

# Parkes Block 6 Section 3

Works Approval and Design Acceptance Submission



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### Works Approval and Design Acceptance Submission

Client: Land Development Agency

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Prepared by

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## Quality Information

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### Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
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## Executive Summary

Parkes Block 6 Section 3 (PS3) is located on a prominent corner of Constitution Avenue at its intersection with Coranderrk Street in Canberra.

The Land Development Agency (LDA) engaged AECOM to undertake the following:

- Develop the planning and design for PS3 site, to establish a vibrant and viable mixed use development proposition and deliver an exemplar precinct within Canberra
- To take the approved designs through documentation and approval, to enable the release of land for development.

Due to uncertainty around the timeframe of the realignment of Parkes Way, two boundary options were explored in the PSP documentation for PS3.

The scheme adopted for the Final Design adopts the existing boundaries of Coranderrk Street and Parkes Way. The northern edge of the site would remain constant and the boundary along Parkes way could be altered without imposing any changes to the northern component of the site. Within the existing boundaries infrastructure and landscape finishes are built to the ultimate aspirations for the site with temporary truncations at the existing boundaries.

The design for the development of the northern site has been progressed to final design and will be submitted by the LDA in mid- May to the National Capital Authority (NCA) for Works Approval and to TaMS for Design Acceptance.

This Final Design report outlines the design process and the final design outcomes for the delivery of Parkes Section 3.

## 1.0 Introduction

### 1.1 Background

Parkes Block 6 Section 3 (PS3) is located on a prominent corner of Constitution Avenue at its intersection with Coranderrk Street in Canberra.

It is a key catalyst site within the context of the growth of the City, due to its size and location. Its development presents significant opportunity to define the character and architectural quality for future development along Constitution Avenue, as well as delivering the direction set by:

- The National Capital Plan (NCP)
- The Griffin Legacy
- The aspirations defined by NCP Appendix T8 and Amendment 60 – Constitution Avenue
- The ambitions for the city defined by 'The City to the Lake' project.

The Land Development Agency (LDA) as Client for the project is responsible for delivering the ACT Government's Land Release Program. Parkes Section 3 is programmed for sale in 2015/16 and the infrastructure works facilitate the future development will be constructed by the ACT Government.

The vision for the project is to:

- Reinforce the significance of Constitution Avenue as the base of the Parliamentary Triangle and as a prestigious address of the capital
- Enable the realisation of Constitution Avenue as a diverse active boulevard, and as a 21st Century exemplar of sustainable urbanism.
- Implement the LDA's vision of contributing positively to the building of vibrant and prosperous communities by facilitating high quality design, place and built form outcomes.

### 1.2 Project Team

The team for the project are as follows:

Role	Organisation	Contact
<b>Client</b>	Land Development Agency	Lea Durie
<b>Lead Consultant</b>	AECOM Australia Pty Ltd	Jane Peters
<b>Sub-consultants</b>		
<b>Geotechnical Investigation</b>	ACT Geotechnical Engineers	Jeremy Murray
<b>Engineering Survey</b>	Leach Steger	Jason Steger
<b>Architects (peer review and development of architectural typologies and guideline for incorporation into Urban Design Guidelines)</b>	Cox Architecture	Ronan Moss
<b>Consultation</b>	Tania Parkes Consulting	Tania Parkes

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### 1.3 Scope of works

The objectives for the project are to:

- Develop the planning and design for PS3 site, to establish a vibrant and viable mixed use development proposition and deliver an exemplar precinct within Canberra.
- To take the approved designs through documentation and approval, to enable the release of land for development.

PS3 is located within the City to the Lake (CTL) study area and bounded by Constitution Avenue, Coranderrk Street and Parkes Way. The future proposed realignment of Parkes Way is part of City to the Lake project. This future project will involve the realignment of the southern and western boundaries of PS3 and the removal of Coranderrk Pond.

Due to uncertainty around the timeframe of the realignment of Parkes Way, two boundary options were explored in the PSP documentation for PS3 to show the ultimate future development scenario and the interim development of the northern site area.

A copy of the Ultimate Development Concept and the Interim Development Concept are included below for information.

**Figure 1 Ultimate Development Parkes Section 3 – Concept Plan**



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**Figure 2 Interim Development Parkes Section 3 Concept Plan**

In October 2014 the Preliminary Sketch Plan design was distributed to the LDA, NCA, TAMS and other key stakeholders for comment. The feedback attained from this consultation has been incorporated into the design where possible.

The design of the northern site area has been developed where the northern edge of the site fronting Constitution Avenue would remain constant and the boundary along Parkes Way could be altered without imposing any changes to the northern component of the site.

The proposed development is located within the National Capital Authority's (NCA's) planning jurisdiction and therefore requires NCA Works Approval.

## 1.4 Final Design Documentation

This Final Design report provides an overview of the design works undertaken by AECOM. It outlines the design objectives and the principles of the PS3 design.

This report will be used for the Works Approval submission to the NCA and the Design Acceptance submission to TaMS and utility providers.

The Final Design submission consists of the following documents:

- Final Design report
- Final Design Drawings

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## 1.5 Reference Documentation

The following reference documents have been referenced and/or incorporated into the design:

- Campbell Section 5 Construction Drawings
- Campbell Section 5 Works Approval Submission
- Constitution Avenue Upgrade Construction Drawings
- Statement of Heritage Impacts, Architectural Projects, November 2014
- Parkes Section 3, Consultation Report, Tania Parkes, September 2014
- Geotechnical Investigation Report, ACT Geotechnical Engineers, January 2015
- Tree Assessment Report, BMS Forestry and AECOM, October 2014
- Asbestos in Soil Investigation, AECOM, December 2014
- Infrastructure Study and Traffic and Services Assessment Report, July 2013 by Mott MacDonald.
- Parkes Draft Urban Design Guidelines, August 2010 by AECOM.
- Preliminary Environmental Assessment, June 2013 by Robert Jessop Pty Ltd.
- Urban Strategy – Linking City Centre to the Lake, October 2013 by Hill Thalys Architecture
- Campbell Section 5 Concept Report (Draft), January 2012 by Hill Thalys Architects and JILA
- Re-engineering Parkes Way and Civic's Southern Road Network, Volume 1 – Feasibility Design, June 2014 by SMEC.

## 1.6 Standards and Design Information

The design standards selected for this project and adopted in the detailed design comply with the provisions contained within the following standards and guidelines:

- AUSTROADS
- Design Standards for Urban Infrastructure – Territory and Municipal Services (TaMS)
- ESA Design Requirements
- Waterways Water Sensitive Urban Design (WSUD) – ACT Planning and Land Authority (ACTPLA), 10 July 2009.
- Water Supply and Sewerage Standards – Actew Water
- National Broadband Network Co. Network Design Rules, NBN-TE-CTO-194, July 2013

## 1.7 Design Certification

The design of the infrastructure and Landscaping to service Parkes Section 3 complies with all relevant standards unless specified otherwise in this report and supporting documentation.

Refer to Appendix K for the letters of certification.



## 2.0 Planning Concepts and Design Objectives

### 2.1 The Spatial Brief and Project Objectives

The consolidation of findings from the 'Design Concept Report' stage of the project determined a set of clear spatial parameters to which design development of the site needed to respond.

#### The Site

- Constitution Avenue is the primary address.
- Staging of development commences along Constitution Avenue, with future staging responding to the expansion of the site to the south and west with the realignment of Parkes Way and Coranderrk Streets respectively.

#### Heritage

- The maximum built form height is 25 m protecting the tree line and views across Lake Burley Griffin.
- The structure for development must respond positively to the grid defined by the Burley Griffin Plan and protect linear and lateral vistas through the site to the Lake.

#### Built form

- The built form responds to the requirements of Constitution Avenue and Coranderrk Street in terms of articulation, scale and massing to establish a prestigious new city address.
- Parkes Way is to be well addressed by development to bring the City closer to the Lake.
- A massing study was undertaken during the Concept Planning to review the proposed building heights. A copy of the proposed building heights is indicated on the diagram below.

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**Figure 3 Proposed Building Heights**



### Active frontage

- The built form fronting Constitution Avenue establishes a diverse and active ground floor lined with shops, cafes and a mix of commercial, entertainment and residential uses.
- The development fronting Coranderrk Street establishes an active ground floor and responds to the future context of the city, specifically the potential stadium location.

### Stormwater Management and Water Sensitive Urban Design (WSUD)

- The existing overland flow from Constitution Avenue has been considered in the PS3 design. WSUD will be integrated into the street and space network to improve the water quality discharge into Lake Burley Griffin.

### Well defined spaces

- The buildings positively front Parkes Way and promote the transition between city street to park edge.
- The built form massing positively shapes and frames as well defines public realm.

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### Dedicated pedestrian and cycle connections

- The development delivers climate comfortable and safe streets that promote the prioritisation of pedestrians and cyclists and connect into the broader network.
- The buildings and streets should be arranged to promote casual surveillance and safety.
- The development provides connectivity to Commonwealth Park via the existing underpass for pedestrians and cyclists.

### Public transit

- The future Capital Metro route and stop interface is considered along Constitution Avenue.

### Desire lines

- The internal road network and pedestrian links are based on desire lines that enable through movements to key destinations including Commonwealth Park.

### Vehicle movements

- The location and type of intersection off Constitution Avenue adhere to both the CTL and Constitution Avenue Upgrade (CAU) projects.
- The future one-way eastbound service road on Parkes Way provides opportunities for access to the site from the south.
- A limited left in/left out movement is permissible from Coranderrk Street with the future realignment of Coranderrk Street.



## 3.0 Location and Context

### 3.1 The City Context

The PS3 site occupies approximately 3.4 Ha of land located in the suburb of Parkes, less than 1 km south-east of City Hill.

It is located at a key gateway location on the southern edge of Constitution Avenue, at its junction with Coranderrk Street, and is bounded by key movement corridors:

- Constitution Avenue to the north – A main avenue and key city street providing important east-west connectivity and public transport. As part of the Griffin Legacy Constitution Avenue will be enhanced to become an elegant and vibrant mixed use boulevard and a key focus of improved public transport.
- Coranderrk Street to the west – A major city street providing a key connection between civic and its adjoining neighbourhoods.
- Parkes Way to the south – A significant city-scale east-west movement corridor, which in the CTL is transformed into a 'smart boulevard' to reduce vehicular dominance of the corridor and improve at-grade connectivity for pedestrians and cyclists between the City and the Lake.

### 3.2 Planning Context

Canberra is a unique city, strongly defined by its role as the Australian Capital and visually distinct due to its planned evolution from the Burley Griffin Master Plan.

The concepts and structuring features of this heritage are integral to the character of Canberra, and continue to be key points of reference informing the future development and growth of the city.

The Australian Government, through the National Capital Authority (NCA) and the Australian Capital Territory (ACT) Government share responsibility for strategic and statutory planning functions in the Australian Capital Territory and have a shared responsibility for the quality and character of development outcomes.

Both Agencies have produced statutory requirements and planning guidance relevant to the development of design options for PS3:

#### Key Commonwealth Government Planning Documents

##### *(a) National Capital Plan*

The National Capital Plan (NCP) is the strategic plan for Canberra and the Territory. Its guidance ensures that Canberra and the Territory are planned and developed in accordance with their national significance.

Under the NCP the Parkes Section 3 site is Designated Land which means that the NCA has responsibility for determining detailed conditions of planning, design and development, and for works approval.

##### *(b) The Griffin Legacy*

The Griffin Legacy provides a strategic framework to align and guide the best of contemporary development in keeping with the Burley Griffin plan.

##### *(c) NCP Appendix T8 & Amendment 60 – Constitution Avenue*

NCP Appendix T8 and Amendment 60 sets the framework for land use and planning, and urban design policies to guide future development along Constitution Avenue.

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## Key ACT Government Planning Documents

### *(a) The Territory Plan*

The Territory Plan is the key statutory planning document in the ACT, providing strategic, framework and planning direction for land and development within the Territory.

### *(b) Transport for Canberra*

The Transport for Canberra strategy sets out direction to deliver a more compact, connected and accessible city supporting integrated land use and transport, sustainable travel options and increased active transport outcomes including safety and accessibility.

### *(c) The City Plan*

The City Plan sets a vision for the future development in the City Centre, or Civic, and a framework for how it could happen. Whilst this is not a statutory document the Plan provides the planning and spatial framework to guide the future development of the City Centre, a key adjacent neighbourhood to PS3.

### *(d) City to the Lake*

The 'City to the Lake' Strategy is a transformational development project that provides a framework for the future urban extension of Canberra City towards Lake Burley Griffin.

The strategy supports the creation of a vibrant public urban waterfront, connecting the City and the Lake with major national and regional educational and cultural institutions. Its focus is West Basin, City Hill and Constitution Avenue.

PS3 is located at the eastern edge of the defined 'City to the Lake' project area and presents the opportunity to deliver a catalyst development to set the precedent for future development within the project area.

## 3.3 Heritage Context

The development of Canberra can be traced through a time line of maps and plans illustrating urban planning ideas for the capital since 1909 (see Heritage Time Line below).

The proximity of PS3 to Civic and its location within the Parliamentary Triangle define the development opportunity within an area of heritage significance.

Through preliminary heritage analysis, undertaken by Architectural Projects Pty Ltd for the LDA, two key guiding principles were identified. These principles have been used to guide the development of design concepts for the site to ensure they are responsive to its sensitive heritage context:

#### 1) Griffin Plan Responsiveness

New development must first be responsive to the Griffin Plan, recapturing and advancing aspects of the intent of Walter Burley Griffin's plan for the city.

#### 2) Heritage Sensitivity

Within the contemporary context of the City there are a number of established sites/buildings/landscape elements/views and vistas, within close proximity PS3 that require a sensitive and respectful response to protect and enhance their integrity.

A detail review of heritage considerations for the project can be found in the following supporting documents:

- The Pre Design Services Report (AECOM/Cox)
- Parkes Section 3 - Heritage & Design Guidelines (Architectural Projects Pty Ltd.)

The Parkes Section 3 Heritage Report is included in Appendix H.

## 4.0 Adjacent Projects

### 4.1 Constitution Avenue Upgrade (CAU)

Constitution Avenue is of major significance to the City of Canberra, as one of the key structuring elements of the Griffin Plan and one of the City's principal east-west links.

It is a significant focus for and has a major role to play in shaping the city's future growth.

PS3 presents a nationally significant development opportunity on the Avenue.

Development at PS3 will define approximately 330 linear metres of street frontage along southern edge of the Constitution Avenue, extending east from the intersection with Coranderrk Street.

The successful treatment of this key frontage will be a critical factor in the realisation of the future vision for the area, as determined by the National Capital Plan and Appendix T8.

Such significance demands the highest design standards with careful consideration of:

- Street frontage activation at ground floor.
- The location of points of access into the development.
- The articulation, scale and massing of the buildings fronting Constitution and Coranderrk Avenues and Parkes Way.
- The appropriate land use mix to 'Establish Constitution Avenue as a diverse and active grand boulevard lined with shops, cafes and a mix of commercial, entertainment and residential uses'.
- Site servicing into the development which generally supplied from Constitution Avenue and Coranderrk Street.

The construction of CAU is currently underway and it is anticipated to complete in March 2016.

### 4.2 City to the Lake (CTL) Project

The Estate Development Plan (EDP) design consultancy for the CTL project is currently running in parallel with PS3.

CTL is unlocking public land for development enabling the reinvestment of capital into major civic projects that will breathe life into the city and waterfront, including a new aquatic centre, stadium and convention centre.

The CTL precinct includes parts of the suburbs of Acton, City and Parkes as shown in Figure 4.

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**Figure 4: CTL Precinct – Locality Plan<sup>1</sup>**

### 4.3 Parkes Way Re-engineering

The feasibility study for the Parkes Way Re-engineering project was intended to run in parallel with PS3, however the timing for this project has been delayed.

It is expected the Parkes Way will have a 'smart boulevard' proposal lowering Parkes Way between Edinburgh Avenue and Coranderrk Street with upper level service roads. Adjacent to PS3 site, Parkes Way will be at grade with the service roads.

The Parkes Way Re-engineering project involves the removal of the Coranderrk Pond and change from a roundabout to an at-grade signalised intersection. Parkes Way and Coranderrk Streets will be realigned adjacent to Parkes Section 3.

The future planning for Parkes Way and the realignment of existing boundaries has been taken into account for the design of PS3 for both the development of the northern site area and the ultimate future development.

### 4.4 Construction of Infrastructure works at Campbell Section 5

LDA is currently constructing the infrastructure works at Campbell Section 5. The proposed development at Campbell Section 5 is a mixed-use urban development project, similar to the development proposed in PS3. The experience gained through the design development and approvals process will be taken into account for the PS3 design. It is anticipated that the approval process for PS3 will be similar to the works at Campbell Section 5.

<sup>1</sup> Source: LDA, CTL Precinct – Estate Development Plan RFT, 2012

## 5.0 Consultation

### 5.1 Public Consultation

The LDA engaged Tania Parkes Pty Ltd to undertake a comprehensive community consultation strategy during the Design Concept stage, involving key stakeholders such as surrounding residents from the suburbs of Reid and Campbell, CIT, NCA, Department of Finance and relevant industry bodies.

The community consultation sessions undertaken to date were on 26 June 2014 and 28 June 2014. The Consultation Report is included in Appendix I

### 5.2 Consultation with Authorities

#### 5.2.1 Consultation with the NCA

Meetings held with the NCA are as follows:

- Initial meeting in February 2014 to introduce the project to the NCA.
- A meeting in April 2014 to discuss the design concept development of PS3.
- A meeting in May 2014 presenting the design concept of PS3 development.
- A meeting in June 2014 as part of concept design review/comments/consultation preparation.
- A meeting in August 2014 to discuss design development and PSP design submission
- A meeting in November 2014 to discuss comments on the PSP submission

The PSP design documentation was circulated to the NCA for comment. A copy of the comments received and responses are included in

Copies of the meeting minutes are included in Appendix B.

#### 5.2.2 Consultation with TaMS

A meeting was held in July 2014 to introduce the PS3 project to TaMS. Follow-up meetings with TaMS were held in August 2014, December 2014 and most recently in April 2015 to discuss the design.

The key items discussed in these meetings are:

- Design Acceptance from TaMS is to be obtained prior to lodgement of Works Approval to the National Capital Territory (NCA).
- Access from Coranderrk Street can only be provided in the extended (realigned) boundary.
- Waste vehicle access using 12.5 m long truck for design.
- Estate Development Code (EDC) Variation 306 is not applicable for the site.

Following the PSP submission there was a meeting held with TaMS on 17 December 2014 and 8 April 2015 to discuss the comments on the preliminary design and subsequent correspondence during the design stage.

Correspondence from the discussions is included in Appendix B.

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### 5.2.3 Consultation with Utility Providers

The following utility providers were consulted during the Preliminary and Final design stages:

- Icon Water
- ActewAGL
- Jemena
- NBNCo
- Telstra
- TransACT

Refer to Appendix D and Section 12.0 for detailed discussions with the utilities providers.



## 6.0 Investigations and studies

### 6.1 Survey

Detailed survey of PS3 site was provided by the LDA in April 2014.

### 6.2 Geotechnical Investigation

ACT Geotechnical Engineers Pty Ltd undertook a preliminary geotechnical investigation within PS3 in 2008 to assist in preparing a masterplan for the design and construction of the proposed multi-storey development.

Additional geotechnical testing and investigation to target and confirm parameters for specific areas was undertaken in December 2014 for detailed design. A copy of the report is included in Appendix C

#### Site Geology

The site geology is controlled by the presence of the City East Fault Zone which trends in an approximate northwest-southeast direction and encompasses the majority of the site except for about the eastern quarter to third of the site. The City East Fault Zone is characterised by zones of deeper weathering of the underlying rocks, so that “hard” rock may not be encountered for a significant depth.

Within the City East Fault Zone, the subsurface profile over the site comprises:

- Between about 2 m and 3 m depth of predominantly gravelly/sandy clay fill;
- Alluvial clayey soils extending to depths of between about 5 m and 7m in the west side of the Zone reducing to about 2 m to 3 m in the east side of the Zone;
- Extremely, highly and moderately weathered siltstone rock of medium or lower strength underlain by strong slightly weathered and fresh siltstone rock; depths to the top of the strong rock as encountered in boreholes ranges between about 7m and 12 m but variable depths are expected due to variable weathering conditions.

East of the City East Fault Zone, the subsurface profile over the site comprises:

- Between about 1.5 m and 2.5 m depth of predominantly gravelly/sandy clay fill;
- Alluvial clayey soils extending to depths about 2 m to 3 m;
- Extremely, highly and moderately weathered siltstone rock of medium or lower strength underlain by strong slightly weathered and fresh siltstone rock; depths to the top of the strong rock as encountered in boreholes ranges between about 8 m and 9 m but variable depths are expected due to variable weathering conditions; fresh calcareous siltstone and limestone of expected extremely high strength was encountered in one borehole towards the eastern edge of the site below about 11 m depth (approximately RL 548 m).

The transition from the City East Fault Zone to the adjacent geology is gradual and a defined fault line or boundary is unlikely to be encountered in excavations. The City East Fault is not geologically active.

The depth to high strength weathered rock is likely require that foundations for multistorey buildings will need to be piled and that temporary and permanent basement excavation supports will have to be designed for earth pressures over the full depth of the basements.

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## Investigation Results

Subsurface conditions for the current project were investigated on 13 December 2014, comprising eight large diameter auger boreholes, designated 1A to 8A along the future road alignments and terminating at between 2.5m and 3.5m depth.

Uncontrolled fill was found in all eight boreholes, and it appears that uncontrolled fill is present under the proposed road alignment to 0.8m - 3.0m depth.

Builders waste (bricks and concrete pieces) was encountered within the existing uncontrolled fill in boreholes 7A and 8A. Apart from some small concrete and brick pieces in boreholes 7A and 8A, the borehole spoil was free of asphalt, road base, other building rubble, vegetation waste, and no chemical or other odours. Refer to Section 7 Contamination with regard to the asbestos in soils assessment.

The fill is underlain by alluvial and residual soils to 2.1m/>3.5m depth, over weak, highly weathered (HW)siltstone bedrock.

Based on the current investigation boreholes, as well as the past investigation boreholes, the site is expected to be covered by uncontrolled fill to 1m-3m depth, over sandy and clayey alluvial and residual soils to 2m-6.5m depth, underlain by very weak to weak, extremely to highly weathered (EW/HW) and highly weathered (HW) siltstone bedrock, which is expected to become medium strong to very strong and moderately weathered (MW) and slightly weathered (SW) with depth.

Bedrock is expected at 2m-3m depth in the eastern two-thirds of the block, deepening to 6m-7m depth at the western end of the site. Fresh limestone was encountered in borehole 107 in the east of the site, of the BMR investigation.

Experience indicates that the calcareous siltstone and limestone rocks present on the east side of the site are likely to be difficult to excavate and so the base of excavations for lift pits, detention structures and services should be located above these rocks if possible.

## Groundwater

The soils and bedrock appeared to be mostly dry or moist in the upper 3m-5m of the subsurface profile, with free groundwater or moist/wet soil conditions encountered within the alluvial soils below this depth in boreholes 1A, 3A, BH3 and BH6 at the western end of the site.

Groundwater had stabilised in the 2008 boreholes at 3m/4m depth below the ground surface level one week after completion of the drilling. This water level is ~RL555/556, which is the approximate water level of Lake Burley Griffin. Based on this and other investigations conducted in the area the lake water is conducted through the alluvial aquifers and fractured upper bedrock, and on this site would ultimately stabilise at lake surface level in any excavations. Temporary, perched groundwater seepages also expected to be present at shallower depth following rainfall.

## Subgrade

Pavement subgrades are expected to comprise newly placed controlled fill comprising re-worked existing fill materials. Therefore, provided the controlled fill comprises low reactive, gravelly soils, road pavements have been designed using a subgrade CBR value of 10%.



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### 6.3 Tree Assessment

A tree assessment report for the Parkes Section 3 site was undertaken by BMS Forestry in October 2014. A copy of the tree assessment report is included in Appendix J.

The report found that the existing planted trees were typical for such an area and function and there are no remnant trees or species of botanical significance in Canberra.

The species include very common species such as *Platanus orientalis*, *Liquidamber styraciflua*, *Populus nigra* and *Cupressus sempervirens*.

The number of *Hakea salicifolia* on the road edge are not trees under the legislation. The *Robinia pseudoacacia*, *Sorbus domestica* and *Pinus radiata* are considered weed species in the ACT and are no longer planted.

Approximately 182 trees are proposed to be removed of which 4 are dead, 32 are declining shrubs and 9 are identified as weeds. The Arboricultural Assessment has deemed 61 of the existing trees as Poor with Low Urban Amenity, the remaining as Medium which would require expenditure and maintenance to attain a high value and are assessed to be of little habitat value.

Overall the trees on this site are of only modest values as they have no cultural, social or scientific values; provide very limited habitat as none are native species and their contribution to the landscape is limited.

The proposal for Parkes Section 3 will introduce 123 new trees in the public domain including streets and park. These new trees will offer considerably more value to the public domain than the 182 identified for removal, in terms of amenity, biodiversity and habitat. The selection contains trees of appropriate species, both in height, spread and resilience to urban conditions. A diversity of tree species across the site will provide seasonal colour, shade and habitat opportunities, which many of the existing trees fail to provide.

The existing trees will be removed on the based on the findings and recommendations of the arborist. The development of Parkes Section 3 will include replacement by species selected for amenity, performance in urban conditions and appropriate for the overall design for the site.

### 6.4 Heritage

A search of the Commonwealth EPBC Protected Matters was carried out on 01 September 2014 and found two listed National Heritage properties within 1 km of the site. These were the High Court-National Gallery precinct and the Australian War Memorial and Memorial Parade; neither is expected to be impacted by the development of this site, given that they are not located within close proximity. Six Commonwealth heritage listed places were found in the EPBC search, including:

- Blundells farmhouse, slab outbuilding and surrounds
- Carillion
- High Court-National gallery precinct
- Parliament House vista
- Parliament House vista extension - portal buildings
- Russell precinct heritage area.

**Figure 5** illustrates the location of the closest of these items relative to the proposed development.

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**Figure 5: Location of Commonwealth and National Heritage listed items and places (hatched areas)**

The closest of the Commonwealth listed heritage places is the Parliament House vista which is located some 100 m east of the site, and south over the Parkes Way transport corridor. Although located within close proximity to the site of proposed development, it is not expected to be significantly impacted, given the size and scale of development relative to the surrounding area, and likely minor visual impacts expected in the context of the broader vista.

**Table 1** considers the potential impacts of the proposed developments from two key vantage points over the Parliament House Vista listing, illustrating the impact of development in the context of the vista. None of the other Commonwealth heritage listed places are expected to be significantly impacted as a result of the development.

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**Table 1: Visual impacts within the context of the Parliament House Vista**

Plate	Discussion
	<p>Taken from outside Old Parliament House looking north towards the War Memorial and Mt Ainslie in the background.</p> <p>The proposed development would not likely be visible from this vantage point, being shielded by the trees within the listed Parliament House Vista.</p>
	<p>Taken from the top of Mt Ainslie, looking down Anzac Parade, over Lake Burley Griffin, towards Old and New Parliament House.</p> <p>The proposed development would be just outside the frame of this photo, likely existing at a similar scale as the West Anzac Park Building seen immediately to the right (west of) of the Anzac Parade in the adjacent plate.</p>

## 6.5 Biodiversity

The site of the proposed development is currently used as an open air car park, and provides little to no habitat value for biodiversity. Scattered introduced trees may provide some marginal foraging habitat for some of the most disturbance tolerant and mobile bird species. The trees across the site would also likely contribute to regional connectivity, however are not significant in any context from a biodiversity perspective. A review of ACTMAPi did not identify any significant biodiversity values across the site, and while the EPBC search showed two threatened ecological communities within 1 km of the site, and 19 threatened species and 11 migratory species with potential habitat within the surrounding region, none of these values are present on the site itself. On this basis the proposed development is not expected to have any significant adverse impacts on any biodiversity values considered threatened or otherwise important at either the ACT or Commonwealth level.

## 6.6 EPBC Act Requirements

The primary aspect of the EPBC Act of relevance to the proposed development, and with the potential to require approval of the Commonwealth Minister for the Environment is in relation to Matters of National Environmental Significance. Actions which will or are likely to result in significant impacts on these matters are considered a controlled action, and require approval from the Minister.

In preparing this report, consideration has been given to the potential for the proposed development of the site to significantly impact a Matter of National Environmental Significance. The previous Sections 6.4 and 6.5 identified that there is unlikely to be any significant impacts to any of the identified heritage places or items listed under the EPBC Act, or any listed threatened species or communities that are known from the wider region.

Matters of National Environmental Significance which are relevant to the proposed development are associated with listed heritage items and places surrounding the site.

While it is likely that any impacts would not be significant, if the proposed development may be or is a controlled action, the project must be referred to the Commonwealth Minister for the Environment for a decision on whether it constitutes a controlled action. To remove any doubt, a referral may also be made for the Minister's decision if the project is considered not a controlled action. In forming a decision around the need to refer the project to the Commonwealth, recent amendments to the EPBC Act provide for the Commonwealth to recover costs associated with the assessment and determination of the project.

## 6.7 Contamination

The Site comprises an unsealed car park, the Parkes Way and Coranderrk Street road verge and a portion of the roadway itself. The car park is predominantly flat and consists of compacted road base with log barricades and concrete kerbing demarcating parking areas. There is a constructed berm (embankment) along the southern extent (i.e. Parkes Way road verge). Vegetation is predominantly located within the property boundary with demarcated parking being complemented by tree plantings. Part of Coranderrk Pond, a man-made ornamental shallow water feature, can be found in the south-west corner of the Site.

A preliminary contamination assessment undertaken by Coffey Environments Australia Pty Ltd (Coffey) revealed evidence of the following potentially contaminating activities:

- Former agricultural use including grazing;
- Placement of fill material across the site of unknown origin and quality;
- Weathering of hazardous building materials from dwellings and structures formerly located on-site;
- Sediment within Coranderrk Pond which collects runoff from nearby roads, and industrial, commercial and residential developments within Braddon, City, Reid, etc; and

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- Other possible historical activities associated with former grazing practices (e.g. waste disposal, chemical use, etc.).

A Phase 2 Environmental Site Assessment undertaken by Coffey found that soil samples collected reported concentrations of chemicals of potential concern below the adopted health and ecological investigation and screening levels, and the management levels. The Coffey Phase 2 concluded that asbestos-in-soil (ASBINS) was the only contaminant of concern that may require further consideration.

Although no fragments of potential asbestos containing material were observed on the surface of the site, or within the subsurface during fieldwork, chrysotile asbestos from two test pits at a depth of 0.5 m below ground located on the south-east/eastern portion of the site was detected as cement sheeting and friable fibres. Coffey noted the presence of small fragments and free friable fibres suggesting that this could pose a potential risk to human health during or after site redevelopment. Coffey concluded that the site is currently not considered suitable for proposed high-density residential land use without further detailed quantitative ASBINS assessment and where appropriate, remediation and/or management.

LDA engaged AECOM to undertake further quantitative ASBINS assessment of the site.

The objectives of the investigation were to:

- assess ASBINS risk in relation to the Site's re-development and subsequent mixed use purposes;
- fill any data gaps identified following previous investigations on-site; and
- provide relevant information to support the development of a remedial strategy (if required) for the proposed development.

Test pits were advanced into topsoil and fill material from 0 to 2.9 m below ground level (bgl), with depths varying across the Site. The fill material typically comprised gravelly and clayey sand with anthropogenic inclusions e.g. brick, roof tile, timber, concrete, plastic and reinforced steel bars, indicating that construction waste-derived fill was imported to Site. Natural soil was present below the fill material to a maximum investigation depth of 3.5 m bgl. Suspected bonded ACM fragments were observed in three test pits within the fill material. No staining or other obvious signs of contamination were noted.

Asbestos fibres were reported in three of 57 samples analysed. The asbestos fibres were associated with the fill material on-site. The locations of asbestos fibres were spread across the Site, identified on the northern, centre and south-western portions.

In accordance with WA DoH (2009), asbestos was quantified in three of the primary samples. The friable asbestos (as asbestos in soil) concentrations were below the laboratory limit of reporting and the WA DoH (2009) guidelines (as presented in ASC NEPM, 2013). Therefore, friable asbestos in soil is unlikely to generate elevated levels of airborne asbestos.

Four fragments of asbestos were also identified during test pitting, along the western boundary and on the southern portion of the Site. The asbestos fragments were also collected from within the on-site fill material.

As asbestos fibres were reported in fill materials on-site, and given the proposed re-development works would require significant cutting, grading and stockpiling of these materials, a complete exposure pathway could potentially be created between the contamination and on-site and off-site human receptors (i.e. inhalation of site-derived soil and dust) as summarised below:

- Future on-site commercial workers.
- Future on-site intrusive maintenance workers.
- Future on-site high density residents.



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- Off-site recreational users of the Canberra Institute of Technology to the north, users of Nerang Pool and surrounds to the south, users of St Johns Church and Anglicare Australia to the east and users of Canberra Olympic Pool and Health Club to the west.
- Off-site users of Reid Early Childcare Centre to the north of the Site (assessed as low density residential).
- Off-site residents of Reid approximately 200 m to the north of the Site.
- Off-site commercial workers of the Anzac Park West Building.

Based on comparison against relevant guidelines, the finds do not represent an unacceptable risk for the Site's future redevelopment for more sensitive uses, as long as the asbestos hazards are appropriately addressed, especially during the Site's redevelopment works phase.

AECOM recommends the adoption of a Site Management Plan (SMP) and appropriate environmental compliance to address the identified potential exposure pathways (and risk) for the receptors identified arising from proposed divestment and potential re-development of the Site:

AECOM considers the application of a SMP and environmental compliance reporting to be the most robust and proactive tool to enable an appropriate levels of human health and the environment protection for the proposed Site development and long-term reuse.

The EPA has reviewed the investigation report and supports the findings and recommendations with respect to the ongoing management and development of the site. A copy of the EPA correspondence is included in Appendix G with the ASBINS report.

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## 7.0 Approvals

### 7.1 Design Acceptance

Territory and Municipal Services (TaMS) has indicated that Design Acceptance is required for the Works Approval by the National Capital Territory (NCA). Consultations with TaMS and the NCA are further discussed in Section 5.2.

### 7.2 Works Approval

Under the *Australian Capital Territory (Planning and Land Management) Act 1988*, the National Capital Authority (NCA) prepares and administers the National Capital Plan (the Plan) to ensure that Canberra and the Territory are planned and developed in accordance with their national significance.

The Plan sets out the broad planning framework for the ACT. Areas designated as having special characteristics of the National Capital, including the location proposed for the development of PS3 are subject to detailed planning policies and guidelines. As such the proposed development will require approval of the NCA prior to commencement.

As noted in Section 6.6, during the Works Approval process, the NCA will also be required to give consideration to the implications from the development under the EPBC Act.

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## 8.0 Transport, Traffic and Planning

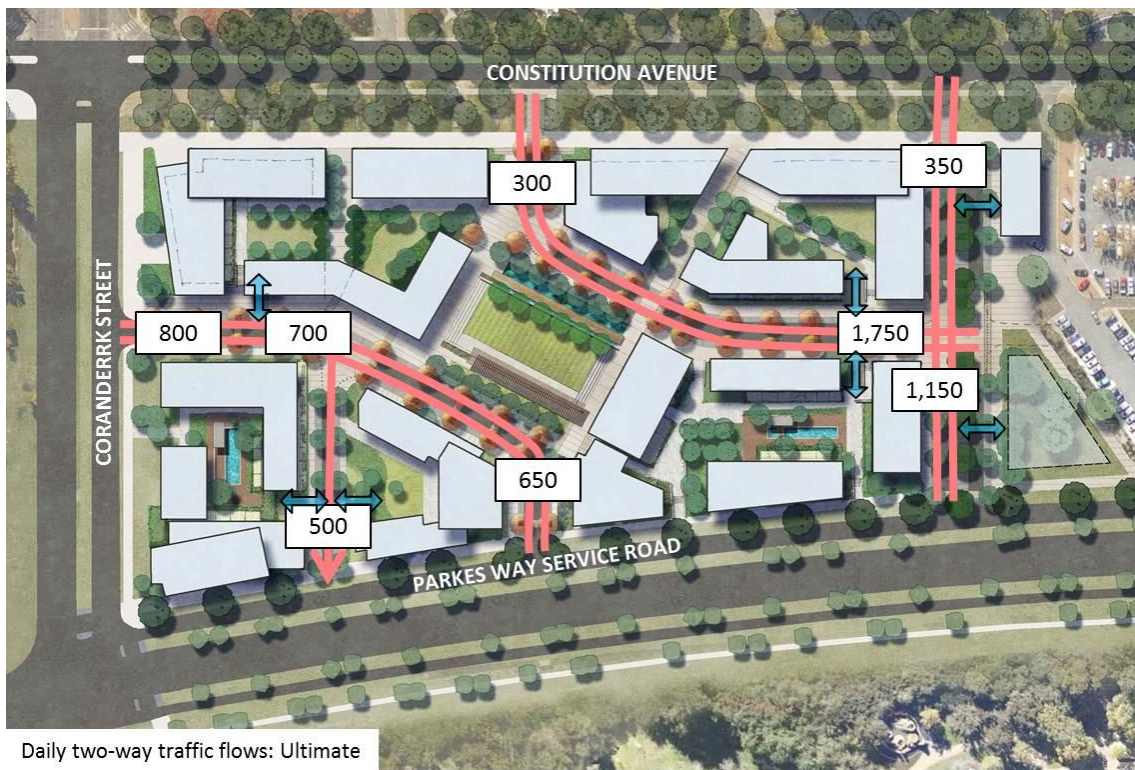
### 8.1 Traffic analysis

The following presents a summary of the traffic volumes and assessment.

A comprehensive assessment Parkes 3 - Traffic Analysis -Concept Design Layout was provided in the PSP submission.

The traffic generation and distribution assumptions resulted in the following two-way daily traffic volumes for the site in both boundary scenarios

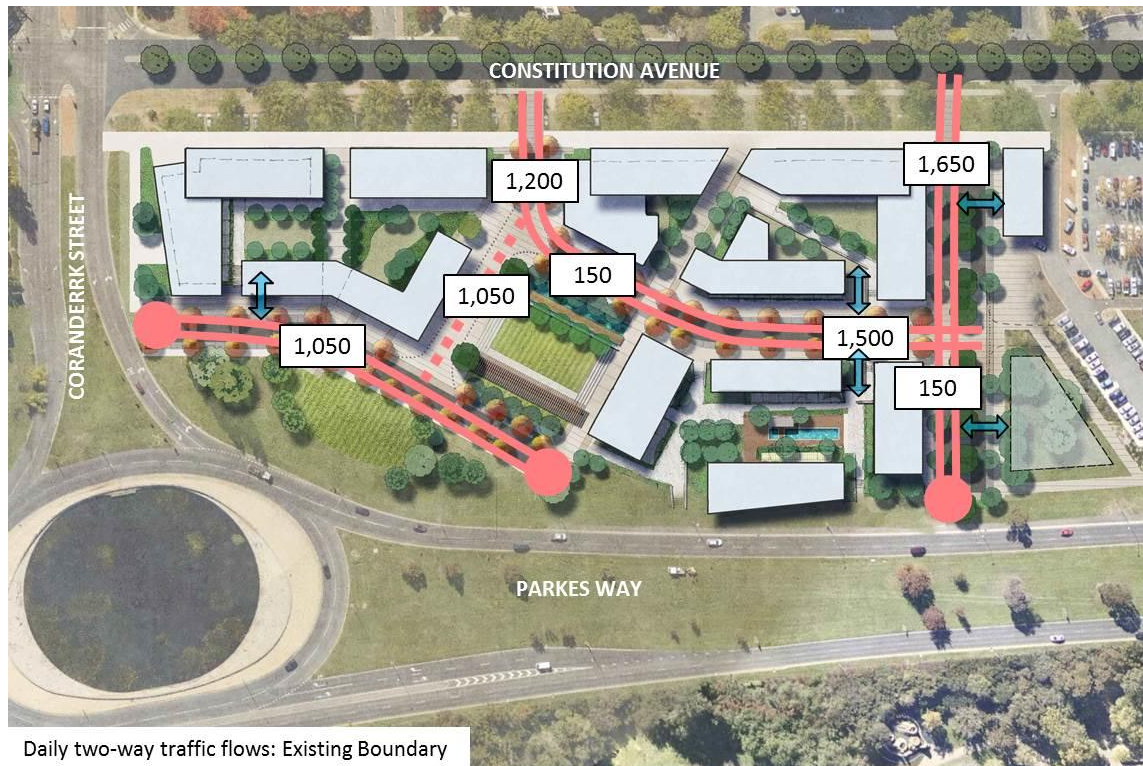
**Figure 6: Daily traffic flows for the extended (realigned) boundary scenario**





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**Figure 7: Daily traffic flows for the existing boundary Scenario**

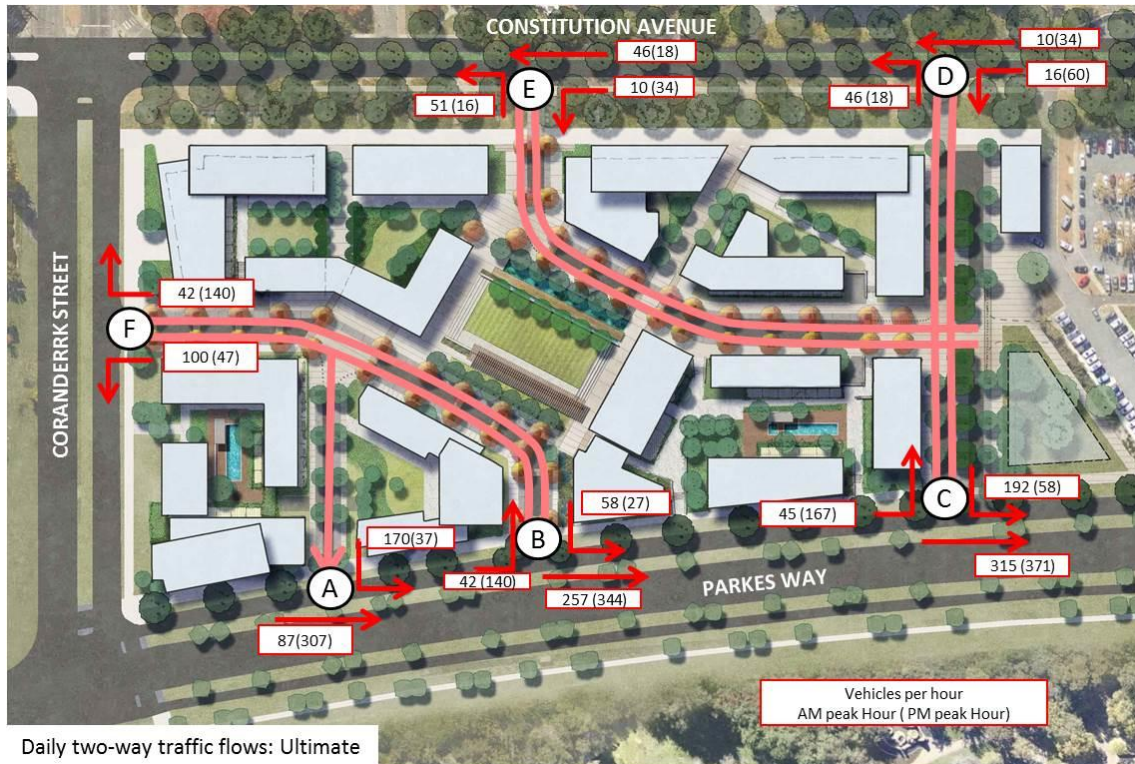


## 8.2 External Intersection Analysis

An assessment of the external access points for the site was undertaken in SIDRA. The resulting peak hour turning movements and SIDRA results are outlined below.

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**Figure 8: Peak hour traffic flows to/from PS3 for the extended (realigned) boundary scenario**



**Table 2: Peak hour operation of site accesses**

Access*	AM Peak Hour		PM Peak Hour	
	DoS	LoS	DoS	LoS
A	0.371	A	0.490	A
B	0.486	A	0.589	A
C	0.519	A	0.619	A
D	0.238	A	0.527	A
E	0.381	A	0.529	A
F	0.206	A	0.318	A

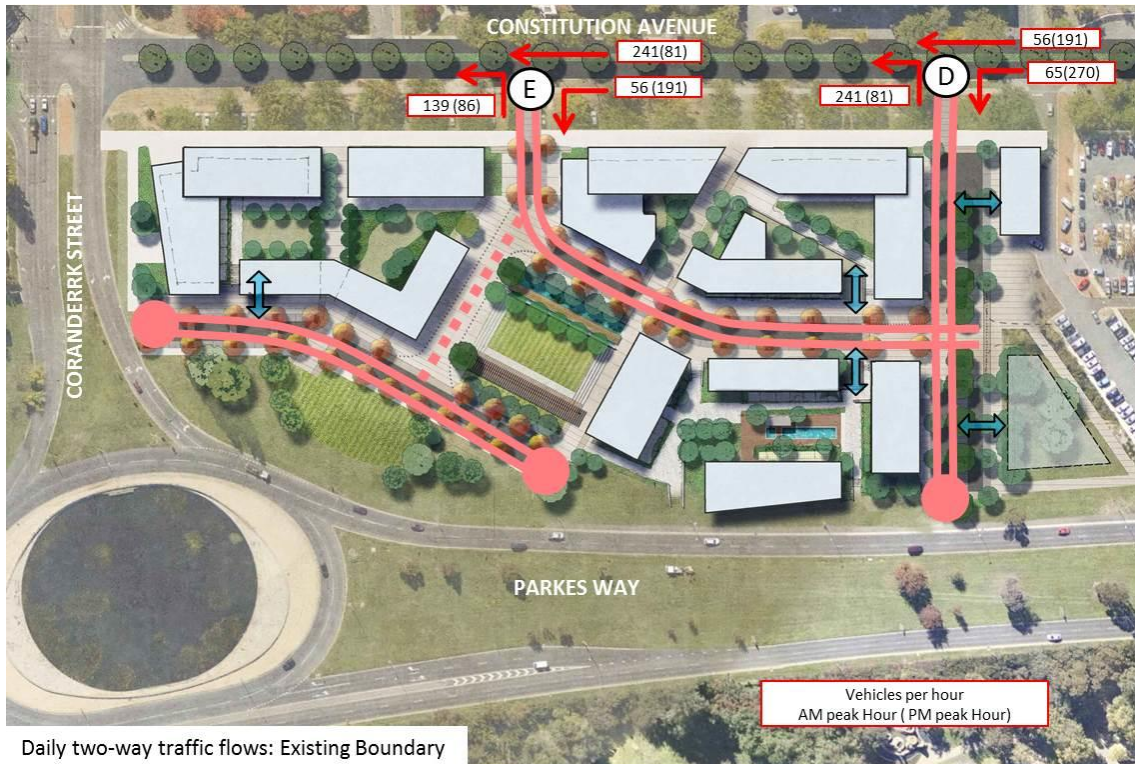
\* Refer Figure 8 for location of accesses

Note: LoS A indicates that average vehicle delays will be less than 10 seconds

LoS = Level of service; DoS = Degree of saturation (ranges from 0 to 1)



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**Figure 9: Peak hour traffic flows to/from PS3 for the existing boundary scenario****Table 3: Peak hour operation of site accesses**

Access*	AM Peak Hour		PM Peak Hour	
	DoS	LoS	DoS	LoS
<b>D</b>	0.317	A	0.587	A
<b>E</b>	0.379	A	0.576	A

\* Refer Figure 9 for location of accesses

Note: LoS A indicates that average vehicle delays will be less than 10 seconds

LoS = Level of service; DoS = Degree of saturation (ranges from 0 to 1)

The SIDRA analysis for both boundary scenarios indicates that each of the accesses will operate with minimal delays and significant spare capacity.

## 8.3 Parking

### 8.3.1 Existing Car Parking

The site currently has a long-stay surface car park. It has 700 spaces, but recent surveys indicate that only 550 spaces are utilised during peak weekday periods. Staff and students of the nearby CIT utilise about half of the available car parks.

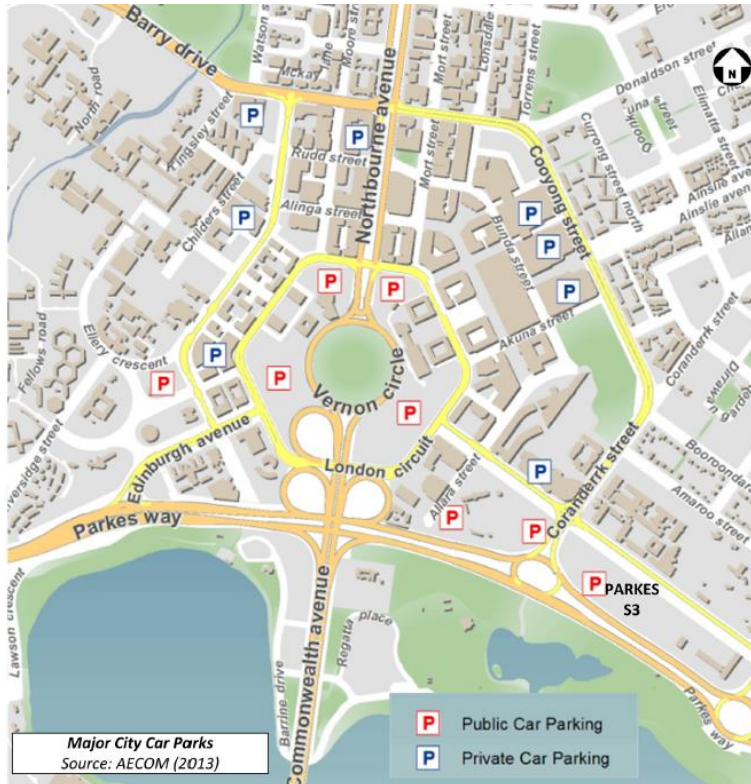
The location of major privately owned and public car parks in City is illustrated in Figure 10. There are plans to remove the public parking adjacent to the pool to facilitate future development and replacement parking would be provided to the west of this site subsequent to major works on Parkes

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Way and the removal of the Commonwealth Avenue loops. It will be important to retain some public parking in City East, to service public events at Commonwealth Park and nearby community facilities.

Further analysis of parking requirements is being undertaken in conjunction with the City to the Lake project and a city parking strategy is being prepared by EPD to determine the number and location of replacement parking.

**Figure 10: Major car parks**



### 8.3.2 Development code parking requirements

Amendment 74 of the National Capital Plan was first created to guide development of Campbell 5. It is also applicable to PS3. It sets out the requirements for car parking at the site, as shown in Table 4. Key observations in relation to Amendment 74 and car parking at PS3 are:

- The requirements for parking on the site will be determined from NCP Amendment 74, which has very low rates to address a current oversupply of parking in City and drive sustainable mode choice
- The parking rates are much less than current observed demand for trips to City but are intended to assist in containing private transport growth in City
- The majority of developers of retail and residential uses prefer to adopt higher rates to improve the marketability of their developments

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**Table 4: Car parking requirements based on Amendment 74**

Land Uses	Car Parking Rate
<b>Residential</b>	One space per dwelling and one visitor space per four dwellings or part thereof.
<b>Office</b>	One space per 100 square meters of gross area.
<b>Administrative use; Banks; Child Care Centre; Consulting Rooms; Co-operative Society; Health Centre; Personal Services Establishment</b>	Two spaces per 100 square metres of gross floor area.
<b>Bar, Café, Restaurant, Retail</b>	Two and a half spaces per 100 square metres of gross floor area.
<b>Hotel, Motel</b>	One space per employees plus one space per guest room or unit for establishments up to 36 units; or 25 spaces plus 0.3 spaces per guest room for establishments of more than 36 units.

The parking requirements based on the proposed land uses/yields.

**Table 5: Parking requirements for development**

Land Uses	Car Parking Rate (based on development brief)	No. of spaces required
<b>Residential</b>	One space per dwelling and one visitor space per four dwellings or part thereof.	
	460 dwellings	575
<b>Commercial</b>	One space per 100 square meters of gross area.	
	4,600 m <sup>2</sup>	46
Replacement car parks for existing site		TBC
Total no of spaces for existing boundary scenario		575+46 = 621 spaces

### 8.3.3 Parking Proposal

#### Basement car parking

The assumptions adopted in estimating the basement car spaces within the lot boundaries are:

- Each car space requires 40 m<sup>2</sup> of basement area.
- Basement footprint will follow the lot boundaries.

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Table 6 provides an estimate of basement parking spaces in each lot based on two levels of basement parking and it shows two level of basement parking is required to meet closer with the parking requirements specified in the Amendment 74.

**Table 6: Basement car parking spaces**

Lot	Area (m2)	Car spaces per one level of basement parking	Total car spaces based on two level of basement parking
1	5,993	150	300
2	6,839	171	342
6	680	17	34
7	1,558	39	78
<b>Total</b>		<b>377</b>	<b>754</b>

**On-street Parking**

The proposed on-street parking will yield 72 parking spaces (refer Table 7).

Disabled car parks are being provided in accordance with the requirements of the Accessible Parking Code AS 2890.6.

Two Loading Zone parking areas are located on Road B1.

**Table 7: On-street car parking spaces**

Road	On Street Car Parking
Road A (including 2 disabled )	29
Road B (including 2 disabled and 2 loading zones)	30
Road C	13
Road E (Shared Zone)	-
<b>Total</b>	<b>72</b>

Table 8 shows the parking requirements based on Amendment 74 and the parking proposal within PS3 site.

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**Table 8: Proposed parking within PS3**

<b>Parking requirements<sup>2</sup></b>	
<b>Residential</b>	575
<b>Commercial</b>	46
<b>Replacement</b>	TBC
<b>Subtotal</b>	<b>621</b>
<b>Parking proposal</b>	
<b>Two level of basement parking</b>	1,070
<b>On-street parking</b>	72
<b>Subtotal</b>	<b>1,142</b>

Assumptions adopted in the parking proposal are:

- On-street parking on Constitution Avenue is not included in the total of on-street parking for PS3 site.

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<sup>2</sup> Based on the Concept Master Plan Development Yield

## 9.0 Landscape

### 9.1 General

The development of the Public Realm within PS3 is centred upon key design elements. These elements include the integrated low speed street network, shared zones, central park open space, water sensitive urban design elements, street furniture and lighting. The careful consideration of these elements that interface with or are within the site, provide a coordinated and integrated design outcome. These elements provide 'place-making' opportunities and a framework for the Public Realm. Constitution Avenue has a significant influence on the PS3 project - it is intended to adopt the same or similar landscape treatments throughout the streetscape and open space.

### 9.2 Existing Trees

PS3 has previously functioned as an at-grade parking facility surfaced with decomposed granite. The layout consists of an orthogonal arrangement of rows of parking bays with shade trees set out within that geometry. Generally the trees are a mixture of deciduous Liquidambar and Plane trees of poor quality.

The trees within Parkes S3 have been subjected to a formal assessment. A tree assessment was carried out by BMS Forestry. The tree assessment found that the trees on this site are of only modest values as they have no cultural, social or scientific values; provide very limited habitat as none are native species and their contribution to the landscape is limited.

The assessment found that Refer to Section 6.3 for further discussions regarding the existing trees.

The Constitution Avenue Tree Management Plan (TMP) is viewed as a primary document and any works within PS3 will adopt the TMP.

- Document: Constitution Avenue Tree Management Plan
- Drawings (Constitution Avenue Upgrade – EARLY WORKS):
- Tree Management – General Notes + Legend, 3002325-DLS-1001
- Tree Management 1016, 3002325-DLS-1016
- Tree Management 1017, 3002325-DLS-1017
- Tree Management 1018, 3002325-DLS-1018
- Tree Management 1019, 3002325-DLS-1019

### 9.3 Landscape and Urban Design

#### 9.3.1 General Principles

The Central Park design accommodates the future levels of the lot developments that surround it, with an appreciation of the falls across the existing site from the north east to the south west.

The design provides a simple, highly legible, geometric layout that has the potential evolve in response to future development scenarios. The resulting landscape is amenable and flexible in its functional potential. The park has a sunken form and as such a secondary function as additional onsite water detention basin.



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### 9.3.2 The 'Central Park'

The Central park space provides a neighbourhood focus to the development. It is defined along its northern, eastern, western edges by simple wide concrete wall elements and the southern edge bordered with an architectural structure. On the northern alignment the landscape wall is incised in multiple locations along its length to provide links from the outside of the park to its lower interior. Along the southern alignment the architectural structure will accommodate seating and barbeque facilities and be shaded by a simple linear 'gazebo'. This simple 'blade' roof will provide weather protection and frame views in and out of the park. This shelter will also support amenity lighting and power.

The Park is contained along its east and west boundaries by simple concrete seat wall. These walls maintain a horizontal alignment as the ground falls about half a meter along its length to the southern end. Within these two walls the irrigated turfed surface is more or less flat such that the northern end of the Park appears to be sunken relative to the boundary walls. Access to the turf surface is stepped at the northern, eastern and western edges to provide informal seating allowing for choice of solar exposure during different climatic conditions.

All of the concrete walls that define the park will be of Class 2 off-form white concrete.

The northern and southern edges of the park are to be framed by groves of deciduous trees running parallel with adjacent street spaces.

Along its southern edge the landscape character will be further enhanced by a planted WSUD feature, accessible via a simple timber deck structure.

The simple structure of the park accommodates a range of uses which may be further determined and refined with input from the Reid community, future developers and residents.

### 9.3.3 Park Canopy

The park architectural structure, or canopy, forms part of the journey through and adjacent the park land. The shelter form is light and allows landscape and pedestrians to be connected. Portal frames cantilevered at the central axis point, provide a clear span through the centre and a sense of lightness. The portal frame is a closed section to reflect a more contemporary structure and a less industrial feel.

The largest element is the underside of canopy (soffit) accentuating the linear plane, being suspended under the portal frame. The outer leading edge of the structure is feathered to provide a lean visual appearance to roof structure. By day the shadow through this edge makes for a 'visual carpet'. Lighting to soffit provides strong night presence and strengthens linear movement through. The screen elements to the southern side of the structure provide a 'pause moment' to movement and facilitate the bench element.

There is a contemporary colour selection with metallic feature colours to the roof edge and a mirror finish to the underside of soffit | contrast to the monochromatic steel columns purposely recessive.

The underside of soffit is a mirror finish (polished reflective aluminium composite panel) and provides the 'Lyrical layer' or expression to the linear space. The mirror soffit explores the fascination of the reflection in the urban and landscape environment, the focus being the notion of the passer by observing themselves in the landscape as and exploration of place. There are elements of Narcissism and the rise of the 'selfie' and the contemporary social behaviour in obsession of self. Further the notion that the soffit takes on the value of the ground plane providing night and day experience and expresses the mood of the day. The large static soffit plane is animated by movement and activity through the space

There are two architectural light elements. Vertical up lights to the columns colour the vertical elements and express the connection to the ground plane. Viewed from afar they show the minimal connection of the canopy. The perimeter coffer lighting to the underside of soffit provide a runway experience, expressing the linearity of the structure.

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### 9.3.4 Furniture Elements

Sculptural elements for the central landscape space were investigated to provide an iconic focus for the space.

Off-the-shelf pre-cast furniture options were investigated including several Escofet products known for their interesting form, quality of finish and durability. Escofet elements have recently been used in Campbell Section 5. Information regarding the products is available from the website.

[http://www.escofet.com/pages/productos/ficha\\_productos.aspx?IdP=59](http://www.escofet.com/pages/productos/ficha_productos.aspx?IdP=59)

Options were assessed against several criteria

- **Iconic form** – attractive and unusual
- **Functionality** - stimulate imagination while also attractive and functional seating
- **Modularity** - ability to be replicated and/or morph into varied shapes and settings in response to program
- **Durability and maintenance** - strong, durable, easily cleaned, easily replaced
- **Unit Cost** - within budget including freight
- **Availability** - delivery within program

The following Escofet products were considered,

- **Lungo Mare**  
A free-standing sculpted seat with wave-like forms of the sea and beach. Its warped surface permits different ergonomic postures, while a stamped texture in the manner of a random deposit of sand. It is to be used at Campbell Section 5. Reinforced cast stone, grey / beige / black / white, soft acid-etched.
- **Xurret System**  
A modular street furniture composed of five elements moulded in concrete with an acid-etched finish. The five elements can be installed in free-form groups to configure urban or natural landscapes. Each item has a unique shape and an irregular geometry, the result of working on the material in a sculptural way to create a comfortable, open seat for users. Etching that resembles the skin of a living organism is a feature of its finished texture. Its weight allows it to be installed unanchored. Reinforced cast stone, a range of colours, soft acid-etched.
- **Milenio**  
A free-standing geometric modular bench whose position can be singular, or multiplied and reversible, and can also be used to form seat/planters. Reinforced cast stone, grey / beige / white, acid-etched and waterproofed.
- **Socrates**  
A free standing pre-cast, backless, polished pre-cast concrete bench seat in two modular sizes. Cast Stone, light grey, grey, beige, black, polished and waterproofed.
- **Bancalosa**  
A free standing pre-cast, wide backless, polished pre-cast concrete bench seat in one modular size. Cast Stone, light grey, grey, beige, black, polished and waterproofed
- **Otto**  
A free-standing geometric modular sculpted unit that can also be used to form octagonal planters, sand pits and the like. Reinforced cast stone, a range of colours, acid-etched and waterproofed.

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Two products were selected:

**Xurret System:** For use as informal seating, The units are modular and may be arranged in a variety of patterns and provide a visually exciting interface between the gazebo shelter and the open lawn area.



Escofet 'Xurret System' modular free-form seating

**Socartes:** For use as a simple bench seat in combination with the shelter picnic bench/table.



Escofet 'Socrates' backless bench seat

### 9.3.5 A network of spaces

The community is already provided with recreation facilities, with sports fields provided at the Reid Oval and Campbell Neighbourhood Oval. The extensive network of passive recreation facilities will be further enhanced by improved access to Commonwealth Park and the lake foreshores that are within easy reach.

The Central Park and shared street network will cater for local and informal use, with the flexibility to adapt to different programs. These include:

- An open grassed area for informal play and relaxation, which may also accommodate events
- Walking and cycling, including linkage to Commonwealth Park and the lake foreshores
- Intimate shaded spaces for picnics, games and retreat
- A more formal green, within a contained and more intimately scaled space - this space can be contemplative, or could be used as an adjunct to activities on Constitution Avenue during events.

The use of Central Park could be expected to evolve with the growth of the community and changing demands.

### 9.3.6 A Simple Palette

The Central Park is intended to evoke a minimal and urbane character as the central focus to the development. As such its success will depend upon the artful use of simple structural elements such as the masonry retaining walls, contrasted with the naturalistic and informal character of the planting elements. For example the fresh, deep green of lawns, or the soft, organic yellow-greys of native grasses, contrasted against the stark, planar forms of off-form concrete walls.

Proposed trees *Lagerstroemia Indica*, crepe myrtle, will frame the park along the northern and southern boundaries. On the southern side of the gazebo *Melaleuca*'s or Paper Bark trees will provide a backdrop and vertical planting to the architectural structure.

## 9.4 Streetscapes

Within the proposed residential developments lots 'Communal Greens' will provide private gardens for new residents.

The internal streetscapes and footpath systems will reflect the hierarchy of movement adopted in the planning of the adjacent streetscape of Constitution Avenue. These streetscapes are planned to respond to pedestrians as the primary user, followed by bicycles and the vehicles.

Entries into the site and junctions within the site movement system are characterised by raised and shared thresholds, to be paved with 'amenity' paving rather than the ubiquitous asphalt, in order to highlight their 'shared use' within a 'low-speed' environment. Landscape materials will be of simple, robust and durable forms, compatible with the systems adopted in the adjacent Constitution Avenue upgrade and with the proposed Central Park space.

## 9.5 Planting Palette

The planting palette below provides the range and type of plants that have been selected in the Final Design. Refer to Landscape Drawing 9042.

Trees have been considered as two main zones of planting. Structural planting to the western and southern boundary edges will reflect the current Parkes Way and Commonwealth Park landscapes of native trees such as *Eucalyptus Rossi*, scribbly gum outside of the detention basin. *Melaleuca ericifolia*, swamp paper bark are proposed on the batters of the detention basin.

Trees within the development site and along its streets will be of an appropriate scale that will mediate between the pedestrian scale and the associated street wall/building height. Solar access has been considered and addressed by selecting deciduous street trees in order to maximise summer shade

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and winter solar access. Medium size structural trees of Claret Ash (*Fraxinus* species) and Zelkova are proposed, with highlights of flowering ornamental trees such as the lagerstroemia used in the Central Park. A row of evergreen trees will be used on the southern edge of the central park to create a strong visual foil to the gazebo structure.

Planting in garden beds, along lot boundaries, and within the central park will be contemporary and ornamental in character. Low shrubs, understorey and ground cover plantings will be of uncomplicated, single species plantations. For example prostate flowering shrubs, native grasses, with textured and colour highlights. For example, beds of English Lavender provide all year texture and form with seasonal flowering highlights. Or, depending on the selected theme, low native shrubs that celebrate texture and colour such as dwarf Callistemon and Banksias of a scale applicable to the limited space of this pocket park.

All species will be selected for resilience and proven success in the local context.

This palette has been chosen to complement the scale and contemporary style of the development, providing a variety of colours, textures, heights for screening and layering and shade.

Landscaping within WSUD (Water Sensitive Urban Design) detention basins will adopt a planting palette specific for use within an area which is subject to partial of full inundation of water for short periods of time.

#### PLANT MIX A - ON GRADE GENERAL PLANTING

Code	Botanical Name	Common Name	Height (m)	Spread (m)	Container size	Plants/m2
<b>Shrubs</b>						
WES wyn	Westringia 'Wynyabbie Gem'	Wynyabbie Coastal Rosemary	1.3	1.5	200mm	3
<b>Ground Covers</b>						
GRE jun	Grevillea juniperina 'Molonglo'	Juniper-leaf grevillea	0.5	3	140mm	2
<b>Grasses</b>						
POA eri	Poa labillardierei cv. 'Erindale'	Erindale Tussock Grass	0.6	0.4	140mm	5
LOM tan	Lomandra tanika	Tanika Mat Rush	0.6	0.6	140mm	4
LOM lon	Lomandra longifolia	Spiny Mat Rush	1	1	140mm	
STY gla	Stypandra glauca	Nodding Blue Lilly	1	0.5	140mm	5

#### PLANT MIX A2 - ON GRADE AT EDGE

Code	Botanical Name	Common Name	Height (m)	Spread (m)	Container size	Plants/m2
<b>Shrubs</b>						
WES wyn	Westringia 'Wynyabbie Gem'	Wynyabbie Coastal Rosemary	1.3	1.5	200mm	3
<b>Ground Covers</b>						
CHR api	Chrysocephalum apiculatum	Yellow Buttons	0.1	0.4	100mm	5
GRE jun	Grevillea juniperina 'Molonglo'	Juniper-leaf grevillea	0.5	3	140mm	2
MYO par	Myoporum parvifolium	Creeping Boobiala	0.1	2	140mm	3
<b>Grasses</b>						
POA eri	Poa labillardierei cv. 'Erindale'	Erindale Tussock Grass	0.6	0.4	140mm	5
LOM tan	Lomandra tanika	Tanika Mat Rush	0.6	0.6	140mm	4
LOM lon	Lomandra longifolia	Spiny Mat Rush	1	1	140mm	
STY gla	Stypandra glauca	Nodding Blue Lilly	1	0.5	140mm	5

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**PLANT MIX TYPE B - WSUD TREE PITS**

Code	Botanical Name	Common Name	Height (m)	Spread (m)	Container size	Plants/m2
LOM tan	Lomandra tanika	Tanika Mat Rush	0.6	0.6	140mm	4
POA sie	Poa sieberiana 'Aranda'	Blue snow tussock	0.3	0.3	140mm	5
STY gla	Stypanandra glauca	Nodding Blue Lilly	1	0.5	140mm	5

**PLANT MIX TYPE C - DETENTION BASIN (HIGH)**

Code	Botanical Name	Common Name	Height (m)	Spread (m)	Container size	Plants/m2
<b>Shrubs</b>						
BAN spi	Banksia spinulosa	Hairpin Banksia	1.5	1.5	200mm	
<b>Grasses</b>						
CAR app	Carex appressa	Saw Sedge	1	0.8	140mm	5
FIC nod	Ficinia nodosa	Knobbly Club Rush	0.8	0.8	140mm	5
JUN usi	Juncus usitatus	Common Rush	1.1	0.8	140mm	5
LOM lon	Lomandra longifolia	Spiny Mat Rush	1	1	140mm	5

**PLANT MIX TYPE D - DETENTION BASIN (LOW)**

Code	Botanical Name	Common Name	Height (m)	Spread (m)	Container size	Plants/m2
<b>Shrubs</b>						
CAR app	Carex appressa	Saw Sedge	1	0.8	140mm	5
FIC nod	Ficinia nodosa	Knobbly Club Rush	0.8	0.8	140mm	5
JUN usi	Juncus usitatus	Common Rush	1.1	0.8	140mm	5
<b>MONOCULTURE PLANTING</b>						
POA sie	Poa sieberiana 'Aranda'	Blue snow tussock	0.3	0.3	140mm	5
COR aus	Cordyline australis	Cabbage Tree	4	2	45ltr	0.5
LAV ang	Lavandula angustifolia	English Lavender	0.8	0.6	200mm	3 to 4
LOM tan	Lomandra tanika	Tanika Mat Rush	0.6	0.6	140mm	5
PHO ten	Phormium tenax	New Zealand Flax	1.2	1.2	200mm	2

**Street Section 1 Road A**

The scale and alignment of development to the street will create a strong sense of address with proposed development providing overlooking and activation of the street and on well-designed on-street parking supporting the mixed use activities along Constitution Avenue. Zelkova Serrata are planted each side of the road and centrally to reflect the scale of Road A and provide shade to the large paved area.

**Street Section 2 Roads B and C**

The 'Neighbourhood Streets' provide the key structure and channels of movement for the community. They provide access to individual development lots, offer safe and attractive links for residents to their park and out into the wider city. The provision of on-street parking within their design offers amenities for visitors and ensures that activity on the street creates a safe street environment

Fraxinus Oxycarpa Raywood, Raywood Ash, is proposed to frame the neighbourhood streets and also reflect the scale of the road and provide shade to the large paved area.

**Street Section 3 – Shared Zone**

The shared zone on the western side of the park offers a slow speed, pedestrian priority environment as well as access to Lot 1 for residents and servicing.

The proposed detailing of these lanes will encourage them to be seen as pedestrian spaces, with flush kerbs and changes from traditional carriageway materials.



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In the future full development, when Road C is connected to Coranderrk St and Road D and Road A connected to Parkes Way the shared zone will become a pedestrian link only.

## 9.6 Paving

All materials selected will be consistent with the Canberra Central Design Manual, in particular paving will be consistent with Part B of the Manual - Paving (Design Principles).

Materials for paths and lighting will be of simple, robust, and durable forms, complementary with the paving systems of the adjacent Constitution Avenue and with the themes set up in the Central Park. The various pavement uses within the road corridor will be defined by different finishes, patterns and arrangements related to purpose.

Car park bays will be highlighted with permeable pavements using Eco Trihex pre-cast concrete interlocking pavers over a structural soil sub base.

Wherever possible all thresholds and junctions will be raised, shared pavements that incorporate decorative pavements in order to highlight the low speed environment of the development.

### P1 – Concrete Unit Pavers – Primary Paths of Travel

The general footpath areas will be concrete unit pavers highlighted where needed by stainless steel tactile indicators. Paving along the general footpaths will be laid stretcher bond pattern perpendicular to the direction of movement. Pavers will be fixed in place using laticrete on a concrete substrate. The pavers will be grey in colour with a shotblast finish. Fields of decorative unit paving will be defined by a header course frame of contrasting colour to the main field.

### P2 – Granite Unit Pavers – Junctions, Pedestrian Spine, Shared Zone adjacent to Park

The pedestrian spine, junctions and shared zone will contrast with the primary paths of travel and will be of light grey high quality natural stone, reconstituted stone, highlighted by stainless steel tactile indicators. Paving will be laid stack bond pattern perpendicular to the direction of movement. Pavers will be fixed in place using laticrete on a concrete substrate. The stone pavers will be honed to achieve the required slip resistance coefficient ratings.

### P3–Exposed Finish Concrete – Central Park

The paved concrete areas surrounding the park will be an exposed concrete finish. The 100% white-washed aggregate will provide a clean but textured finish against the off form concrete walls. This finish will also allow for effective sealing of the concrete adjacent to the BBQ's to prevent unwanted staining.

### P4–In-situ Broom Finished Concrete Pavement

A reinforced in-situ concrete pavement is proposed within the road corridor for trafficable pavement. This pavement will form a robust but also visual different finish to the main asphaltic trafficable road pavement. The saw cut pattern will also provide visual relief and texture to the 'plaza' spaces which provide a crossing point for pedestrians.

### P5– Concrete Unit Pavers – Primary Paths of Travel

The concrete unit pavers surrounding the 'plaza' spaces will be a concrete unit paver. While the 'plaza' space is to be prioritised to the pedestrian, the pavers will visually identify the 'safe' zone for pedestrians within the plaza space. The pavers are intentionally selected to closely match the adjacent concrete, to reduce creating a bitsy appearance.

### P6 – Permeable Tri-hex Pavements – Parking Bays

To maximise WSUD opportunities and to assist in water harvesting for street tree irrigation, permeable pavement is proposed for all on-street parking and service bays. Storm water will be captured in the car bays, filtered through the permeable pavements and the structural soil substrate. The structural soils will be contiguous with the adjacent tree pits to optimise stormwater transfer to the tree deep root zones.

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The permeable pavement will be of precast EcoTri-hex concrete unit paving, laid in an interlocking pattern. The precast paving units will be 80 mm thick to meet vehicular loading requirements. Units will be high density, honed-finish Charcoal in keeping with the other high quality pavements.

### **P7–In-situ Oxide Coloured Exfoliated Concrete Pavement**

A reinforced in-situ concrete pavement is proposed to link the paths from the Parkes Section 3 site to the Constitution Avenue path network. This pavement will match the shared path for Constitution Avenue.

## **9.7 Walls**

The walls will be of simple, robust, and durable forms, complementary with the walls of the adjacent Constitution Avenue and with the themes set up in the Central Park.

### **W1 - Wall Type 1, 2 and 3**

Class 2 RC concrete wall, smooth, planar finished with chamfered arises to all exposed edges. Shot blast face finish with honed horizontal surface finish.

## **9.8 Steps**

### **S1 – Pre-cast Concrete Steps**

Class 2 concrete steps integrated into adjacent concrete wall. Risers of 150 mm x tread 300 mm

### **Furniture and Hard Materials**

All hardscape and furniture materials will be robust and durable, suitable for everyday use. Furniture fixtures and fittings will be equal to that provided by HUB furniture manufacturers as selected for the Campbell S5 project.

Materials will be contemporary and simple, with clean lines and a quality finish, to complement nearby planting and the materials palette of Constitution Avenue. All furniture will be of shot blast stainless steel finish.

## **9.9 Landscaping within the dry detention pond**

The landscaping within the detention basin will use specific planting palette which is complimentary to the overall planting strategy. The planting will also be selected based on the functional requirement for use within an area which is subject to partial of full inundation of water for short periods of time.

## **9.10 Irrigation**

The irrigation design is based on the ACT Government Design Standards for Urban Infrastructure – 21 Irrigation and Specification number 9.04.

The irrigation connects to the 150mm diameter main. The meter pit has been designed in accordance with TaMS requirements for DN50 equipment.

The irrigation Control Valve is located in a lockable valve box with 100mm cover from the final surface level.

The irrigation controller housing is built into the bench structure under the park canopy. The Automatic Irrigation Control Unit shall be a Hunter ICORE modular controller.

Refer to Appendix L for the Irrigation Specification for the Installation, Testing and Commissioning requirements.

## 10.0 Road Design and Geometry

### 10.1 Design Speed

The posted speed limit on Constitution Avenue and Parkes Way are 60 km/h and 80 km/h respectively.

It is proposed that the speed limit within PS3 development be a maximum of 20 km/h and a design speed of 40 km/h is used for design purposes. Standard 3.5 m lane widths for two-way traffic lanes and 4 m lane width for one-way traffic lane with parking bays and raised thresholds with different surface treatment have been selected to create a low speed environment,

Street lights and tree planting are positioned near the kerb to provide visual narrowing of the road and making motorists more conscious of the low speed environment.

### 10.2 Proposed road horizontal alignments

New internal access roads will be created as part of the development within the site. The proposed streets and corner radii have been designed to Austroads and checked using vehicle swept path software Auto Track. The following turning template vehicles were selected from Austroads:

- Design vehicle: 8.8 m long Service Vehicle;
- Checking vehicle: 12.5 m long Single Unit Truck.

A low frequency of 12.5 m long single unit truck accessing the site is expected. Therefore it is acceptable for this category of vehicle to utilise the full carriageway for some manoeuvres and encroach into the opposite traffic lane, as allowed under note 7.1.2 of Austroads 2010 Design Vehicle and Turning Path Templates.

The general routes for the 12.5 m long single unit truck are:

- One direction of a 12.5 m long single unit truck is expected to enter Road A from Constitution Avenue, travelling along Road A and Road B and back onto Constitution Avenue via Road B
- Access to Road C will be gained from Road B and along the shared zone (Road E). Due to low volume of traffic on Road C as it does not have any connections to Coranderrk Street or Parkes Way and low frequency of the 12.5 m long single unit truck accessing the site, the truck could reverse along Road C and travel back onto the shared zone and back onto Road B and Constitution Avenue.

A turn-around for a 5.2 m long vehicle has been provided at the western end of Road C to allow smaller vehicles to turn around. A turn-around for a 12.5 m long truck has not being provided due to the following reasons:

- The eastern end of Road C does not have access to adjacent lots.
- The western end of the turn-around only access one driveway access to Lot 2.
- The size of the turn-around is substantially larger and will encroach both the road reserve and area in the adjacent lots.

Due to a longer reversing distance of approximately 65 m between the proposed driveway on Lot 2 to Road E, a 12 m long stub of Road D has been provided to cater for the 12.5 m long single unit truck to reverse into and continue travel forward on Road C and Road E.

Minimum corner radii of 4 m have been used throughout the PS3 development consistent with the kerb radii of the access road on Constitution Avenue. Where vehicle turning paths have dictated the minimum corner radii has been increased to 6m in response to TaMS comments on the PSP design.

### 10.3 Proposed road vertical alignments

The roads generally will have a cross-fall of 3%.

Longitudinal grades of between 0.5% and 4% are proposed throughout and where possible the desirable minimum grade of 1% has been adopted to ensure satisfactory drainage.

### 10.4 Verge Treatment

The verges within the development will be paved with a landscape strip adjacent to the block boundary. The proposed type of paving and trees planting are discussed in Section 9.0.

A crossfall of 2% will be applied to all verges.

### 10.5 On-street parking

Public on-street parking will be provided throughout the development. All the proposed on street parking spaces will be indented to the verge and is 2.6 m wide.

The length of the parallel parking bays is 6.6 m. This length is 300 mm longer than required by AS2890.1 to provide additional clearance to the tree pits as discussed and agreed with TaMS during the PSP design phase.

Parallel parking bays on the verge with 90° centre parking bays in the median along the Road A is proposed. A 5.4 m wide carriageway is proposed along this road to allow vehicles to turn into these parking bays.

The width of Road A (21.7 m) does not conform to AS 2890 5 (on-street parking) for the following reasons:

- The dimensions in AS 2890.5 are “should”, i.e. recommendations not mandatory requirements.
- A potential problem with adopting AS 2890.1 road widths of 6.4 m and 5.4 m central parking zone is that the 6.4 m basically allows for two lanes which has the potential for a car to overtake a vehicle which is turning into the central parking bay or reversing into the kerbside parking spaces creating a safety hazard. We want to create a slow speed safe environment and Road A is not a through road.
- The proposed cross section with 90 degree central parking bay widths has been used in Kingston Foreshore (Dawes Street, Eyre Street and Giles Street) and Campbell 5 previously.

The crossfall over the indented parking bay is to be 2% towards the OCI where specified.

Permeable paving is proposed in the parking bays area to contribute to the WSUD objectives.

### 10.6 Pedestrian and cycling facilities - Constitution Avenue

There is a 3 m wide cycle path and 4.5 m wide footpath on the southern verges of Constitution Avenue between London Circuit and Anzac Parade being constructed as part of CAU project.

### 10.7 Pedestrian and cycling facilities - PS3 internal streets

A temporary 2.5 m wide shared path is proposed as part of the Constitution Avenue project along the eastern side of Lot 6, to replace the existing path currently located approximately in the middle of Lot 6. In the long term this shared path will provide a connection between Constitution Avenue and Commonwealth Park via the existing underpass at Parkes Way.

The internal roads are designed to be low speed local roads and cyclists as one of the road users. Cycle parking within the PS3 development has been located centrally adjacent to the Park.

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## 10.8 Block driveway access, servicing and waste collection

It is proposed all the lots will have servicing and waste collection internally.

Heavy Duty Driveways with 7.2 m wide at kerb tapering to 6m wide, similar to Campbell 5 development, has been adopted.

There is a designated route for a 12.5 m long single unit truck within the development as discussed in the proposed horizontal road design alignment section above.

A summary of Road A to Road E are tabulated in Table 9.

**Table 9: A summary of Road A to Road E proposal**

Design Features	Measurement	
Road A (North of Road B)		
Traffic Volume (vpd)	1,650	Adopt 1,650 vpd for the assessment of design traffic assessment
ACT Road Classification	Minor Collector	
Design Speed (km/h)	40	
Posted Speed (km/h)	20	
Road Reserve Width (m)	30.8	
Carriageway Width (m)	21.7	Two-way
Verge Width	4.7 m on both verges	
Parking Provision	Indented parallel parking on the kerb side 90 <sup>0</sup> parking in the median	
Road A (South of Road B)		
Traffic Volume (vpd)	150	
ACT Road Classification	Access Street A	
Design Speed (km/h)	40	
Posted Speed (km/h)	20	
Road Reserve Width (m)	30.8	
Carriageway Width (m)	21.7	Two-way
Verge Width	4.7 m on both verges	

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Design Features	Measurement	
Parking Provision	Indented parallel parking on the kerb side 90° parking in the median	
<b>Road B (North of Road C)</b>		
Traffic Volume (vpd)	1,200	Adopt 1,200 vpd for the assessment of design traffic assessment
ACT Road Classification	Minor Collector	
Design Speed (km/h)	40	
Posted Speed (km/h)	20	
Road Reserve Width (m)	19.7	
Carriageway Width (m)	12.2	Two-way
Verge Width	4.2 m (western verge) 2.9 m (eastern verge)	
Parking Provision	Indented parallel parking on the kerb side	
<b>Road B (Between Road C and driveway accesses to Lot 1 and 4)</b>		
Traffic Volume (vpd)	150	Adopt 300 vpd for the assessment of design traffic assessment
ACT Road Classification	Access Street A	
Design Speed (km/h)	40	
Posted Speed (km/h)	20	
Road Reserve Width (m)	19.6	
Carriageway Width (m)	12.2	Two-way
Verge Width	4.7 m on both verges	
Parking Provision	Indented parallel parking on the kerb side	



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Design Features	Measurement	
Road B (Between Road A and driveway accesses to Lot 1 and 4)		
Traffic Volume (vpd)	1,500	Adopt 1,750 vpd for the assessment of design traffic assessment
ACT Road Classification	Minor Collector	
Design Speed (km/h)	40	
Posted Speed (km/h)	20	
Road Reserve Width (m)	19.6	
Carriageway Width (m)	12.2	Two-way
Verge Width	4.7 m on both verges	
Parking Provision	Indented parallel parking on the kerb side	
Road C		
Traffic Volume (vpd)	1,050	Adopt 1,750 vpd for the assessment of design traffic assessment
ACT Road Classification	Minor Collector	
Design Speed (km/h)	40	
Posted Speed (km/h)	20	
Road Reserve Width (m)	20	
Carriageway Width (m)	12.2	Two-way
Verge Width	3.9 m on both verges	
Parking Provision	Indented parallel parking on the kerb side	
Road E		
Traffic Volume (vpd)	1,050	
ACT Road Classification	Minor Collector	
Design Speed (km/h)	40	
Posted Speed (km/h)	20	

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Design Features	Measurement	
Road Reserve Width (m)	17	
Carriageway Width (m)	7	Two-way
Verge Width	5 m on both verges	
Parking Provision	-	

## 10.9 Intersections

### 10.9.1 Constitution Avenue/Road A and Road B

The two of existing accesses to PS3 site have been reconfigured and currently under construction as part of CAU project. The works included as part of CAU project includes new kerb and gutter, paving of the verge adjacent to PS3 site and a semi raised cycle crossing threshold treatment at the entry to Road A and Road B.

The two new accesses to PS3 site will have left in/left out arrangement.

### 10.9.2 Within PS3 site

The intersection layouts within PS3 are priority controlled T intersections.

## 11.0 Stormwater Management

As mentioned in the earlier sections, the PS3 design is progressing concurrently with the construction of CAU project and the feasibility study of the Parkes Way Re-engineering project. The PS3 drainage design has adopted the latest available information from the CAU project and Parkes Way Re-engineering projects.

The Parkes Way Re-engineering project has not progressed and therefore the stormwater drainage design for the development of the northern site area is based on the existing drainage regime.

### 11.1 Existing Conditions

PS3 site is currently a gravel carpark. Isolated concrete kerbs form the site into grid sections. Stormwater pits are located at the southwest corner of each section. Debris and sediment are accumulated within the stormwater pit inlet and in some instances block almost the whole pit inlet.

An earth bund is located on the southern boundary of the block and separates the site and Parkes Way.

#### 11.1.1 Overland Flow

The PS3 site generally falls from northeast to southwest. An existing overland flow path runs from Constitution Avenue through the PS3 site to the Coranderrk Pond. Overland flow concentrates at the southwest corner of the block where the existing earth bund separates PS3 and Parkes Way and forms a barrier to the overland flow. Overland flow is collected by three stormwater pits at the southwest corner of the block before discharging to the Coranderrk Pond. For flows greater than the 20 year ARI event, the water ponds behind the bund and has the potential to discharge around the bund onto Coranderrk Street.

#### 11.1.2 Pipe Drainage Network

The existing stormwater pipe network consists of two pipe systems, an eastern system and a western system. The eastern system connects to an existing 600 mm diameter pipe crossing Parkes Way and flows to Lake Burley Griffin. This pipe lines convey the stormwater from the northeast of the site to the Lake. The remainder of the site connects to the southwest pipe system which joins to the Coranderrk Pond.

Our design for the ultimate development assumes no constraints to stormwater discharge from the site into the future Parkes Way stormwater drainage network. The Parkes Way Re-engineering project will consider the stormwater management for the catchment with the removal of the Coranderrk Pond.

#### 11.1.3 Stormwater Modelling

A DRAINS hydraulic model has been developed for the existing piped stormwater network located within PS3 and the connection to the Coranderrk Pond.

The DRAINS model was used to determine the existing infrastructure capacities and assess the expected performance of the new system with connection downstream into the existing system.

DRAINS model parameters were determined using the TaMS Design Standards for Urban Infrastructure.

The DRAINS model was developed using detailed survey and observations from the site visit. It is noted that it was not possible to survey pipe invert levels at numerous manholes where manhole covers for structures could not be found. Invert levels were estimated at these structures by interpolating between known invert levels further upstream and downstream.

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DRAINS models were developed for the existing network to determine the network capacity based on the existing condition. A 70% blockage was adopted on the existing drainage modelling as the existing stormwater pit inlet is almost blocked.

The DRAINS models were simulated for the 20 year ARI and 100 year ARI design events.

At the Coranderrk Pond, water levels of 556.03 for the 20 and 100 year ARI were provided by CAU design consultant (SMEC).

The existing overland flows from Constitution Avenue through PS3 site were not available. The design of Constitution Avenue includes regrading to reduce the overland flow through PS3. The 100yr ARI overland flow of 1.5 m<sup>3</sup>/s into PS3 has been provided by the CAU design team as a design constraint. In order to compare the downstream impact on Parkes Way between the existing and the proposed condition, overland flows that are same to the proposed condition have been adopted in the model for the existing situation.

#### 11.1.4 Existing Site Stormwater Network Capacity

The existing stormwater network capacity is discussed below:

##### 20 year ARI

- Most of the existing stormwater pipes can convey the 20 year ARI event with additional capacity available.
- The existing stormwater pipe linking the site to the Coranderrk Pond does not have sufficient capacity to convey 20 year ARI event.
- Most of the stormwater pits modelled do not have sufficient capacity due to the 70% blockage. If the pits were maintained, sufficient capacity would be provided.
- Overland flows and bypass generated from each sub-catchment (each section of the grid carpark) flows from northeast to southwest.
- There is approximately 120 mm depth of water ponding at the southwest corner before discharging to the Coranderrk Pond
- No overland flow discharges to Parkes Way/Coranderrk Street from PS3

##### 100 year ARI

- Overland flows and bypass generated from each sub-catchment (each section of the grid carpark) flows from northeast to southwest
- There is approximate 260 mm depth of water ponding at the southwest corner before discharging to the Coranderrk Pond
- Overland flow is discharging to Coranderrk Street from PS3. The peak flow and average velocity is 1.8 m/s and 0.51 m/s respectively.

#### 11.2 Proposed Development

PS3 will be fully developed within the current boundary. The proposed drainage network is designed to suit the current and the future extended (realigned) boundary to minimise future reworks.

The existing stormwater pipe linking the site to the Coranderrk Pond does not have sufficient capacity to convey 20 year ARI event.

Upgrading the existing stormwater infrastructure crossing Parkes Way to the Coranderrk Pond is complex with regard to constructability and potential redundancy in the future Parkes Way Realignment project.

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Therefore, a detention basin is proposed at the connection to the existing network at the southwest corner of the block. The detention basin will resolve this issue by providing storage of stormwater runoff from the site during the 20 year ARI storm event prior to discharging to the Coranderrk Pond.

The detention basin will be removed for the future extended (realigned) boundary scenario when Parkes Way and Coranderrk Street are upgraded and the PS3 stormwater network can be connected to the future stormwater infrastructure along the proposed Parkes Way Service Road

### 11.2.1 Overland Flow Path

The existing overland flow path from Constitution Avenue through the site will be retained and the flow of  $1.5\text{m}^3/\text{s}$  has been provided as an input for the PS3 design. The internal overland flow path was modelled as a 6 m wide flat base drain with 1:4 batters on both sides which will run through the centre of Lot 1, Road C/Road D intersection to the proposed detention basin via Road D. The flow path is contained within a proposed 10 m wide easement. The 100 year ARI storm will discharge out of the basin from the southern bank via Parkes Way then enter Coranderrk Pond.

The 100 yr overland flow is 160 mm deep over the 6 m wide base. A 300 mm freeboard has been provided to the adjacent block level. Assuming a paved surface with a grade of 0.6% the velocity is 1.8 m/s.

Two double R-sumps have been provided at the block boundary to capture  $0.55\text{m}^3/\text{s}$  overland flow and reduce the depth of water crossing the verge and Road C.

An easement 10 m wide must be provided through Lot1 to cater for the overland flow from Constitution Avenue. The design guidelines will include the requirement for a 10 m wide easement with a cross section to safely carry the 1:100 yr flow through the Lot.

### 11.2.2 Detention Basins

Two detention basins are provided for the development within the current boundary. One is the central sunken park (central basin) which has a surcharge structure connected to the eastern pipe line. It will be used as a detention basin during larger storms. Another basin (western basin) is located at the southwest corner of the block and connects to the existing stormwater pipes at the Coranderrk Pond.

The level at the base of the central basin is 558.10. The level on the spill way of the central basin is approximately 558.70. Maximum storage of the central basin is approximately  $260\text{m}^3$

The level at the base of the western basin is 556.45 at the existing pipe outlet. The level on the spill way of the western basin is approximately 557.90. Maximum storage of the western basin is approximately  $640\text{m}^3$

The pipes discharge via headwalls into the western basin.

The western basin will be fenced to preclude access by other than maintenance authorities.

### 11.2.3 Proposed Development Pipe Drainage Network

The stormwater pipe network consists of two piped systems, the western pipe line and the eastern pipe line. The western pipe line conveys stormwater runoff from Road C and the eastern pipe line conveys stormwater runoff from Road A and Road B. Both of the pipe lines terminate at the proposed western basin. The eastern pipe line runs through the surcharge structure at the central basin with a 525 mm diameter pipe and a 450 mm diameter pipe and then connects to the western basin via a 525 mm diameter pipe. The western pipe line connects to western basin with a 600 mm diameter pipe.

The existing two pipe lines linked to the site to the Coranderrk Pond will be retained under the Parkes Way ramp. Modification will be required to connect the pipe lines to the western basin as outlet structures.

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Some information is being sought on the existing gas main adjacent to the western pond to determine whether the existing discharge pipe connecting PS3 to the Coranderrk Pond can be lowered to improve upstream hydraulic conditions.

Stormwater pits are located at low points in the on-street car parking adjacent to the tree pit. See figure below:



This configuration allows the OCI to direct flows into the tree pit. Once the tree pit has 30 mm depth of water, it starts to flow into the side inlet pit. The low flows in the OCI are directed into the tree pit. Higher flows are directed into the side inlet pit and grate.

#### 11.2.4 Proposed Development Stormwater Modelling

A DRAINS hydraulic model has been developed for the development within the current boundary.

DRAINS model parameters were determined using the TaMS Design Standards for Urban Infrastructure. A 50% blockage for sag pit and 20% blockage for grade pit were adopted.

The DRAINS models were simulated for the 20 year ARI and 100 year ARI design events.

The tail water level of 556.03 at Coranderrk Pond for 20 and 100 year ARI was provided by SMEC.

The overland flow from Constitution Avenue to PS3 is 1.5m<sup>3</sup>/s and is adopted in the model for 100 year event which was provided by SMEC. No overland flow runs into PS3 from Constitution Avenue in 20 year ARI storm.



### 11.2.5 Proposed Development Stormwater Network Capacity

The existing stormwater network capacity is discussed below:

#### 20 year ARI event

- Most stormwater pipes modelled can convey the 20 year ARI event but no additional capacity available.
- Most stormwater pits modelled have sufficient capacity.
- No overland flow appears during 20 year ARI storm event.
- Approximate 110 m<sup>3</sup> stormwater will surcharge from the pipe system in the central basin.
- Approximate 340 m<sup>3</sup> stormwater will be stored in the western basin. The ponding in the western basin will be approximately 980 mm in depth and the level on the top of the ponding will be approximately 557.43.

#### 100 year ARI event

- All stormwater pipes modelled have no additional capacity available.
- 1.5 m<sup>3</sup>/s overland flows from Constitution Avenue will be 160 mm deep in the proposed 6 m wide overland flow path with a 1.83 m/s velocity.
- The western basin will reduce stormwater discharge to 1.85 m<sup>3</sup>/s flow and a 0.62 m/s velocity

### 11.3 Water Sensitive Urban Design (WSUD)

Development on the site will need to achieve compliance with the relevant requirements of the ACT WSUD General Code for Water Sensitive Urban Design (WSUD) including:

- Reduction of potable water consumption by 40% compared to 2003 levels
- Attenuation of peak flows from the site for storm events including the 5 year ARI and 100 year ARI events
- On-site detention of the 3 months ARI corresponding to the 1.4 kL/100 m<sup>2</sup> of impervious catchment
- Achieving the Developer Targets for pollutant load removals from stormwater of Total Suspended Solids 60%, Total Phosphorus 45% and Total Nitrogen 40%.

#### 11.3.1 Reduction of potable water consumption by 40%

The reduction in potable water consumption will be made through measures to be applied on lots. Each lot will be required to use measures such as water efficient fittings and devices, rainwater tanks and low-water-use landscapes. The specific combination of water-saving measures is dependent on site and building design. This is typically demonstrated through the use of the ACT Government water reduction spreadsheet, and conditions specifying water consumption reduction targets can form conditions for building approval.

#### 11.3.2 Peak Flow Attenuation

The attenuation of peak flows is a strategy designed to mitigate the increase in peak flows that results from the creation of new impervious surfaces in the development. Typically, any increase in impervious area results in an increase in runoff volume and rate from any developed catchment. If the development is located in the middle to upper reaches of a catchment, any increase in volume and rate of runoff can cause flooding in the downstream reaches. However, if the development is in the lower reaches of the catchment, the peak flow from the lower catchment is typically discharged prior to the arrival of the peak flows from the middle and upper catchments. In these situations in the lower reaches of the catchment, providing attenuation for peak flows is counter-productive. The attenuation

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provided for the lower reaches holds back the peak flow making it more likely to coincide with peak flows from other parts of the catchment, making the flood prone areas more prone to flooding.

PS3 site is located at the bottom of its catchment, adjacent to and discharging to Lake Burley-Griffin. Providing peak flow attenuation in this location would worsen the occurrence of flooding in flood prone areas, or would require drainage infrastructure to be unnecessarily large. In order to minimise the impact of the extra volume and rate of peak flows from the project, it is recommended that no attenuation be provided for peak flows at this location.

In the interim period, detention will be provide to mitigate additional flooding at Parkes Way until the future upgrade and improved pipe network can be provided.

### 11.3.3 Peak Flow Attenuation for Small Storm Events

The increase in volume and rate of runoff from urbanising catchments can cause scour in streams. The WSUD requirement for the attenuation of peak flows to pre-development levels for small rainfall events up to the 3 month Annual Recurrence Interval is a measure designed to protect streams from scour. This target requires the provision of 1.4 kL of temporary storage for runoff per 100m<sup>2</sup> of area developed.

The application of this flow target to PS3 site would provide no benefit to the receiving environment because it discharges directly to Lake Burley Griffin, which is not susceptible to scour damage. For this reason, it is recommended that this target not be applied to this development.

### 11.3.4 Achieving the Developer Targets for pollutant load removals

Stormwater runoff from the site will need to be treated to the water quality targets specified in the ACT WSUD General Code. The ACT WSUD General Code developer targets require the removal of 60% of total suspended solids (TSS), 45% of total phosphorus (TP) and 40% of total nitrogen (TN) pollutant loads for the site. The responsibility for achieving the pollutant removal targets for runoff from PS3 will be split as follows:

- Runoff from individual lots must be treated on each lot. The strategy for treating runoff from individual lots will be determined as each lot is developed.
- Runoff from the public domain will be treated within the streetscapes and the Central Park. Road runoff will be treated in street tree pits that function as bioretention systems or raingardens.

The options for stormwater treatment for runoff from the public domain was highly constrained; the highly urbanised nature of the catchment left insufficient space for swales, the road layout and associated drainage requirements made constructed wetlands impracticable. There was also no opportunity for a large “end-of-pipe” solution. However, the use of bioretention systems that also function as street tree pits accommodates both the stormwater treatment and landscape requirements for the streets. Examples of street tree or streetscape bioretention systems are shown in Figure 11. The relative advantages of this stormwater treatment device for this site include:

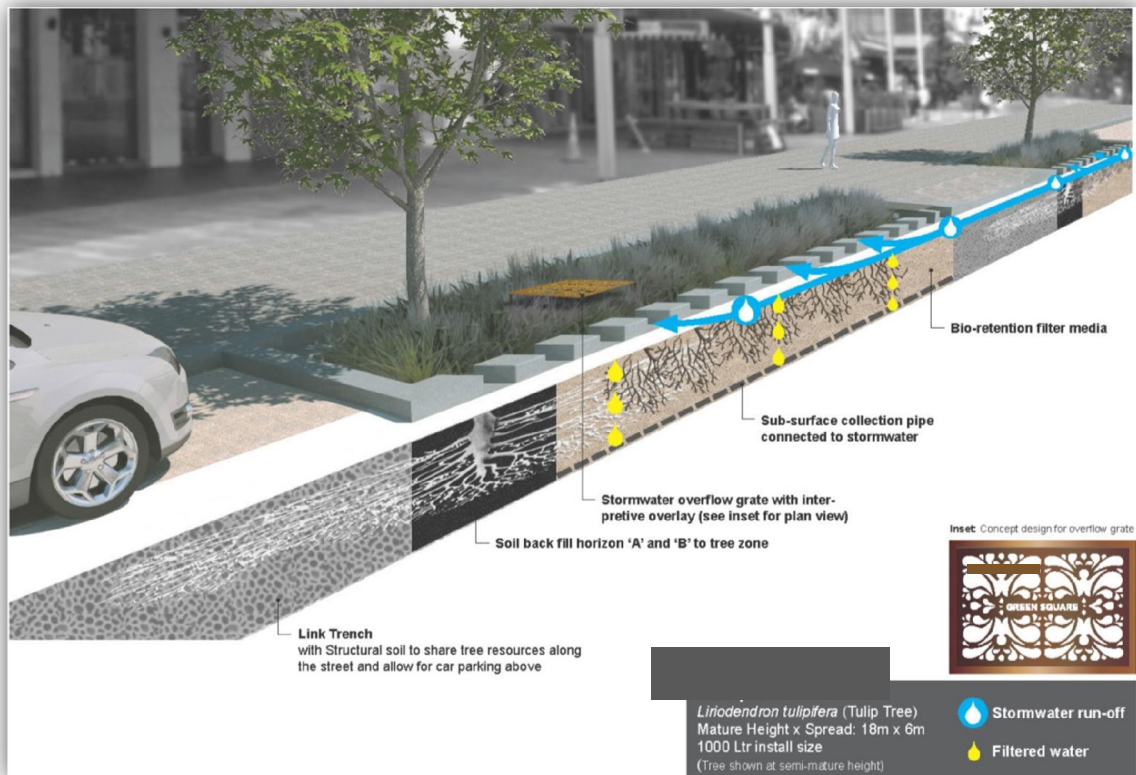
- High hydraulic loading – capacity to treat relatively large catchments for a small footprint of treatment area
- High amenity value when integrated in street design early
- Very flexible in design
- Contribution to buffering urban heat island (cooling effect).

An example of the type of street tree bioretention system that can be used is illustrated in Figure 12.

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**Figure 11 Bioretention Tree pit at Crace, ACT (left) and Bioretention containing Street trees in Central Dandenong (Lonsdale Street) (right)**



**Figure 12 Typical street tree bioretention system that can be used in PS3 site****11.3.5 MUSIC Modelling to demonstrate compliance**

A MUSIC model (version 6) was developed to demonstrate compliance with water quality treatment targets for the public domain areas. The model was built using the guidelines for MUSIC modelling outlined in the ACT Waterways Code for the meteorological template and pollutant generation.

The bioretention systems have been sized using MUSIC to meet the water quality targets specified in the ACT WSUD General Code. Each of the proposed bioretention systems is required to be about 1.0 % of its catchment size. In each case, the size of the bioretention system was driven by TN removal, since once the TN target was met; the treatment requirements for TSS and TP were always exceeded.

Bioretention Systems were modelled as integrated into the streetscape landscaping as raingardens.

Treatment Area Requirement: A 1% area allocation includes:

- Filter media footprint of 0.8%, and
- Sediment forebay and batters or edge treatments of 0.2%.

Typical design parameters:

- Extended detention depth = 0.1 m,
- Depth to subsurface drainage pipe = 1.1 m below filter media surface (1.2 m below surrounding surface level),
- No Saturated zone
- Lined filter media
- TN and orthophosphate content of the filter media was lowered from the default values to give a more realistic representation of filter performance, whilst still using conservative values that are higher than the locally available filter media.

The overall pollutant reductions calculated by the MUSIC model were **76 % for TSS, 56 % for TP and 43 % for TN**. These pollutant reduction rates are sufficient to meet the water quality targets specified in the ACT WSUD General Code (TSS, TP and TN reduction targets are **60%, 45%, 40%** respectively) (results summarised in Table 10). This is the overall result for the site and includes providing extra treatment for most catchments to compensate for areas such as intersections that must be drained without receiving any treatment.

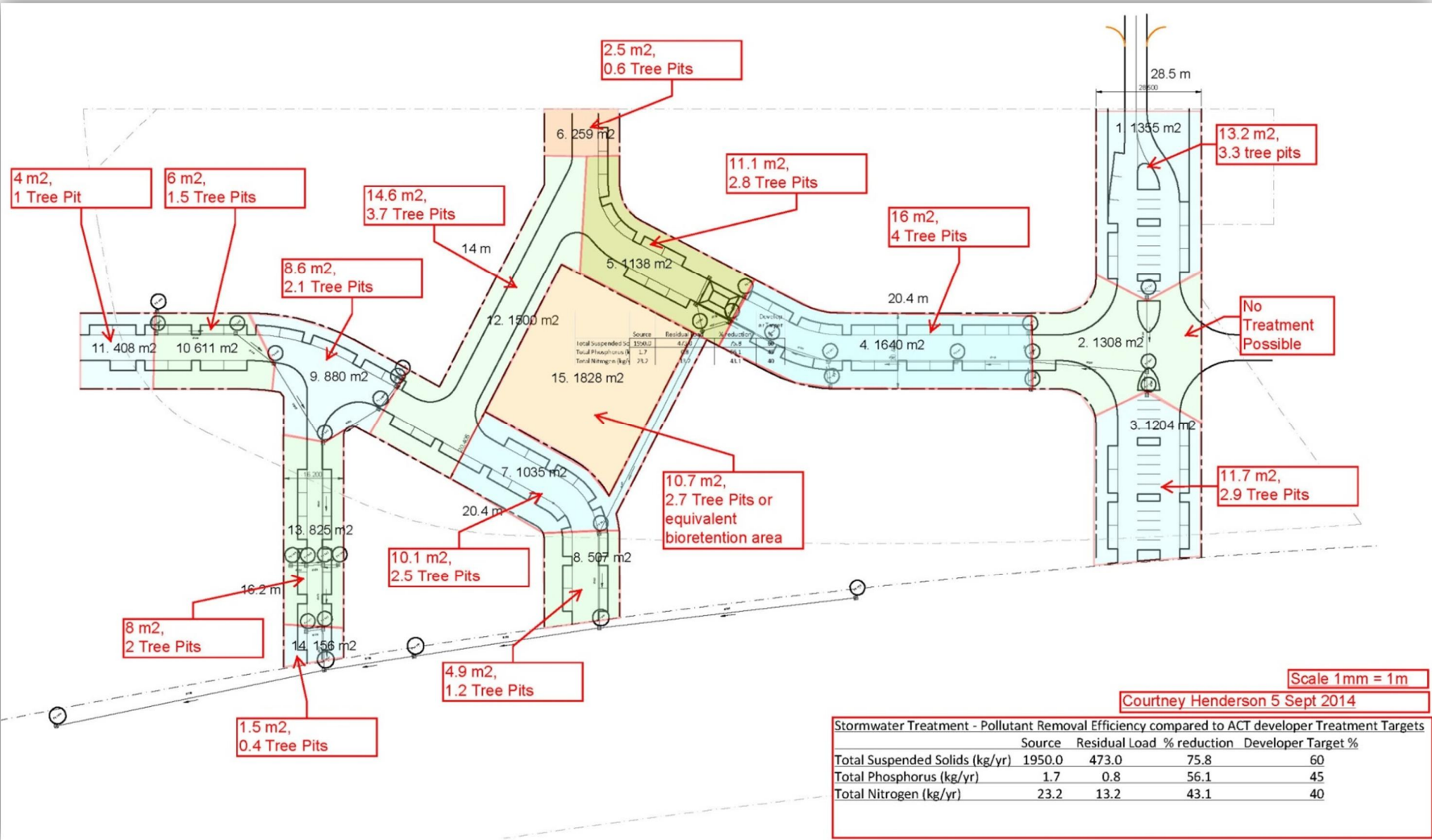
**Table 10 Results of MUSIC modelling for public domain stormwater quality treatment**

Pollutant	Source (kg/year)	Residual (kg/year)	Pollutant Removal (%)	Pollutant Removal Required (%)	Target exceeded?
<b>TSS</b>	1950.0	473.0	75.8	60	Yes
<b>TP</b>	1.7	0.8	56.1	45	Yes
<b>TN</b>	23.2	13.2	43.1	40	Yes

The requirements to the inclusion of bioretention systems into the streetscape landscaping are illustrated in Figure 13. These requirements have been considered in the design of the landscape masterplan included in the PSP drawings.

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**Figure 13 Stormwater Treatment Strategy for PS3. Streetscape runoff to be treated in Bioretention Systems designed as tree pits, or bioretention without trees if desired. 1 Tree Pit = 4m2. Lot runoff to be treated on-lot by the lot owner.**





### 11.3.6 Construction Phase Environmental Management Plan

Protection of the existing urban stormwater assets during the construction phase will be achieved by controlling runoff from the site to limit the potential for site erosion. Sediment control and retention measures will be installed prior to the commencement of construction (or stripping of vegetation and topsoil) as shown conceptually in the EMP. These provide for:

- Closure of all existing car parks
- Protection of existing flow paths to allow upstream events to bypass the site without erosion occurring.
- Control of site runoff to prevent discharge of sediment into the main drainage system.
- Strict site access control with established construction entrances with stabilised gravel thresholds that vehicles must use.
- Installation of sediment traps (filter rolls, bunding and silt fences) at points of discharge from the site.
- Installation of combined site and silt fences surrounding the site.
- Stockpiling of materials during earthworks to be stored outside hazard areas such as drainage lines.
- Controlling heavy vehicle access to well defined access routes and haul roads.
- Installation of a sediment control pond.

### 11.3.7 Maintenance

With maintenance in mind, we make some observations and recommendations regarding the maintenance of bioretention systems or raingardens, for Parkes Section 3. The following issues are common with bioretention systems:

1. Clogging
2. Weeds
3. Trees
4. Maintenance requirements not documented or understood
5. Designs require rectification to achieve desired performance (for water quality, stability or amenity)

**Clogging** – frequently occurs as a result of poor sediment control from construction sites. This can be addressed in the following ways:

- Construction staging. The early stages of development where active worksites leave large areas of soil exposed are the periods when most sediment is liberated. Bioretention systems are to be constructed as temporary sediment basins until at least 80% of the catchment has been built out.
- Sediment forebay – Removal of accumulated sediment is commonly the most important maintenance task for bioretention systems. Sediment looks unsightly, can interrupt flow distribution, resulting in plant death, and is often a site for weed establishment. Sediment forebays should be designed to be easy to clean out. This requires a flat surface and free draining to prevent pooling water. A concrete grass paver surface on a gravel base with a perforated edge restraint would be a suitable solution for most small scale bioretention systems as shown in the Figure 14 below. Formal sediment forebays such as these could be cleaned out in only a few minutes by 2 operators with flat-tipped shovels. If this was done regularly, other requirements for maintenance would be substantially reduced.



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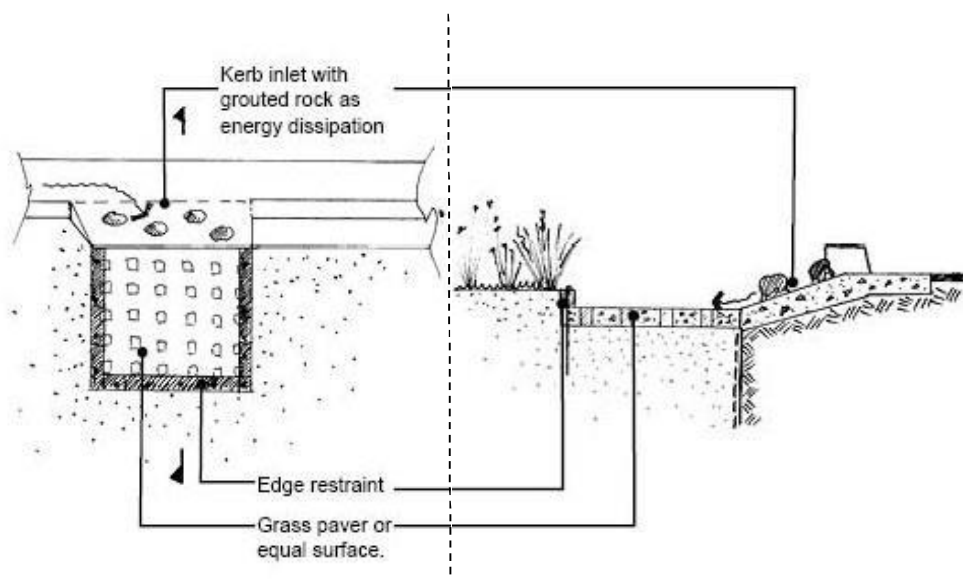


Figure 14 Example of sediment forebay in streetscape system (left image is in plan view, right image is in cross-section). Note the use of grass pavers to allow the accumulated sediment to be easily removed with a shovel. (AECOM)

**Weeds - Plant palette and density** – Bioretention systems should be designed to have complete canopy cover. 100 % cover stabilises the soil, dissipates flow energy and most importantly suppresses weeds. Many systems are planted with only one or two species that may be cultivars bred for their use and appearance in formal landscape plantings. Consequently, these plants may be unsuccessful in the harsher and highly variable conditions of bioretention systems. Secondly, plant density is often compromised during the 'value engineering' phase of a project resulting in plantings of 6 plants/m<sup>2</sup> or less. Low plant densities combined with low species diversity results in plant failure and gaps in the canopy cover, and consequent poor water treatment, poor amenity and poor weed resistance. An example of a bioretention system with good canopy cover as a result of diverse and dense plantings is shown below. A bioretention system with 100% canopy cover would normally require less maintenance than mowing.

**Trees** – Trees can be an important part of the success and amenity of a bioretention system. If a sediment forebay is provided and the media thus protected from clogging, the lifespan of the filter media may be similar to the lifespan of the tree (25+ years). Trees enhance the growth of groundcovers and grasses by providing a microclimate that is cooler, shadier and less subject to drying winds. We have found that bioretention systems that have some form of shade or perimeter planting have much better plant growth than those without. An example of NSW's oldest bioretention system is Victoria Park, Sydney ~2001. The trees provide excellent amenity to the streetscape.

**Maintenance requirements not documented or understood** – This is a common issue and few bioretention systems in Australia have been maintained well. Maintenance crews charged with the responsibility often have limited knowledge of the range of functions that bioretention systems provide. Therefore specific training may be required or specific contractors hired for the role.

Provided the aforementioned design aspects (clogging protection and weeds) have been addressed, periodic maintenance should only require:

- Sediment cleanout
- Spot weeding – spraying is possible if herbicides such as Roundup Biactive, Weedmaster Duo, Weedmaster 360 are used. These are designed for use near aquatic areas. Other glyphosate-based products contain surfactants that can be harmful to aquatic organisms.
- Litter removal.
- Occasional plant replacement

If maintenance was done regularly i.e. 3 monthly, an appropriately equipped crew of 2 people would be able to undertake periodic maintenance of a streetscape bioretention system in less than 10 minutes.

## 12.0 Site Servicing

### 12.1 General

Mott MacDonald prepared an initial Infrastructure Study, Traffic and Services Assessment Report for PS3 site in July 2013. The report included assessments of site servicing requirements for two development options which are referred in this report as existing and extended (realigned) boundary scenarios.

A Dial Before You Dig (DBYD) request was undertaken at the commencement of the project in January 2014.

The general approach adopted in assessing site servicing requirements for the development of the site is:

- Requirements for the ultimate (extended boundary) development were determined initially.
- Requirements for the proposed northern site development and existing boundary scenario were subsequently assessed ensuring minimal alterations to the extended (realigned) boundary scenario.
- There were discussions with the utility providers to clarify and confirm the site servicing requirements of the site. A copy of these discussions is included in Appendix D.

### 12.2 Sewer

#### 12.2.1 Impacts to existing utilities

The existing sewer infrastructure located the vicinity of the site is as follows:

- A 525 mm diameter trunk sewer within the southern verge of Constitution Avenue (relocated from the PS3 site as part of the CAU works)
- A number of 150 mm diameter sewers crossings under Constitution Avenue from Canberra Institute Technology (CIT) and drain to the 525 mm diameter trunk sewer
- A 150 mm diameter sewer line and 80 mm diameter rising main within Block 7 in close proximity to eastern boundary of the site

In order to minimise impacts to the recently constructed verge of Constitution Avenue, provision of three (3) ties of 225 mm diameter pipe on the 525 mm diameter trunk sewer along Constitution Avenue are included in the CAU project to service future development within PS3 site.

#### 12.2.2 Proposed Development

The site servicing to Lot 1, 2, 3, 6 and 7 are serviced from the sewer ties located in the vicinity of Road A and Road B intersection with Constitution Avenue.

A 225 mm diameter sewer line is proposed to be installed along the verge of Road C and end capped at both ends until the connection of Road C to Coranderrk Street and service road on Parkes Way is constructed in the future extended (realigned) boundary scenario to avoid future excavation of Road C verge.

### 12.3 Water

#### 12.3.1 Impacts to existing utilities

The existing water infrastructure located the vicinity of the project area is as follows:

- 300 mm diameter and 450 mm diameter mains run along the northern and southern verge of Constitution Avenue respectively
- A 375 mm diameter main runs within the site adjacent to the eastern boundary from the southern verge of Constitution Avenue to northern verge of Parkes Way. This main is proposed to be capped as part of the CAU works.

- A 300 mm diameter main runs along the northern verge of Parkes Way

The impacts to the existing mains were discussed with Icon Water and the outcomes of the discussion were:

- The existing 375 mm diameter main within the site is being relocated into the southern verge of Constitution Avenue as part of CAU works as a 450 mm diameter main.
- Provision for 150 mm diameter ties into PS3 site on the new 450 mm diameter main are proposed and will be located in the vicinity of both Road A and Road B intersections with Constitution Avenue as part of CAU works.
- The 375 mm diameter main required to be installed along the eastern verge of Coranderrk Street as part of CAU project will be relocated in the extended (realigned) boundary scenario.

Icon Water design submission documentation for the relocated water main as part of CAU works is included in Appendix E.

The 375 mm diameter main along the western boundary and the 300 mm diameter main along the southern boundary of PS3 will be located within the future extended (realigned) boundary scenario. These mains are anticipated to be relocated as part of Parkes Way Re-engineering project.

### 12.3.2 Proposed Development

The site servicing to the lots within the existing boundary scenario can be gained from the proposed 150 mm water main proposed along Road A and Road B.

Icon Water indicated that no public main is to be located within private block. No water main is proposed along the shared zone (Road E).

Installation of a 150 mm diameter main along the verge of Road C is proposed due to the following:

- Firefighting requirements for southern boundary of Lot 2
- To avoid future excavation of Road C verge.

Outcome of discussions with Icon Water regarding temporary connections on Road A and Road C is as follow:

- The southern end of the proposed 150 mm diameter main on Road A will be connected to the existing 300 mm diameter main located within the northern verge of Parkes Way.
- The western end of the proposed 150 mm diameter main on Road C is to be connected to the 375 mm diameter main within the eastern verge of Coranderrk Street (part of CAU works).
- The eastern end of the proposed 150 mm diameter main on Road C can be temporarily end capped i.e. no connection to the existing 300 mm diameter on Parkes Way until Road C is connected to Parkes Way service road.

## 12.4 Gas

### 12.4.1 Impacts to existing utilities

There is an existing 350 mm diameter High Pressure (HP) steel gas main within the northern verge of Parkes Way in the vicinity of north-east corner of Coranderrk Street/Parkes Way roundabout. This main crosses Parkes Way and continues south-east within the Parkes Way median.

This main will require relocation to accommodate the extended (realigned) boundary scenario for PS3 and, similarly to the existing water main, it is anticipated this gas main will be relocated as part of Parkes Way Re-engineering project.

There is a provision for an 850 mm wide utility corridor within the southern verge of Constitution Avenue for future realignment of the gas main.

### 12.4.2 Proposed Development

Site servicing requirements for the site were discussed with ZNX and the outcomes of the discussion were:

- The development can be supplied from the existing 350 mm diameter HP main located within the Parkes Way median.
- A 110 mm diameter PE gas main to be installed along Road A and connected to the existing 350 mm diameter HP main on Parkes Way.
- A 63 mm diameter PE gas main to be connected off the 110 mm diameter PE main on Road A, and located along all other internal roads.
- A gas main is not required within Constitution Avenue southern verge due to provision of main along the proposed eastern road.
- Shared trenches within internal roads to adopt horizontal separation between electrical and telecom/gas assets – ultimate trench width determined by utility requirements.

ZNX advised its preference for providing shared trench along all road verges to provide flexibility for servicing connections at any location within the site. A shared trench on one side of the road verge and one tie to service one lot are not considered sufficient due to the possibility of digging up of concrete and pavers if more than one tie is required to one lot. Thus the provision of shared trench along all verges has been adopted in the documentation.

Discussions on the type of shared trenches proposed within the development are discussed in Section 12.13.

To limit potential alteration to the shared trench arrangement and to accommodate the extended (realigned) boundary scenario the following shared trench alignment is proposed:

- Road crossings prior to the turnaround area at both ends of Road C are proposed.
- Stubs are proposed on Road D for future extension.

## 12.5 Electricity

### 12.5.1 Impacts to existing utilities

The existing electricity infrastructure located within the vicinity of the project area is as follows:

- HV underground conduits within the southern verge of Constitution Avenue.
- A service pillar, located adjacent to the eastern boundary within Block 6, has LV cabling passing through the site to service the pedestrian crossing control box on Constitution Avenue, parking machines, and the traffic signal controller at the carpark entrance within Block 6. This pillar also supplies low voltage supply to Block 6.
- LV supply to streetlight poles.

The existing service pillar and the associated LV cables will require relocation. It is anticipated the relocated low voltage cables can utilise one of the conduits proposed in the shared trench along Road A.

### 12.5.2 Proposed Development

ActewAGL has indicated that estimated demand for the future development is approximately 2 MVA which can be supplied from the existing 11 kV HV feeder (Jamieson House) located to the north of Constitution Avenue.

ActewAGL advised a provision for 6 x 150 mm diameter conduits to be included within the shared trench for the site. The HV cable is proposed to be circulated through the site, entering via Road A and exiting Road B1, before utilising existing conduits within the southern verge of Constitution Avenue. Discussions on the type of shared trenches proposed within the development are discussed in Section 12.13.

ActewAGL is the nominated sub-consultant for electrical design in the project thus confirmation on the electrical supply to each block cannot be determined until substation locations are confirmed.

To limit potential alteration to the shared trench arrangement and to accommodate the extended (realigned) boundary scenario the following shared trench alignment is proposed:

- Road crossings prior to the turnaround area at both ends of Road C are proposed.
- Stubs are proposed on Road D for future extension.

## 12.6 Telstra

### 12.6.1 Impacts to existing utilities

The existing Telstra assets located in the vicinity of the project area are as follows:

- Two pits located within Constitution Avenue southern verge; (1) at the intersection with Coranderrk Street, and (2) fronting Lot 7.
- Two pits located within the site and adjacent to the western boundary. One pit has a P100 conduit which connects to the pit located on the southern verge of Constitution Avenue. It also has a direct buried cable which crosses Parkes Way. The second pit has direct buried cables connecting to the pit located on the southern verge of Constitution Avenue and crosses Parkes Way.

Telstra advised that the cables and pits within PS3 site are no longer required and have been cut adjacent to the manhole on the corner of Constitution Avenue/Coranderrk Street. Thus Telstra have no objection for the developer to remove the cables during the excavation for the buildings.

Currently Telstra is arranging 2 x P100 conduits to be installed along the southern verge of Constitution Avenue, adjacent to PS3 site, in a shared trench as part of CAU project.

### 12.6.2 Proposed Development

Telstra advised the supply to the development can be gained from Constitution Avenue and required exclusive use of a minimum of 1 x P100 within the site with 1 x P100 lead into each lot. Provision for communication conduits is included in the proposed shared trench inside the development. Discussions on the type of shared trenches proposed within the development are discussed in Section 12.13.

Telstra indicated the costs for installation of Telstra conduit should be included as part of the costs of the development. The design and construction of Telstra conduit should be undertaken by an accredited Telstra contractor.

To limit potential alteration to the shared trench arrangement and to accommodate the extended (realigned) boundary scenario the following shared trench alignment is proposed:

- Road crossings prior to the turnaround area at both ends of Road C are proposed.
- Stubs are proposed on Road D for future extension.

## 12.7 NBNCo

### 12.7.1 Impacts to existing utilities

NBNCo advised it will be installing network around the site within the Telstra network as part of the CAU works.

### 12.7.2 Extended (realigned) boundary Scenario

NBNCo advised the need for a single telecommunication network utilising a 100 mm diameter conduit for the development. Provision for communication conduits is included in the proposed shared trench inside the development. Discussions on the type of shared trenches proposed within the development are discussed in Section 12.13.

### 12.7.3 Existing Boundary Scenario

To limit potential alteration to the shared trench arrangement and to accommodate the extended (realigned) boundary scenario the following shared trench alignment is proposed:

- Road crossings prior to the turnaround area at both ends of Road C are proposed.
- Stubs are proposed on Road D for future extension.

## 12.8 TransACT

### 12.8.1 Impacts to existing utilities

The existing TransACT infrastructure located within the vicinity of the project area is as follows:

- A 100 mm diameter conduit located within the south-east quadrant of the Coranderrk Street/Constitution Avenue intersection.
- A 100 mm diameter conduit located within the north-east corner of the Parkes Way/Coranderrk Street roundabout, crosses under Parkes Way to the east of Coranderrk Street and continues south-east within the Parkes Way median. This conduit is contained within a shared trench with ICON and AAPT assets.

There is a provision of 2 x 100 mm diameter conduits for TransACT within the southern verge of Constitution Avenue as part of CAU works.

### 12.8.2 Proposed Development

TransACT advised the supply to the development can be gained from Constitution Avenue and one tie per lot is acceptable. Provision for communication conduits is included in the proposed shared trench inside the development. Discussions on the type of shared trenches proposed within the development are discussed in Section 12.13.

TransACT indicated the costs for installation of conduit and pits for TransACT to link into Constitution Avenue should be included as part of the costs of the development.

To limit potential alteration to the shared trench arrangement and to accommodate the extended (realigned) boundary scenario the following shared trench alignment is proposed:

- Road crossings prior to the turnaround area at both ends of Road C are proposed.
- Stubs are proposed on Road D for future extension.

## 12.9 AAPT

### 12.9.1 Impacts to existing utilities

AAPT cables exist within a shared trench with ICON and TransACT, within the western verge of Coranderrk Street and then continuing within the Parkes Way median.

The existing AAPT cables will be located within the future extended (realigned) boundary scenario and, similarly to the existing water main, it is anticipated this cable will be relocated as part of the Parkes Way Re-engineering project.

The Infrastructure Study report (Mott MacDonald, 2013) noted AAPT has no concern of relocating the existing cable and there is no indication of AAPT wishing to service the proposed development within the site.

The CAU Early Works drawings documented a provision for 1 x 100 mm diameter conduit within the southern verge of Constitution Avenue.

## 12.10 ICON

The existing ICON asset located the vicinity of the site is as follows:

- ICON and IntACT assets along Constitution Avenue.
- ICON is located within shared trench with TransACT and AAPT within the western verge of Coranderrk Street. This continues within the Parkes Way median and beyond the eastern site boundary.

The Infrastructure Study report (Mott MacDonald, 2013) included discussions of the following relating to ICON asset:

- ICON has no objection to relocating this cable in the extended (realigned) boundary development scenario.



- ICON supplies services to federal government agencies only. Thus, ICON service is not required to the development site.

Further discussions with ICON were undertaken and the outcomes of discussions are as follows:

- In the existing boundary scenario, ICON advised protection of the conduit is required for heavy machineries crossing these conduits when accessing the site.

In the extended (realigned) boundary scenario, ICON indicated the following:

- Currently there is an outage required for the relocation of ICON asset as part of CAU project. The relocation of ICON assets will also have an outage impact.
- ICON highlighted concern on the number of outages within a short period of time (couple of years) as it would have major disruption and coordination issues to resolve.
- ICON to discuss the likely timing with the Parkes Way Re-engineering project team.

There is provision for 4 x 100 mm diameter ICON conduits within shared trench along the southern verge of Constitution Avenue as part of the CAU project.

#### **12.10.1 Proposed Development**

ICON supplies services to federal government agencies only. Therefore, ICON service is not required to the development.

### **12.11 Optus**

#### **12.11.1 Impacts to existing utilities**

Optus cable exists within the northern verge of Constitution Avenue and is not expected to be impacted by the development.

Infrastructure Study report (Mott MacDonald, 2013) indicated the existing Optus cable is a major fibre optic cable and is located in shared trench with Telstra and Nextgen. The report also advised the existing network should have sufficient capacity to accommodate the proposed development.

There is provision for 2 x 100 mm diameter Optus conduits within shared trench along the southern verge of Constitution Avenue as part of the CAU project.

#### **12.11.2 Proposed Development**

No discussion with Optus has been undertaken regarding conduit provision within the development. Other telecommunication providers such as Telstra, TransACT and NBN Co advised they would provide service to the development.

As indicated in the Infrastructure Study report the existing Optus network would also have sufficient capacity to accommodate the proposed development if required.

### **12.12 NEXTGEN**

#### **12.12.1 Impacts to existing utilities**

Nextgen cable exists within 3<sup>rd</sup> party duct located within the south-east corner of Coranderrk Street/Constitution Avenue. It crosses Constitution Avenue and continues north within the eastern verge of Coranderrk Street. Nextgen assets also exist within the northern verge of Constitution Avenue and are not expected to be impacted by the development.

There is provision for 2 x 100 mm diameter Nextgen conduits within shared trench along the southern verge of Constitution Avenue as part of the CAU project.

#### **12.12.2 Proposed Development**

No discussion with Nextgen has been undertaken regarding conduit provision within the development. Other telecommunication providers such as Telstra, TransACT and NBN Co advised they would provide service to the development.

### 12.13 Proposed Shared Trench

Two shared trench arrangements are proposed for the PS3 development. Both trenches include the 6 x 150 mm diameter conduits for power, one for streetlighting and two small communications conduits as requested by ActewAGL.

The differences between these trenches are:

- Shared Trench (ST) 2 includes 110 mm diameter gas main and the required number of telecommunications conduits requested by Telstra, TransACT and NBN Co. ST2 is wider than ST3 and is only located along Road A.
- Shared Trench (ST) 3 is located within the verge of all other internal roads and includes 63 mm diameter gas main and a reduced number of telecommunications conduits.

ST3 adopts a similar arrangement to that constructed for Campbell 5.

## 13.0 Pavement Design

Based on the detailed geotechnical investigation undertaken by the ACT Geotechnical Engineers in December 2014 a design CBR value of 10% has been used for the detailed pavement design. This assumes that either the existing fill materials from blocks or imported fill materials of CBR  $\geq$  10% are used for filling for the road embankments.

The design traffic adopted within PS3 site has been based on the traffic modelling undertaken for the development.

**Table 11: Design Traffic**

Street type	Design traffic based on 20 years design period (ESA)
Road A – Minor Collector Pavement Type 1	$5 \times 10^5$
Road B1 – Minor Collector Pavement Type 1	$5 \times 10^5$
Road B2 – Local Access Pavement Type 2	$4 \times 10^4$
Road C – Minor Collector Pavement Type 1	$5 \times 10^5$
Road D – Minor Collector Pavement Type 1	$5 \times 10^5$
Road E – Minor Collector Pavement Type 1	$5 \times 10^5$

A concrete raised pavement is proposed at the intersection Road A/Road B and Road B/Road E.

The pavement compositions within PS3 are as follow:

### Pavement Type 1 - mid block – minor collector

- 40 mm AC10-MD (AR320) Wearing Course
- Prime
- 120 mm base (DGB20)
- 120 mm subbase (DGS20)
- Subgrade with CBR 10%

### Pavement Type 2 - mid block – access road

- 40 mm AC10-MD (AR320) Wearing Course
- Prime
- 120 mm base (DGB20)
- 100 mm subbase (DGS20)
- Subgrade with CBR 10%

**Pavement Type 3 (concrete raised threshold)**

- 210 mm concrete base 32 MPa with SL 82 (60 mm cover)
- 100 mm subbase (DGS20)
- Subgrade with CBR 10%

**Pavement Type 4 (paved strip within raised threshold)**

- 80mm concrete unit paver
- 5/10 latcrete
- 210 mm concrete base 32 MPa with SL 82 (60 mm cover)
- 100 mm subbase (DGS20)
- Subgrade with CBR 10%

**Pavement Type 5 (driveways)**

- 175 mm concrete base 32 MPa with SL 82 (60 mm cover)
- 100 mm subbase (DGS20)
- Subgrade with CBR 10%

**Pavement Type 6 (parking bays)**

- 60mm Tri-hex permeable pavers
- 30mm fine gravel
- Geotextile
- 150 mm GMB20
- 
- 1000 mm structural soil
- Subgrade drainage treatment as per landscape details

**Pavement Type 7 (parking bay)**

- concrete base 32 MPa with SL 82 (60 mm cover) (thickness varies)
- 100 mm subbase (DGS20)
- Subgrade with CBR 10%

## 14.0 Street lighting

### 14.1 Road lighting

The street lighting design along the proposed roads has been undertaken in accordance with Australian Standard 1158.3.1.

The following parameters have been used in the design of the lighting:

- P1 along Road A.
- P3 along the remainder of the roads.

Generally 0.6 m set back has been used adjacent to on-street parking kerb as agreed with TaMS.

The calculated is based on We-ef VFL 520 series pole top luminaires on pole heights varying between four and nine metres to ensure compatibility with TaMS standards for luminaires and poles and to compliment the street light pole proposed as part of CAU project. Therefore, the following is proposed for the street lighting along the roads:

- A 24W VFL 520 series with S65 distribution in a pole top arrangement at a height of approximately 9 m on Road A.
- A 12W VFL 520 series with S65 distribution in a pole top arrangement at a height of approximately 4 m for driveways and pedestrian paths.
- A 12W VFL 520 series with S65 distribution in a pole top arrangement at a height of approximately 9 m along the rest of the roads.

Cabling and conduits are to be compatible with TaMS standards and ActewAGL requirements. Conduits are to run in shared trench where practicable.

### 14.2 Park lighting

The proposed lighting of the park is as follow:

- Bega 2384 luminaires integral lighting on the stairs.
- Bega 2356 luminaires integral lighting along the wall.
- Klik Ledpod series lighting in the gazebos area.
- Lumascape Tree Uplighter (LS9402LED) for the tree up-lighting.
- Luminaires are grouped in twos to reduce wiring, conduits and for effect
- Paths surrounding the park will be lit to a P4 category with lower wattage versions of the VFL 500 series

These luminaires are small and discrete allowing the luminaire to be closer to the target area, thereby reducing spill light.

## 15.0 Earthworks

The earthworks quantities for the final design are:

- Cut – 802 m<sup>3</sup>
- Fill – 13,200 m<sup>3</sup>
- Deficiency of fill material – 12,400 m<sup>3</sup>

The preliminary quantities are based on the following assumptions:

- Central Park not included
- Access to Finance site not included
- Grading for 100yr overland flow within block not included
- Exclude removal of topsoil;
- Exclude pavement boxing;
- Exclude regrading of the lots; and
- Exclude of removal of unsuitable material.
- Exclude retaining walls i.e. earthworks quantities are based on the 1:4 batters for both fill and cut.

### 15.1 Temporary Traffic Management (TTM)

In the development of the Concept TTM plans we have assumed that the site is fenced off with no access to the public.

Construction access will be primarily off Parkes Way using the same arrangement as for the CAU works. The Concept TTM plans consider:

- Impacts on access from Constitution Avenue.
- Possibility of concurrent work with the CAU main package.

### 15.2 Staging

The proposed staging for construction works is as follows. The current CAU works have a site compound located on the southern end of Road A and eastern end of Road B and the proposed staging will need to coordinate with the existing construction contract timing.

#### Stage 1

- Construction of on-site detention pond
- Construction of Road A from Constitution Avenue to driveway entry to Lot 7
- Construction of Road B between Constitution Avenue and Road A
- Release Lot 1, Lot 6 and Lot 7

#### Stage 2

- Construction of part of Road C, with no connection to Coranderrk Street and Parkes Way.
- Construction of Road E (shared zone) to enable access to Lot 2
- Release Lot 2

#### Stage 3

- Construction of the Central Park

This staging would reflect the proposed Separable Portions in the construction contract.



## 16.0 Safety in Design Considerations

The Work Health and Safety Act (2011) requires the Work Health and Safety Design Process to be documented as a standard part of the design documentation process. Safety in Design discussions were held in October 2014 during the PSP design and reviewed as part of the Final Design.

### 16.1 Key Safety in Design Findings

The key design considerations and findings resulting from the Safety in Design process include:

- Relocation and/or protection of existing utilities within the project site; in particular the 350 mm high pressure steel gas pipeline and trunk utilities on Constitution Avenue.
- Safety to road users including cyclists and pedestrians during construction phase.
- During flood events, the depth of water in the detention basin
- Stormwater pipes discharging via headwalls into detention basin
- The presence of Asbestos-in-soil (ASBINS) within PS3 site and the requirement for a Site Management Plan for the development works.
- Possible fuel/oil spills into Coranderrk Pond and Nerang Pool during construction phase.
- 12.5 m long vehicle may not be able to negotiate at some of the intersections and encroach into the verge and path if not following the designated route.
- Repair existing utilities during maintenance phase.

Further analysis is provided in the Safety in Design Report in Appendix F.

## 17.0 Assessment of Probable of Costs

An assessment of the probable cost for constructing the works is tabulated below. The assessment is based on the Final Design drawings and the following assumptions:

- The cost assessment is exclusive of professional fees (i.e. contract administration, project management etc.).
- No allowance for removal of unsuitable material.
- No allowance for the management and removal of asbestos.
- No allowance for connection to Finance site
- Preliminaries are assumed to be in the order of 10% of the estimated construction costs.

Utility relocation/protection/connection allowances made as follows (some costs have been estimated as accurate cost indications were not provided by the relevant authority including ActewAGL, Telstra, NBNCo, Optus and Actew Water):

- \$25,000 for connections of relocated electricity cables by ActewAGL
- \$10,000 for works by Actew Water for connection with the existing sewer main.
- \$10,000 for works by Actew Water for connection with the existing water main.
- \$10,000 for works by telecommunication provider (per provider) for connection with the existing asset.
- \$10,000 for works by Jemena for connection with the existing asset.

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Table 12: Proposed Development

Item	Description	Total
00	Preliminaries	\$660,000
100	Provision For Traffic	\$72,000
200	Earthworks	\$490,000
303	Underground Services	\$1,396,500
304	Sewerage	\$140,000
305	Stormwater Drainage	\$496,000
306	Subsoil Drainage	\$50,500
307	Conduits	\$505,000
308	Water Supply	\$186,000
309	Water Services	\$0
400	Flexible Pavement Construction	\$407,000
500	Rigid Pavement Construction	\$0
600	Concrete Kerbs Footpaths And Minor Works	\$475,500
700	Road Furniture	\$0
800	Incidental Works	\$306,000
900	Landscape (Including Central Park, Canopy Structure and Sculptural elements)	\$2,494,000
1000	Road Signs	\$27,500
1100	Pavement Markings	\$17,500
1200	Segmental Paving	\$1,390,500
1300	Traffic Signals	\$0
1400	Street Lighting	\$274,500
Sub-Total		\$8,947,500
GST (10%)		\$894,750
Total (Inc GST)		\$9,842,250

## Appendix A

# PSP Circulation Comments

## Appendix B

# NCA and TaMS Consultation

## Appendix C

# Geotechnical Investigation



## Appendix D

# Utility Providers Consultation

## Appendix E

# Actew Water Submission (CAU works)

## Appendix F

# Safety In Design Report

## Appendix G

# ASBINS Assessment

## Appendix H

# Heritage Report

## Appendix I

# Consultation Report



## Appendix J

# Tree Assessment

## Appendix K

# Certification

## Appendix L

# Irrigation Specification