

# **AMENDMENT TO THE ASSESSMENT REPORT**

For the Buckland Park (Riverlea)

Major Development

Amendment to the Environmental Impact  
Statement (EIS) for

- Precinct 2 Land Division
- Road closure(part of Buckland Road)

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**Government of South Australia**

Department of Planning,  
Transport and Infrastructure

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## 1 INTRODUCTION

This Amendment to the Assessment Report (AAR) has been prepared by the Minister for Planning and assesses the environmental, social and economic impacts of a proposal by Walker Corporation Pty Ltd (proponent) to amend development at its approved Buckland Park (Riverlea) site near Virginia. Changes to the proposed staging, approval of the Precinct 2 land division, and consequential closure of Buckland Road are proposed. The Buckland Park site is a 1400 hectare site from the south of the Gawler River to Thomson Road in the south and within the City of Playford. Information on the Buckland Park (Riverlea) development can be obtained from the *Assessment Report for the Environmental Impact Statement for the Buckland Park Residential Development*.

### 1.1 BACKGROUND

The Buckland Park Residential Development (also known as Riverlea) was the subject of an Environmental Impact Statement (EIS) released in May 2009 pursuant to the Major Development provisions (Section 46) of the *Development Act 1993* (the Act). Provisional Development Authorisation (with conditions) was provided by the Governor on 3 February 2010. On 23 December 2010 the whole site was rezoned for residential (and other related purposes) by an amendment to the City of Playford Development Plan.

There have been numerous subsequent variations to the development authorisation over the years from 3 February 2010 to the present time.

In November 2014 the proponent submitted a Development Application (Amendment to the EIS or AEIS) (Appendix A) to facilitate:

- Super Lot (staging) Amendment
- Precinct 2 Land Division
- Road Closure (part of Buckland Road – unmade).

It was determined by the Minister for Planning that the proposed amendment was not covered by the provisions of the original EIS, mainly due to the change in staging proposed whereby development would occur in the north of the site and before the west of the site as originally proposed. This is in accordance with the relevant provisions of the *Development Act 1993*.

A copy of the proponent's Development Application for an Amendment to the EIS is attached as Appendix A. This outlines the details of the proposal and anticipated effects.

In addition the proponent also separately requested that a small land division for Precinct 2C of 40 allotments also be included in the current request for a variation to the development authorisation.

### 1.2 ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURES

Section 47 of the *Development Act 1993* requires the Minister to publicly exhibit the EIS Amendment if the Minister is of the opinion the amendment "significantly affects the substance of the EIS. Following a 3 week public display period in March 2015, no public submissions were received. Government submissions were forwarded to the proponent to respond to the matters

raised. Copies of all submissions received are included in Appendix B. The proponent's response to submissions is included in.

Pursuant to Section 47 of the Act, in preparing this AAR, consideration has been given to; the original EIS; submissions from the public (none received), the Environment Protection Authority and other government agencies; comments from the City of Playford; the proponent's response to submissions; and any other matters considered relevant.

Pursuant to Section 48(7) of the Act the Governor must, when making a decision, have regard to the provisions of the appropriate Development Plan and the relevant regulations, Building Rules (if relevant), and the Planning Strategy. Further, when making a decision on an "activity of environmental significance", as listed in the Act, the Governor must have regard to certain provisions of the *Environment Protection Act 1993*. In particular, the Governor must have regard to the Objects of the Act, the general environmental duty under the Act and any relevant environment protection policies. The Governor must also, pursuant to Section 48 (5) (e) of the *Development Act 1993*, have regard to the EIS Amendment and the AAR. Further, as indicated in Section 48(7), the Governor may specify conditions which should be attached to a development authorisation that must be complied with in the future and under some circumstances, may vary or revoke conditions to which the development authorisation is subject or attach new conditions to the development authorisation.

## **2. PROJECT DESCRIPTION**

### **2.1 PROJECT JUSTIFICATION**

Section 1.2 of the Amendment to the EIS outlines the proposed changes to the development of the site as a result of the reviews that the proponent has undertaken with infrastructure providers, reviewing land use planning and staging and its broad marketing strategy.

This resulted in the proponent wishing to proceed with the development of the land to the north of the currently approved Precinct 1 area (near Legoe Road) instead of the area to the west of Precinct 1 as was outlined in the original EIS.

The Buckland Park site has been identified for some time in the 30 Year Plan for Greater Adelaide as a green field development site for residential development.

The proposed closure of part of Buckland Road, which is an unmade road included in paddocks, also required advertising and consultation under Section 34B of the *Roads (Opening and Closing) Act 1992*. There were no objections to this closure and this is a necessary action to allow Precinct 2 and its new road structure to be developed. Agreement between the proponent and the council has occurred in relation to the value of the road, with an offset of the cost of recreation facilities/open space development for Precinct 2.

### **2.2 THE SITE AND CURRENT LAND USE**

The nature of the existing site is as described in the initial EIS in 2009 has not changed. The existing uses include grazing, horticulture and open space uses.

There has been investment by the proponent in upgrading the water and gas supply to the site along with other works. A number of required plans have been completed and approved. This includes a Construction Environment Management and Monitoring Plan (CEMMP), bulk earthworks plans and a number of other requirements which were a condition of approval before development could be commenced on Precinct 1. The City of Playford have also been involved in the development and approval of plans for the site.

Negotiations with DPTI (Transport) concerning the design of the intersection with Port Wakefield Road have also been agreed and completed, which is another step in the process of delivering the Precinct 1 development.

### **2.4 THE PROPOSAL**

A general description of the proposed changes to the development of the Buckland Park (Riverlea) Residential development is provided in this section. For a more detailed description refer to the proponent's EIS Amendment document (dated November 2014).

The proposed development of Precinct 2 encompasses approximately 2,600 residential allotments, a school site for a potential birth to 12 school and a variety of open space recreation and nature areas, some of which will have multiple uses. The existing mature red gum trees along the Gawler River are included in open space reserves and will be preserved

15% of the allotments will be nominated as Affordable Housing. This component includes a range of allotment sizes and locations.

A concept plan developed by Wallbridge & Gilbert for the management of storm and flood water is included in the information provided by the proponent.

Infrastructure provision including Electricity, Gas supply, Roads and traffic, bus services have been considered in the development of Precinct 2.

### **3. CONSISTENCY WITH GOVERNMENT POLICIES**

When making a development decision on a major development or project for which a declaration applies, the Governor must have regard to the Planning Strategy, provisions and regulations in the Development Plan and if relevant, Building Rules. In addition where the development involves a prescribed activity under the *Environment Protection Act 1993*, the Governor must have regard to the objects of the Act, the general environmental duty and any relevant environment protection policies.

#### **3.1 PLANNING STRATEGY**

The general conclusions in relation to the objectives of the Planning Strategy have not fundamentally changed from the assessment undertaken in January 2010. Residential Development in the Buckland Park area is still supported by Government policy and forms part of the supply of residential land in the Greater Adelaide area.

#### **3.2 THE DEVELOPMENT PLAN**

The relevant Development Plan is the City of Playford Consolidated version dated 21 April 2016. The Development Plan contains policies relating to the Buckland Park area and the Council Wide area. Zone Maps Play 2 and 3 are the reference maps for zone provision for the Precinct 2 area. The proposed Precinct (2 and 2C) land division are within the Suburban Neighbourhood Zone which includes appropriate policies for the proposed residential development. Part of the land also includes a "Moss" or Metropolitan Open Space zone for the land close to the Gawler River and it is proposed to retain most of this land as open space in the development application/ EIS amendment submitted by Walker Corporation.

The current zoning supports the development.

#### **Conclusion**

**It is concluded that, the proposal is not "seriously at variance" and indeed is consistent with the Development Plan. Section 5 assesses the potential issues in detail.**

#### **3.3 BUILDING RULES**

This report does not include specific assessment of the proposal against the provisions of the Building Rules under the *Development Act 1993*. In the case of Buckland Park the City of Playford will be the authority for the approval of dwellings including the display villages and will also therefore be responsible for the approval of Building Rules. The Neighbourhood Centre (in Precinct 1) will require a delegated decision (from the Governor) for Building Rules at the appropriate time.

### **3.4 ENVIRONMENT PROTECTION ACT**

The proposed development does not involve an activity of major environmental significance as prescribed in the *Environment Protection Act 1993*. Before making a decision on the proposed development the Governor must have regard to the objects of the Act, the general environmental duty and any relevant environment protection policies.

The objects of the Act are:

- *To promote the principles of ecologically sustainable development;*
- *To ensure that all reasonable and practicable measures are taken to protect, restore and enhance the quality of the environment having regard to the principles of ecologically sustainable development, and to prevent, reduce, minimise and, where practicable, eliminate harm to the environment.*

The environmental duty of the Act and the following associated policies are considered relevant to the proposal:

- *Environment Protection (Water Quality) Policy 2015*
- *Environment Protection (Air Quality) Policy 2016*
- *Environment Protection (Noise) Policy 2007*
- *Environment Protection (Waste to Resources) Policy 2010*

The Assessment Report (as amended) concludes that subject to appropriate design and management, the proposal, if approved, would be consistent with the applicable policies outlined above and relevant State legislation.

In addition, proper weight should be given to both long and short term economic, environmental, social and equity considerations in deciding all matters relating to environmental protection, restoration and enhancement. The EPA is required to apply a precautionary approach to the assessment of risk of environmental harm and ensure that all aspects of environmental quality affected by pollution, and waste are considered in decisions relating to the environment.

The EPA provided comment on the Amended EIS, their issues are summarised in Section 4. In general the EPA were focussed on ensuring that any stormwater flooding and groundwater/surface water interactions were appropriately considered. They required the updating of the Precinct 1 stormwater/groundwater management plans to include the Precinct 2 area. EPA comments are also provided in Appendix B.

### **3.5 OTHER MATTERS FOR CONSIDERATION**

#### **South Australia's Strategic Plan (2014-15 update)**

The Governor is also required to have regard to any other matters considered relevant. In this context, an assessment has been carried out with reference to the Strategic Plan. The Plan seeks to widen opportunities for all South Australians through the pursuit of seven strategic objectives:

1. Creating a vibrant city
2. Safe communities, healthy neighbourhoods
3. An affordable place to live
4. Every chance for every child

5. Growing advanced manufacturing
6. Realising the benefits of the mining boom for all
7. Premium food and wine from our clean environment

The development of the Buckland Park (Riverlea) Residential development support a number of targets in the Strategic Plan including T.7 Affordable Housing, T.8 Housing Stress, T.47 Jobs and a number of the sustainability targets in relation to house design and recycling. The design of the subdivision also promotes healthy living with extensive bike ways and open spaces for recreation.

## **Environment Protection and Biodiversity Conservation Act, 1999**

A referral to the Australian Government was made by the proponent to assess whether the development of Precinct 2 triggered a controlled action and therefore required a joint assessment under bilateral arrangements. In response, the action was deemed not to be a controlled action on 26/8/13 by the then Commonwealth Department of Sustainability, Environment, Water, Population and Communities.

### **4. CONSULTATION WITH THE PUBLIC, COUNCIL AND GOVERNMENT AGENCIES**

The EIS Amendment was placed on public exhibition for 3 weeks in March 2015, with no submissions received from the public and 4 submissions from government (including a submission from the City of Playford). Refer to Appendix B for a copy of all submissions received. All submissions were forwarded to the proponent, who subsequently prepared a response document.

#### **4.1 PUBLIC SUBMISSIONS**

No public submissions were received

#### **4.2 CITY OF PLAYFORD**

The City of Playford submission was supportive of the development and also required that the same conditions of approval be applied to Precinct 2/2C as applied to Precinct 1. The Council also supports the closure of the northern unmade part of Buckland Road and has come to a financial agreement with the proponent about the value of the road. The council supports the operating date of 18 December 2017 for closure of the road

#### **4.3 GOVERNMENT AGENCIES**

Relevant government agencies were consulted, with comments received summarized below.

##### **4.3.1 Environment Protection Authority**

The issues raised were:

- Impact of stormwater/groundwater interactions
- Details of Water sensitive urban Design (WSUD)
- Site contamination report required

##### **4.3.2 Department of Environment, Water and Natural Resources**

Stormwater

- Groundwater/surface water interactions due to the high groundwater table in the area,
- Development of the Stormwater Management plan be developed and approved before land division approval for Precinct 2 (also supported by EPA),
- Suggested conditions of approval (and notes) for the development of the Stormwater Management Plan.
- The stormwater plan should also consider the nature or the risks and strategies to cope with potentially shallow groundwater levels, high groundwater salinity and changes to the natural aquatic ecosystems in the Gawler River and downstream of the development

- Scaled maps of the precinct and stormwater infrastructure works, including details of Water Sensitive Urban Design (WSUD)
- Details of ground water/stormwater interactions and how they are to be managed.
- How pipe infrastructure would be constructed and maintained in such high salinity environment
- How Thompson Creek would be incorporated into the precinct given that it would now overlay the Thompson Creek drainage line

#### Native Vegetation

- Detailed survey work in support of the amendment should be provided
- Provide the biodiversity management strategy for review
- Provide information on any clearance of vegetation
- Ensure that residential areas are not under threat from falling large eucalypt limbs
- Seek endorsement for proposed clearing of native vegetation (under Regs 5 (1) (ab) and (d) prior to finalising the amendment.

#### Green Infrastructure

- The proponent be requested to provide the Landscape Master Plan for DEWNR to review against green infrastructure principles and practices.

#### 4.3.3 Department for Planning, Transport and Infrastructure (DPTI) – Transport

- Traffic Impact Study to be undertaken.

### 4.4 PROPONENT'S RESPONSE

The proponent responded to the issues raised in the Government submissions.

A summary of the proponent's response is provided below:

#### DEWNR Comments

##### Flooding

Consultants (Australian Water Environments or AWE) for the proponent have considered the potential unexpected levee failure of the Gawler River. AWE states that the current proposal (Precinct 1 and surrounds) has the capacity to deal with potential unexpected flow paths and levee failures and is not highly reliant on the integrity of the levee system.

Detailed design of the channels will ensure the following are correct:

- Design floor levels of the development
- Channel width
- Channel depth

As part of the current detailed design there will be designed overflow points at the locations of the current break outs which will include erosion control.

The final finished allotment levels, design flow rates and other issues related to inundation, are part of the detailed design which will occur as required. Channels are to be sized for the 1:100 year flow from the Gawler River with the top of the channel banks approximately the same level as the current land. There will then be approximately 200mm freeboard to the top of kerbs and then another 300mm freeboard above the top of the kerb to the finished floor levels of the dwellings.

## **Groundwater and Stormwater**

The proponent is committed to providing a Stormwater Management Plan as per Precinct 1. As the EIS/Amended EIS is at a high level of documentation and does not by necessity go into detailed design of civil engineering, stormwater pipe locations, sizes or invert levels. This detail would be provided in a future (or expanded) Stormwater Management Plan which will need to be to the satisfaction of the Council. Similarly any WSUD implemented into the design will become an asset of the Council and subject to detailed design and construction to the satisfaction of the Council.

## **Biodiversity Conservation**

There are no additional impacts to flora and fauna on the site to those previously assessed. There is no requirement to provide additional information on the potential impacts of the flora and fauna for the new Precinct 2 footprint as all the information is available in the original EIS.

Precinct 2 maintains the Metropolitan Open Space Scheme (MOSS) zone with all the development being outside of the current MOSS zone. Precinct 2 supports the retention of all the existing large scattered eucalypts (River Red gums). The proposal does require the removal of 0.4ha of highly degraded *Maireana aphylla* low shrub land with a Significant Environmental Benefit (Significant Environmental Benefit) ratio of 3:1. The approval to clear that vegetation will require the approval of the Native Vegetation Council in due course.

All of the retained eucalypts have been sited within either road reserve or open space. A biodiversity strategy has been developed by the proponent.

## **Green Infrastructure**

The Landscape Master Plan for Precinct 1 has been completed to the satisfaction of the Playford Council and the plan is intended to be extended across the whole site as it is developed including for Precinct 2 (and 2C) under current consideration.

## **EPA Comments**

### **Stormwater**

The Stormwater plan for Precinct 1 will also be extended to cover Precinct 2 and 2C and will address the following:

- Stormwater leaving the site meets the required performance objectives;
- Outline the measures to achieve the water quality targets;
- Maintenance requirements and obligations.

### **Site Contamination**

It is acknowledged that the farmers quarters and tractor maintenance area is located within the Precinct 2 boundary however it is located within the MOSS Zone and therefore not in the actual developable area.

A general clean-up of the area will occur however with remediation of the ground to occur to a suitable level for the landscaping and revegetation of the area.

## **DPTI (Transport) comments**

Walker Corp and DPTI have agreed upon, the terms of a Deed of Agreement on the upgrade of the intersection of Legoe Rd and Port Wakefield Road, including triggers for the ultimate (grade separated) scheme.

All works are to be undertaken at the proponents cost to the satisfaction of DPTI. This has been reflected in the proposed condition of approval.

In relation to the internal roads and engineered infrastructure to Precinct 2 (and 2C) this is the responsibility of the Council and will be subject to separate civil/engineering specifications agreed by the Council. This is a condition of approval for this development.

Decisions in relation to public transport provision and also transport infrastructure are subject to ongoing discussion between the proponent, the State Government, bus operators and the Council.

## **5. ASSESSMENT OF ENVIRONMENTAL, SOCIAL AND ECONOMIC ISSUES**

The amended EIS submitted by the proponent has focussed on the differences between the original development proposal and the amended plans.

The Assessment Report for the original Environmental Impact Statement dated January 2010 is still relevant to the proposal to develop Precinct 2 and 2C and closure of part of Buckland Road.

The findings of this Amended AR do not differ markedly from those of the original assessment undertaken in 2010. The difference consists of consideration of the impact on the Gawler River environments and the need to re-visit the stormwater management plan for the site.

The following was identified in the original Assessment Report as being important for subsequent (post Precinct 1) development.

As indicated below these issues are being appropriately dealt with by the proponent. They are central to the proposal and can be appropriately conditioned to provide for a functioning and integrated residential and community development outcome.

- Roads – An agreement is required between the Proponent and DTEI on the timing and funding of future intersection upgrades at Legoe Road and Park Road junctions with Port Wakefield Road (progressed)
- Public Transport – With DTEI the proponent needs to determine the requirements for upgrading the 900 bus service to Salisbury/Elizabeth (Precinct 2). The requirements for a metro ticket service from Buckland Park to Salisbury/Elizabeth would also need consideration during Precinct 2 (progressed).
- Education – Negotiations for the first primary school on the site would need to start planning during Precinct 1 with plans for the second primary school underway by Precinct 2 or Precinct 3. The third and fourth primary schools would be planned for Precinct 4 and 5. The first and second planned high school would be planned from Precinct 3. Negotiations for childcare/preschool providers would start in Precinct 2 and be ongoing as dictated by the demand (progressed).
- Affordable Housing – Negotiations for the 15% affordable housing requirement would be ongoing for the life of the development (progressed).
- Biodiversity – Significant Environmental Benefits should be negotiated in advance of approval for detailed subdivision. Where residential Precincts incorporate scattered trees into landscape designs there should be adoption of an environmentally sensitive construction approach. The Proponents intention to protect 70% of remnant vegetation in open space reserves is acceptable, provided detailed subdivision plans also seek to retain as much of the remaining 30% as possible (progressed).
- Community Services/Facilities - Community centres to be accommodated in land division plans for Precinct 3 and Precinct 5 of the development. Provision of a library would be identified in Precinct 5. The timing and location for a Council Depot will be identified with the City of Playford. Land and designs for parks, recreation and public domain will be identified as detailed land division for future Precincts are designed in consultation with Council (progressed).
- Mosquitoes – A Management Plan for mosquitoes will be established for Precinct 3 to 5 as detailed land division occurs (ongoing/active consideration)

- Feral animals - A more detailed feral pest management strategy based on lines of defence is required for the later Precincts if development adjoins the Gawler River and the salt pans (progressed).
- Health – The proponent will liaise with the City of Playford to look at the timing of community health services within Buckland Park. Planning to start from Precinct 1 of the development but ongoing indicatively health services may not be provided within Buckland Park until later Precincts (ongoing/active consideration).
- Potable Water – The Proponent will enter into agreements with SA Water (or a water provider) in relation to the timing of water services to the Precincts (progressed).
- Waste Water - The Proponent will enter into agreements with SA Water (or a wastewater provider) in relation to the timing of water services to the Precincts (progressed).
- Recycled Water – For Precinct 2 to 5 of the development the Proponent will prepare a strategy and designs with SA Water for their approval (progressed).
- Storm Water – Designs for any aquifer recharge (Precinct 2) and treatment of stormwater off site (Precinct 4) will be done in consultation with the City of Playford and relevant Government Agencies. The Flood Management Strategy should be revised to consider the opportunities for providing environmental flows to the Gawler River through gravitational means (via swales/wetlands using natural topography or constructed flow paths) or 'passive' infrastructure using piping (ongoing/active consideration).
- Electricity – Upgrades to the electricity will occur progressively as the Precincts commence. Indicatively plans for a substation would be done with an electricity provider for Precinct 2 and other upgrades would be required for Precinct 3 to 5 (progressed).
- Gas – Services would be upgraded as needed from Precinct 1. A new 200mm steel main would be required from the Epic Gas Gate Station. Amplification of the Epic Gas Gate Station would be as required. Hazard risk associated with the EPIC Pipeline has been considered appropriately (This gas upgrade has already occurred).
- Telecommunications – The Proponent will work with telecommunications companies to identify upgrades as needed (ongoing/active consideration).
- Sea level rise – a minimum site level of 4.00 m AHD and building floor level of 4.25 m AHD will be required. The long term actual effect of sea level rise will require monitoring to determine whether any additional protective works are required (ongoing/active consideration).
- Construction Environmental Management and Monitoring Plan (CEMMP) and Operation Environmental Monitoring and Management Plan (OEMMP) will be provided for each Precinct (ongoing/active consideration).

The key items now raised by Government Departments as potential issues in relation to the new location of Precinct 2 can be dealt with via additional condition setting including through a series of either extended management plans or new management plans. Of particular interest to the agencies is stormwater management and vegetation clearance. Stormwater management is being appropriately dealt with through a coordinated stormwater design and approach that also limits clearance vegetation in existing stormwater drains or roadside vegetation. Any clearance will be subject to the requirement to complete a Significant Environmental Benefit (SEB) plan to the approval of the Native Vegetation Council. That process is separate to any development authorisation under the *Development Act 1993*.

It is noted that there were no public submissions in relation to the amendments or to the closure of part of Buckland Road.

## **6 MITIGATION, MANAGEMENT AND MONITORING**

The operation of the Buckland Park Residential development (Riverlea) would need to be managed and monitored in accordance with a Construction Environmental Management and Monitoring Plan (CEMMP) and an ongoing Operational Environmental Management and Monitoring Plan (OEMMP)

Examples of the issues requiring consideration in either a CEMMP or OEMMP include but are not limited to:

- Landscape plans
- Groundwater Management Plan.
- Surface Water and Drainage Management Plan.
- Vegetation Management and Revegetation Plan.
- Pest Plant and Animal Management Plan.
- Aboriginal Heritage Management Plan.
- Facilities Management Plan.
- Fire Risk Management Plan.
- Waste Management Plan.
- Recycled water management plan
- Infrastructure agreements with Council or Government
- Detailed engineering plans.
- Air quality plans
- Remediation plans (if any contamination found)

The CEMMP and OEMMP would need to be prepared to the reasonable satisfaction of DEWNR, EPA and/or council, prior to construction commencing if approval is granted. As indicated above appropriate condition setting is available to ensure this outcome is met.

## 7. SUMMARY

As mentioned above, the findings of the Amended AR do not differ markedly from those of the original assessment undertaken in 2010 (and reproduced below) with the exception of consideration of the impact on the Gawler River environments and also the need to re-visit the stormwater management plan for the site.

Relevant extracts from the 2010 Assessment Report as provided below:

### 1.1 Strategic position

In relation to strategic policy issues this Assessment Report concludes that:

- Strategic and legislative requirements have been investigated as part of the EIS and Response Document process. This development proposal is consistent with the *Draft 30 Year Plan for Adelaide*.
- The proposal will assist in meeting the supply of land for future northern metropolitan growth, and will assist in provision of affordable housing.
- The requirements of Affordable Housing have been met for Precinct 1 of the proposal.

### 1.2 Infrastructure

In relation to policy issues this Assessment Report concludes that:

- A schedule of infrastructure is required for Precinct 1 and future Precincts of the proposal
- The Master Plan shows adequate manoeuvrability within the site for pedestrian and cyclists. Due to the location of this development it is important that a transport system is provided by the proponent and linked to the nearest public transport until the majority of the development is established and more regular public transport services are provided.
- The requirement for infrastructure is significant for the site. The Walker Corporation has already undertaken work towards negotiating agreements with infrastructure providers. It is envisaged that a Schedule of Commitments will provide more certainty on the provision of infrastructure. This AR concludes that final arrangements for infrastructure can be secured as part of the Certificate of Approval Precinct of the land division process.
- Precinct 1 will require timing and funding agreements for traffic lights at the corner of Legoe Road and Port Wakefield Road. Later Precincts will require an agreement on grade separation. The Super lot land division plan includes an appropriate reserve for a future grade separated intersection if required (part Lots 80 and 81).
- Closure of a portion of Legoe Road is appropriate, at the time new subdivision roads are open.
- Hazard risk associated with the EPIC Pipeline has been considered appropriately.

### **1.3 Environmental**

In relation to environmental issues this Assessment Report concludes that:

- Future Precincts of the development that Significant Environmental Benefits should be negotiated in advance of approval for detailed subdivision.
- Where residential Precincts incorporate scattered trees into landscape designs there should be adoption of an environmentally sensitive construction approach.
- The Proponents intention to protect 70% of remnant vegetation in open space reserves is acceptable, provided detailed subdivision plans also seek to retain as much of the remaining 30% as possible. In any event SEB requirements will impose offset benefits with any clearance.
- Sea level rise risk is adequately dealt with for Precinct 1 and for future Precincts is within the current policy which asks for an allowance for risk beyond 2100.
- The Flood Water Management Strategy should be revised to consider the opportunities for providing environmental flows to the Gawler River through gravitational means (via swales/wetlands using natural topography or constructed flow paths) or 'passive' infrastructure using piping.
- Further work is required to minimise stormwater runoff, and increase water quality outcomes, as detailed design for each subdivision Precinct.
- Measures for resource and waste minimisation are appropriate if undertaken as outlined during the construction and operational phase of the project.
- A more detailed feral pest management strategy based on lines of defence is required for the later Precincts where development adjoins the Gawler River and the salt pans.
- Mosquitoes are unlikely to be a significant issue for Precinct 1. For the later Precincts of the development, further research and trapping would assist in determining the appropriate measures for mitigation and for funding of this mitigation.
- In conclusion, this AR recommends that, as stated by the Proponent, a Construction EMMP and Operation EMMP be provided.

### **1.4 Design**

In relation to design issues this Assessment Report concludes that:

- The land division design of Precinct 1 is appropriate when considered in the broader context of the Buckland Park Master Plan, provided local design and construction standards are met.
- The design of the boulevard with no direct access from residential allotments is acceptable given the likely high volume of traffic this road will accommodate as the project proceeds/
- The proposed development accords with the objectives sought for public open space provided the proponent prepares landscape plans as part of the detailed design for future Precincts, as well as an overarching Recreation Facilities Strategy.

- The sustainable design strategies outlined in the Buckland Park Sustainability Guidelines should be followed for project's construction and operation. Many of these objectives will be met, however, though the requirement of five star energy rated for new houses as required by the Building Code.
- Future Precincts could be built by different building companies and as such could create a variety of styles. Themes would need to be clear in the first instance to provide a consistent vision.
- The Design Guidelines need more investment in appropriate residential design that is site specific and climate responsive.
- Safety and natural surveillance will need to be developed through detailed design Precincts.
- The use of efficient water landscaping and the use of local indigenous species are recommended. A landscaping plan should be provided that improves the biodiversity and ecological habitat outcomes for the area.
- The landscape plans provided are conceptual and as such landscaping plans/details would need to be provided. However, it is recommended that water sensitive urban design should be an underpinning principle and requirement in a development of this nature, rather than an option to be encouraged and WSUD guidelines must be included in all landscaping specifications.
- The proposed display village is acceptable subject to submission of detailed designs as a reserved matter.

## **1.5 Community**

In relation to community issues this Assessment Report concludes that:

- The proponent's commitment to providing a bus service from first resident until such time as the public transport system is connected to the site is sufficient.
- Traffic impacts will be managed acceptably in Precinct 1 of the proposal.
- Land has been put aside to accommodate an at grade separated intersection for when traffic lights become unsuitable due to the growth in traffic volume for the Port Wakefield Road/Legoe Road intersection.
- The frequency of existing public transport is presently limited, but would be improved with the extra residents to the Virginia/Buckland Park region in future Precincts of the proposal.
- The proposed neighbourhood centre is appropriately located and designed, and should proceed as part of Precinct 1 development.
- The proposed display village is appropriately located, and should proceed as part of Precinct 1 development.

- The proposed community bus will assist residents with transport to health facilities in Precinct 1. The Proponent and SA Health will pursue options for health services in Buckland Park in future Precincts when there is a higher population to support the services locally.
- The demand for student places in schools will be met in Precinct 1 within existing Government and Non-Government School providers. Strategic planning of school services for future Precincts will be considered as the population increases.
- There is a commitment to providing community services for Precinct 1 of the development. The Walker Corporation will need to work in conjunction with the City of Playford and Virginia residents to ensure that future Precincts provide services which are suitable for Buckland Park and the broader region.
- The facilities proposed in the Master Plan would substantially increase recreational opportunities for Buckland Park and the Virginia region.
- The Walker Corporation has sought to address concerns of adjoining neighbours. The interface between residential and horticultural uses will be of concern to be addressed into any future rezoning. A portion of Precinct 1 (18 allotments) should not proceed due to the interface with an adjacent horticultural property. An agreement on a buffer is required before the allotments can be created.

## **1.6 Economic**

In relation to economic issues this Assessment Report concludes that:

- Initial impacts on Virginia will be positive in terms of employment and additional income for shops. Impacts beyond Precinct 1 will depend on the types of goods and services provided within the development site.
- There will be positive economic impacts from the development at the construction Precinct. Then, when houses are occupied, there will be positive economic impacts on retail and services to the broader region. The loss of income from agricultural/horticultural activities within the site is small in a regional context.

## 8. CONCLUSION

This Assessment Report has considered through the assessment of the amended EIS the proposal by Walker Corporation to amend the location of Precinct 2 in the north of the Buckland Park. A limited range of social, economic and environmental issues have been considered in this report given the previous Assessment Report.

The issues associated with the proposal have been satisfactorily addressed in the amended EIS, the proponent's response to submissions and further information provided by the proponent.

This Amendment to the Assessment Report concludes that the potential environmental, social and economic impacts associated with the Buckland Park Precinct 2 site can be minimised to acceptable levels and are manageable through the provision of a number of management plans dealing with (in particular, stormwater management and vegetation clearance/management).

It is also recommended that it is appropriate to approve the closure of the northern part of Buckland Road (an unmade road) in order to facilitate the development of Precinct 2.

It is therefore considered that approval of the land division plans for Precinct 2 and 2C can be approved along with a number of accompanying conditions:

If the Governor were to grant development authorisation, the current development approval will need to be amended, with additional conditions based on the following requirements recommended:

### **PRECINCT 2 AND 2C**

63. No allotments within Precinct 2 shall have section 51 granted until such time as:
- (a) 50% of Precinct 1 (including Stage 2C) have been completed with section 51 approval; and
  - (b) commitments for a community space and worker, bus service and convenience shopping are fulfilled.

### *ENGINEERING DESIGN*

64. A Stormwater Management Plan for Precinct 2 be negotiated with the Council, the EPA and DEWNR, to the satisfaction of the DAC as delegate of the Minister prior to commencement of work on Precinct 2.
65. Water sensitive urban design measures and practices shall be adopted for the management of run-off, including stormwater capture and reuse.
66. The proponent to prepare water storage treatment and re-use system within Precinct 2 (public reserves and areas) for Council approval.
67. The Precinct 2 and 2C landscape strategy will follow the guidelines set out in the 'Riverlea Landscape Master Plan Report'. This report guides the establishment and ongoing management of the public realm landscapes and includes the following aspects:
- set desired character;
  - set urban design objectives;
  - set design themes and principles;
  - nominate street tree themes;

- design pedestrian paths and cycle ways (including provision for bicycle parking);
  - include management plans for landscape items; and
  - include agreed maintenance schedules , handover and defects liability periods with the Council
68. All public roads within the development will be local roads under the care and control of the Council.
69. Road typologies for Precinct 2 and 2C will be consolidated into the (by then) existing road typologies for Precinct 1, to the satisfaction of the Council.
70. Any traffic control devices for residential areas shall be designed and constructed in accordance with the main standard of the Manual of Uniform traffic Control devices \_ AS 1742.
71. Engineering construction plans for roads, drainage and footpaths and intersections shall be completed to the satisfaction of the Council.
72. Cut and fill batters required for road works shall be in accordance with the requirements of the Engineering and Design Guidelines for the Council.
73. Proponent to enter into an agreement with a licensed water entity for all water and wastewater requirements for Precinct 2 (Precinct 2C will initially be serviced via the approved WWMF for the first 350 allotments).
74. Detailed design for the open space areas is subject to agreement by the Council.
75. Subject to Section 34B of the Roads (Opening and Closing) Act 1991, Buckland Road between Legoe Road and the Gawler River will be closed on 19 December 2016 (as agreed with the Council) and the relevant plans will be lodged with the Surveyor General within 3 months of this closure.

#### *RESIDENTIAL DEVELOPMENT*

76. Residential Guidelines and an Encumbrance document incorporating all details as per the (original) Response Document shall be provided for any Community Titled and Torrens Titled allotments.
77. Proponent to provide and implement an agreed Recreation Facilities Strategy in agreement with the Council as required.

#### *PRIOR TO CONSTRUCTION WORK*

78. A Construction Environment Monitoring and Management Plan (CEMMP) for Precinct 2 and 2C must be completed to the satisfaction of the EPA and DAC on behalf of the Minister before construction commences (see notes for content of CEMMP).
79. An Operational Environment and Monitoring Management Plan (OEMMP) including the following and considering the suggested inclusions in the 'Notes' section attached:
- A Mosquito Management Plan (in consultation with the Department of Health)
  - An approved Significant Environmental Benefit (SEB) plan are to be completed for Precincts 2 and 2C and to the satisfaction of DEWNR and DAC.

### DURING CONSTRUCTION

80. Normal operating hours for the construction activities and construction work movements to and from the site shall be from 7am to 7pm Monday to Saturday inclusive.
81. Stockpiled soils shall be suitably managed to control dust emissions, erosion and weed infestation.
82. Undeveloped allotments shall be left in a neat and tidy condition, with soil surfaces stabilised to minimise erosion.

### PRIOR TO REGISTRATION OF NEW ALLOTMENTS

83. The Proponent must:

- a) Enter into a legally binding agreement with the Minister for Planning or his delegate dedicating a portion of the total Precinct 2 and 2C residential allotments to the provision of affordable housing such that 15% of the total residential development will meet the 'affordable housing criteria' as determined by the Minister by notice in the South Australian Government Gazette on October 2009 as amended by notice from time to time; and
- b) Provide a Plan developed to the satisfaction of the Director Affordable Housing and Asset Strategy within Renewal SA, for Precinct 2 and 2C showing the proposed location of the 15% of dwellings that will meet the affordable housing criteria.

84. The proponent must provide 2 copies of certified survey plans for Precinct 2 and 2C, which satisfy compliance with section 51 and the subsequent issue of Certificates of Title.

85. Landscaping and streetscaping of the common areas of the site shall commence prior to issuing of the Certificates of Title for Precinct 2 and 2C and when established shall be maintained in good health and condition at all times. A plant shall be replaced if and when it dies or becomes seriously diseased. A weed control plan shall also be implemented.

86. That any fencing surrounding the open space and along any boulevards shall be treated with a suitable anti-graffiti coating to facilitate easy removal of graffiti.

87. Proponent to provide accurate projections of resident populations to the Department of Health to plan for local and regional health services at 12 month intervals.

### 'SUBSTANTIAL COMMENCEMENT'

Substantial commencement will be deemed to be the completion of the road intersection works with Port Wakefield Road.

The development to which this development authorisation relates (Precinct 1 phase) must be commenced by substantial work (the intersection with Port Wakefield Road) on the site of the development by 31 October 2017, failing which the Governor may cancel the development authorisation.

### **PART B: NOTES TO PROPONENT**

1. The following is advised to the proponent:

#### **a) Building Rules**

The proponent must obtain a Building Rules assessment and certification from either the Council or a private certifier (at the proponent's option) and forward to the Minister all

relevant certification documents as outlined in Regulation 64 of the Development Regulations 2008 in relation to the building works for the Neighbourhood Centre ; and

Pursuant to Development Regulation 64, the proponent is especially advised that the Council or private certifier conducting a Building Rules assessment must:

- provide to the Minister for Planning a certification in the form set out in Schedule 12A of the *Development Regulations 2008* in relation to the building works in question; and
- to the extent that may be relevant and appropriate:
  - (i) issue a Schedule of Essential Safety Provisions under Division 4 of Part 12;
  - (ii) assign a classification of the buildings under these regulations; and
  - (iii) ensure that the appropriate levy has been paid under the Construction Industry Training Fund 1993.

Regulation 64 of the *Development Regulations 2008* provides further information about the type and quantity of all Building Rules certification documentation for major developments required for referral to the Minister for Planning. The City of Playford or private certifier undertaking Building Rules assessments must ensure that the assessment and certification are consistent with the provisional development authorisation (including its Conditions and Notes).

**b) *Construction, Environmental Management and Monitoring Plan covering preconstruction and construction phases.***

A Construction Environmental Management and Monitoring Plan (CEMMP) covering both pre-construction and construction phases shall be prepared in consultation with the EPA, before its submission to the Development Assessment Commission on behalf of the Minister. The CEMMP shall include the following:

- reference to, and methods of adherence to, all relevant EPA policies and codes of practice for construction sites, including the inclusion of a copy of Schedule 1 of the *Environment Protection Act 1993* as an Appendix to the Construction Environmental Management and Monitoring Plan to ensure contractors are aware of EPA requirements;
- address management issues during construction and including a site audit (or as required by EPA);
- timing, staging and methodology of the construction process and working hours (refer also to conditions outlining working hours);
- a risk assessment relating to the potential impacts of construction activities;
- traffic management strategies during construction, including transport beyond the development site;
- management of infrastructure services during construction;
- control and management of construction noise, vibration, dust and mud;
- stormwater and groundwater management during construction;
- control and management of any floodwater risk across the site;

- identification and management of contaminated soils and groundwater, should these be encountered;
- site security, fencing and safety and management of impacts on local amenity for residents, traffic and pedestrians;
- disposal of construction waste, any hazardous waste and refuse in an appropriate manner according to the nature of the waste;
- protection and cleaning of roads and pathways as appropriate; and
- overall site cleanup.

The CEMMP should be prepared taking into consideration, and with explicit reference to, relevant EPA policies and guideline documents, including the *Environment Protection (Noise) Policy 2007*.

### **c) Operational Environment Management Plan**

The Operational Environment Management Plan would need to be prepared the commercial components, to the reasonable satisfaction of the EPA, the Department of Environment, Water and Natural Resources and the Council, prior to construction commencing, for approval by the DAC on behalf of the Minister.

2. The proponent is advised that noise emissions from the Neighbourhood centre and residential (display village) development will be subject to the Environment Protection (Noise) Policy 2007 and the *Environment Protection Act 1993*.
3. If the development is not substantially commenced by 31 October 2017, the Governor may cancel this development authorisation.
4. The proponent is advised of the General Environmental Duty under Section 25 of the *Environment Protection Act 1993*, which provides that a person must not undertake any activity, which pollutes, or may pollute, without taking all reasonable and practical measures to prevent or minimise harm to the environment.
5. The proponent is advised of the requirement to comply with the EPA's 'Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry' during demolition and construction of the development.
6. The proponent is advised that the *Development Act 1993* outlines the roles and responsibilities of the applicant and the Council for matters relating to building works during and after construction of the neighbourhood centre and associated works.
7. Partial closure of Legoe Road under Part 7A (Section 34C (2) (a) (ii)) of the *Roads (Opening and Closing) Act 1991* as described in drawing number 19000PO2—r5 Issue 5—Sheets 1-4 to take effect on a day to be fixed by subsequent order of the Governor or Minister published in the *Gazette*, once surveyed Land Division plans have been submitted and alternate physical access is provided to all affected allotments.
8. Section 51 of the *Development Act 1993* will apply to the land division in that the proponent will need to satisfy the requirements of this Section in order to implement this land division, including completion of the signalised intersection at the junction of Port Wakefield Road/Legoe Road.

9. This approval does not include any approval for dwellings as it is not part of this application.
10. This approval does not include any approval for signs (as defined as 'Development' under the *Development Act 1993*) as it is not part of this application.
11. The provisions of the *Food Act 2001*, and associated food regulations apply
12. Any Sanitation units installed in the Neighbourhood Centre will be installed as per the requirements of the *Public and Environmental Health Act (1987)*.
13. That provision shall be made for secure storage of shopping trolleys within the neighbourhood complex at night to the reasonable satisfaction of the City of Playford.
14. In addition to the Building Code of Australia, the proponent must comply with the Commonwealth *Disability Discrimination Act 1992*, in planning access for the disabled.
15. The main standard for traffic control devices is the Manual of Uniform Traffic Control Devices—AS 1742. There are many standards under AS 1742 covering the various traffic control devices that may need to be referred to.
16. As per Schedule 8, Item 23, Development Regulations 2008, and the *Affordable Housing Act 2007* for the proposal to include 15 per cent affordable housing.
17. The proponent should note that they and their contractors must comply with the requirements of the *Aboriginal Heritage Act 1988*.
18. 18. The proponent should note that they and their contractors must comply with the *Adelaide Dolphin Sanctuary Act 2005* and the general duty of care under that Act.
19. Proponent to undertake vegetation surveys and to complete a Significant Environmental Benefit (SEB) with attached Vegetation Management Plans to the satisfaction of the Department of Environment, Water and Natural Resources for Stages 2-5 where native vegetation exists on the site (there is no native vegetation in Stage 1).
20. Approval for further Road closures under the *Roads (Opening and Closing Act) 1991*, will be required in future stages of the development and will proceed through the normal (Council) process in relation to this matter.
- 20A. The proponent must take all reasonable and practicable measures to prevent odour impacts at sensitive receivers (in the form of environmental nuisance) from all odour sources including the pump stations, storage tanks and the effluent transfer and transport.
- 20B. The management plan for the biofiltration bed associated with the WWMF should include how aspects of the biofiltration such as moisture control, microbial efficiency, condition and maintenance will be monitored and managed.
21. The Minister has a specific power to require testing, monitoring and auditing under Section 48C of the Act.

## 9. REFERENCES

The Premier of South Australia, 2007, *South Australia's Strategic Plan*.

Strategic Infrastructure Plan for South Australia (2005/6 – 2014/15)

Walker Corporation, *Buckland Park Environmental Impact Statement*, March 2009

Walker Corporation, *Response to Submissions on the Environmental Impact Statement*, October 2009

Department of Planning, Transport and Infrastructure, *Assessment Report for the Buckland Park EIS*, 7 January 2010

Walker Corporation, Amendment to the EIS, March 2015

30 Year Plan for Greater Adelaide, DPTI, September 2016.

## 10. GLOSSARY

AS	Australian Standard
CEMMP	Construction Environment Management and Monitoring Plan
DHS	Department of Human Services
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	Environment Protection Authority
OEMMP	Operational Environment Management and Monitoring Plan
PIRSA	Primary Industries and Resources SA
The Act	<i>Development Act 1993</i>
WWMF	Waste Water Management Facility

# BUCKLAND PARK MAJOR DEVELOPMENT

## DEVELOPMENT APPLICATION

AMENDMENT TO THE EIS

- SUPER LOT (STAGING) AMMENDMENT
- PRECINCT 2 LAND DIVISION
- ROAD CLOSURE

## *RIVERLEA*

NOVEMBER 2014

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# RIVERLEA



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## 1.0 INTRODUCTION

### 1.1 Background

On 12 June 2008 the Minister for Planning made a Major Project Declaration across the Buckland Park Masterplan site, nominating the following developments for assessment:

- Land divisions, comprising more than one allotment, and associated works and activities.
- The first neighbourhood centre, of up to 8,000m<sup>2</sup> of gross leasable area, associated community uses, and ancillary development and signs.
- A display village and ancillary development and signs.

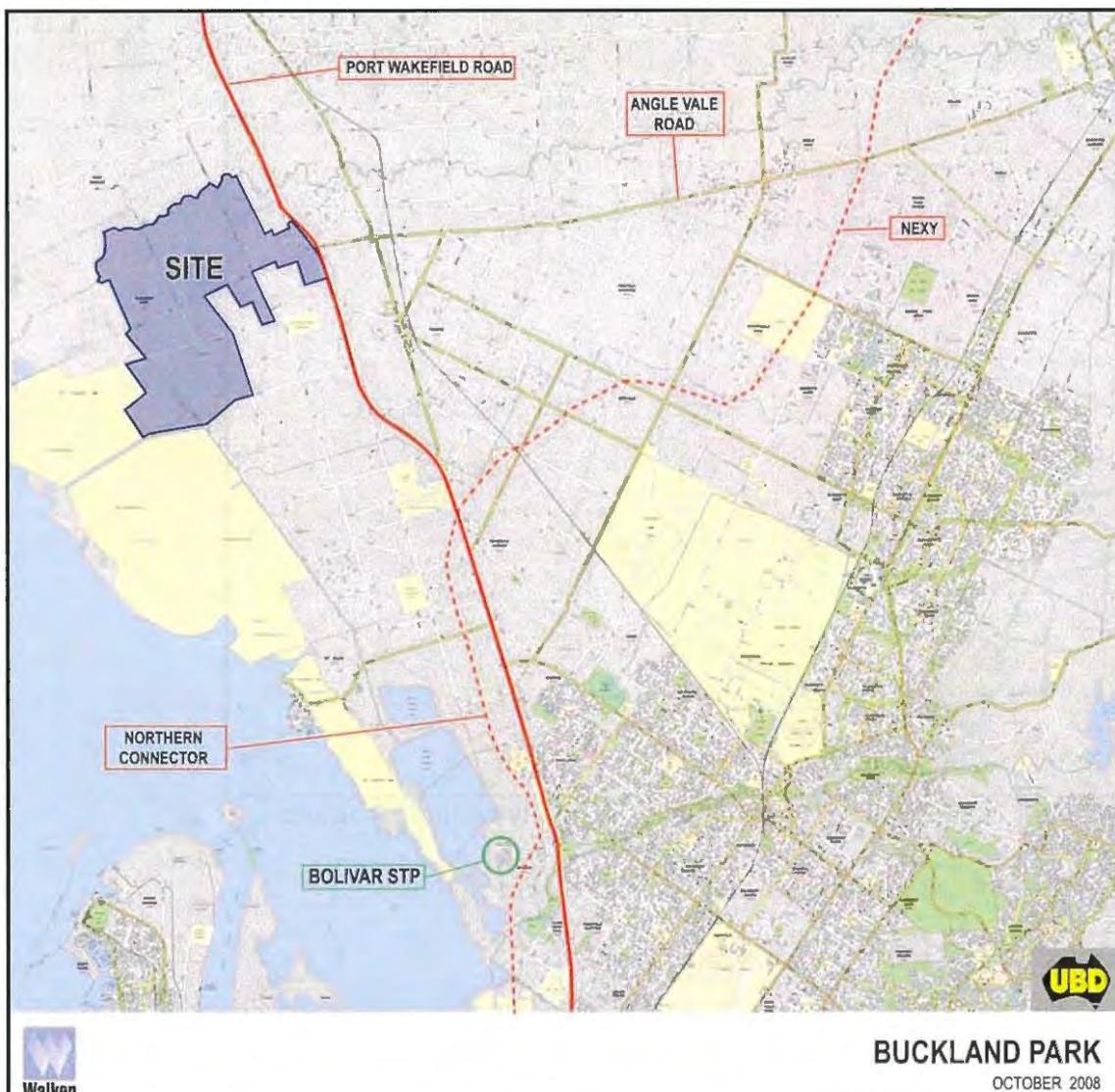


Figure 1: Major Project Declaration site - location

After preparation and assessment of an EIS, and compliance with conditions of a provisional authorisation, on 22 December 2011 the SA government gave authorisation for a Super lot land division of the Buckland Park Masterplan site, which sets out the location, size and order of stages for the progressive development of the site over 25 years.

The Super lot (staging) was informed by a Masterplan which set out the location of key community infrastructure.

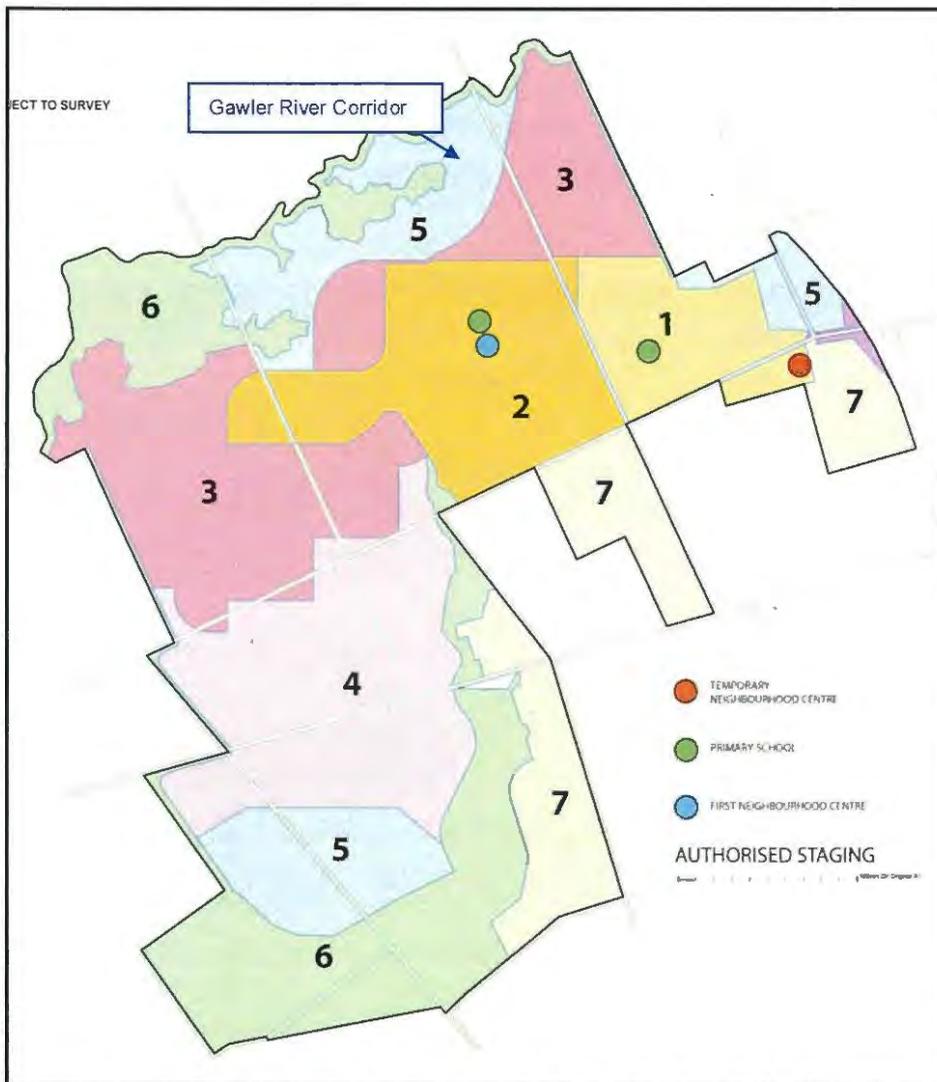


Figure 2: Authorized staging and community facility locations

## 1.2 Super Lot (staging) and Precinct 2 land division

Since receiving authorisation, Walker has:

- Worked with infrastructure agencies designing and/or constructing essential infrastructure.
- Reviewed land use planning and staging.
- Prepared a broad marketing strategy.



## 2.0 THE PROPOSED SUPER LOT (STAGING) AMENDMENT

In summary, the proposed staging amendments respond to three criteria:

1. Creating a 'sense of place', around which a new community will grow.
2. Building a strong community focus, with the facilities and services needed to support the new community into the future.
3. Recognising the Gawler River corridor as an important asset, both for the environment, and for landscape and recreation amenity.

Precincts 1 and 2's key community facilities have been grouped to create a community focus, located centrally to both Precincts' residential neighbourhoods.

The size and location of Precinct 2 has been amended to connect its residential neighbourhoods to community focus, and to incorporate the Gawler River corridor into the project at an early stage. The amended staging and community focus is reflected in the Super Lot land division concept at **Annexure 1**. Essentially, residential neighbourhoods will roll out west from Precinct 1, then north toward the Gawler River. As authorised, roll out into Precinct 2 headed west, and connection to the Gawler River was not envisaged until Precincts 3 and 5 were implemented.

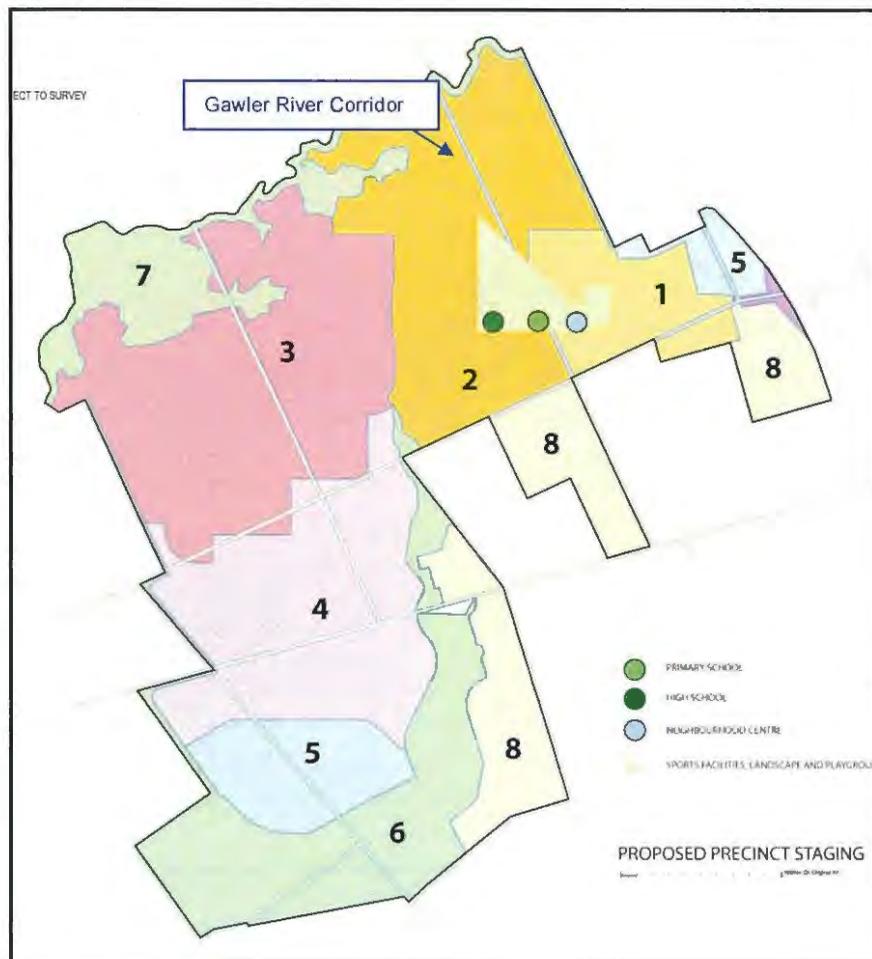


Figure 4: Proposed staging and community facility locations

## 2.1 A new community focus

The amended staging facilitates the provision of a centrally located community focus, integrated into the residential areas of Precincts 1 and 2 by roads, open space corridors and local parks, which are arranged to facilitate access by bus, on foot, or by bicycle. Connections are provided to the Gawler River corridor.

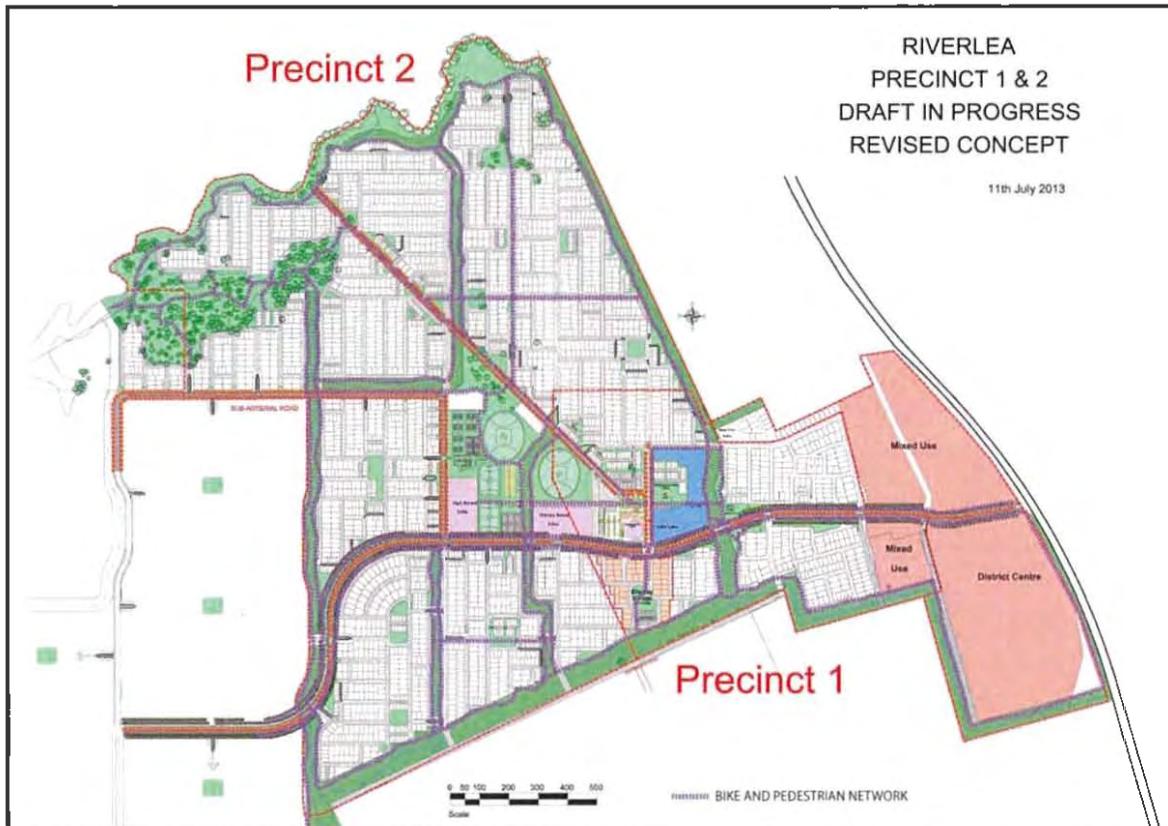


Figure 5: Precincts 1 and 2 with integrated community focus

Facilities have been planned within the community focus which will attract future residents, serve the new community into the future, and draw visitors into the area:

### Precinct 2:

- District level sporting fields and courts.
- A primary school.
- A high school.

### Precinct 1:

- A new community centre.
- A neighbourhood centre.
- A Display Village.
- Improved, larger and more feasible retail facilities, particularly the supermarket.
- A landscaped lake with opportunities for high amenity housing, recreation activities and restaurants or cafes.

Its location on the landscaped entry boulevard facilitates visibility creating a point at which you feel you've 'arrived' contributing to that 'sense of place'. It is highly accessible for buses, delivery vehicles and cars.

A bike and pedestrian network will provide connections between, and within, each Precinct's residential neighbourhoods and the community focus.

## 2.2 Road and Bus Routes

The amended Super lot staging retains the logical arrangement of major roads and bus routes. The proposed community focus is located on the future Elizabeth (red) and Munno Para (green) regional bus routes.

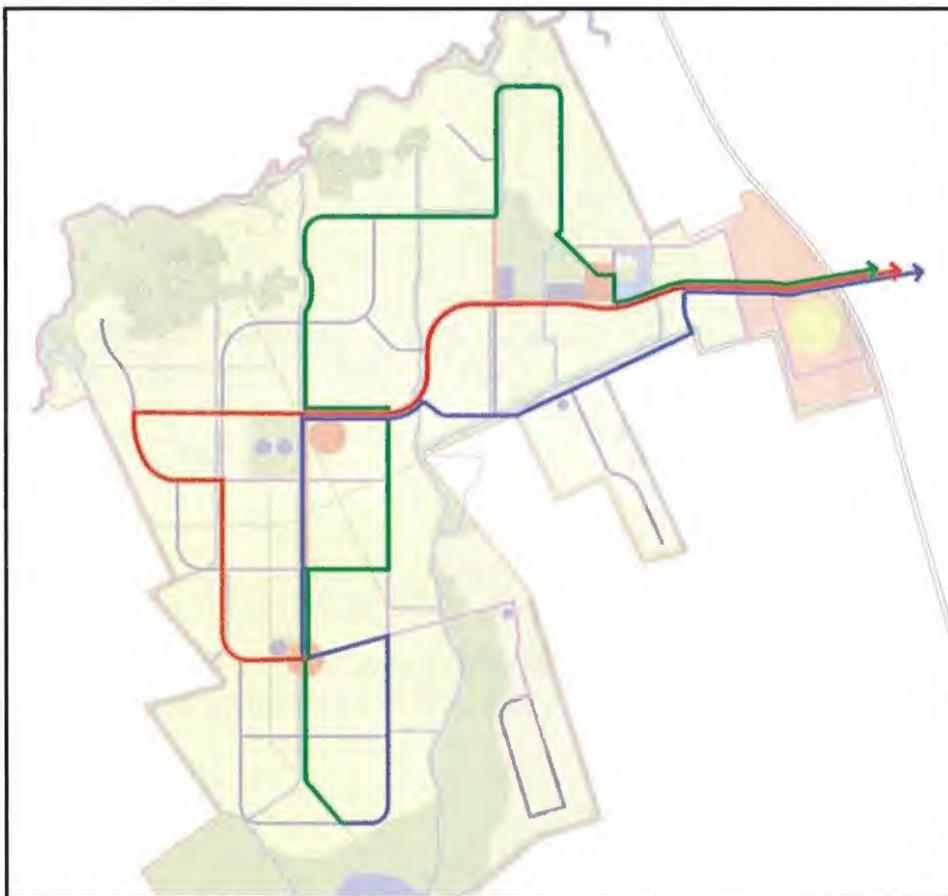


Figure 6: Ultimate bus routes

### 3.0 PROPOSED PRECINCT 2 LAND DIVISION

The Precinct 2 land division comprises 2,664 residential allotments of various sizes. Residential neighbourhoods will be supported by facilities in the community focus, as well as local and sub-arterial roads, and local, district and regional open space.

This Development Application seeks approval for the Precinct 2 land division, associated construction of roads, parks and civil works, as well as the installation of necessary infrastructure and utilities.

Plans and concepts are at Annexure 1.

### 3.1 Land division

Statistics for Precincts 1 and 2 are provided, to provide an overall picture.

**Table 1: Precincts 1 and 2 statistics**

	PRECINCT 1	PRECINCT 2	TOTAL
<b>PRECINCT AREA</b>			
<b>TOTAL</b>	<b>76.200</b>	<b>371.480</b>	<b>447.680 hectares</b>
<b>RESIDENTIAL AREA</b>			
<b>TOTAL</b>	<b>69.700</b>	<b>258.660</b>	<b>328.370 hectares</b>
<b>OPEN SPACE AREA</b>			
Reserves	12.941	49.910	62.851
Drainage	8.953	34.550	43.503
<b>TOTAL</b>	<b>21.894</b>	<b>84.460</b>	<b>106.354 hectares</b>
<b>SCHOOL AREA</b>			
Primary School	0.650	1.351	2.001
High School		2.002	2.002
<b>TOTAL</b>	<b>0.650 hectares</b>	<b>3.350 hectares</b>	<b>4.003 hectares</b>
<b>NEIGHBOURHOOD CENTRE AREA</b>			
<b>TOTAL</b>	<b>2.640 hectares</b>	<b>0</b>	<b>2.640 hectares</b>
<b>NEIGHBOURHOOD CENTRE</b>			
Supermarket	3,010m <sup>2</sup>	0	3,010m <sup>2</sup>
Specialty shops (14)	1,213m <sup>2</sup>	0	1,213m <sup>2</sup>
Park Kiosk (3)	675m <sup>2</sup>	0	675m <sup>2</sup>
Community space	400m <sup>2</sup>	0	400m <sup>2</sup>
Sales Office	500m <sup>2</sup>	0	500m <sup>2</sup>
<b>TOTAL</b>	<b>5,348m<sup>2</sup></b>	<b>0</b>	<b>5,348m<sup>2</sup></b>
Car parking spaces	200	0	200

	PRECINCT 1	PRECINCT 2	TOTAL
<b>DISPLAY VILLAGE</b>			
TOTAL	45	0	45
<b>RESIDENTIAL ALLOTMENTS</b>			
SIZE	PRECINCT 1	PRECINCT 2	TOTAL
500m <sup>2</sup> +	179 (33%)	497 (19%)	676 (21%)
450 m <sup>2</sup> – 500m <sup>2</sup>	136 (25%)	600 (23%)	736 (23%)
300 m <sup>2</sup> – 450m <sup>2</sup>	94 (17%)	786 (30%)	880 (27%)
175m <sup>2</sup> – 300m <sup>2</sup>	132 (25%)	781 (29%)	913 (28%)
<b>TOTAL</b>	<b>541 (100%)</b>	<b>2,664 (100%)</b>	<b>3,205 (100%)</b>
Future mixed use	4.17	0	4.17 hectares

### 3.2 Community

The community focus can accommodate many of the community facilities. It is located centrally to both Precinct 1 and Precinct 2’s residential neighbourhoods.

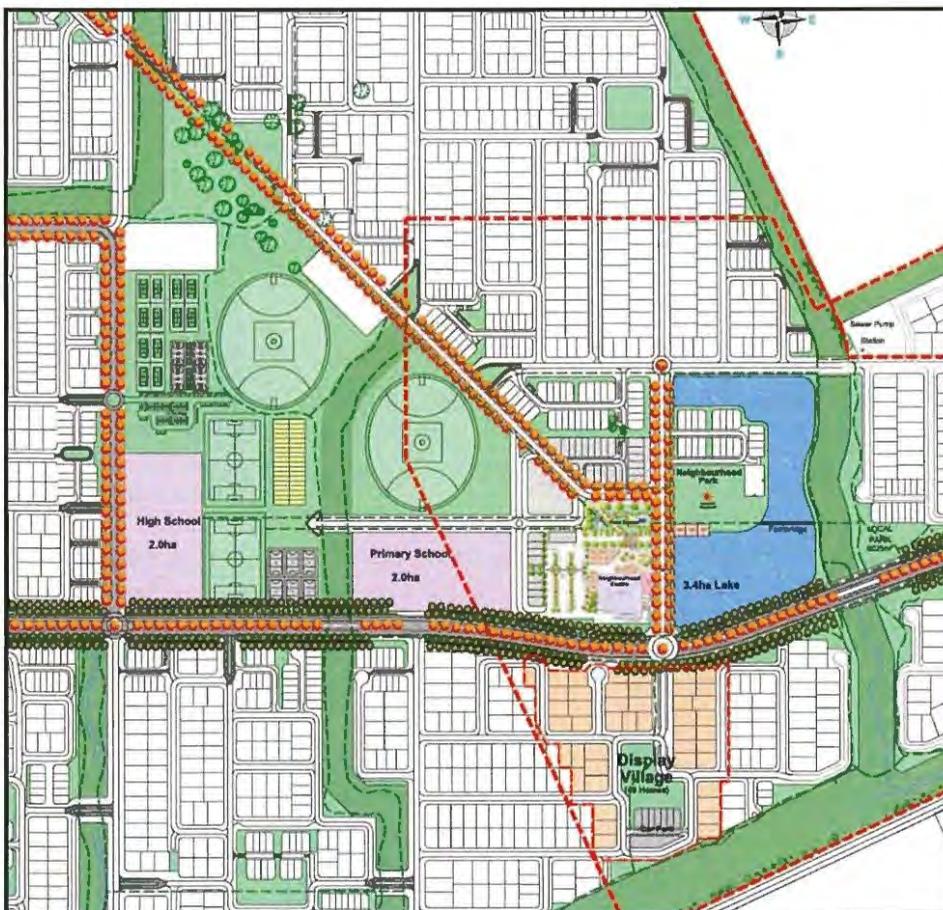


Figure 7: The community focus

### ***Schools***

Sites within the community focus have been identified for a primary and a high school, co-located with district recreation facilities. Two separate allotments have been provided, however this arrangement is flexible, and can be revised to meet the requirements of the education provider, whether public or private. The Department of Education and Child Development has advised 4 hectares are required for a Birth to 12 school (DECD, 2013).

### ***Parks and recreation***

Precinct 2's open space areas will be used for a variety of purposes:

- Passive recreation.
- Active recreation with kick about areas and playgrounds.
- Tree, vegetation and biodiversity management.
- Bicycle and walking connections.
- Local recreation – playgrounds and landscaping.
- District recreation – ovals and sports facilities.
- Regional recreation – the Gawler River corridor.
- Storm and flood water management.

To ensure efficiency, many spaces will be used for a variety of purposes. For example, local parks will support retained native trees, contribute to landscape quality and/or provide equipment for active play.

The primary and high school allotments adjoin proposed district active open space, facilitating shared use, efficient use of land, and reduced construction, maintenance and operations costs, for all potential users, for example, the Department of Education, private sector education providers, and Playford Council.

### **3.3 Affordable housing**

15% (400) of Precinct 2's allotments has been nominated as Affordable Housing. This component includes a range of allotment sizes and locations.

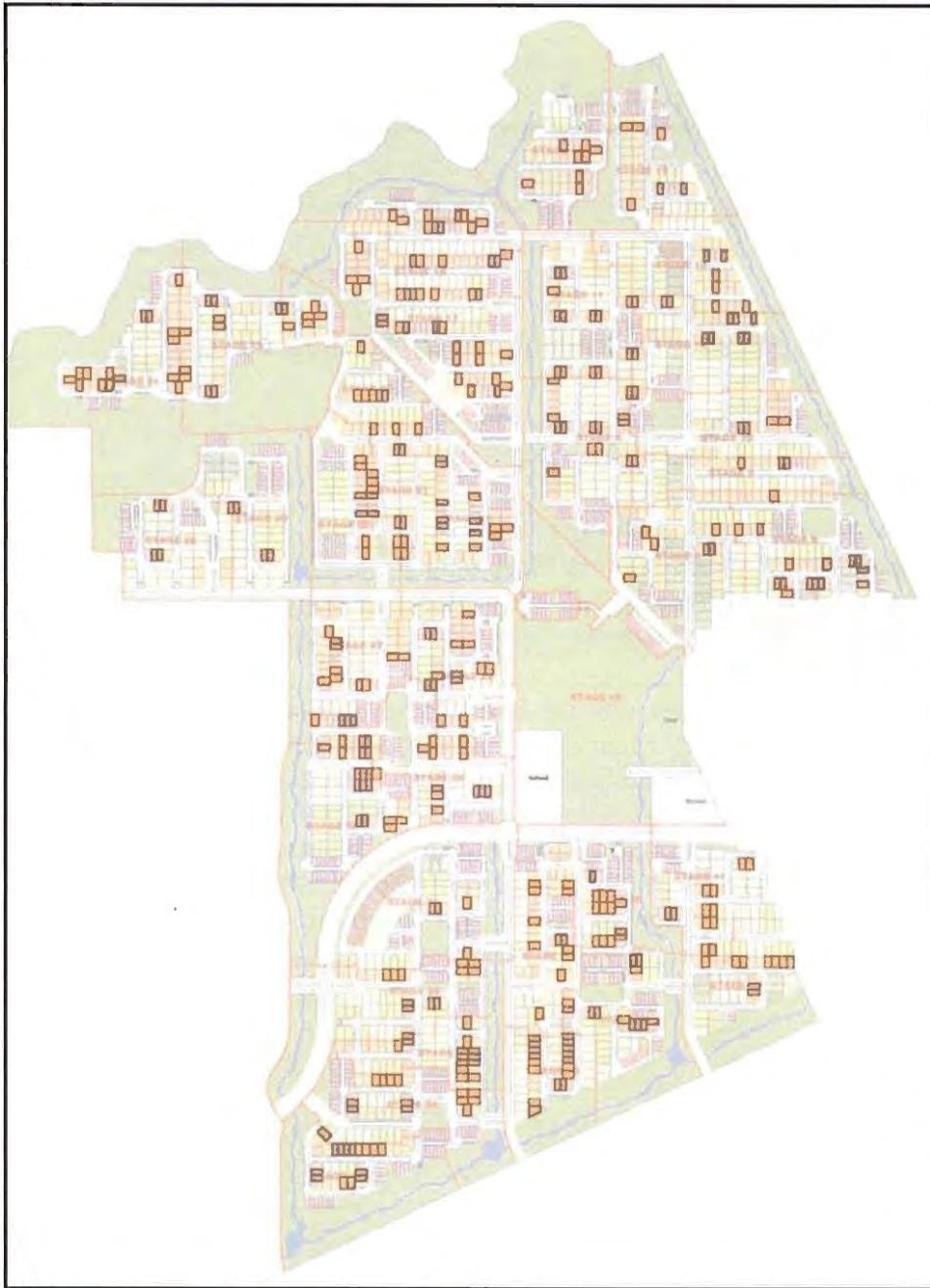


Figure 8: Affordable Housing

### 3.4 Storm and flood water management

Wallbridge & Gilbert have prepared a concept for the management of storm and flood water within Stage 2. The recommended channels, swales and detention facilities will be incorporated into the project as it is implemented. (Annexure 4).

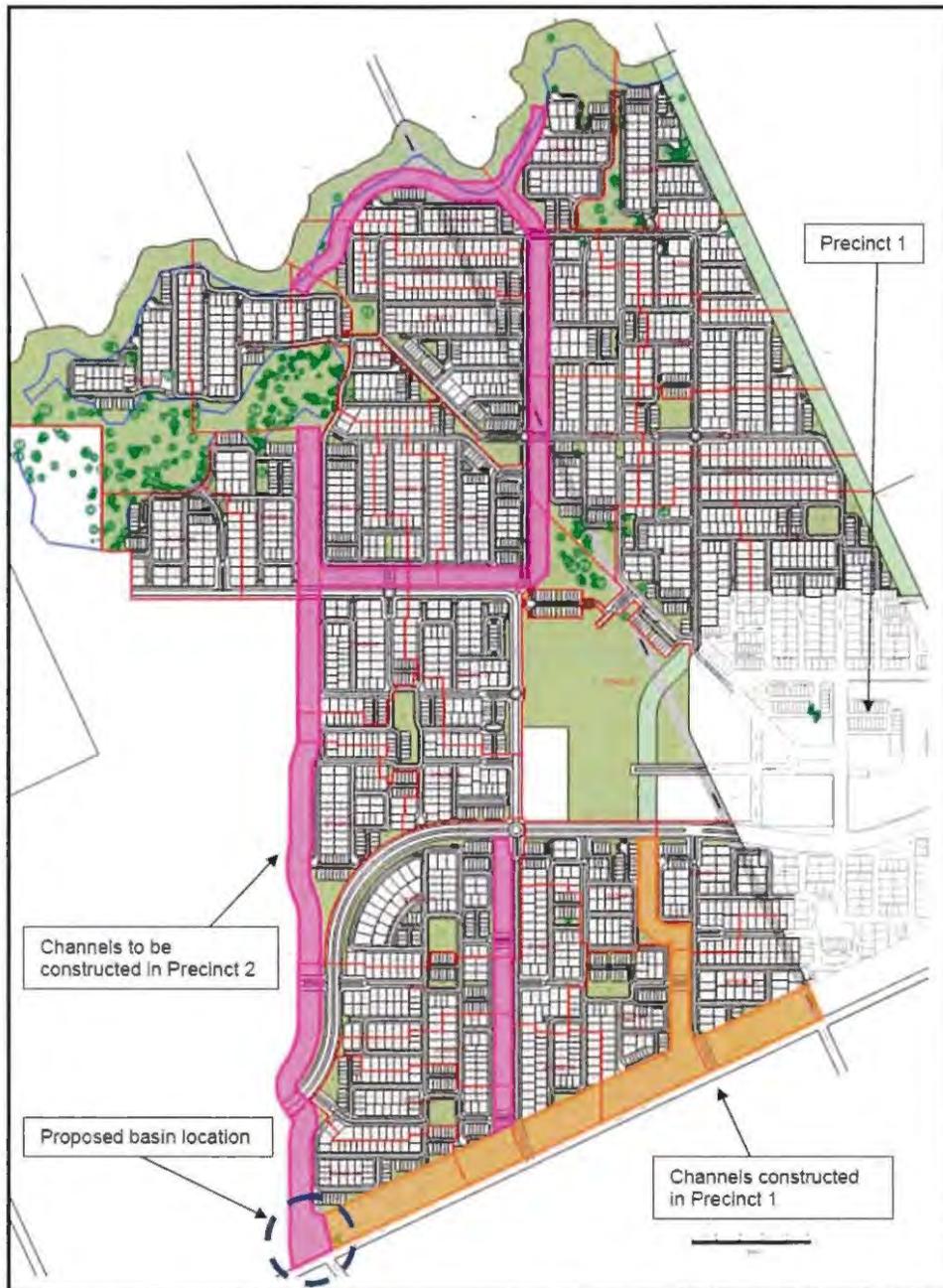


Figure 9: Stormwater management infrastructure

### 3.5 Infrastructure

Infrastructure and utilities will be required to support new housing on the proposed land division.

The Master plan approach facilitates the orderly roll out of Precincts, which in turn allows the coordinated and efficient provision of infrastructure. Accordingly, infrastructure across and between Precincts 1 and 2 has been coordinated.

### ***Bikes and walking***

Precinct 2 includes networks for bikes and pedestrian, using parks and road systems.

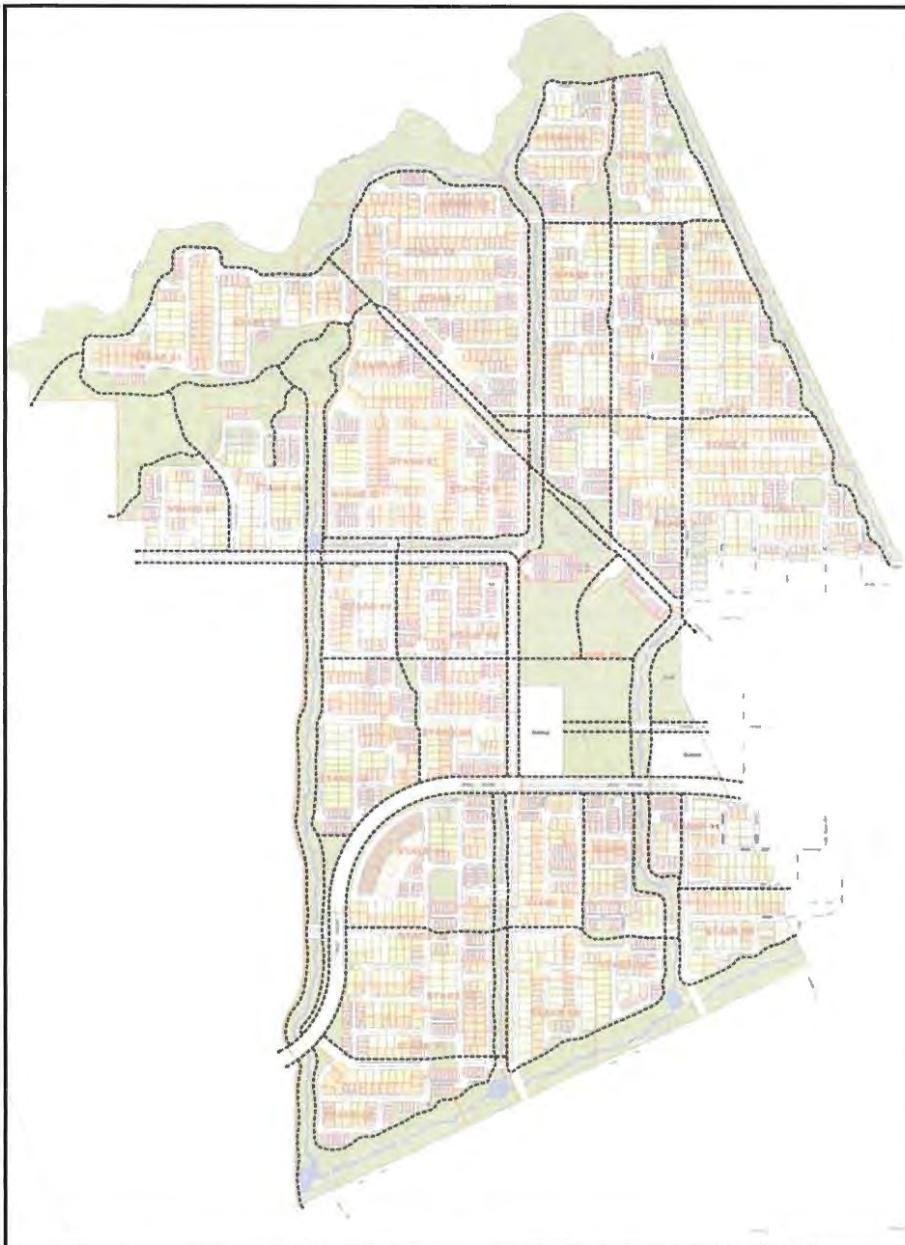


Figure 10: Precinct 2 bicycle and pedestrian network

### ***Water and sewer***

On 31 July 2013, SA Water confirmed water utilities would be available to Precinct 2. (Annexure 2)

**Electricity**

On 20 June 2013, SA Power Networks confirmed electricity would be available to Precinct 2. (Annexure 2)

**Gas**

On 9 July APA Group confirmed gas would be available to Precinct 2. (Annexure 2)

**Roads and traffic**

GTA Consultants conclude Precinct 2's road layout, and traffic management facilities have the capacity to accommodate anticipated traffic generation from both Precincts 1 and 2 (page 37). (Annexure 3).

**Buses**

Precinct 2's bus routes integrate into the network anticipated in the EIS Masterplan, providing connections into Precinct 1 and the wider region.

**4.0 DESIGN ISSUES****4.1 Appearance and landscape quality****Public domain**

Walker and Playford Council have prepared a Landscape Master Plan to guide the progressive implementation of a landscaped public domain across the site which is both functional and sustainable, while being attractive to residents and visitors. Its strategic framework is complemented by landscape guidelines, images and diagrams illustrating intended outcomes for open space and streetscapes, to create a cohesive and integrated public domain.

The Plan was informed by analysis of the site's environmental and climatic conditions to ensure it is achievable. It also clearly sets out parameters for the design and on-going management of storm water and biodiversity networks. Consistency with the other Playford projects will be achieved by concurrent application of other City of Playford landscape guidelines.

**Special fencing controls**

To address public domain appearance, and potential vandalism, residential allotments with fencing to open space or major roads will be subject to special fencing controls, which will be imposed via 'Walker Residential Design Guidelines'.

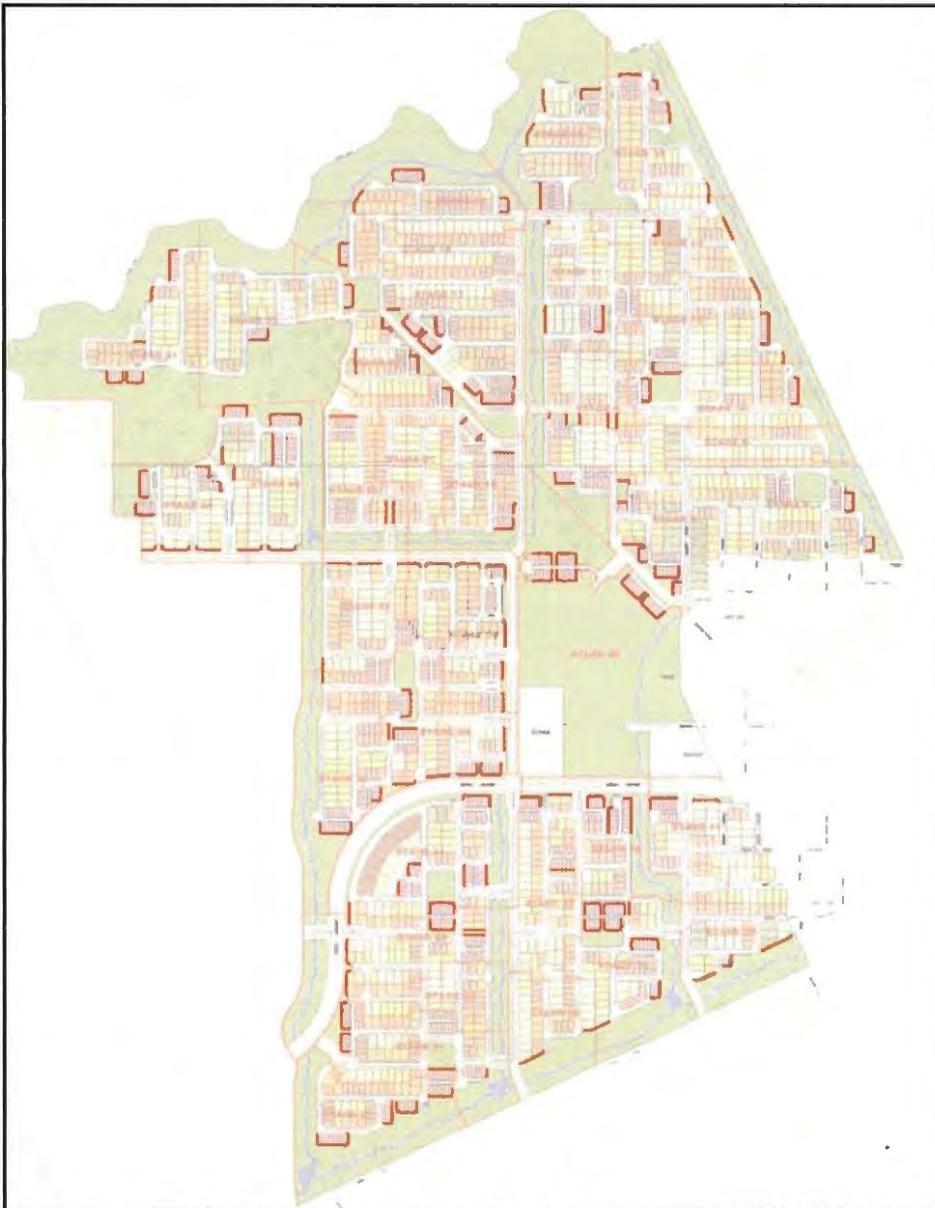


Figure 11: Special fencing control locations

## 4.2 Physical environment

### *Ground water*

Ground water below Precinct 2 is deeper than elsewhere within the Masterplan site. SKM (2009) concluded ground water is likely to be lowered as a result of implementing the Masterplan project, and to Walker's knowledge there have been no changes in the region which would supersede this conclusion.

Detailed site investigations will be undertaken as part of Precinct 2's civil engineering design.

### ***Contamination***

Connell Wagner's (2008a) identified Precinct 2's southern part as having a 'low to moderate risk' of contamination associated with previous grazing and agricultural activities (2008a: 15, 16).

However, after preliminary soil and ground water sampling, Connell Wagner concluded there were 'no major signs of contamination across the site' (2008a: 34).

Notwithstanding, detailed contamination investigations will be undertaken as part of Precinct 2's civil engineering design.

### ***Noise and air quality***

Air quality and odour issues related to the Jeffries facility are not applicable to Precinct 2. Horticulture interface issues are pertinent in the north eastern area, and accordingly, the land division includes a 50 metre separation between residential neighbourhoods and the boundary.

### ***Geotechnical conditions***

Golder and Associates (2009a & b) found no issues related to geotechnical conditions, or actual Acid Sulphate Soils (ASS), actual ASS indicators, or Potential ASS within Precinct 2's boundaries. In Precinct 2's southern part, there is a 'medium risk' of encountering ASS.

Detailed geotechnical investigations will be undertaken to inform Precinct 2's civil engineering and landscaping designs.

### ***Gawler River Corridor and Significant Trees***

EBS Ecology have mapped vegetation within Precinct 2's boundaries, updating flora work undertaken by Dr Bob Anderson in 2008 for the Buckland Park EIS. This work will be presented to the City of Playford and the Native Vegetation Council as part of Masterplan site biodiversity strategy.

Notwithstanding, Precinct 2 has been designed so significant trees and the Gawler River corridor are incorporated into open space areas.

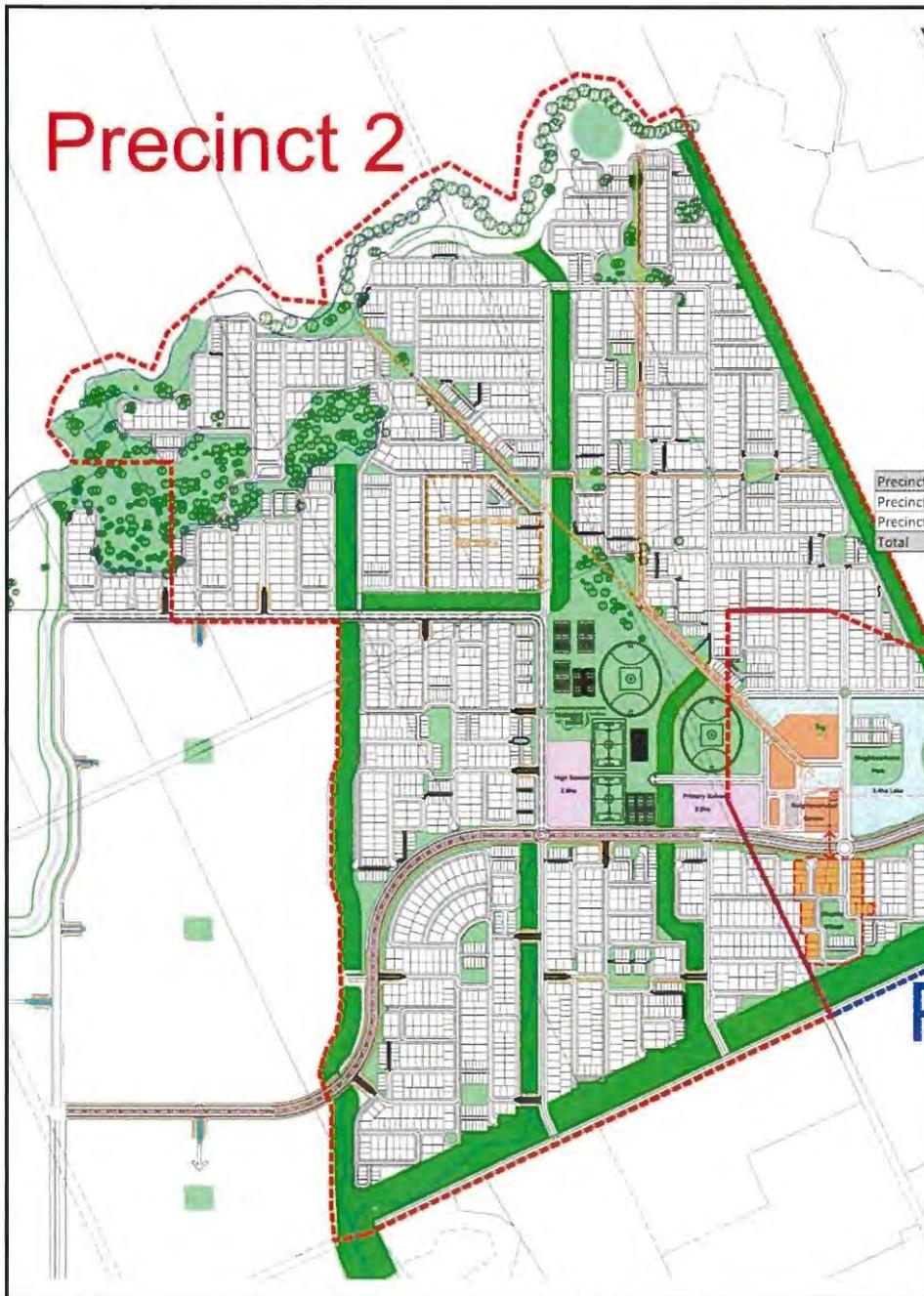


Figure 12: Existing vegetation with land division overlaid

### 4.3 Indigenous Heritage

In late 2012 detailed surveys of the Masterplan site and Precinct 2 were undertaken by AHCM, with the close involvement of the traditional Kaurna owners (AHCM, 2013).

Walker is taking a proactive approach to managing indigenous heritage and cultural issues associated with the Masterplan site.

Accordingly, an application pursuant to Sections 21 and 23 of the *Aboriginal Heritage Act 1988* was submitted to the Minister for Aboriginal Affairs and Reconciliation to undertake archaeological investigations in locations across the Masterplan site, including Precinct 2, and to salvage items if required.

This application was approved by the Minister for Aboriginal Affairs on 1 August 2014 subject to conditions.

#### **4.4 European Heritage**

There are no matters of European Heritage associated with Precinct 2 (Anderson, 2008).

## 5.0 METROPOLITAN PLANNING

### 5.1 The 30 Year Plan for Greater Adelaide

The Precinct 2 land division is consistent with the 30 Year Plan, which nominates the Buckland Park site as a location to accommodate a significant amount of the new housing required in northern Adelaide over the coming decades.

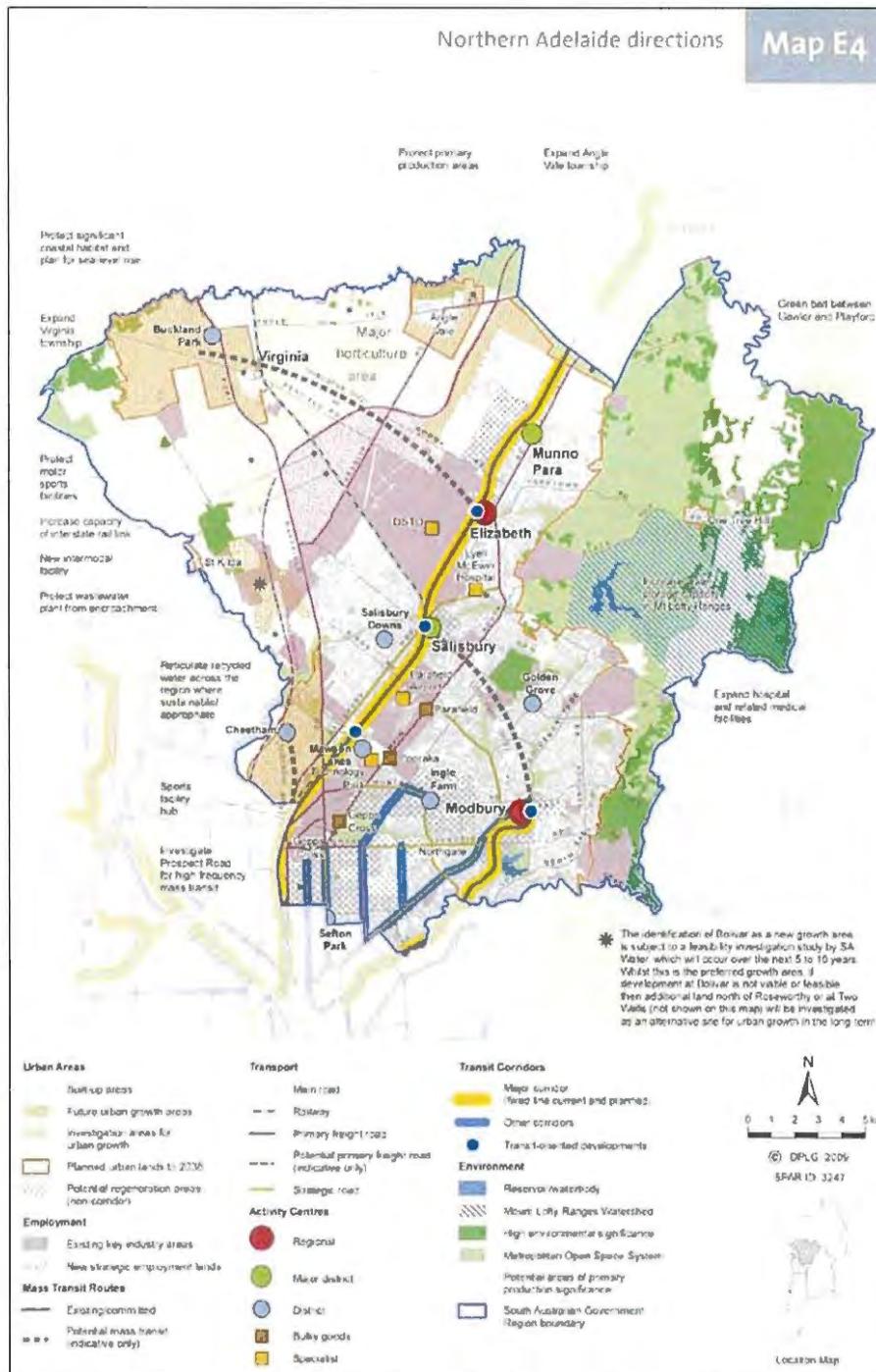


Figure 13: Regional Directions for northern Adelaide

## 5.2 The Playford Growth Area Structure Plan

The 30 Year Plan is being implemented in Playford through a Growth Area Structure Plan, which the Department of Planning Transport and Infrastructure (DPTI) exhibited to 2 August 2013.

The draft Structure Plan seeks to coordinate infrastructure provision across all identified growth areas in the Playford local government area. To a certain extent, it therefore supersedes infrastructure planning work undertaken as part of the Buckland Park EIS and DPA processes, which considered infrastructure only for that project.

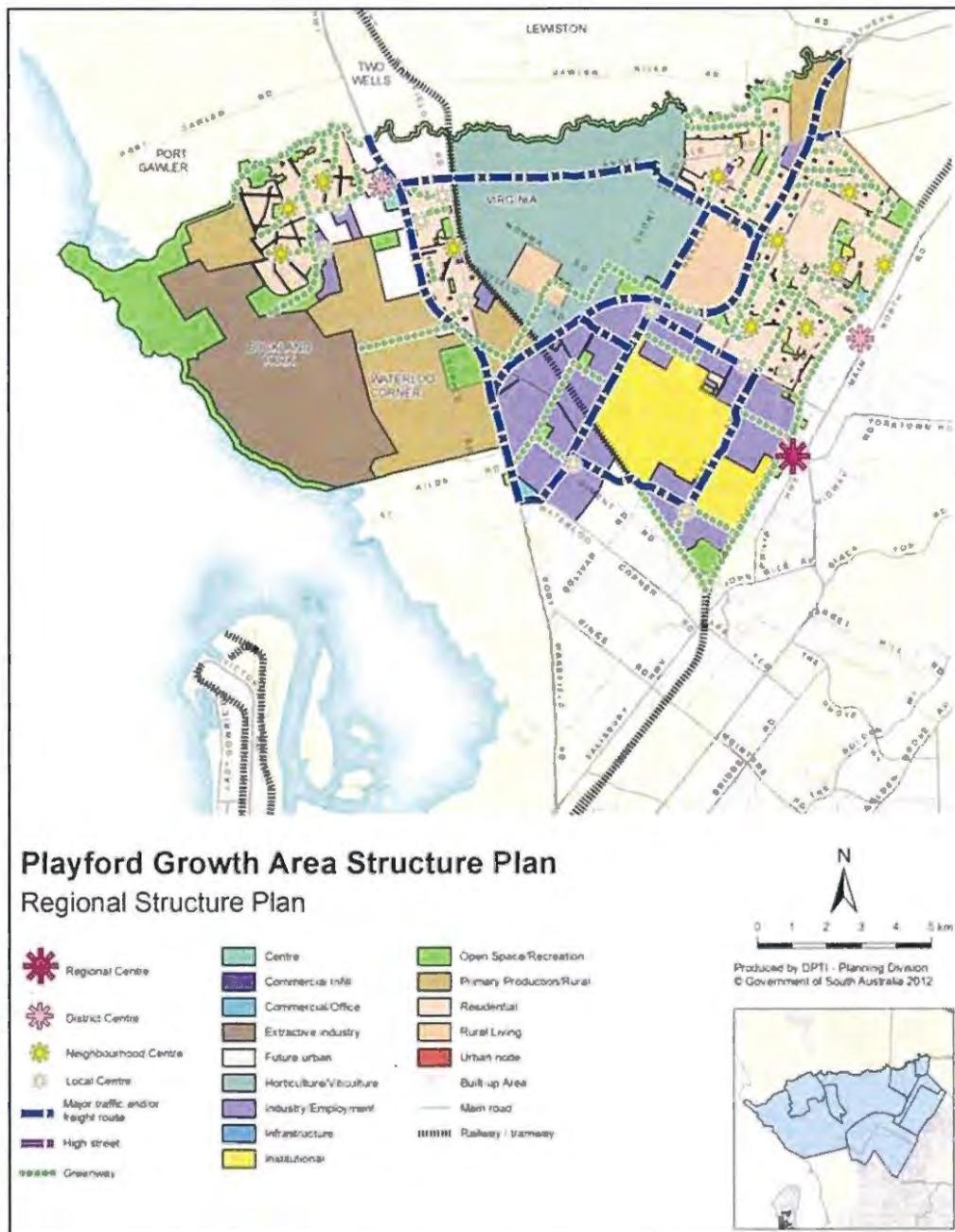


Figure 14: Draft Playford Growth Area Structure Plan

### ***Transport infrastructure***

Buckland Park's major regional road connection is Port Wakefield Road, and accordingly, the District Centre is located there, facilitating visibility and clear connections with the wider region. Heavy vehicles visiting the District Centre will be separated from the Masterplan's residential areas.

This is consistent with the Structure Plan's nomination of Port Wakefield Road as a major traffic and freight route.

The Structure Plan envisages road improvements in the Masterplan's locality, particularly traffic lights at Port Wakefield Road's intersection with Angle Vale Road.

Importantly it identifies possible grade separated intersections to be provided as growth occurs, one at Port Wakefield Road and Angle Vale Road, and one at Port Wakefield Road and Old Port Wakefield Road .

The Precinct 2 land division is consistent with the Structure Plan's proposals for road infrastructure.

### ***Public transport***

Buckland Park's main entry boulevard will carry metro ticketed bus routes into the Masterplan site, and is consistent with the Structure Plan's proposals for public transport. In particular it links with the District Centre to the community focus.

Bus routes will extend from the main entry boulevard into Precinct 2.

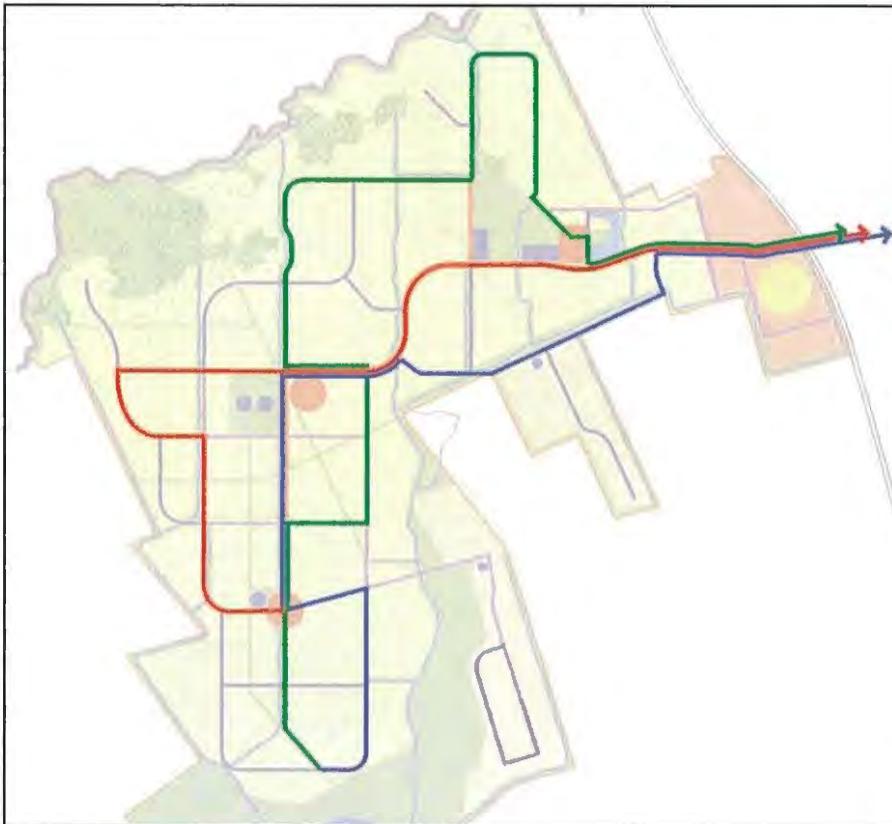


Figure 15: Amended masterplan bus routes

### ***Walking and cycling***

Precinct 2's layout is consistent with the Structure Plan. It includes the Gawler River corridor as a biodiversity and recreation asset. Bike and pedestrian routes are incorporated into its residential neighbourhoods, and link to the community focus.

They are designed and coordinated across Precinct 1 and 2.

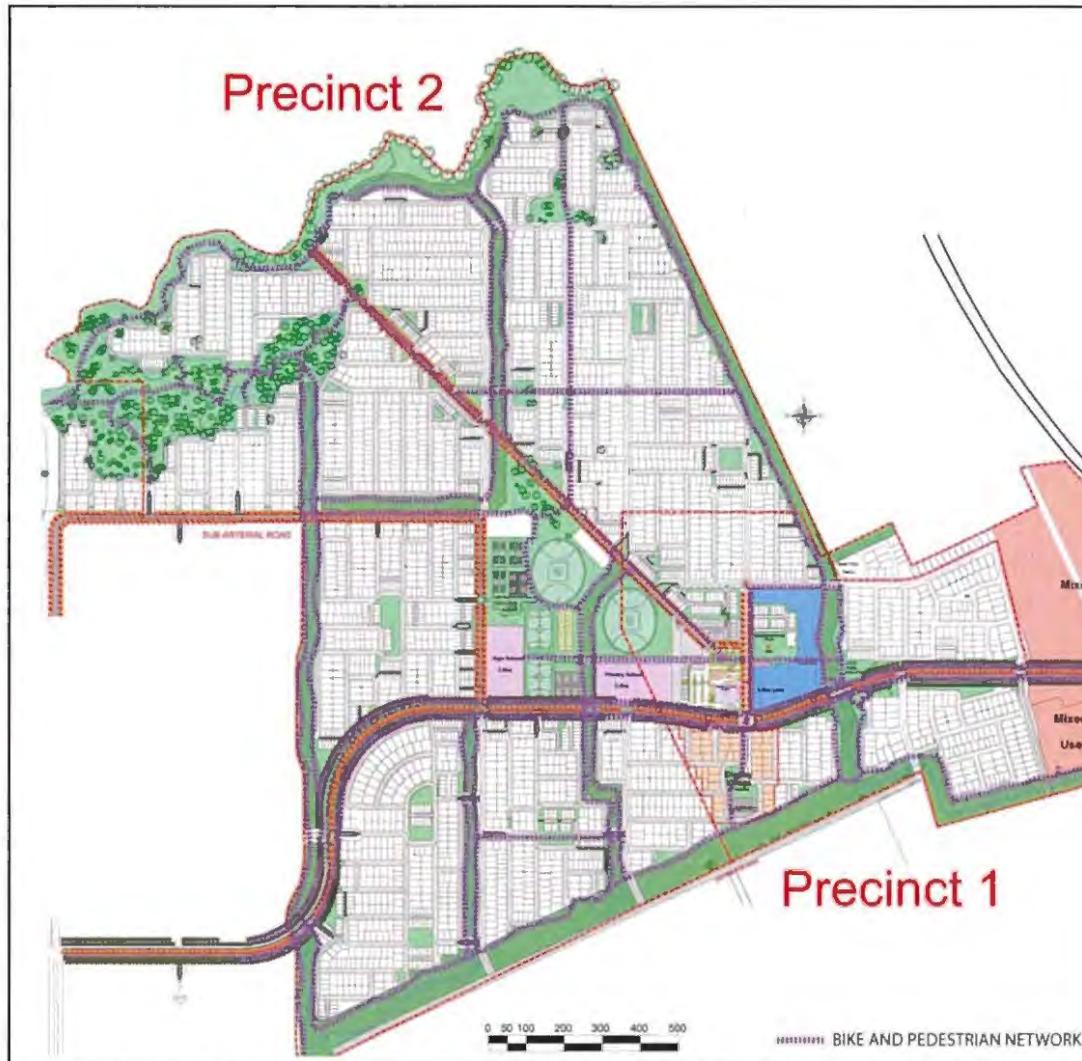


Figure 16: Bike and walk ways coordinated over Precincts 1 and 2

### ***Storm and flood water management***

Buckland Park's storm and flood water management system is self-contained. The Masterplan site is located at the bottom of the Gawler River flood catchment.

It is therefore not anticipated Precinct 2 will impact on other locations within the stormwater catchment or Gawler River flood plan.

Precinct 2 is therefore consistent with the Structure Plan.

***Potable and waste water***

Walker and SA Water are working toward provision of new potable and waste water infrastructure to serve Precinct 2.

Recycled water, either storm water treated and stored in an aquifer storage and recovery scheme, or recycled water from the Bolivar Waste Water Treatment Plant delivered via the Virginia Reuse Network is being used to irrigate open space and the public domain.

The Structure Plan process is an opportunity to effectively and efficiently coordinate provision of water infrastructure across several growth areas within Playford, benefiting existing and new residents.

***Electricity***

Walker and SAPN are working toward provision of a new substation within the Masterplan site, in conjunction with new or upgraded, transmission lines.

As with water infrastructure, the Structure Plan process is an opportunity to effectively and efficiently coordinate provision of infrastructure across several growth areas within Playford, benefiting existing and new residents.

***Gas***

The Buckland Park Masterplan site does not impact on the major gas lines identified in the Structure Plan.

Walker and APA Group have an agreement in place to service Precinct 2 with gas.

***Telecommunications***

Walker is arranging telecommunications servicing with the relevant agencies.

***Open Space***

Precinct 2's design is consistent with the open space areas and linear parks shown in the Structure Plan.

## 6.0 PLAYFORD COUNCIL DEVELOPMENT PLAN

### 6.1 Zone compliance

Precinct 2 is zoned part *Residential Neighbourhood*, and part *Metropolitan Open Space System (MOSS)*. Precinct 2's land division, and land use locations are consistent with those zones.

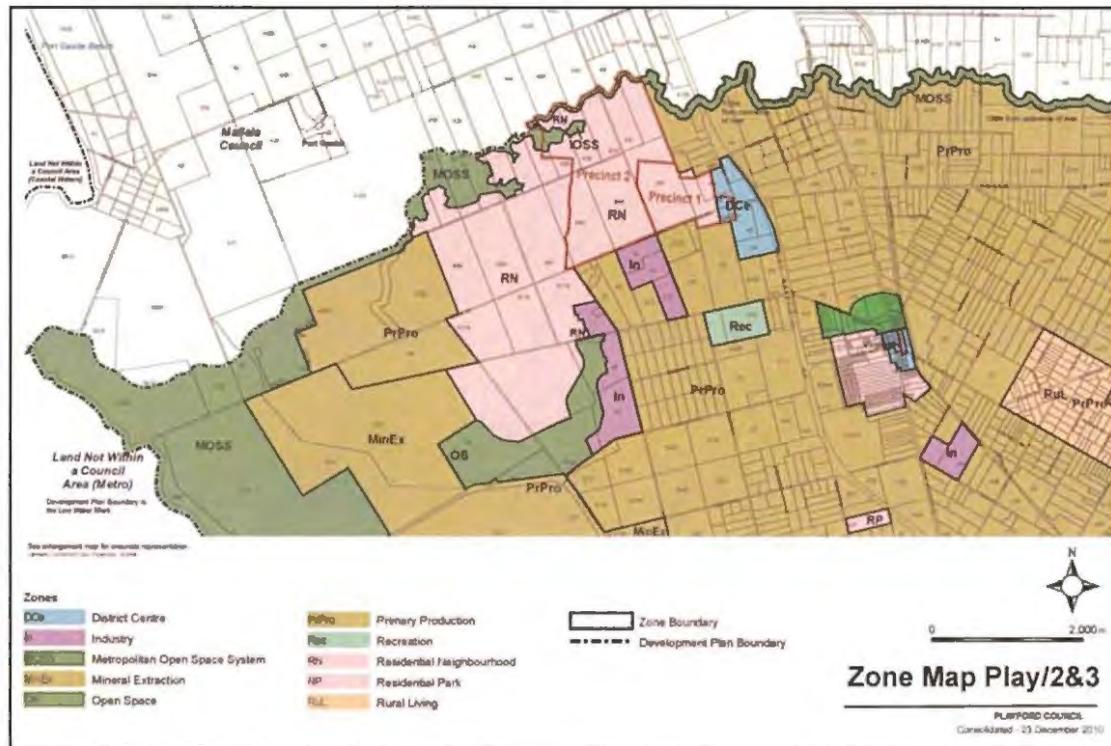


Figure 17: Precincts 1 and 2 with zones

## 6.2 The Buckland Park Concept Plan

The Precinct 2 land division is consistent with the Playford City Development Plan *Buckland Park Concept Plan*.

In particular, it incorporates the following principles from the Concept Plan:

- Residential neighbourhoods, connected by linear parks, and an open space corridor along the Gawler River.
- Integration within, and between Buckland Park's Precincts and neighbourhoods.
- The provision of centres and community facilities which are accessible from residential neighbourhoods by bus, foot or bike.

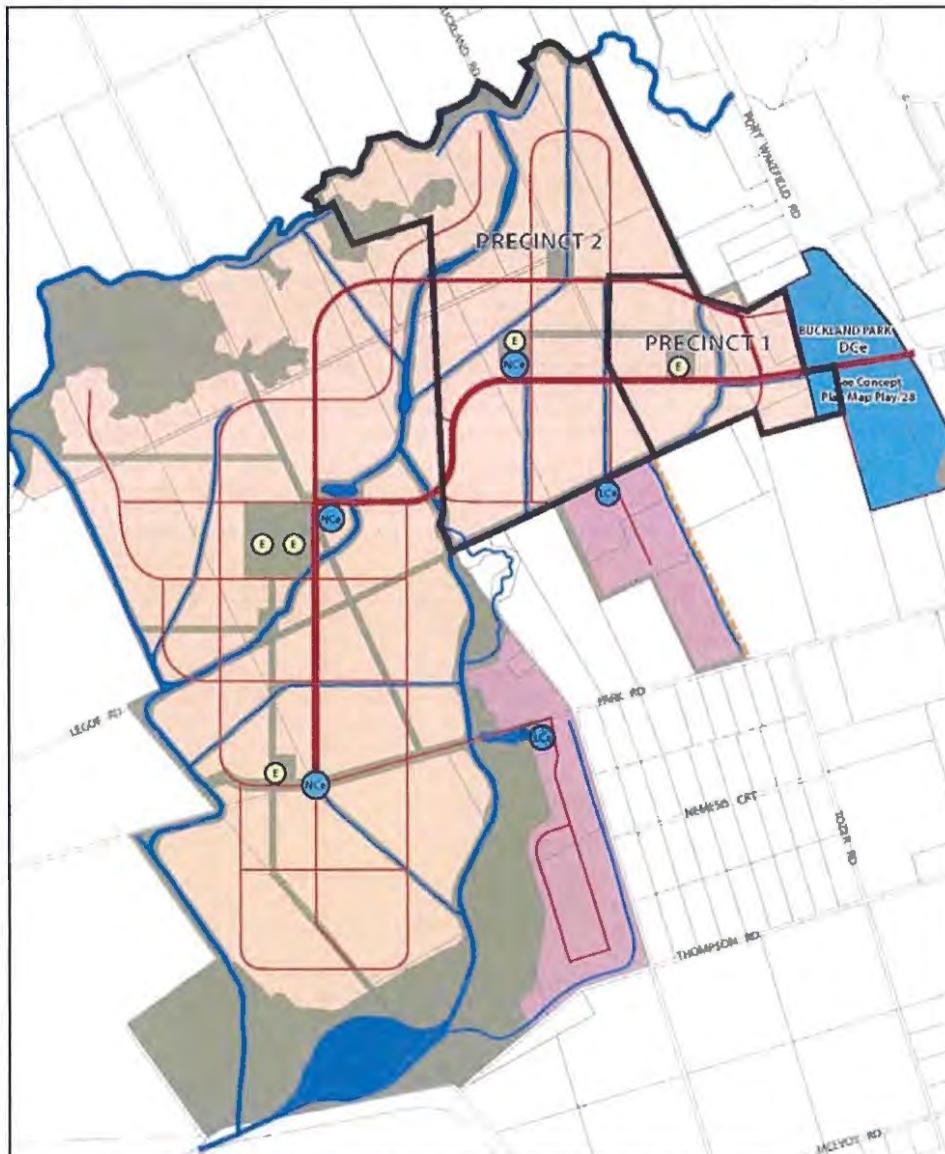


Figure 18: Precinct 2 and the Buckland Park Concept Plan

### 6.3 The Residential Neighbourhood zone

**Table 2: Residential Neighbourhood zone objectives**

OBJECTIVES	COMMENT
<p><b>1</b> <i>A predominantly residential area that comprises a range of dwelling types together with local and neighbourhood centres that provide a range of shopping, community, business, and recreational facilities for the surrounding neighbourhood in the locations indicated on Concept Plan Map Play/29 – Buckland Park.</i></p>	<p>Precinct 2 is predominately residential, with access to local, district and regional open space, and a neighbourhood centre which will offer a range of facilities and services.</p>
<p><b>2</b> <i>Provision of increased residential densities within and adjacent to centres, public transport stops and public open spaces.</i></p>	<p>Precinct 2 includes medium density sites near public transport routes and open space, and around the neighbourhood centre.</p>
<p><b>3</b> <i>A zone that provides a range of affordable and adaptable housing choices that cater for a variety of household structures, including a minimum of 15 per cent affordable housing.</i></p>	<p>15% (400) Affordable Housing is included, as illustrated in drawing A035613LM Precinct 2 Affordable Housing Rev A.</p> <p>A diverse range of housing types could be provided given the variety of allotment sizes and types, including provision for medium densities around the community focus.</p>
<p><b>4</b> <i>The orderly expansion of the urban area, to support the economic and effective provision of public infrastructure and community services and that is consistent with the development outcomes contained in Concept Plan Map Play/29 – Buckland Park.</i></p>	<p>Precinct 2 can be provided with infrastructure and utilities in an orderly manner as envisaged in the <i>Buckland Park Concept Plan Map</i>. The proposed amended staging is consistent with the structure envisaged in the Concept Plan.</p>
<p><b>5</b> <i>Open space systems designed to provide multiple use reserve areas that promote water management, habitat retention and enhancement, and active and passive recreation.</i></p>	<p>Precinct 2's open space will support a variety of uses, including bike and walking routes, water management, and active and passive recreation.</p> <p>As can be seen from Figures 4, 5, 10 and 12 these are connected to Precinct 1, and westward into future Precincts.</p>
<p><b>6</b> <i>Sustainable development outcomes through innovation in stormwater management, waste minimisation, water conservation, energy efficiency and urban biodiversity.</i></p>	<p>A sustainable approach to storm and flood water, biodiversity, energy efficiency, and waste management will be implemented in Precinct 2.</p>
<p><b>7</b> <i>Land not used for sensitive urban purposes until potential adverse impacts from organics waste treatment and composting operations south of the zone are removed.</i></p>	<p>Not applicable to Precinct 2.</p>
<p><b>8</b> <i>Development that contributes to the desired character of the zone.</i></p>	<p>Precinct 2 is consistent with the zone's desired character (Table 3).</p>

**Table 3: Desired Character for Residential Neighbourhoods**

ELEMENT		COMMENT
1	<i>The zone will be developed as a series of interconnected neighbourhoods that are designed to promote social interaction, participation and a sense of community for all residents.</i>	Precinct 2's residential neighbourhoods are connected by roads and parks. The proposed community focus will foster a sense of community.
2	<i>Equitable access to public open space, local or neighbourhood centres, education facilities, and a range of community services will be integral to the design of the area.</i>	Open space is distributed through Precinct 2, and the proposed community focus is located to serve the eastern half of the Masterplan site, and is consistent with the Buckland Park Structure Plan. Co-location of district sporting facilities in this central location facilitates access.
3	<i>It is anticipated that the zone will accommodate around 12,000 dwellings of varying forms that respond to different household sizes, life cycle stages and housing preferences. While the dominant character is expected to be low to medium density housing forms of up to three storeys, higher density housing (including taller buildings) are envisaged within 400 metres to centres, public transport routes and areas of high public amenity including public open space.</i>	Smaller allotments and higher densities have been provided along bus routes, and around parks and open space.  There are no centres within Precinct 2, as it adjoins the community focus.
4	<i>To deliver housing diversity, including affordable and social housing products, innovative solutions in land division, housing design, access and parking will be encouraged.</i>	15% (400) of Precinct 2's allotments will be Affordable Housing. A good range of allotment sizes provide opportunities for all types and sizes of new homes. No house construction is proposed.
5	<i>The creation of unique and interesting residential themes will be achieved through landscaping, surface treatments, street furniture, building design and other elements. In most cases, development setbacks to local streets will be used to provide opportunities for landscaping to soften the built form and establish a streetscape pattern within the locality.</i>	The Precinct 2 land division can support the desired landscape and public domain treatments, which will be subject to detailed design in accordance with the Landscape Master Plan.
6	<i>However, opportunities to create a distinctive urban form adjacent to and within centres, to frame plazas and courtyards or to reinforce a main-street theme, will be sought and encouraged to add vibrancy to community hubs.</i>	While Precinct 2 adjoins the community focus, it is not within its boundaries. Therefore this is not applicable.

ELEMENT	COMMENT
<p><b>7</b> <i>Public open space will be designed as safe and attractive places for a range of recreational activities and formal sport as well as water management and environmental protection. An indoor recreation centre is anticipated within or adjacent to the neighbourhood centre located centrally within the zone.</i></p>	<p>The Precinct 2 land division accommodates a variety of open space:</p> <ul style="list-style-type: none"> <li>• Active sporting fields and courts.</li> <li>• Local parks</li> <li>• Linear connecting areas for bikes and walking.</li> </ul> <p>It is envisaged the indoor recreation centre will be accommodated in the central neighbourhood centre, which is within Precinct 3, and therefore not the subject of this application.</p>
<p><b>8</b> <i>Movement networks will be integral to subdivision and neighbourhood design and will minimise the need for local vehicle trips, reduce travel distances and promote low vehicle speeds in local streets. To encourage walking and cycling to local services and facilities, a comprehensive network of off-road, shared paths for pedestrians and cyclists will be established linking residential precincts to schools, shops, recreation areas and other places of interest.</i></p>	<p>Movement networks, for pedestrians and bicycles have been considered in the Precinct 2 design, with networks provided within open space areas connecting residential neighbourhoods with schools, parks, recreational and sporting facilities.</p> <p>In particular, the design facilitates connections to the Gawler River corridor, an important location of interest.</p>
<p><b>9</b> <i>The major collector roads identified on Concept Plan Map Play/29 – Buckland Park will be established as the pre-eminent movement corridor through the zone and will be identifiable as a landscaped boulevard feature. The collector and major local road network is expected to connect the major features of the zone including centres, schools, open space areas and residential areas.</i></p>	<p>Precinct 2 supports the main entry boulevard as an important landscaped, movement corridor.</p>
<p><b>10</b> <i>Local roads will have a more intimate feel and support walking and cycling with lower traffic volumes and speeds, smaller street setbacks, consistent street tree planting, architectural variety, a pedestrian scale of development and quality street lighting.</i></p>	<p>Precinct 2 includes variety of local roads types, which facilitate walking and cycling networks meshed with open space, as well as supporting a variety of housing types and streetscapes.</p> <p>Quality landscaping and lighting will be provided subject to detailed design in consultation with Playford Council.</p>

ELEMENT		COMMENT
11	<p><i>Water Sensitive Urban Design principles will be incorporated into the layout and design of the zone. Stormwater discharge from the site will be minimised through on-site retention/detention, and the speed and volume of flows will be minimised by design features such as grassed swales and channels which feed into a detention basin in the southwest corner of the site for managed discharge to the Gulf Vincent via Thompson Outfall Channel.</i></p>	<p>WSUD principles are central to the design, and storm water management systems are being designed in consultation with Playford Council.</p> <p>Storm water will be directed to the Thompson Outfall Channel.</p>

### ***Principles of Development Control***

The Precinct 2 land division, is capable of accommodating and supporting the land uses envisaged for the zone, and indeed some of these uses are part of the amended proposal.

- community centres
- domestic outbuilding in association with a dwelling
- dwelling
- dwelling addition
- educational establishment
- indoor recreation centre
- open space
- recreation area
- residential flat buildings
- small scale non-residential use that serves the local community, for example:
  - child care facility
  - health and welfare service
  - shop, office or consulting room (generally less than 250 m<sup>2</sup> of floor space)
- supported accommodation.

Non-residential development will not occur within Precinct 2's residential neighbourhoods. It is confined to the community focus area.

**Table 4: Compliance with site area controls**

DWELLING TYPE	SITE AREA (square metres)	MINIMUM FRONTAGE	OK
<i>Detached</i>	270 (minimum)	7	✓
<i>Semi-detached</i>	220 (minimum)	6	✓
<i>Group dwelling</i>	200 (minimum)	5	✓
<i>Residential flat building (1 and 2 storey)</i>	200 (average)	5	NA
<i>Row dwelling and detached dwellings constructed boundary to boundary</i>	150 (minimum)	5	✓

### **Affordable Housing**

Precinct 1 as amended includes 400 (15%) affordable housing allotments, dispersed through the Precinct, and including a variety of types.

### **Land Division**

Precinct 2 includes allotments of a variety of sizes, suitable to facilitate land uses which meet the zone objectives.

They are designed to:

- (a) avoid direct access to a major collector road
- (b) ensure any allotment with direct access to a road with existing or projected traffic volumes exceeding 6,000 vehicles per day is sited and designed to avoid the need for vehicles to reverse onto or from the road
- (c) avoid unreasonable interference with the flow of traffic on adjoining roads.

The neighbourhood centre is located within Precinct 1, in a location which is consistent with the Concept Plan.

Significant trees, trees with habitat value, River Red Gums and remnant vegetation is generally contained within the MOSS zone, open space areas, or road reserves within Precinct 2.

## **7.0 EIS ASSESSMENT REPORT MATTERS**

In January 2010, the Department of Planning and Local Government assessed the Buckland Park Major Project, preparing an Assessment Report for the Minister.

While it focused on elements of the project for which authorization was sought, the EIS covered the entire Masterplan area, and so the Assessment Report included recommendations relevant to Precinct 2's detailed land division.

**Table 5: DPLG Assessment Report**

<b>MATTER FOR CONSIDERATION</b>		<b>RESPONSE</b>
<b>1</b>	<i>Roads – An agreement is required between the Proponent and DTEI on the timing and funding of future intersection upgrades at Legoe Road and Park Road junctions with Port Wakefield Road.</i>	DPTI has agreed to concept designs for the initial, interim and ultimate intersections.  The intersection will be available to serve Precinct 2.
<b>2</b>	<i>Public Transport – With DTEI the proponent needs to determine the requirements for upgrading the 900 bus service to Salisbury/Elizabeth (Stage 2). The requirements for a metro ticket service from Buckland Park to Salisbury/Elizabeth would also need consideration during Stage 2.</i>	Additional bus services have already been provided along Port Wakefield Road past the site. 2 services are provided in both the am and pm peaks along Port Wakefield Road, connecting to Elizabeth. Discussions will continue with DPTI regarding extensions to the routes and more frequent services over time.

MATTER FOR CONSIDERATION		RESPONSE
3	<p><i>Education – Negotiations for the first primary school on the site would need to start planning during Stage 1 with plans for the second primary school underway by Stage 2 or Stage 3. The third and fourth primary schools would be planned for Stages 4 and 5. The first and second planned high school would be planned from Stage 3. Negotiations for childcare/preschool providers would start in Stage 2 and be ongoing as dictated by the demand.</i></p>	<p>The Playford Growth Area Structure Plan nominates the provision of schools within the Masterplan site.</p> <p>In particular, a B-12 school can be accommodated within Precinct 2 generally in accordance with the Playford Growth Structure Plan.</p> <p>Discussions with both Dept. of Education and the private school sector will be ongoing.</p> <p>Land will be available for childcare providers within the community focus.</p>
4	<p><i>Affordable Housing – Negotiations for the 15% affordable housing requirement would be ongoing for the life of the development.</i></p>	<p>15% (400) of Precinct 2's residential allotments are nominated as Affordable Housing.</p>
5	<p><i>Biodiversity – Future stages of the development that SEB should be negotiated in advance of approval for detailed subdivision. Where residential stages incorporate scattered trees into landscape designs there should be adoption of an environmentally sensitive construction approach. The Proponents intention to protect 70% of remnant vegetation in open space reserves is acceptable, provided detailed subdivision plans also seek to retain as much of the remaining 30% as possible.</i></p>	<p>Precinct 2's layout incorporates remnant vegetation into the MOSS zone. Significant trees, and groups of trees have been incorporated into local and district parks.</p> <p>A biodiversity management strategy is prepared and will be discussed with the City of Playford and the Native Vegetation Council. It covers the entire Masterplan site, not just Precinct 2.</p>
6	<p><i>Community Services/Facilities - Community centres to be accommodated in land division plans for Stage 3 and Stage 5 of the development. Provision of a library would be identified in Stage 5. The timing and location for a council depot will be identified with the City of Playford. Land and designs for parks, recreation and public domain will be identified as detailed land division for Stages 2 to 5 are designed.</i></p>	<p>Precinct 2's community services and facilities will be provided in the community focus, which links it to Precinct 1. The community focus includes 400m<sup>2</sup> of community space within the neighbourhood centre.</p> <p>Precinct 2 can accommodate district level sporting facilities, as well as passive areas of open space, neighbourhood parks and connecting parks/storm water management areas. The design of these facilities is being discussed with Playford City Council.</p>
7	<p><i>Mosquitoes – A Management Plan for mosquitoes will be established for Stages 3 to 5 as detailed land division occurs.</i></p>	<p>Not Applicable.</p>

MATTER FOR CONSIDERATION		RESPONSE
8	<i>Feral animals - A more detailed feral pest management strategy based on lines of defence is required for the later stages if development adjoins the Gawler River and the salt pans.</i>	Management and exclusion of feral animals from the Gawler River corridor will be addressed in the biodiversity management strategy.
9	<i>Health – The proponent will liaise with the City of Playford to look at the timing of health services within Buckland Park. Planning to start from Stage 1 of the development but indicatively health services may not be provided within Buckland Park until Stages 2 to 3.</i>	The Playford Growth Area Structure Plan envisages a 'Super GP' clinic within the Masterplan's District Centre. It further considers health facilities required across the growth area over time. The Precinct 1 neighbourhood centre includes space for medical services. Precinct 2 will enjoy good access to those services.
10	<i>Potable Water – The Proponent will enter into agreements with SA Water in relation to the timing of water services to the Stages.</i>	Please see Annexure 2.
11	<i>Waste Water - The Proponent will enter into agreements with SA Water in relation to the timing of water services to the Stages.</i>	Please see Annexure 2.
12	<i>Recycled Water – For Stages 2 to 5 of the development the Proponent will prepare a strategy and designs with SA Water for their approval.</i>	Please see Annexure 2.
13	<i>Storm Water – Designs for aquifer recharge (Stage 2) and treatment of stormwater off site (Stage 4) will be done in consultation with the City of Playford and relevant Government.</i>	Walker and the City of Playford are discussing options for providing water for irrigation from sustainable sources. While this matter refers to 'Stage 2', it is considered the amended staging proposed places this issue now in a future Precinct 3.

MATTER FOR CONSIDERATION		RESPONSE
14	<p><i>Agencies. The Flood Management Strategy should be revised to consider the opportunities for providing environmental flows to the Gawler River through gravitational means (via swales/wetlands using natural topography or constructed flow paths) or 'passive' infrastructure using piping.</i></p>	<p>The Gawler River is a perched river, and is therefore higher than surrounding land. Directing storm or flood water to the River is therefore contrary to gravity, requiring additional infrastructure, such as a pumping system.</p> <p>Notwithstanding this, it is not optimal in terms of water quality in the River. The Masterplan's storm and flood water management system was designed to mimic the site's natural hydrology, which directs storm and flood water away from the Gawler River to the Gulf St Vincent via the Thompson Outfall Channel.</p> <p>In response to the EIS Guidelines (DAC, 2008: 4.2.5), the system specifically excludes urban storm water from the Gawler River, ensuring it passes through the project's management and treatment system prior to discharge via the Thompson Outfall Channel.</p>
15	<p><i>Electricity – Upgrades to the electricity will occur progressively as the Stages commence.</i></p> <p><i>Indicatively plans for a substation would be done with ETSA for Stage 2 and other upgrades would be required for Stages 3 to 5.</i></p>	<p>On 20 June 2013, SA Power Networks confirmed electricity would be available to Precinct 2. <b>(Annexure 2)</b></p>
16	<p><i>Gas – Services would be upgraded as needed from Stage 1. A new 200mm steel main would be required from the Epic Gas Gate Station. Amplification of the Epic Gas Gate Station would be staged as required. Hazard risk associated with the EPIC Pipeline has been considered appropriately.</i></p>	<p>On 9 July APA Group confirmed gas would be available to Precinct 2. <b>(Annexure 2)</b></p> <p>Precinct 2 is not affected by the EPIC Pipeline.</p>
17	<p><i>Telecommunications – The Proponent will work with Telstra to identify upgrades as needed.</i></p>	<p>Walker is working with telecommunications providers to ensure utilities are provided in a timely manner.</p>
18	<p><i>Sea level rise – a minimum site level of 4.00 m AHD and building floor level of 4.25 m AHD will be required as part of any rezoning. The long term actual effect of sea level rise will require monitoring to determine whether any additional protective works are required.</i></p>	<p>Precinct 2 is at 5.3 AHD to 11.8 AHD, therefore this is not applicable.</p>

MATTER FOR CONSIDERATION		RESPONSE
19	<i>Any rezoning would consider buffer to adjacent horticultural activities and restricting intensification of horticulture.</i>	Housing in Precinct 2 is buffered from horticultural activities, to its east by a 50 metre wide storm water management area, and to its north by the Gawler River corridor.
20	<i>A Schedule of Commitments will be entered into by the Walker Corporation for each stage.</i>	Please see information on infrastructure and services contained in this report.
21	<i>This Schedule could be a reserved matter in the current authorisation and future decision making relating to the site. The purpose of the Schedule would be to commit the Proponent into making sure the infrastructure provided for Stages 1 to 5 are timely are appropriate.</i>	<p>Precinct 1's schedule of infrastructure requirements has been satisfied. Walker is working toward complying with the authorisation's conditions.</p> <p>In respect of this application for the Precinct 2 land division, it is considered that the information regarding infrastructure and services provided in this application is sufficient to facilitate approval.</p>

## 8.0 CONCLUSION

It is concluded the proposed amendment to the project's staging, Precinct 2's detailed land division and the closure of part of Buckland Road are suitable for authorisation on the basis that:

- They are consistent with the planning controls applicable to the site.
- Infrastructure and services will be provided.
- A high level of residential amenity will be achieved.

## REFERENCES

ACHM (2013) *Draft Buckland Park Development Area - Precinct 2: Proposed development and applications*, for Walker Corporation

Connell Wagner (2008a) *Preliminary Site Contamination Investigation: Buckland Park Proposal*

Connell Wagner (2008b) *Preliminary Noise Investigation: Buckland Park Proposal*

Connell Wagner (2008c) *Preliminary Air Quality Investigation: Buckland Park Proposal*

Department of Education and Child Development (DECD), 2013 *email to DPTI 10 October 2013*.

Department of Planning and Local Government (DPLG), 2010 *Assessment Report for the Environmental Impact Statement Buckland Park Residential Development Proposal*

Development Assessment Commission (DAC), 2008 *Amended Guidelines for the preparation of an Environmental Impact Statement: Buckland Park Country Township Proposal*

Golder and Associates (2009a) *Preliminary Geotechnical Investigation: Buckland Park, South Australia*, for Walker Corporation

Golder and Associates (2009b) *Preliminary Acid Sulphate Soil Investigation: Buckland Park, South Australia*, for Walker Corporation

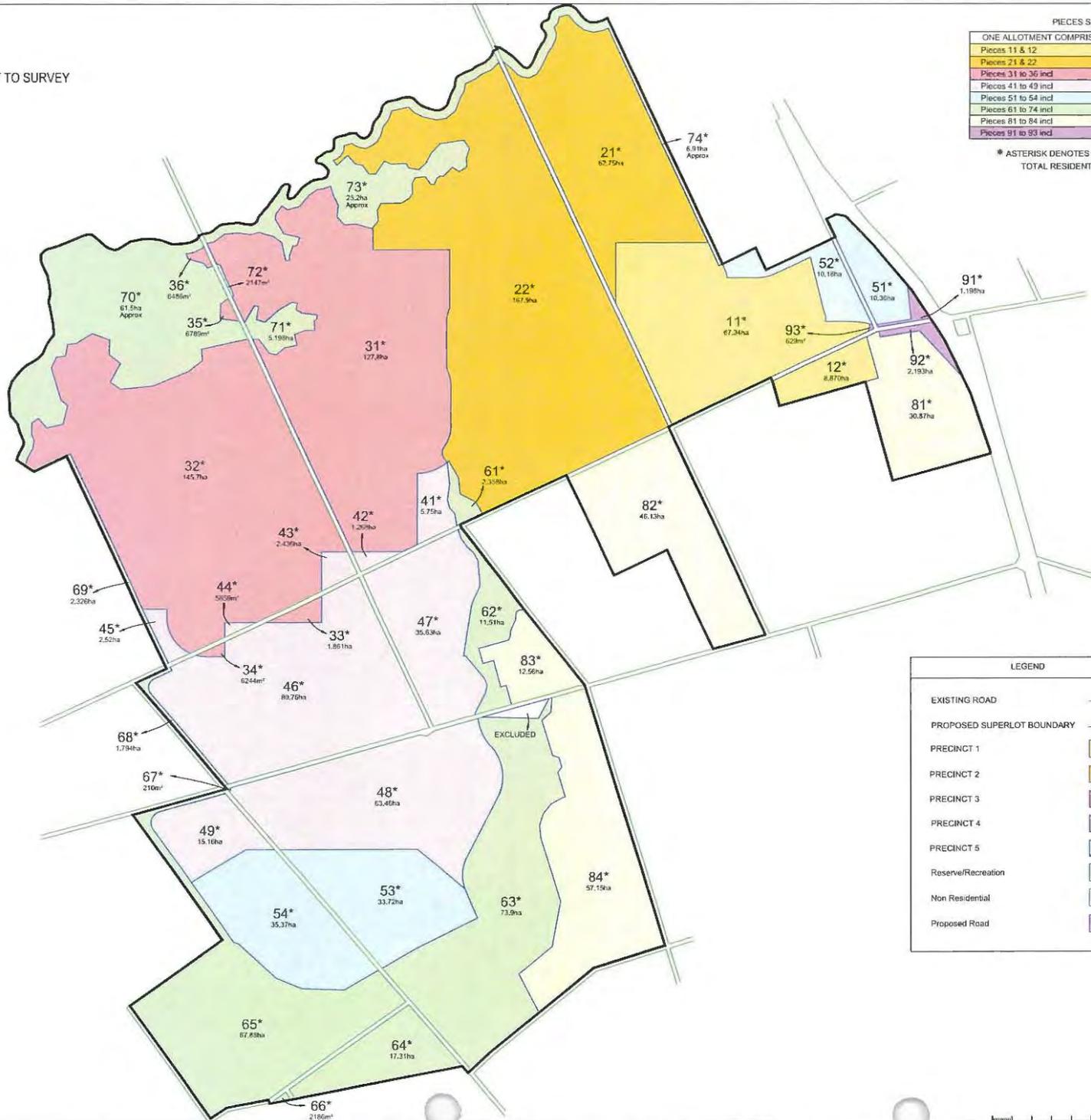
SASH Consulting Services (2008) *European Heritage Assessment Report: Buckland Park* for Walker Corporation.

Sinclair Knight Merz (2008) *Buckland Park EIS Groundwater Investigations* for Walker Corporation

# **ANNEXURE ONE**

## **PLANS AND CONCEPTS**

SUBJECT TO SURVEY



ONE ALLOTMENT COMPRISES	TOTAL AREA
Pieces 11 & 12	76.21 ha
Pieces 21 & 22	230.65 ha
Pieces 31 to 36 incl	277.31 ha
Pieces 41 to 49 incl	207.57 ha
Pieces 51 to 54 incl	89.64 ha
Pieces 61 to 74 incl	276.4 ha approx
Pieces 81 to 84 incl	146.71 ha
Pieces 91 to 93 incl	3.454 ha

\* ASTERISK DENOTES PIECE IDENTIFIER ONLY  
TOTAL RESIDENTIAL AREA 881.4 ha

LEGEND	
EXISTING ROAD	
PROPOSED SUPERLOT BOUNDARY	
PRECINCT 1	
PRECINCT 2	
PRECINCT 3	
PRECINCT 4	
PRECINCT 5	
Reserve/Recreation	
Non Residential	
Proposed Road	



Sheet 1 of 3

Issue	Description	Drawn	Checked	Appd.	Date
1	Iss 21, 22 & 31, 1 on renumbered	RHF	GHB		18.06.2018
2	Lot 10 removed	RHF	GHB		15.04.2019
3	Proposed 1 subdivision	RHF	GHB		21.02.2018
4	Redesign	RHF	RHF		05.11.2019
5	Redesign	RHF	RHF		20.10.2019
6	Access road off B20 changed	RHF	RHF		10.06.2019
7	Superlots 1 & 2 changed	RHF	RHF		02.02.2019
8	Final network added, superlots changed	RHF	RHF		27.02.2019
9	Final network updated	RHF	RHF		18.12.2018
10	Issued for review	RHF	RHF		19.11.2018

Client

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Title

**RIVERLEA**

Status

CONCEPT PLAN  
Superlots

Scale (A1)

1:10000 Datum

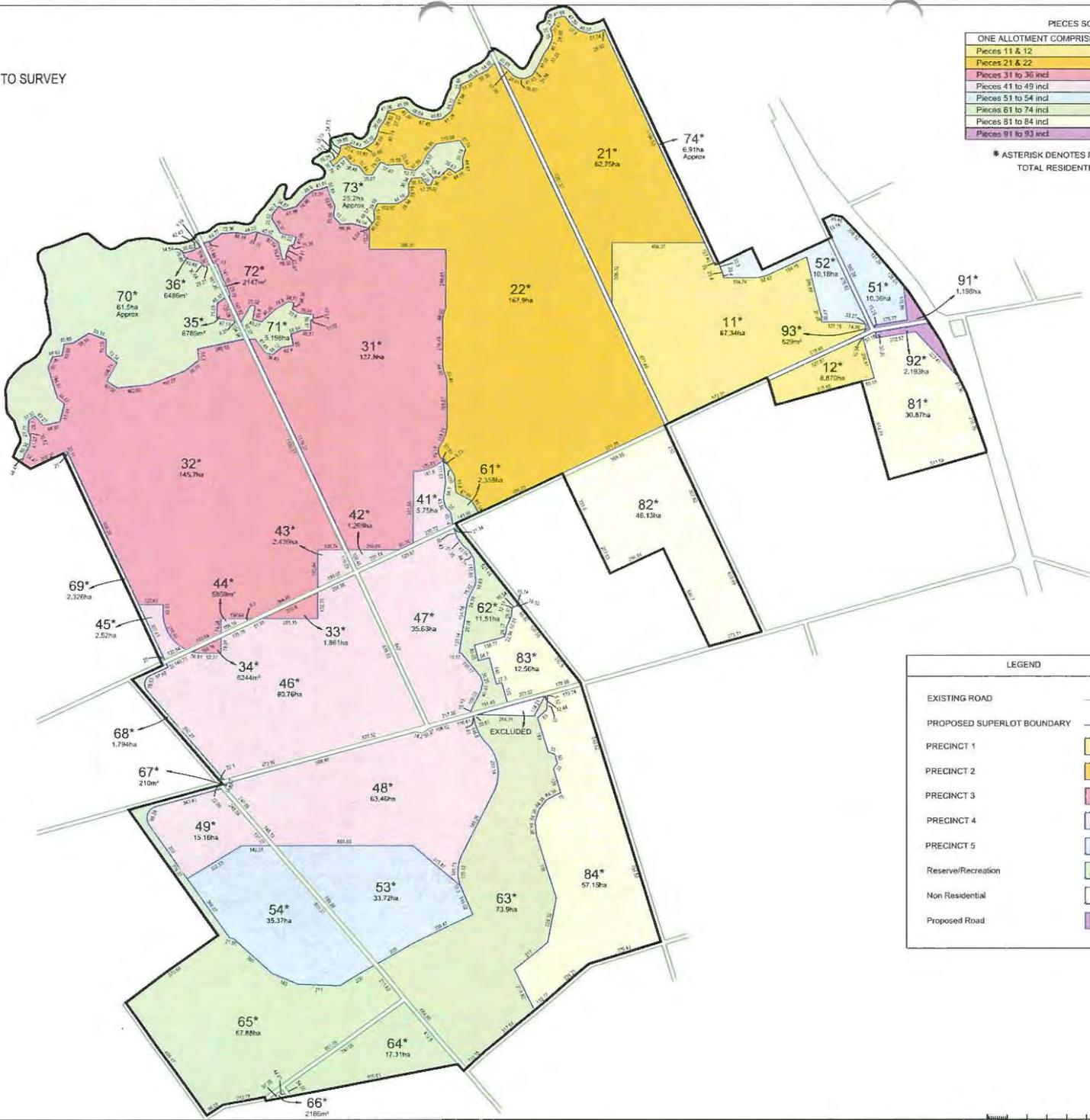
Drawn RHF Designed

Project Code A056410.0000 Drawing No. A056410SL Issue D

SUBJECT TO SURVEY

PIECES SCHEDULE	
ONE ALLOTMENT COMPRISES	TOTAL AREA
Pieces 11 & 12	76.21 ha
Pieces 21 & 22	230.65 ha
Pieces 31 to 35 incl	211.31 ha
Pieces 41 to 49 incl	207.57 ha
Pieces 51 to 54	89.64 ha
Pieces 61 to 74 incl	278.4 ha approx
Pieces 81 to 84 incl	146.71 ha
Pieces 91 to 93 incl	3.45 ha

\* ASTERISK DENOTES PIECE IDENTIFIER ONLY  
TOTAL RESIDENTIAL AREA 881.4 ha



Sheet 2 of 3

Item	Description	Drawn	Chk'd	App'd	Date
D	Lot 21, 22 & 31 Lot renumbered.	RHF	GBH		18.06.2010
C	Lots 83 & 91	RHF	GBH		15.06.2011
B	Lot 88 removed	RHF	GBH		15.04.2011
A	Proposed 1 redesign	RHF	GBH		31.02.2011
4	Redesign	RHF	RAF		29.11.2009
5	Redesign	RET	RAF		20.10.2009
4	Access road 25 & 26 changed	RHF	RAF		10.08.2009
3	Superlot 1 & 2 changed	RHF	RAF		02.02.2009
2	Road network public, superlots changed	RET	RAF		27.02.2009
1	Road network updated	RET	RAF		19.12.2008
D	Based for review	RET	RAF		11.11.2008

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Title

**RIVERLEA**

Status

CONCEPT PLAN  
Superlots

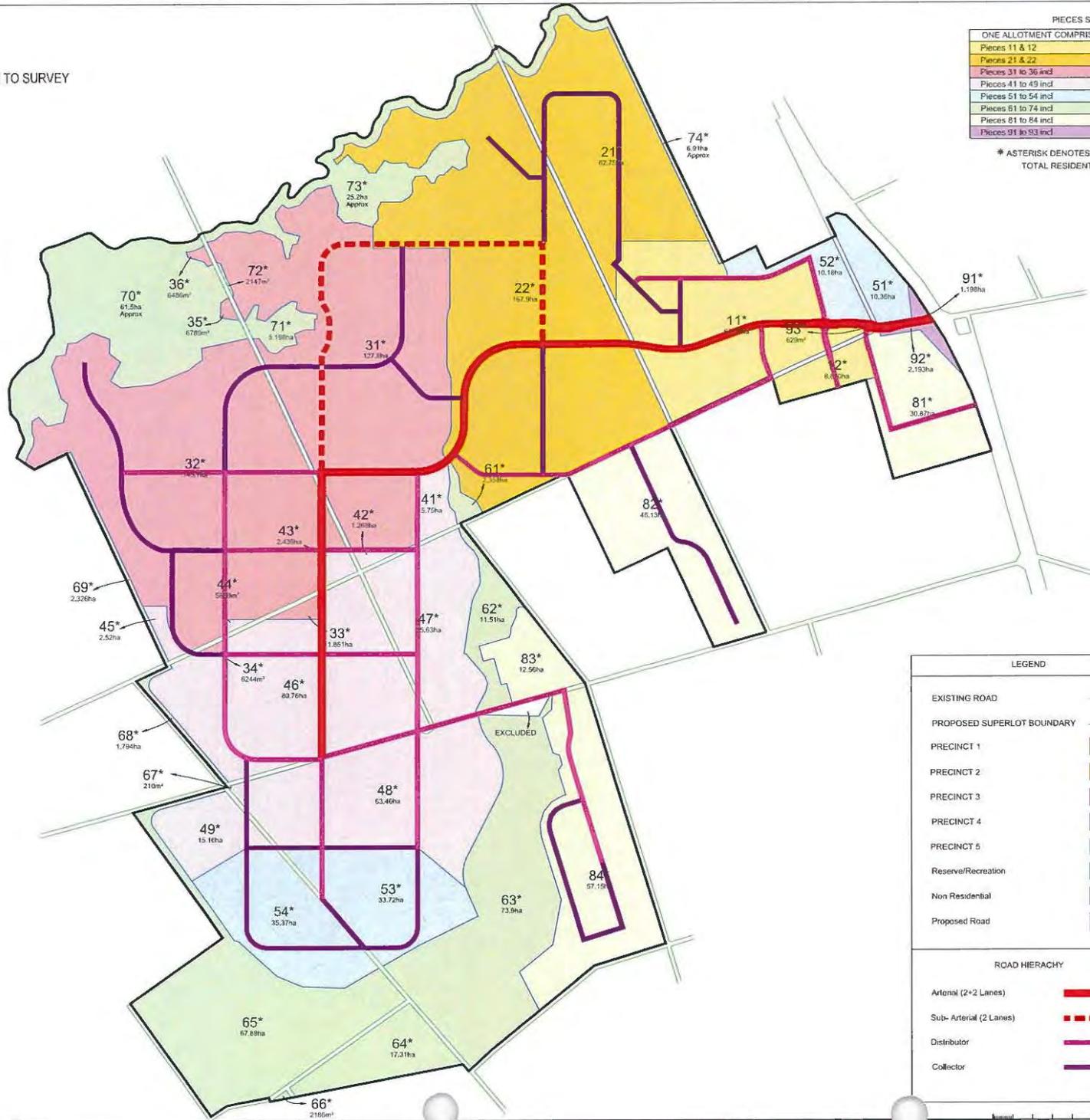
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Project Code	A056410.0000	Drawing No.	A056410SL
Issue		Issue	D

LEGEND

- EXISTING ROAD
- PROPOSED SUPERLOT BOUNDARY
- PRECINCT 1
- PRECINCT 2
- PRECINCT 3
- PRECINCT 4
- PRECINCT 5
- Reserve/Recreation
- Non Residential
- Proposed Road

SUBJECT TO SURVEY



PIECES SCHEDULE	
ONE ALLOTMENT COMPRISES	TOTAL AREA
Pieces 11 & 12	76.21 ha
Pieces 21 & 22	230.05 ha
Pieces 31 to 36 incl	277.31 ha
Pieces 41 to 49 incl	207.57 ha
Pieces 51 to 54 incl	89.64 ha
Pieces 61 to 74 incl	276.4 ha approx
Pieces 81 to 84 incl	146.71 ha
Pieces 91 to 93 incl	145.4 ha

\* ASTERISK DENOTES PIECE IDENTIFIER ONLY  
TOTAL RESIDENTIAL AREA 881.4 ha



Sheet 3 of 3

Issue	Description	Drawn	Check	Appr.	Date
1	Issue for RHP	RHF	CBH		18.06.2013
2	Issue for RHP	RHF	CBH		15.06.2011
3	Issue for RHP	RHF	CBH		15.04.2011
4	Issue for RHP	RHF	CBH		21.07.2011
5	Issue for RHP	RHF	CBH		10.11.2009
6	Issue for RHP	RHF	CBH		20.10.2009
7	Issue for RHP	RHF	CBH		02.05.2009
8	Issue for RHP	RHF	CBH		27.02.2009
9	Issue for RHP	RHF	CBH		18.12.2008
10	Issue for RHP	RHF	CBH		11.11.2008

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**Title**

**RIVERLEA**

<b>Status</b>		
CONCEPT PLAN Superlots		
Scale (A1)	1:10000	Datum
Drawn	RHF	Designed
Project Code	A056410.0000	Drawing No.
		Issue
		D

**LEGEND**

**EXISTING ROAD** ———

**PROPOSED SUPERLOT BOUNDARY** ———

**PRECINCT 1** [Yellow Box]

**PRECINCT 2** [Orange Box]

**PRECINCT 3** [Pink Box]

**PRECINCT 4** [Light Blue Box]

**PRECINCT 5** [Light Green Box]

**Reserve/Recreation** [Light Green Box]

**Non Residential** [Light Yellow Box]

**Proposed Road** [Purple Box]

**ROAD HIERARCHY**

**Arterial (2+2 Lanes)** [Red Solid Line]

**Sub-Arterial (2 Lanes)** [Red Dashed Line]

**Distributor** [Pink Solid Line]

**Collector** [Purple Solid Line]

100mm On Original A1

**SHEET INDEX**

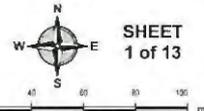


Development No. 292 / D / 13  
City of Playford

Proposed Plan of Division  
Allotment 91 in F174425  
Allotment 92 in F174426  
Allotment 93 in F174427  
Allotment 95 in F174429  
Blocks 58 to 60 & 67 to 69 in D1671  
Allotments 5003 to 5006 in 292 / D019 / 12  
Part Closed Road (Buckland Road)  
Hundred of Port Adelaide

**BUCKLAND PARK**

C&T 5869/774, 5869/780, 5869/771, 5869/775, 5869/785, 5869/770,  
5869/782, 5869/787, 5869/786, 5869/788  
PT CT 5869/789



1:1000 @ A1  
**RIVERLEA  
PRECINCT 2**

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Issue	Description	Drawn	Chk.	Appd.	Date
C	NO DRAFT AMENDMENTS	RFH	GM		25.09.2013
B	'ST DRAFT AMENDMENTS	RFH	GM		29.08.2013
A	'ST ISSUE	RFH	GM		02.08.2013

No. of proposed allotments	2667
No. of proposed residential allotments	2664
Total area	371.48ha
Developable area (less schools)	258.66ha
Reserves	49.910ha
Drainage Reserves	34.550ha
Total Reserve area	84.460ha
Contributed Reserve (26.0% of Drainage Reserves)	67.185ha
(total reserve less 50% of Drainage Reserves)	
Length of new roads	41.69km
Contour interval 1m. Datum AHD.	
Road pavements shown are indicative only.	
Dimensions and areas are subject to survey.	

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**Glenn Ian Hordacre**  
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DATE: 26.09.2013

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City of Playford

Proposed Plan of Division  
Allotment 91 in F174425  
Allotment 92 in F174426  
Allotment 93 in F174427  
Allotment 95 in F144219  
Blocks 58 to 60 & 67 to 69 in D1671  
Allotments 5003 to 5006 in 292 / D019 / 12  
Part Closed Road (Buckland Road)  
Hundred of Port Adelaide  
in the area named  
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Rev	Description	Drawn	Chk'd	App'd	Date
A	2018 DRAFT AMENDMENTS 2018 DRAFT AMENDMENTS 161 REVISION				26.09.2018 02.08.2019 02.08.2019

No. of proposed allotments	2667
No. of proposed residential allotments	2664
Total area	371.48ha
Developable area (less schools)	258.66ha
Reserves	49.910ha
Drainage Reserves	34.550ha
Total Reserve area	84.460ha
Contributed Reserve (total reserve less 50% of Drainage Reserves)	(26.0%) 67.185ha

Length of new roads 41.69km  
Contour interval 1m, Datum AHD.  
Road pavements shown are indicative only.  
Dimensions and areas are subject to survey.

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Development No. 292 / D / 13  
 City of Playford

Proposed Plan of Division  
 Allotment 91 in F174425  
 Allotment 92 in F174425  
 Allotment 93 in F174429  
 Blocks 58 to 60 & 67 to 69 in D1671  
 Allotments 5003 to 5006 in 292 / D019 / 12  
 Part Closed Road (Buckland Road)  
 Hundred of Port Adelaide

In the area named  
**BUCKLAND PARK**

Ct 5866/774, 5866/780, 5866/771, 5866/775, 5866/776, 5866/778,  
 5866/782, 5866/787, 5866/786, 5866/748  
 Pt Ct 5866/783



**SHEET**  
 11 of 13

1:1000 @ A1  
**RIVERLEA**  
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Issue	Description	Drawn	Chk.	Appr.	Date
C	UND DRAFT AMENDMENTS	RHF	DR1		26.08.2013
B	1ST DRAFT AMENDMENTS	RHF	DR1		20.08.2013
A	1ST DRAFT AMENDMENTS	RHF	DR1		09.08.2013

No. of proposed allotments 2667  
 No. of proposed residential allotments 2664  
 Total area 371.48ha  
 Developable area (less schools) 258.66ha

Reserves 49.910ha  
 Drainage Reserves 34.550ha  
 Total Reserve area 84.460ha  
 Contributed Reserve (26.0%) 67.185ha  
 (total reserve less 50% of Drainage Reserves)

Length of new roads 41.69km  
 Contour interval 1m. Dalum AHD.  
 Road pavements shown are indicative only.  
 Dimensions and areas are subject to survey.

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REF A035613.00P2  
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Development No. 292 / D / 13  
 City of Playford

Proposed Plan of Division  
 Allotment 91 in F174425  
 Allotment 92 in F174426  
 Allotment 93 in F174427  
 Allotment 95 in F174429

Blocks 58 to 60 & 67 to 69 in D1671  
 Allotments 5003 to 5006 in 292 / D019 / 12  
 Part Closed Road (Buckland Rod)  
 Hundred of Port Adelaide  
 In the area named  
**BUCKLAND PARK**

CST 5868774, 5868780, 5868771, 5868775, 5868785, 5868770,  
 5868782, 5868767, 5868766, 5868768  
 PT CT 5868769



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Issue	Description	Drawn	Chkd.	Date
C	2ND DRAFT AMENDMENTS	RHF	GAB	26.09.2013
B	1ST DRAFT AMENDMENTS	RHF	GAB	20.06.2013
A	1ST ISSUE	RHF	GAB	02.06.2013

No. of proposed allotments	2667
No. of proposed residential allotments	2664
Total area	371.48ha
Developable area (less schools)	258.66ha
Reserves	49.910ha
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(total reserve less 50% of Drainage Reserves)	

Length of new roads 41.69km  
 Contour interval 1m, Datum AHD.  
 Road pavements shown are indicative only.  
 Dimensions and areas are subject to survey.

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**Glenn Ian Hordacre**  
 LICENSED SURVEYOR

REF	DATE
REF A035613.00P2	
DWG No. A035613PROP(C)	
REVISION C	
RHF 26.09.2013	

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D1671



Development No. 292 / D / 13  
 City of Playford

Proposed Plan of Division  
 Allotment 91 in F174425  
 Allotment 92 in F174428  
 Allotment 93 in F174427  
 Allotment 95 in F174429  
 Blocks 58 to 60 & 67 to 69 in D1671  
 Allotments 5003 to 5006 in 292 / D019 / 12  
 Part Closed Road (Buckland Road)  
 Hundred of Port Adelaide  
 In the area named  
**BUCKLAND PARK**

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Issue	Description	Drawn	Chd.	Appt.	Date
C	2ND DRAFT AMENDMENTS	RHF	GH		26.09.2013
A	1ST DRAFT AMENDMENTS RES ISSUE	RHF	GH		20.08.2013

No. of proposed allotments	2667
No. of proposed residential allotments	2664
Total area	371.49ha
Developable area (less schools)	258.66ha
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(total reserve less 50% of Drainage Reserves)	
Length of new roads	41.69km
Contour interval 1m. Datum AHD.	
Road pavements shown are indicative only.	
Dimensions and areas are subject to survey.	

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REF	DESCRIPTION
REF A835613.00P2	
DWG No. A035613(PROPIC)	
REVISION C	
RHF 26.09.2013	

Alexander & Symonds Pty Ltd  
 11 King William Street West Tower  
 South Australia 5000  
 PO Box 1000 Kent, Town, SA 5071  
 DX 109 Adelaide 5000 713 3888

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 E info@alexander.com.au

Alexander & Symonds  
 Surveying & Consulting



Development No. 292 / D / 13  
City of Playford

Proposed Plan of Division  
 Allotment 91 in F174425  
 Allotment 92 in F174426  
 Allotment 93 in F174427  
 Allotment 95 in F174429  
 Blocks 58 to 60 & 67 to 69 in D1671  
 Allotments 5003 to 5006 in 292 / D019 / 12  
 Part Closed Road (Buckland Rod)  
 Hundred of Port Adelaide  
 in the area named  
**BUCKLAND PARK**

CST 5868/774, 5869/790, 5869/771, 5868/775, 5869/785, 5869/776,  
 5869/782, 5869/787, 5869/789, 5869/788  
 PT CT 5868/783



1:1000 @ A1  
**RIVERLEA**  
 PRECINCT 2

Client



Walker Corporation Pty Ltd  
 ABN 54 001 476 263  
 G.P.O. Box 4973  
 Sydney NSW 2001  
 Level 21 Governor Macquarie Tower  
 1 Farrer Place Sydney NSW 2000  
 Telephone (02) 8573 8600  
 Facsimile (02) 8573 7492  
 Web www.walker.com.au

Issue	Description	Drawn	Chk.	Appr.	Date
C	2ND DRAFT AMENDMENTS	RHF	GH		26.09.2013
A	1ST DRAFT AMENDMENTS	RHF	GH		22.08.2013
B	1ST ISSUE	RHF	GH		02.06.2013

No. of proposed allotments	2667
No. of proposed residential allotments	2664
Total area	371.48ha
Developable area (less schools)	258.66ha
Reserves	49.910ha
Drainage Reserves	34.550ha
Total Reserve area	84.460ha
Contributed Reserve (26.0%)	67.185ha
(total reserve less 50% of Drainage Reserves)	

Length of new roads 41.69km  
 Contour interval 1m. Datum AHD.

Road pavements shown are indicative only.

Dimensions and areas are subject to survey.

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 LICENSED SURVEYOR

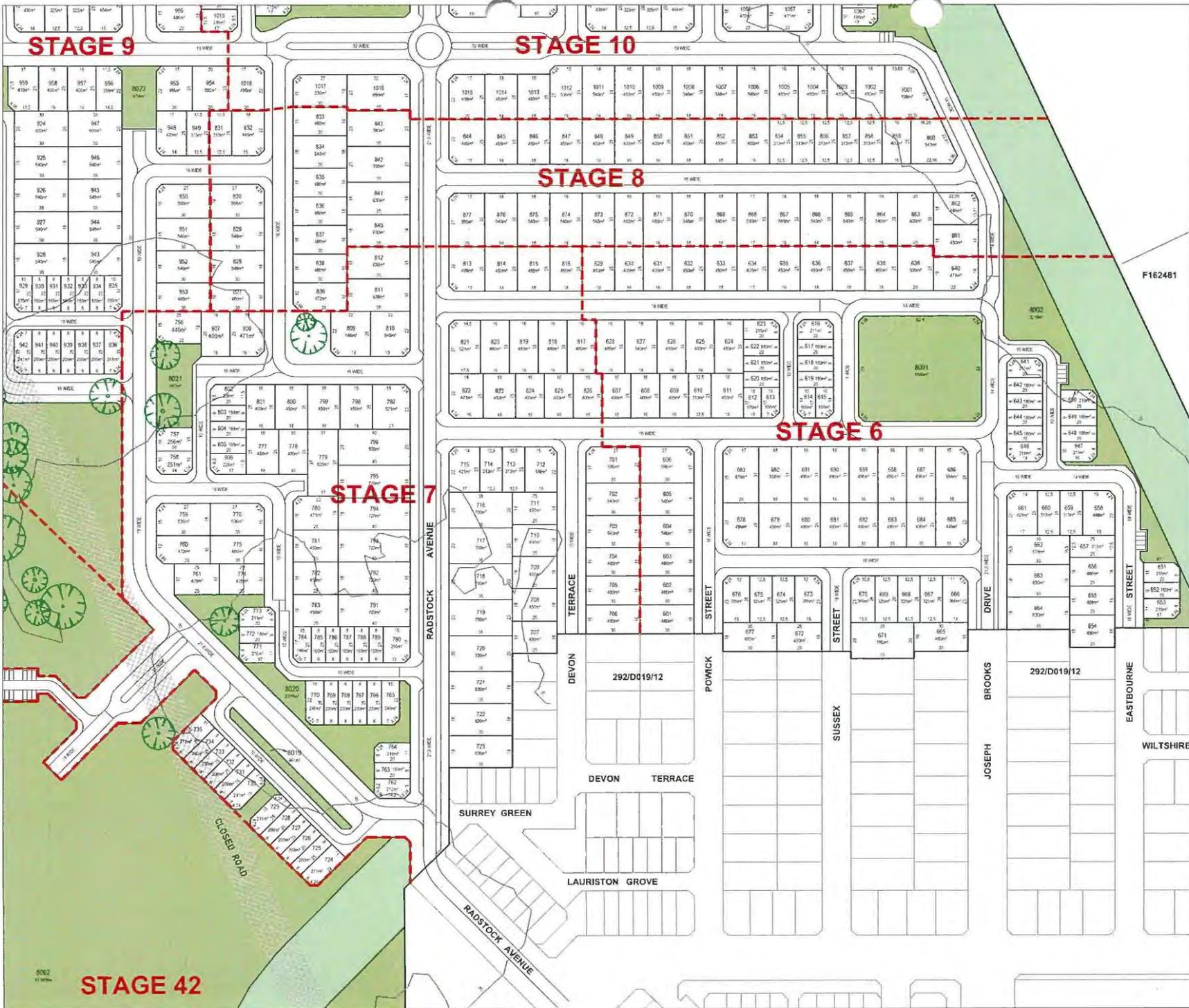
REF A035613.06P2	
DWG No. A035613PROP(C)	
REVISION C	
RHF 26.09.2013	

Alexander & Symonds Pty Ltd  
 11 King William Street, 4th Floor, Tower  
 South Australia 5067  
 PO Box 12000, North Tower, SA 5071  
 EN 269 AMX 53967 753 988

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 F (08) 8132 0099  
 W www.alexander.com.au  
 E alexander@alexander.com.au

\* Property = Land Development +  
 = Construction + Planning +  
 = Spatial Information Management +





Development No. 292 / D / 13  
City of Playford

**Proposed Plan of Division**  
 Allotment 91 in F174425  
 Allotment 92 in F174426  
 Allotment 93 in F174427  
 Allotment 95 in F174429  
 Blocks 58 to 60 & 67 to 69 in D1671  
 Allotments 5003 to 5006 in 292 / D019 / 12  
 Part Closed Road (Buckland Road)  
 Hundred of Port Adelaide  
 In the area named  
**BUCKLAND PARK**  
 C/T 5868/774, 5868/780, 5868/771, 5868/775, 5868/785, 5868/770,  
 5868/782, 5868/787, 5868/786, 5868/788  
 PT CT 5868/783



**SHEET**  
4 of 13  
**1:1000 @ A1**  
**RIVERLEA**  
**PRECINCT 2**

Client: Walker Corporation Pty Ltd  
 ABN 95 951 176 263  
 G.P.O. Box 4073  
 Sydney NSW 2001  
 Level 21 Governor Macquarie Tower  
 1 Farrer Place Sydney NSW 2000  
 Telephone (02) 6273 9889  
 Facsimile (02) 9233 7499  
 Email walker@walker.com.au

Rev	Description	Drawn	Chk.	Appt.	Date
1	2ND DRAFT AMENDMENTS				26.09.2013
2	1ST DRAFT AMENDMENTS				20.08.2013
3	1ST EDITION				20.08.2013

No. of proposed allotments	2687
No. of proposed residential allotments	2664
Total area	371.48ha
Developable area (less schools)	258.66ha
Reserves	49.910ha
Drainage Reserves	34.550ha
Total Reserve area	84.460ha
Contributed Reserve	(26.0%) 67.185ha
(total reserve less 50% of Drainage Reserves)	

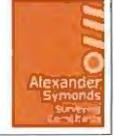
Length of new roads 41.69km  
 Contour interval 1m, Datum AHD.  
 Road pavements shown are indicative only.  
 Dimensions and areas are subject to survey.

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 DWG No. A035613PROP(C)  
 REVISION C  
 RHF-26.09.2013

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F162492

GAWLER RIVER

NOTES ZONE BOUNDARY

STAGE 15

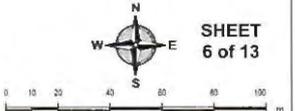
STAGE 14

STAGE 13

STAGE 11

Development No. 292 / D / 13  
City of Playford

**Proposed Plan of Division**  
 Allotment 91 in F174425  
 Allotment 92 in F174426  
 Allotment 93 in F174427  
 Allotment 95 in F174429  
 Blocks 58 to 60 & 67 to 69 in D1671  
 Allotments 5003 to 5006 in 292 / D019 / 12  
 Part Closed Road (Buckland Road)  
 Hundred of Port Adelaide  
 In the area named  
**BUCKLAND PARK**  
 C/T 5868/774, 5868/780, 5868/771, 5868/775, 5868/785, 5868/770,  
 5868/782, 5868/783, 5868/786, 5868/789  
 PT CT 5868/783



1:1000 @ A1  
**RIVERLEA**  
PRECINCT 2

Client: Walker Corporation Pty Ltd  
 ABN 95 951 178 263  
 G.P.O. Box 4913  
 Sydney NSW 2001  
 Level 21, Governor Macquarie Tower  
 1 Farrer Place Sydney NSW 2000  
 Telephone: (02) 8274 9800  
 Facsimile: (02) 9524 7998  
 Email: info@walker.com.au

Issue	Description	Drawn	Chk'd	Appl'd	Date
A	2ND DRAFT AMENDMENTS 1ST DRAFT AMENDMENTS 1ST ISSUE	RHF	GH		26.09.2013
B		RHF	GH		29.08.2013
C		RHF	GH		22.09.2013

No. of proposed allotments	2687
No. of proposed residential allotments	2664
Total area	371.48ha
Developable area (less schools)	258.66ha
Reserves	49.910ha
Drainage Reserves	34.550ha
Total Reserve area	84.460ha
Contributed Reserve	(26.0%) 67.185ha
(total reserve less 50% of Drainage Reserves)	

Length of new roads 41.69km

Contour interval 1m. Datum AHD.

Road pavements shown are indicative only.

Dimensions and areas are subject to survey.

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REF A035613.06P2  
 DWG No. A035613PROJ(C)  
 REVISION C  
 RHF-26.09.2013

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Development No. 292 / D / 13  
City of Playford

Proposed Plan of Division  
Allotment 91 in F174425  
Allotment 92 in F174426  
Allotment 93 in F174427  
Allotment 95 in F174429  
Blocks 58 to 60 & 67 to 69 in D1671  
Allotments 5003 to 5006 in 292 / D019 / 12  
Part Closed Road (Buckland Road)  
Hundred of Port Adelaide  
in the area named  
**BUCKLAND PARK**

C17 586/774, 586/780, 586/771, 586/775, 586/785, 586/770,  
586/782, 586/767, 586/765, 586/768  
PT CT 586/763



1:1000 @ A1  
**RIVERLEA**  
PRECINCT 2

Client:  Walker Corporation Pty Ltd  
ABN 91 001 176 283  
G.P.O. Box 407  
Stirling Road 2001  
Level 2 - Governor Macgill Tower  
1 Farnes Place Sydney NSW 2000  
Telephone: (02) 8273 9600  
Facsimile: (02) 8262 7400  
Email: info@walker.com.au

Issue	Description	Drawn	Checked	Approved	Date
C	2ND DRAFT AMENDMENTS				25.09.2013
B	1ST DRAFT AMENDMENTS				22.08.2013
A	AS ISSUED				02.08.2013

No. of proposed allotments	2667
No. of proposed residential allotments	2664
Total area	371.48ha
Developable area (less schools)	258.66ha
Reserves	49.910ha
Drainage Reserves	34.550ha
Total Reserve area	84.460ha
Contributed Reserve (total reserve less 50% of Drainage Reserves)	(26.0%) 67.185ha

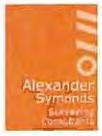
Length of new roads 41.69km  
Contour interval 1m, Datum AHD.  
Road pavements shown are indicative only.  
Dimensions and areas are subject to survey.

G. M. FRASER & SYMONDS PTY LTD Original Draft Date A1  
**Glenn Ian Hardacre**  
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REF AB15613.08P2  
DWG No. A035613PROP(C)  
REVISION C  
RHF 26.09.2013

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13 King William Street 4th Floor  
South Australia 5007  
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Development No. 292 / D / 13  
 City of Playford

Proposed Plan of Division  
 Allotment 91 in F174425  
 Allotment 92 in F174426  
 Allotment 93 in F174427  
 Allotment 95 in F174428

Blocks 58 to 60 & 67 to 69 in D1671  
 Allotments 5003 to 5006 in 292 / D019 / 12  
 Part Closed Road (Buckland Road)  
 Hundred of Port Adelaide

**BUCKLAND PARK**  
 in the area named

Cat 5966/774, 5869/780, 5968/771, 5968/775, 5969/785, 5969/770,  
 5969/782, 5969/787, 5969/790, 5969/796,  
 PT CT 5968/769



**SHEET**  
 8 of 13

1:1000 @ A1  
**RIVERLEA**  
 PRECINCT 2



Walker Corporation Pty Ltd  
 ABN 55 951 178 263  
 G.P.O. Box 4973  
 Sydney NSW 2001  
 Level 21 Gateway Square Tower  
 1 Farnham Place Sydney NSW 2000  
 Telephone (02) 8273 9800  
 Facsimile (02) 9552 7400  
 Email info@walker.com.au

REV	Description	Drawn	Chkd.	Appd.	Date
C	2ND DRAFT AMENDMENTS				26.09.2013
B	1ST DRAFT AMENDMENTS				20.06.2013
A	ISSUE				02.08.2013

No. of proposed allotments	2667
Total area	371.48ha
Developable area (less schools)	258.66ha
Reserves	49.910ha
Drainage Reserves	34.550ha
Total Reserve area	84.460ha
Contributed Reserve (28.0%)	67.185ha
(total reserve less 50% of Drainage Reserves)	
Length of new roads	41.69km
Contour interval 1m. Datum AHD.	
Road pavements shown are indicative only.	
Dimensions and areas are subject to survey.	

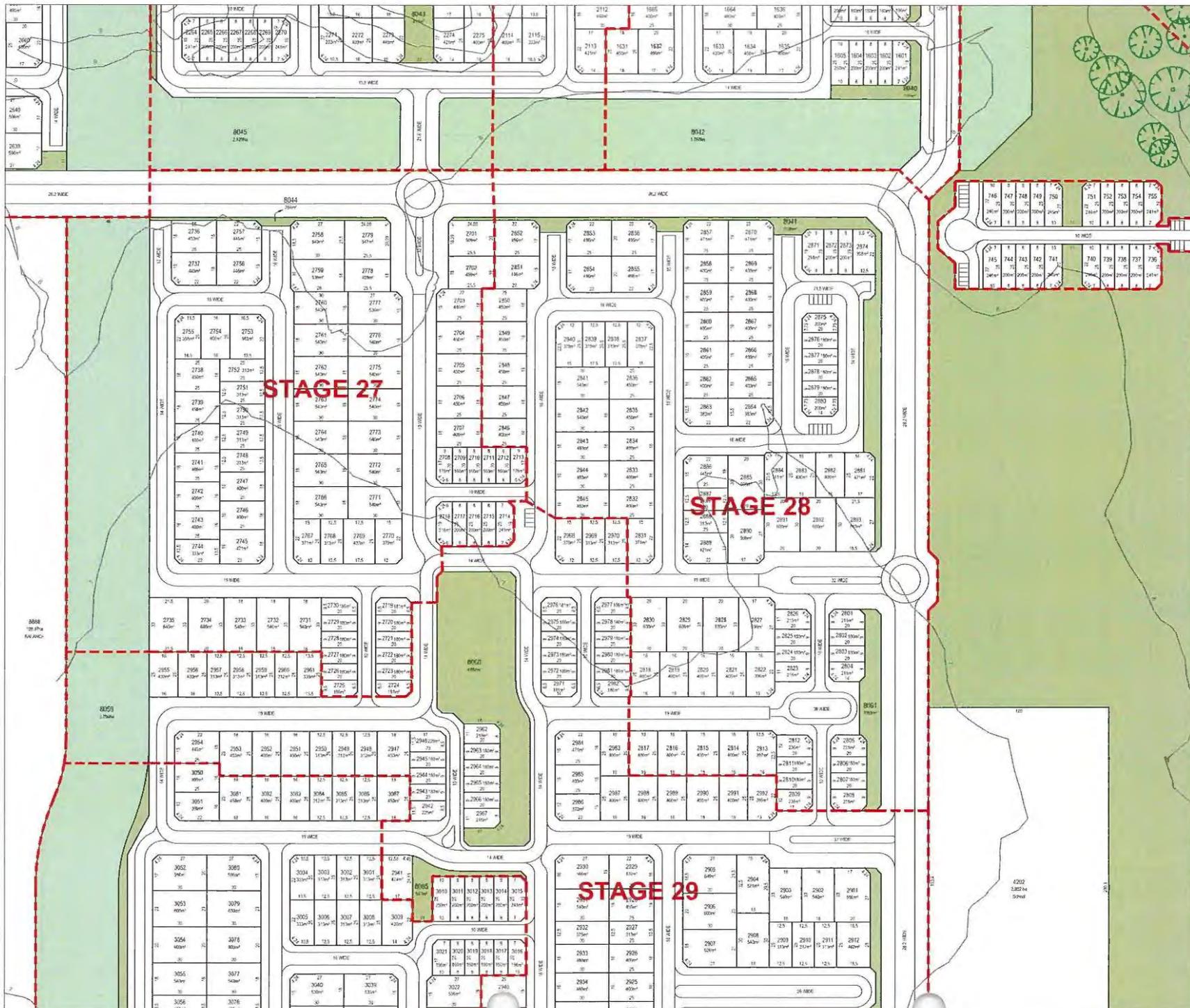
G & A EXAMINER & SYDNEY PTY. LTD. Original Sheet Size A1  
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REF A035813.00P2  
 DWG No. A035613PROP(C)  
 REVISION C  
 REV# 26.09.2013

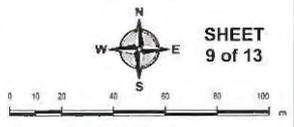
Alexander & Symonds Pty Ltd  
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 South Australia 5067  
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Development No. 292 / D / 13  
 City of Playford  
 Proposed Plan of Division  
 Allotment 91 in F174425  
 Allotment 92 in F174426  
 Allotment 93 in F174427  
 Allotment 95 in F174429  
 Blocks 58 to 60 & 67 to 69 in D1671  
 Allotments 5003 to 5006 in 292 / D019 / 12  
 Part Closed Road (Buckland Road)  
 Hundred of Port Adelaide  
 in the area named  
**BUCKLAND PARK**  
 Cst 5866/774, 5868/720, 5868/771, 5868/775, 5868/785, 5868/770,  
 5868/782, 5868/767, 5868/756, 5868/768  
 PT CT 5868/769



**SHEET**  
 9 of 13  
 1:1000 @ A1  
**RIVERLEA**  
**PRECINCT 2**

Client  
  
 Walker Corporation Pty Ltd  
 ABN 95 001 178 263  
 G.P.O. Box 4012  
 Sydney NSW 2001  
 Level 21, Governor Macquarie Tower  
 5 Fame Place Sydney NSW 2000  
 Telephone (02) 8733 9600  
 Facsimile (02) 9552 1600  
 Web www.walker.com.au

Issue	Description	Drawn	Checkd.	Appd.	Date
1	2ND DRAFT AMENDMENTS				25.08.2013
2	"1ST DRAFT AMENDMENTS" 1ST ISSUE				20.08.2013

No. of proposed allotments	2667
No. of proposed residential allotments	2664
Total area	371.48ha
Developable area (less schools)	258.66ha
Reserves	49.910ha
Drainage Reserves	34.550ha
Total Reserve area	84.460ha
Contributed Reserve (26.0%)	67.185ha
(total reserve less 50% of Drainage Reserves)	

Length of new roads 41.69km  
 Contour interval 1m, Dalum AHD.  
 Road pavements shown are indicative only.  
 Dimensions and areas are subject to survey.

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 REF AB35611.06P2  
 DIVG No. A035613PROP(C)  
 REVISION C  
 RHF 26.08.2013  
 Alexander & Symonds Pty Ltd  
 11 King William Street, First Floor  
 South Australia 5001  
 PO Box 1207, North Adelaide, SA 5013  
 DX 295 496 93067 753 988  
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 F (08) 8162 0091  
 W www.alexander-symonds.com.au  
 E info@alexander-symonds.com.au  
 \* Property & Land Development \*  
 \* Construction & Mining \*  
 \* Spatial Information Management \*



# RIVERLEA

### LEGEND

Allotment Type	Width	Depth	Area m <sup>2</sup>	Total	Total%
Small Courtyard	12.5	25	312	330	12.90%
Medium Courtyard	18	25	450	490	17.90%
Large Courtyard	18	25	450	325	12.90%
Small Traditional	18	30	450	275	10.20%
Medium Traditional	18	30	540	316	12.00%
Large Traditional	20	30	600	120	5.00%
Small Estate	18	35	630	29	1.00%
Medium Estate	20	35	700	25	0.90%
Large Estate	20	35	700	12	0.40%
Medium Density	8	25	200	791	30.00%
<b>Total</b>				<b>2564</b>	<b>100%</b>



Client



Walker Corporation Pty Ltd  
 480 St Georges Road  
 G.P.O. Box 8713  
 Sydney NSW 2001  
 Level 21, Governor Macquarie Tower  
 11 Farrer Place Sydney NSW 2000

Telephone: 622 8272 9800  
 Facsimile: 622 8252 7400  
 Web: walkercorp.com.au

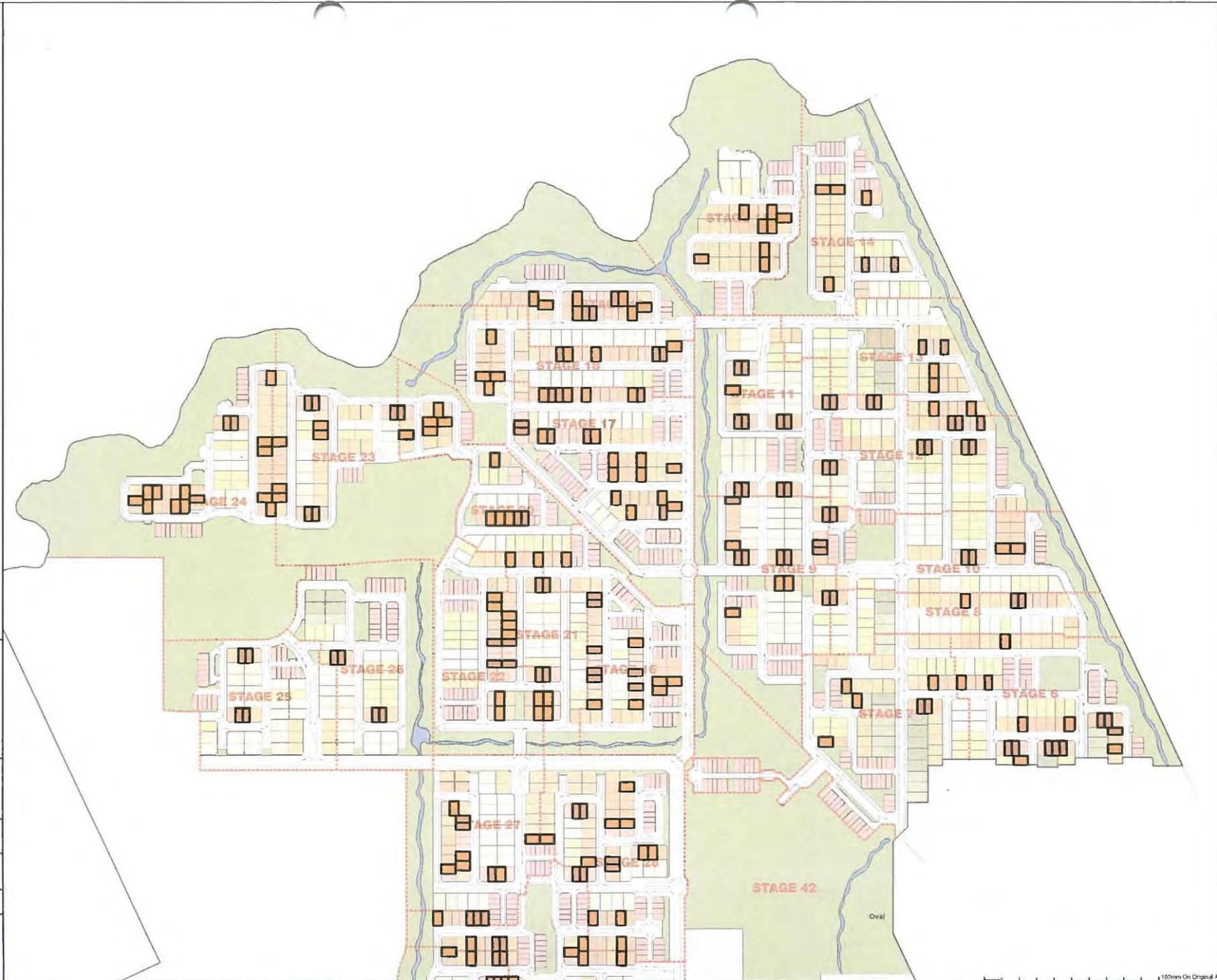
**PRECINCT 2**  
**Affordable Housing**  
**Modification**  
**(400 Allotments)**  
 Sheet 1 of 2

**Project**  
**RIVERLEA**

Project Code: A035613.0000  
 Drawing No.: A035613LM  
 Rev: A

Revision Date:  
 16 October 2013

Surveyor  
 Walker Corporation Pty Ltd  
 11 Farrer Place Governor Macquarie Tower  
 Sydney NSW 2000  
 PO Box 1028 Kent Town, SA 5071  
 Tel: (81) 496 1227 763 666  
 Fax: (81) 496 1227 763 666  
 www.walkercorp.com.au





# RIVERLEA

### LEGEND

Allotment Type	Width	Depth	Area m <sup>2</sup>	Total	Total%
Small Courtyard	12.5	25	312	330	12.00%
Medium Courtyard	16	25	400	450	17.00%
Large Courtyard	18	25	450	525	20.00%
Small Traditional	16	30	480	575	22.00%
Medium Traditional	18	30	540	630	24.00%
Large Traditional	20	30	600	720	28.00%
Small Estate	18	35	630	735	29.00%
Medium Estate	20	35	700	840	33.00%
Large Estate	22	35	770	924	36.00%
Medium Density	8	25	200	231	9.00%
<b>Total</b>				<b>2664</b>	<b>100%</b>



Client

 Walker Corporation Pty Ltd  
 ABN 95 001 176 263  
 G.P.O. Box 4079  
 Sydney NSW 2001  
 Level 21, Governor Macquarie Tower  
 1 Farrer Place Sydney NSW 2000

Telephone: (61) 2 9213 9800  
 Facsimile: (61) 2 9212 7400  
 Web: www.walker.com.au

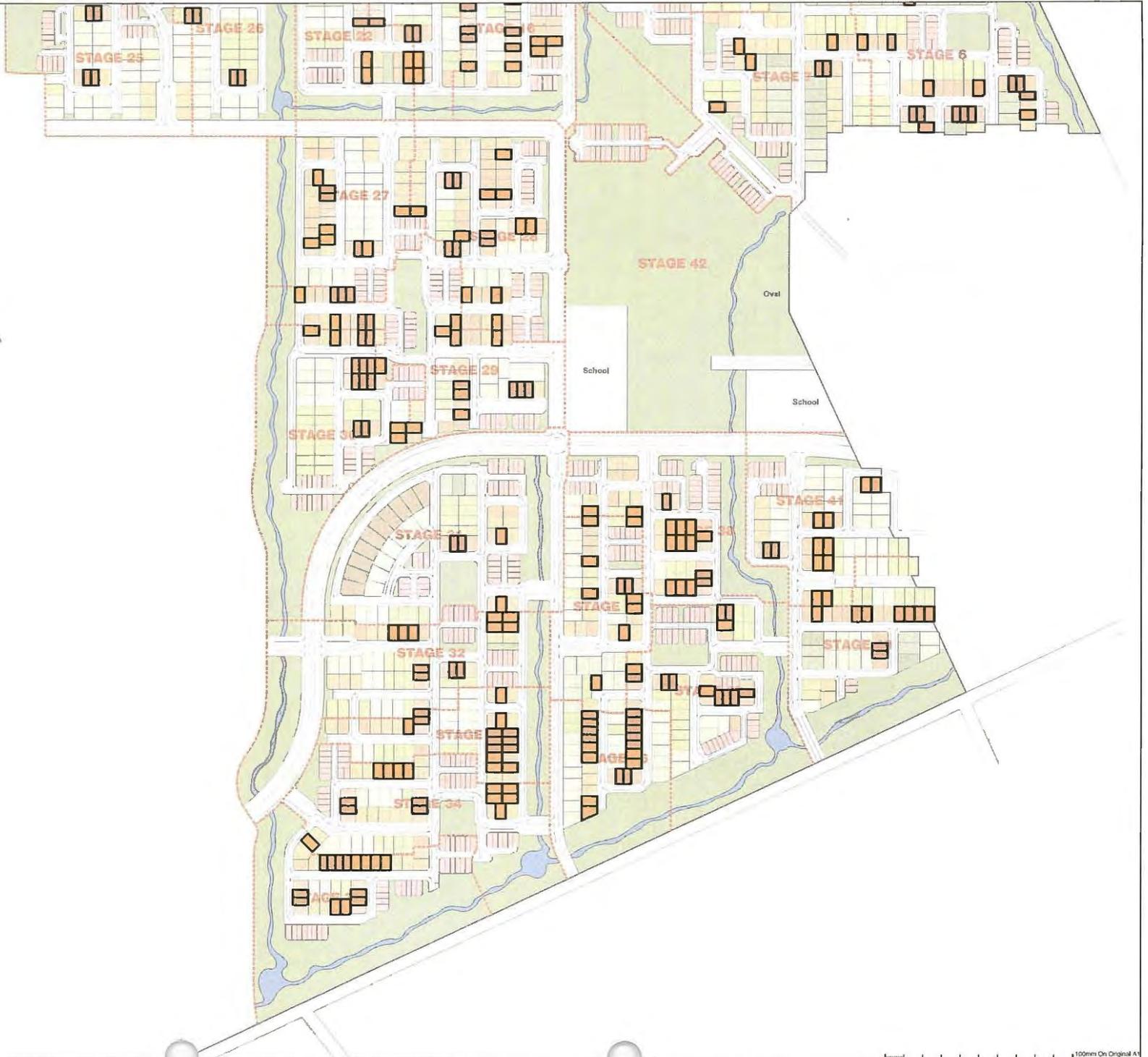
Title: **PRECINCT 2  
Affordable Housing  
Modification  
(400 Allotments)  
Sheet 2 of 2**

Project: **RIVERLEA**

Project Code: A035613.0000    Drawing No.: A035613.LM    Rev: A

Revision Date: **18 October 2013**

Surveyor:  
 Riverlea & Environs Pty Ltd  
 10 Macquarie Street, Suite 200  
 Sydney NSW 2000  
 Tel: (61) 2 9213 9800  
 Fax: (61) 2 9212 7400  
 Email: info@riverlea.com.au  
 Website: www.riverlea.com.au





# RIVERLEA

### LEGEND

Allotment Type	Width	Depth	Area m <sup>2</sup>	Total	Total%
Small Courtyard	12.5	25	312	330	12%
Medium Courtyard	10	25	400	456	17%
Large Courtyard	18	25	450	325	12%
Small Traditional	18	30	480	275	10%
Medium Traditional	18	30	540	316	12%
Large Traditional	20	30	600	120	5%
Small Estate	18	35	630	28	1%
Medium Estate	20	35	700	20	0.5%
Large Estate	22	35	770	12	0.5%
Medium Density	8	25	200	783	30%
<b>Total</b>				<b>2664</b>	<b>100%</b>



### Client



Walker Corporation Pty Ltd  
 40th Floor, 110, Pitt St  
 G.P.O. Box 4023  
 Sydney NSW 2001  
 Level 21, Governor Macquarie Tower  
 1 Farnell Place, Sydney, NSW 2008

Telephone: (02) 6273 9600  
 Facsimile: (02) 9552 7450  
 Web: walker.com.au

### Title

**PRECINCT 2  
 Residential Allotment Mix  
 Modification**  
 Sheet 1 of 2

### Project

**RIVERLEA**

Project Code	Drawing No.	Rev
A035613.0000	A035613LM	A

Revision Date  
**18 October 2013**

Surveyor  
 Walker Corporation Pty Ltd  
 110 Pitt Street, Level 40  
 Sydney NSW 2001  
 P.O. Box 4023, Sydney NSW 2001  
 (02) 6273 9600



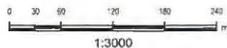
Allotment Type	Width	Depth	Area m <sup>2</sup>	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10	Stage 11	Stage 12	Stage 13	Stage 14	Stage 15	Stage 16	Stage 17	Stage 18	Stage 19	Stage 20	Stage 21	Stage 22	Stage 23	Stage 24	Stage 25	Stage 26	Stage 27	Stage 28	Stage 29	Stage 30	Stage 31	Stage 32	Stage 33	Stage 34	Stage 35	Stage 36	Stage 37	Stage 38	Stage 39	Stage 40	Stage 41	Total	Total%
Small Courtyard	12.5	25	312	13	2	0	12	4	18	13	4	10	3	15	16	7	17	7	0	8	10	7	6	10	10	16	14	4	7	11	9	12	13	4	8	10	2	5	330	12%	
Medium Courtyard	10	25	400	17	11	5	18	12	8	12	11	5	17	21	38	17	15	13	14	14	9	23	0	6	11	28	20	8	9	10	5	10	10	5	10	15	456	17%			
Large Courtyard	18	25	450	13	23	10	2	7	6	9	16	20	16	9	16	8	5	6	0	7	20	6	8	2	14	15	9	2	6	11	8	3	10	8	3	4	4	325	12%		
Small Traditional	18	30	480	15	12	11	7	13	11	15	8	2	2	3	9	10	11	13	4	8	3	11	0	3	18	12	12	6	5	2	3	5	4	11	11	6	275	10%			
Medium Traditional	18	30	540	6	3	14	22	14	10	15	9	5	2	6	12	8	11	7	9	5	7	17	10	18	2	7	6	3	11	9	6	2	16	6	3	4	8	16	316	12%	
Large Traditional	20	30	600	6	0	1	5	1	12	3	0	0	2	0	2	1	2	1	6	0	5	1	11	5	3	9	4	4	7	1	1	2	0	3	13	0	2	8	5	120	5%
Small Estate	18	35	630	3	11	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	1%		
Medium Estate	20	35	700	1	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0.5%	
Large Estate	22	35	770	9	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0.5%	
Medium Density	8	25	200	25	58	9	29	16	24	21	8	21	21	43	53	10	11	15	15	28	5	15	20	28	23	28	33	15	37	24	0	36	31	9	13	33	39	2	12	791	30%
<b>Total</b>				<b>93</b>	<b>126</b>	<b>51</b>	<b>95</b>	<b>67</b>	<b>87</b>	<b>93</b>	<b>61</b>	<b>67</b>	<b>62</b>	<b>96</b>	<b>142</b>	<b>54</b>	<b>56</b>	<b>58</b>	<b>49</b>	<b>75</b>	<b>60</b>	<b>65</b>	<b>65</b>	<b>70</b>	<b>79</b>	<b>93</b>	<b>92</b>	<b>87</b>	<b>83</b>	<b>75</b>	<b>45</b>	<b>79</b>	<b>63</b>	<b>44</b>	<b>61</b>	<b>73</b>	<b>79</b>	<b>54</b>	<b>65</b>	<b>2664</b>	<b>100%</b>



# RIVERLEA

### LEGEND

Allotment Type	Width	Depth	Area m <sup>2</sup>	Total	Total%
Small Courtyard	12.5	25	312	330	12%
Medium Courtyard	18	25	450	456	17%
Large Courtyard	18	25	450	325	12%
Small Traditional	18	30	540	275	10%
Medium Traditional	18	30	540	316	12%
Large Traditional	20	30	600	120	5%
Small Estate	18	35	630	29	1%
Medium Estate	20	35	700	23	0.5%
Large Estate	22	35	770	15	0.5%
Medium Density	8	25	200	781	30%
<b>Total</b>				<b>2664</b>	<b>100%</b>



### Client



### Title

**PRECINCT 2  
Residential Allotment Mix  
Modification  
Sheet 2 of 2**

### Project

**RIVERLEA**

Project Code	Drawing No.	Rev
A035613.0000	A035613LM	A

Revision Date  
**18 October 2013**

Surveyor  
Abraham & Daniels Pty Ltd  
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New South Wales 1587  
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Allotment Type	Width	Depth	Area m <sup>2</sup>	Stage 6	Stage 7	Stage 8	Stage 9	Stage 10	Stage 11	Stage 12	Stage 13	Stage 14	Stage 15	Stage 16	Stage 17	Stage 18	Stage 19	Stage 20	Stage 21	Stage 22	Stage 23	Stage 24	Stage 25	Stage 26	Stage 27	Stage 28	Stage 29	Stage 30	Stage 31	Stage 32	Stage 33	Stage 34	Stage 35	Stage 36	Stage 37	Stage 38	Stage 39	Stage 40	Stage 41	Total	Total%
Small Courtyard	12.5	25	312	13	2	8	12	4	18	12	4	19	2	15	19	7	12	7	9	8	10	7	6	6	16	16	18	14	4	7	11	9	12	13	4	8	15	3	5	330	12%
Medium Courtyard	18	25	450	17	11	5	18	12	6	12	11	5	17	21	28	17	15	12	18	14	9	23	9	9	11	28	20	8	6	8	18	16	8	6	11	17	9	13	15	456	17%
Large Courtyard	18	25	450	13	23	10	2	7	6	9	16	20	18	6	5	16	0	7	20	8	8	2	14	15	9	2	6	11	8	11	8	3	10	6	3	4	4	325	12%		
Small Traditional	18	30	540	15	12	11	7	13	9	17	15	6	2	2	3	0	10	11	13	4	6	3	13	0	3	3	18	12	12	6	5	2	3	5	4	11	11	6	275	10%	
Medium Traditional	18	30	540	6	3	14	22	14	10	15	9	5	2	6	12	8	11	7	9	5	7	7	17	10	18	2	7	6	3	11	9	6	2	16	6	3	4	8	16	316	12%
Large Traditional	20	30	600	0	0	1	5	1	12	3	0	0	2	0	2	1	2	1	6	0	5	1	11	5	3	9	4	4	7	1	1	2	0	3	13	0	2	8	5	120	5%
Small Estate	18	35	630	3	11	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	1%	
Medium Estate	20	35	700	1	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0.5%	
Large Estate	22	35	770	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0.5%
Medium Density	8	25	200	25	38	8	28	16	24	2	0	21	24	43	53	16	11	16	6	28	5	15	28	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	781	30%
<b>Total</b>				<b>93</b>	<b>126</b>	<b>51</b>	<b>95</b>	<b>67</b>	<b>87</b>			<b>67</b>	<b>62</b>	<b>96</b>	<b>142</b>	<b>54</b>	<b>56</b>	<b>58</b>	<b>49</b>	<b>75</b>	<b>60</b>	<b>65</b>	<b>63</b>	<b>70</b>		<b>93</b>	<b>92</b>	<b>87</b>	<b>83</b>	<b>75</b>	<b>45</b>	<b>79</b>	<b>63</b>	<b>44</b>	<b>61</b>	<b>73</b>	<b>79</b>	<b>54</b>	<b>65</b>	<b>2664</b>	<b>100%</b>





# RIVERLEA

### LEGEND

Allotment Type	Width	Depth	Area m <sup>2</sup>	Total	Totals
Small Courtyard	12.5	25	312	330	12%
Medium Courtyard	18	25	450	458	17%
Large Courtyard	18	25	450	325	12%
Small Traditional	16	30	480	275	10%
Medium Traditional	18	30	540	318	12%
Large Traditional	20	30	600	120	5%
Small Estate	18	35	630	29	1%
Medium Estate	20	35	700	20	0.5%
Large Estate	22	35	770	13	0.5%
Suburban Density	8	25	200	783	28%
<b>Total</b>				<b>2664</b>	<b>100%</b>



### Client



Walker Construction Pty Ltd  
 ABN 55 501 116 263  
 G.P.O. Box 4472  
 Sydney NSW 2031  
 Level 21 Governor Macquarie Tower  
 1 Farrer Place Sydney NSW 2000  
 Telephone: (02) 9273 9000  
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 Web: walker.com.au

### Title

**PRECINCT 2**  
**Residential Allotment Mix**  
**Modification**  
 Sheet 1 of 2

### Project

**RIVERLEA**

### Project Code

A035613.0000

### Drawing No.

A035613LM

### Rev

A

### Revision Date

18 October 2013

### Surveyor

Walker Construction Pty Ltd  
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18 Oct 2013  
 A  
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# RIVERLEA

### LEGEND

Allotment Type	Width	Depth	Area m <sup>2</sup>	Total	Totals
Small Courtyard	12.5	25	312	330	12%
Medium Courtyard	15	25	450	436	17%
Large Courtyard	18	25	450	325	12%
Small Traditional	16	30	480	275	10%
Medium Traditional	18	30	540	310	12%
Large Traditional	20	30	600	120	5%
Small Estate	18	35	630	21	1%
Medium Estate	20	35	700	25	0.5%
Large Estate	22	35	770	12	0.5%
Medium Density	8	25	200	781	30%
<b>Total</b>				<b>2664</b>	<b>100%</b>



### Client



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### Title

**PRECINCT 2**  
**Residential Allotment Mix**  
**Modification**  
 Sheet 2 of 2

### Project

**RIVERLEA**

### Project Code

A035613.0000

### Drawing No.

A035613LM

### Rev

A

### Revision Date

18 October 2013

### Surveyor

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RIVERLEA

LEGEND

--- Pedestrian and Cycling Path (29.5km)



Client



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Title

**PRECINCT 2  
Residential  
Pedestrian and Cycling Network**  
Sheet 1 of 2

Project

**RIVERLEA**

Project Code

A035613.0000

Drawing No.

A035613PC

Rev

A

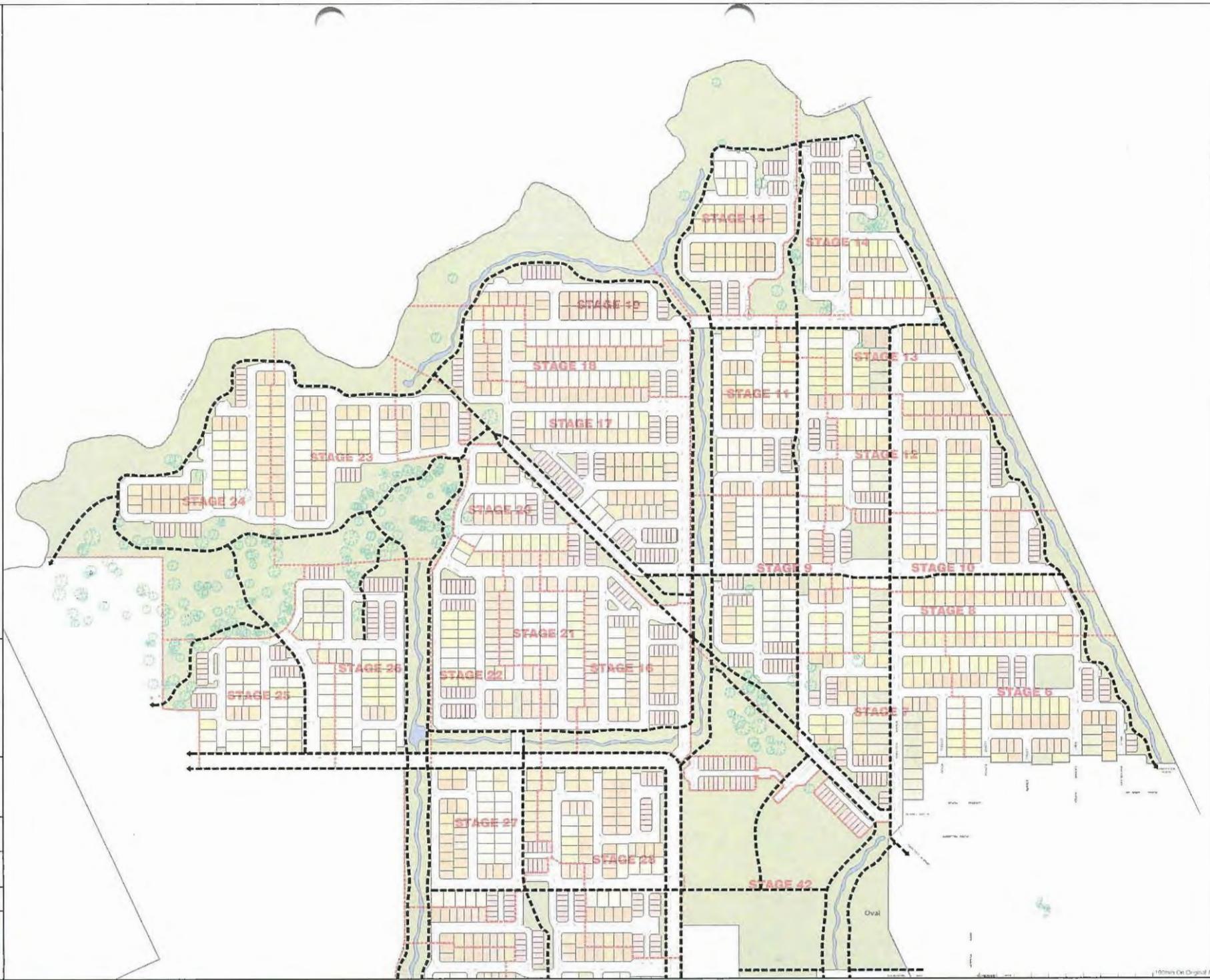
Revision Date

18 October 2013

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RIVERLEA

LEGEND

--- Pedestrian and Cycling Path (20.5km)



Client



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**PRECINCT 2  
Residential  
Pedestrian and Cycling Network  
Sheet 2 of 2**

Project

RIVERLEA

Project Code

A035613.0000

Drawing No.

A035613PC

Rev.

A

Revision Date

18 October 2013

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RIVERLEA

LEGEND

— Areas of Special Fencing Control



Client



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Title

PRECINCT 2  
Residential  
Special Fencing Control  
Sheet 1 of 2

Project

RIVERLEA

Project Code

A035613.0000

Drawing No.

A035613FC

Rev

A

Revision Date

18 October 2013

Surveyor

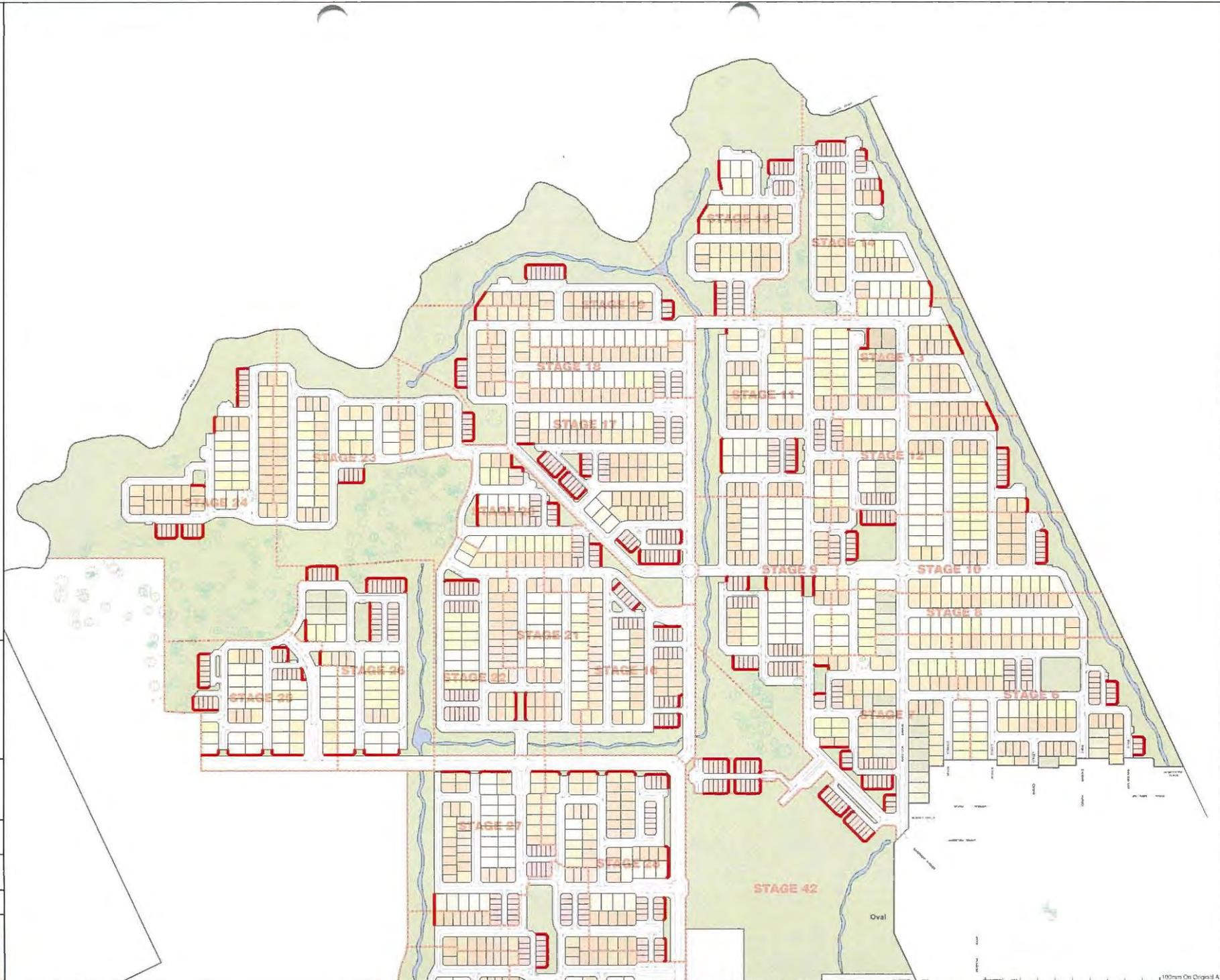
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Tel

Fax

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RIVERLEA

LEGEND

Areas of Special Fencing Control



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Title

PRECINCT 2  
Residential  
Special Fencing Control  
Sheet 2 of 2

Project

RIVERLEA

Project Code

A035613.0000

Drawing No.

A035613FC

Rev

A

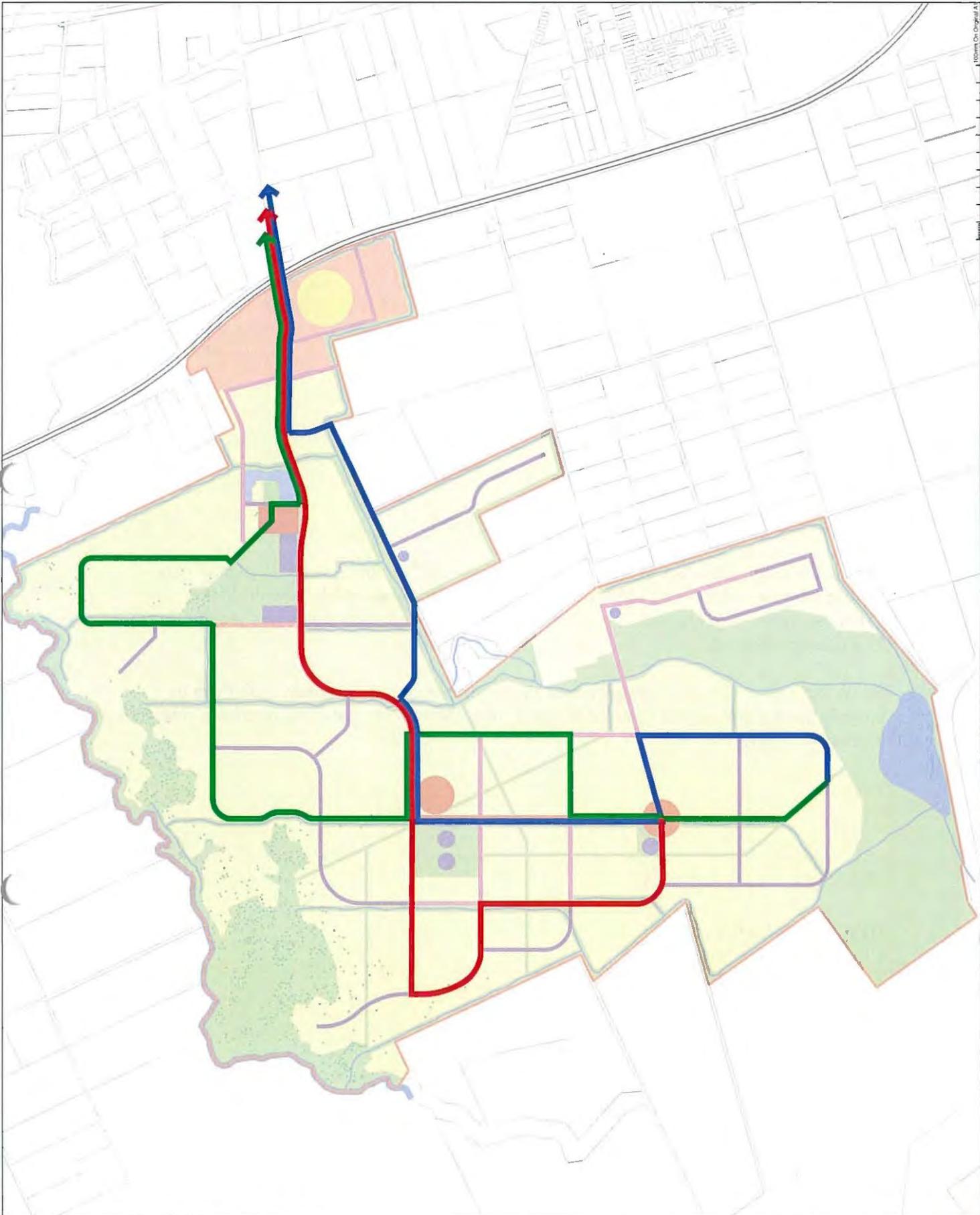
Revision Date

18 October 2013

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Sydney NSW 2000  
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**LEGEND**

- To Munno Para
- To Elizabeth (via Virginia)
- To Salisbury (via Virginia)

Note: Buses to and from Elizabeth and Salisbury to be routed via Virginia to replace existing bus route 960.

Client

**walker**

Walker Corporation Pty Ltd  
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 Melbourne VIC 3000  
 T +61 3 9593 8200  
 F +61 3 9593 8201  
 E info@walker.com.au  
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Title

**PROPOSED  
 BUS ROUTE STRATEGY  
 2031**

Project

**RIVERLEA**

Project Code	Drawing No.	Rev
A056410.0000	A056410BR	B
Revision Date	31 July 2013	
Scale	As Shown	
Author	[Name]	
Checker	[Name]	
Drawn	[Name]	
Reviewed	[Name]	
Approved	[Name]	

# **ANNEXURE TWO**

## **INFRASTRUCTURE AGENCY CORRESPONDENCE**

Ed Macolino  
APA Group 9/07/13  
Telephone (08) 8113 9017  
9th July 2013.

Walker Corporation Pty Ltd  
Attention: Mr Brett Butler  
Project Manager  
6 Greenfield Street  
Mt Barker SA 5251  
Australia

Dear Brett,

**Re: Buckland Park Development.**

With regards to the provision of Natural Gas infrastructure to the Buckland Park Development, We can advise that Envestra is committed to providing natural gas infrastructure to the development in accordance with the Natural Gas Infrastructure agreement in place between Walker Corporation and Envestra.

If you have any queries please call Ed Macolino, of our contractor, APA Group, on 08 8113 9017

Yours Sincerely



Ed Macolino,  
Manager, Strategic Development  
08 8113 9017  
0439 868 607  
L7 Currie St, Adelaide 5000  
ed.macolino@apa.com.au

Our Ref: 100688197

20 June 2013

Walker Corporation  
Attention: Brett Butler  
PO Box 1008  
Virginia  
South Australia 5120

Dear Mr Butler

**SA POWER NETWORKS CONTESTABLE CONNECTION BUCKLAND PARK**

I am writing regarding the Precinct 2 application for Buckland Park, SA Power Networks mains and equipment currently have capacity and Precinct 2 will be supplied from the Virginia substation. When the contestable construction is completed and has received compliance by SA Power Networks compliance group SA Power Networks will endeavour to energise the vested assets within 80 days, subject to weather and switching availability.

Yours faithfully,



Mario Pepicelli  
**CUSTOMER SOLUTIONS MANAGER - ELIZABETH**

File R:\Network\Elizabeth\BLPRO\NDB Projects\Gosden N\PROJECTS\100688197

31 July 2013

SOUTH AUSTRALIAN  
WATER CORPORATION

Our Ref     Buckland Park

SA Water House  
250 Victoria Square  
Adelaide South Australia 5000

GP0 Box 1751  
Adelaide SA 5001

Telephone +61 8 1300 650 950

ABN 69 336 525 019

Walker Corporation  
Attention: Brett Butler  
6 Greenfield St  
MOUNT BARKER SA 5251

Dear Brett

### **BUCKLAND PARK - RIVERLEA PRECINCT 2**

I am writing to confirm SA Waters capability to service Precinct 2 of the Buckland Park – Riverlea development. As a result of ongoing planning and discussions with Walker Corporation SA Water is able to provide drinking water and wastewater servicing to Precinct 2 of this development.

SA Water will continue to negotiate with the developer and work closely with them to provide the required servicing at the relevant time. Should you have any queries please do not hesitate to contact me.

Regards



**DEBBIE SNOSWELL**

**Client Proposals Manager**

Telephone: 7424 1133

Facsimile: 7003 1133

Email: [debbie.snoswell@sawater.com.au](mailto:debbie.snoswell@sawater.com.au)



# **ANNEXURE THREE**

## **GTA REPORT**



Riverlea  
Precinct 2

Traffic Assessment

transportation planning, design and delivery

Riverlea  
Precinct 2,  
Traffic Assessment

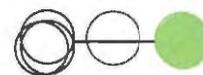
Issue: C 10/11/14

Client: Walker Buckland Park Developments  
Reference: 13A1177000  
GTA Consultants Office: SA

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A	09/09/13	Final	Andrew Pine	Paul Morris	Paul Morris	Paul Morris
B-Dr	14/10/13	Draft revision	Andrew Pine	Paul Morris	Paul Morris	Paul Morris
B	05/11/13	Final	Andrew Pine	Paul Morris	Paul Morris	Paul Morris
C	11/10/14	Final – amended	Paul Morris	Paul Morris	Paul Morris	

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# 1. Introduction

## 1.1 Background

Riverlea is a major development which will form a new township in the northern area of greater Adelaide. The township will provide 12,000 dwellings, a district centre, 4 neighbourhood centres, a mixed use precinct and an employment precinct to cater for 33,000 residents. The development will be undertaken over 20 years.

Key to the development is the street and road network which will provide access for the daily services and needs of the community. A master plan has been prepared for the whole township, however revisions are proposed to Precincts 1 and 2 to commence creation of the township.

Precinct 2 was included in the master plan however it is proposed to revise the layout to integrate better with Precinct 1, which will provide the initial neighbourhood centre, key arterial road network to Port Wakefield Road and associated residential development. Precinct 2 will comprise some 2,735 dwellings with a school precinct.

## 1.2 Purpose of this Report

This report sets out an assessment of the anticipated traffic and transport implications of the proposed development in Precinct 2, including consideration of the:

- i existing and estimated traffic conditions surrounding the site;
- ii traffic generation characteristics of the proposed development;
- iii proposed access arrangements for the site;
- iv overview of the layout based on the master plan for Precinct 2;
- v transport impact of the development proposal on the surrounding township road network.

## 1.3 Referenced Documents

In preparing this report, reference has been made to a number of background documents, including:

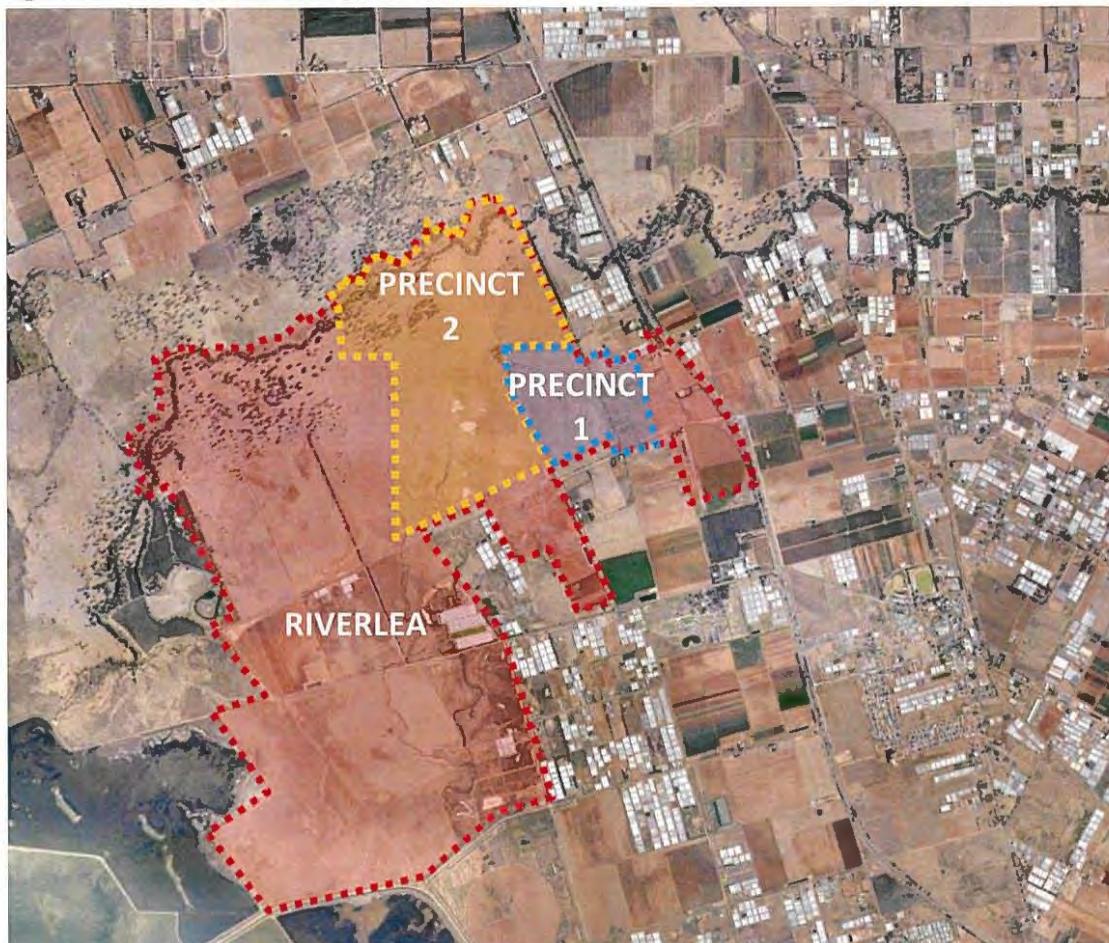
- Masterplan for the proposed development provided by Walker Corp (dated 4<sup>th</sup> June 2013)
- 'Buckland Park Traffic Impact Assessment' Parsons Brinckerhoff Australia Pty Ltd, 1 April 2009
- 'Buckland Park Boulevard Intersection Operation Review' GTA Consultants, 24 August 2011
- various technical data as referenced in this report
- other documents as nominated.

## 2. Existing Conditions

### 2.1 Subject Site

The subject site is located within the Riverlea site, which is located adjacent Port Wakefield Road opposite Angle Vale Road. The location of the site can be seen in Figure 2.1.

Figure 2.1: Site and Surrounding Environs



(Photomap courtesy of NearMap Pty Ltd)

### 2.2 Road Network

There is no road network currently within the Riverlea site.

#### 2.2.1 Adjoining Roads

##### Port Wakefield Road

Port Wakefield Road is an arterial road under the core and control of the Department for Planning, Transport and Infrastructure (DPTI). It is a two-way road aligned in an approximate southeast to northwest orientation. It is configured with dual, two-lane approximately 12.5 metre wide carriageways (measured to the southeast of Angle Vale Road). The carriageways are

separated by approximately 14 metre wide median. Unsealed shoulders are provided either side of the carriageway.

Port Wakefield Road carries approximately 13,300 vehicles per day<sup>1</sup> and is subject to a posted speed limit of 110 km/h.

### Angle Vale Road

Angle Vale Road is collector road under the care and control of DPTI. It is a two-way road aligned in an approximate east to west orientation. It is configured with a two-lane approximately 11 metre wide carriageway (measured to the east of Port Wakefield Road). Unsealed shoulders are provided either side of the carriageway.

Angle Vale Road carries approximately 2,500 vehicles per day<sup>1</sup> and is subject to a posted speed limit of 90 km/h.

## 2.2.2 Surrounding Intersections

Port Wakefield Road and Angle Vale Road currently form a Give-Way controlled intersection with priority assigned to Port Wakefield Road. The intersection is currently shaped in a seagull T-junction arrangement.

In order to manage the increased traffic flows associated with the new Riverlea development, traffic signals are proposed at the intersection with associated upgrade of the existing T-junction to a four way intersection.

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<sup>1</sup> 'Annual Average Daily Traffic Estimates 24 hour two-way flows' DPTI 01 July 2013

## 3. Development Proposal

### 3.1 Masterplan

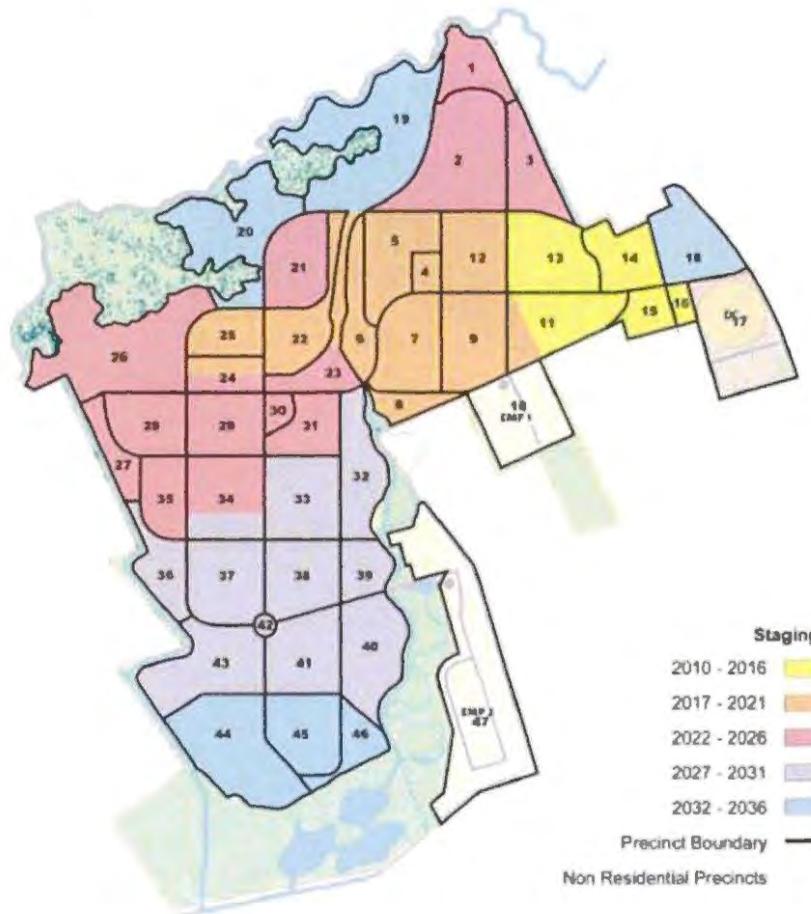
A master plan has been developed for Riverlea to include:

- approximately 12,000 low and medium density residential allotments;
- a District Centre (DC);
- an integrated primary/secondary school;
- four Neighbourhood Centres (NC) - local primary schools to be provided within each NC;
- additional Commercial and Industrial precincts;
- an Internal road network comprising a main arterial road with collector and local access roads was proposed to distribute vehicle around the site.

Further, an at-grade, signalised intersection connecting to Port Wakefield Road was proposed to provide vehicle access to the previously approved Stage 1.

The Buckland Park 'Traffic Impact Assessment' (Parsons Brinkerhoff, 1 April 2009) for the previous development. Figure 3.1 shows the proposed staging plan of the previous Riverlea township, Precinct 1 and 2 can be seen in yellow and orange respectively.

Figure 3.1: Riverlea Previous Development Staging Plan



## 3.2 Revised Proposal

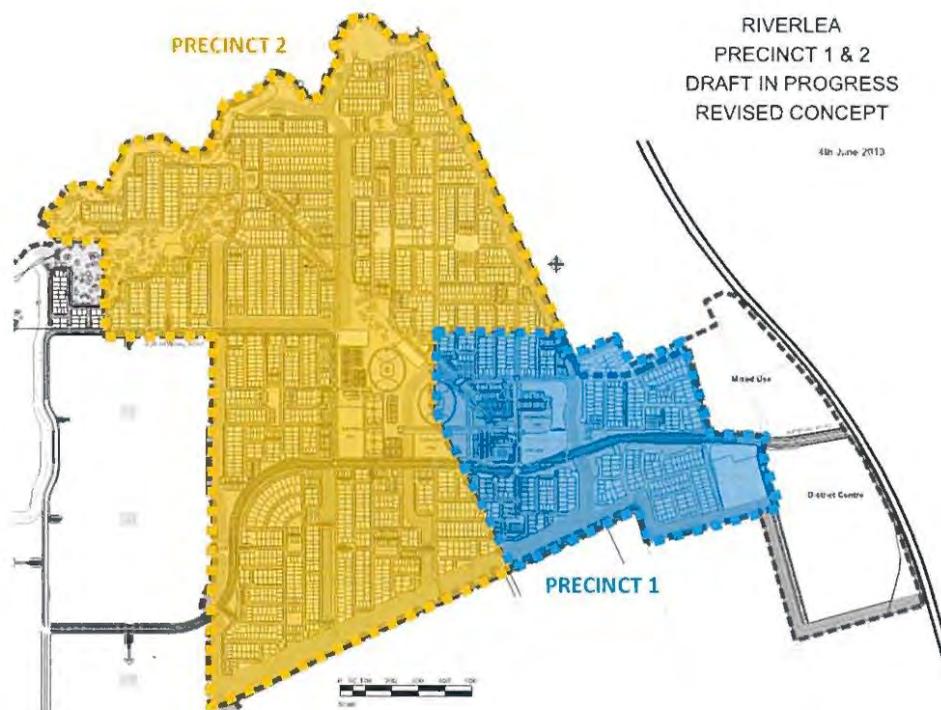
The revised proposal seeks to modify Precinct 2 of the proposed Riverlea Township. The revised Precinct 2 is proposed to comprise approximately 2,630 residential allotments and medium density apartments, a primary and secondary school, and be situated around the proposed Precinct 1.

Vehicle access to Precinct 2 will be via the arterial road that will be developed as part of Precinct 1. The arterial road will provide access to Port Wakefield Road (as per the previous consent).

The revised precinct will also include a road network comprising arterial, sub-arterial, collector and local access roads.

The proposed site layout can be seen in Figure 3.2

Figure 3.2: Revised Precinct 2 Layout



## 4. Traffic Assessment

### 4.1 Previous Assessment

The traffic assessment for the previously approved Riverlea township was undertaken by Parsons Brinkerhoff using a strategic transport model. The assessment was undertaken on the site master plan and did not consider individual precincts. However, the traffic assessment did include traffic generation of the master plan at 5-year intervals based on the anticipated dwelling occupancy.

Based on the anticipated dwelling occupancy, Precincts 1 and 2 would be completed and occupied by the year 2020.

### 4.2 Traffic Generation

#### 4.2.1 Design Rates

To assess the traffic impacts of Precinct 2, it is important to consider the traffic generated as a result of Precinct 1. Hence, this assessment will include the likely traffic generated as a result of Precinct 1.

Given the smaller nature of Precinct 2 and limited choices for access through the site, the application of traffic generation rates and manual assignments to the street network is an appropriate method of analysis for this precinct.

Traffic generation estimates for the proposed development have been sourced from the 'Guide to Traffic Generating Developments' (RTA NSW, 2002, henceforth referred to as RTA Guide). The RTA Guide states the following traffic generation rates:

Residential Dwelling Houses	Daily Vehicle Trips	9.0 trips per dwelling
	Peak Hour Vehicle Trips	0.65 trips per dwelling
Medium Density Residential Flat Building (three or more bedrooms)	Daily Vehicle Trips	6.5 per dwelling
	Weekday Peak Hour Vehicle Trips	0.65 per dwelling

These trip generation rates are considered conservative and likely to be higher than actually realised however these provide a consistent approach to the model given their use in the master plan traffic assessment for Riverlea.

Given the collector and arterial road layout, Precinct 1 and 2 have been broken up into four and five zones.

GTA has assumed the neighbourhood centre will attract traffic from the residents within Riverlea with negligible passing trade from along Port Wakefield Road.

Estimates of peak hour and daily traffic volumes resulting from the proposed zones are set out in Table 4.1.

Table 4.1: Traffic Generation Estimates Precinct 1 &amp; 2

Precinct	Zone	Use	Approx. No. of dwellings	Traffic Generation Rate (Movements /Dwelling)		Vehicle Movements		
				Peak Hour	Daily	Peak Hour	Daily	
1	1	Dwelling House	160	0.85	9.0	136	1440	
		Medium Density	40	0.65	6.5	26	260	
	2	Dwelling House	120	0.85	9.0	102	1080	
		Medium Density	10	0.65	6.5	7	65	
	3	Dwelling House	90	0.85	9.0	77	810	
		Medium Density	60	0.65	6.5	39	390	
	4	Dwelling House	40	0.85	9.0	34	360	
		Medium Density	20	0.65	6.5	13	130	
	2	1	Dwelling House	605	0.85	9.0	514	5445
			Medium Density	171	0.65	6.5	111	1112
2		Dwelling House	78	0.85	9.0	66	702	
		Medium Density	22	0.65	6.5	14	143	
3		Dwelling House	663	0.85	9.0	564	5967	
		Medium Density	187	0.65	6.5	122	1216	
4		Dwelling House	273	0.85	9.0	232	2457	
		Medium Density	77	0.65	6.5	50	501	
5		Dwelling House	432	0.85	9.0	367	3888	
		Medium Density	122	0.65	6.5	79	793	
TOTAL			3170	N/A	N/A	2553	26759	

Table 4.1 indicates that Precinct 1 and 2 could potentially generate approximately 2,600 and 26,800 vehicle movements during the weekday peak hour and daily period respectively. This is consistent with the Traffic Impact Assessment for Buckland Park (2009).

Rates provided within the RTA Guide suggest the neighbourhood centre of 5,550 sq.m total floor area will typically attract 6,750 vehicle trips per day (Thursday).

The proposed school is likely to have an attendance of up to 1,000 students. Traffic generation rates for schools as surveyed by GTA indicate a trip generation of 1.34 trips per student per day. Application of this rate suggests the proposed school is likely to attract 1,340 trips per day.

As previously mentioned, the traffic associated with the proposed school and neighbourhood centre are anticipated to be associated with Precinct 1 and 2 and not "passing trade" from along Port Wakefield Road. Hence it can be seen that approximately 30% (rounded up from 28.4%) of all traffic generated by Precinct 1 and 2 will be internal to the Riverlea site.

#### 4.2.2 Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

- i configuration of the arterial road network in the immediate vicinity of the site;
- ii existing operation of intersections providing access between the local and arterial road network;
- iii distribution of households in the vicinity of the site;
- iv the surrounding employment centres, retail centres and schools in relation to the site;
- v configuration of access points to the site.

Having consideration to the above, GTA has assumed that 30% of all trips generated will be internal and the remaining 70% will be external to the Riverlea site (that is to and from Port Wakefield Road and Angle Vale Road. Figure 4.1 shows the directional distributions of both internal and external trips for the purposed of estimated vehicle movements.

Figure 4.2 shows the anticipated daily traffic volumes on key roads within the Riverlea site.

Figure 4.1: Anticipated Directional Distributions

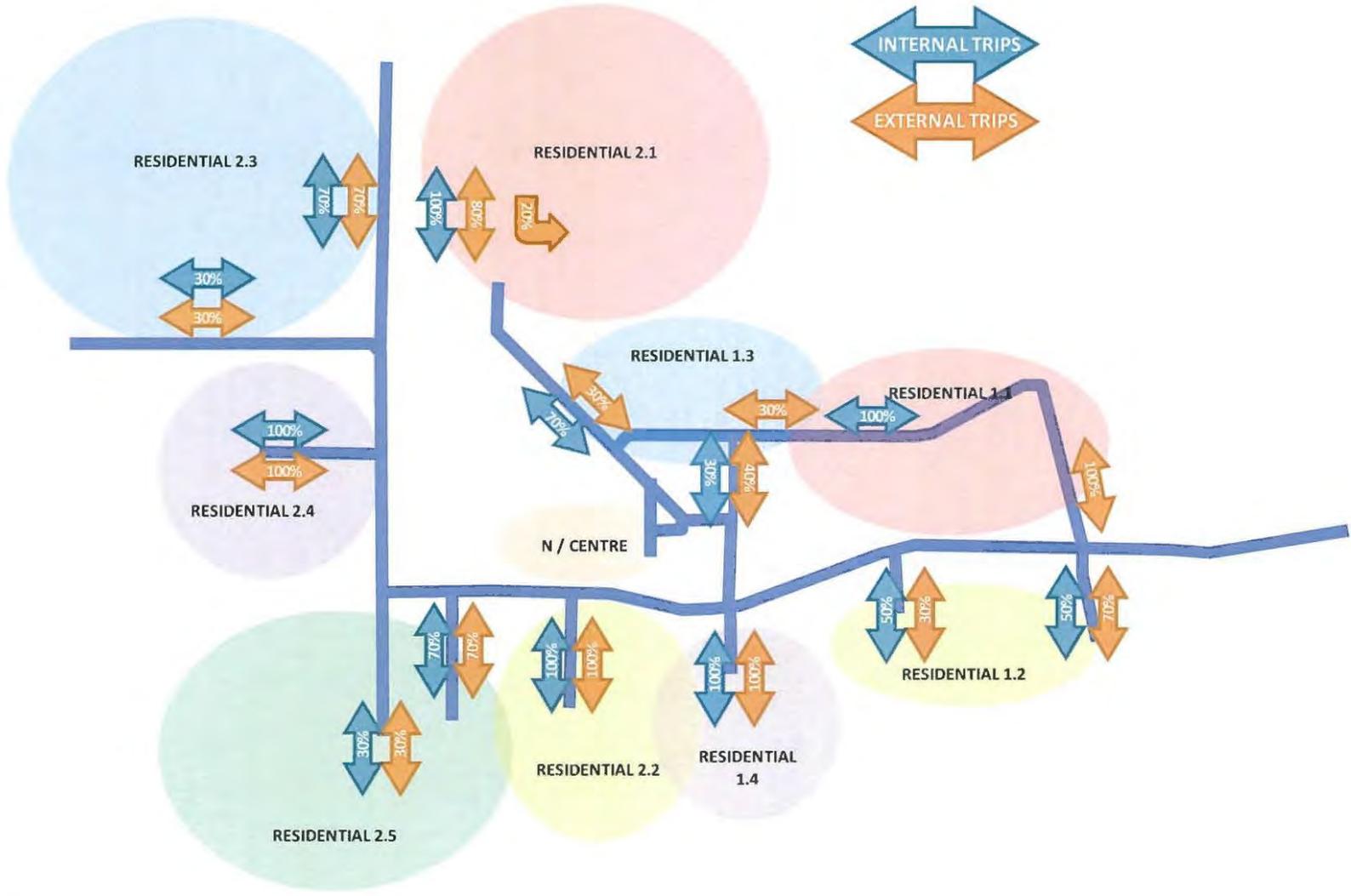
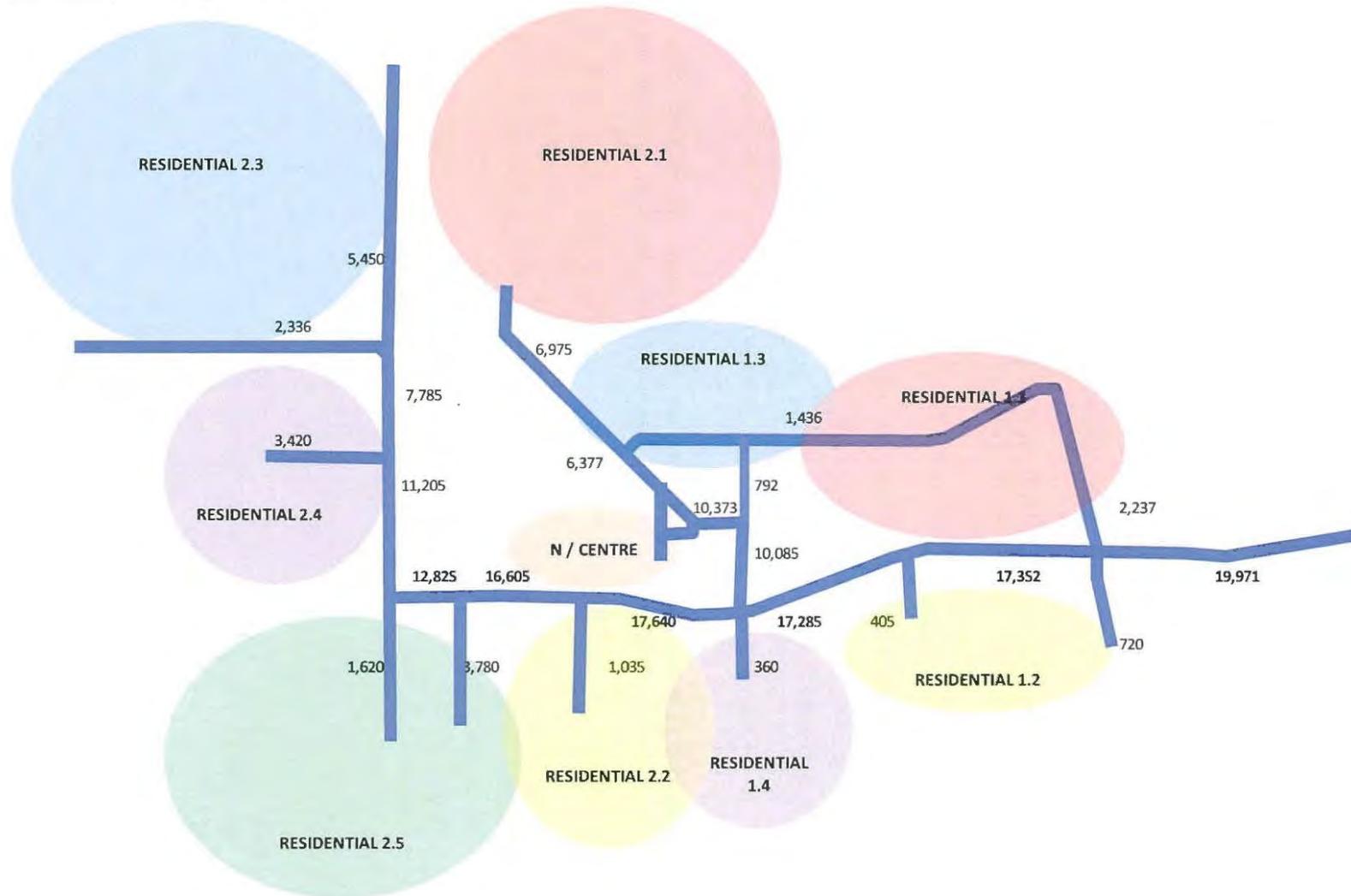


Figure 4.2: Anticipated Daily Traffic Volumes



In addition, the directional splits of traffic (i.e. the ratio between the inbound and outbound traffic movements) in the AM and PM peak periods are 90:10 (90% outbound 10% inbound) and 40:60 (40% outbound and 60% inbound) respectively for the external trips.

These AM directional splits have been assumed based on the majority of residential traffic likely to be leaving while the PM directional splits have been assumed based on some residents leaving for dinner or other commitments external to the development while the inbound traffic is residents returning from work.

The internal trip directional splits are assumed to be 50:50 during both peak periods. These external traffic are likely to be a more even with AM directional splits likely to be associated with student drop off and PM directional split likely to be a result of customers at the neighbourhood centre.

The traffic volumes are consistent with the Traffic Impact Assessment (2009) for the traffic demands for Precinct 2 on the arterial road network in Riverlea.

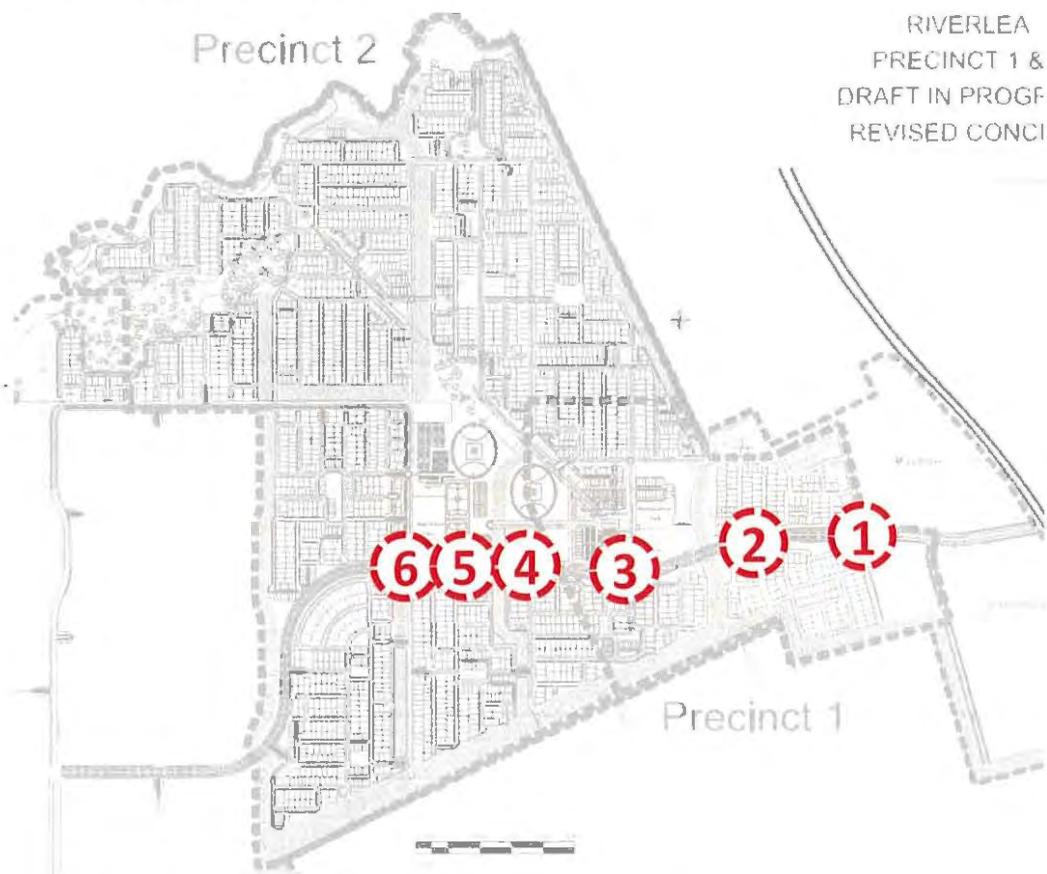
### 4.3 Traffic Impact

The traffic impact assessment will consider the following scenarios:

- "Precinct 1 and 2" Scenario comprising the Precinct 1 and 2 traffic volumes anticipated in Section 4.2.2.
- "Ultimate" Scenario including the traffic volumes for the ultimate Riverlea site as determined by '*Buckland Park Traffic Impact Assessment*' (Parsons Brinckerhoff Australia Pty Ltd, 1 April 2009).

The impact of the development traffic has been assessed using SIDRA INTERSECTION at key intersections throughout Precinct 1 and 2. The key intersection locations are shown in Figure 4.3.

Figure 4.3: Location of Key Intersections



The Riverlea / Port Wakefield Road intersection is not part of this assessment.

#### 4.3.1 Reedy Road Intersection

The anticipated AM and PM peak hour traffic volumes for both the "Precinct 1 and 2" and "Ultimate" scenarios for the Reedy Road intersection are shown in Figure 4.4 and Figure 4.5 respectively.

Figure 4.4: AM Peak Hour Turning Movement Volumes – Reedy Road Intersection

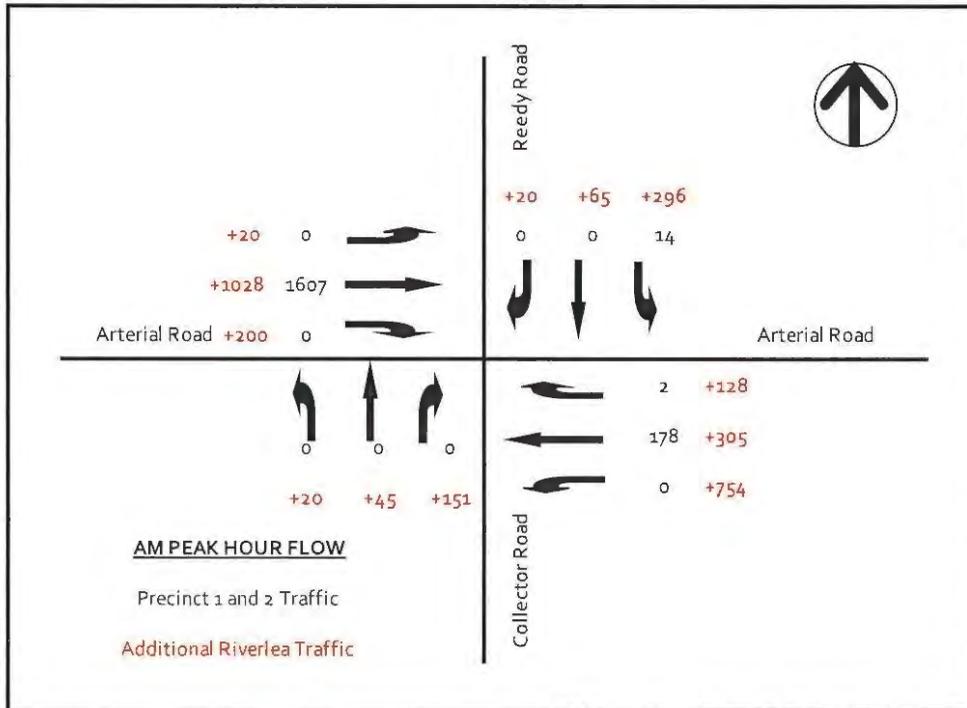
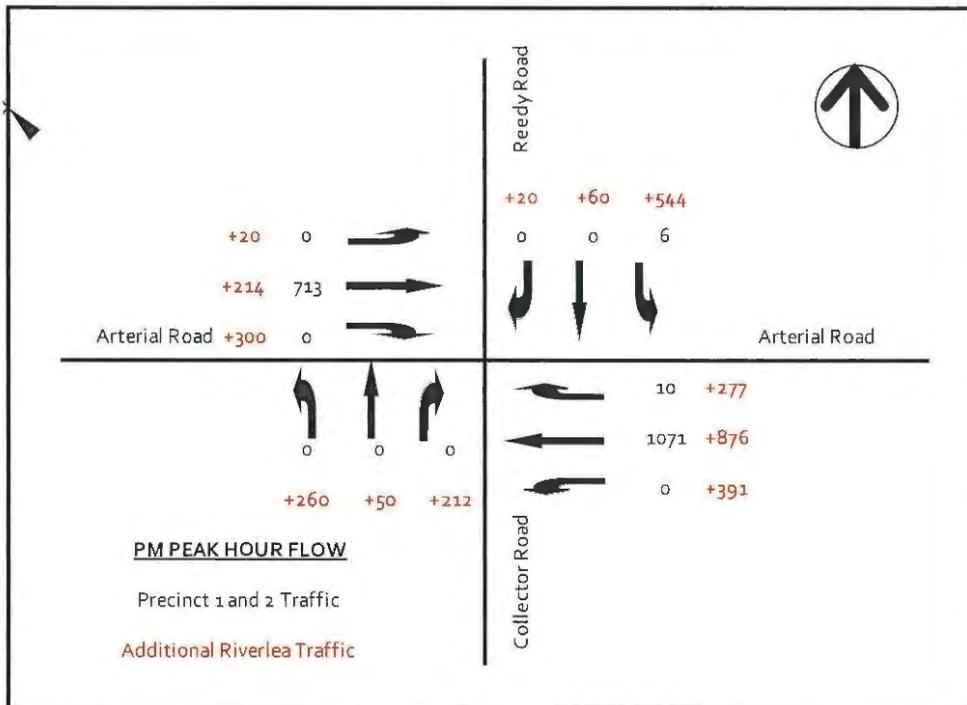


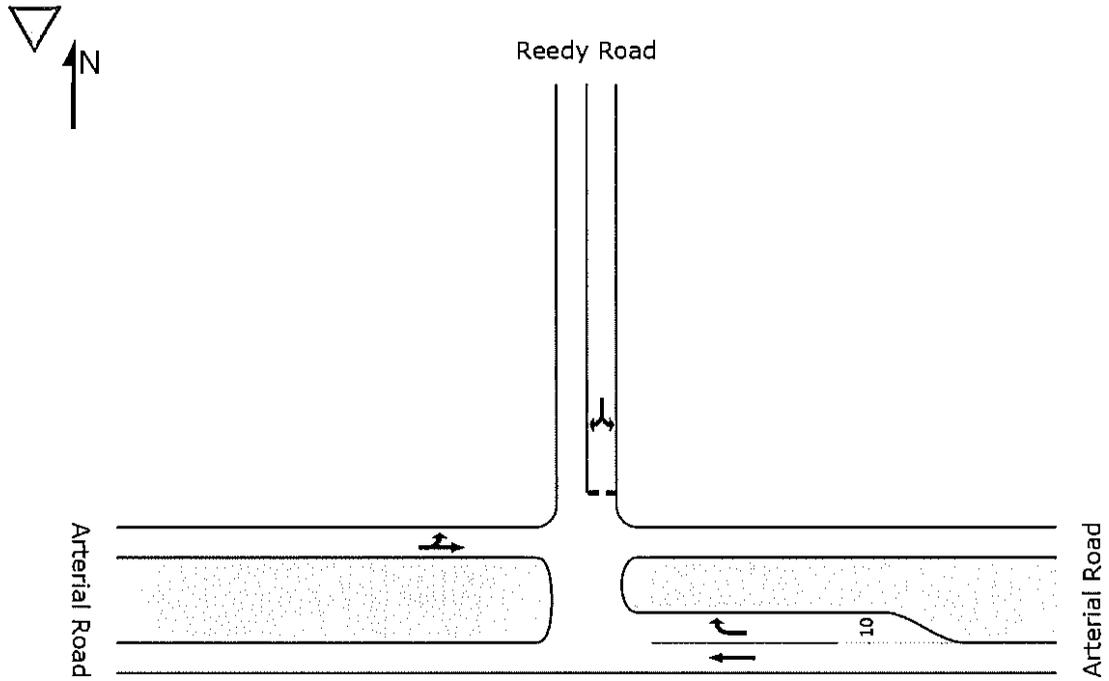
Figure 4.5: PM Peak Hour Turning Movement Volumes – Reedy Road Intersection



The layout applied for the "Precinct 1 and 2" scenario comprises a Give-Way, t-junction with appropriate turn lanes and a median storage. The layout adopted for the "Ultimate" scenario comprises a four-way signalised intersection and appropriate turn lanes.

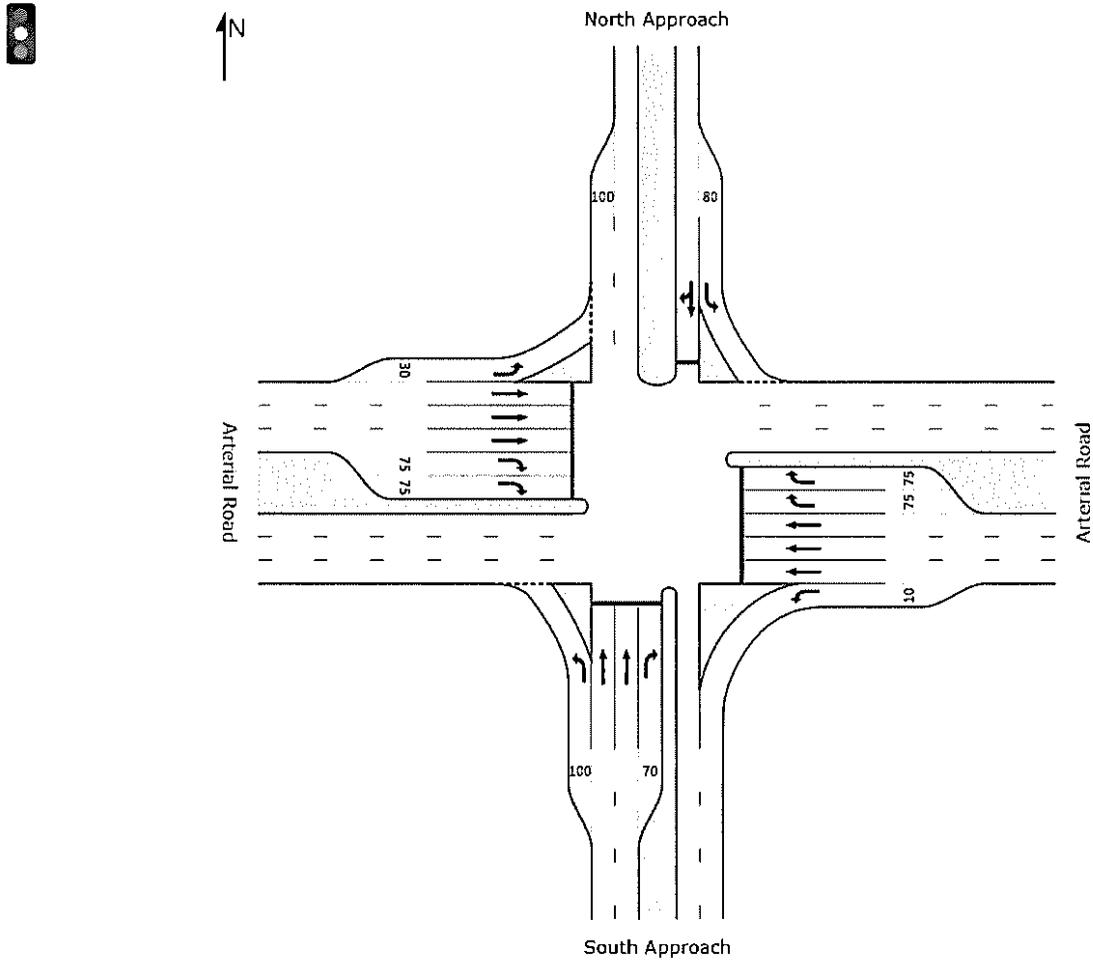
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.6 and Figure 4.7 respectively.

Figure 4.6: "Precinct 1 and 2" Intersection Layout – Reedy Road Intersection



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Figure 4.7: "Ultimate" Intersection Layout – Reedy Road Intersection



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Appendix A also provides the intersection layouts and intersection performance details, however a summary is shown in Table 4.2.

Table 4.2: Reedy Road Intersection Performance Summary

Scenario	Peak Period	Level of Service	Average Delay (sec)	95 <sup>th</sup> percentile queue length (m)
Precinct 1 and 2	AM	F*	4.9	23.7
	PM	A*	0.1	0.3
Ultimate	AM	B	20.7	213.9
	PM	B	19.9	118.0

\* Lowest Movement Level of Service

The above analysis indicates the "Precinct 1 and 2" Give-Way controlled intersection will have negligible delays and queue lengths, however a Level of Service (LOS) F is anticipated on the left and right turns for the northern approach. Whilst LOS F is indicated for these movements, it should be noted the average delay and queue length are 579.5 sec and 23.7 metres which are typical results for minor movements at arterial road intersections.

The signalised "Ultimate" intersection is anticipated to operate with a LOS B and average delays of less than 21 seconds. The 95<sup>th</sup> percentile queue length of approximately 220 metres (western approach during the AM peak) is not anticipated to impact on Intersection 1. Similarly the approximately 120 metre 95<sup>th</sup> percentile queue (eastern approach during the PM peak) is not anticipated to impact Port Wakefield Road intersection.

### 4.3.2 Intersection 1 Assessment

The anticipated AM and PM peak hour traffic volumes for both the "Precinct 1 and 2" and "Ultimate" scenarios for intersection 1 are shown in Figure 4.8 and Figure 4.9 respectively.

Figure 4.8: AM Peak Hour Turning Movement Volumes – Intersection 1

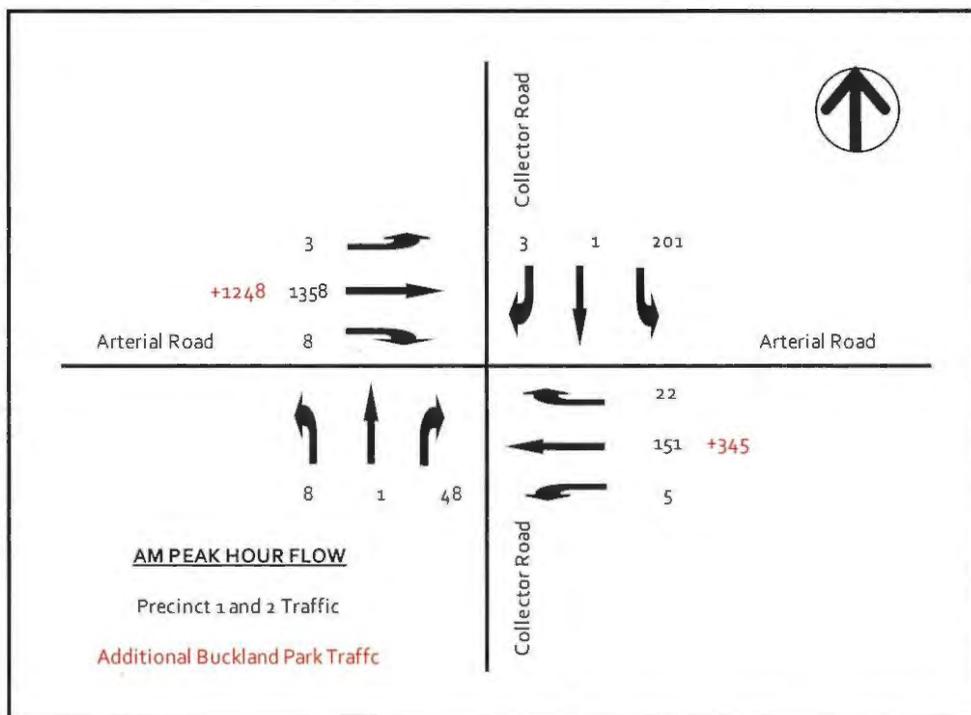
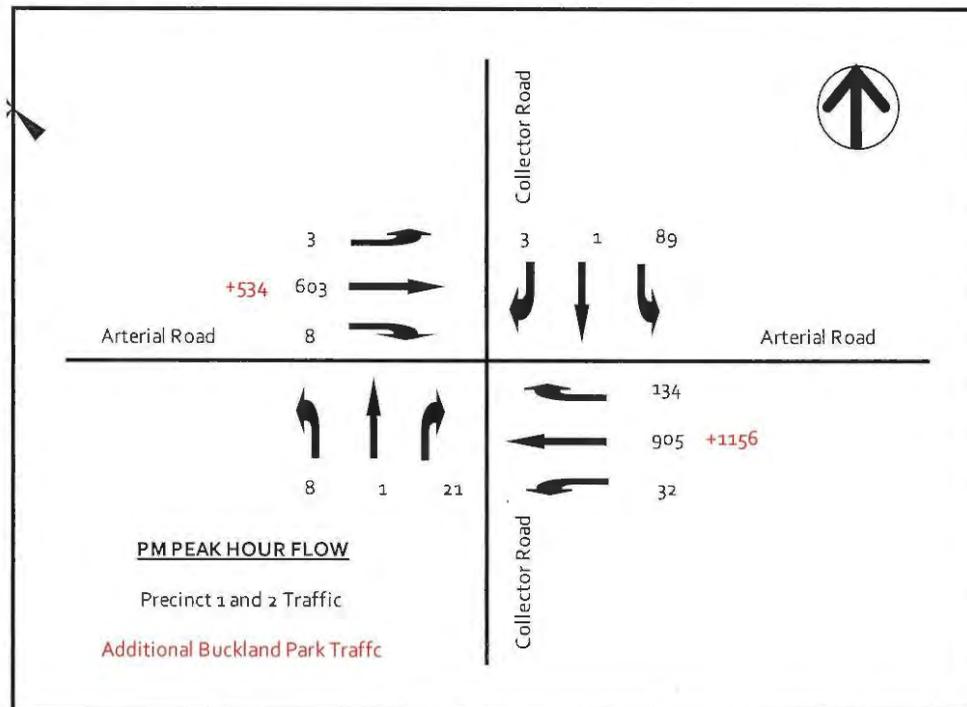
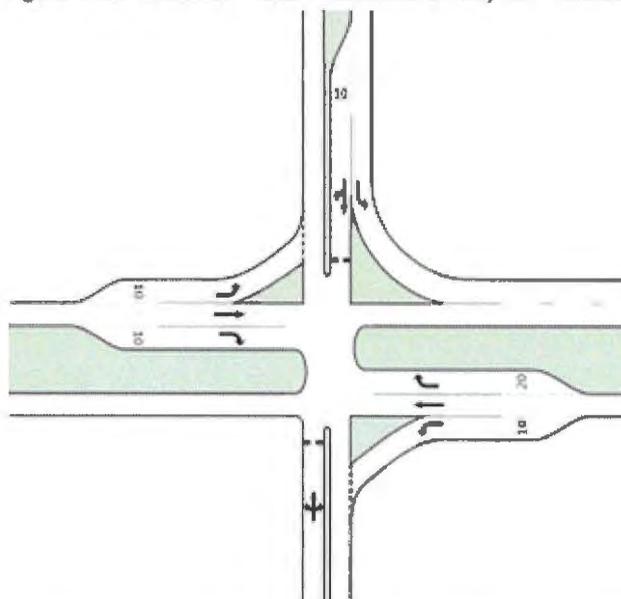


Figure 4.9: PM Peak Hour Turning Movement Volumes – Intersection 1



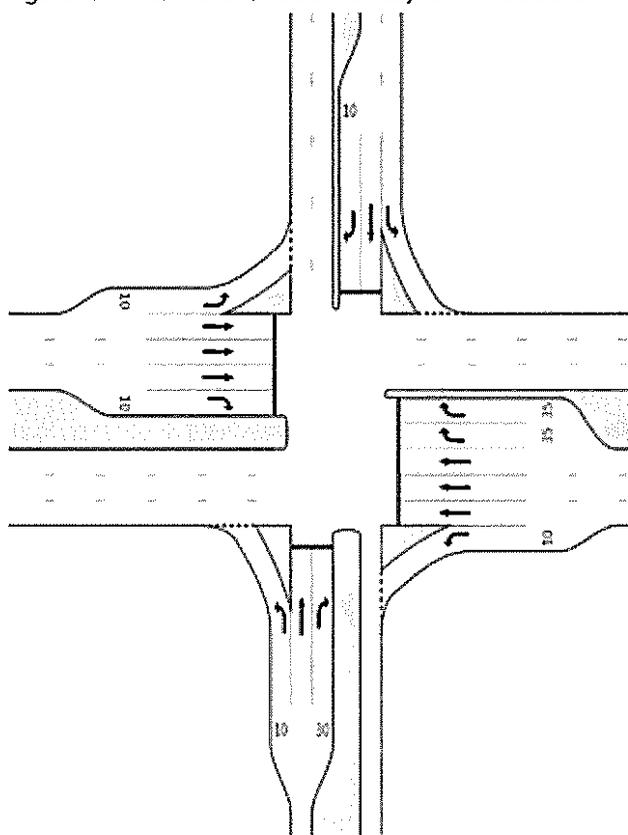
The layout applied for the "Precinct 1 and 2" scenario comprises a Give-Way, four-way intersection with appropriate turn lanes and a median storage. The layout adopted for the "Ultimate" scenario comprises a four-way signalised intersection and appropriate turn lanes. The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.10 and Figure 4.11 respectively.

Figure 4.10: "Precinct 1 and 2" Intersection Layout – Intersection 1



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Figure 4.11: "Ultimate" Intersection Layout – Intersection 1



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Appendix B also provides the intersection layouts and intersection performance details, however a summary is shown in Table 4.3.

Table 4.3: Intersection 1 Performance Summary

Scenario	Peak Period	Level of Service	Average Delay (sec)	95 <sup>th</sup> percentile queue length (m)
Precinct 1 and 2	AM	B*	2.0	4.4
	PM	B*	1.7	4.6
Ultimate	AM	A	5.3	45.2
	PM	B	15.2	115.1

\* Lowest Movement Level of Service

The above analysis indicates the "Precinct 1 and 2" Give-Way controlled intersection will have negligible delays and queue lengths, however a Level of Service (LOS) B is anticipated on the right turn movement for the eastern approach. Whilst LOS B is indicated for this movement, it should be noted the average delay and queue length are 36.1 sec and 3.7 metres which is typical for minor movements at arterial road intersections.

GTA notes that this intersection may be staged with the northern approach constructed prior to the southern approach; hence the intersection would be a T-junction. It may be desirable to consider left in and out for the southern approach to avoid a four-way intersection across an arterial road.

The signalised "Ultimate" intersection is anticipated to operate with a LOS B and average delays of less than 16 seconds. The 95<sup>th</sup> percentile queue length of approximately 120 metres (eastern on Port Wakefield Road intersection).

### 4.3.3 Intersection 2 Assessment

The anticipated AM and PM peak hour traffic volumes for both the "Precinct 1 and 2" and "Ultimate" scenarios for intersection 2 are shown in Figure 4.12 and Figure 4.13 respectively.

Figure 4.12: AM Peak Hour Turning Movement Volumes – Intersection 2

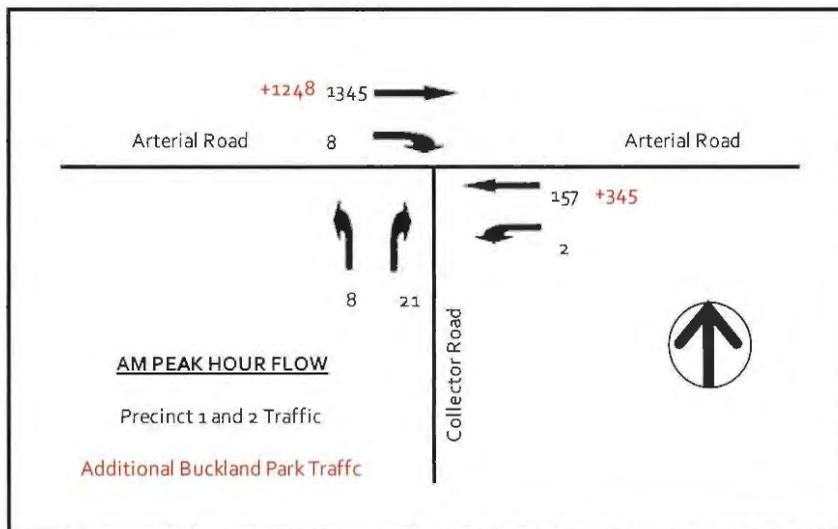
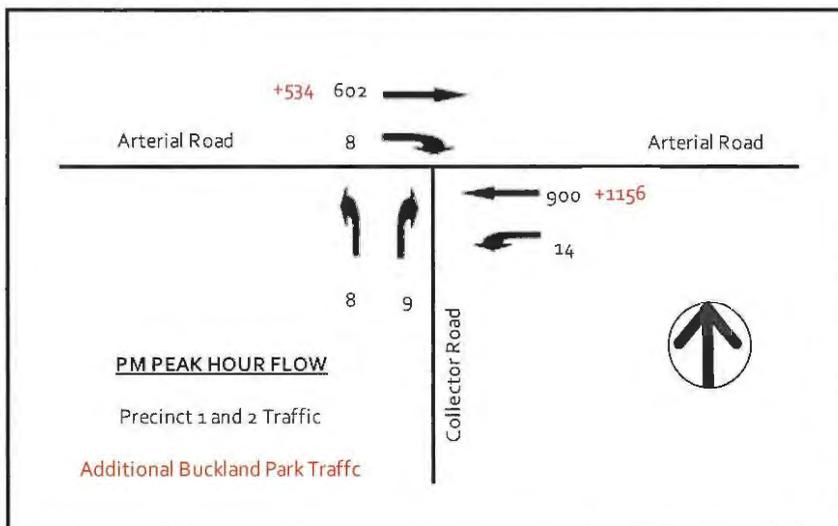


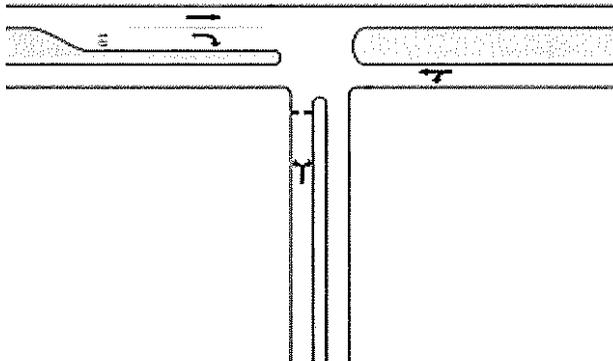
Figure 4.13: PM Peak Hour Turning Movement Volumes – Intersection 2



The layout applied for the "Precinct 1 and 2" and "Ultimate" scenarios comprise a Give-Way, T-junction with appropriate turn lanes and a median storage.

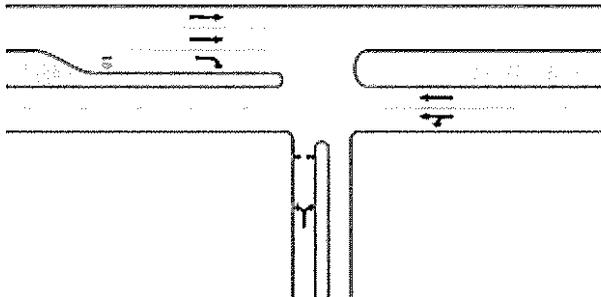
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.14 and Figure 4.15 respectively.

Figure 4.14: "Precinct 1 and 2" Intersection Layout – Intersection 2



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Figure 4.15: "Ultimate" Intersection Layout – Intersection 2



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Appendix C provides the intersection layouts and intersection performance details; however a summary has been reproduced in Table 4.4.

Table 4.4: Intersection 2 Performance Summary

Scenario	Peak Period	Level of Service	Average Delay (sec)	95 <sup>th</sup> percentile queue length (m)
Precinct 1 and 2	AM	B*	0.5	1.9
	PM	B*	0.4	1.4
Ultimate	AM	F*	2.9	22.5
	PM	F*	1.6	12.7

\* Lowest Movement Level of Service

The above analysis indicates the Give-Way controlled T-junction will have negligible delays and queue lengths up to approximately 25 metres. While LOS F is indicated for the southern approach, with delays of up to 220 seconds, these results are typical of minor road approaches with arterial roads.

#### 4.3.4 Intersection 3 Assessment

The anticipated AM and PM peak hour traffic volumes for both the "Precinct 1 and 2" and "Ultimate" scenarios for intersection 3 are shown in Figure 4.16 and Figure 4.17 respectively.

Figure 4.16: AM Peak Hour Turning Movement Volumes – Intersection 3

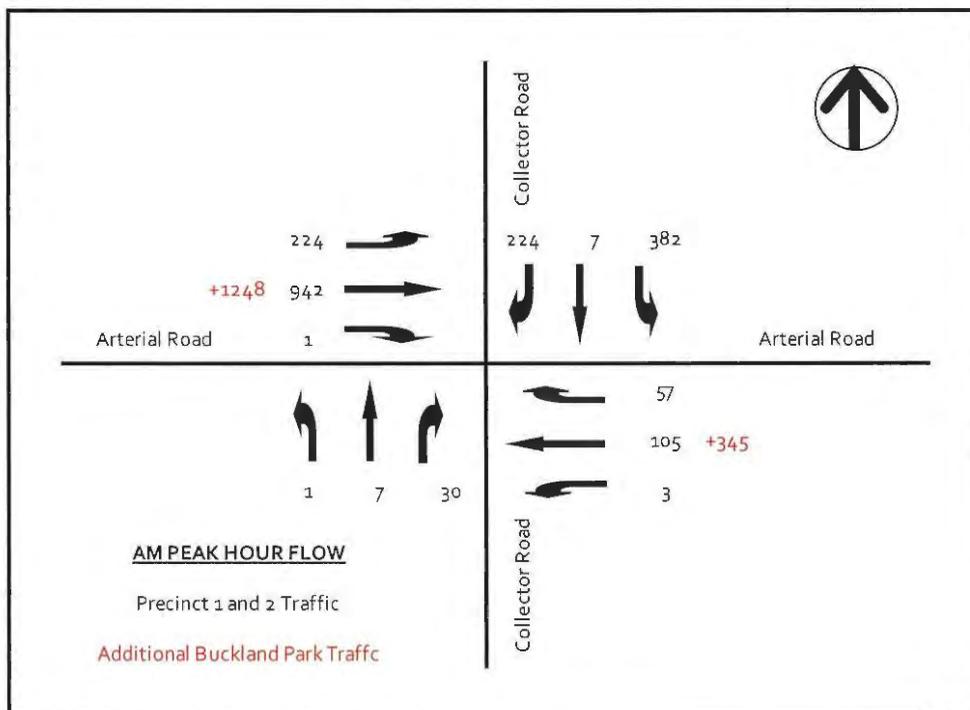
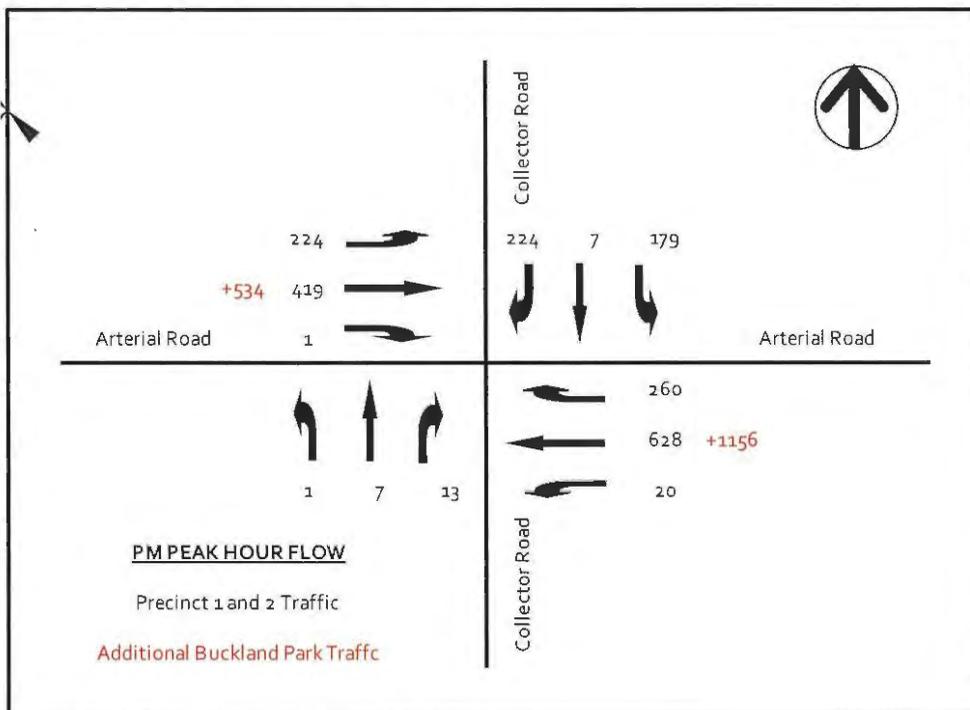


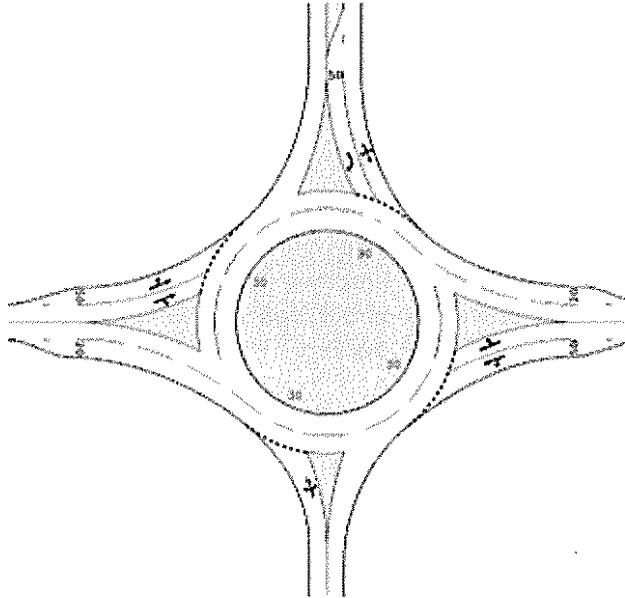
Figure 4.17: PM Peak Hour Turning Movement Volumes – Intersection 3



The layout applied for the "Precinct 1 and 2" scenario comprised a roundabout controlled intersection with dual circulating lanes and appropriate turn lanes. The "Ultimate" intersection layout comprised a signalised intersection with appropriate turning lanes.

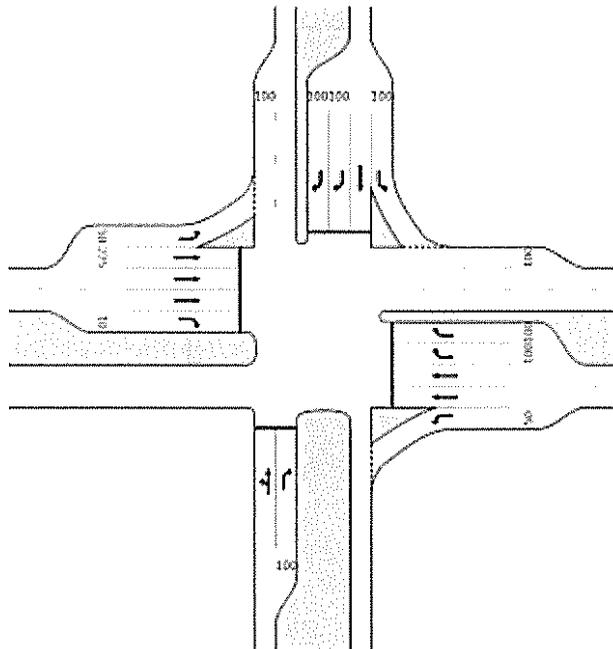
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.18 and Figure 4.19 respectively.

Figure 4.18: "Precinct 1 and 2" Intersection Layout – Intersection 3



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Figure 4.19: "Ultimate" Intersection Layout – Intersection 3



(Note: Distances shown above (i.e 100 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Appendix D also provides the intersection layouts and intersection performance details, however a summary has been reproduced in Table 4.5.

**Table 4.5: Intersection 3 Performance Summary**

Scenario	Peak Period	Level of Service	Average Delay (sec)	95 <sup>th</sup> percentile queue length (m)
Precinct 1 and 2	AM	A	9.3	43.9
	PM	A	7.3	33.2
Ultimate	AM	A	8.4	99.8
	PM	A	7.7	66.2

The above analysis indicates the "Precinct 1 and 2" Give-Way controlled T-junction will have negligible delays, queue lengths and operate with a LOS A.

The signalised "Ultimate" intersection is anticipated to operate with a LOS A and average delays of less than 9 seconds. The 95<sup>th</sup> percentile queue length of less than 100 metres is not anticipated to impact the adjacent junctions, assuming a coordinated traffic signal system on the arterial road with queue detection between intersections where required.

#### 4.3.5 Intersection 4 Assessment

The anticipated AM and PM peak hour traffic volumes for both the "Precinct 1 and 2" and "Ultimate" scenarios for intersection 4 are shown in Figure 4.20 and Figure 4.21 respectively.

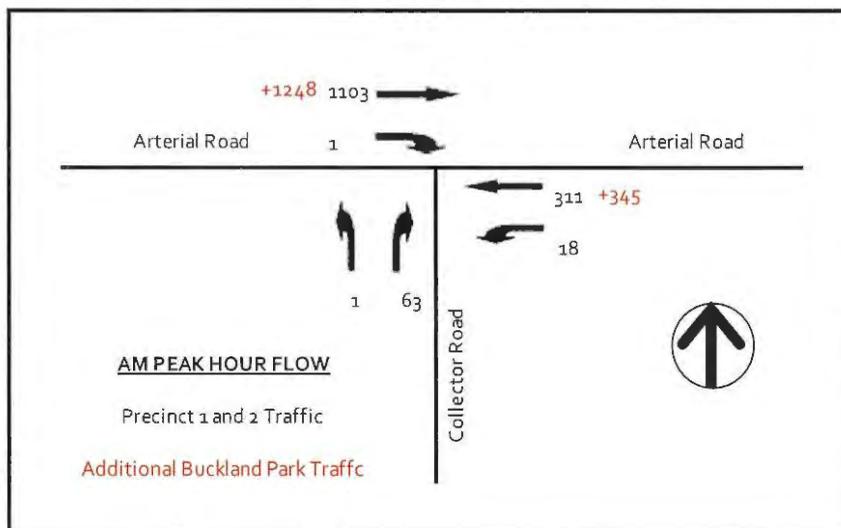
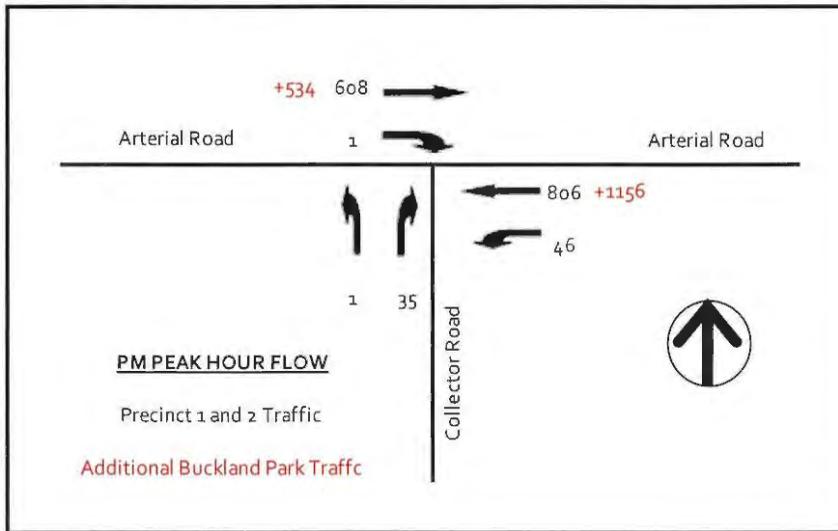
**Figure 4.20: AM Peak Hour Turning Movement Volumes – Intersection 4**


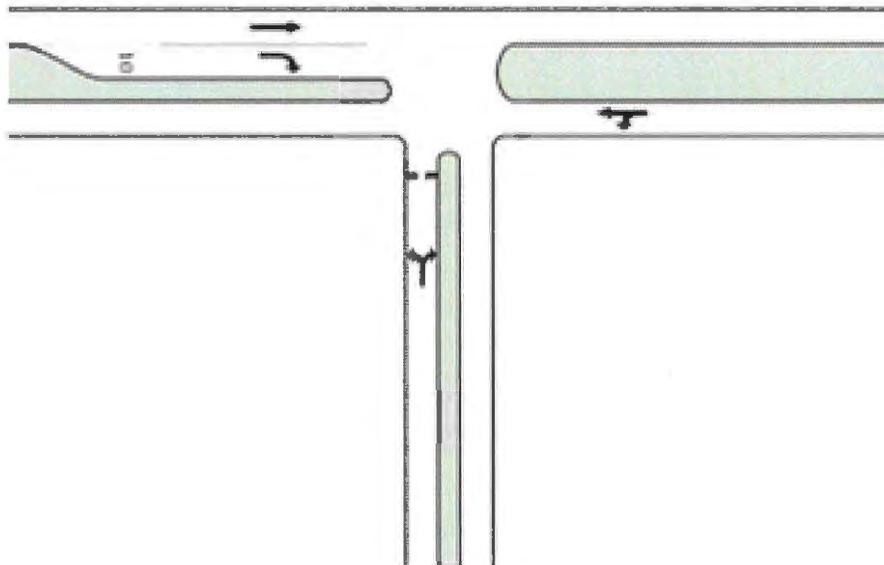
Figure 4.21: PM Peak Hour Turning Movement Volumes – Intersection 4



The layout applied for the "Precinct 1 and 2" and "Ultimate" scenarios comprises a Give-Way, T-junction with appropriate turn lanes and a median storage.

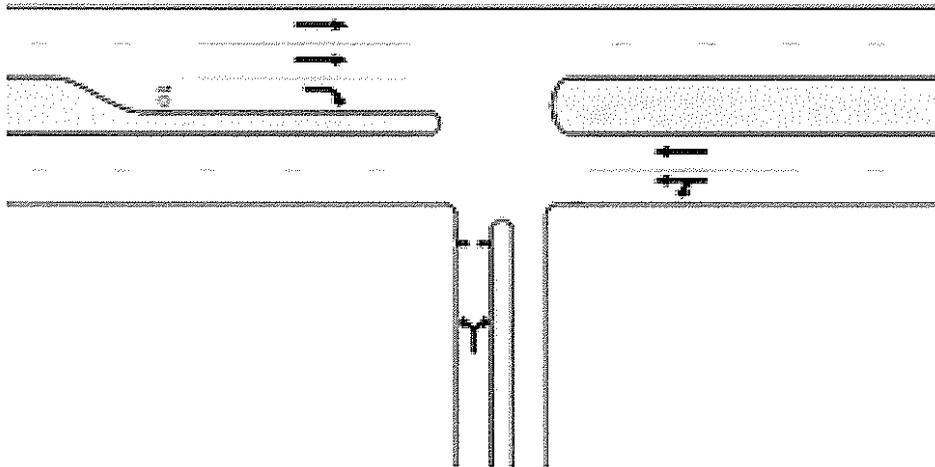
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.22 and Figure 4.23 respectively.

Figure 4.22: "Precinct 1 and 2" Intersection Layout – Intersection 4



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Figure 4.23: "Ultimate" Intersection Layout – Intersection 4



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Appendix E also provides the intersection layouts and intersection performance details, however a summary has been reproduced in Table 4.6.

Table 4.6: Intersection 4 Performance Summary

Scenario	Peak Period	Level of Service	Average Delay (sec)	95 <sup>th</sup> percentile queue length (m)
Precinct 1 and 2	AM	B*	1.3	4.7
	PM	B*	1.9	2.7
Ultimate	AM	F*	6.8	62.6
	PM	F*	4.2	33.8

\* Lowest Movement Level of Service

The above analysis indicates the Give-Way controlled T-junction will have a LOS B, negligible delays and queue lengths under 8 metres in the "Precinct 1 and 2" scenario.

The "Ultimate" intersection arrangement is anticipated to have a LOS F and a 95<sup>th</sup> percentile queue length of approximately 65 metres on the southern approach during the AM peak period. These results are common of unsignalised intersections along arterial roads. It is also noted that vehicles may seek alternate routes (i.e Intersection 3) as a result of increased delays.

#### 4.3.6 Intersection 5 Assessment

The anticipated AM and PM peak hour traffic volumes for both the "Precinct 1 and 2" and "Ultimate" scenarios for intersection 5 are shown in Figure 4.24 and Figure 4.25 respectively.

Figure 4.24: AM Peak Hour Turning Movement Volumes – Intersection 5

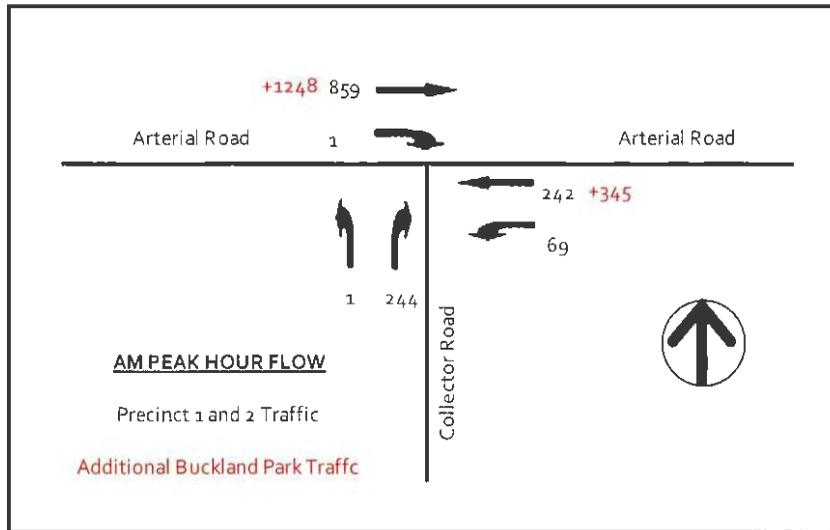
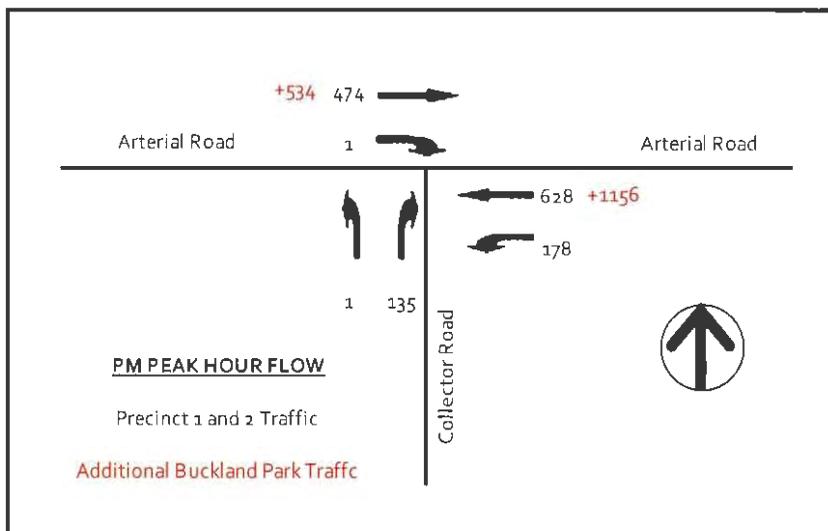


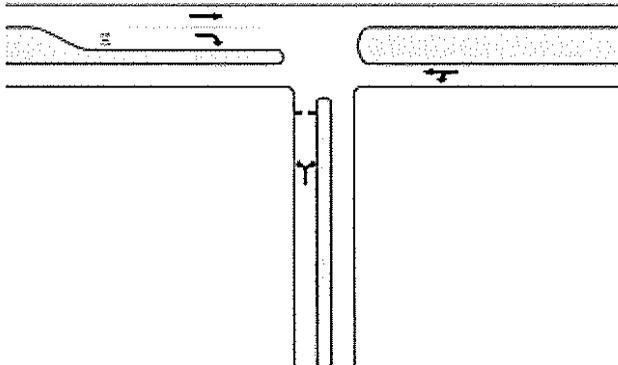
Figure 4.25: PM Peak Hour Turning Movement Volumes – Intersection 5



The layout applied for the "Precinct 1 and 2" scenario comprises a Give-Way, T-junction with appropriate turn lanes and a median storage. The intersection layout for the "Ultimate" scenario comprises a signalised, T-junction with appropriate turn lanes.

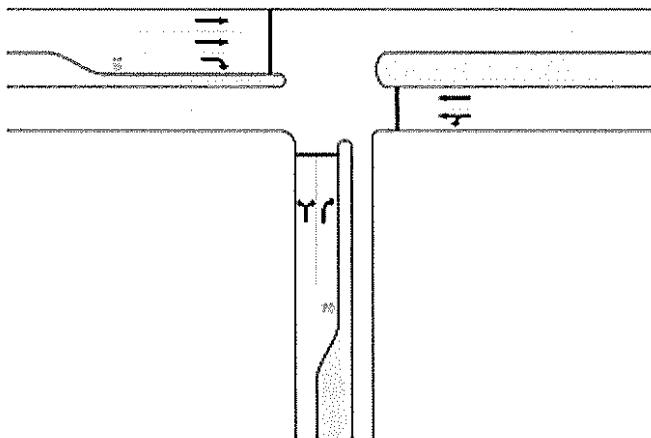
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.26 and Figure 4.27 respectively.

Figure 4.26: "Precinct 1 and 2" Intersection Layout – Intersection 5



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Figure 4.27: "Ultimate" Intersection Layout – Intersection 5



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Appendix F also provides the intersection layouts and intersection performance details, however a summary has been reproduced in Table 4.7.

Table 4.7: Intersection 5 Performance Summary

Scenario	Peak Period	Level of Service	Average Delay (sec)	95 <sup>th</sup> percentile queue length (m)
Precinct 1 and 2	AM	B*	4.4	18.6
	PM	B*	3.1	8.8
Ultimate	AM	A	6.8	68.1
	PM	A	4.4	52.7

\* Lowest Movement Level of Service

The above analysis indicates the Give-Way controlled T-junction will have an average delay of less than 5 seconds in the "Precinct 1 and 2" scenario. However LOS B and queue lengths up to 20 metres are anticipated along the southern approach during the AM peak. These results are typical of unsignalised intersections at arterial roads.

The "Ultimate" intersection arrangement is anticipated to operate with a LOS A and average delays of less than 7 seconds. 95<sup>th</sup> percentile queue length of approximately 70 metres are

anticipated on the western approach during the AM peak period. These queues are not anticipated to impede on Intersection 6.

### 4.3.7 Intersection 6 Assessment

The anticipated AM and PM peak hour traffic volumes for both the "Precinct 1 and 2" and "Ultimate" scenarios for intersection 6 are shown in Figure 4.28 and Figure 4.29 respectively.

Figure 4.28: AM Peak Hour Turning Movement Volumes – Intersection 6

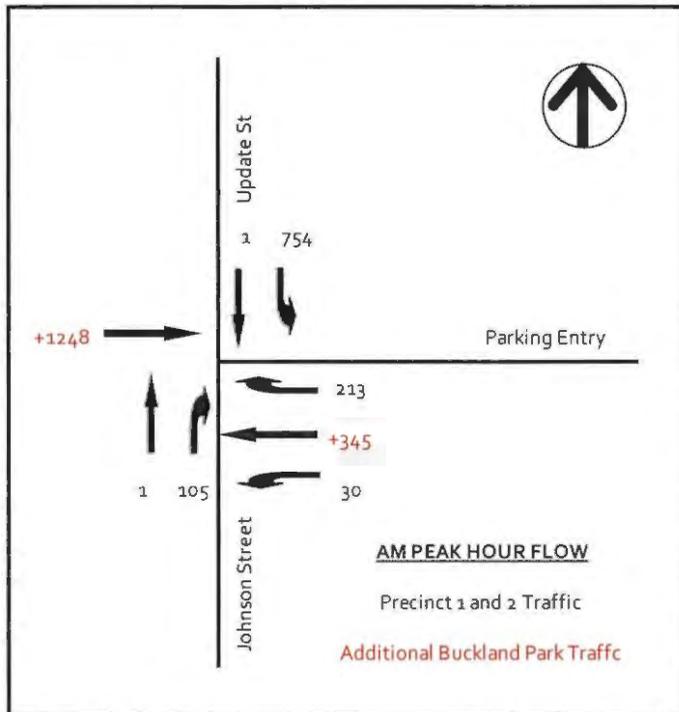
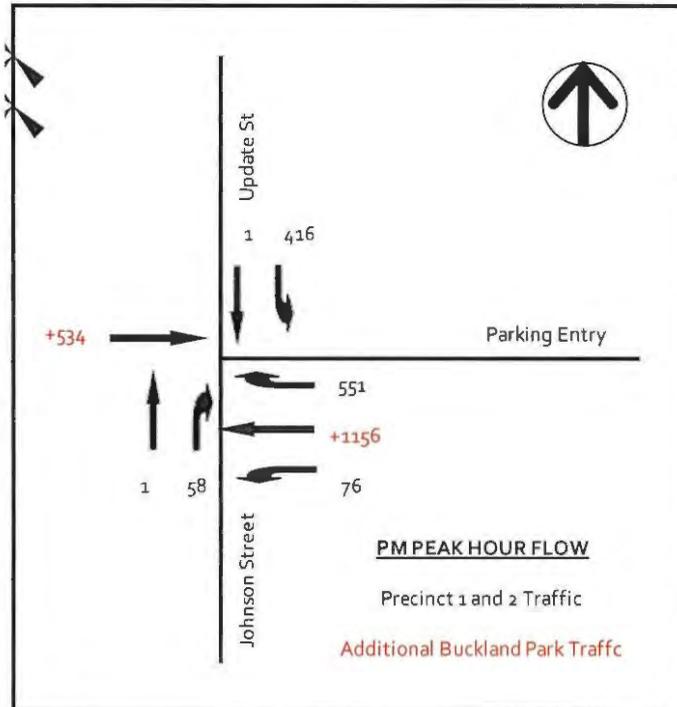


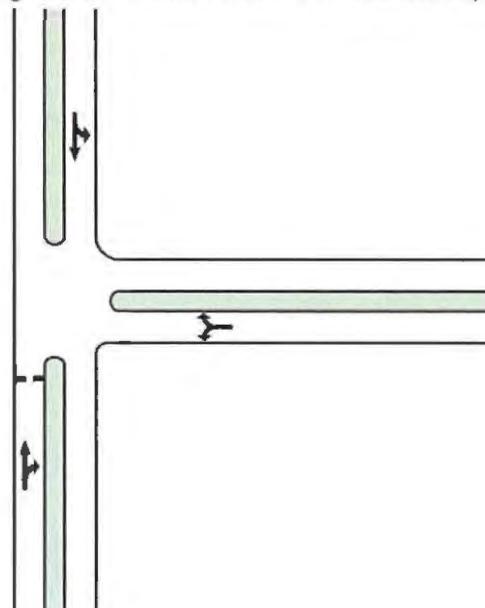
Figure 4.29: PM Peak Hour Turning Movement Volumes – Intersection 6



The layout applied for the "Precinct 1 and 2" scenario comprises a re-aligned T-junction with priority assigned to the north-east approaches. The intersection layout for the "Ultimate" scenario comprises a signalised, T-junction with appropriate turn lanes.

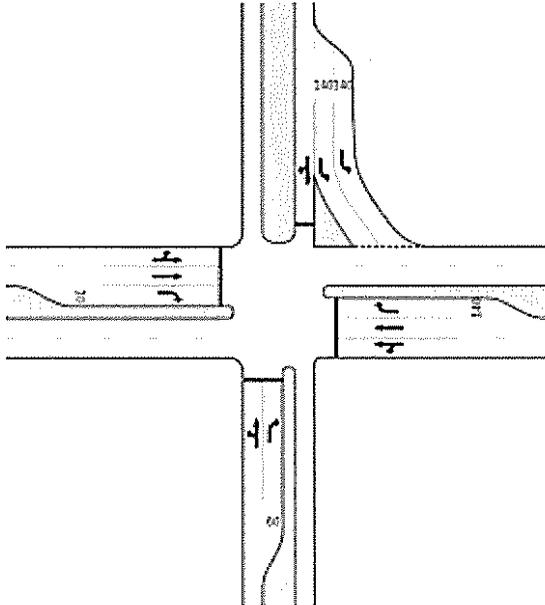
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.30 and Figure 4.31 respectively.

Figure 4.30: "Precinct 1 and 2" Intersection Layout – Intersection 6



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Figure 4.31: "Ultimate" Intersection Layout – Intersection 6



(Note: Distances shown above (i.e. 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Appendix G also provides the intersection layouts and intersection performance details, however a summary has been reproduced in Table 4.8.

Table 4.8: Intersection 6 Performance Summary

Scenario	Peak Period	Level of Service	Average Delay (sec)	95 <sup>th</sup> percentile queue length (m)
Precinct 1 and 2	AM	A*	8.9	27.9
	PM	A*	9.2	17.1
Ultimate	AM	B	20.1	190.4
	PM	A	13.8	102.9

\* Lowest Movement Level of Service

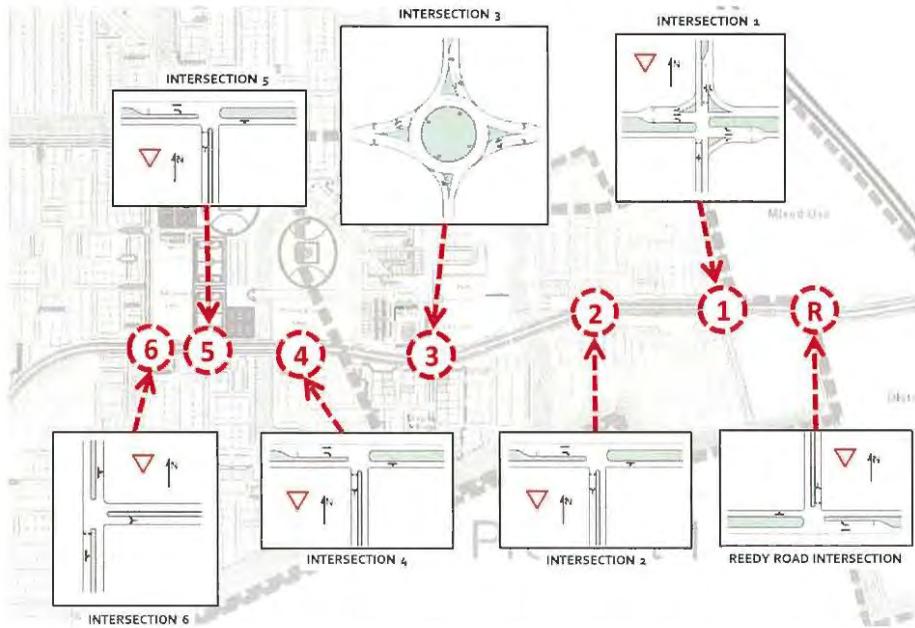
The above analysis indicates the realigned T-junction will have an average delay of less than 10 seconds in the "Precinct 1 and 2" scenario. However queue lengths up to 28 and 18 metres are anticipated along the northern approach during the AM and PM peaks respectively. However, GTA considers these results to be unrealistic of actual operation given the northern approach will have priority.

The "Ultimate" intersection arrangement is anticipated to operate with a LOS B and average delays of less than 21 seconds. 95<sup>th</sup> percentile queue length of approximately 190 metres are anticipated on the western approach during the AM peak period. These queues are not anticipated to impede on the adjacent intersections (which will form part of the later stages of the Riverlea site).

### 4.3.8 Traffic Impact Summary

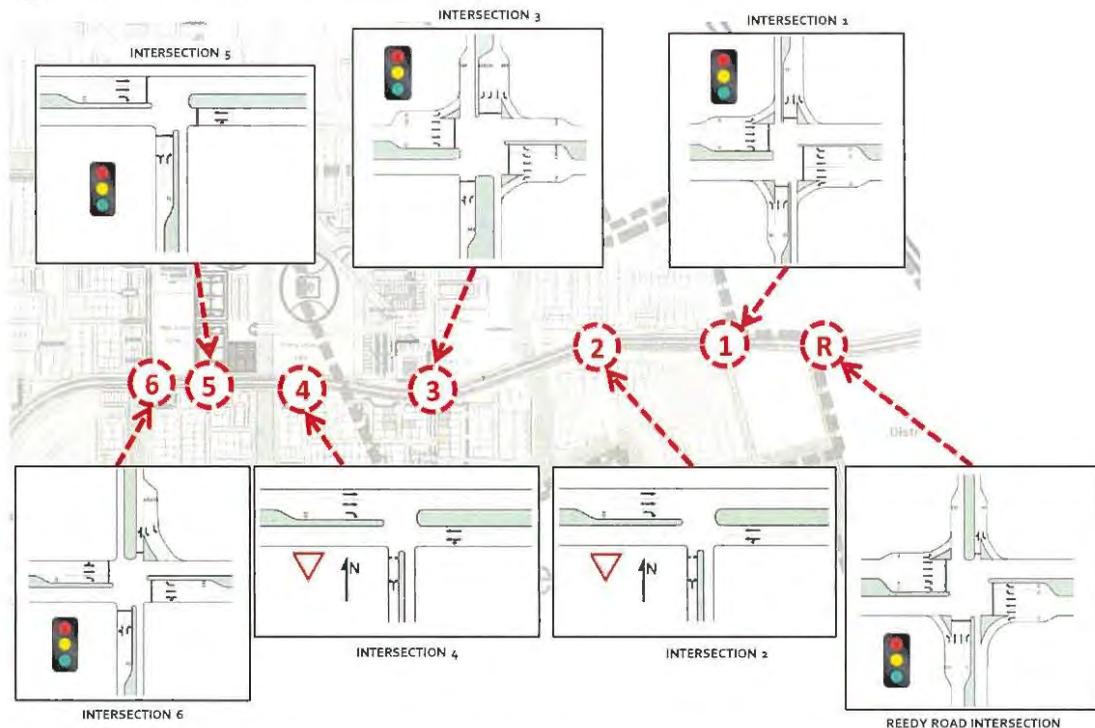
Based on the above, Figure 4.32 and Figure 4.33 present the intersection layout arrangements for the "Precinct 1 and 2" and "Ultimate" scenarios respectively.

Figure 4.32: Precinct 1 and 2 Intersection Layouts



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

Figure 4.33: Ultimate Riverlea Intersection Layouts



(Note: Distances shown above (i.e 10 metres) indicates storage length requirement. Appropriate deceleration lengths should be provided above the distances indicated)

GTA considers the intersections presented to operate with similar conditions to existing arterial road intersections under both the "Precinct 1 and 2" and "Ultimate" scenarios. These intersection

arrangements have been prepared to indicate the minimum intersection requirements along the arterial road.

The intersections recommended are also similar to the intersections previously recommended by GTA under the previously approved scheme (refer: '*Buckland Park Boulevard Intersection Operation Review*' (GTA Consultants, 24/08/2011)). Notably the previous recommendations recommended two-lane carriageways along the arterial road from intersection 1. LOS A's and B's were also recommended as part of the previous schemes.

Notwithstanding, additional modelling undertaken with AIMSUM is recommended to determine the operational performance of network.

#### 4.3.9 Intersection Upgrading

The recommended intersections layouts for Precinct 1 and 2 (Figure 4.32) are anticipated to be able to accommodate additional traffic generated up to 620 dwellings beyond precinct 2 (3,790 occupied dwellings total). The arterial road will operate at a Degree of Saturation of approximately 0.9, which is considered to be the ideal maximum with 620 additional allotments. However, it is noted that the proportion of medium density/residential allotments will influence the intersection upgrade requirements.

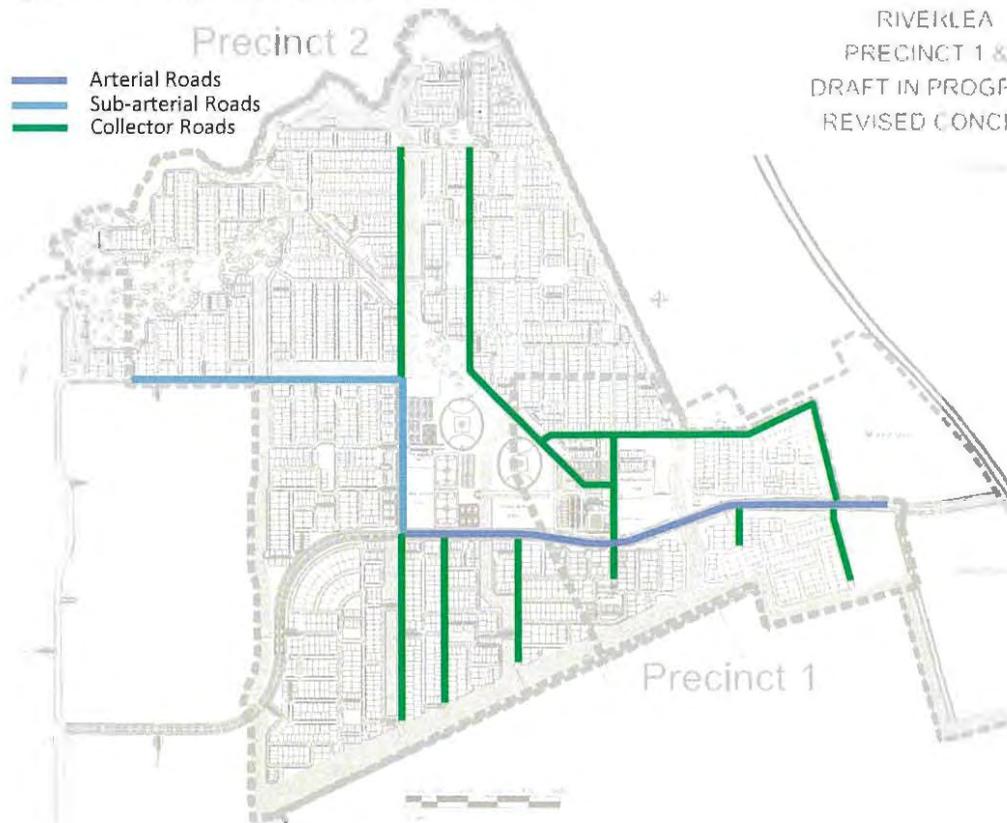
Further to the above, given the flow on the northern approach to intersection 6, additional approach lanes should be considered beyond Precinct 2.

## 5. Street Network Review

### 5.1 Street Layout

The layout of the street network for the proposed development is based on a modified grid layout, with local streets connecting to a number of key collector streets and then to the arterial roads. A modified grid can provide advantages to a residential area in managing traffic to low volumes on each street, limiting the ability for rat-running through the area, managing the speed environment and providing convenient access for walking, cycling and public transport through the area. The arterial and collector streets have been highlighted in Figure 5.1.

Figure 5.1: Arterial and Collector Road Network

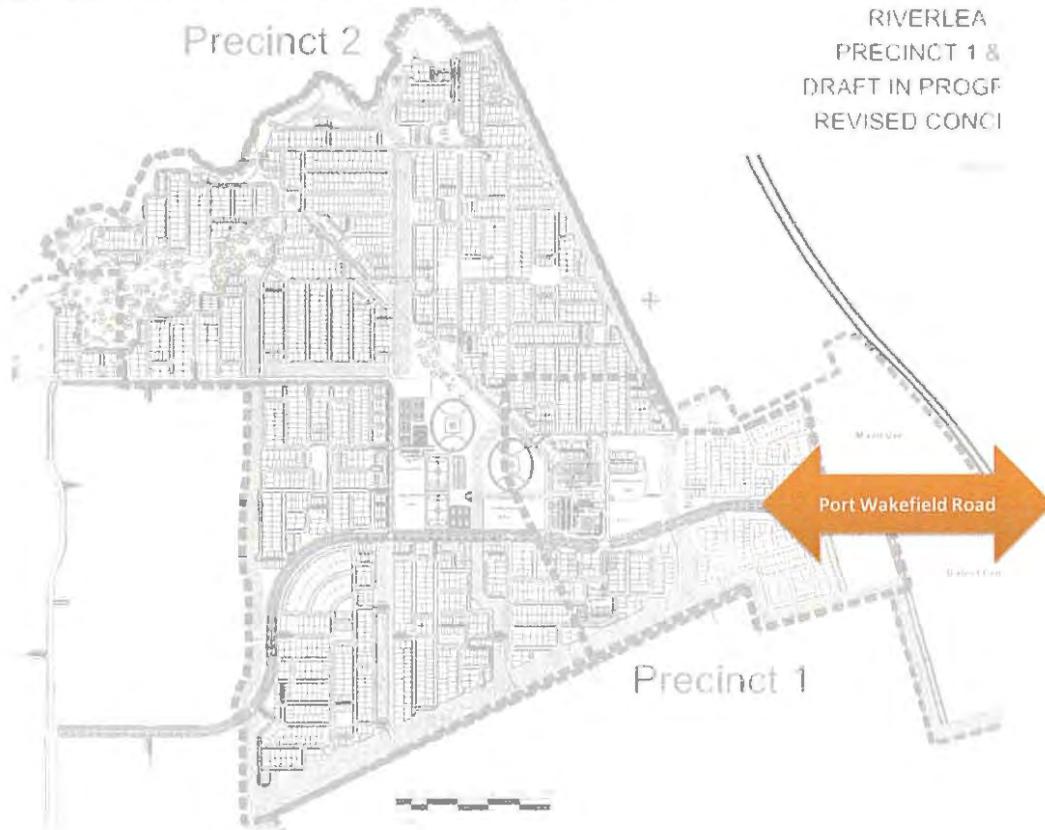


### 5.2 Site Access

Vehicle access to the site from the external road network will be provided via a signalised intersection located along Port Wakefield Road as per the previous approved arrangement.

The location of the access point in relation to the development can be seen in Figure 5.2.

Figure 5.2: Vehicle Access to the External Road Network



### 5.3 Carriageway Width

The proposed development will comprise roads of varying widths suited to the function of streets within the network. A summary of the recommended road widths for the proposed development is shown in Table 5.1.

Table 5.1: Typical carriageway widths

Road Reserve Width	Carriageway Width	Parking	Function
Approximately 47 metres	Dual 8.8 metre	None	Arterial
26.2 metres	13.1 metres	One sided (where permitted)	Sub-Arterial
17-21.6 metres	9.5 metres	One side (where permitted)	Collector Road
14-16 metres	7.0 metres	None	Local street
10 metres	5.0 metres	None	Access place

The proposed minimum road carriageway width will be 5.0 metres for Access places. A 5.0 metre carriageway will provide sufficient width to allow two vehicles to pass at low speed, however no parking should be provided along the carriageway. Given that these roads will not serve a movement function, and the low operating speeds expected the 5.0 metre carriageways are deemed suitable.

The majority of roads within the development will have a carriageway width of 7.0 metres. These roads are expected to provide both access and movement functions and serve less than 1,000

vehicles per day. The 7.0 metre wide carriageway will be suitable for one vehicle in each direction.

Collector Roads within the proposed development will be used for the collection and distribution of traffic with minimal access to abutting dwellings. Collector Roads are expected to cater for up to 12,000 vehicles daily. A 9.5 metre wide carriageway will accommodate one traffic lane per direction and sufficient width to provide on-street parking. Collector Roads will cater for access by bus services where required.

The carriageway and road reserve for the arterial road will vary depending on the location and carriageway requirements based on the traffic assessment undertaken in Section 4. Consideration of the provision of pedestrian paths / shared paths / cycling lanes is also recommended and likely to influence the widths.

## 5.4 Street Traffic Management

The precinct plan provides an indication of the street layout, and may change through development in detail. The following are principles to be applied in detailed design to ensure an appropriate traffic outcome for the street environment.

The precinct plan will include a number of traffic management options in the street network to assist in appropriate management of vehicles travelling on these streets. The aim of these devices and designs is to maintain a safe and low speed environment. The recommendations from this assessment should be incorporated in detailed design.

### 5.4.1 Realigned T-Intersections

Realigned T-Intersections are proposed at number locations throughout the development. A realigned T-intersection is designed to affect a change in the vehicle travel path thereby slowing traffic via deflection of traffic movements and/or reassignment of priority. These are effective in limiting street lengths and managing speeds on a local road network whilst maintaining a modified grid network. As a result, the safety within the local road network can be improved.

Traffic management measures are required at T-intersections to ensure drivers understand the give-way priority assigned. Generally the right angle bend in conjunction with appropriate kerb alignments will be sufficient however a review in detailed design should consider the following methods to clarify give way priority:

- Give way signs on the minor road approach.
- Pavement marking on the bend for the centreline and parking control.
- Distinctive pavement on the minor road approach.
- Careful consideration of radius of bends to ensure suitable turn paths are achieved for the anticipated traffic volumes and vehicle types.

### 5.4.2 Roundabouts

A roundabout is an effective form of intersection control and reduces the relative speeds of conflicting vehicles by providing impedance to all vehicles entering the roundabout. A number of roundabout controlled intersections are proposed in Precinct 2.

It is recommended that the roundabouts be designed to allow full turning movements for larger vehicles, and in order to cater for semi-trailers a mountable island be provided. The roundabouts

will be required to conform to the relevant standards and guidelines, and the Code, which would be confirmed in detailed design.

### 5.4.3 T-Junctions

The majority of the intersections within the proposed development will be controlled by T-Junctions. It is noted that distinctive pavement markings will be provided at junctions on both the side street. GTA recommends that distinctive pavement markings be provided along the major road approaches in order to delineate the junction and manage vehicle speeds of through traffic on the collector roads by breaking up the visual length of these roads.

### 5.4.4 Cul-de-sacs

The development will incorporate circular cul-de-sacs at a number of locations.

GTA recommend that 18 metre diameter circular cul-de-sacs be provided to enable turning movements by larger vehicles including waste collection vehicles.

### 5.4.5 Access Places

Within the development there will be short and narrow sections of roads that will be used for dwelling access, these roads are Access Places.

The access places are typically short sections of road leading directly to dwellings. They range in length from 6 metres to 65 metres depending upon the number of allotments being serviced.

The very short access places will not typically be accessed by large vehicles (i.e. refuse collection) as bins can be placed adjacent to the main street.

On the longer access places, large vehicles may require to enter (for refuse collection) and reverse back to the main street. This method of operation is considered satisfactory for irregular heavy vehicle movements where Access Place segments are less than 70 metres in length.

## 5.5 Vehicle Speed Management

Austroads Guide to Road Design "Part 3: Geometric Design" (2009) states a typical acceleration of 1km/h for every 5 metres is possible for private vehicles from a stationary position. Therefore a vehicle can be expected to reach 50km/h (the expected posted speed limit) from a stopped position after 250 metres.

In consideration of the above, roads that provide less than 250 metres of straight sections of road are considered too short for excessive vehicle speeds to occur and act as natural speed control devices. Generally, most streets in the proposed development will be less than 250 metres in length. These streets will generally assist in creating a speed environment of less than 50km/h, and closer to 35km/h where streets are less than 150 metres long.

A number of streets will have a total length greater than 250 metres however, the curvilinear alignments will manage appropriate speeds.

Roads with straight segments greater than 250 metres should consider using urban design techniques to assist in managing vehicle speeds. Tree plantings and house design/driveways, in conjunction with carriageway design techniques should be considered in the context of street design features to manage speeds.

Notwithstanding the above, it is GTA's opinion that vehicle speeds within Precinct 2 will be generally naturally managed and acceptable, subject to detailed design.

## 5.6 Intersection Sight Distance

In order to provide fundamental safety at intersections, adequate sight distances must be provided at each one. There are three categories of sight distances, these are:

- Approach Sight Distance (ASD)
- Safe Intersection Sight Distance (SISD)
- Minimum Gap Sight Distance (MGSD).

A description and review of each of these sight distances for the proposed development is discussed in the following sections.

### Approach Sight Distance (ASD)

ASD is the sight distance required for a driver of a vehicle on a minor road approaching an intersection to observe the holding line for the intersection on the ground. The distance is required such that the driver can observe the holding line, react and stop as required.

Based upon the table provided with the Austroads 'Guide to Road Design Part 4a: Signalised and Signalised Intersections' (2009, henceforth referred to as Austroads Guide) a design speed of 50km/h has an ASD of 55 metres.

### Safe Intersection Sight Distance (SISD)

SISD is the sight distance required for a driver of a vehicle on a major road approaching an intersection to observe a vehicle within the intersection. The SISD is required such that if a vehicle has stopped (i.e. stalled) within an intersection the driver of the approach vehicle on the major road will observe the vehicle and be able to react and stop if required.

Based upon the table provided with the Austroads Guide a design speed of 50km/h has an SISD of 97 metres.

### Minimum Gap Sight Distance (MGSD)

MGSD is the sight distance required for a driver of a vehicle on a minor road at the intersection to observe vehicles in the conflicting streams. The distance is required such that the vehicle can view approaching vehicles in order to safely commence the desired manoeuvre.

The MGSD is based upon the number of lanes the vehicle is required to cross, the type of manoeuvre that is required.

Austroads Guide requires a road with a design speed of 50km/h has an MGSD of 69 metres for the critical right turn movement on a two lane/two way road.

### Sight Distance Summary

GTA has undertaken an assessment of the above horizontal sight distances and is satisfied the intersections within the proposed development provide the minimum requirements. A further sight distance assessment is recommended during detailed design to ensure the horizontal and vertical sight distances are met.

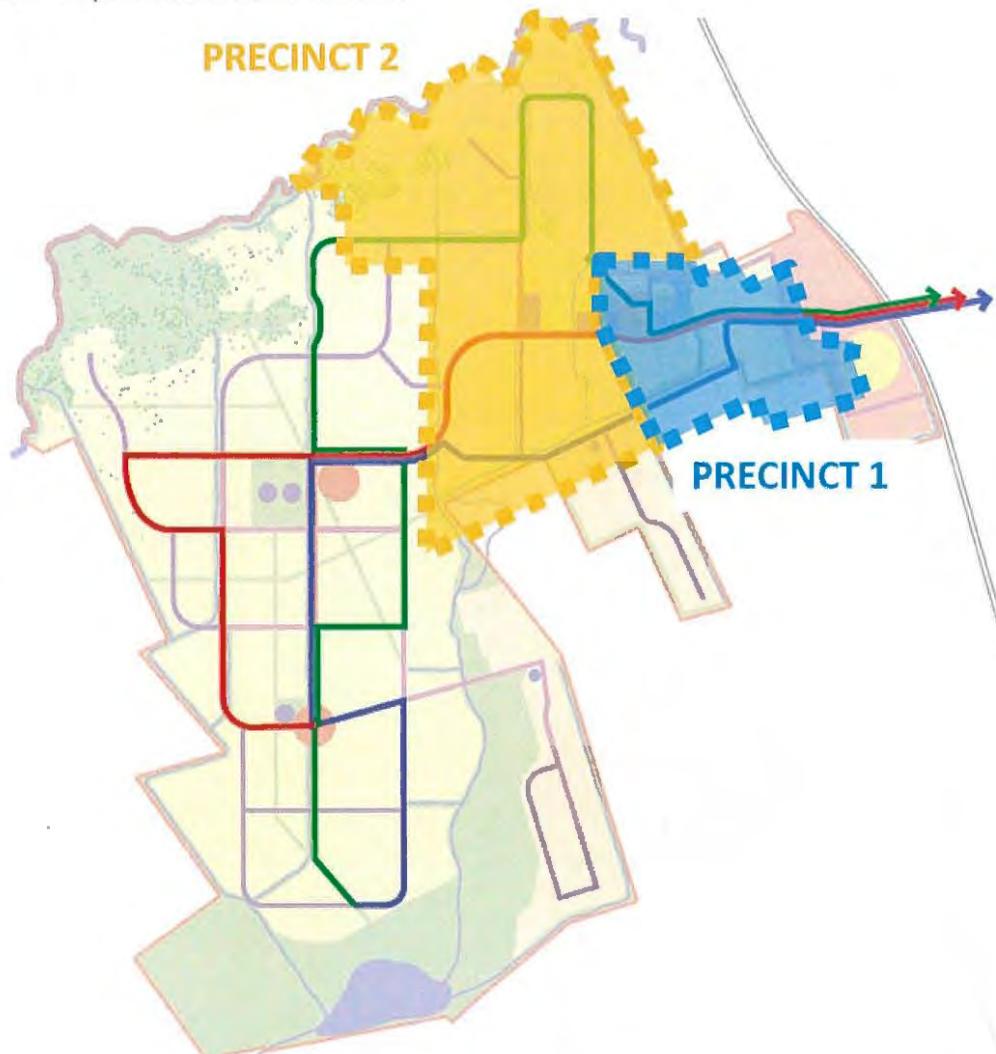
## 5.7 Street Gradients for Vehicles

It is noted that the current site is very flat and roads will generally be designed with appropriate grades for stormwater management, as opposed to achieving compatibility with existing terrain in undulating environments. Hence, grades of streets are not considered to be an issue within the precinct.

## 5.8 Public Transport

Three bus routes are proposed to provide public transport access to the Riverlea township. The three bus routes will connect Riverlea township to Munna Para, Elizabeth (via Virginia) and Salisbury (via Virginia). Figure 5.3 indicates the proposed bus route strategy.

Figure 5.3: Proposed Bus Routes in Precinct 2



The proposed bus routes will utilise the arterial, sub-arterial and collector road and network to provide a bus route that will be within approximately 600 metres of all residential allotments within the Riverlea township.

## 6. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

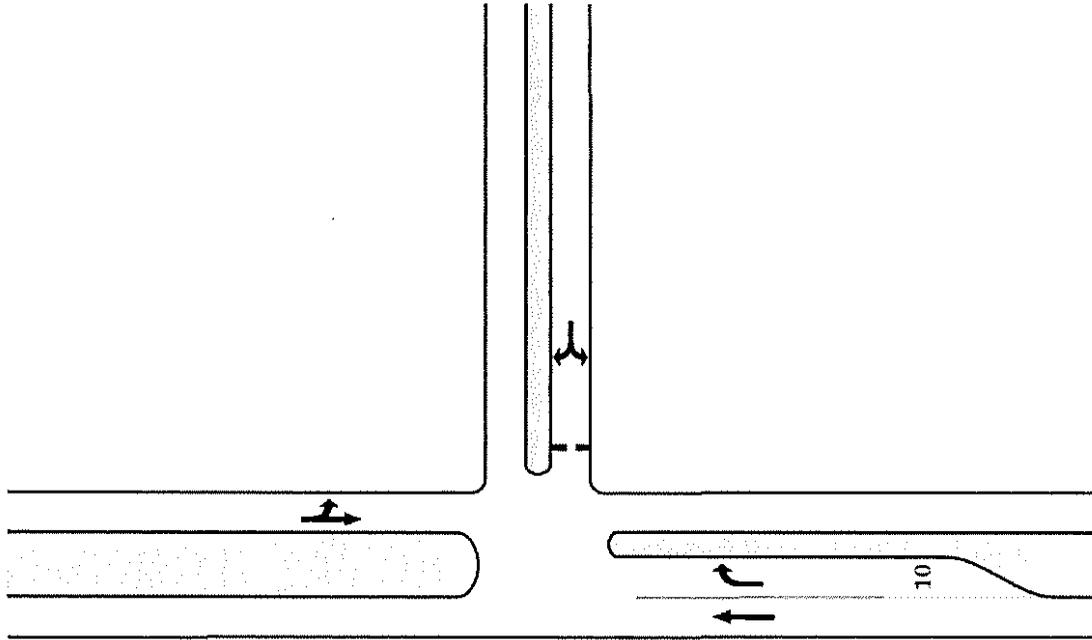
- i The proposed Precinct 2 development will include approximately 2,735 residential allotments, a neighbourhood centre and school within a modified grid network and key access routes to Port Wakefield Road.
- ii This report has also considered the combined impact of Precinct 1.
- iii Precinct 1 and 2 will generate some 26,800 vehicles trips per day which is consistent with the Traffic Impact Assessment prepared for the master plan in 2009.
- iv Unsignalised intersections (including T-junctions and/or roundabouts) on the main arterial road (from Port Wakefield Road) will be suitable to cater for the traffic demand as a result of Precinct 1 and 2, however, as further development to the Riverlea township continues signalised intersections are required at key intersection locations.
- v The configurations of the street network will be conducive to a low speed environment of less than 40km/h on the minor streets.
- vi The collector streets will be suitable for the anticipated traffic volumes for the proposed development, and provide a suitable speed environment in the range of 40km/h.

## Appendix A

Appendix A

### Reedy Road Intersection

"Precinct 1 and 2" Reed Road Intersection Layout



## "Precinct 1 and 2" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-AM

Reedy Road Intersection  
BaseCase  
AM Peak Hour  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Req. Sat/sat v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>East Arterial Road</b>											
5	T	178	0.0	0.061	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	2	0.0	0.040	71.6	LOS F	0.1	0.7	0.97	0.99	19.4
Approach		180	0.0	0.061	0.6	NA	0.1	0.7	0.01	0.01	58.7
<b>North East: Median</b>											
26	R	1	0.0	0.001	6.0	LOS A	0.0	0.0	0.12	0.52	44.6
Approach		1	0.0	0.001	6.0	LOS A	0.0	0.0	0.12	0.52	44.6
<b>North: Reedy Road</b>											
7	L	14	0.0	1.000 <sup>4</sup>	579.5	LOS F	3.4	23.7	1.00	1.14	3.5
9	R	1	0.0	1.000 <sup>4</sup>	579.5	LOS F	3.4	23.7	1.00	1.17	3.5
Approach		15	0.0	1.000	579.5	LOS F	3.4	23.7	1.00	1.15	3.5
<b>West: Arterial Road</b>											
10	L	1	0.0	0.625	7.4	LOS A	0.0	0.0	0.00	1.19	48.6
11	T	1607	0.0	0.625	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		1608	0.0	0.625	0.0	NA	0.0	0.0	0.00	0.00	60.0
All Vehicles		1804	0.0	1.000	4.9	NA	3.4	23.7	0.01	0.01	52.8

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

<sup>4</sup> x = 1.00 due to minimum capacity.

## "Precinct 1 and 2" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-PM

Reedy Road Intersection  
BaseCase  
PM Peak Hour  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Req. Sat/sat v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>East Arterial Road</b>											
5	T	1071	0.0	0.549	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	10	0.0	0.019	10.7	LOS A	0.0	0.3	0.58	0.71	45.2
Approach		1081	0.0	0.549	0.1	NA	0.0	0.3	0.01	0.01	59.6
<b>North East: Median</b>											
26	R	1	0.0	0.002	9.0	LOS A	0.0	0.0	0.56	0.70	42.2
Approach		1	0.0	0.002	9.0	LOS A	0.0	0.0	0.56	0.70	42.2
<b>North: Reedy Road</b>											
7	L	6	0.0	0.013	12.5	LOS A	0.0	0.3	0.63	0.75	39.6
9	R	1	0.0	0.013	12.5	LOS A	0.0	0.3	0.63	0.69	39.6
Approach		7	0.0	0.013	12.5	LOS A	0.0	0.3	0.63	0.74	39.6
<b>West: Arterial Road</b>											
10	L	1	0.0	0.366	7.4	LOS A	0.0	0.0	0.00	1.19	48.6
11	T	713	0.0	0.366	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		714	0.0	0.366	0.0	NA	0.0	0.0	0.00	0.00	60.0
All Vehicles		1803	0.0	0.549	0.1	NA	0.0	0.3	0.01	0.01	59.6

Level of Service (LOS) Method: Delay (RTA NSW).

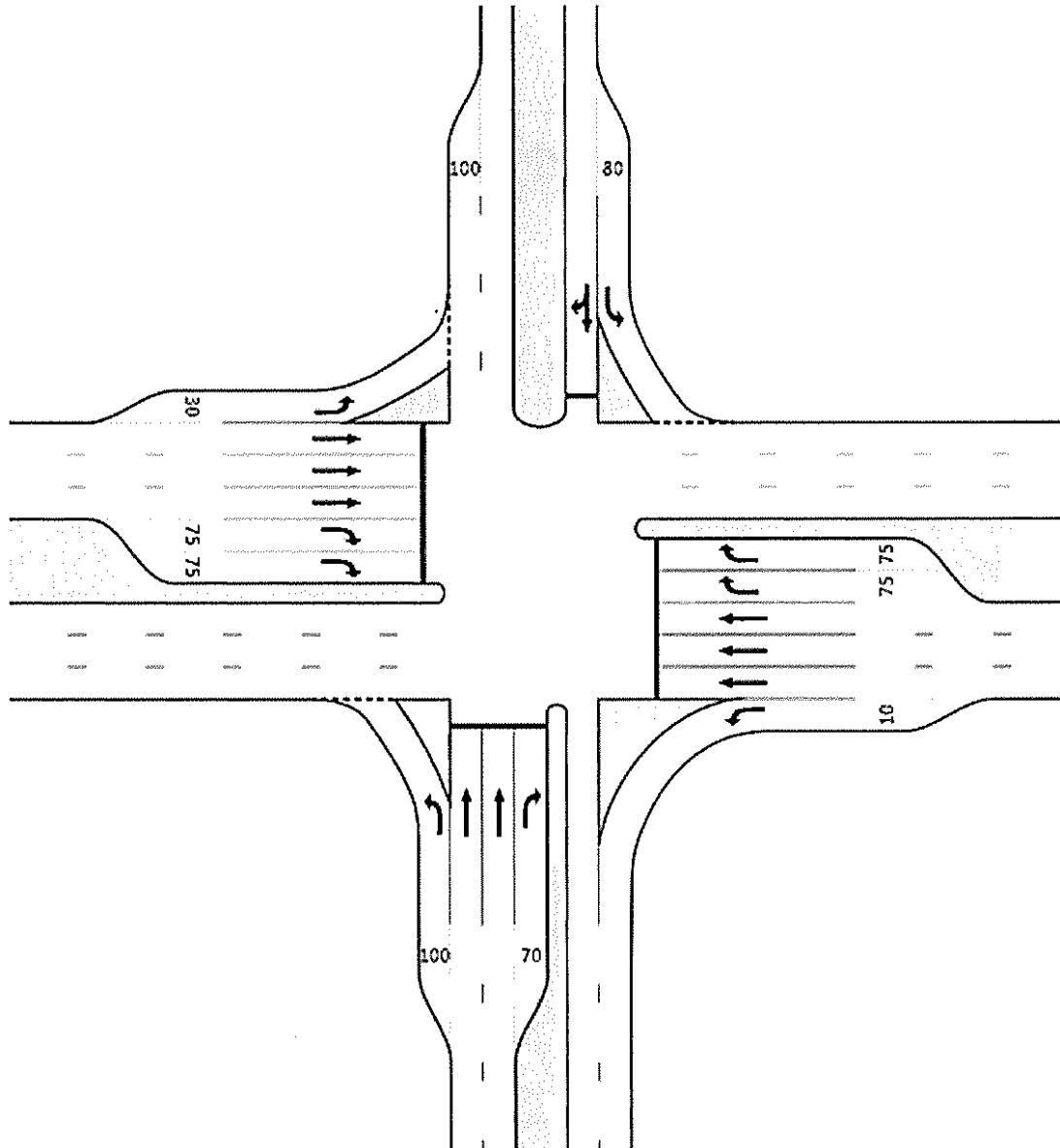
Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

"Ultimate" Reedy Road Intersection Layout



## "Ultimate" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate - AM

Reedy Road Intersection  
 Ultimate  
 Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Req. Sats veh	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: South Approach											
1	L	20	0.0	0.017	7.4	LOS A	0.1	0.6	0.23	0.60	43.6
2	T	45	0.0	0.109	30.0	LOS C	0.9	6.0	0.91	0.65	28.4
3	R	151	0.0	0.616	46.1	LOS D	5.8	40.6	1.03	0.97	24.6
Approach		216	0.0	0.616	79.2	LOS C	5.8	40.6	0.91	0.67	26.6
East: Arterial Road											
4	L	754	0.0	0.406	7.6	X	X	X	X	0.60	49.7
5	T	493	0.0	0.222	16.3	LOS B	3.8	26.5	0.72	0.59	39.5
6	R	133	0.0	0.517	43.3	LOS D	2.9	20.4	0.99	0.76	27.4
Approach		1387	0.0	0.517	14.1	LOS A	3.8	26.5	0.35	0.61	42.6
North: North Approach											
7	L	310	0.0	0.490	16.4	LOS B	6.8	47.7	0.79	0.79	35.9
8	T	65	0.0	0.362	31.9	LOS C	2.8	19.6	0.96	0.74	27.4
9	R	20	0.0	0.362	36.5	LOS C	2.8	19.6	0.96	0.77	27.6
Approach		395	0.0	0.490	21.7	LOS B	6.8	47.7	0.82	0.78	33.7
West: Arterial Road											
10	L	20	0.0	0.023	6.4	LOS A	0.1	0.6	0.21	0.63	49.6
11	T	2635	0.0	0.652	21.9	LOS B	30.6	213.9	0.93	0.96	35.5
12	R	200	0.0	0.222	31.1	LOS C	2.6	19.6	0.84	0.76	32.5
Approach		2855	0.0	0.652	22.4	LOS B	30.6	213.9	0.92	0.94	35.3
All Vehicles		4933	0.0	0.652	20.7	LOS B	30.6	213.9	0.75	0.83	36.4

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW)  
 Vehicle movement LOS values are based on average delay per movement  
 Intersection and Approach LOS values are based on average delay for all vehicle movements  
 SIDRA Standard Delay Model used.

## "Ultimate" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate - PM

Reedy Road Intersection  
 Ultimate  
 Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Req. Sats veh	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: South Approach											
1	L	260	0.0	0.260	13.5	LOS A	3.2	22.3	0.82	0.73	43.7
2	T	50	0.0	0.097	20.1	LOS B	0.7	4.6	0.99	0.63	32.6
3	R	212	0.0	0.836	36.5	LOS C	6.1	42.7	1.00	1.00	30.1
Approach		522	0.0	0.836	23.5	LOS B	6.1	42.7	0.80	0.63	36.0
East: Arterial Road											
4	L	391	0.0	0.211	5.6	X	X	X	X	0.53	44.1
5	T	1792	0.0	0.651	23.1	LOS B	16.9	116.0	0.99	1.05	34.6
6	R	237	0.0	0.543	27.9	LOS B	4.3	20.0	0.94	0.79	31.0
Approach		2470	0.0	0.651	20.6	LOS B	16.9	116.0	0.82	0.93	35.3
North: North Approach											
7	L	550	0.0	0.546	10.9	LOS A	5.2	36.4	0.61	0.77	46.1
8	T	60	0.0	0.266	21.3	LOS B	1.8	12.9	0.92	0.71	31.6
9	R	20	0.0	0.266	26.9	LOS C	1.8	12.9	0.92	0.76	34.4
Approach		630	0.0	0.546	12.4	LOS A	5.2	36.4	0.65	0.76	43.6
West: Arterial Road											
10	L	20	0.0	0.026	6.0	LOS A	0.1	0.7	0.34	0.62	43.1
11	T	927	0.0	0.626	16.3	LOS B	6.5	45.5	0.99	0.74	35.1
12	R	300	0.0	0.673	32.4	LOS C	3.9	27.6	1.03	0.67	29.3
Approach		1247	0.0	0.673	20.0	LOS B	6.5	45.5	0.93	0.77	36.2
All Vehicles		4969	0.0	0.651	19.9	LOS B	16.9	116.0	0.82	0.66	36.6

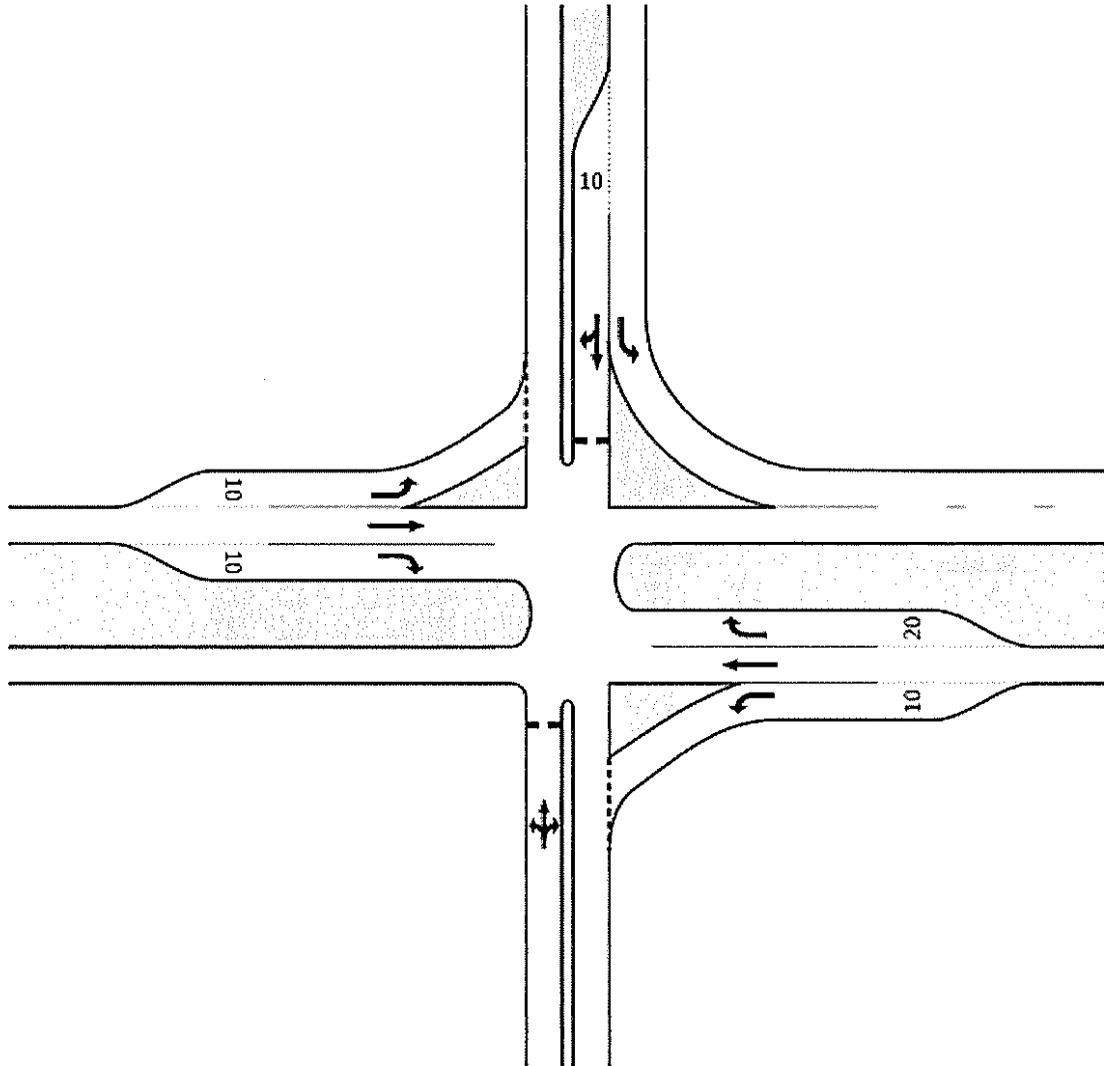
X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW)  
 Vehicle movement LOS values are based on average delay per movement  
 Intersection and Approach LOS values are based on average delay for all vehicle movements  
 SIDRA Standard Delay Model used.

## Appendix B

### Intersection 1

"Precinct 1 and 2" Intersection 1 Layout



## "Precinct 1 and 2" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-AM

Intersection 1  
 BaseCase  
 AM Peak Hour  
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow vph/h	HV %	Deg. Sat'n v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South Collector Road</b>											
1	L	8	0.0	0.174	18.2	LOS B	0.6	4.4	0.71	0.60	36.1
2	T	1	0.0	0.174	16.8	LOS B	0.6	4.4	0.71	0.66	35.6
3	R	51	0.0	0.174	17.8	LOS B	0.6	4.4	0.71	0.66	36.2
Approach		60	0.0	0.174	17.9	LOS B	0.6	4.4	0.71	0.64	36.1
<b>East Arterial Road</b>											
4	L	5	0.0	0.008	6.7	LOS A	0.0	0.1	0.06	0.55	49.1
5	T	159	0.0	0.062	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	23	0.0	0.160	36.1	LOS C	0.5	3.7	0.54	0.96	29.2
Approach		187	0.0	0.160	4.6	NA	0.5	3.7	0.12	0.14	53.0
<b>North East Median</b>											
24	L	1	0.0	0.016	14.9	LOS B	0.0	0.3	0.79	0.69	36.8
26	R	3	0.0	0.016	15.6	LOS B	0.0	0.3	0.79	0.69	37.5
Approach		4	0.0	0.016	15.4	LOS B	0.0	0.3	0.79	0.69	37.3
<b>North Collector Road</b>											
7	L	212	0.0	0.114	5.6	X	X	X	X	0.53	44.1
8	T	1	0.0	0.014	17.5	LOS B	0.0	0.3	0.63	0.67	35.0
9	R	3	0.0	0.014	18.5	LOS B	0.0	0.3	0.63	0.66	35.8
Approach		216	0.0	0.114	5.9	LOS A	0.0	0.3	0.02	0.54	43.9
<b>West Arterial Road</b>											
10	L	3	0.0	0.005	6.8	LOS A	0.0	0.1	0.11	0.53	48.6
11	T	1429	0.0	0.733	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	8	0.0	0.011	7.8	LOS A	0.0	0.2	0.26	0.57	47.4
Approach		1441	0.0	0.733	0.1	NA	0.0	0.2	0.00	0.00	59.9
<b>South West Median</b>											
33	L	1	0.0	0.121	10.1	LOS A	0.3	1.9	0.65	0.60	40.4
32	R	51	0.0	0.121	10.5	LOS A	0.3	1.9	0.65	0.62	41.1
Approach		52	0.0	0.121	10.5	LOS A	0.3	1.9	0.65	0.61	41.0
All Vehicles		1980	0.0	0.733	2.0	NA	0.6	4.4	0.06	0.12	55.0

X: Not applicable for Continuous movement.

## "Precinct 1 and 2" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

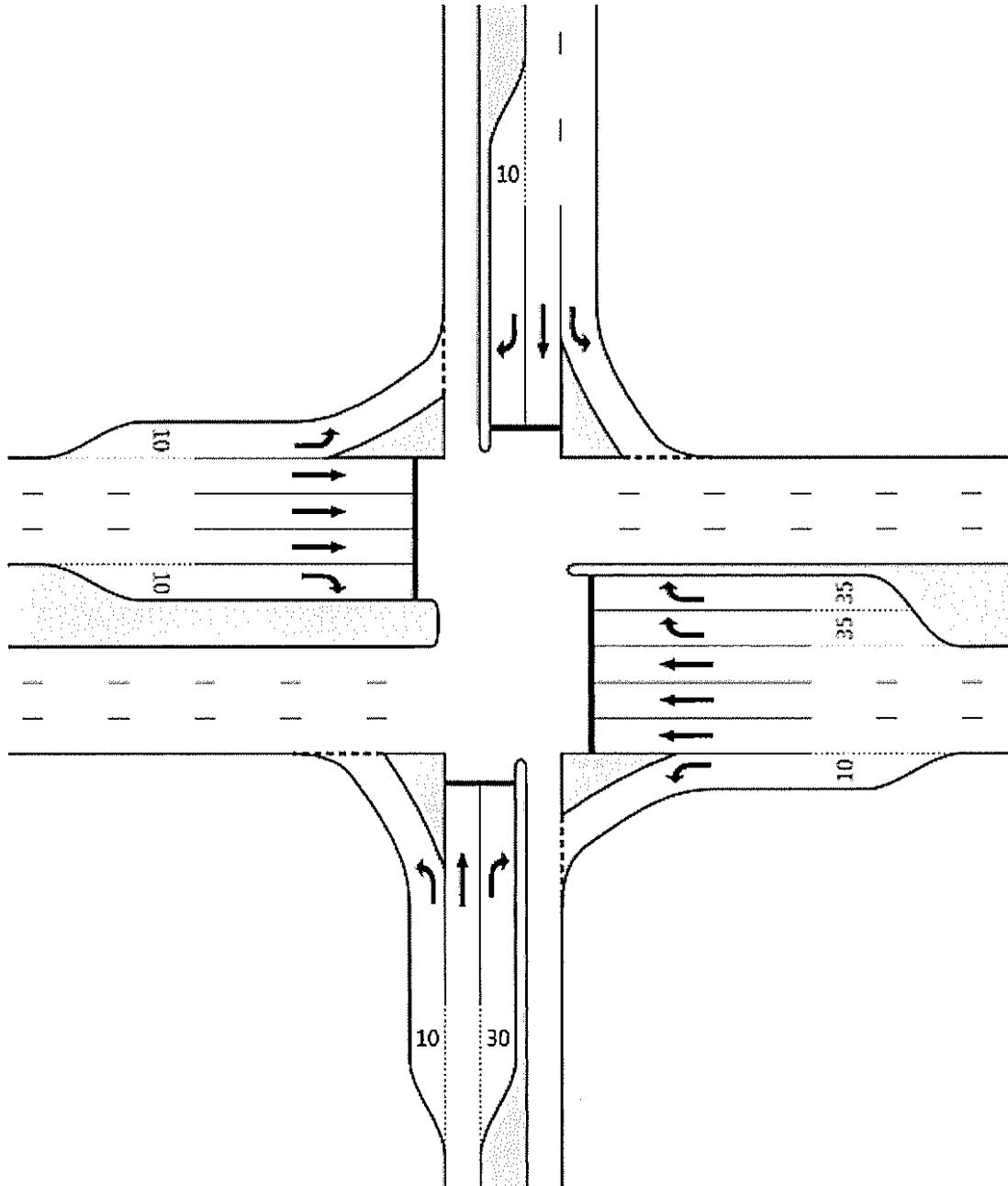
Site: BaseCase-PM

Intersection 1  
 BaseCase  
 PM Peak Hour  
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow vph/h	HV %	Deg. Sat'n v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South Collector Road</b>											
1	L	8	0.0	0.110	20.2	LOS B	0.4	2.7	0.64	0.96	34.6
2	T	1	0.0	0.110	18.8	LOS B	0.4	2.7	0.64	0.92	34.3
3	R	22	0.0	0.110	19.9	LOS B	0.4	2.7	0.64	0.93	35.0
Approach		32	0.0	0.110	19.9	LOS B	0.4	2.7	0.64	0.94	34.9
<b>East Arterial Road</b>											
4	L	33	0.0	0.049	6.8	LOS A	0.1	0.8	0.17	0.90	46.5
5	T	953	0.0	0.489	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	141	0.0	0.156	10.2	LOS A	0.7	4.6	0.59	0.60	45.7
Approach		1126	0.0	0.489	1.5	NA	0.7	4.6	0.06	0.11	57.4
<b>North East Median</b>											
24	L	1	0.0	0.010	9.5	LOS A	0.0	0.2	0.64	0.62	40.7
26	R	3	0.0	0.010	10.2	LOS A	0.0	0.2	0.64	0.61	41.4
Approach		4	0.0	0.010	10.0	LOS A	0.0	0.2	0.64	0.76	41.2
<b>North Collector Road</b>											
7	L	94	0.0	0.050	5.6	X	X	X	X	0.53	44.1
8	T	1	0.0	0.016	19.7	LOS B	0.1	0.4	0.66	0.91	33.6
9	R	3	0.0	0.016	20.8	LOS B	0.1	0.4	0.66	0.93	34.5
Approach		99	0.0	0.050	6.3	LOS A	0.1	0.4	0.04	0.55	43.6
<b>West Arterial Road</b>											
10	L	3	0.0	0.005	7.3	LOS A	0.0	0.1	0.31	0.49	47.7
11	T	635	0.0	0.326	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	8	0.0	0.021	13.3	LOS A	0.1	0.4	0.71	0.62	42.7
Approach		646	0.0	0.326	0.2	NA	0.1	0.4	0.01	0.01	59.6
<b>South West Median</b>											
30	L	1	0.0	0.062	11.0	LOS A	0.1	1.0	0.71	0.65	39.7
32	R	22	0.0	0.062	11.5	LOS A	0.1	1.0	0.71	0.65	40.3
Approach		23	0.0	0.062	11.5	LOS A	0.1	1.0	0.71	0.65	40.3
All Vehicles		1929	0.0	0.489	1.7	NA	0.7	4.6	0.07	0.13	56.3

X: Not applicable for Continuous movement.

"Ultimate" Intersection 1 Layout



## "Ultimate" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate-AM

Intersection 1  
 Ultimate  
 AM Peak Hour  
 Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Req. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles/veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Collector Road												
1	L	8	0.0	0.024	7.1	LOS A	0.0	0.3	0.14	0.56	44.0	
2	T	1	0.0	0.011	59.6	LOS E	0.1	0.4	0.97	0.57	19.9	
3	R	51	0.0	0.506	70.8	LOS F	3.1	21.6	1.03	0.74	15.4	
Approach		60	0.0	0.506	61.5	LOS E	3.1	21.6	0.83	0.71	21.1	
East: Arterial Road												
4	L	5	0.0	0.010	7.0	LOS A	0.0	0.1	0.10	0.56	49.9	
5	T	522	0.0	0.153	12.0	LOS A	4.6	31.9	0.49	0.41	43.5	
6	R	23	0.0	0.206	69.4	LOS E	1.2	8.1	0.99	0.69	15.9	
Approach		551	0.0	0.206	14.4	LOS A	4.6	31.9	0.50	0.42	41.6	
North: Collector Road												
7	L	212	0.0	0.437	9.0	LOS A	4.2	29.3	0.41	0.70	42.5	
8	T	1	0.0	0.011	59.6	LOS E	0.1	0.4	0.97	0.57	19.9	
9	R	3	0.0	0.060	67.3	LOS E	0.2	1.3	0.97	0.61	20.0	
Approach		216	0.0	0.437	10.1	LOS A	4.2	29.3	0.42	0.70	41.6	
West: Arterial Road												
10	L	3	0.0	0.004	6.9	LOS A	0.0	0.0	0.05	0.56	49.2	
11	T	2745	0.0	0.625	1.7	LOS A	6.5	45.2	0.13	0.12	56.6	
12	R	8	0.0	0.153	46.5	LOS D	0.3	2.4	0.74	0.65	25.5	
Approach		2755	0.0	0.625	1.9	LOS A	6.5	45.2	0.14	0.13	56.4	
All Vehicles		3561	0.0	0.625	5.3	LOS A	6.5	45.2	0.22	0.22	51.0	

Level of Service (LOS) Method: Delay (RTA NSW).  
 Vehicle movement LOS values are based on average delay per movement.  
 Intersection and Approach LOS values are based on average delay for all vehicle movements.  
 SIDRA Standard Delay Model used.

## "Ultimate" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate-PM

Intersection 1  
 Ultimate  
 AM Peak Hour  
 Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

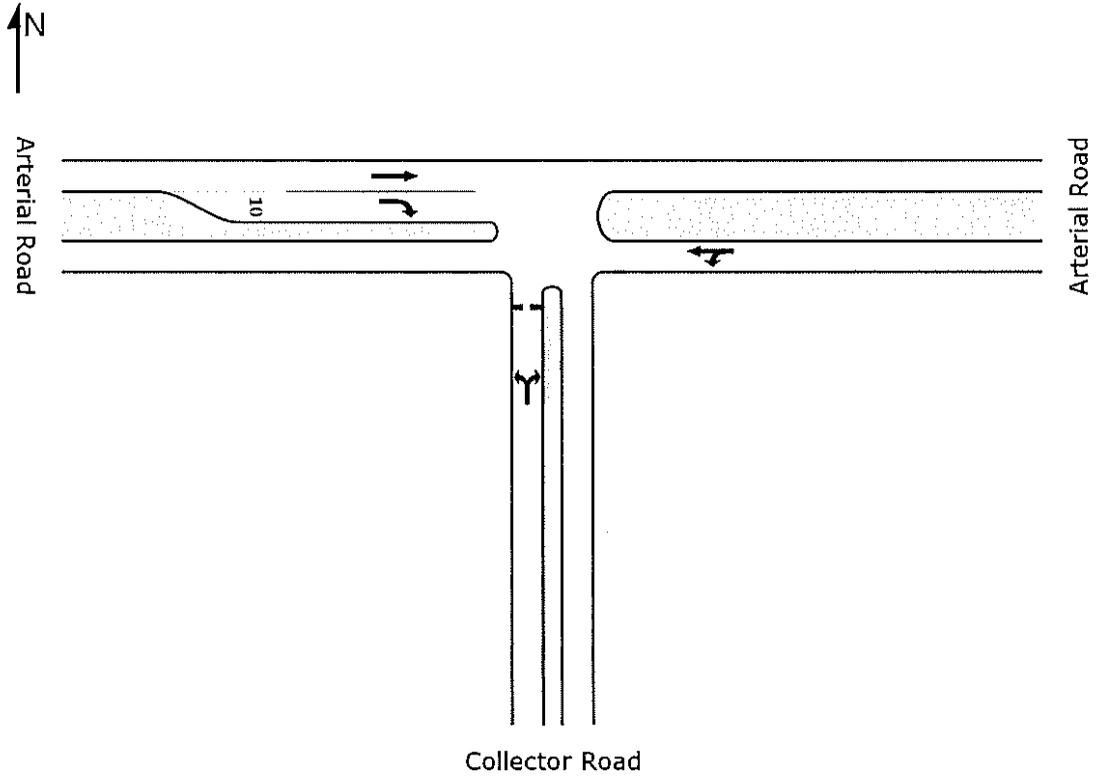
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Req. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles/veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Collector Road												
1	L	8	0.0	0.062	9.1	LOS A	0.1	0.7	0.26	0.60	42.3	
2	T	1	0.0	0.011	59.6	LOS E	0.1	0.4	0.97	0.57	19.9	
3	R	22	0.0	0.221	69.1	LOS E	1.3	9.2	0.99	0.70	19.7	
Approach		32	0.0	0.221	52.6	LOS D	1.3	9.2	0.79	0.67	23.0	
East: Arterial Road												
4	L	34	0.0	0.061	7.0	LOS A	0.1	0.7	0.11	0.59	48.9	
5	T	2169	0.0	0.494	6.3	LOS A	16.4	115.1	0.43	0.40	49.4	
6	R	141	0.0	0.540	25.3	LOS C	4.2	29.1	0.64	0.72	32.2	
Approach		2344	0.0	0.540	7.7	LOS A	16.4	115.1	0.44	0.42	47.9	
North: Collector Road												
7	L	94	0.0	0.084	9.5	LOS A	1.3	9.1	0.29	0.64	42.0	
8	T	1	0.0	0.011	59.6	LOS E	0.1	0.4	0.97	0.57	19.9	
9	R	3	0.0	0.060	67.3	LOS E	0.2	1.3	0.97	0.61	20.0	
Approach		98	0.0	0.084	11.6	LOS A	1.3	9.1	0.32	0.64	43.1	
West: Arterial Road												
10	L	3	0.0	0.005	7.0	LOS A	0.0	0.0	0.05	0.56	49.1	
11	T	1197	0.0	0.546	29.0	LOS C	16.0	111.7	0.74	0.64	32.1	
12	R	8	0.0	0.213	68.7	LOS E	0.5	3.4	0.96	0.65	20.0	
Approach		1206	0.0	0.546	25.2	LOS C	16.0	111.7	0.74	0.64	32.0	
All Vehicles		3662	0.0	0.546	15.2	LOS B	16.4	115.1	0.54	0.50	40.7	

Level of Service (LOS) Method: Delay (RTA NSW).  
 Vehicle movement LOS values are based on average delay per movement.  
 Intersection and Approach LOS values are based on average delay for all vehicle movements.  
 SIDRA Standard Delay Model used.

## Appendix C

### Intersection 2

"Precinct 1 and 2" Intersection 2 Layout



## "Precinct 1 and 2" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-AM

Intersection 2  
 BaseCase  
 AM Peak Period  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South: Collector Road</b>											
1	L	8	0.0	0.077	15.6	LOS B	0.3	1.9	0.53	0.60	37.3
3	R	22	0.0	0.077	15.9	LOS B	0.3	1.9	0.53	0.65	37.2
Approach		31	0.0	0.077	15.9	LOS B	0.3	1.9	0.53	0.78	37.2
<b>East: Arterial Road</b>											
4	L	2	0.0	0.066	7.4	LOS A	0.0	0.0	0.00	1.17	48.6
5	T	165	0.0	0.066	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		167	0.0	0.066	0.1	NA	0.0	0.0	0.00	0.01	56.6
<b>West: Arterial Road</b>											
11	T	1416	0.0	0.726	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	8	0.0	0.011	8.0	LOS A	0.0	0.2	0.27	0.59	47.3
Approach		1424	0.0	0.726	0.0	NA	0.0	0.2	0.00	0.00	59.9
<b>South West: Median</b>											
32	R	22	0.0	0.051	11.0	LOS A	0.1	0.6	0.65	0.64	40.7
Approach		22	0.0	0.051	11.0	LOS A	0.1	0.6	0.65	0.64	40.7
All Vehicles		1644	0.0	0.726	0.5	NA	0.3	1.9	0.02	0.03	58.9

Level of Service (LOS) Method: Delay (RTA NSW)

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements

SIDRA Standard Delay Model used.

## "Precinct 1 and 2" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-PM

Intersection 2  
 BaseCase  
 PM Peak Period  
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South: Collector Road</b>											
1	L	9	0.0	0.062	16.9	LOS B	0.2	1.4	0.81	0.93	35.4
3	R	9	0.0	0.062	16.1	LOS B	0.2	1.4	0.81	0.94	35.4
Approach		18	0.0	0.062	16.0	LOS B	0.2	1.4	0.81	0.93	35.4
<b>East: Arterial Road</b>											
4	L	15	0.0	0.494	7.4	LOS A	0.0	0.0	0.00	1.17	48.6
5	T	947	0.0	0.494	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		962	0.0	0.494	0.1	NA	0.0	0.0	0.00	0.02	56.8
<b>West: Arterial Road</b>											
11	T	634	0.0	0.325	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	8	0.0	0.021	13.7	LOS A	0.1	0.4	0.72	0.63	42.4
Approach		642	0.0	0.325	0.2	NA	0.1	0.4	0.01	0.01	55.7
<b>South West: Median</b>											
32	R	9	0.0	0.022	10.6	LOS A	0.0	0.3	0.64	0.64	40.6
Approach		9	0.0	0.022	10.6	LOS A	0.0	0.3	0.64	0.64	40.6
All Vehicles		1632	0.0	0.494	0.4	NA	0.2	1.4	0.02	0.03	56.1

Level of Service (LOS) Method: Delay (RTA NSW)

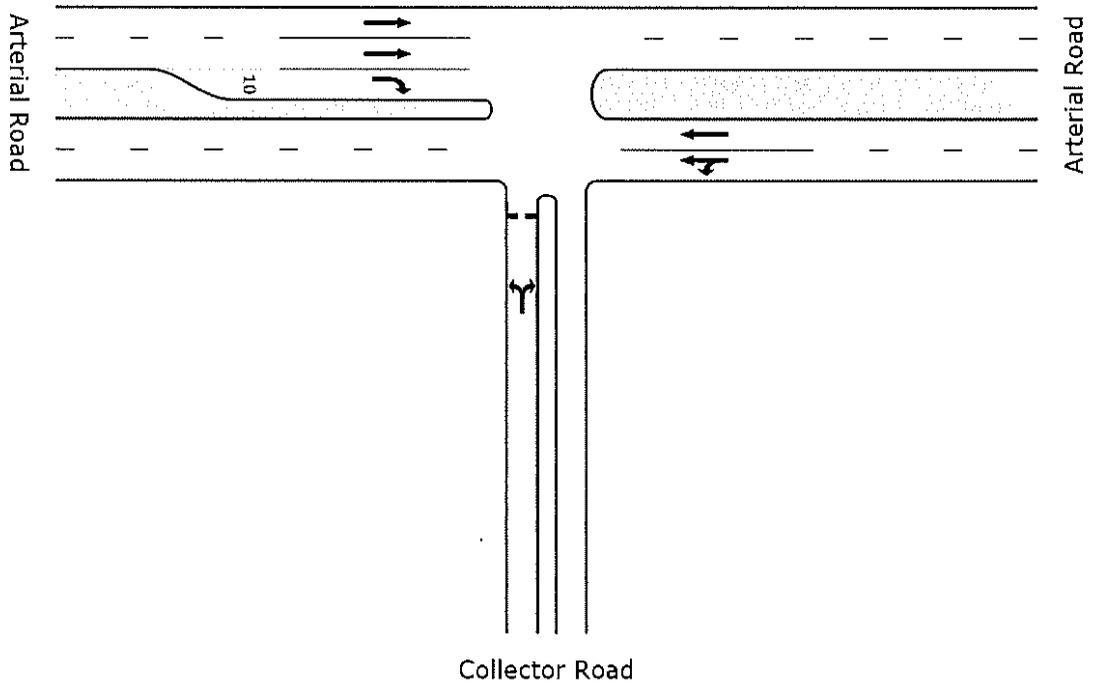
Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements

SIDRA Standard Delay Model used

"Ultimate" Intersection 2 Layout



## "Ultimate" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate-AM

Intersection 2  
Ultimate  
AM Peak Period  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South: Collector Road</b>											
1	L	8	0.0	0.655	280.6	LOS F	3.2	22.5	0.93	1.26	6.7
3	R	22	0.0	0.655	280.6	LOS F	3.2	22.5	0.93	1.15	6.7
Approach		31	0.0	0.655	280.6	LOS F	3.2	22.5	0.93	1.18	6.7
<b>East: Arterial Road</b>											
4	L	2	0.0	0.136	7.4	LOS A	0.0	0.0	0.00	1.18	48.6
5	T	528	0.0	0.136	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		531	0.0	0.136	0.0	NA	0.0	0.0	0.00	0.00	59.9
<b>West: Arterial Road</b>											
11	T	2729	0.0	0.700	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
12	R	8	0.0	0.019	10.1	LOS A	0.0	0.3	0.42	0.66	45.6
Approach		2738	0.0	0.700	0.0	NA	0.0	0.3	0.00	0.00	59.9
<b>South West: Median</b>											
32	R	22	0.0	0.263	46.1	LOS D	0.6	4.5	0.95	1.00	24.6
Approach		22	0.0	0.263	46.1	LOS D	0.6	4.5	0.95	1.00	24.6
All Vehicles		3321	0.0	0.655	2.9	NA	3.2	22.5	0.02	0.02	55.4

Level of Service (LOS) Method: Delay (RTA NSW)

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements

SIDRA Standard Delay Model used.

## "Ultimate" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate-PM

Intersection 2  
Ultimate  
PM Peak Period  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South: Collector Road</b>											
1	L	8	0.0	0.625	220.9	LOS F	1.8	12.7	0.99	1.05	8.3
3	R	9	0.0	0.625	220.6	LOS F	1.8	12.7	0.99	1.05	8.3
Approach		18	0.0	0.625	220.6	LOS F	1.8	12.7	0.99	1.05	8.3
<b>East: Arterial Road</b>											
4	L	15	0.0	0.559	7.4	LOS A	0.0	0.0	0.00	1.17	48.6
5	T	2164	0.0	0.559	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
Approach		2179	0.0	0.559	0.1	NA	0.0	0.0	0.00	0.01	59.9
<b>West: Arterial Road</b>											
11	T	1196	0.0	0.307	0.0	LOS A	0.0	0.0	0.00	0.00	80.0
12	R	8	0.0	0.240	112.7	LOS F	0.6	4.1	0.93	1.00	14.0
Approach		1204	0.0	0.307	0.6	NA	0.6	4.1	0.01	0.01	58.7
<b>South West: Median</b>											
32	R	9	0.0	0.128	43.3	LOS D	0.3	1.9	0.95	0.98	25.4
Approach		9	0.0	0.128	43.3	LOS D	0.3	1.9	0.95	0.98	25.4
All Vehicles		3411	0.0	0.625	1.6	NA	1.8	12.7	0.01	0.02	57.4

Level of Service (LOS) Method: Delay (RTA NSW)

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements

SIDRA Standard Delay Model used.

## Appendix D

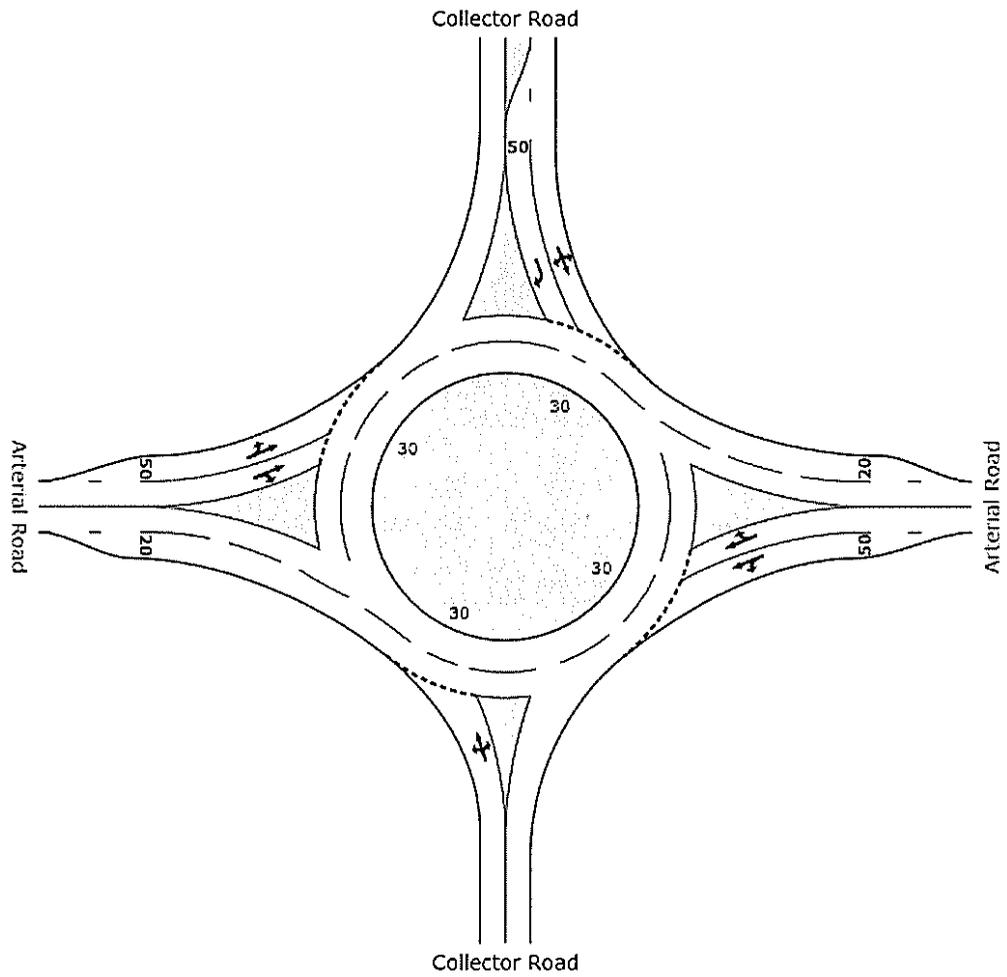
### Intersection 3


Appendix D



"Precinct 1 and 2" Intersection 3 Layout



## "Precinct 1 and 2" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-AM

Intersection 3  
BaseCase  
AM Peak  
Roundabout

Movement Performance - Vehicles												
MovID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Collector Road												
1	L	1	0.0	0.042	5.6	LOS A	0.2	1.3	0.46	0.51	43.7	
2	T	7	0.0	0.042	3.6	LOS A	0.2	1.3	0.46	0.42	43.4	
3	R	32	0.0	0.042	11.6	LOS A	0.2	1.3	0.46	0.70	41.2	
Approach		40	0.0	0.042	10.0	LOS A	0.2	1.3	0.46	0.65	41.6	
East: Arterial Road												
4	L	3	0.0	0.036	6.1	LOS A	0.2	1.2	0.42	0.56	45.4	
5	T	111	0.0	0.115	5.2	LOS A	0.6	4.3	0.41	0.46	50.0	
6	R	60	0.0	0.115	10.5	LOS A	0.6	4.3	0.40	0.75	45.7	
Approach		174	0.0	0.115	7.1	LOS A	0.6	4.3	0.41	0.57	48.4	
North: Collector Road												
7	L	402	0.0	0.596	16.2	LOS B	6.3	43.9	0.98	1.15	36.0	
8	T	7	0.0	0.596	14.8	LOS B	6.3	43.9	0.98	1.15	36.1	
9	R	236	0.0	0.444	20.6	LOS B	3.3	23.0	0.80	1.04	35.7	
Approach		645	0.0	0.596	17.6	LOS B	6.3	43.9	0.95	1.11	35.9	
West: Arterial Road												
10	L	236	0.0	0.266	6.2	LOS A	1.1	6.0	0.27	0.51	50.1	
11	T	992	0.0	0.639	4.9	LOS A	5.4	36.1	0.37	0.44	50.6	
12	R	1	0.0	0.639	10.4	LOS A	5.4	36.1	0.37	0.84	46.5	
Approach		1229	0.0	0.639	5.2	LOS A	5.4	36.1	0.35	0.45	50.5	
All Vehicles		2087	0.0	0.639	9.3	LOS A	6.3	43.9	0.54	0.67	44.6	

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model used.

## "Precinct 1 and 2" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-PM

Intersection 3  
BaseCase  
PM Peak  
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Collector Road												
1	L	1	0.0	0.039	5.5	LOS A	0.2	1.4	0.74	0.72	41.6	
2	T	7	0.0	0.039	7.6	LOS A	0.2	1.4	0.74	0.68	41.2	
3	R	14	0.0	0.039	15.5	LOS B	0.2	1.4	0.74	0.62	39.1	
Approach		22	0.0	0.039	12.6	LOS A	0.2	1.4	0.74	0.77	39.6	
East: Arterial Road												
4	L	21	0.0	0.197	6.3	LOS A	0.9	6.5	0.44	0.61	49.3	
5	T	861	0.0	0.597	5.7	LOS A	4.7	33.2	0.55	0.52	48.9	
6	R	274	0.0	0.597	11.1	LOS A	4.7	33.2	0.57	0.78	45.7	
Approach		956	0.0	0.597	7.2	LOS A	4.7	33.2	0.55	0.60	47.9	
North: Collector Road												
7	L	198	0.0	0.200	6.4	LOS A	1.1	7.4	0.55	0.63	43.5	
8	T	7	0.0	0.200	4.3	LOS A	1.1	7.4	0.55	0.49	43.1	
9	R	236	0.0	0.210	11.9	LOS A	1.2	6.2	0.54	0.72	40.5	
Approach		432	0.0	0.210	9.4	LOS A	1.2	6.2	0.54	0.68	41.7	
West: Arterial Road												
10	L	236	0.0	0.233	6.2	LOS A	1.2	6.4	0.46	0.58	48.6	
11	T	441	0.0	0.353	5.5	LOS A	2.1	14.9	0.48	0.51	49.6	
12	R	1	0.0	0.353	11.0	LOS A	2.1	14.9	0.48	0.68	46.4	
Approach		678	0.0	0.353	5.6	LOS A	2.1	14.9	0.48	0.53	49.3	
All Vehicles		2087	0.0	0.597	7.3	LOS A	4.7	33.2	0.53	0.59	46.8	

Level of Service (LOS) Method: Delay (RTA NSW).

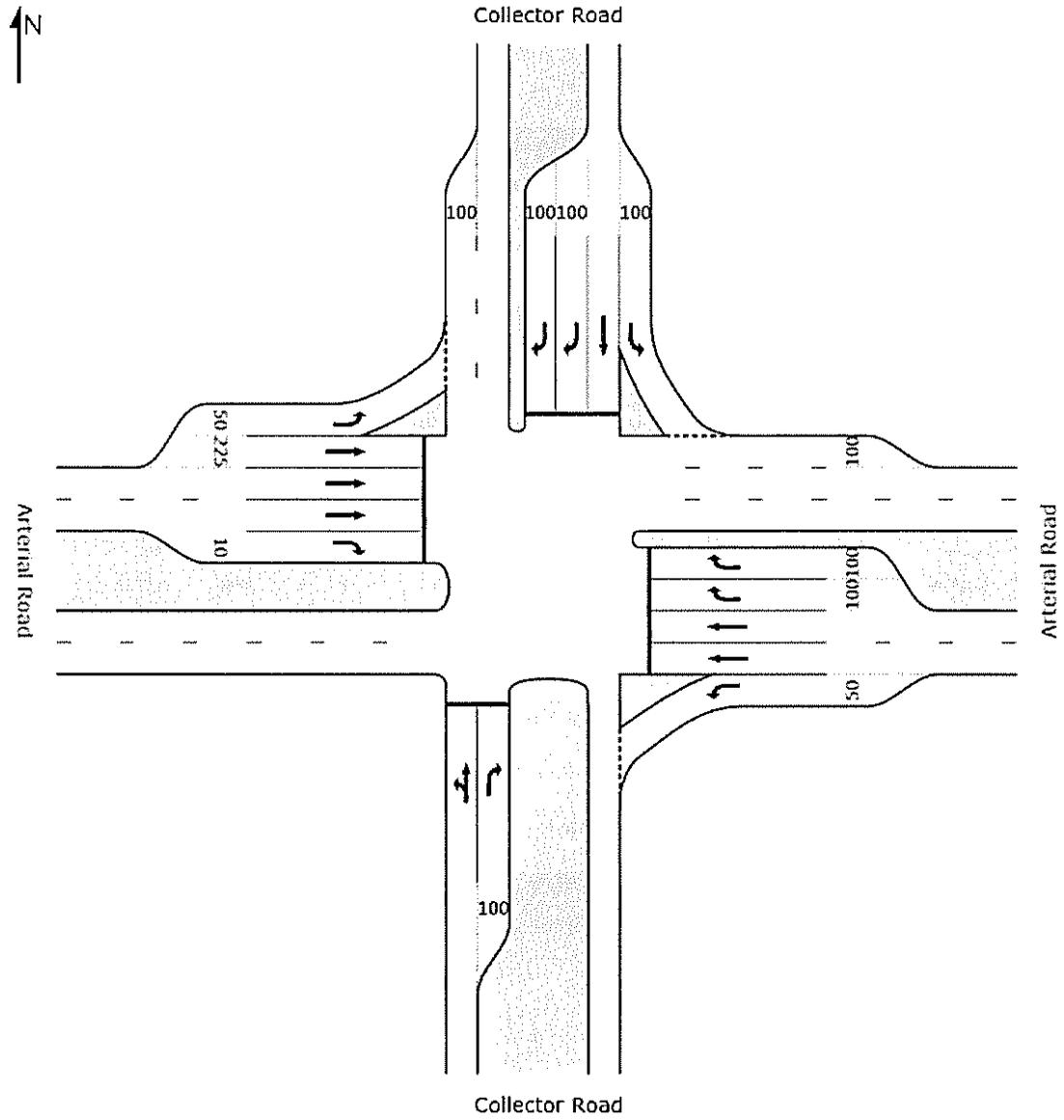
Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model used.

"Ultimate" Intersection 3 Layout



## "Ultimate" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate-AM

Intersection 3  
 Ultimate  
 AM Peak  
 Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles												
MovID	Turn	Demand Flow (veh/h)	HV %	Dep. Satn (v/c)	Average Delay (sec)	Level of Service	95% Back of Queue Vehicles (veh)	Distance (m)	Prop. Queued	Effective Stop Rate (per veh)	Average Speed (km/h)	
<b>South: Collector Road</b>												
1	L	1	0.0	0.064	66.4	LOS E	0.5	3.4	0.99	0.67	20.1	
2	T	7	0.0	0.064	61.3	LOS E	0.5	3.4	0.99	0.65	19.5	
3	R	32	0.0	0.315	69.5	LOS E	1.9	13.3	1.00	0.72	19.7	
Approach		40	0.0	0.315	67.9	LOS E	1.9	13.3	0.99	0.70	19.6	
<b>East: Arterial Road</b>												
4	L	3	0.0	0.002	6.9	LOS A	0.0	0.0	0.05	0.58	49.2	
5	T	474	0.0	0.167	1.6	LOS A	1.1	7.5	0.09	0.07	57.0	
6	R	60	0.0	0.431	12.9	LOS A	0.6	4.3	0.24	0.64	43.2	
Approach		537	0.0	0.431	2.9	LOS A	1.1	7.5	0.10	0.14	55.0	
<b>North: Collector Road</b>												
7	L	402	0.0	0.566	10.4	LOS A	14.3	99.6	0.70	0.60	40.0	
8	T	7	0.0	0.016	40.9	LOS C	0.3	2.4	0.83	0.56	24.4	
9	R	236	0.0	0.613	64.6	LOS E	6.9	46.4	1.00	0.80	20.6	
Approach		645	0.0	0.613	20.6	LOS C	14.3	99.6	0.81	0.60	29.4	
<b>West: Arterial Road</b>												
10	L	236	0.0	0.166	7.6	LOS A	0.4	3.0	0.06	0.62	49.4	
11	T	2305	0.0	0.622	2.4	LOS A	6.0	56.3	0.16	0.15	55.4	
12	R	1	0.0	0.003	6.9	LOS A	0.0	0.0	0.09	0.61	47.0	
Approach		2542	0.0	0.622	2.9	LOS A	6.0	56.3	0.15	0.19	54.8	
All Vehicles		3764	0.0	0.622	8.4	LOS A	14.3	99.6	0.27	0.29	47.0	

Level of Service (LOS) Method: Delay (RTA NSW).  
 Vehicle movement LOS values are based on average delay per movement.  
 Intersection and Approach LOS values are based on average delay for all vehicle movements.  
 SIDRA Standard Delay Model used.

## "Ultimate" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate-PM

Intersection 3  
 Ultimate  
 PM Peak  
 Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

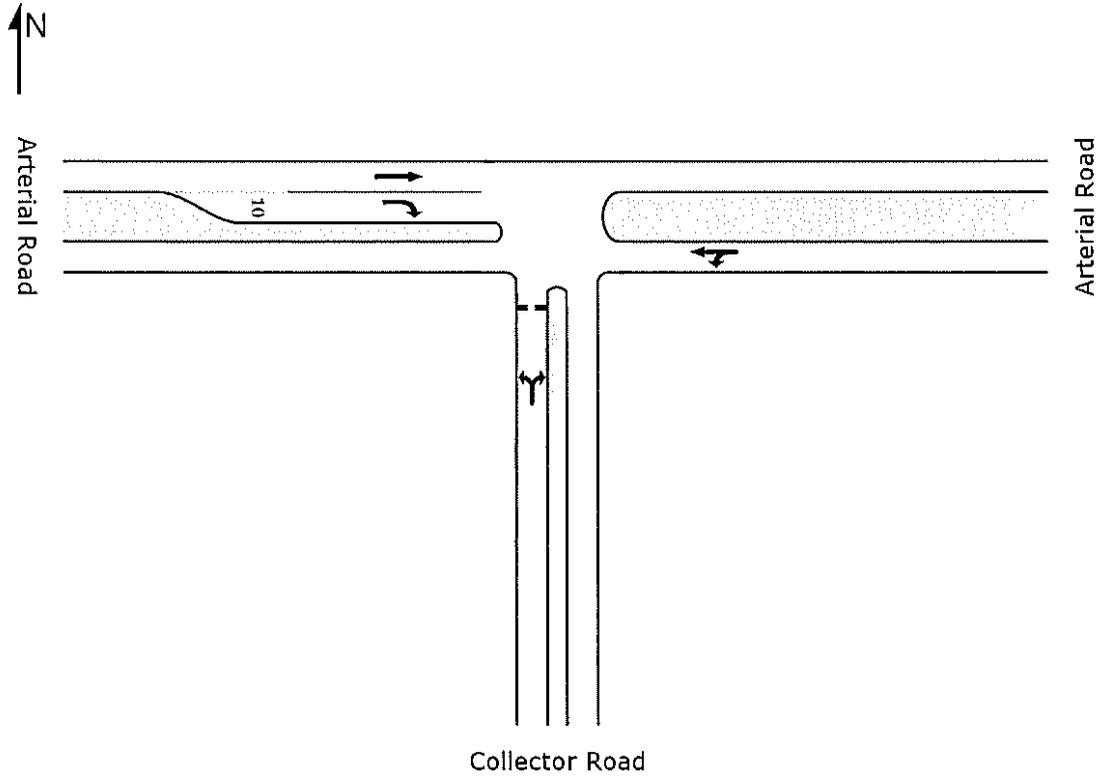
Movement Performance - Vehicles												
MovID	Turn	Demand Flow (veh/h)	HV %	Dep. Satn (v/c)	Average Delay (sec)	Level of Service	95% Back of Queue Vehicles (veh)	Distance (m)	Prop. Queued	Effective Stop Rate (per veh)	Average Speed (km/h)	
<b>South: Collector Road</b>												
1	L	1	0.0	0.064	66.4	LOS E	0.5	3.4	0.99	0.67	20.1	
2	T	7	0.0	0.064	61.3	LOS E	0.5	3.4	0.99	0.65	19.5	
3	R	14	0.0	0.136	65.3	LOS E	0.8	5.6	0.98	0.68	19.9	
Approach		22	0.0	0.136	66.0	LOS E	0.8	5.6	0.99	0.67	19.8	
<b>East: Arterial Road</b>												
4	L	21	0.0	0.016	6.9	LOS A	0.0	0.0	0.05	0.58	49.2	
5	T	1878	0.0	0.664	2.7	LOS A	9.5	66.2	0.19	0.18	54.9	
6	R	274	0.0	0.631	10.5	LOS A	2.2	15.5	0.20	0.64	45.5	
Approach		2173	0.0	0.664	3.7	LOS A	9.5	66.2	0.19	0.24	53.5	
<b>North: Collector Road</b>												
7	L	183	0.0	0.259	6.3	LOS A	1.2	8.6	0.17	0.59	43.3	
8	T	7	0.0	0.016	40.9	LOS C	0.3	2.4	0.83	0.56	24.4	
9	R	236	0.0	0.613	64.6	LOS E	6.9	46.4	1.00	0.80	20.6	
Approach		432	0.0	0.613	38.7	LOS C	6.9	46.4	0.64	0.71	26.6	
<b>West: Arterial Road</b>												
10	L	236	0.0	0.215	7.6	LOS A	0.4	3.0	0.06	0.62	49.4	
11	T	1003	0.0	0.271	1.6	LOS A	2.0	13.7	0.09	0.08	56.7	
12	R	1	0.0	0.015	12.2	LOS A	0.0	0.1	0.17	0.63	43.6	
Approach		1240	0.0	0.271	2.9	LOS A	2.0	13.7	0.09	0.18	55.2	
All Vehicles		3366	0.0	0.664	7.7	LOS A	9.5	66.2	0.21	0.28	48.1	

Level of Service (LOS) Method: Delay (RTA NSW).  
 Vehicle movement LOS values are based on average delay per movement.  
 Intersection and Approach LOS values are based on average delay for all vehicle movements.  
 SIDRA Standard Delay Model used.

## Appendix E

### Intersection 4

"Precinct 1 and 2" Intersection 4 Layout



## "Precinct 1 and 2" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-AM

Intersection 4  
 BaseCase  
 AM Peak Period  
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South: Collector Road</b>											
1	L	1	0.0	0.163	17.6	LOS B	0.7	4.7	0.32	0.60	36.1
3	R	66	0.0	0.163	17.7	LOS B	0.7	4.7	0.32	0.94	36.1
Approach		67	0.0	0.163	17.7	LOS B	0.7	4.7	0.32	0.94	36.1
<b>East: Arterial Road</b>											
4	L	19	0.0	0.178	7.4	LOS A	0.0	0.0	0.00	1.13	48.6
5	T	327	0.0	0.178	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		346	0.0	0.178	0.4	NA	0.0	0.0	0.00	0.06	59.3
<b>West: Arterial Road</b>											
11	T	1161	0.0	0.595	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	1	0.0	0.002	6.6	LOS A	0.0	0.0	0.40	0.57	46.7
Approach		1162	0.0	0.595	0.0	NA	0.0	0.0	0.00	0.00	60.0
<b>South West: Median</b>											
32	R	66	0.0	0.140	10.7	LOS A	0.3	2.2	0.64	0.64	40.9
Approach		66	0.0	0.140	10.7	LOS A	0.3	2.2	0.64	0.64	40.9
All Vehicles		1642	0.0	0.595	1.3	NA	0.7	4.7	0.06	0.09	57.2

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

## "Precinct 1 and 2" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-PM

Intersection 4  
 Precinct 1&2  
 PM Peak Period  
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South: Collector Road</b>											
1	L	1	0.0	0.106	17.6	LOS B	0.4	2.7	0.32	0.93	36.2
3	R	37	0.0	0.106	17.7	LOS B	0.4	2.7	0.32	0.94	36.1
Approach		38	0.0	0.106	17.7	LOS B	0.4	2.7	0.32	0.94	36.1
<b>East: Arterial Road</b>											
4	L	48	0.0	0.461	7.4	LOS A	0.0	0.0	0.00	1.13	48.6
5	T	849	0.0	0.461	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		897	0.0	0.461	0.4	NA	0.0	0.0	0.00	0.06	59.3
<b>West: Arterial Road</b>											
11	T	640	0.0	0.328	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	1	0.0	0.002	12.5	LOS A	0.0	0.0	0.67	0.68	43.4
Approach		641	0.0	0.328	0.0	NA	0.0	0.0	0.00	0.00	60.0
<b>South West: Median</b>											
32	R	37	0.0	0.078	10.5	LOS A	0.2	1.2	0.62	0.63	41.1
Approach		37	0.0	0.078	10.5	LOS A	0.2	1.2	0.62	0.63	41.1
All Vehicles		1613	0.0	0.461	0.9	NA	0.4	2.7	0.03	0.08	58.1

Level of Service (LOS) Method: Delay (RTA NSW).

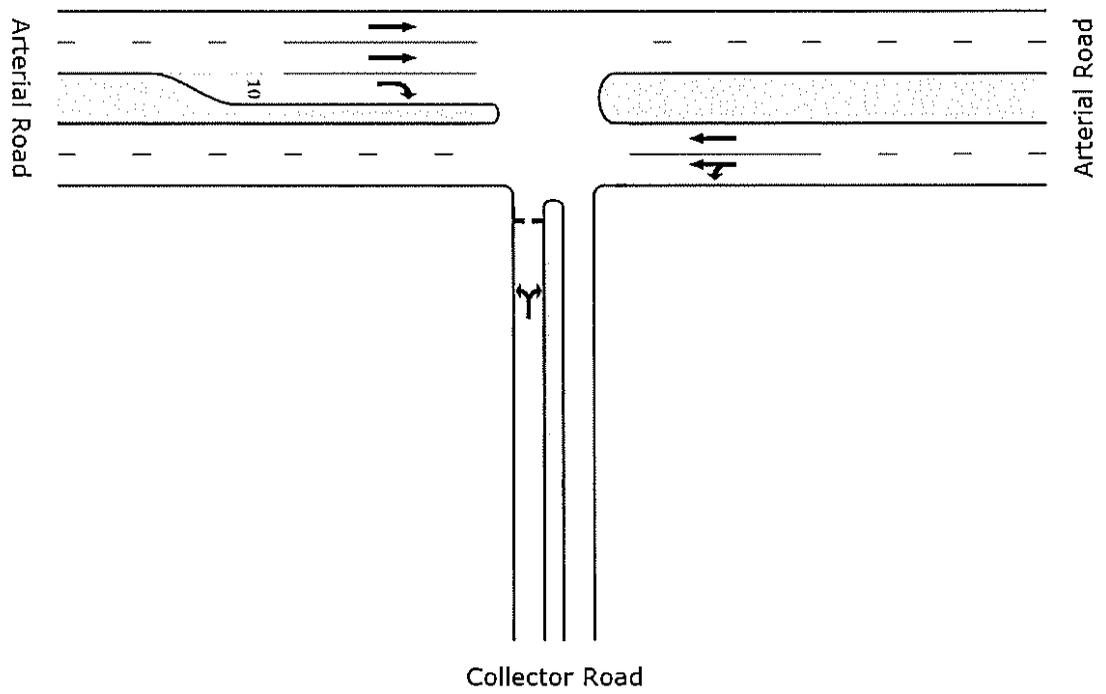
Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

"Ultimate" Intersection 4 Layout



## "Ultimate" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate-AM

Intersection 4  
 Ultimate  
 AM Peak Period  
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South: Collector Road</b>											
1	L	1	0.0	1.107	293.9	LOS F	6.9	62.6	1.00	1.92	6.9
3	R	66	0.0	1.107	293.6	LOS F	6.9	62.6	1.00	1.64	6.5
Approach		67	0.0	1.107	293.6	LOS F	6.9	62.6	1.00	1.64	6.5
<b>East: Arterial Road</b>											
4	L	19	0.0	0.162	7.4	LOS A	0.0	0.0	0.00	1.13	48.6
5	T	651	0.0	0.162	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		709	0.0	0.162	0.2	NA	0.0	0.0	0.00	0.03	59.6
<b>West: Arterial Road</b>											
11	T	2476	0.0	0.636	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	1	0.0	0.003	11.3	LOS A	0.0	0.0	0.52	0.64	44.6
Approach		2476	0.0	0.636	0.0	NA	0.0	0.0	0.00	0.00	60.0
<b>South West: Median</b>											
32	R	66	0.0	0.557	39.3	LOS C	1.5	10.2	0.95	1.05	26.6
Approach		66	0.0	0.557	39.3	LOS C	1.5	10.2	0.95	1.05	26.6
All Vehicles		3319	0.0	1.107	6.6	NA	6.9	62.6	0.04	0.06	50.3

Level of Service (LOS) Method: Delay (RTA NSW)  
 Vehicle movement LOS values are based on average delay per movement  
 Minor Road Approach LOS values are based on average delay for all vehicle movements  
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements  
 SIDRA Standard Delay Model used

## "Ultimate" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate-PM

Intersection 4  
 Ultimate  
 PM Peak Period  
 Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
<b>South: Collector Road</b>											
1	L	1	0.0	1.000 <sup>b</sup>	326.9	LOS F	4.8	33.6	1.00	1.28	5.9
3	R	37	0.0	1.000 <sup>b</sup>	326.9	LOS F	4.8	33.6	1.00	1.28	5.9
Approach		38	0.0	1.000	326.9	LOS F	4.8	33.6	1.00	1.28	5.9
<b>East: Arterial Road</b>											
4	L	48	0.0	0.543	7.4	LOS A	0.0	0.0	0.00	1.14	48.6
5	T	2065	0.0	0.543	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		2114	0.0	0.543	0.2	NA	0.0	0.0	0.00	0.03	59.7
<b>West: Arterial Road</b>											
11	T	1202	0.0	0.306	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	1	0.0	0.025	83.3	LOS F	0.1	0.4	0.97	0.99	17.5
Approach		1203	0.0	0.306	0.1	NA	0.1	0.4	0.00	0.00	59.9
<b>South West: Median</b>											
32	R	37	0.0	0.376	40.6	LOS C	0.9	6.3	0.95	1.01	26.1
Approach		37	0.0	0.376	40.6	LOS C	0.9	6.3	0.95	1.01	26.1
All Vehicles		3392	0.0	1.000	4.2	NA	4.8	33.6	0.02	0.04	53.6

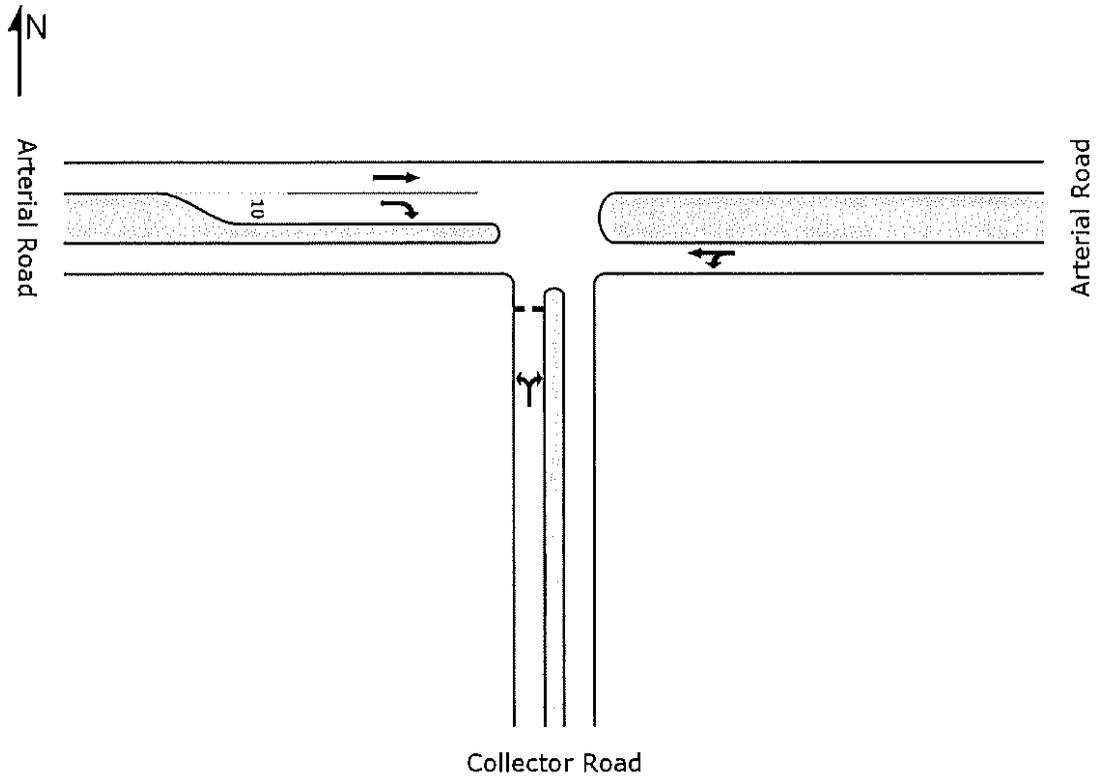
Level of Service (LOS) Method: Delay (RTA NSW)  
 Vehicle movement LOS values are based on average delay per movement  
 Minor Road Approach LOS values are based on average delay for all vehicle movements  
 NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements  
 SIDRA Standard Delay Model used

## Appendix F

### Intersection 5



"Precinct 1 and 2" Intersection 5 Layout



## "Precinct 1 and 2" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-AM

Intersection 5  
BaseCase  
AM Peak Period  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Collector Road												
1	L	1	0.0	0.479	17.3	LOS B	2.7	16.6	0.82	1.00	36.3	
3	R	257	0.0	0.479	17.4	LOS B	2.7	16.6	0.82	1.07	36.3	
Approach		258	0.0	0.479	17.4	LOS B	2.7	16.6	0.82	1.07	36.3	
East: Arterial Road												
4	L	73	0.0	0.170	7.4	LOS A	0.0	0.0	0.00	0.99	48.6	
5	T	255	0.0	0.170	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
Approach		327	0.0	0.170	1.7	NA	0.0	0.0	0.00	0.22	57.1	
West: Arterial Road												
11	T	904	0.0	0.464	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
12	R	1	0.0	0.002	6.5	LOS A	0.0	0.0	0.39	0.56	46.8	
Approach		905	0.0	0.464	0.0	NA	0.0	0.0	0.00	0.00	60.0	
South West: Median												
32	R	257	0.0	0.416	10.3	LOS A	1.2	6.6	0.62	0.90	41.2	
Approach		257	0.0	0.416	10.3	LOS A	1.2	6.6	0.62	0.90	41.2	
All Vehicles		1747	0.0	0.479	4.4	NA	2.7	16.6	0.21	0.33	51.2	

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

## "Precinct 1 and 2" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-PM

Intersection 5  
BaseCase  
PM Peak Period  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Collector Road												
1	L	1	0.0	0.267	15.7	LOS B	1.3	6.6	0.79	0.96	37.2	
3	R	142	0.0	0.267	15.6	LOS B	1.3	6.6	0.79	0.97	37.3	
Approach		143	0.0	0.267	15.6	LOS B	1.3	6.6	0.79	0.97	37.3	
East: Arterial Road												
4	L	187	0.0	0.440	7.4	LOS A	0.0	0.0	0.00	0.99	48.6	
5	T	661	0.0	0.440	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
Approach		848	0.0	0.440	1.6	NA	0.0	0.0	0.00	0.22	57.2	
West: Arterial Road												
11	T	499	0.0	0.256	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
12	R	1	0.0	0.002	11.9	LOS A	0.0	0.0	0.64	0.67	43.9	
Approach		500	0.0	0.256	0.0	NA	0.0	0.0	0.00	0.00	60.0	
South West: Median												
32	R	142	0.0	0.230	9.4	LOS A	0.6	3.9	0.55	0.62	41.9	
Approach		142	0.0	0.230	9.4	LOS A	0.6	3.9	0.55	0.62	41.9	
All Vehicles		1634	0.0	0.440	3.1	NA	1.3	6.6	0.12	0.27	53.7	

Level of Service (LOS) Method: Delay (RTA NSW).

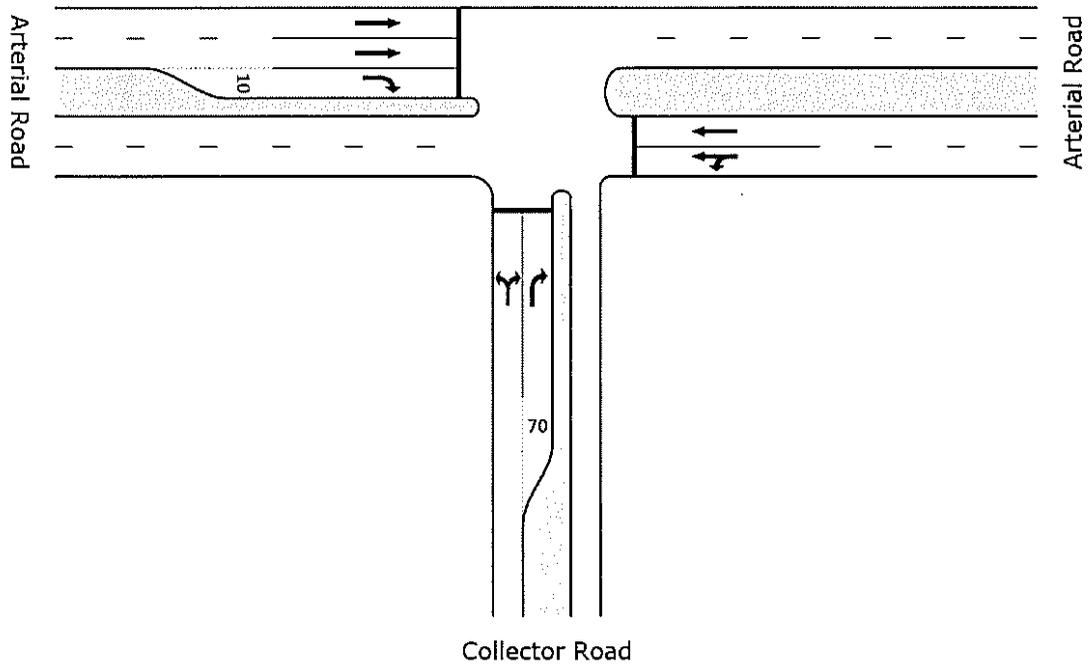
Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model used.

"Ultimate" Intersection 5 Layout



## "Ultimate" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate-AM

Intersection 5  
 Ultimate  
 AM Peak Period  
 Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn WC	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	1	0.0	0.694	67.0	LOS E	7.7	54.2	1.00	0.64	19.9
3	R	257	0.0	0.694	66.9	LOS E	7.7	54.2	1.00	0.64	19.9
Approach		258	0.0	0.694	66.9	LOS E	7.7	54.2	1.00	0.64	19.9
East: Arterial Road											
4	L	73	0.0	0.222	6.2	LOS A	1.2	6.7	0.07	0.99	49.0
5	T	618	0.0	0.222	6.6	LOS A	1.3	6.6	0.07	0.96	52.3
Approach		691	0.0	0.222	1.5	LOS A	1.3	6.6	0.07	0.16	57.1
West: Arterial Road											
11	T	2215	0.0	0.710	1.5	LOS A	9.7	66.1	0.17	0.16	56.6
12	R	1	0.0	0.004	6.0	LOS A	0.0	0.0	0.05	0.63	48.0
Approach		2216	0.0	0.710	1.5	LOS A	9.7	66.1	0.17	0.16	56.6
All Vehicles		3164	0.0	0.710	6.6	LOS A	9.7	66.1	0.21	0.21	49.4

Level of Service (LOS) Method: Delay (RTA NSW)  
 Vehicle movement LOS values are based on average delay per movement  
 Intersection and Approach LOS values are based on average delay for all vehicle movements  
 SIDRA Standard Delay Model used.

## "Ultimate" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate-PM

Intersection 5  
 Ultimate  
 PM Peak Period  
 Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

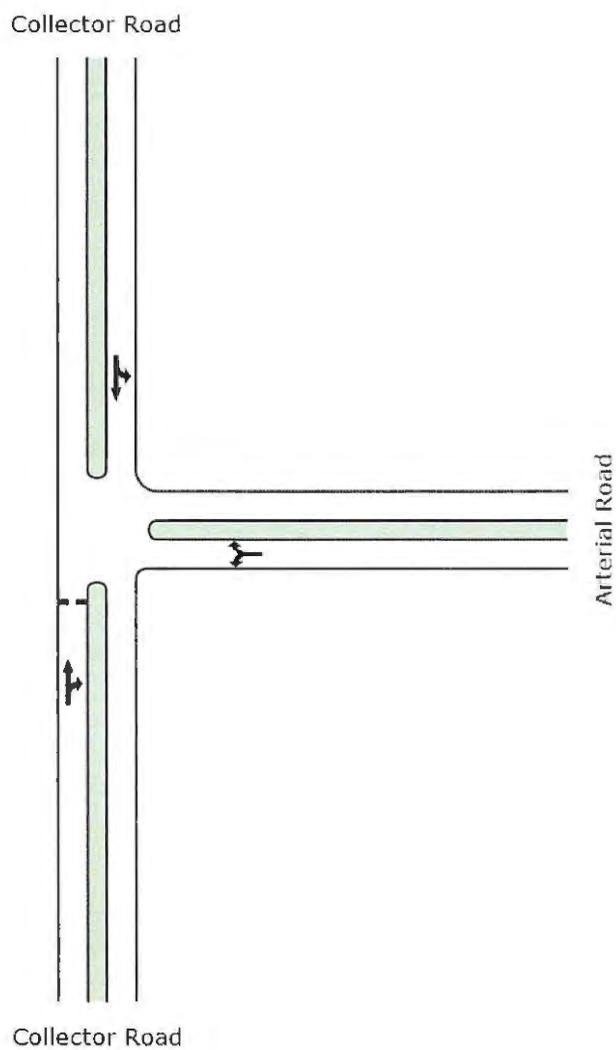
Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn WC	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	1	0.0	0.576	66.5	LOS E	4.3	30.3	1.00	0.78	19.4
3	R	142	0.0	0.576	66.4	LOS E	4.3	30.3	1.00	0.78	19.4
Approach		143	0.0	0.576	66.4	LOS E	4.3	30.3	1.00	0.78	19.4
East: Arterial Road											
4	L	187	0.0	0.636	6.6	LOS A	7.5	52.3	0.14	1.01	47.9
5	T	1878	0.0	0.636	1.1	LOS A	7.5	52.7	0.14	0.13	57.3
Approach		2065	0.0	0.636	1.6	LOS A	7.5	52.7	0.14	0.21	56.3
West: Arterial Road											
11	T	1072	0.0	0.330	0.7	LOS A	2.2	15.6	0.09	0.07	59.4
12	R	1	0.0	0.016	6.1	LOS A	0.0	0.0	0.05	0.63	47.6
Approach		1073	0.0	0.330	0.7	LOS A	2.2	15.6	0.09	0.07	58.4
All Vehicles		3281	0.0	0.636	4.4	LOS A	7.5	52.7	0.16	0.19	52.6

Level of Service (LOS) Method: Delay (RTA NSW)  
 Vehicle movement LOS values are based on average delay per movement  
 Intersection and Approach LOS values are based on average delay for all vehicle movements  
 SIDRA Standard Delay Model used.

## Appendix G

### Intersection 6

"Precinct 1 and 2" Intersection 6 Layout



## "Precinct 1 and 2" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-AM

Intersection 6  
BaseCase  
AM Peak  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Dep. Satn v/s	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
2	T	1	0.0	0.166	11.0	LOS A	0.7	5.2	0.71	0.58	38.9
3	R	111	0.0	0.166	13.2	LOS A	0.7	5.2	0.71	0.90	39.1
Approach		112	0.0	0.166	13.2	LOS A	0.7	5.2	0.71	0.90	39.1
East: Arterial Road											
4	L	32	0.0	0.136	7.4	LOS A	0.0	0.0	0.00	0.63	48.6
6	R	224	0.0	0.136	7.6	LOS A	0.0	0.0	0.00	0.66	48.4
Approach		256	0.0	0.136	7.6	NA	0.0	0.0	0.00	0.66	48.5
North: Collector Road											
7	L	794	0.0	0.426	8.7	LOS A	4.0	27.9	0.53	0.30	42.0
8	T	1	0.0	0.426	1.6	LOS A	4.0	27.9	0.53	0.36	42.4
Approach		795	0.0	0.426	8.7	NA	4.0	27.9	0.53	0.30	42.0
All Vehicles		1162	0.0	0.426	8.9	NA	4.0	27.9	0.43	0.44	42.9

Level of Service (LOS) Method: Delay (RTA NSW)

Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements

SIDRA Standard Delay Model used

## "Precinct 1 and 2" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: BaseCase-PM

Intersection 6  
BaseCase  
PM Peak  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Dep. Satn v/s	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
2	T	1	0.0	0.106	11.0	LOS A	0.4	2.9	0.70	0.76	39.0
3	R	61	0.0	0.106	13.2	LOS A	0.4	2.9	0.70	0.90	39.1
Approach		62	0.0	0.106	13.2	LOS A	0.4	2.9	0.70	0.89	39.1
East: Arterial Road											
4	L	80	0.0	0.355	7.4	LOS A	0.0	0.0	0.00	0.63	48.6
6	R	590	0.0	0.355	7.6	LOS A	0.0	0.0	0.00	0.66	48.4
Approach		660	0.0	0.355	7.6	NA	0.0	0.0	0.00	0.66	48.5
North: Collector Road											
7	L	438	0.0	0.237	11.2	LOS A	2.4	17.1	0.70	0.19	40.5
8	T	1	0.0	0.237	4.1	LOS A	2.4	17.1	0.70	0.61	40.4
Approach		439	0.0	0.237	11.2	NA	2.4	17.1	0.70	0.19	40.5
All Vehicles		1161	0.0	0.355	9.2	NA	2.4	17.1	0.30	0.49	44.5

Level of Service (LOS) Method: Delay (RTA NSW)

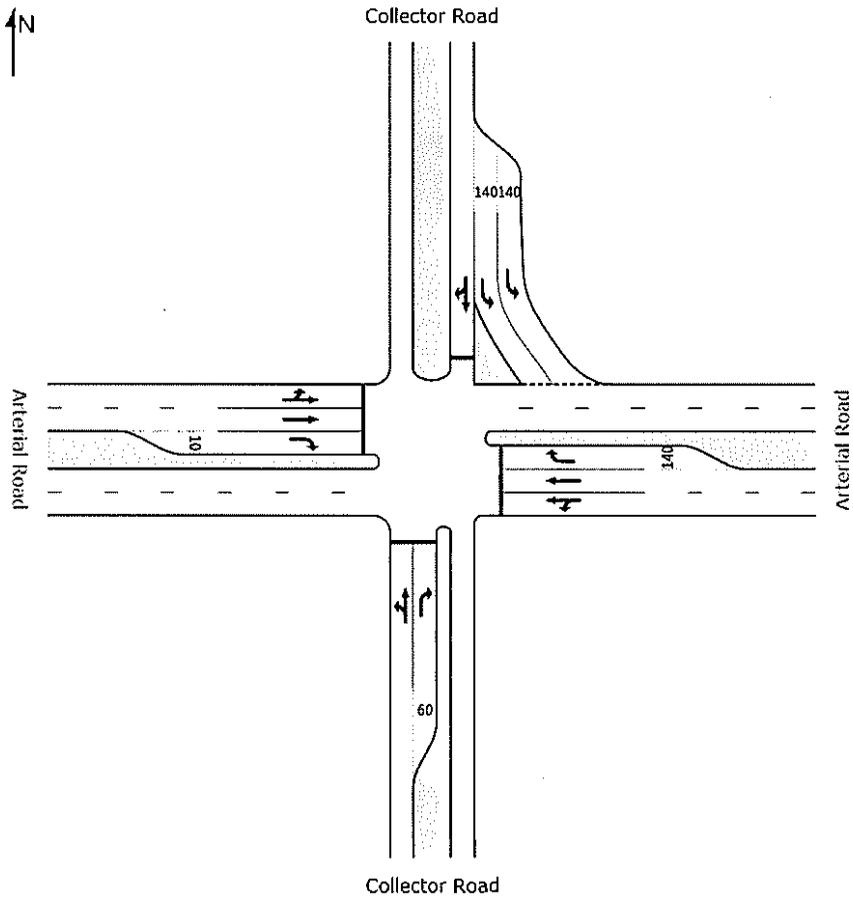
Vehicle movement LOS values are based on average delay per movement

Minor Road Approach LOS values are based on average delay for all vehicle movements

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements

SIDRA Standard Delay Model used

"Ultimate" Intersection 6 Layout



## "Ultimate" Intersection Performance – AM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate-AM

Intersection 6  
Ultimate  
AM Peak  
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow vch/h	HV %	Deg. Satn. v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South Collector Road											
1	L	1	0.0	0.012	61.9	LOS E	0.1	0.6	0.93	0.63	22.5
2	T	1	0.0	0.012	53.7	LOS D	0.1	0.6	0.93	0.59	20.8
3	R	111	0.0	0.649	66.9	LOS E	6.6	46.2	1.00	0.82	19.9
Approach		113	0.0	0.649	66.7	LOS E	6.6	46.2	1.00	0.81	20.0
East Arterial Road											
4	L	32	0.0	0.143	8.5	LOS A	0.6	4.5	0.06	1.02	47.7
5	T	363	0.0	0.143	1.0	LOS A	0.7	4.6	0.06	0.05	59.0
6	R	245	0.0	0.645	12.5	LOS A	3.8	26.6	0.41	0.73	43.5
Approach		640	0.0	0.645	5.6	LOS A	3.8	26.6	0.20	0.36	51.1
North Collector Road											
7	L	794	0.0	0.546	22.3	LOS B	16.8	117.4	0.81	0.84	32.6
8	T	1	0.0	0.022	60.4	LOS E	0.1	0.6	0.97	0.59	19.5
9	R	1	0.0	0.022	68.4	LOS E	0.1	0.6	0.97	0.62	21.1
Approach		796	0.0	0.546	22.4	LOS B	16.8	117.4	0.82	0.84	32.7
West Arterial Road											
10	L	1	0.0	0.642	29.9	LOS C	27.2	190.4	0.77	0.95	34.7
11	T	1314	0.0	0.642	21.7	LOS B	27.2	190.4	0.77	0.70	35.9
12	R	1	0.0	0.014	22.4	LOS B	0.0	0.2	0.49	0.64	37.1
Approach		1316	0.0	0.642	21.7	LOS B	27.2	190.4	0.77	0.70	35.9
All Vehicles		2954	0.0	0.649	20.1	LOS B	27.2	190.4	0.66	0.67	36.5

Level of Service (LOS) Method: Delay (RTA NSW)  
Vehicle movement LOS values are based on average delay per movement  
Intersection and Approach LOS values are based on average delay for all vehicle movements  
SIDRA Standard Delay Model used.

## "Ultimate" Intersection Performance – PM Peak Period

### MOVEMENT SUMMARY

Site: Ultimate-PM

Intersection 6  
Ultimate  
PM Peak  
Signals - Fixed Time Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow vch/h	HV %	Deg. Satn. v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South Collector Road											
1	L	1	0.0	0.019	67.1	LOS E	0.1	0.6	0.96	0.62	21.3
2	T	1	0.0	0.019	56.9	LOS E	0.1	0.6	0.96	0.59	19.7
3	R	61	0.0	0.564	70.4	LOS E	3.7	26.1	1.00	0.77	19.3
Approach		63	0.0	0.564	70.2	LOS E	3.7	26.1	1.00	0.76	19.4
East Arterial Road											
4	L	80	0.0	0.450	8.7	LOS A	3.2	22.6	0.09	1.05	47.7
5	T	1217	0.0	0.450	1.2	LOS A	3.2	22.7	0.09	0.09	57.5
6	R	590	0.0	0.596	6.7	LOS A	2.7	19.2	0.13	0.63	47.2
Approach		1877	0.0	0.596	3.6	LOS A	3.2	22.7	0.11	0.31	53.5
North Collector Road											
7	L	439	0.0	0.197	9.9	LOS A	3.2	22.1	0.31	0.65	41.7
8	T	1	0.0	0.022	60.4	LOS E	0.1	0.6	0.97	0.59	19.5
9	R	1	0.0	0.022	68.4	LOS E	0.1	0.6	0.97	0.62	21.1
Approach		440	0.0	0.197	10.1	LOS A	3.2	22.1	0.32	0.65	41.5
West Arterial Road											
10	L	1	0.0	0.596	51.9	LOS D	14.7	102.9	0.94	0.66	25.9
11	T	562	0.0	0.596	43.7	LOS D	14.7	102.9	0.94	0.60	26.2
12	R	1	0.0	0.025	46.0	LOS D	0.1	0.4	0.79	0.65	25.9
Approach		564	0.0	0.596	43.7	LOS D	14.7	102.9	0.94	0.60	26.2
All Vehicles		2544	0.0	0.596	13.6	LOS A	14.7	102.9	0.32	0.46	41.7

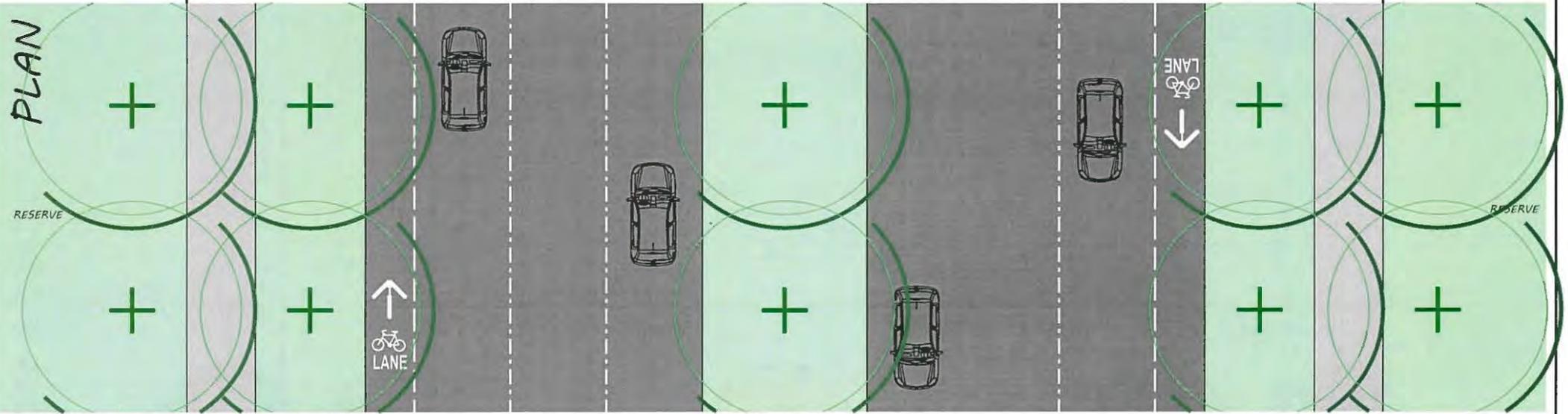
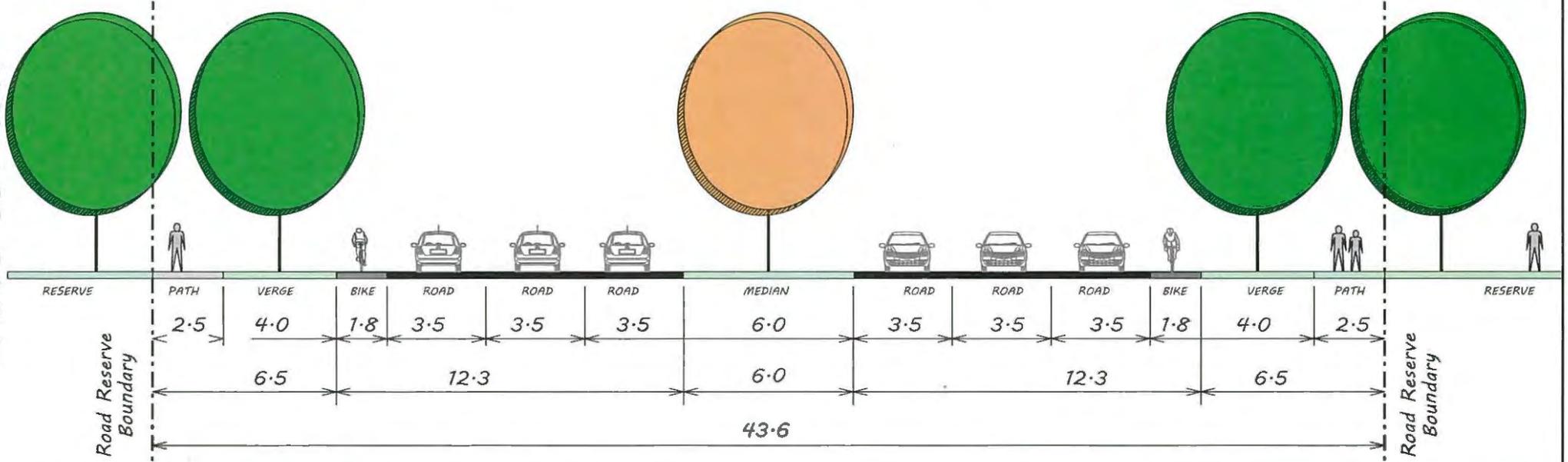
Level of Service (LOS) Method: Delay (RTA NSW)  
Vehicle movement LOS values are based on average delay per movement  
Intersection and Approach LOS values are based on average delay for all vehicle movements  
SIDRA Standard Delay Model used.

## Appendix H

### Cross Section Diagrams



CROSS SECTION



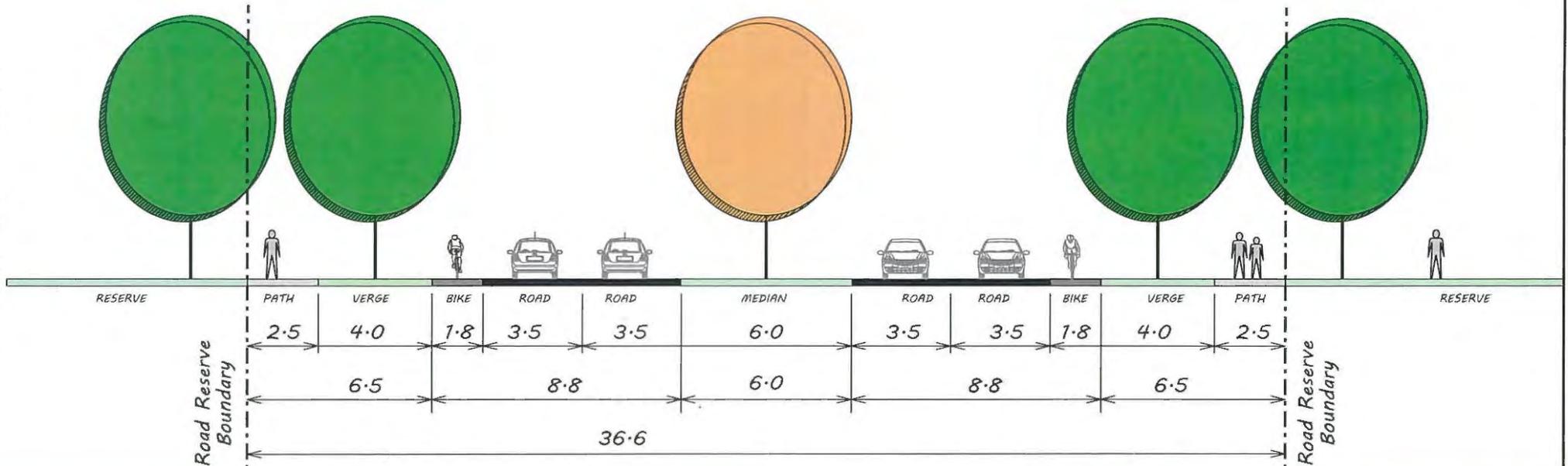
43.6m Arterial Road (3+3 lanes)

Date:	28th March 2014
Scale:	1:200 @ A4
Rev:	A
Drawn:	TP

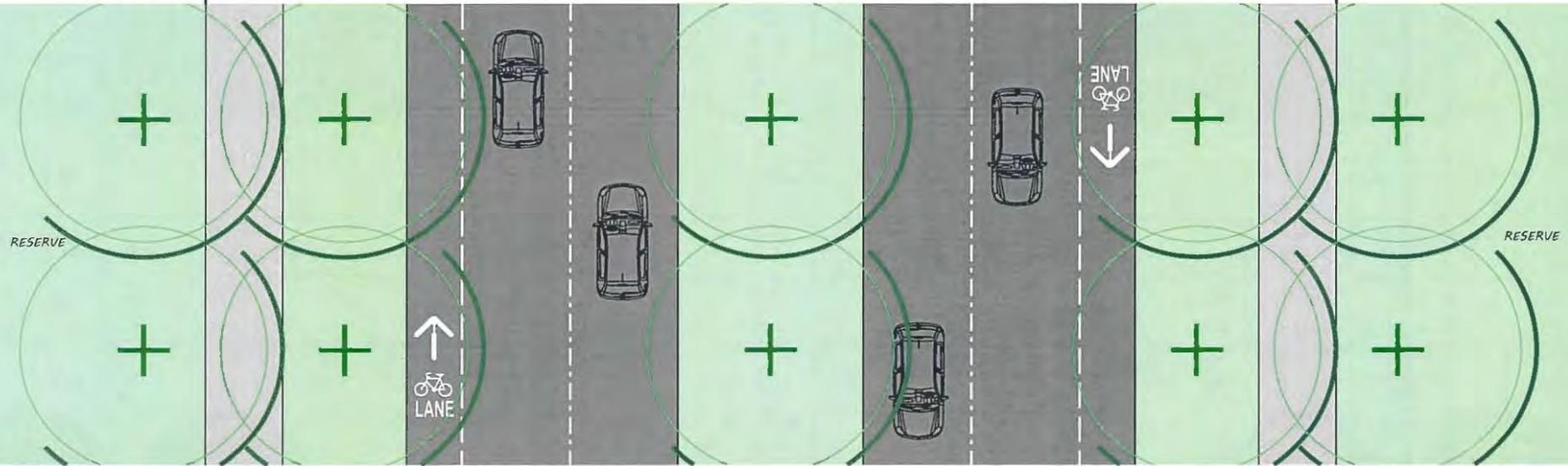
Notes:	



CROSS SECTION



PLAN

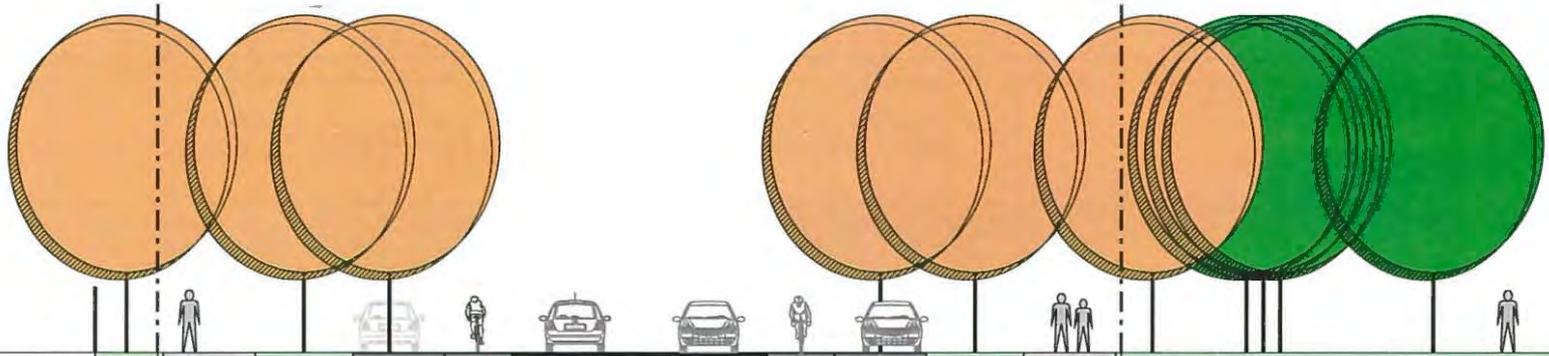


36.6m Arterial Road (2+2 lanes)



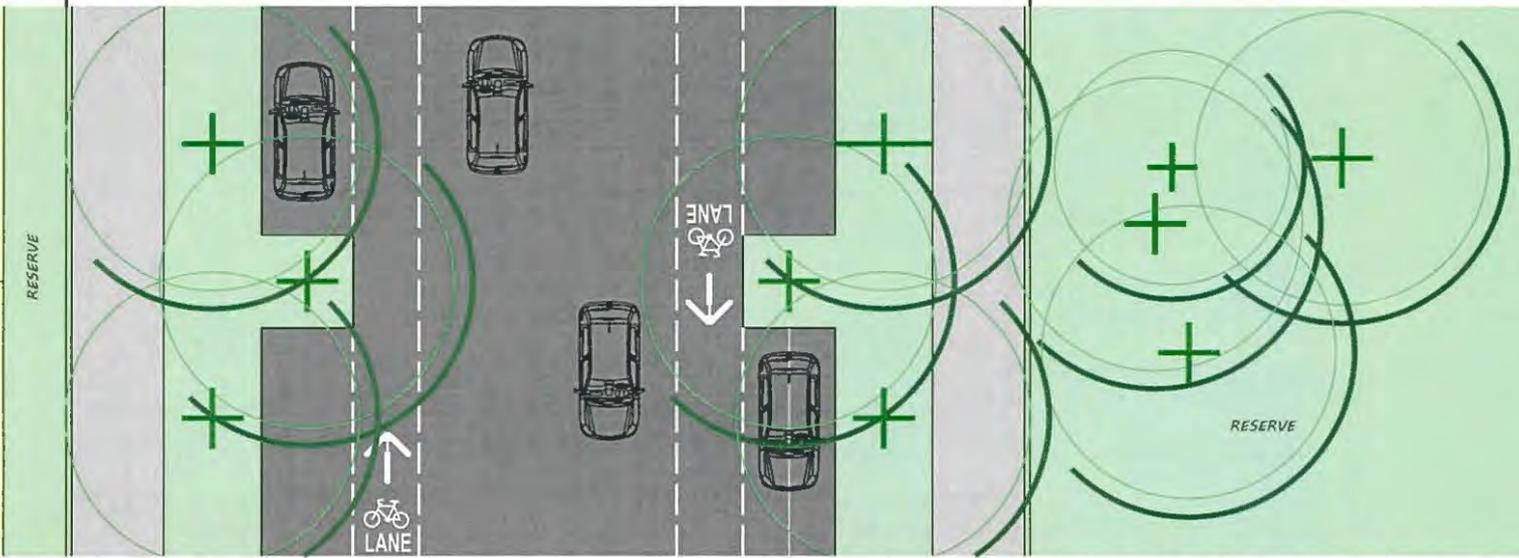
Date:	28th March 2014	Notes:	
Scale:	1:200 @ A4		
Rev:	A		
Drawn:	TP		

CROSS SECTION



RESERVE	PATH	VERGE	PARKING	BIKE	ROAD	BIKE	PARKING	VERGE	PATH	RESERVE	
0.15	2.5	2.65	2.5	1.8	7.0	1.8	2.5	2.65	2.5	0.15	
Road Reserve Boundary		7.8			7.0		7.8			Road Reserve Boundary	
26.2											

PLAN



26.2m Sub Arterial Road

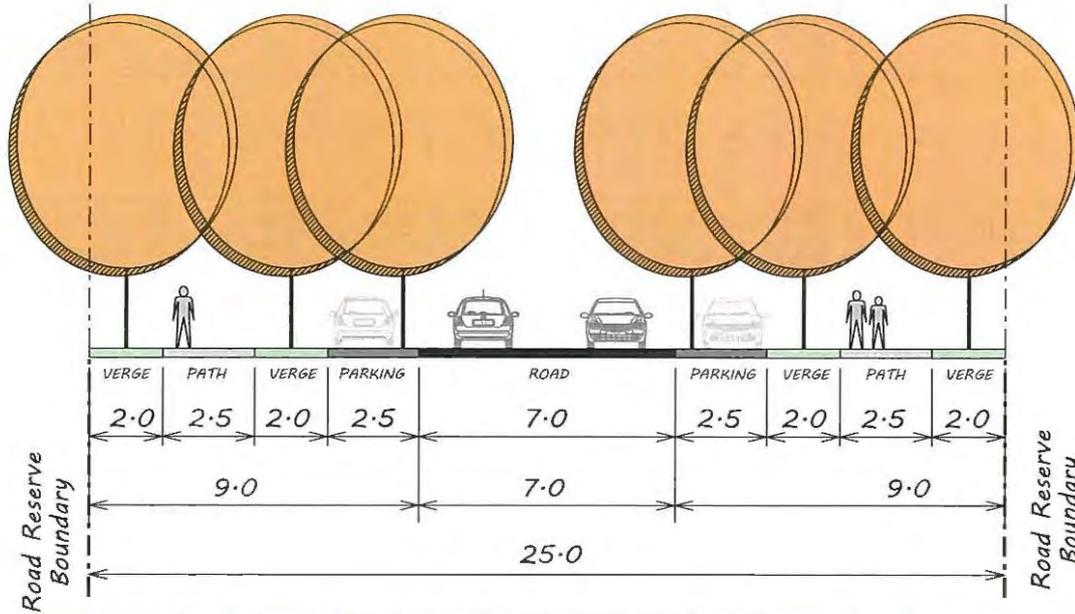


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Rev:	A
Drawn:	TP

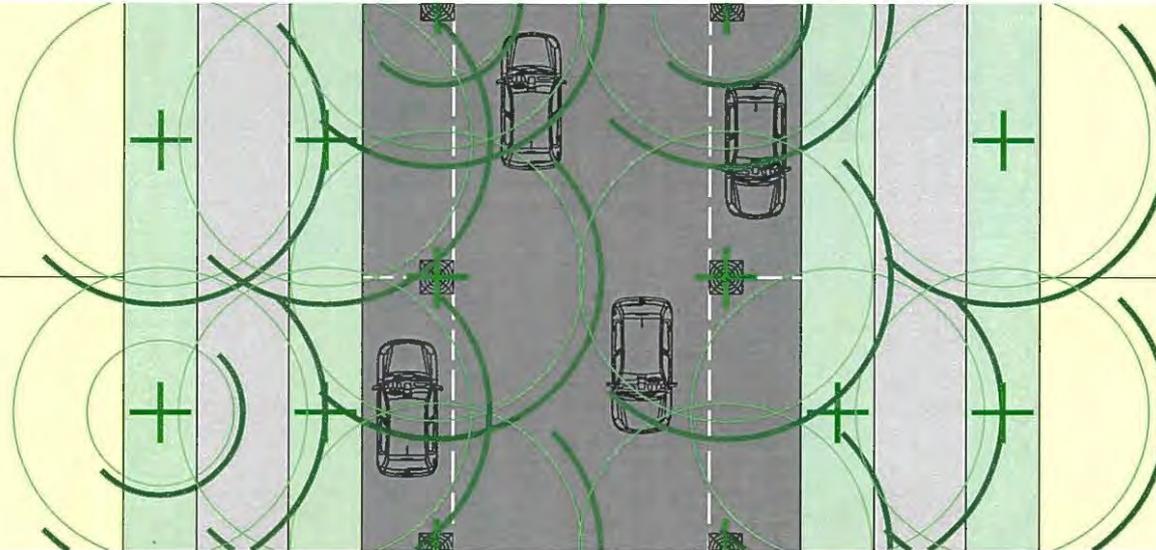
Notes:	



CROSS SECTION



PLAN



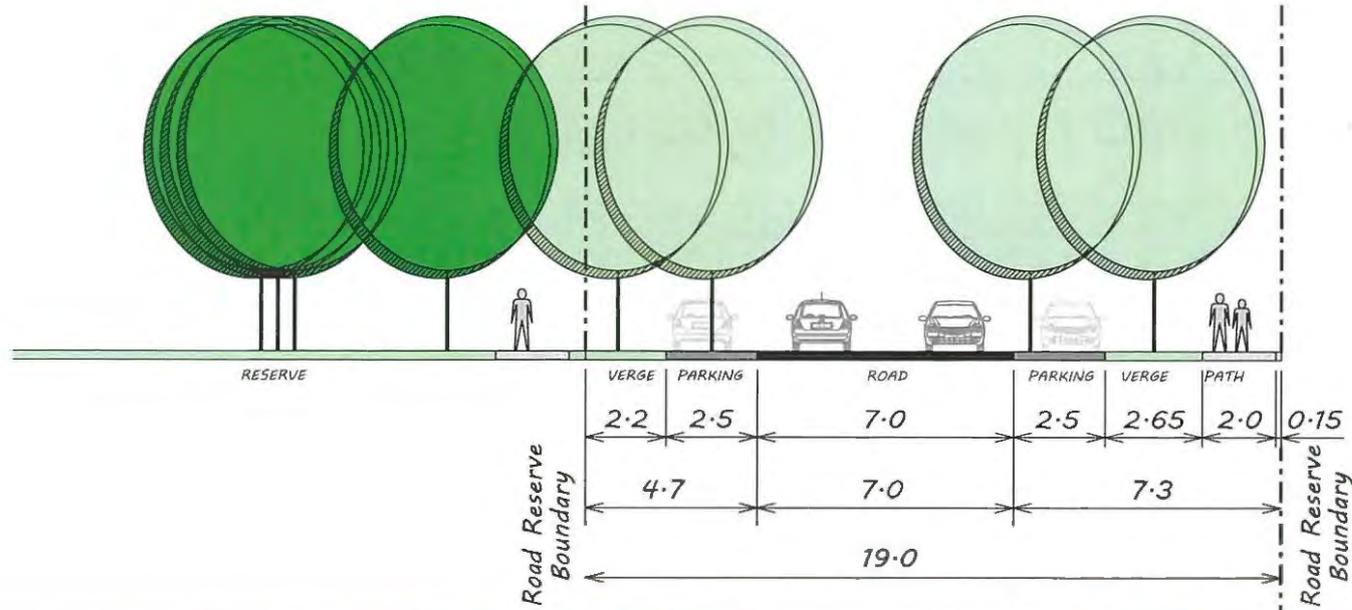
25.0m Diagonal Axis Road



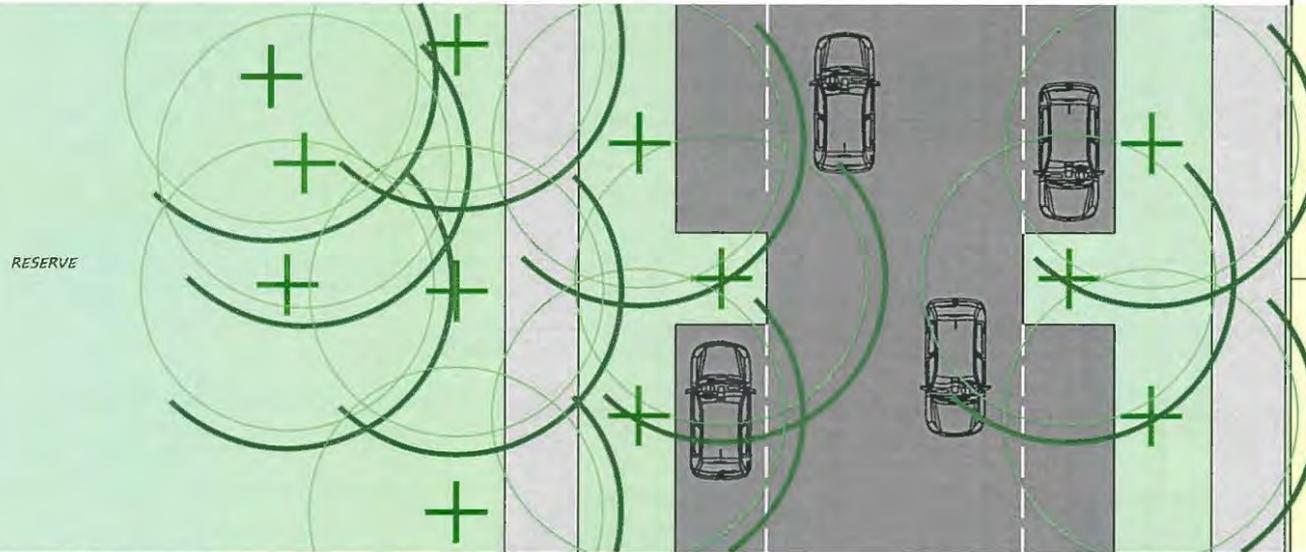
Date:	28th March 2014	Notes:	
Scale:	1:200 @ A4		
Rev:	A		
Drawn:	TP		



CROSS SECTION



PLAN



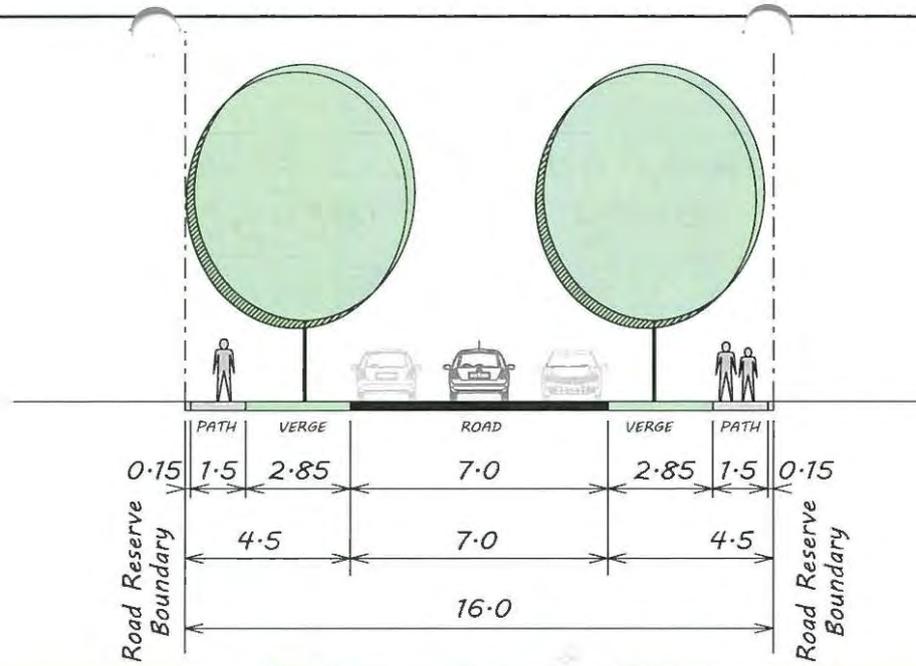
19.0m Distributor Road  
(type 2 - adjacent reserve)

Date: 28th March 2014  
 Scale: 1:200 @ A4  
 Rev: A  
 Drawn: TP

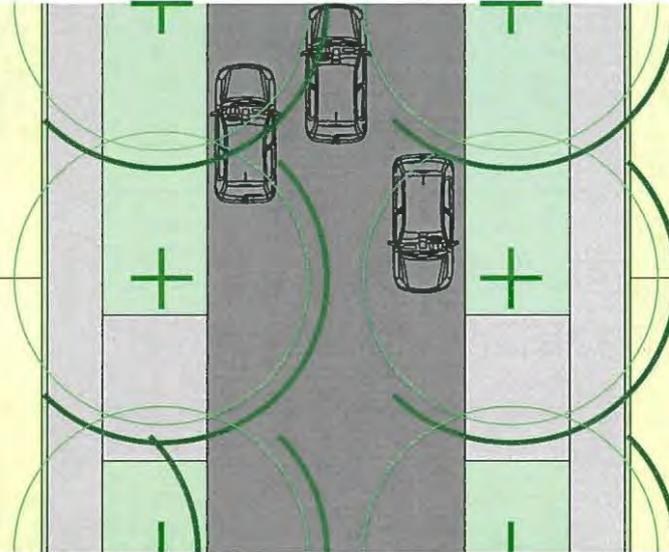
Notes:



CROSS SECTION



PLAN



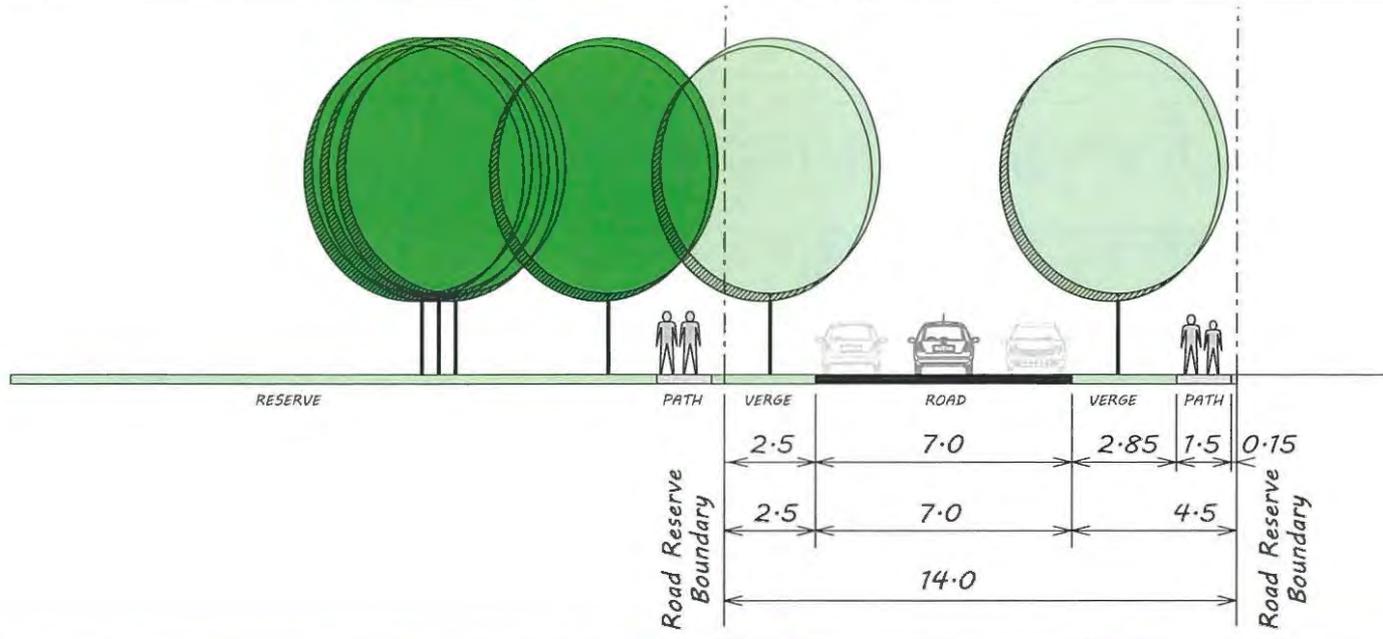
16.0m Local Road (type 1)



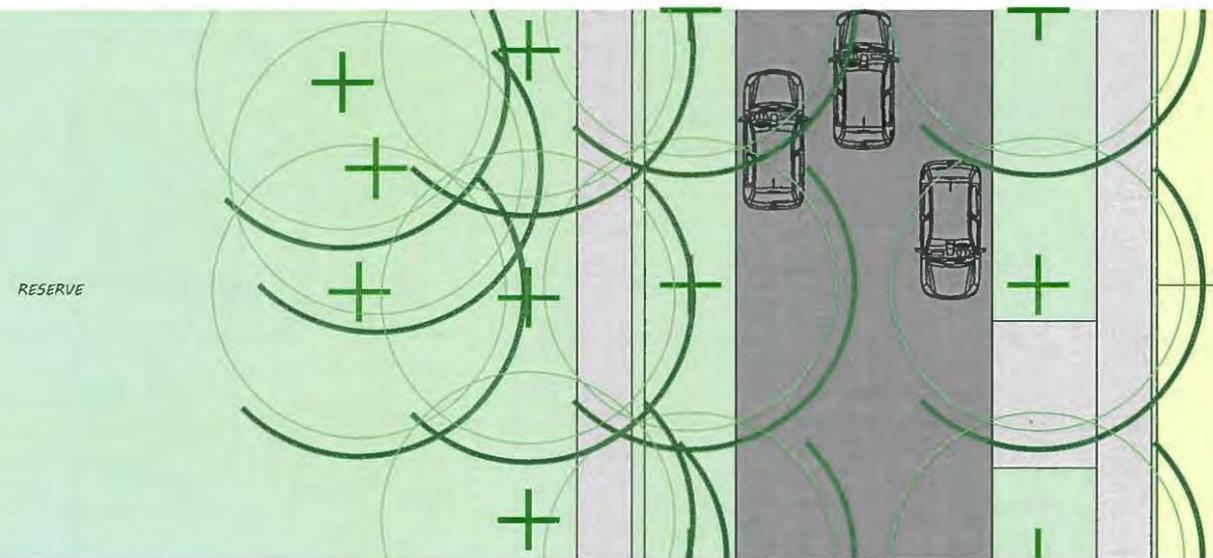
Date: 28th March 2014  
 Scale: 1:200 @ A4  
 Rev: A  
 Drawn: TP

Notes:

CROSS SECTION



PLAN



14.0m Local Road  
(type 2 - adjacent reserve)

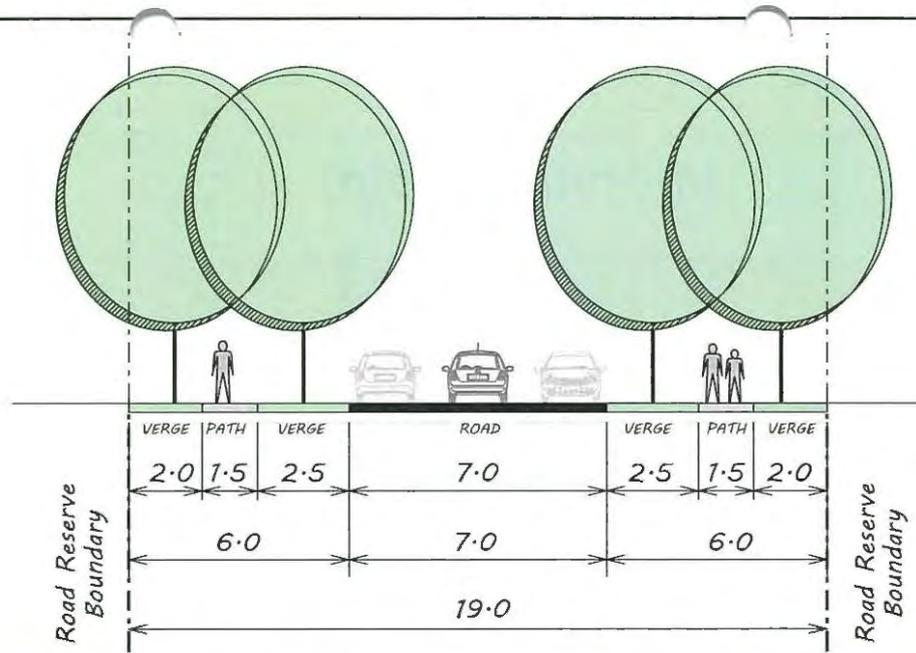


Date: 28th March 2014  
 Scale: 1:200 @ A4  
 Rev: A  
 Drawn: TP

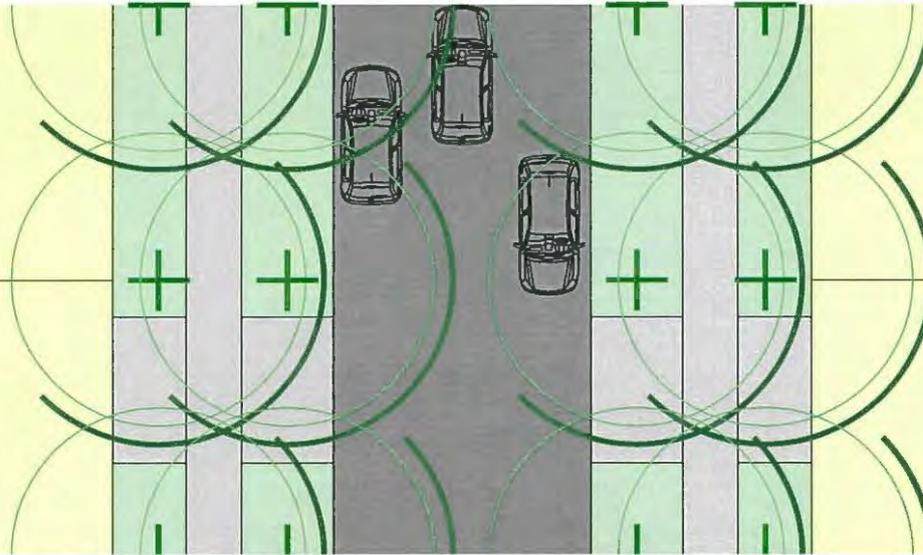
Notes:



CROSS SECTION



PLAN



19.0m Local Road (type 3)  
Key Pedestrian Route

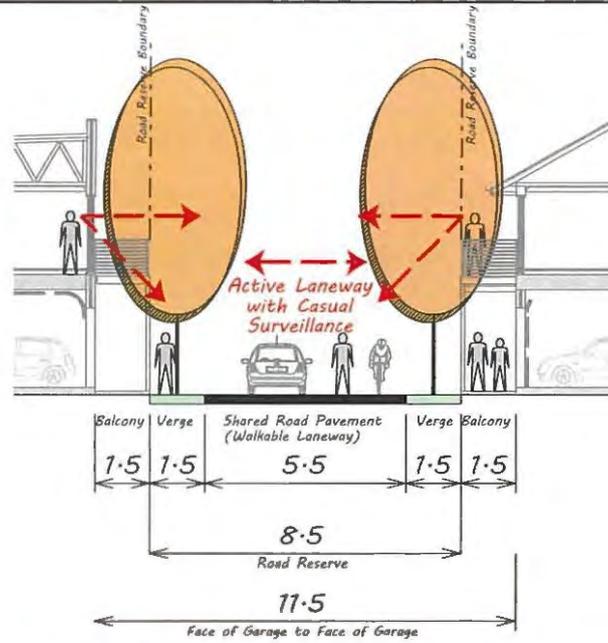


Date: 28th March 2014  
Scale: 1:200 @ A4  
Rev: A  
Drawn: TP

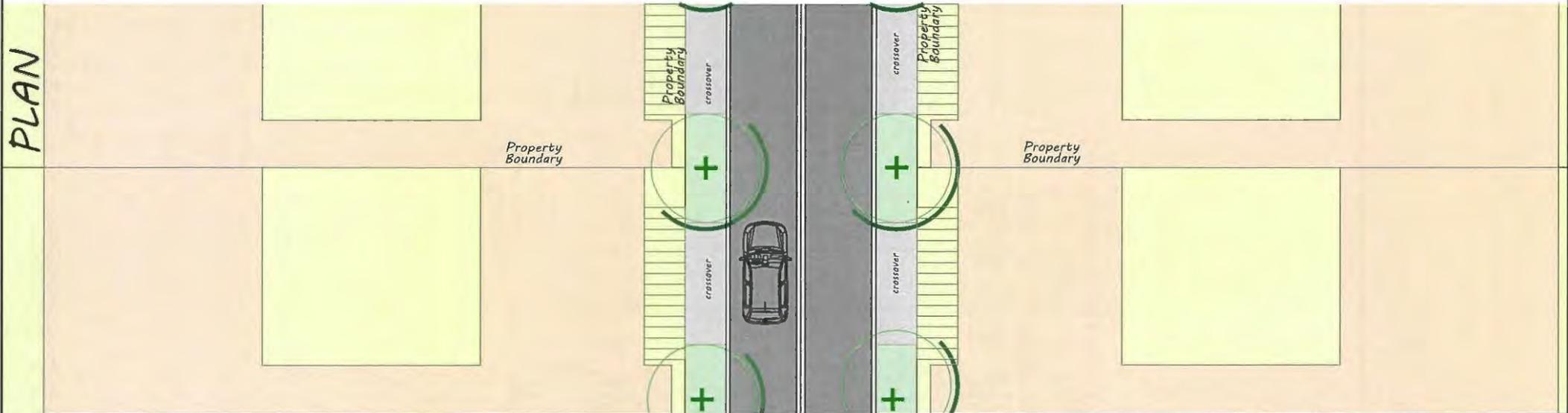
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CROSS SECTION



PLAN



## 8.5m Wide Laneway

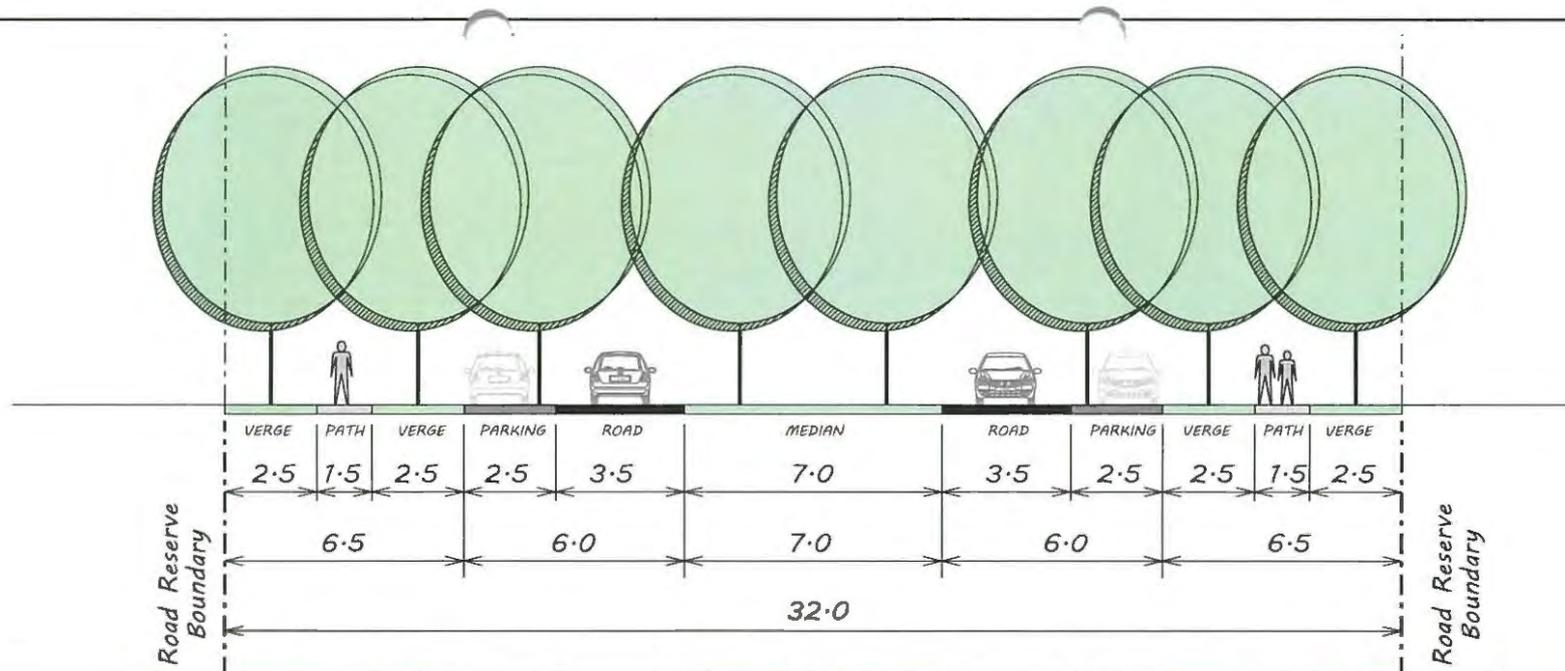


Date:	28th March 2014
Scale:	1:200 @ A4
Rev:	A
Drawn:	TP

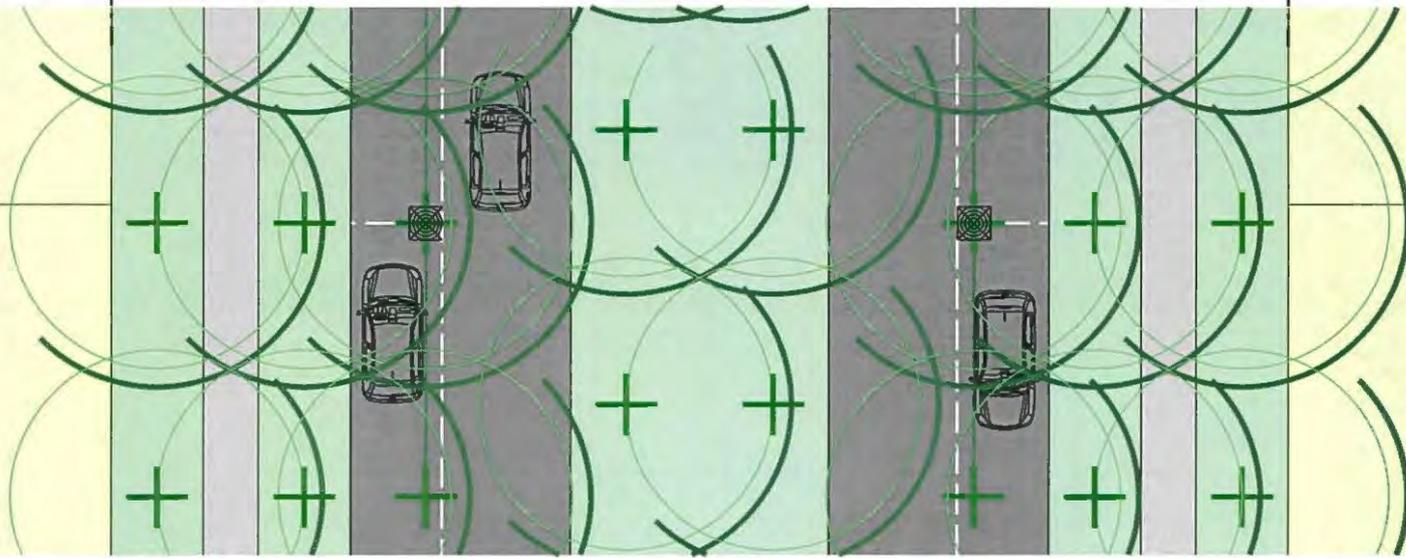
Notes:	



CROSS SECTION



PLAN



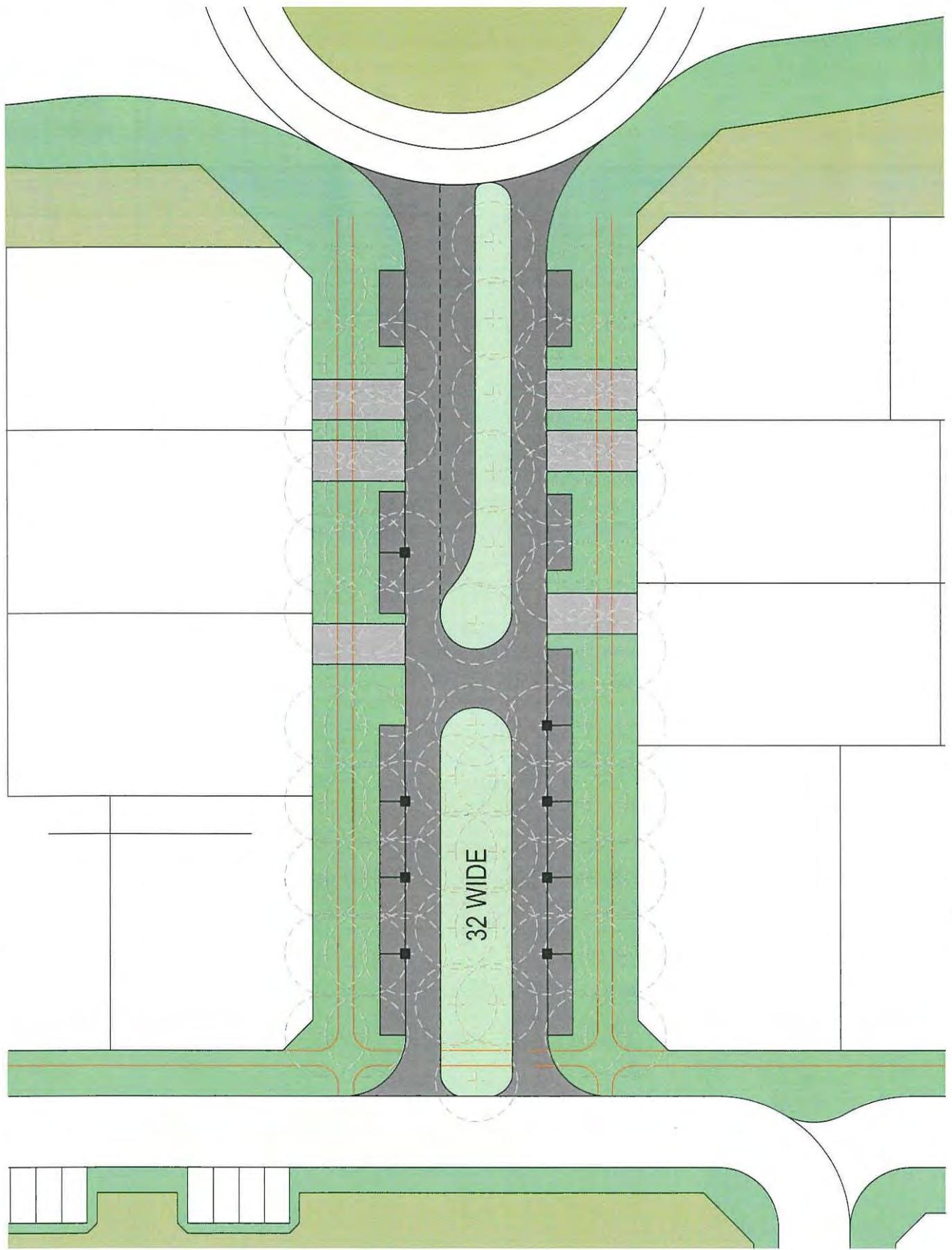
## 32.0m Wide Entrance Road



Date: 28th March 2014  
 Scale: 1:200 @ A4  
 Rev: A  
 Drawn: TP

Notes:



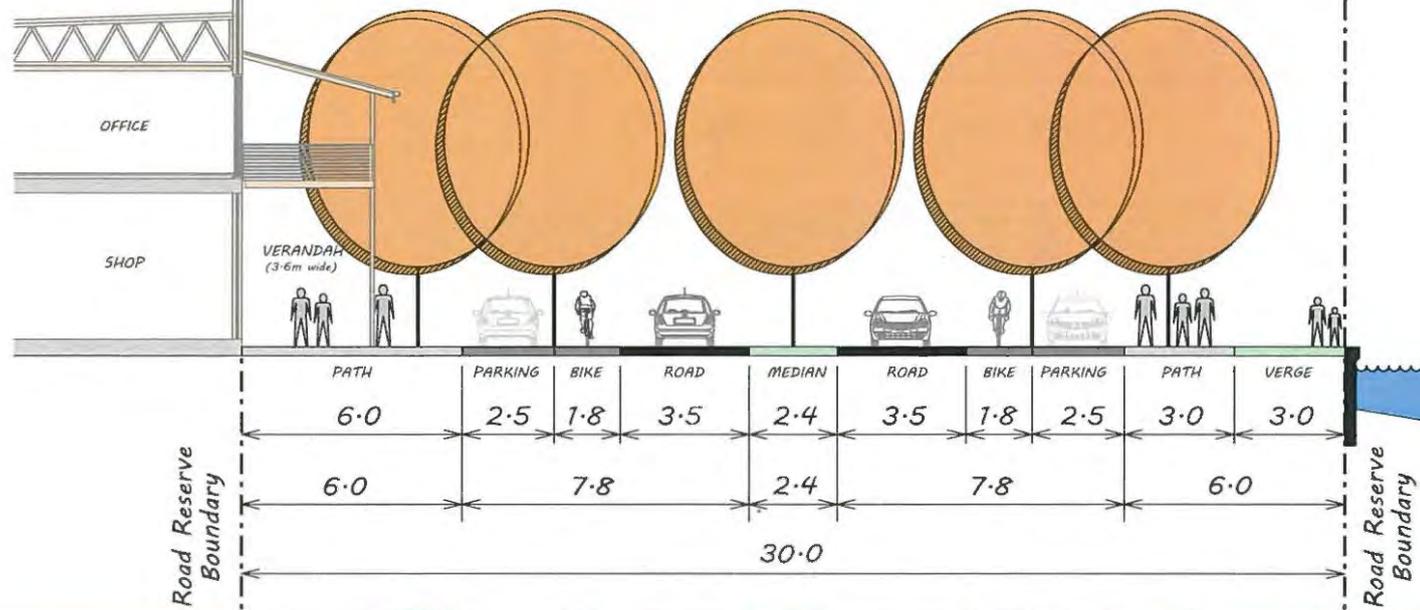


## 32.0m Entrance

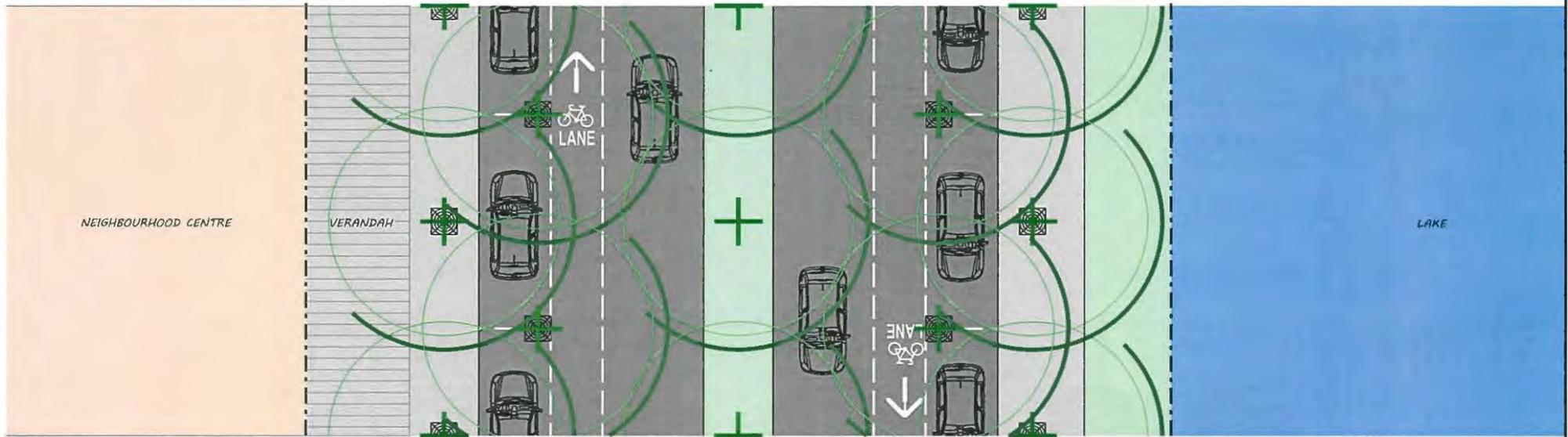
Date:	28th March 2014	Notes:
Scale:	1:500 @ A4	
Rev:	A	
Drawn:	TP	



CROSS SECTION



PLAN



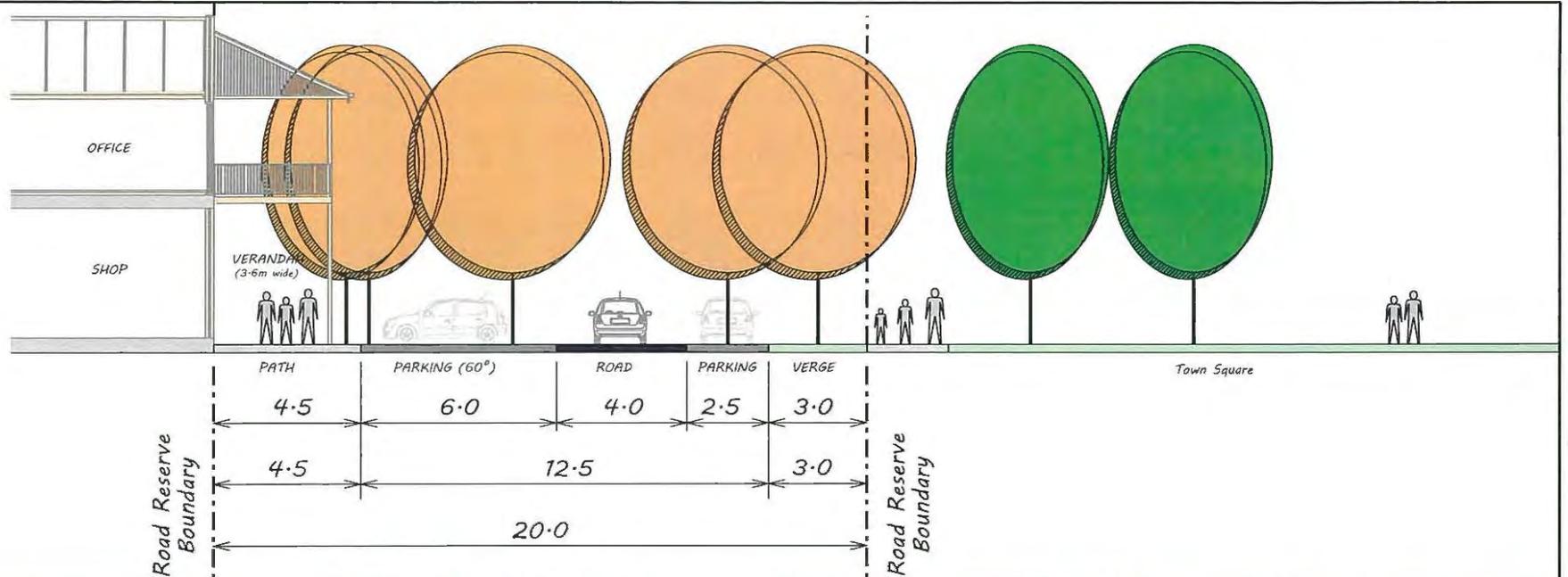
## 30.0m Wide Main Street

Date: 28th March 2014  
 Scale: 1:200 @ A4  
 Rev: A  
 Drawn: TP

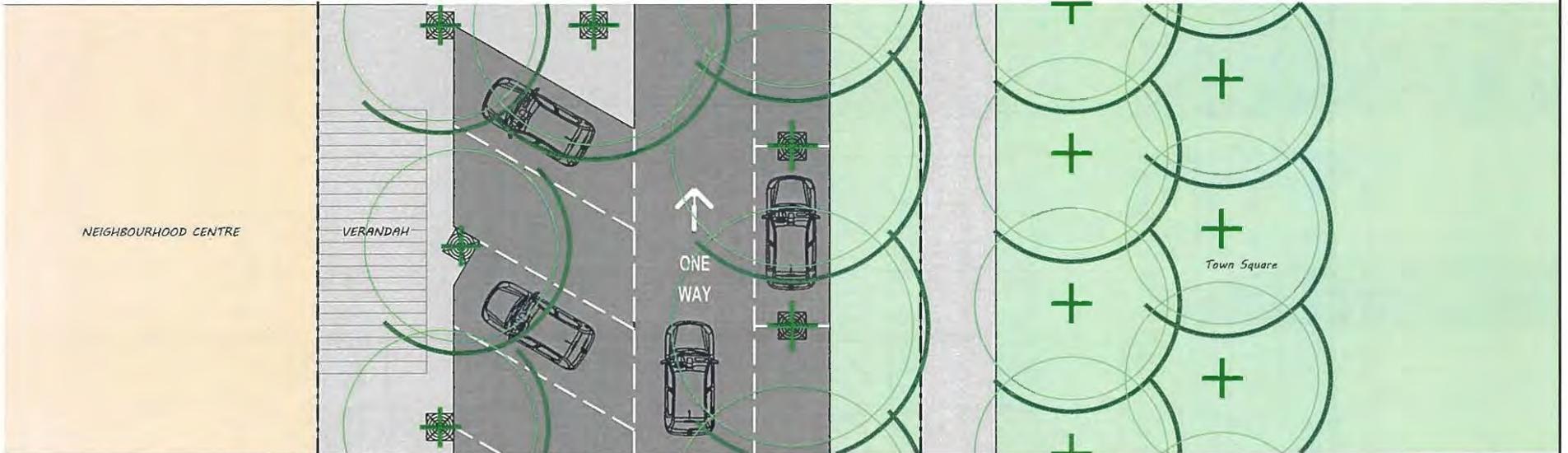
Notes:



CROSS SECTION



PLAN



## 20.0m Wide Main Street



Date: 28th March 2014  
 Scale: 1:200 @ A4  
 Rev: A  
 Drawn: TP

Notes:



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P +617 4722 2765  
F +617 4722 2761  
E townsville@gta.com.au

# **ANNEXURE FOUR**

## **WALLBRIDGE AND GILBERT REPORT**



WALLBRIDGE & GILBERT  
Consulting Engineers

60 Wyatt Street  
Adelaide, South Australia 5000  
Phone (08) 8223 7433  
Facsimile (08) 8232 0967  
adelaide@wbgeng.com  
www.wallbridgeandgilbert.com.au

28<sup>th</sup> October 2013

Job No: C080163

Walker Buckland Park Developments  
6 Greenfield Street  
Mount Barker  
SOUTH AUSTRALIA 5251

Attention: Mr Brett Butler

Dear Brett,

#### **BUCKLAND PARK DEVELOPMENT – PRECINCT 2 STORMWATER MANAGEMENT**

Wallbridge & Gilbert (W&G) has been engaged to undertake stormwater analysis for the proposed Precinct 2 of the Buckland Park Development.

Precinct 2 encompasses an area of 371.5 hectares and is proposed to include a total of 2667 allotments. The site will adjoin the western and northern boundaries of the Precinct 1 site, as seen in Figure 1.

Hydrological assessment has been undertaken in order to model the hydraulic performance of the proposed stormwater system and determine the efficiency of the stormwater management measures to be employed.

#### Stormwater management

In accordance with the stormwater management guidelines outlined in W&G's *'Buckland Park Proposal – Stormwater Management, Water, Wastewater and Recycled Water: Technical Paper,'* 2009 (hereafter referred to as Technical Paper), the aim of the stormwater management plan for Precinct 2 is to reduce peak flow of stormwater from the site, so that runoff does not exceed the pre-developed rate.

Similar to the stormwater management plan for the overall development, the stormwater runoff generated by Precinct 2 will be channelised into large open drains with peak flows being attenuated within a detention basin. It is proposed that the detention basin will be located at the downstream end of the channel network constructed as part of Precinct 1. The details of the detention basin will be determined during the detailed design phase.

Figure 1 shows the indicative location of the basin, as well as the proposed layout of the channel system included within the precinct. The extent of channels to be constructed within this stage has been determined to adequately protect the development from flooding of the Gawler River and these are shown in magenta in Figure 1. These channels also act to convey major flows from the localised catchment and are aimed at minimising earthworks required on site also.

The open channels that will be used to channelise stormwater flow through Precinct 2 will form an important part of the overall stormwater management system for the overall development and have been sized as detailed in W&G's Technical Paper.

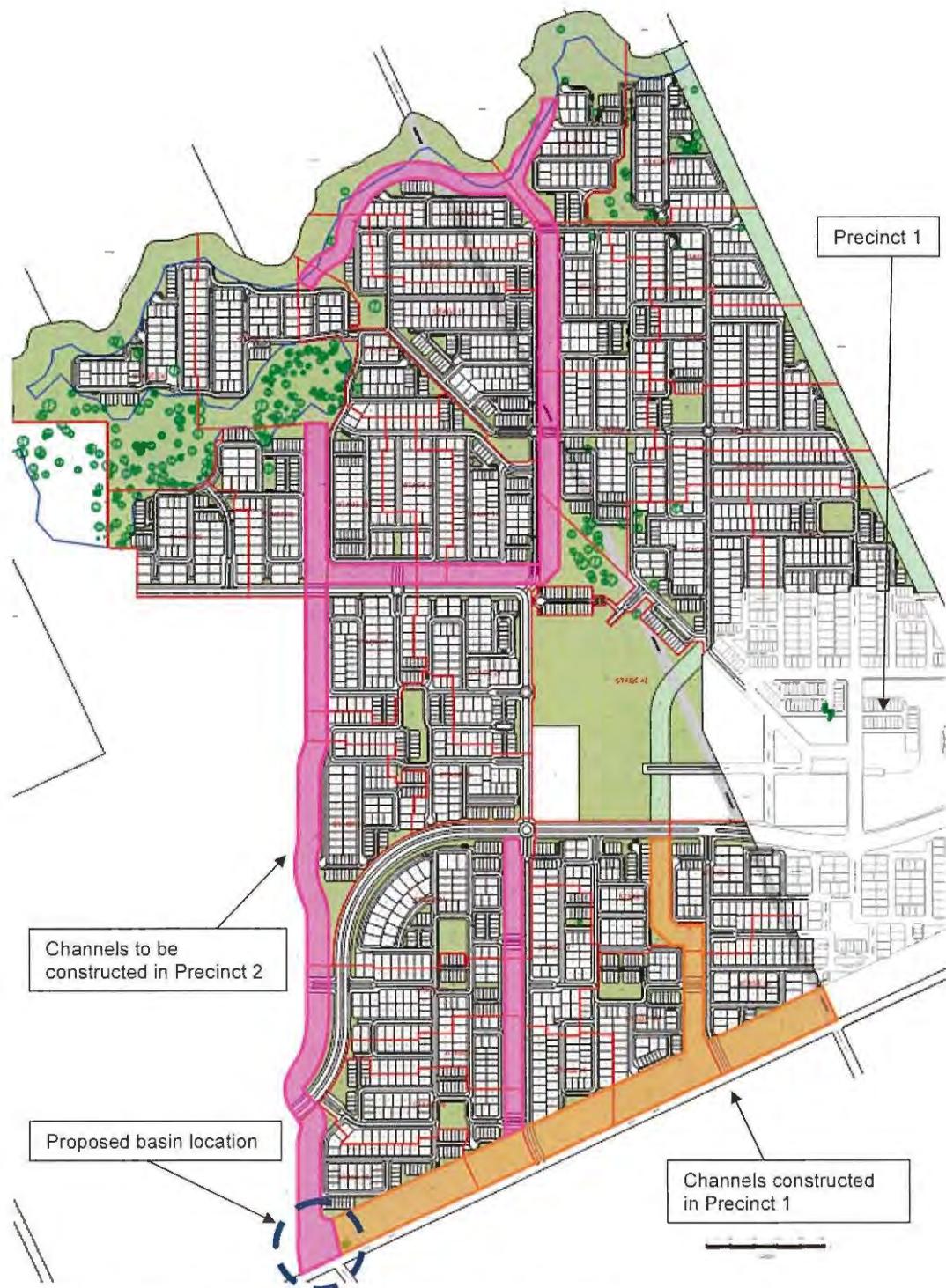


Figure 1 - Precinct 2 Locality Plan and Proposed Channel Layout

Allowable flow

From stormwater modelling, the peak 100 year ARI flow for both the pre-developed and post-developed site conditions were determined as shown in Table 1.

**Table 1 - Precinct 2 stormwater runoff peak flow rates**

	Pre-developed	Post-developed
100 year ARI	3.3 m <sup>3</sup> /s	22.9 m <sup>3</sup> /s

From Table 1 it can be seen that the maximum allowable outflow from the basin is 3.3 m<sup>3</sup>/s.

Detention basin

It was determined from analysis that in order to limit the outflow from Precinct 2, as well as contributing upstream catchments, to 3.3m<sup>3</sup>/s, a detention basin with approximately 33,000m<sup>3</sup> of storage would be required.

The basin would be located at the most downstream end of Precinct 2 and will provide flood mitigation applications that will protect the residential development from stormwater inundation. The basin is likely to be provided through extension of the flood mitigation channels that are required ultimately to connect to the Thompson's Outfall channel further downstream from Precinct 2 or through partial construction of the ultimate detention basin at the lowest end of the site discussed in the Technical Paper.

Outflow channel

Outflow from the detention basin will be carried via open channel to the existing Thompson Creek. As indicated previously, the peak flow rate will be 3.3m<sup>3</sup>/s.

Should you have any queries or wish to discuss further, please do not hesitate to contact the undersigned on (08) 8223 7433.

Yours faithfully

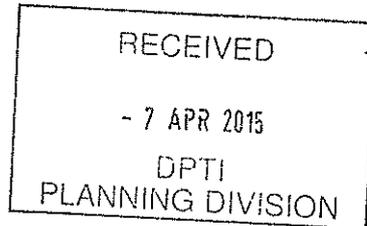


Damien Byrne  
**Director**  
for  
**WALLBRIDGE & GILBERT**

JPC:db

**APPENDIX B**  
**GOVERNMENT SUBMISSIONS**

Enquiries: James Leahy  
 Telephone: (08) 8256 0162  
 Fax: (08) 8256 0578  
 Email: [jleahy@playford.sa.gov.au](mailto:jleahy@playford.sa.gov.au)



2 April 2015

Ms Karen Ferguson  
 Chief Environmental Officer  
 Assessment Branch - Statutory Planning Division  
 Department of Planning, Transport and Infrastructure  
 GPO Box 1815  
 ADELAIDE SA 5001

Via Email: [karen.ferguson@sa.gov.au](mailto:karen.ferguson@sa.gov.au)

Dear Ms Ferguson,

**Re: City of Playford Response to Amendment Precinct 2 by Walker Corporation**

Thank you for forwarding the amended Precinct 2 proposal by Walker Corporation for the Major Project area at Buckland Park for comment.

Council notes the revised proposal continues the design review process undertaken by Walker Corporation since the previous approvals, dating back to 2010. The latest revision has been commissioned in response to a desire to achieve greater place making and urban design outcomes for the early stages of Buckland Park.

Council has been working closely with Walker Corporation in reviewing what makes a successful residential community and has actively contributed to this review via briefings of key technical staff and detailed assessment of specific elements of the amended proposal.

In this regard, Council has appreciated the active involvement of its staff in formulating the key design elements of Precinct 2. It is within this context that Council wishes to provide the following comments to the Commission regarding the proposed amendments to Precinct 2 of Buckland Park.

Council has referred to the Buckland Park Major Development (Riverlea) - Development Application dated November 2014, Amendment to the EIS, which includes the following:

- Superlot Staging Amendment
- Precinct 2 Land Division
- Road Closure

and the amended GTA Traffic Report dated 19 March 2015, Revision D.

The proposed development application amendments can be summarised as follows:

### The Proposed Superlot (Staging) Amendment

The size and location of Precinct 2 has been amended to connect its residential neighbourhoods to community focus, and to incorporate the Gawler River corridor into the project, at an early stage.

Precinct 1 and 2's key community facilities have been grouped to create a community focus, located centrally to both Precinct's residential neighbourhoods.

The amended staging facilitates the provision of a centrally located community focus, integrated into the residential areas of Precinct 1 and 2 by roads, open space corridors and local parks, which are arranged to facilitate access by public transport, on foot, or cycle. Connections are provided to the Gawler River corridor.

### Precinct 2 Land Division

The Precinct 2 land division comprises 2,664 residential allotments of various sizes. A 2.0 hectare high school site and 2.0 hectare primary school site (in both Precinct 1 and 2) is also proposed along with District level sporting fields and courts.

### Residential Lot Mix

The proposed residential lot mix will be in accordance with the following table:

Size	Number
500m <sup>2</sup> +	497 (19%)
450-500m <sup>2</sup>	600 (23%)
300-450m <sup>2</sup>	786 (30%)
175-300m <sup>2</sup>	781 (29%)
<b>Total</b>	<b>2664 (100%)</b>

### Buckland Road Closure

To facilitate the implementation of the proposed Precinct 2 land division approval, approval is also sought for the closure of part of Buckland Road's northern end under the Roads (Opening and Closing) Act 1991.

### Traffic Report

Council accepts the proposed amendments in the amended GTA Consultants Traffic Assessment Report dated 19 March 2015, Issue D.

### Landscape and Open Space Reserves

During the consultation period Council and Walker Corporation agreed in principle to a number of minor changes to the alignment and configuration of small reserves to improve the maintenance and function of the reserves.

It is acknowledged that these draft changes are being finalised by Walker Corporation in the Scheduled drawings. Council requests the completion of the drawings. Following completion of the amended drawings Council will approve, subject to its satisfaction and provide endorsement of the drawing number and date of amendment.

Storm Water and Flood Management

Council requests that a Storm Water Management Plan for Precinct 2 be prepared to its satisfaction and the satisfaction of Development Assessment Commission (DAC), Department of Environment, Water and Natural Resources (DEWNR) and the Environment Protection Agency (EPA).

Council accepts the proposed amendments to Precinct 2, subject to the above mentioned advice.

Yours faithfully



**Shaun Kennedy**  
**GENERAL MANAGER**  
**PLANNING, STRATEGY & COMPLIANCE**

EPA 05 22327.

Karen Ferguson  
Chief Environmental Officer  
Department of Planning, Transport and Infrastructure  
GPO Box 1815  
ADELAIDE SA 5001

Dear Karen

**Buckland Park Residential Development – Amendment to the Environmental Impact Statement for Precinct 2**

Thank you for the opportunity to respond to the letter from Walker Buckland Park Developments Pty Ltd dated 18 May 2015 regarding the comments made by the Environment Protection Authority (EPA) and Department of Environment, Water and Natural Resources on the amendment to Precinct 2.

Please note that this response is from the EPA only. The Department of Environment, Water and Natural Resources will respond separately.

Stormwater Management

Precinct 2 is a significant size, some 372 hectares in total with 2667 allotments proposed. It is in an area known to be at risk of flooding from the Gawler River immediately to the north of the proposed Precinct 2 area.

Necessary infrastructure would normally include stormwater infrastructure and its installation is an integral part of civil works and construction of other infrastructure such as roads and parks.

Land subdivision and subsequent built development generally leads to vegetation removal and increased impermeable surfaces with associated increases in runoff and pollutants in stormwater. The cumulative impacts of stormwater to Gulf St Vincent are well documented in the *Adelaide Coastal Waters Study* (Fox et al, 2007).

Use of the principles of water sensitive urban design (WSUD) assists in offsetting the effects of urban development through improving management of urban stormwater and wastewater and minimising the impacts of urban pollution, and its impacts on the receiving environment. This is supported through the *Adelaide Coastal Water Quality Improvement Plan* outlining that:

*The adoption of WSUD features into land development offers the opportunity to minimise the entry of further pollutants including nitrogen and sediment into Adelaide's coastal waters if adopted for all new land developments (EPA, 2013, p.81).*

Furthermore, use of the principles of WSUD is considered best practice stormwater management and should be undertaken to demonstrate compliance with the general environmental duty as defined in section 25 of the *Environment Protection Act 1993*. WSUD is also supported through government policy

in *Water sensitive urban design – creating more liveable and water sensitive cities in South Australia* (DEWNR 2013).

Included in the original documentation for the Buckland Park development was Wallbridge and Gilbert *Buckland Park Proposal – Stormwater Management, Water, Wastewater and Recycled Water: Technical Paper*, 2009 (Technical Paper). The Technical Paper states that “the intention is also to include WSUD features through the proposal at the detailed precinct level” (Wallbridge and Gilbert, p. 19)

From the information provided, the proposed land division for Precinct 2 does not outline any WSUD principles or features. Further information on stormwater management and WSUD features for Precinct 2 was requested by the EPA on 10 April 2015. However the proponent indicated in its letter dated 18 May 2015 that a stormwater management plan will be prepared as a condition of the approval.

Given stormwater infrastructure is integral to other necessary infrastructure and allotment design, there is a risk that it will not be possible to provide the necessary stormwater quality improvement infrastructure and WSUD features if this is not integrated with other infrastructure and the overall design unless considered as part of the planning phases of Precinct 2.

Therefore, given the policy framework outlined above, previous commitments to incorporate WSUD features at the precinct level, conditions on the major development at Buckland Park and the requirement to integrate stormwater infrastructure and WSUD features with other infrastructure, it is the EPA's preference that a stormwater management plan is provided prior to any land division approval for Precinct 2.

It is recommended that the stormwater management plan include a construction and operational plan that includes (but is not limited to):

- Scaled maps of the precinct and stormwater management infrastructure works, including details of precinct-scale WSUD
- Measures to ensure that stormwater leaving the site would meet the WSUD performance principles and performance targets in the SA government WSUD policy, *Water sensitive urban design – creating more liveable and water sensitive cities in South Australia* (2013). In particular, the flow and water quality outcomes of proposed stormwater management infrastructure should meet:
  - a) run-off rates that do not exceed the rate of discharge from the site that existed during pre-development
  - b) quality targets of:
    - suspended solids 80% reduction of the typical urban average annual load with no treatment
    - total phosphorus 60% reduction of the typical urban average annual load with no treatment
    - total nitrogen 45% reduction of the typical urban average annual load with no treatment
    - Litter and gross pollutants by 90
    - no visible oils for flows up to the 3 month average recurrence interval peak flow.
- Demonstration (modelling) of flow and water quality outcomes of proposed stormwater management will achieve the required targets outlined above

- Details of how the components of the proposed stormwater management system will be maintained and who will have long term responsibility for that maintenance
- Details of how ground water and surface water interactions are to be managed
- How pipe infrastructure would be constructed and maintained with such high salinity within the area
- How Thompson Creek would be incorporated into Precinct 2 given that it would now overlay the Thompson Creek drainage line
- The dimensions of the buffer between residential lots and the Gawler River
- Measures to ensure sediment and pollutants are prevented from leaving the site or entering watercourses during development of the site and construction of dwellings in accordance with the *Code of Practice for the building and construction industry*
- Measures on how WSUD features will be protected from pollutants from housing construction when the house building phase commences.

*References:*

Department of Environment, Water and Natural Resources (DEWNR), 2013, *Water sensitive urban design – creating more liveable and water sensitive Cities in South Australia*

Fox, D.R., Batley, G.E., Blackburn, D., Bone, Y., Bryars, S., Cheshire, A., Collings, G., Ellis, D., Fairweather, P., Fallowfield, H., Harris, G., Henderson, B., Kämpf, J., Nayar, S., Pattiaratchi, C., Petrusевичs, P., Townsend, M., Westphalen, G., Wilkinson, J. 2007, *Adelaide Coastal Waters Study, Final Report, Volume 1 Summary of Study Findings*, CSIRO

EPA 2013, *Adelaide Coastal Water Quality Improvement Plan (ACWQIP)*, EPA

Site contamination

It is stated in the letter from Walker Buckland Park Developments Pty Ltd dated 18 May 2015 that the farmers quarters and tractor maintenance area are located within the boundary of Precinct 2, but are not within that part of it to be developed for residential land uses. Rather, it is within the MOSS Zone and is to be landscaped and revegetated. It is stated that a general clean-up of the area will occur and any remediation will be to a suitable level for the intended use.

Whilst the EPA acknowledges the low risk attached to this site contamination, it is recommended that the management of site contamination be incorporated into a construction environmental management plan for Precinct 2. This would ensure that any site contamination would be managed to avoid impact on areas that are to be developed for residential purposes.

For further information on this matter, please contact Geoff Bradford on 8204 9821 or [geoffrey.bradford@epa.sa.gov.au](mailto:geoffrey.bradford@epa.sa.gov.au).

Yours sincerely



Kym Pluck

**DELEGATE**

**ENVIRONMENT PROTECTION AUTHORITY**

Date: 1/6/15

Environment Protection Authority

www.epa.sa.gov.au



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EPA 05 22327

Karen Ferguson  
Chief Environmental Officer  
Department of Planning, Transport and Infrastructure  
GPO Box 1815  
ADELAIDE SA 5001

Dear Karen

**Buckland Park Residential Development – Amendment to the Environmental Impact Statement (EIS) for Precinct 2**

Thank you for the opportunity to comment on the amendment to the EIS for Precinct 2 of the Buckland Park Residential Development.

The amendment has been reviewed by the Department of Environment, Water and Natural Resources and the Environment Protection Authority and comments are attached.

For further information on this matter, please contact Geoff Bradford on 8204 9821 or [geoffrey.bradford@epa.sa.gov.au](mailto:geoffrey.bradford@epa.sa.gov.au).

Yours sincerely

A handwritten signature in black ink, appearing to read 'K. Pluck'.

Kym Pluck

**DELEGATE**

**ENVIRONMENT PROTECTION AUTHORITY**

Date: 10/4/15

## ATTACHMENT 1 - DEPARTMENT OF ENVIRONMENT, WATER AND NATURAL RESOURCES

### FLOODING

#### Context

The development site is subject to flooding for the 100 year Average Return Interval (ARI) flood event. The Gawler River is perched adjacent to and upstream from the site, that is, it is bounded on one or both sides by natural or man-made levees. Flooding from the Gawler River occurs due to break-outs from the main river channel that travel across the floodplain to secondary outlets north and south of the main river mouth. For Buckland Park, breakouts are predicted to occur both adjacent to the site and further upstream of the site. Under existing development conditions, breakout flows will flow through the site to the Thomson outlet. The proposed flood mitigation measures have focussed on ensuring that these breakout flows are confined to defined channels through the site.

The location and magnitude of breakouts from the Gawler River are dependent on the height of the natural and man-made levees and, crucially, whether the levees hold. In 2005 flooding occurred to the south of the Gawler River rather than to the north as predicted due to an unexpected levee breach. DEWNR is concerned that the proposed flood management measures are reliant on flood modelling (AWE and Water Technology, February 2008) which has assumed that natural and man-made levees adjacent to the Gawler River are structurally sound and that flooding of the adjacent floodplain only occurs when levees are overtopped. However, levee failure may occur by a range of mechanisms including erosion and slumping. Additional modelling undertaken in December 2008 did not consider potential levee breaches in locations that could affect Precinct 2.

The water level in the Gawler River adjacent to Precinct 2 during major flood events is up to one metre higher (approximately) than the surrounding floodplain due to the presence of natural and man-made levees. Flood modelling shows overtopping occurring in three locations along the northern boundary of Precinct 2 which has been accommodated in the design for Precinct 2 by intercept channels along approximately 40% of the northern river frontage.

There is a background of mixed ownership and poor maintenance of Gawler River levees which is linked to an increased risk of levee failure during flood events. This will influence the flood risk for Precinct 2 and Buckland Park in general.

#### Comments on amendment

- There are concerns that the breakout flows from the Gawler, either adjacent to the site or upstream of it, could be higher than assumed due to poor structural integrity or breaches of the natural or man-made levees. Breakout flows could occur adjacent to the site in locations different to what has been assumed.
- There are insufficient details to provide the assurance that flooding would be managed effectively.

## Recommendations

That the proponent be requested to provide:

- information on what levee and river bank management arrangements are in place (for example, geotechnical assessment of bank condition, remediation works, maintenance arrangements, provision of freeboard above the maximum water level) to ensure that breakout flows from the Gawler River adjacent to the site only occur in locations that have been anticipated and designed for and the risk of levee failure is minimised.
- information on what levee and river bank management arrangements are in place (for example, dedicated overflow point, erosion protection) to ensure that breakout flows from the Gawler River don't result in uncontrolled erosion of the levee or bank adjacent Precinct 2
- additional detail on finished allotment levels, design flow rates through all flood conveyance channels, including the Thomson Creek outlet, and design water levels - to confirm if the flood design is adequate.

## GROUND WATER AND STORMWATER

### Context/site limitations

A desktop evaluation of the available aquifer shallow water level and salinity data in the DEWNR database with respect to monitoring wells or any other wells within the Precinct 2 boundary indicated:

- Ground water levels in summer of 2.94 m and 3.78 m below ground level (bgl) (based on limited data - January 2008)
- A salinity value of 17258 mg/L (approximately half the salinity value expected of sea water) (based on limited data).
- Time series data available to the south and south east of the Precinct 2 site, near the Precinct 1 site indicated:
  - shallow aquifer water table values for January near the Precinct 1 site show similar shallow aquifer water levels (nearer to ground level by around 1 meter in some areas) below ground level to that of the Precinct 2 site, indicating that the shallow ground water system is a similar system and is behaving in similar way seasonally (based on substantial data).
  - ground water levels in spring of between 0.78 and 0.86 m bgl (based on limited data).

### Previous comments

Throughout the assessment process, DEWNR and its antecedent agencies, DENR and DWLBC, as well as the Adelaide Mount Lofty Ranges Natural Resources Management Board (AMLR NRMB), have consistently:

- raised concerns about the presence of shallow saline ground water (see background) and the implications for stormwater management and WSUD (channels, basins, wetlands), road and built infrastructure development, landscape development and irrigation and the apparent insufficient consideration of how the development's stormwater system will integrate and develop with the Council's existing system

- raised concerns about the lack of detail provided by the proponent on the proposed flood, stormwater and ground water management, and
- made numerous recommendations to address those concerns, including that the proponent use and provide additional data on ground water (to date the proponent has only used one data point), consider the interactions between surface water and ground water in the ground water modelling and in the design of the stormwater management system, and provide detailed designs for the stormwater management system.

To date, the proponent has not addressed these concerns to DEWNR's and AMLR NRMB's satisfaction.

#### Comments on amendment

The amendment includes a super lot (staging) amendment, Precinct 2's detailed land division and associated construction of roads, parks and civil works, as well as the installation of necessary infrastructure and utilities, and road closure. The following comments focus on the super lot (staging) amendment, land division and associated infrastructure.

- In section 6.3 – Table 2: Residential Neighbourhood zone objectives – the response in relation to Objective 6 states *"a sustainable approach to storm and flood water, biodiversity, energy efficiency, and waste management will be implemented in Precinct 2"*, however, the amendment lacks detailed on-site technical data, information and scaled plans regarding construction of civil works infrastructure (such as pipes, swale drains and detention basins) (in the context of previous inadequate information on stormwater and ground water management) to determine the suitability of the proposal, and as such DEWNR's and AMLR NRMB's previous concerns remain applicable to Precinct 2.
- The Wallbridge and Gilbert 'report' is only a brief letter on the proposed stormwater (and flood) management, which is focussed on peak flow management, and the indicative stormwater management infrastructure/channel layout for Precinct 2 (Figure 9 and Annexure 4), which, as the amendment acknowledges, is a 'concept' only.
- Matter for consideration number 13 in Table 5 – DPLG Assessment Report (section 7) states that *"Walker and the City of Playford are discussing options for providing water for irrigation from sustainable sources"*, but no options are provided.
- It is noted that the approval for the major development states that *"Future stages of the major development (2-5) will be determined when detailed land division applications are lodged"* and that Condition 12 states *"Water sensitive urban design measure and practices shall be adopted for the management or runoff, including stormwater capture and reuse"*.
- Further, the referred to Wallbridge and Gilbert *Buckland Park Proposal – Stormwater Management, Water, Wastewater and Recycled Water: Technical Paper, 2009* (Technical Paper) states that *"the intention is also to include WSUD features through the proposal at the detailed precinct level"* (Wallbridge and Gilbert, 2009, p. 19)
- The amendment does not outline any water urban design principles or features. The commentary in relation to Objective 11 states *"WSUD is central to its design and stormwater management systems are being designed in consultation with Playford Council"*, however, no further information has been provided to demonstrate that this is the case.

- The Wallbridge and Gilbert letter states that the open channels have been sized as detailed in the Technical Paper, however, the Technical Paper is a high level investigative report that makes a lot of suggestions on how stormwater, water, wastewater and recycled water *could* be managed, rather than an actual Stormwater (etc.) Management Plan and contains no site infrastructure implementation plans.

### Recommendations

More detailed information is required to assess if the proposed stormwater management is appropriate and implements best practice. As such, it is recommended that the proponent be requested to provide a precinct Stormwater Management Plan (including Construction Plan and Operational Plan) that addresses (but is not limited to):

- scaled maps of the precinct and stormwater management infrastructure works, including details of precinct-scale Water Sensitive Urban Design (WSUD)
- modelling of flow and water quality outcomes of proposed stormwater management infrastructure and how it would meet the WSUD performance principles and performance targets in the SA government WSUD policy, *Water sensitive urban design – creating more liveable and water sensitive cities in South Australia* (2013)
- details of how ground water and surface water interactions are to be managed
- how pipe infrastructure would be constructed and maintained with such high salinity within the area
- how Thompson Creek would be incorporated into the precinct given that it would now overlay the Thompson Creek drainage line
- the dimensions of the buffer between residential lots and the Gawler River

### Note

- Given that the amendment indicates that aquifer recharge would now occur in Precinct 3, rather than Precinct 2. It should be noted that such recharge would be dependent on:
  - The capacity of the target aquifer to be able to 'take' and 'store' the recycled water, especially as there is low current use of the target T2 aquifer for irrigation in the immediate vicinity and there are many schemes currently in operation or planned by the City of Playford City of Salisbury, as well as planned by SA Water, which may further reduce the aquifers 'capacity' to store water.
  - The EPA 'Discharge of stormwater to aquifers' application process, which includes the proponent producing and submitting all the appropriate technical reports and management plans in line with the requirements in the *National Water Quality Management Strategy Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) Managed Aquifer Recharge*.

### BIODIVERSITY CONSERVATION

The change to the footprint of Precinct 2 is a significant variation to that proposed in the EIS, and hence may have different impacts on flora and fauna on site to those previously assessed. As such information should be provided on potential impacts to flora and fauna within the new footprint.

The EIS states "Detailed survey will be required as part of the detailed design of the proposal's future stages, during both winter and spring to assess if additional areas or species of winter growing plants are present during a year of average rainfall. This work will inform each stage's:

- Detailed land division plan
- Detailed landscape design
- Flora and Fauna Rehabilitation, Revegetation and Management Plans
- Requirements to achieve SEB..."

This survey work should be provided in support of the amendment and any assessment of impacts on flora and fauna from the proposed amendment.

In addition, the amendment states that "A biodiversity management strategy is prepared and will be discussed with the City of Playford and the Native Vegetation Council.", however, the strategy has not been provided to DEWNR, representing the NVC, for review. This information should be provided in support of the amendment.

### **Native vegetation**

DEWNR has previously provided comments on native vegetation in relation to the major development application, Environmental Impact Statement (EIS), and Development Plan Amendment for the area. Those comments included concerns that the EIS did not provide information on potential impacts to native vegetation and wildlife habitat on Stages 2-5 of the development, and that the proposed rezoning would significantly reduce the width of the MOSS zone along much of the length of the Gawler River. However, DEWNR did recognise that the applicant had attempted to retain and manage significant areas of native vegetation on the land, much of which has become severely degraded through past land use.

Precinct 2 supports some native vegetation, including scattered large eucalypts (mostly Red Gums) over pasture and areas of low shrubland subject to flooding dominated by Cotton Bush *Maireana aphylla* and samphires. Some of the native vegetation is located within proposed reserves. The remaining native vegetation may be cleared under *Native Vegetation Regulations 2003* 5(1)(ab) 'residential subdivisions' and (d) 'infrastructure', provided there is an appropriate offset and the clearance is endorsed by the Native Vegetation Council. An application for use of the regulations to clear native vegetation is yet to be received or endorsed, although the Native Vegetation Council has previously considered and endorsed the use of some areas of the Buckland Park development as being suitable for future potential offsets. Regulations 5(1)(ab) and (d) also specify that areas of significant native vegetation need to be identified and protected as part of the planning process.

DEWNR notes that the environmental impacts of the development in Precinct 2 (to 5) have not been adequately described or assessed.

DEWNR is concerned that the natural drainage lines are no longer proposed for stormwater management across the site, thus additional clearance of remnant low shrublands may be required. It is also evident that some proposed residential allotments are located within areas previously identified as potential offset areas (e.g. along the north of Stage 19, south of Stage 23 and 24 and north of Stage 25 and 26 on the Precinct 2 plan provided). From the information provided it is not clear what native vegetation is proposed for clearance, and whether large eucalypts are included. Dwellings should be sited away from retained trees due to the potential for falling limbs.

## Recommendation

That the proponent be requested to:

- provide the detailed survey work in support of the amendment
- provide the biodiversity management strategy for review
- (as necessary) provide further information on what native vegetation is proposed to be cleared in order to assess potential impacts to native vegetation and determine whether the use of the Regulations 5(1)(ab) and (d) is appropriate.
- consider amending the subdivision to exclude the proposed residential allotments referred to above, and to ensure that other residential allotments and roads are located a sufficient distance from retained large eucalypts so that falling limbs do not present a safety issue.
- seek endorsement for proposed clearance of native vegetation (under Regulations 5(1)(ab) and (d)) prior to finalising the amendment.

## GREEN INFRASTRUCTURE

Green Infrastructure describes the network of green spaces and water systems that deliver multiple environmental, economic and social values and benefits.

Green infrastructure may include parks and gardens, streetscapes and greenways, vegetated buffers and corridors, wetlands and waterways, shared productive spaces and forests, and green roofs and walls, with the emphasis on:

- a strategic, integrated approach whereby the planning and design of 'green infrastructure' is considered on an equal footing with that of built and 'grey infrastructure';
- enhancing the connectivity between green and blue (i.e. water) spaces; and
- providing a multiplicity of benefits.

The amendment lacks detail on the proposed landscaping, only stating that:

- there would be "*quality landscaping*"
- there would be "*a variety of...streetscapes*"
- "*The Precinct 2 land division can support the desired landscape and public domain treatments, which will be subject to detailed design in accordance with the Landscape Master Plan*" and
- "*Walker and Playford Council have prepared a Landscape Master Plan to guide the progressive implementation of a landscaped public domain across the site which is both functional and sustainable, while being attractive to residents and visitors. Its strategic framework is complemented by landscape guidelines, images and diagrams illustrating intended outcomes for open space and streetscapes, to create a cohesive and integrated public domain...The Plan was informed by analysis of the site's environmental and climatic conditions to ensure it is achievable. It also clearly sets out parameters for the design and on-going management of storm water and biodiversity networks.*"

DEWNR seeks to promote green infrastructure, and hence would appreciate the opportunity to review the Landscape Master Plan against green infrastructure principles and practices.

**Recommendation**

That the proponent be requested to provide the Landscape Master Plan for DEWNR to review against green infrastructure principles and practices.



## ATTACHMENT 2 - ENVIRONMENT PROTECTION AUTHORITY

### Stormwater Management

Land subdivision and subsequent built development generally leads to vegetation removal and increased impermeable surfaces with associated increases in runoff and pollutants in stormwater. Precinct 2 is a significant size, some 372 hectares in total with 2667 allotments proposed. It is in an area known to be at risk of flooding from the Gawler River immediately to the north.

The cumulative impacts of stormwater on water quality on Gulf St Vincent - to which the watercourses at Buckland Park flow - are well documented in *The Adelaide Coastal Waters Study, Final Report, Volume 1 Summary of Study Findings* (Fox et al, 2007). The Study found that nutrient rich inputs from stormwater, sewage treatment plants, and industrial charges are the main causes for the loss of seagrass along the Adelaide coastline. It was recommended in the Study that steps be taken to reduce the volumes of stormwater flowing into Adelaide's coastal environment.

Use of the principles of water sensitive urban design (WSUD) assists in offsetting the effects of urban development through improving management of urban stormwater and wastewater and minimising the impacts of urban pollution, and its impacts on the receiving environment. This is supported through the *Adelaide Coastal Water Quality Improvement Plan* outlining that:

*The adoption of WSUD features into land development offers the opportunity to minimise the entry of further pollutants including nitrogen and sediment into Adelaide's coastal waters if adopted for all new land developments (EPA, 2013, p.81).*

Use of the principles of WSUD is considered best practice stormwater management and should be undertaken to demonstrate compliance with the general environmental duty as defined in section 25 of the *Environment Protection Act 1993*. WSUD is also supported through government policy in *Water sensitive urban design – creating more liveable and water sensitive cities in South Australia (DEWNR 2013)*.

It is noted that in the approval for the major development that "Future stages of the major development (2-5) will be determined when detailed land division applications are lodged". The approval for the major development included a number of conditions including Condition 12 that states "Water sensitive urban design measure and practices shall be adopted for the management or runoff, including stormwater capture and reuse".

To support the application a letter from Wallbridge and Gilbert date 28<sup>th</sup> October 2013 is supplied. The letter refers to the Wallbridge and Gilbert *Buckland Park Proposal – Stormwater Management, Water, Wastewater and Recycled Water: Technical Paper*, 2009 (Technical Paper). However the Technical Paper clearly states that "the intention is also to include WSUD features through the proposal at the detailed precinct level" (Wallbridge and Gilbert, p. 19)

From the information provided, the proposed land division for Precinct 2 does not outline any water urban design principles or features. Given the policy framework outlined above, previous commitments to incorporate WSUD features at the precinct level and conditions on the major development at Buckland Park, it is requested that a review of stormwater management in Precinct 2 be undertaken and further information be provided that outlines:

- a) Measures to ensure that stormwater leaving the site will achieve the following performance objectives:

- i) run-off rates that do not exceed the rate of discharge from the site that existed during pre-development
- ii) quality targets of:
  - o suspended solids 80% reduction of the typical urban average annual load with no treatment
  - o total phosphorus 60% reduction of the typical urban average annual load with no treatment
  - o total nitrogen 45% reduction of the typical urban average annual load with no treatment
  - o Litter and gross pollutants by 90
  - o no visible oils for flows up to the 3 month average recurrence interval peak flow
- b) Demonstration that the measures employed will achieve the required water quality targets outlined above.
- c) Details of how the components of the proposed stormwater management system will be maintained and who will have long term responsibility for that maintenance.

#### References:

Department of Environment, Water and Natural Resources (DEWNR), 2013, *Water sensitive urban design – creating more liveable and water sensitive Cities in South Australia*

Fox, D.R., Batley, G.E., Blackburn, D., Bone, Y., Bryars, S., Cheshire, A., Collings, G., Ellis, D., Fairweather, P., Fallowfield, H., Harris, G., Henderson, B., Kämpf, J., Nayar, S., Pattiaratchi, C., Petrushevics, P., Townsend, M., Westphalen, G., Wilkinson, J. 2007, *Adelaide Coastal Waters Study*, Final Report, Volume 1 Summary of Study Findings, CSIRO

EPA 2013, *Adelaide Coastal Water Quality Improvement Plan (ACWQIP)*, EPA

#### Site Contamination

Connell Wagner's *Site history investigation Buckland Park proposal* (2008), which was prepared for the Environmental Impact Statement, identified that the primary land use of the Precinct 2 area was grazing and rotational use for barley cropping, with the potential for localised contamination in the tractor maintenance compound at the northern end of Buckland Road.

It is stated in section '4.2 Physical environment – Contamination' of the development application for Precinct 2 that the Connell Wagner report, *Preliminary site contamination investigation: Buckland Park proposal* (2008), identified Precinct 2's southern part as having a 'low to moderate risk' of contamination associated with previous grazing and agricultural activities. It is further stated that 'after preliminary soil and groundwater sampling, Connell Wagner concluded there were "no major signs of contamination across the site"'. However, although referred to in the preliminary site contamination investigation, it is not clear if the tractor maintenance compound was specifically investigated. As noted in the preliminary site contamination investigation, any part of the site proposed for any sensitive use will require further investigation.

The EPA notes that the main land use for Precinct 2 was grazing and cropping, which are considered to be low risk activities. However, it is noted that tractor maintenance compound at the northern end of

Buckland Road, which is within Precinct 2, is a higher risk land use and further investigation for this area may be necessary. Such an investigation should be carried out in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure* (1999).

## Ferguson, Karen (DPTI)

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**From:** Whitford, Michael (DPTI)  
**Sent:** Friday, 3 July 2015 3:24 PM  
**To:** Ferguson, Karen (DPTI)  
**Cc:** Lawes, Phil (DPTI)  
**Subject:** Buckland Park / Riverlea Precinct 2

Karen,

Apologies for the delay in responding to the letter dated 15 May 2015 from Walker Buckland Developments regarding issues with the Precinct 2 Traffic Assessment.

In my response of 8 May 2015, I highlighted that the Commissioner of Highways has no intention of assuming care and control of any roads within the Riverlea development, and that review of the analysis provided by GTA has not been undertaken. I recommend review of the Traffic Assessment by the City of Playford to ensure their acceptance of the traffic arrangements.

I note four main issues that required resolution from my response of 8 May:

Inclusion of Port Wakefield Road / Riverlea intersection in analysis  
with the addition in the conditions of approval of the triggers for review and upgrade of this intersection, the requirement to undertake analysis is removed.

This issue has been resolved.

### 2. Provision of Traffic Survey data

With the resolution of the intersection analysis issue above, this issue is no longer relevant.

This issue has been resolved.

### 3. Road Typology

DPTI has highlighted since 2009 that the road typology is inconsistent with the Road Classification guidelines. Whilst it is disappointing that this issue cannot be resolved to our satisfaction, it is requested that a condition of approval be added to the gazette notice as suggested by Mr Butler.

“All public roads within the development will be local roads under the care and control of the City of Playford”

### 4. Bus Routes

The response provided by Mr Butler suggests that approval of the EIS constitutes approval for the bus network. Mr Butler should be made aware that approval of the EIS does not constitute approval of the bus network or subsequent delivery of these services by the State Government.

DPTI has consistently given advice that provision of bus services to Riverlea will be a challenge for the State Government. Delivery of bus services to Riverlea by the State Government will be based on an ongoing assessment of demand for services, and an ongoing assessment of delivery costs and budgetary constraints. Furthermore, the direction for bus service delivery is towards providing mass transit corridors that will deliver more frequent and direct services, rather than providing a number of wandering services at a lot lower frequencies.

DPTI is continuing to work with the proponent to develop a sustainable bus service.

Should you have any further queries, do not hesitate to contact me on the details below.

Regards,

**Michael Whitford**

A/Major Projects Manager

Planning and Transport Policy

Department of Planning, Transport and Infrastructure

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Stage 2 comment  
PIRSA.

**Ferguson, Karen (DPTI)**

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**From:** Houston, Peter (PIRSA)  
**Sent:** Thursday, 12 March 2015 12:21 PM  
**To:** Ferguson, Karen (DPTI)  
**Cc:** Manson, Andrew (PIRSA)  
**Subject:** Buckland Park Precinct 2 - Amendment to EIS

Dear Karen,

In light of the information you have provided, PIRSA raises no concerns about the proposed amendment to the EIS.

The proponent's plans appear to make reasonable provision for buffers between new residential areas and adjacent (continuing) horticultural activities.

On your advice, PIRSA will raise whatever future issues it may have regarding buffers with the City of Playford.

regards

 Peter Houston  
PIRSA Policy Unit  
South Australian Department of Primary Industries & Regions (PIRSA)  
Tel. (08) 8204 1633 Fax. (08) 8226 0333  
[peter.houston@sa.gov.au](mailto:peter.houston@sa.gov.au)

**PLEASE NOTE: I work Wednesday-Friday and alternate Tuesdays.**

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