THK PRECAST

NOTE: ALL OTHER INTERNAL WALLS LIGHTWEIGHT STUD (T.B.C.)

CONCEPT DESIGN

STRUCTURE SHOWN AS INDICATIVE ONLY. SUBJECT TO DETAILED DESIGN

Project Name	Centennial Park
Project No	26689-PER-S
Sketch Title	Stadium - Roof Structure
Sketch No	S-SK002
Date	9/09/2014
By	James.Lee

WOOD & GRIEVE ENGINEERS
Ground Level
226 Adelaide Terrace
Perth, WA 6000
Phone 08 6222 7000
Fax 08 6222 7100

Schematic Design
BCA Compliance Report

Project:	Albany Centennial Park Sports Precinct
Site Address:	Centennial Park Sporting Precinct, North Road, Centennial Park WA 6330
Client:	Gresley Abas
Our Ref:	14000030
Date:	18 September 2014
Revision:	1

Author	**Reviewed**
Paul.da Costa	Wayne Chant
Associate Director	**Associate Director**
Registration No. 112	**Registration No. 157**

www.codegroup.com.au

EXECUTIVE SUMMARY

The Preliminary BCA Compliance Report and Strategy has been prepared by CODE Building Surveyors for Gresley Abas Architects to outline how the development will comply with the National Construction Code (NCC), Building Code of Australia (BCA) by satisfying the performance requirements of the Building Code of Australia.

The following BCA strategy will outline the key BCA compliance criteria, whilst identifying aspects that will need to be addressed via the Performance provision of the BCA.

BCA Strategy

No major items of non-compliance have been identified as a result of the schematic design NCC BCA assessment. As a result no items have been identified as potentially requiring an alternative solution (fire or otherwise).
The items identified in the schematic BCA review are provided as compliance guidance to assist in the collation and confirm compliance at the next review stage.

INTRODUCTION

The proposal consist of a single store football stadium building with associated change room facilities and a Soccer/Cricket Pavilion at the City of Albany's Centennial Park.

This report has been developed to assist the client and the design team to address any areas of the project scope that require attention in relation to the deemed-to-satisfy provisions of the NCC Building Code of Australia, Volume 1 and Certificate of Design Compliance.

REPORT SCOPE & LIMITATIONS

The extent of the BCA Audit and or certification excludes assessment against the Safety Codes of Practice for "Safe Design of Buildings and Structures" unless formally engaged to undertake this assessment.

CODE Group (CODE) offer this advice based on our knowledge of the building and the information received from the client or client's representative as described in the description of the building and classification listed in the building assessment data. This report is provided to and is to be used by the direct client to CODE and use of this report for any other purpose, project or any changes to the design without further assessment or certification from CODE will invalidate the content of and certification associated with this document. No part of this document may be reproduced in any form or by any means without written permission from CODE. This report is based solely on client instructions, and therefore should not be used by any third party without prior knowledge of such instructions.

All advice provided by CODE is in good faith and the provision of specialist design and certification (alternative design solutions, design and commissioning certificates and reports) by appropriately qualified consultants will be taken on face value. CODE will not be responsible for the accuracy, appropriateness or third party review of information provided for the purpose of determining compliance. CODE will not be held responsible for interpretations of other building surveyors, conditions of development approval or local laws associated with non-BCA matters prior to the submission of a permit application to the local authority.

The extent of this report does not include assessment for stock loss, goodwill, environmental impact (in fire situation), or any loss of trade or business interruption associated directly or indirectly with fire in these premises.

The report does not provide advice on the Access to Premises Standard Legislation, of which will be undertaken by other parties with suitable recommendations for compliance being provided.

BUILDING ASSESSMENT DATA

The building assessment date is used to determine the BCA and risk status of the building.
Permit Authority: City of Albany

Football Stadium Building Building Characteristics (Eastern Precinct)	
Classification	9b
No. of Storeys Contained	1
Rise in Storeys	1
Type of Construction	C
Effective Height	<12m

Soccer/Cricket Pavilions Building Characteristics (Western Precinct)	
Classification	9b
No. of Storeys Contained	1
Rise in Storeys	1
Type of Construction	C
Effective Height	<12m

Notes:

- The estimated population numbers will be developed and articulated as part of the design phase and fire engineering strategy for the development. All future population calculations will be estimated in accordance with Table D1.13 of the BCA or as agreed with the building certifier.
- Carparking areas have been considered ancillary to the use for the purposes of population numbers

BUILDING IMPORTANCE LEVEL

The building Importance Level (IL) must be determined to ensure that the structural engineer includes the probabilities of the design events for safety in their building design.

The Building Importance Level is interpreted to be :

Football Stadium Building Building Characteristics : 3
Soccer/Cricket Pavilions Building : 2

BCA Table B1.2a Importance Levels of Building and Structures.

Importance level	**Building Types**
1	Building or structures presenting a low degree of hazard to life and other property in the case of failure.
2	Building or structures not included in importance level 1, 3 and 4.
3	Building or structures that are designed to contain a large number of people.
4	Building or structures that are essential to pot-disaster recovery or associated with hazardous facilities.

Notes:

- Whilst CODE has estimated the BIL for the building based on the information provided by our client, it is subject to agreement with the structural engineer for its compatibility with the use proposed.
- Occupancy load numbers are determined by BCA D1.13, Number of persons accommodated. If it is intended that the occupants converge for emergency purposes the owner/designer is to provide details.

SAFETY IN DESIGN

The Occupational Safety and Health regulations of 1996 (Part 3.140) require a Designer to provide a Safety Report to the person who commissions the Design for commercial construction projects.

CODE offer a Safety in Design service to Architects and Designers to assist them to meet their legislated obligations under the Work Safety and Health Act.

DFES & GENERAL REQUIREMENTS

Department of Fire & Emergency (DFES)

It should be noted that DFES are referenced in the Building Act and regulations as a commentary body, not an approval authority.

Comment:
Plans and specifications are required to be lodged with DFES 15 business days prior to a Certificate of Design Compliance being issued.

Action:
Once design development has progressed to working drawings stage please provide CODE with one hard copy of Architectural, Electrical, Hydraulic and Mechanical documentation to allow us to lodge to DFES.

Development Approval

Please contact the relevant planning authority for written confirmation of whether development approval is required for the scope of works.
If a development approval (DA) has been issued the design drawings must comply with the approved plans and relevant conditions. A copy of the Development Approval Conditions and Plans are to be provided to Code Group with written confirmation that the proposed design is consistent with DA plans and conditions.

BCA COMPLIANCE REVIEW

The results of this review are preliminary in nature and should not be construed as being a complete list of items for CDC. We can advise that the following BCA compliance issues require resolution and inclusion in documentation lodged for the next stage review.

Legend:
To comply: means proposed works to comply with the BCA
Alternative Solution: Possible alternative solution to address performance requirements
Detail required: means additional detail is required to confirm compliance

Content:

1. **Safe Movement & Egress** Travel Distance, exit widths, stairs, exit lighting
2. **Sanitary & Accessible Facilities** Facility numbers, layout, health requirements
3. **Access for People with Disabilities** Carparking, pathways, circulation, lifts
4. **Fire Compartment & Separation** Fire compartment size, fire walls, openings
5. **Structure & Fire Resistance** Importance Level, wind loadings, fire resistance
6. **Fire Services & Equipment** Hydrants, sprinklers, hose reels, extinguishers
7. **Smoke Hazard Management** Detection & alarm, smoke control & suppression
8. **Health & Amenity** Light & ventilation, ceiling heights
9. **Energy Efficiency** Building Fabric, glazing, services

1 SAFE MOVEMENT & EGRESS

Dimensions of Exits & Paths of Travel to Exits (Part D1.6)
In a required exit or path of travel to an exit the unobstructed height throughout must be not less than 2 m, except the unobstructed height of any doorway may be reduced to not less than 1980 mm; and the unobstructed width of each exit or path of travel to an exit, except for doorways, must be not less than 1m.
Comment:
Ensure one metre minimum width is provided to the Umpire 1 passageway.

Goings and Risers (Part D2.13)
(a) A stairway must have—

- not more than 18 nor less than 2 risers in each flight; and
- going (G), riser (R) and quantity (2R + G) in accordance with Table D2.13; and
- except as permitted by (b) and (c), goings and risers that are constant throughout in one flight; and
- risers which do not have any openings that would allow a 125 mm sphere to pass through

between the treads; and

- (v) treads which have a surface with a slip-resistance classification not less than that listed in Table D2.14 when tested in accordance with AS 4586; or a nosing strip with a slip-resistance classification not less than that listed in Table D2.14 when tested in accordance with AS 4586

Going and riser dimensions to stairways must be in the range of:

Riser (R)		Going (G)		Quantity (2R+G)	
Max	Min	Max	Min	Max	Min
180	115	355	280	700	550

Action:
Riser and going dimensions to be provided on documentation submitted at certificate of design compliance stage.

Balustrades & Other Barriers (Part D2.16)
Balustrades must achieve a compliant height above floor level and incorporate balusters that are compliant with Part D2.16 of the NCC BCA Volume 1.
Action:
Documentation detailing compliant balustrades to be submitted at certificate of design compliance stage.

Emergency Lighting Requirements (Part E4.2)
An emergency lighting system must be installed in every storey of a Class 9b building where the storey has a floor area more than 300 m2—
(i) in every passageway, corridor, hallway, or the like, that is part of the path of travel to an exit; and
(ii) in any room having a floor area more than 100 m2 that does not open to a corridor or space that has emergency lighting or to a road or open space; and
(iii) in every room or space to which there is public access in every storey in a Class 9b building if—

- the floor area in that storey is more than 300 m2; or
- any point on the floor of that storey is more than 20 m from the nearest doorway leading directly to a stairway, ramp, passageway, road or open space; or
- egress from that storey involves a vertical rise within the building of more than 1.5 m, or any vertical rise if the storey concerned does not admit sufficient light; or
- the storey provides a path of travel from any other storey required by (i), (ii) or (iii) to have emergency lighting

Action:
Documentation detailing compliant balustrades to be submitted at certificate of design compliance stage.

Exit Signs (Part E4.5)
An exit sign must be clearly visible to persons approaching the exit, and must be installed on, above or adjacent to each—
(a) door providing direct egress from a storey to—

(i) an enclosed stairway, passageway or ramp serving as a required exit; and
(ii) an external stairway, passageway or ramp serving as a required exit; and
(iii) an external access balcony leading to a required exit; and
(b) door from an enclosed stairway, passageway or ramp at every level of discharge to a road or open space; and
(c) horizontal exit; and
(d) door serving as, or forming part of, a required exit in a storey required to be provided with emergency lighting in accordance with E4.2.
Action:
Details are to be provided from the electrical design engineer detailing exit signage that is compliant with AS2293.1-2005 and is clearly visible at all times when the building is occupied by any person having right of legal entry to the building.

Handrails (Part D2.17)
Handrails must be located as required by Part D2.17 of the NCC BCA Volume 1.
Comment:
Handrails requirements have been identified for the proposed football stadium building to the proposed concrete terraces.
Action:
Documentation demonstration compliance to be provided at Design Certification assessment stage.

Refrigerated Chambers, Strong Rooms and Vaults (Part G1.2)

A refrigerated or cooling chamber which is of sufficient size for a person to enter must have—
(i) a door which is capable of being opened by hand from inside without a key; and
(ii) internal lighting controlled only by a switch which is located adjacent to the entrance doorway inside the chamber, strongroom or vault; and
(iii) an indicator lamp positioned outside the chamber, strongroom or vault which is illuminated when the interior lights required by (a)(ii) are switched on; and
(iv) an alarm that is—
(A) located outside but controllable only from within the chamber, strongroom or vault; and
(B) able to achieve a sound pressure level outside the chamber, strongroom or vault of 90 dB(A) when measured 3 m from the sounding device.

A door required by (a)(i) in a refrigerated or cooling chamber must have a doorway with a clear width of not less than 600 mm and a clear height not less than 1.5 m.
Action:
Details/documentation demonstrating compliance with the above requirements is to be provided.

Seating Area (Public Halls) (H1.4)
In a seating area the gradient of the floor surface must not be steeper than 1 in 8, or the floor must be stepped so that—
(i) a line joining the nosings of consecutive steps does not exceed an angle of 30° to the horizontal; and

(ii) the height of each step in the stepped floor is not more than 600 mm; and
(iii) the height of any opening in such a step is not more than 125 mm; and
If an aisle divides the stepped floor and the difference in level between any 2 consecutive steps—
(i) exceeds 230 mm but not 400 mm — an intermediate step must be provided in the aisle; and
(ii) exceeds 400 mm — 2 equally spaced intermediate steps must be provided in the aisle; and
(iii) the going of intermediate steps must be not less than 270 mm and such as to provide as nearly as practicable equal treads throughout the length of the aisle; and
(c) the clearance between rows of fixed seats used for viewing performing arts, sport or recreational activities must be not less than—
(i) 300 mm if the distance to an aisle is not more than 3.5 m; or
(ii) 500 mm if the distance to an aisle is more than 3.5 m.

Comment:

These requirements are applicable to the open concrete terraced seating areas of the Football Stadium Building.

Action:

Details of the proposed terraces to be provided at design certification assessment stage.

Safe movement and access - Due to the preliminary nature of the review we have not included every BCA clause and the following BCA considerations, where relevant, will need to be included in further design documentation: Pedestrian ramps (D2.10), Goings and risers (D2.13), Landings (D2.14), Thresholds (D2.15), Balustrades or other barriers (D2.16), Handrails (D2.17), Fixed platforms, walkways, stairways and ladders (D2.18), Doorways and doors (D2.19), Operation of latch (D2.21), Re-entry from fire-isolated exits (D2.22), Signs on doors (D2.23), Emergency lighting requirements (E4.2), Design and operation of emergency lighting (E4.4), Exit signs (E4.5), Direction signs (E4.6), Design and operations of exit signs (E4.8)

2 SANITARY & ACCESSIBLE FACILITIES

Facilities in Class 3-9 Buildings (Part F2.3)

Sanitary facilities must be provided in class 9 buildings as required by Part F2.3 of the NCC BCA Volume 1.

Comment:

Sanitary facilities calculations below are based on occupant numbers as advised by Gresley Abas. Facilities specifically provided for sport participants are not included in the calculations below.

Action:

Sanitary facilities to be provided as per tables below.

Required Facilities in Class 3 to 9 buildings (F2.3)

Football Stadium Building

(sports venues or the like)

	Occupants	Closet Pans	Urinals	Washbasins
Male	250	1	3	2
Female	250	5		3
Total	500	6	3	5

Facilities in Class 3 to 9 buildings (F2.3)

Soccer/Cricket Pavilion

(public halls, function rooms or the like)

	Occupants	Closet Pans	Urinals	Washbasins
Male	100	1	2	2
Female	100	3		2
Total	200	4	2	4

Notes:

- Calculation of persons accommodated is to be calculated according to BCA D1.13 if it cannot be more accurately determined by other means. If there are specific design maximum numbers associated with the project they may be used as a basis of calculation.
- Floor areas may be adjusted without ancillary areas such as sanitary facilities, corridors, shelving and or racking layouts in storage areas.
- CODE are not responsible for design occupancy calculation numbers are used in sanitary facility calculations.
- In calculating the number of sanitary facilities to be provided, a unisex facility required for people with a disability may be counted once for each sex.
- A closet pan may be used in place of a urinal.

Sanitary & Accessible Facilities - Due to the preliminary nature of the review we have not included every BCA clause and the following BCA considerations, where relevant, will need to be included in further design documentation: Construction of sanitary compartments (F2.5), Methods of extend of natural lighting (F4.2), Ventilation of rooms (F4.5), Natural ventilation (F4.6)

3 ACCESS FOR PEOPLE WITH DISABILITIES

Please refer to our separate Access Report for this project, completed by a qualified Access Consultant.

4 FIRE COMPARTMENTS & SEPARATION

Comment:

Currently no compartmentation is proposed for the project buildings.
Compartmentation /separation is commonly incorporated in building design to reduce the requirement for fire services and the required type of construction.

5 STRUCTURE & FIRE RESISTANCE

Determination of Individual Actions (B1.2)

AS1170.1 – Permanent & Imposed Actions
To be determined by structural engineer

AS1170.2 – Wind Actions
To be determined by structural engineer appropriate to the wind region

Construction of Buildings in flood hazard areas (B1.6)

Geotechnical engineer to determine whether proposed building is located in an area subject to flooding and advise of the minimum floor level for the building.

Specification C1.1 Fire Resistance Levels

All building elements will need to comply with the FRL's detailed in the appropriate table in Appendix A at the rear of this report.

Structure & Fire Resistance - Due to the preliminary nature of the review we have not included every BCA clause and the following BCA considerations, where relevant, will need to be included in further design documentation:

6 FIRE SERVICES & EQUIPMENT

Fire Hydrant Systems (Part E1.3)
A fire hydrant system must be provided to serve a building having a total floor area greater than 500 m2 where a fire brigade is available to attend a building fire.
Comment:
The fire hydrant system must be installed in accordance with AS 2419.1. This requirement is applicable to Football Stadium Building (Eastern Precinct) only.
Action:
A fire hydrant system will be required to serve all parts of this building. A flow and pressure test should be carried out in the first instance to determine the capacity of the town main to provide the required minimum flow rate and pressure of 10L/s @ 200 kPa for each hydrant (2 minimum). If the town mains cannot provide this level of performance with an allowance of 40 kPa for loss of pressure due to installation of a backflow prevention device,

Fire hose reels (Part E1.4)
A fire hose reel system must be provided to serve any fire compartment with a floor area greater than 500 m2.
The fire hose reel system must—
(i) have fire hose reels installed in accordance with AS 2441; and
Comment:
Fire hose reels are required to service the proposed buildings and are to be in accordance with AS2441.
Action:
Details of a compliant system be included in design documentation.

Fire Services & Equipment - Due to the preliminary nature of the review we have not included every BCA clause and the following BCA considerations, where relevant, will need to be included in further design documentation: Fire Hydrants (E1.3), Fire hose reels (E1.4), Portable fire extinguishers (E1.6, Fire control centres (E1.8) and Fire precautions during construction (E1.9).

7 SMOKE HAZARD MANAGEMENT

Comment:
Due to the use, size and rise in storeys of the proposed buildings, there are no smoke hazard management requirements for this project.

8 HEALTH & AMENITY

Stormwater Drainage (Part F1.1)
Stormwater drainage must comply with AS/NZS 3500.3 and local council requirements.
Action:
Hydraulic services plans will be required showing stormwater disposal at Design Certification assessment stage.

Artificial Lighting (Part F4.4)
Artificial lighting must be provided in required stairways, passageways and ramps; and if natural lighting equivalent to that required by the NCC BCA Part F4.2 is not available , and the periods of occupation of the room will create undue hazard to occupants seeking egress in an emergency then artificial lighting is to be provided to all rooms that are frequently occupied, all spaces required to be accessible , all corridors , lobbies, internal stairways, other circulation spaces and paths of egress.
Comment:
The artificial lighting system is to comply with AS/NZS 1680.0
Action:
Documentation demonstration compliance to be provided at Design Certification assessment stage.

Ventilation of Rooms (Part F4.5)
A habitable room, office, shop, factory, workroom, sanitary compartment, bathroom, shower room, laundry and any other room occupied by a person for any purpose must have—
(a) natural ventilation complying with Part F4.6; or
(b) a mechanical ventilation or air-conditioning system complying with AS 1668.2 and AS/NZS 3666.1.

Action:
Documentation demonstration compliance to be provided at Design Certification assessment stage.

Kitchen Local Exhaust Ventilation
A commercial kitchen must be provided with a kitchen exhaust hood complying with AS/NZS 1668.1 and AS1668.2 where -
a) any cooking apparatus has -
i) a total maximum electrical power input exceeding 8kW; or
ii) a total gas power input exceeding 29MJ/h; or
b) the toatl maximum power input to more than on apparatus exceeds-
i) 0.5kW electrical power; or
ii) 1.8 MJ gas;
per sqm of floor area.
Action:
Documentation demonstration compliance to be provided at Design Certification assessment stage.

Health & Amenity - Due to the preliminary nature of the review we have not included every BCA clause and the following BCA considerations, where relevant, will need to be included in further design documentation:
External above ground membranes (F1.4), Roof coverings (F1.5), Sarking (F1.6), Waterproofing of wet areas in buildings (F1.7), Damp-proofing (F1.9),Damp-proofing of floors on the ground (F1.10), Provision of floor wastes (F1.11), Sub-floor ventilation (F1.12), Glazed assemblies (F1.13), Height of rooms and other spaces (F3.1),

9 ENERGY EFFICIENCY – SECTION J

Building Fabric & Glazing (Part J1,2 & 3)
Building Fabric and Glazing elements are to comply with the energy efficiency requirements of the BCA
Action:
Compliance with the above requirements is to be provided through a Energy Efficiency Compliance report.

Air Conditioning and Ventilation Systems (Part J5)
Air-conditioning and ventilation systems are to comply with the energy efficiency requirements identified in Part J5 of the BCA.
Action:
Documentation demonstration compliance to be provided at Design Certification assessment stage.

Artificial Lighting and Power (Part J6)
Artificial lighting and power are to comply with the energy efficiency requirements identified in Part J6 of the BCA.
Action:
Documentation demonstration compliance to be provided at Design Certification assessment stage.

DRAWINGS

This report has been prepared based on the review of the following Architectural plans prepared by Gresley Abas Architects.

Drawing No.	Title	Revision	Date
1411 - SD01	Football Stadium Building Floor Plan - Schematic Design	B	22/08/2014
1411 - SD01	Soccer/Cricket Pavilion Floor Plan - Schematic Design	B	22/08/2014

REFERENCES

- Australian Building Codes Board, National Construction Code (2014), Building Code of Australia, Volume 1
- Australian Building Codes Board, National Construction Code (2014), Building Code of Australia, Volume 2
- Australian Building Codes Board, National Construction Code (2014), Guide to the Building Code of Australia, Class 2-9 Buildings
- Australian Standards: AS1428.1-2009 Design of Access and Mobility, Part 1: General Requirements for Access – New Building work

APPENDICES

Appendix A: Fire Resistance Levels
Appendix B: Essential Safety - Design and Installation
Appendix C: List of Requirements

Appendix A: Fire Resistance Levels

Table 5 Type C Construction: FRL of Building Elements (in minutes)

BUILDING ELEMENT	Class 2,3 or 4 part	5,7a or 9	6	7b or 8
EXTERNAL WALL (including any column and other building element incorporated therein) or other external building element, where the distance from any fire-source feature to which it is exposed is—				
For loadbearing parts—				
Less than 1.5 m	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90
1.5 to less than 3 m	–/–/–	60/ 60/ 60	60/ 60/ 60	60/ 60/ 60
3 m or more	–/–/–	–/–/–	–/–/–	–/–/–
For non-loadbearing parts—				
Less than 1.5 m	–/ 90/ 90	–/120/120	–/180/180	–/240/240
1.5 to less than 3 m	–/ 60/ 30	–/ 90/ 60	–/120/ 90	–/180/120
3 m or more	–/–/–	–/–/–	–/–/–	–/–/–
EXTERNAL COLUMN not incorporated in an external wall, where the distance from any firesource feature to which it is exposed is—				
Less than 1.5 m	90/–/–	90/–/–	90/–/–	90/–/–
1.5 to less than 3 m	–/–/–	60/–/–	60/–/–	60/–/–
3 m or more	–/–/–	–/–/–	–/–/–	–/–/–
COMMON WALLS and FIRE WALLS	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90	90/ 90/ 90
INTERNAL WALLS				
Bounding public corridors, public lobbies and the like—	60 / 60/ 60	–/–/–	–/–/–	–/–/–
Between or bounding sole-occupancy units—	60 / 60/ 60	–/–/–	–/–/–	–/–/–
Bounding a stair if required to be rated—	60/ 60/ 60	60/ 60/ 60	60/ 60/ 60	60/ 60/ 60
ROOFS	–/–/–	–/–/–	–/–/–	–/–/–

Appendix B: Essential Safety - Design & Installation Standards

The following safety measures to be installed in the proposed building are to be designed and installed to comply with the Building Code of Australia and referenced Standards unless forming part of an alternative solution. The applicable year of the adopted standards reflect those adopted by the BCA at the time of lodgement of the Building Permit Application.

Requirement	BCA Reference	Standard
Access for people with disabilities	Part D3	AS 1428.1 - 2009
Accessible Facilities, facilities, signage	D3.6	AS 1428.1 - 2009
Accessible Parking	D3.5	AS 2890.1 -
Automatic Fail Safe Devices	D2.21	
Automatic Fire Detection System	BCA Spec. E2.2a	AS/NZS 1668.1
Car park Ventilation	F4.11	AS 1668.2
Emergency Lighting	E4.2, E4.4	AS/NZS 2293.1
EWIS (SSISEP)	E4.9	AS 1670.4 – 2004
Exit signs	E4.5, 4.6, 4.7	AS/NZS 2293.1
Exit Doors (power operated)	D2.19(b)	
Fire Hazard Properties	Spec C1.10	AS 1530, AS 4254, AS 1735.2
Fire Resisting Construction	Spec C1.1	AS 1530
Fire Doors	Spec C3.4	AS/NZS 1905.1
Fire Stopping Systems	C3.15	AS 1530.4, AS 4072.1
Fire Hydrant System	E1.3	AS 2419.1
Fire Hose Reels	E1.4	AS 2441.1
Fire & Smoke Alarms	Table E2.2 & Spec E2.2	AS 1670.1
Fire Service Controls	E3.7	AS 1735.1
Glazed Assemblies	B1.4	AS 2047
Glass	B1.4	AS 1288
Latches	D2.21	
Lift Facilities	E3.6	AS 1735.12
Lightweight Construction	C1.8	AS 1530.3 – 1999
Mechanical Ventilation & Air Conditioning Systems	E2.2	AS/NZS 1668.1 & AS 1668.2
Non-combustible materials	C1.12	AS 1530
Portable Fire Extinguishers	E1.6	AS 2444 – 2001
Power operated doors	D2.19	
Pressurising Systems	E2.2	AS/NZS 1668.1 -1998
Structural Provisions	Part B1	as per BCA Part B1
Smoke Hazard Management	Table E2.2a	AS/NZS 1668.1
Sound Transmission	Part F5	AS/NZS 1276.1 / ISO 717.1
Tactile Indicators	D3.8	AS1428.1

Appendix C: List of Design Documentation

Prior to assessment of
Before we can allocate resources to your project we need the following information:

PRELIM & BCA STRATEGY	Scaled PDF drawings
	Copy of relevant development approvals
	Copies of other relevant approvals
DFES SUBMISSION	Fire Services Drawings
DESIGN CERTIFICATION	Architectural working drawings
	Document transmittal listing all current drawings for CDC
	2 full sets of drawings (to scale) and supportive documentation Structural engineering drawings & certification Hydraulic consultants drawings & certification Mechanical consultants drawings & certification Electrical consultant drawings & certification Energy efficiency report Geotechnical report Acoustic report where relevant
PERMIT COORDINATION	Completed and signed Form BA01 Certified Building Permit Application Form for lodgement Applicable council fees and taxes (cheque or credit card authorisation)

Schematic Design Access Report

Project:	Albany Centennial Park Sports Precinct
Site Address:	Centennial Park Sporting Precinct, North Road, Centennial Park WA 6330
Client	Gresley Abas
Our Ref:	14000030
Date:	25 Aug 2014
Revision:	0

Author

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ACAA Registered
Member No. 417

Reviewed

Paul daCosta
Associate Director
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EXECUTIVE SUMMARY

The Schematic BCA Access Report and Strategy has been prepared by CODE Access Consultants for Gresley Abas Architects to outline how the development will comply with the National Construction Code (NCC) and Building Code of Australia 2013 (BCA) by satisfying the performance requirements of parts D3 Access for People with a Disability, E3.6 Passenger Lifts and F2.4 Accessible Sanitary Facilities of the Building Code of Australia 2013.

The following BCA strategy will outline the key BCA Access provisions compliance criteria, while identifying aspects that will need to be addressed via the Performance provision of the BCA.

DISABILITY ACCESS STRATEGY

WESTERN PRECINCT

- Provide step free transitions to and through the veranda and buildings.
- Widen doorways at areas marked on the drawings to achieve 850mm door opening width.
- Increase external latch clearances to 660mm at ablutions area leading into each unisex accessible facility and internal latch to 530mm at change rooms 1-4 for an exit from the areas.
- Provide appropriate wheelchair turning spaces leading into change rooms 1-4.
- Reduce cubicle width at one ambulant WC and swing both ambulant doors outwards to achieve doorway and pan circulation spaces.
- Provide an accessible shower in each unisex accessible facility and ensure configuration of the facility as a whole complies.

EASTERN PRECINCT

- Provide accessible features on all stairways throughout the building an external environment (including handrails at each side with extensions at top and bottom, contrasting nosings and tactile ground surface indicators).
- Widen doorways at areas marked on the drawings to achieve 850mm door opening width.
- Provide 110mm hinge clearance at the terrace area leading into the function space.
- Increase the corridor length to 1240mm at the amenity area (entry to UAT).
- Increase internal latch clearance within the umpire 1 and ablution areas to 530mm.
- Increase external ramp landing space to 1200mm at the intermediate landing.
- Provide appropriate wheelchair turning spaces leading to umpire 1 to 1500x1500mm (with permitted 500x500mm internal truncations).
- Make provision for wheelchair seating spaces at the tiered viewing area.
- Include hearing augmentation provisions where inbuilt amplification system/s are installed for people with hearing impairment.

INTRODUCTION

The proposal consists of a single story football stadium building with associated change room facilities and a Soccer/Cricket Pavilion at the City of Albany's centennial park.

This report has been developed to assist the client and the design team to address any areas of the project scope that require attention in relation to the deemed-to-satisfy provisions of the NCC Building Code of Australia, Volume 1 and Certificate of Design Compliance.

REPORT SCOPE & LIMITATIONS

This benchmark for this BCA Access Preliminary Report is the Building Code of Australia, Australian Standards 1428.1, 1428.4.1, 2890.6 and 1735.12 as well as some additional considerations to improve general access to the facility. It provides an overview of the key access issues to consider in the design of the facility to provide improved access for all users.

CODE Group (CODE) offer this advice based on our knowledge of the building and the information received from the client or client's representative as described in the description of the building and classification listed in the building assessment data. This report is provided to and is to be used by the direct client to CODE and use of this report for any other purpose, project or any changes to the design without further assessment or certification from CODE will invalidate the content of and certification associated with this document. No part of this document may be reproduced in any form or by any means without written permission from CODE. This report is based solely on client instructions, and therefore should not be used by any third party without prior knowledge of such instructions.

All advice provided by CODE is in good faith and the provision of specialist design and certification (alternative design solutions, design and commissioning certificates and reports) by appropriately qualified consultants will be taken on face value. CODE will not be responsible for the accuracy, appropriateness or third party review of information provided for the purpose of determining compliance. CODE will not be held responsible for interpretations of other building surveyors or access consultants, conditions of development approval or local laws associated with non-BCA matters prior to the submission of a permit application to the local authority.

BUILDING ASSESSMENT DATA

The building assessment data is used to determine the general building access requirements and the parts within that are required to be accessible in accordance with the Building Code of Australia.

Permit Authority: City of Albany

	Building characteristics
Classification	9b
Rise in Storeys	1

BCA COMPLIANCE REVIEW

The results of this review are preliminary in nature and should not be construed as being a complete list of items for CDC. We can advise that the following BCA Access provisions require resolution and inclusion in documentation lodged for the next stage review.

Content:

1. ACCESS REQUIREMENTS FOR PEOPLE WITH A DISABILITY
1.1 BUILDING CODE OF AUSTRALIA 2013 Volume One
Part D3.2 Access to buildings
Part D3.3 Parts of buildings to be accessible
Part D3.7 Hearing Augmentation
Part D3.8 Tactile Indicators
Part D3.9 Wheelchair seating spaces
Part E3.6 Passenger lifts
Part F2.4 Accessible sanitary facilities
1.2 AUSTRALIAN STANDARD 1428.1 2009 General access req's-new building work
Clause 6 Continuous accessible paths of travel
Clause 10 Ramps & landings
Clause 11 Stairways
Clause 13 Doorways, doors and circulation spaces at doorways
Clause 15/16 Sanitary facilities for people with disabilities

1 ACCESS REQUIREMENTS FOR PEOPLE WITH A DISABILITY

New buildings and buildings that undergo significant modification require inclusion of Access provisions in line with the federal Disability Discrimination Act (DDA).

1.1 BUILDING CODE OF AUSTRALIA 2013 V1

D3.2 Access to the Buildings

(a) An accessway must be provided to the principal pedestrian entrance—
(i) from the main points of the pedestrian entries at the allotment boundary; and
(ii) from another accessible building connected by a pedestrian link; and
(iii) from any required accessible carparking space on the allotment.

Comments:
Ensure accessible pathways are provided to each building from the main pedestrian entry points at each precinct and from accessible carparking bays and between buildings in accordance with clause 6 and 10 section 1.2 below.

D3.3 Parts of the Building to be Accessible

In a building required to be accessible—
(a) every ramp and stairway, except for ramps and stairways in areas exempted by D3.4, must comply with—
(i) for a ramp, except a fire-isolated ramp, clause 10 of AS 1428.1 ; and
(ii) for a stairway, except a fire-isolated stairway , clause 11 of AS 1428.1 ; and
(b) every passenger lift must comply with E3.6; and

Comment:
Ramps and stairways are required to comply with clause 10 and 11 section 1.2 below.

D3.7 Hearing Augmentation

(a) A hearing augmentation system must be provided where an inbuilt amplification system, other than one used only for emergency warning, is installed—
(i) in a room in a Class 9b building; or
(ii) in an auditorium, conference room, meeting room or room for judicatory purposes; or
(iii) at any ticket office, teller's booth, reception area or the like, where the public is screened from the service provider.
(b) If a hearing augmentation system required by (a) is—
(i) an induction loop, it must be provided to not less than 80% of the floor area of the room or space served by the inbuilt amplification system; or
(ii) a system requiring the use of receivers or the like, it must be available to not less than 95% of the floor area of the room or space served by the inbuilt amplification system, and the number of receivers provided must not be less than—
(A) if the room or space accommodates up to 500 persons, 1 receiver for every 25

persons or part thereof, or 2 receivers, whichever is the greater; and
(B) if the room or space accommodates more than 500 persons but not more than 1000 persons, 20 receivers plus 1 receiver for every 33 persons or part thereof in excess of 500 persons; and
(C) if the room or space accommodates more than 1000 persons but not more than 2000 persons, 35 receivers plus 1 receiver for every 50 persons or part thereof in excess of 1000 persons; and
(D) if the room or space accommodates more than 2000 persons, 55 receivers plus 1 receiver for every 100 persons or part thereof in excess of 2000 persons.
(c) The number of persons accommodated in the room or space served by an inbuilt amplification system must be calculated according to D1.13.
(d) Any screen or scoreboard associated with a Class 9b building and capable of displaying public announcements must be capable of supplementing any public address system, other than a public address system used for emergency warning purposes only.

Comment:
If an inbuilt amplification system is installed within any room, reception area or the like, a hearing augmentation system is required in accordance with clause D3.7 above.

D3.8 Tactile Indicators

(a) For a building required to be accessible, tactile ground surface indicators must be provided to warn people who are blind or vision impaired that they are approaching—
(i) a stairway, other than a fire-isolated stairway ; and
(iv) a ramp other than a fire-isolated ramp, step ramp, kerb ramp ; and
(v) in the absence of a suitable barrier—
(A) an overhead obstruction less than 2 m above floor level, other than a doorway.
(b) Tactile ground surface indicators required by (a) must comply with sections 1 and 2 of AS/NZS 1428.4.1 .

Comment:
Includes tactile ground surface indicators on ramps and stairs in accordance with clause 10 and 11 section 1.2 below.

D3.9 Wheelchair Seating Spaces

Where fixed seating is provided in a Class 9b assembly building, wheelchair seating spaces complying with AS 1428.1 must be provided in accordance with the following:
(a) The number and grouping of wheelchair seating spaces must be in accordance with Table D3.9 of the BCA.

Comment:
The tiered viewing area incorporates fixed seating and where this fixed seating is available to the public and staff, provision for wheelchair seating spaces is required to be provided for people with disabilities in accordance with the Building Code of Australia and AS 1428.1 2009.

Action:
1. Confirm total no of fixed seats available at the Eastern Precinct. We can advise of the number of wheelchair spaces required on receipt of total seating spaces.

E3.6 Passenger Lifts

In an accessible building, every passenger lift must—
(a) be one of the types identified in Table E3.6a, subject to the limitations on use specified in the Table; and
(b) have accessible features in accordance with Table E3.6b; and
(c) not rely on a constant pressure device for its operation if the lift car is fully enclosed.

Action:
1. Provide passenger lift specification at the next stage for review.

F2.4 Accessible Sanitary Facilities

In a building required to be accessible—
(a) accessible unisex sanitary compartments must be provided in accessible parts of the building in accordance with Table F2.4(a); and
(b) accessible unisex showers must be provided in accordance with Table F2.4(b); and
(c) at each bank of toilets where there is one or more toilets in addition to an accessible unisex sanitary compartment at that bank of toilets, a sanitary compartment suitable for a person with an ambulant disability in accordance with AS 1428.1 must be provided for use by males and females; and
(d) an accessible unisex sanitary compartment must contain a closet pan, washbasin, shelf or bench top and adequate means of disposal of sanitary towels; and
(e) the circulation spaces, fixtures and fittings of all accessible sanitary facilities provided in accordance with Table F2.4(a) and Table F2.4(b) must comply with the requirements of AS 1428.1.

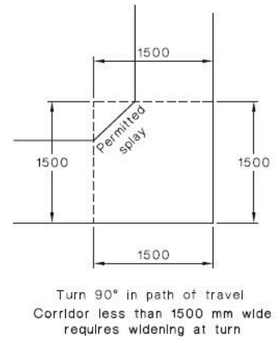
Comment:
Ensure facilities provided for people with disabilities comply with the above provisions and the provisions contained in clause 15/16 section 1.2 below.

1.2 AUSTRALIAN STANDARD 1428.1 2009

Continuous accessible path of travel (Clause 6)

The accessible path of travel from the main pedestrian entry points at each precinct and accessible parking bays at each location must be step free, slip resistant and incorporate appropriate gradients (max 1:20 with landings every 15m, 1:33 require landings every 25m).

Turning spaces 60° to 90°
A turning space of 1500mm wide x 1500mm deep is required with permitted internal truncations of 500 x 500mm on the accessible pathway.



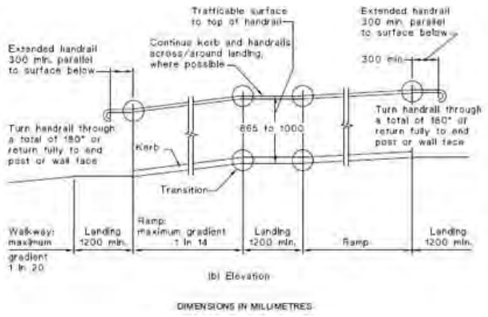
Circulation space required for a 30°- 90° turn

Comments:
The turning space at change rooms 1 & 2 at the western precinct is insufficient for a person using a mobility disability to gain access through the area at the western precinct.
The turning space outside the umpire room 1 within the eastern precinct is insufficient.
Actions:
1. Ensure a step free entry to and through buildings opn the accessible path of travel.
2. Increase the turning space on the path of travel at change rooms 1 -4 (western precinct) to achieve 1500mm x 1500mm with permitted truncation (500 x 500mm internally).
3. Increase internal latch clearances to 530mm at change 1-4 for an exit from each change room within the western precinct.
4. Remove the barrier that impedes on the latch clearance at each unisex accessible facility within change rooms in the western precinct to achieve 660mm at latch.
5. Increase the turning space outside umpire 1 (eastern precinct) to achieve 1500mm x 1500mm with permitted truncation (500 x 500mm internally).
6. Increase internal latch clearance to 530mm within the umpire 1 at the eastern precinct.
7. Increase internal latch clearances to 530mm and external latch clearances to 510mm at both ablutions areas within the eastern precinct.
8. Increase corridor length at the amenity area located beside the bar/function space to 1240mm for an entry to the room adjacent to the WC (UAT).
9. Increase hinge clearance at the terrace to 110mm for an entry to the function space at marked location on the drawings.

Ramps & landings (Clause 10)

Ramps
1:14 ramp gradients require landings every 9m, 1:19 ramp gradients require landings every 14m. Ramps are required to have handrails at each side with 300mm extensions at the top and bottom, kerbs and tactile ground surface indicators at the top, bottom and intermediate landings (where handrails are non-continuous).

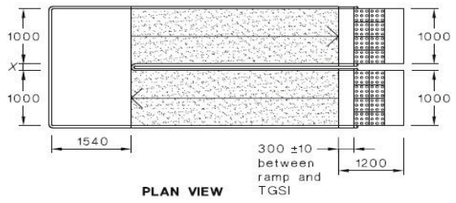
Ramp landings
The landings at the top, bottom and intermediate landings on the ramp are required to be sufficient in length and width to allow a person using a mobility to utilise the ramp independently.



Pedestrian Ramp with handrails & kerbs.

Comment:
The intermediate ramp landing space is insufficient in length.

Action:
1. Provide ramp detail with elevation for review at design development stage.
2. Increase landing length to 1200mm at the intermediate landing.
3. Incorporate tactile ground surface indicators at the top, bottom and intermediate landing if the handrail is non-continuous.
4. Install handrails at each side of the ramp with 300mm extensions at the top and bottom.
5. Provide kerbs at each side of the ramp in accordance with clause 10.3 (j) of AS 1428.1 2009.



Ramp and landing - 180 degree turn

Stairways (Clause 11)

All stairways throughout are required to be accessible (two handrails 865-1000mm high with extensions at the top and bottom, tactile ground surface indicators and contrasting stair nosings).

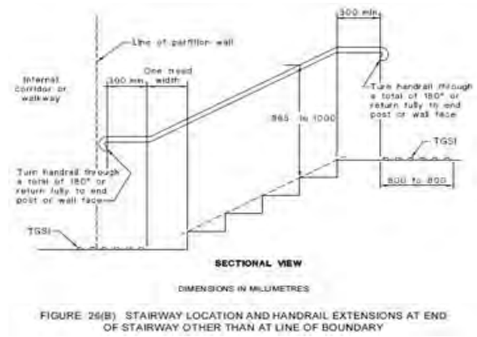


FIGURE 26(B) STAIRWAY LOCATION AND HANDRAIL EXTENSIONS AT END OF STAIRWAY OTHER THAN AT LINE OF BOUNDARY

Stairs with handrails and tactiles

Comment:
Stairways throughout require accessible features such as handrails at each side with extensions at the top and bottom, contrasting stair nosings and tactiles at the top and bottom.

Action
1. Provide stair detail for review at design development stage.

Doorways, doors and circulation spaces at doorways (Clause 13)

Doorway opening widths
Doorways on the path of travel require a minimum opening width to allow a person with a mobility aid to transition through rooms and areas with ease.

Doorway circulation spaces
Doorway circulation spaces on the accessible path of travel are required to comply with clause 13.3 of AS 1428.1.

Comments:
There are doorways throughout both buildings that have insufficient widths for a person with a mobility disability.
The western precinct change room leading through to the amenity area incorporates a barrier at latch of each UAT door for entry to the facilities at change room 1-2 and change room 3-4 UAT.

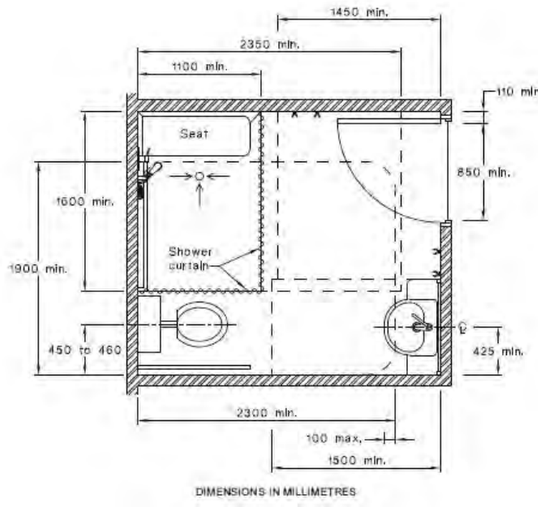
Actions:
1. Increase door opening widths on the accessible path of travel throughout the two buildings as per the areas marked on the drawings (red line at doorways that require increasing).
2. Increase doorways circulation spaces within both buildings at marked areas on the drawings.

Sanitary facilities for people with a disability (Clause 15/16)

Unisex accessible sanitary facilities
Unisex accessible sanitary facilities are required to comply with clause 15 & 16 of AS 1428.1 2009.

Ambulant facilities
Where an additional sanitary facility is provided in addition to a unisex accessible facility, provision for a facility for a person with an ambulant disability is required for use by both sexes.

Accessible showers
Accessible showers are required within buildings where showers are available for able bodied persons and in accordance with F2.4 of the Building Code of Australia.. We suggest incorporating an accessible shower within each unisex accessible sanitary facility at each change room area within the western precinct.



Combination shower & unisex accessible facility

Comments:
Ambulant cubicles facilities require decreasing and a change of door swing (swing outwards) to achieve appropriate pan circulation and door circulation space within the facilities for both sexes.
There are showers available for able bodied people, however there is no provision for accessible showers at the western precinct amenities.

Actions:
1. Ensure pan projections achieve between 790-810mm from rear walls in both buildings.

2. Decrease the width in one ambulant cubicle and swing both ambulant doors outwards in the western precinct to achieve 900-920mm widths and 900mm lengths.
3. Provide accessible showers in each unisex accessible facility within the western precinct. Suggest including within each unisex accessible sanitary facility in the western precinct.

DRAWINGS

This report has been prepared based on the review of the following Architectural plans prepared by Gresley Abas.

Drawing No.	Revision	Date
SD 01 (Eastern Precinct)	B	22.08.2014
SD 01 (Western Precinct)	B	22.08.2014

REFERENCES

- Australian Building Codes Board, National Construction Code (2013), Building Code of Australia, Volume 1.
- Australian Building Codes Board, National Construction Code (2013), Guide to the Building Code of Australia, Class 2-9 Buildings.
- Australian Standards 1428.1-2009 Design of Access and Mobility, Part 1: General Requirements for Access – New Building work.
- AS 1428.4.1:2009 Design for access and mobility – Part 4.1: Means to assist the orientation of people with vision impairment – Tactile ground surface indicators (incorporating Amendment No. 1) referenced by the NCC and therefore mandatory requirements which impact on new building design.
- AS 2890.6:2009 Off-street parking for people with disabilities referenced by the NCC and therefore mandatory requirements which impact on new building design.

REPORT ITEM SCM 010 REFERS

APPENDICES

Appendix A: Terminology

Appendix A: Terminology

For the purpose of this report, the definitions below apply.

Accessible means having features to enable use by people with a disability.

Accessway means a continuous accessible path of travel to, into or within a building.
An accessway is required to be provided to the building from:

(i) From the main points of a pedestrian entry at the allotment boundary; and
(ii) From another accessible building connected by a pedestrian link; and
(iii) From any required accessible carparking space on the allotment.

Circulation space means a clear unobstructed area, to enable persons using mobility aids to manoeuvre.

Encroachment means the intrusion of a building component, fixture or fitment into a continuous accessible path of travel or circulation space.

Grabrail means a rail used to give a steadying or stabilizing assistance to a person engaged in a particular function.

Handrail means a rail used in circulation areas such as corridors, passageways, ramps and stairways to assist in continuous movement.

Kerb means a side barrier to a trafficable or accessible pedestrian surface.

Landing means a resting place on a path of travel.

Luminance contrast means the light reflected from on surface or component, compared to the light reflected from another surface or component.

People with ambulant disabilities means people who have a mobility disability but are able to walk.

Ramp means an inclined surface on a continuous accessible path of travel between two landings with a gradient steeper than 1:20 but not steeper then 1:14.

Tactile ground surface indicators (TGSI's) means truncated cones and / or bars installed on the ground or floor surface, designed to provide pedestrians who are blind or vision-impaired with warning or directional orientation information.



Appendix 2 - Stakeholder Presentation Minutes

Meeting with Football Club representatives

Club attendees

Phil Mellon	Sharks Football Club
Mitch Curnow	Royals Football Club
David Flick	Royals Football Club
Rob Marks	?
Rick Minane	?
Mick O'Dea	Albany Junior Football Association
Basil Worner	independent advisor – ex DSR

Introductions made

Overview by Phil Gresley

Looking at Centennial Park as a whole with a view to totally engaging the community

Not just a standard pavilion – needs to be a bit special within the Centennial Park project – which is to create a play to 'play'.

Existing buildings to be removed. Royal's clubhouse to be repurposed.

Phil showed examples of existing structures elsewhere including:

Lark Hill, Capel, Prince Alfred Pool Sydney, Templestowe Melbourne, Rotterdam, Brazil, Borregos Mexico, Zurich, Court on wall,

Walk through lessons learned

Identified built form key objectives

4 distinct requirements articulated

Showed scheme development and then schematic design

Brief development relationship diagram

Showed comparison between Opus area allocations and current area allocations

Q: What is the surface on the seating plinths?

A: No resolution at this stage – to be advised – considering the demographic of spectators

Q: Is there a specific star rating being targeted for this building?

A: Not a specific star rating other than BCA compliance – GA is a certified Green Star architect

Q: Does this relate to the needs for WAFL / pre-season AFL requirements?

A: Yes, as advised by Paul Lekias from WAFC

Q: Are there stairs or steps from the changerooms to the playing field?

A: No, changerooms will be at grade or on a slight ramp

Q: Can the service access to the kitchen be achieved by a ramp along the player's race in lieu of the lift access to the kitchen area?

A: To be investigated

Q: Is the building elevation of 1.5m from the playing surface?

A: Zero point is from the Boundary of the playing field

Q: What is the maximum height to go to – aim is to achieve maximum height

A: consider additional cost and options for increased height to improve

Q: what is the width if access to first aid room. Need to consider the access to stretcher and carriers and side support people

A; Consider making access separate from changeroom and allow turning circle for stretcher and ambulance gurney

Q: How do juniors have access to the toilets when they are there en-masse and not necessarily needing to access the changerooms?

A: To be considered with a view to junior access times particularly when the changerooms and the clubrooms might not be open. Add an extra toilet near the UA toilet on the changeroom level.

Q: Where and how are the juniors to be included and incorporated into the stadium building?

A: to be considered and further advised with the option of U15 and U17 moving to Friday nights

Age 5 to 10 is Auskick

11-15 is junior on lower ovals and 15-17 on main stadium

Q: Is there a floor plan for the existing soccer clubhouse and storage facilities

A: Request Ryan Taylor to provide flor plan

Q: When do we do the kitchen layout so that our needs can be itemised

A: GA will provide an indicative layout for the kitchen and kiosk /canteen operation



Appendix 3 - Preliminary Show Layout

KEEP OFF THIS

LOCATION??

STATIC DISPLAYS (ANTIQUE CARS).

CATTLE

AUSKICK OVALS AVAILABLE FOR USE?

ON OVAL
- REARRANGE GAME FUNCTIONS AS EXISTING CENTENNIAL OVAL ON SHOW DAY.

CARPARK ?

CARPARKING OVERFLOW PARKING 50 SPACES

SEALED ROAD

SEALED PARKING 100 SPACES

ENTRY 3

ENTRY 1

2 WAY STAGE

NEW STADIUM FOR STATIC DISPLAYS + MANAGEMENT.

FFBS / SHOWBAG STALLS.

SHEEP DOGS.

UNSEALED ROAD

UNSEALED PARKING 80 SPACES

SEALED PARKING 60 SPACES

PARKING (ASPHALT)

O/FLOW PARK

TURF OVERFLOW CARPARK 100 SPACES

SEALED ROAD

30 x 12M MARQUEES

SIDE SHOW

STALLS

HORSES

ROYALS USED FOR PHOTO GALLERY ETC?

ENTRY 2

STABLES ZONE

FUNCTION MARQUEE TBC ?

HORSE FLOAT PARKING.

PARKING

PARKING OVERFLOW PARKING 60 SPACES

EVENT PARKING ACCESS

EVENT PARKING ACCESS

NO ACCESS

GRESLEY ARTS | CCS.

15/9/14 AG. SHOW CONCEPT EVENT LAYOUT 1:2000 @ A3.

- PROPOSED FENCE
- TOILETS (TEMP).
- PED CIRCULATION
- CATERING / EATING SPACES.
- EXISTING FENCE