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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CONTENTS

FIGURES

TABLES

ANNEXURES

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^2 of gross leasable area, associated community uses, and ancillary development and signs.
- A display village and ancillary development and signs.

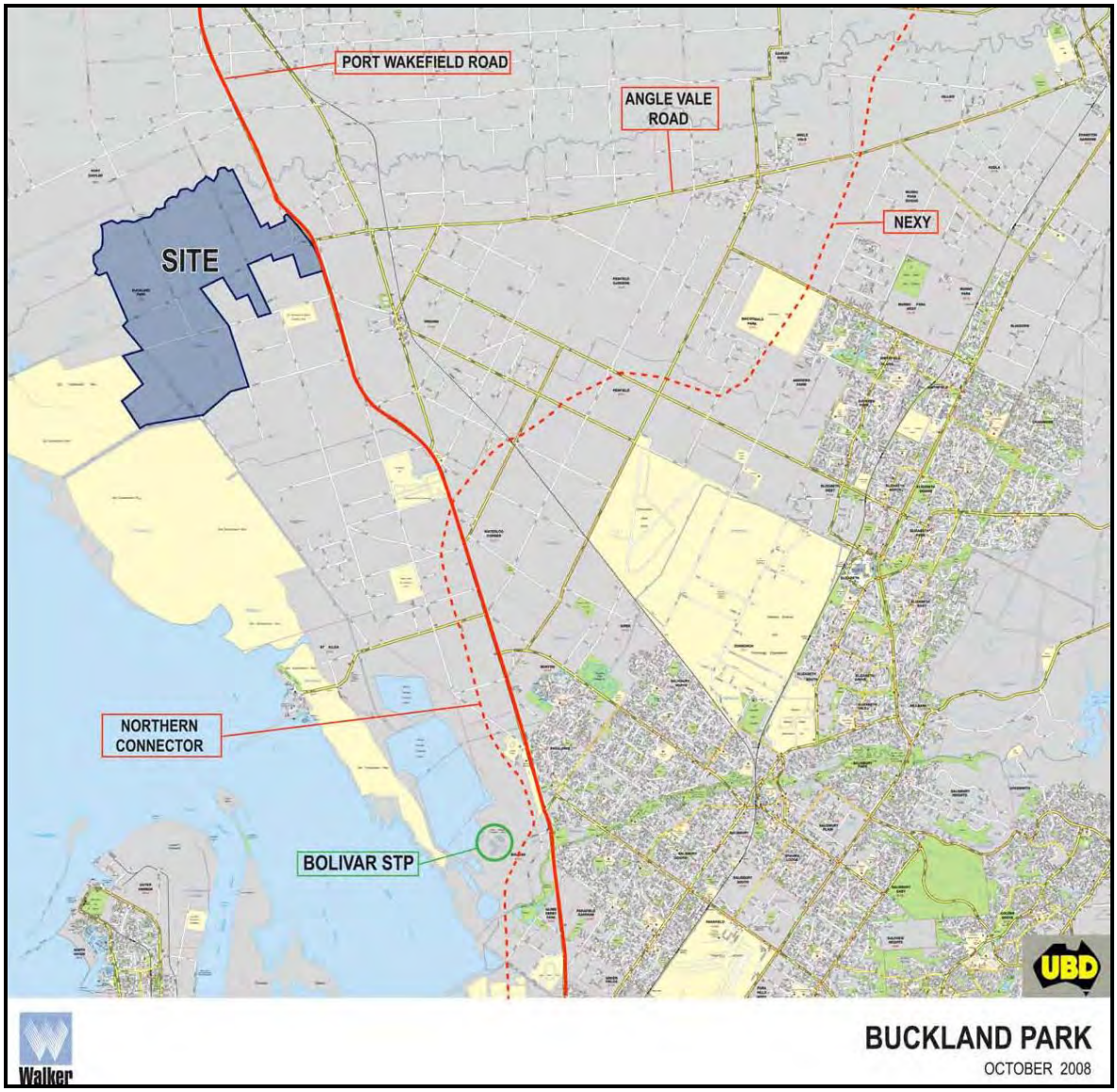


Figure 1: Major Project Declaration site - location

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.

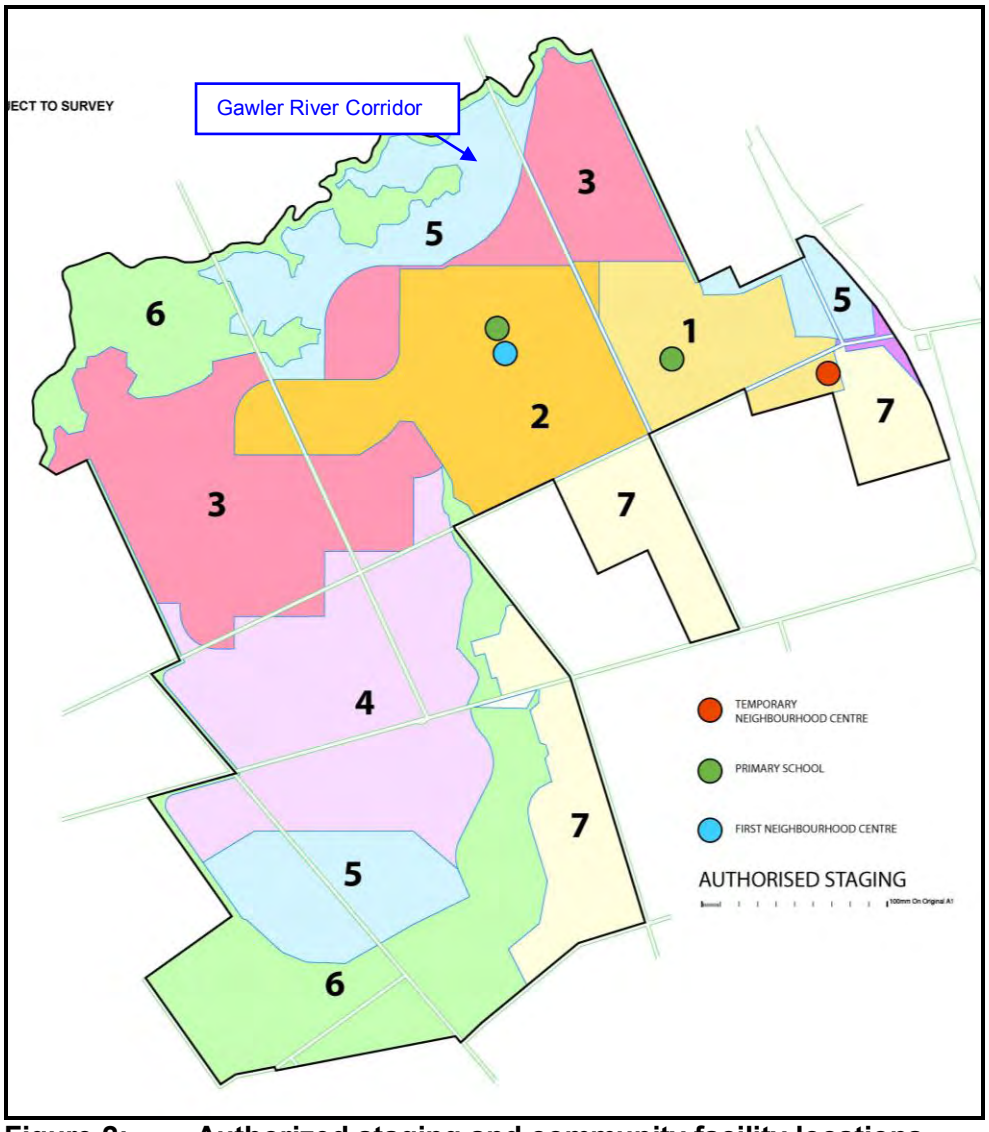


Figure 2: Authorized staging and community facility locations

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.

As a result, amendments have been made to the project's staging, and location of community facilities. These amendments are reflected in the Super Lot land division.

Concurrently with the staging review, detailed land division plans were prepared for Precinct 2, and the Precinct 1 land division was amended (see application lodged 19 July 2013).

In accordance with the 2008 Declaration, this Development Application seeks authorization for 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. In conjunction, authorisation is sought for the amended Super Lot (staging) plan.

The application describes the proposed land division and supporting works, and provides an assessment against relevant environmental, design and planning considerations.

1.3 Buckland Road closure

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

This section is an unmade road, and is physically part of adjoining grazing paddocks.

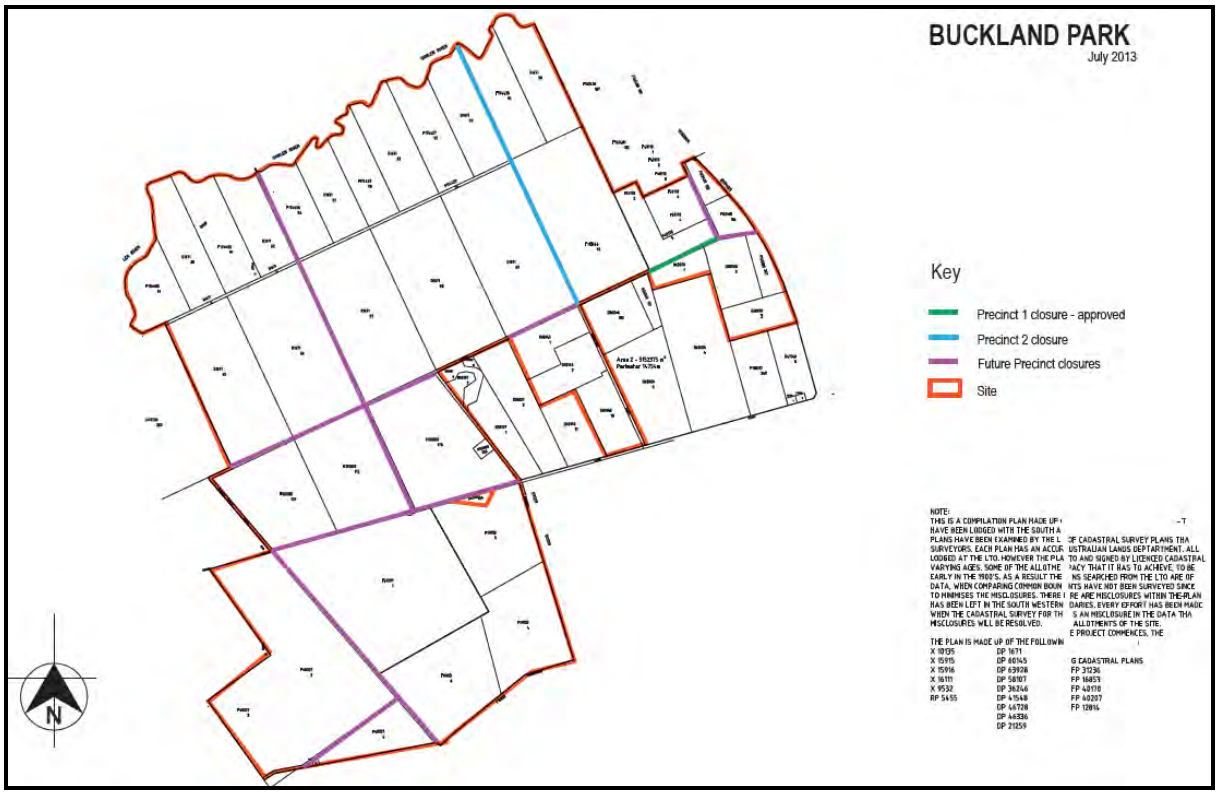


Figure 3: Buckland Road Closure

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.

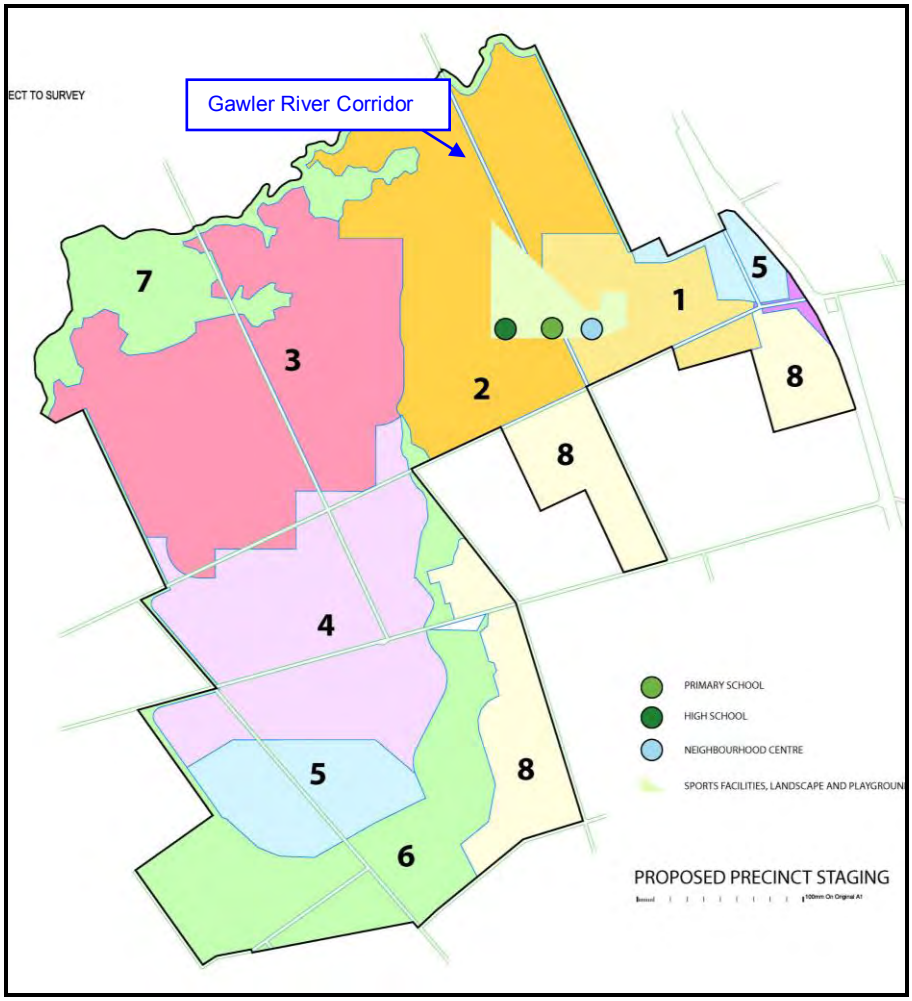


Figure 4: Proposed staging and community facility locations

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.

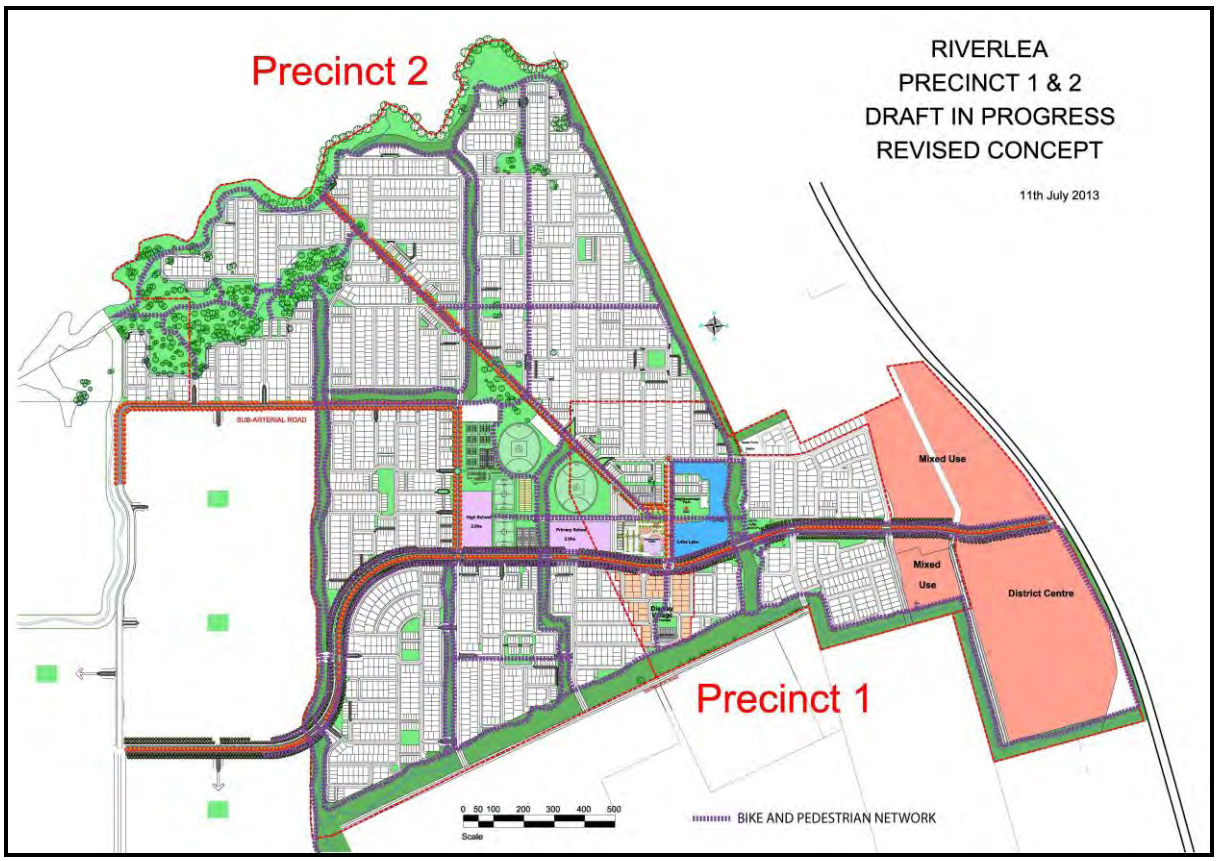


Figure 5: Precincts 1 and 2 with integrated community focus

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 boulevarde 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.

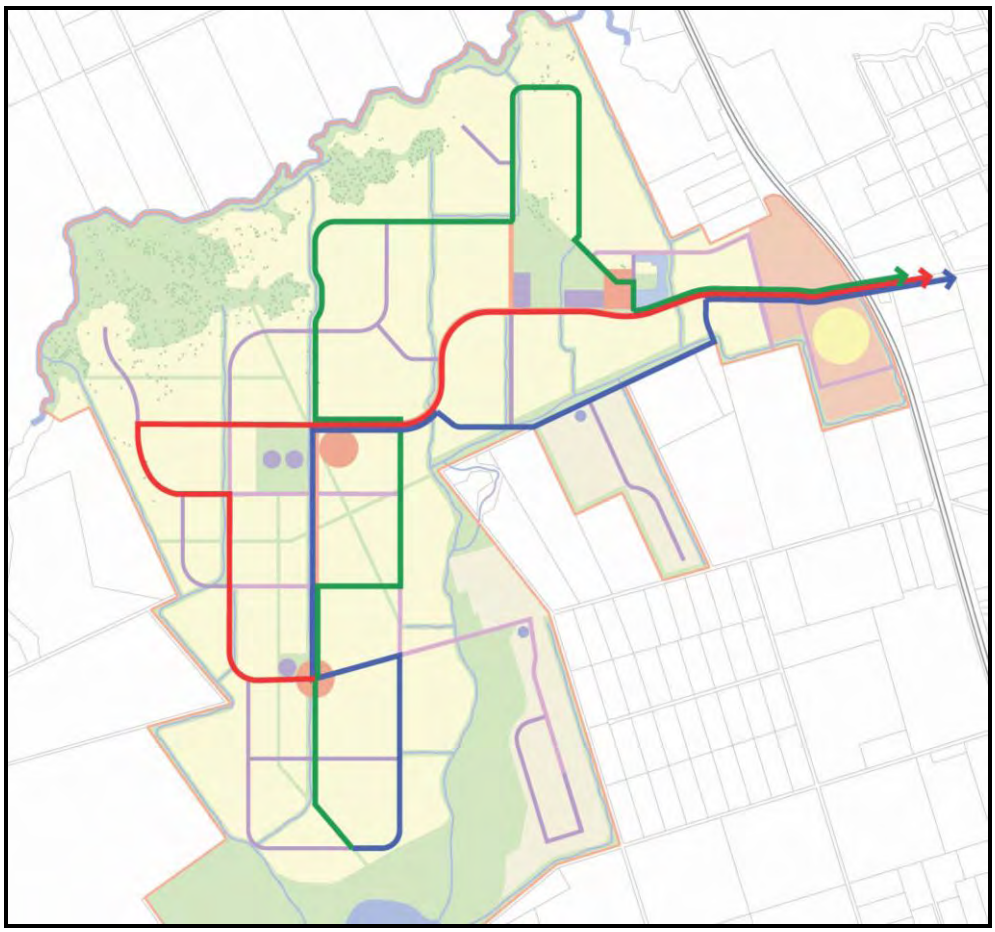


Figure 6: Ultimate bus routes

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

	PRECINCT 1	PRECINCT 2	TOTAL
DISPLAY VILLAGE			
TOTAL	**45**	**0**	**45**
RESIDENTIAL ALLOTMENTS			
SIZE	**PRECINCT 1**	**PRECINCT 2**	**TOTAL**
500m^2 +	179 (33%)	497 (19%)	676 (21%)
450 m^2 – 500m^2	136 (25%)	600 (23%)	736 (23%)
300 m^2 – 450m^2	94 (17%)	786 (30%)	880 (27%)
175m^2 – 300m^2	132 (25%)	781 (29%)	913 (28%)
TOTAL	**541 (100%)**	**2,664 (100%)**	**3,205 (100%)**
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.

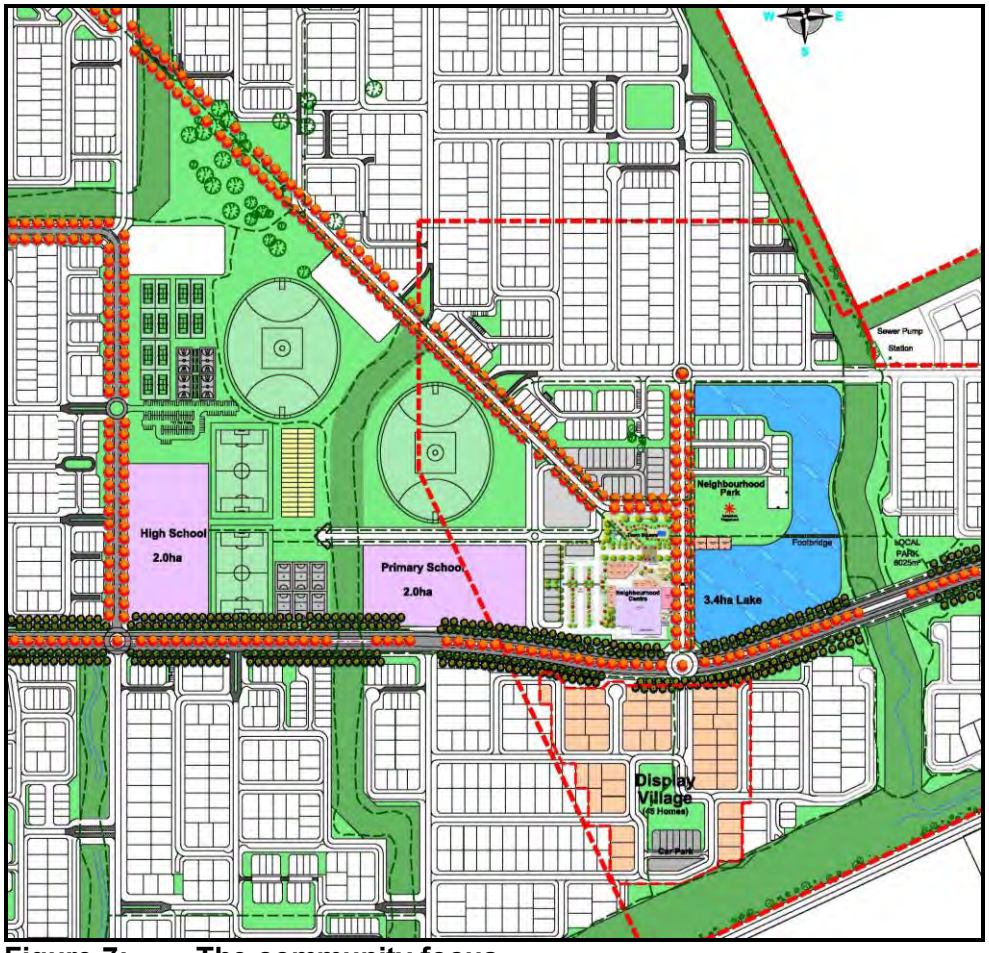


Figure 7: The community focus

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.

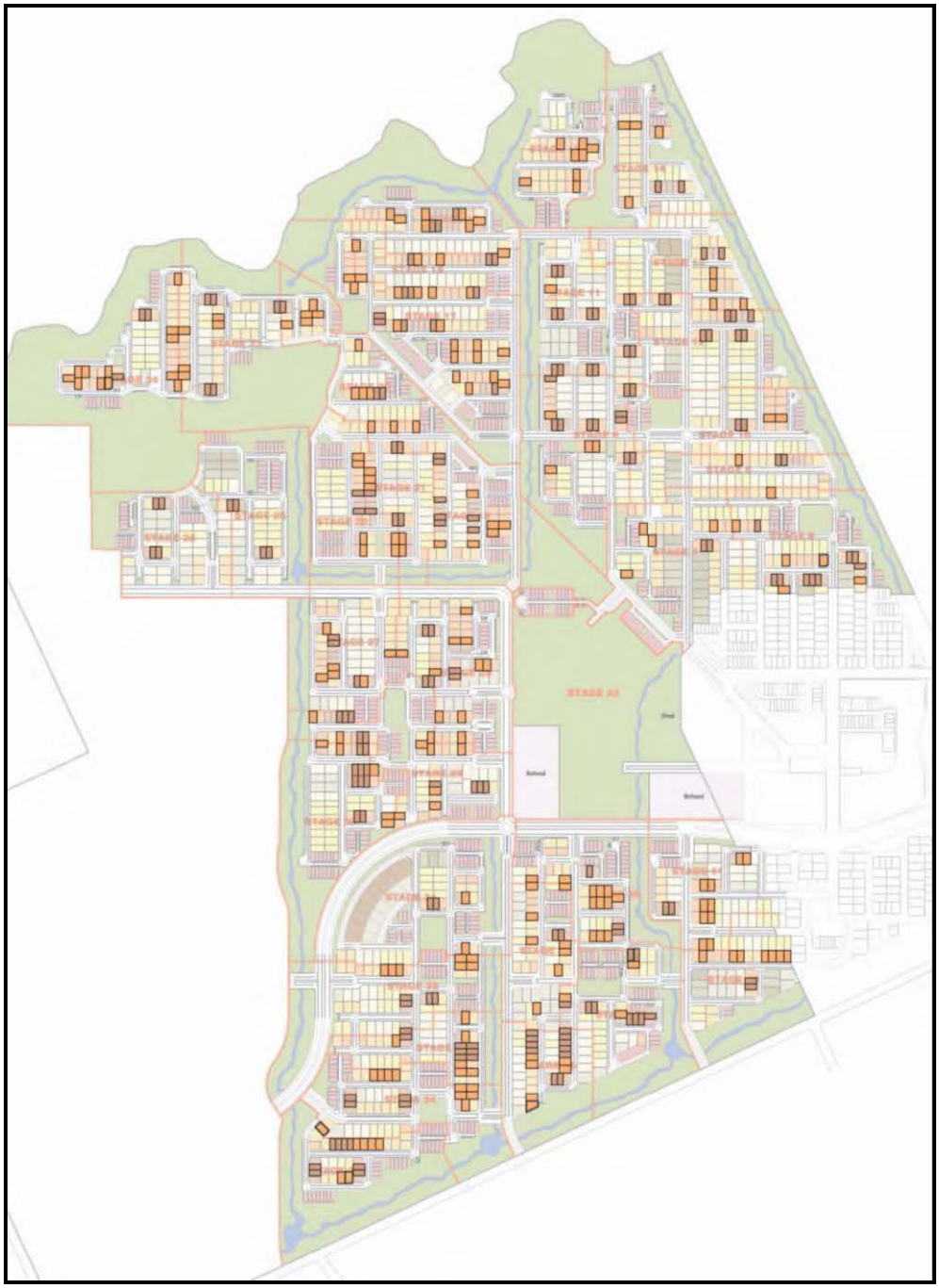


Figure 8: Affordable Housing

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).**

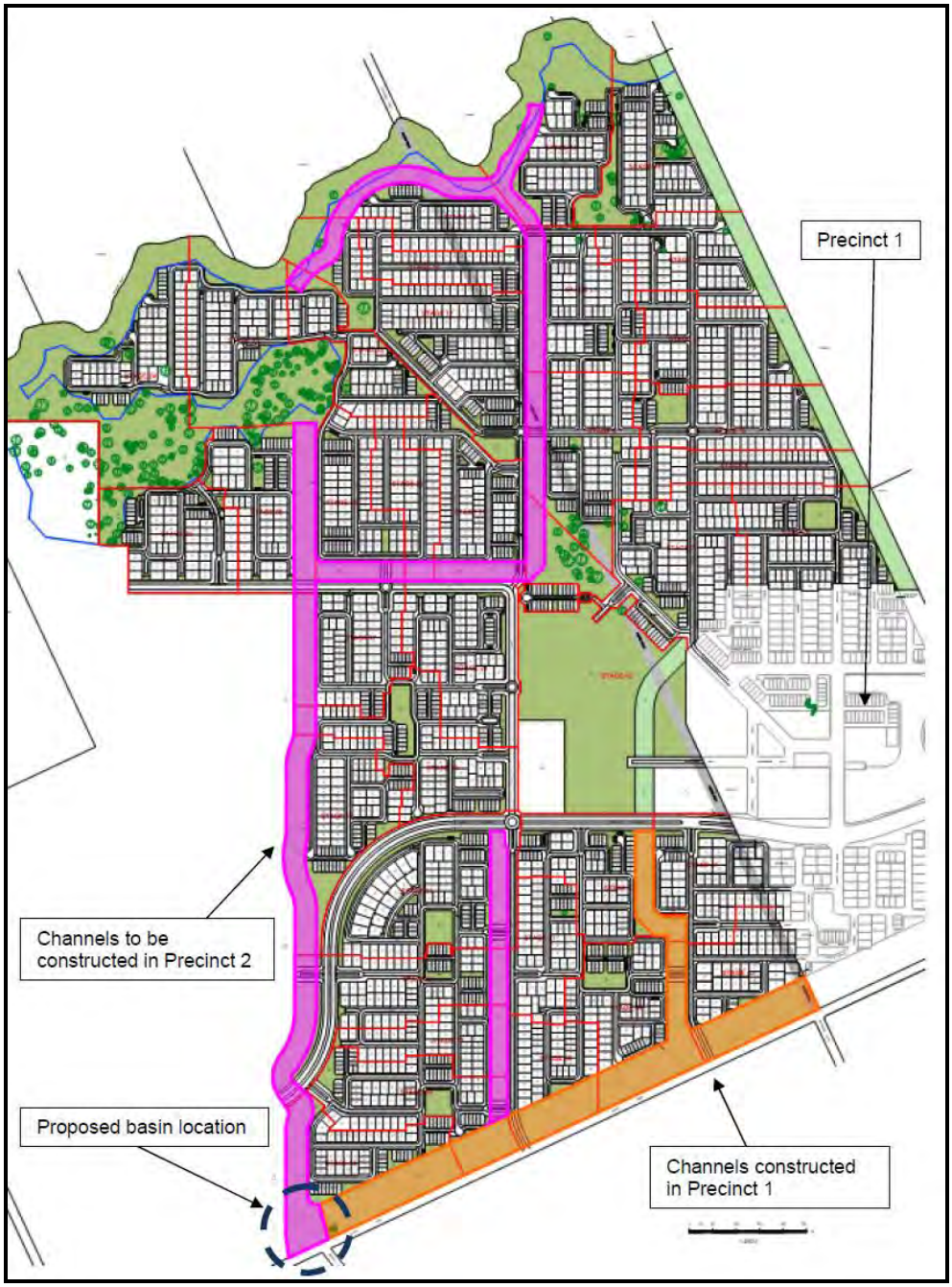


Figure 9: Stormwater management infrastructure

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.

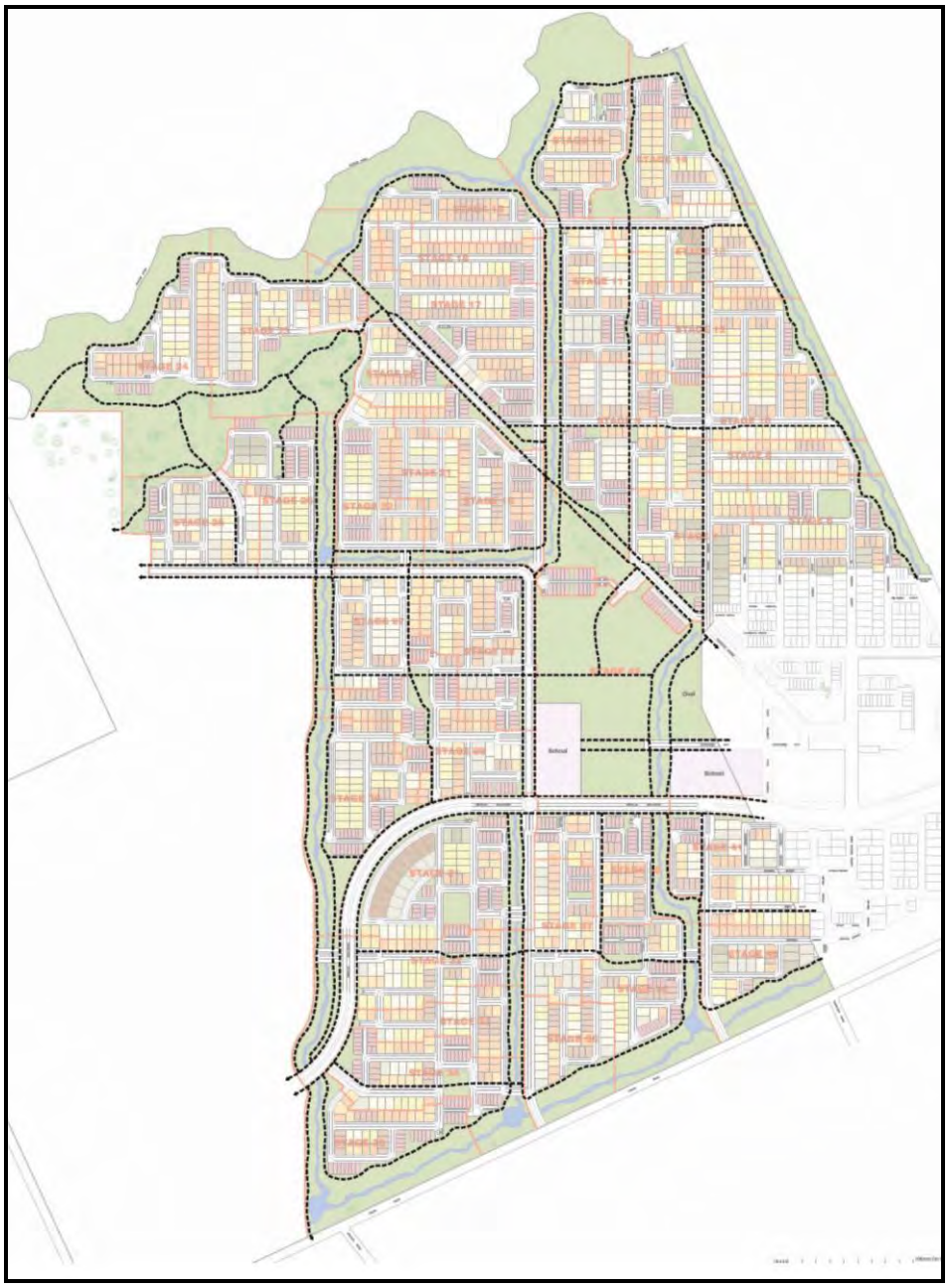


Figure 10: Precinct 2 bicycle and pedestrian network

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'.

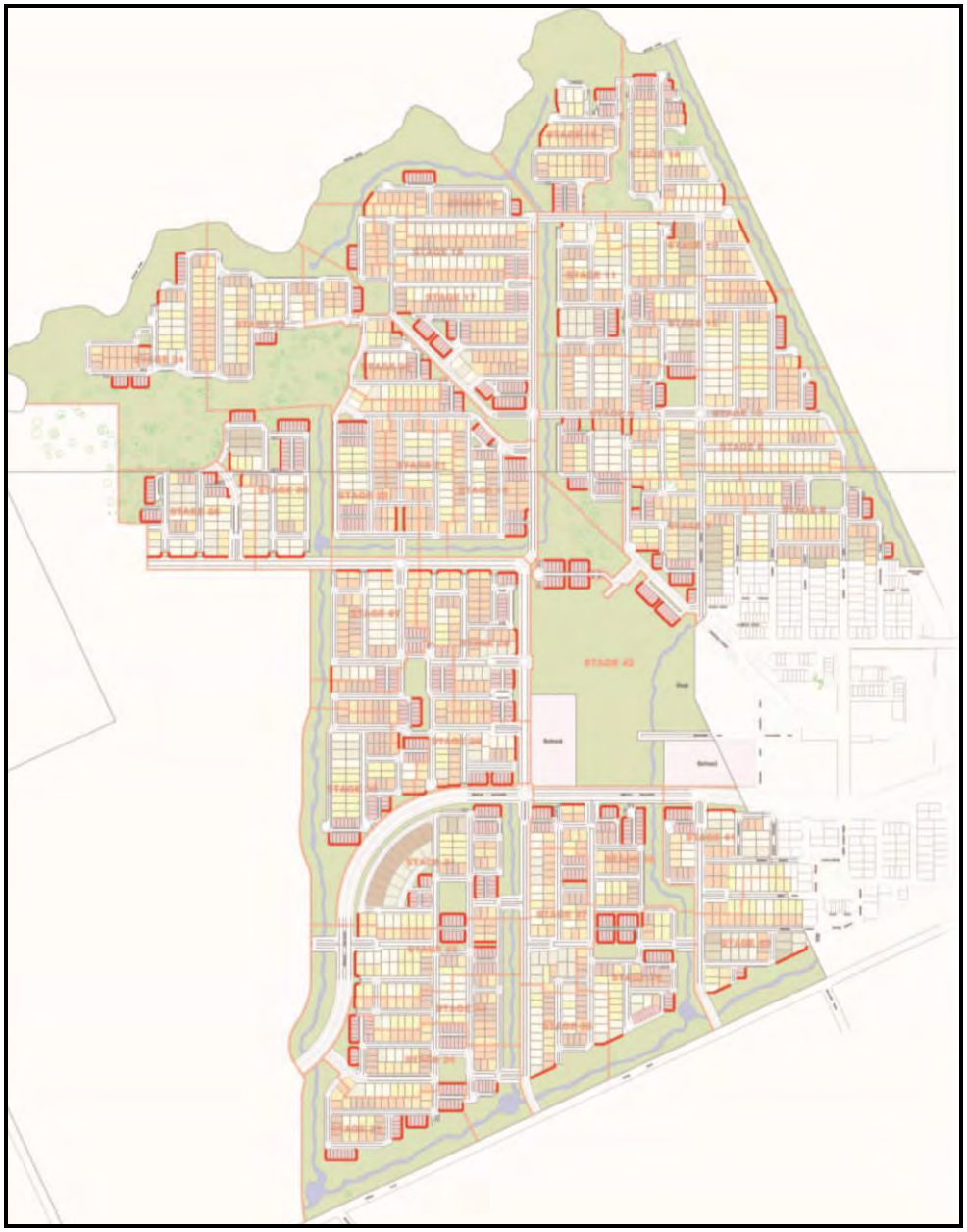


Figure 11: Special fencing control locations

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.

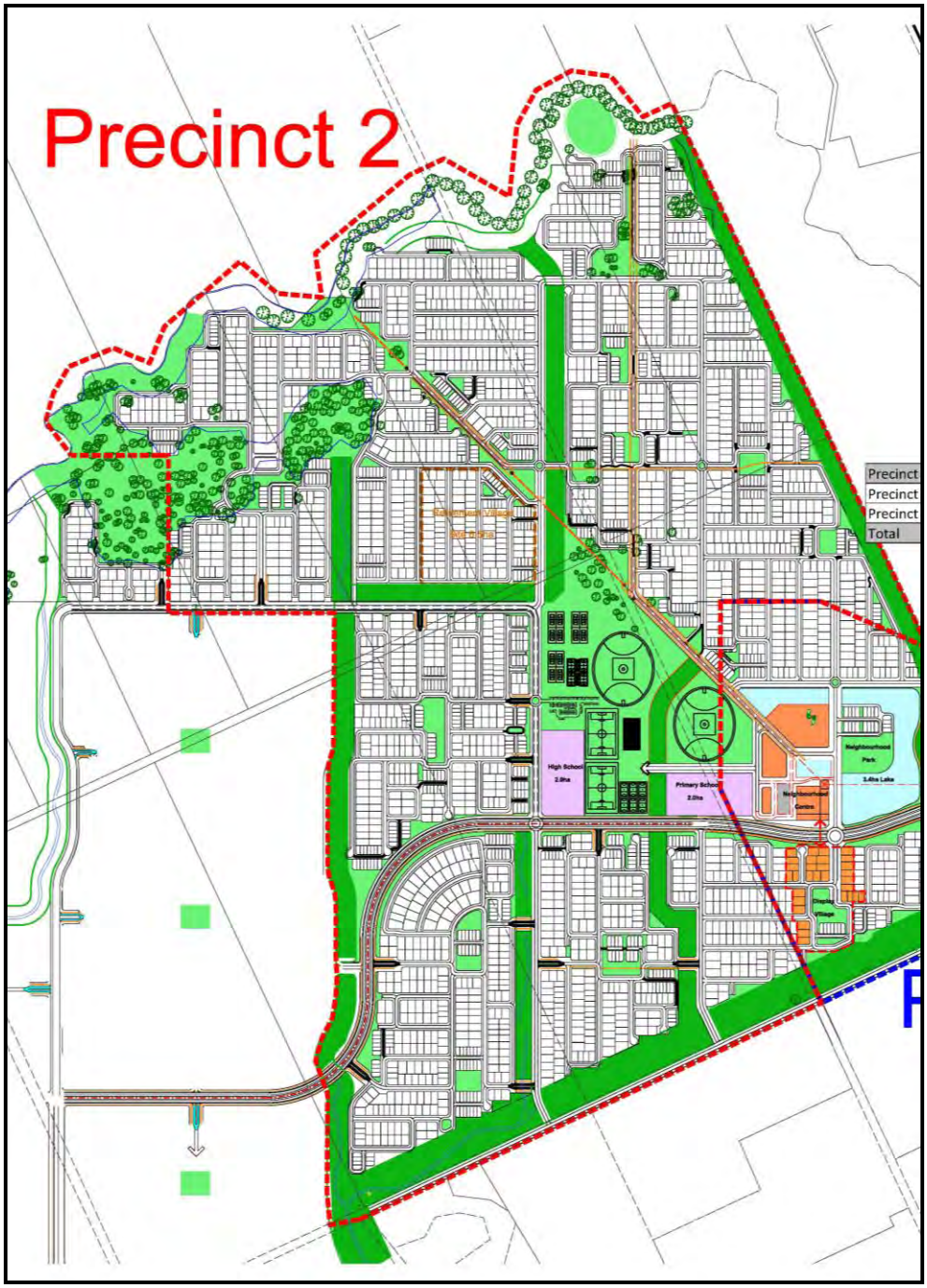


Figure 12: Existing vegetation with land division overlaid

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.

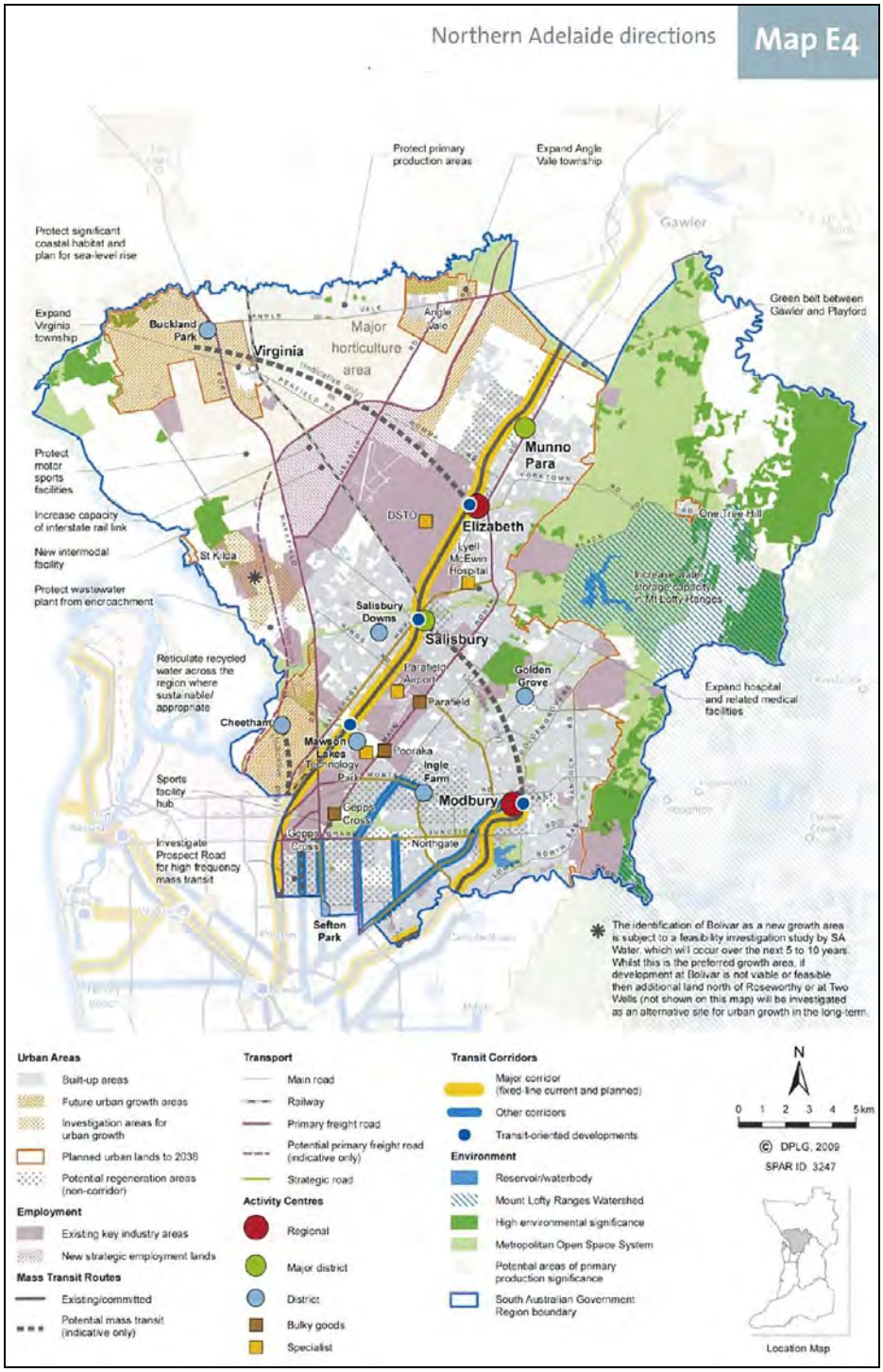


Figure 13: Regional Directions for northern Adelaide

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.

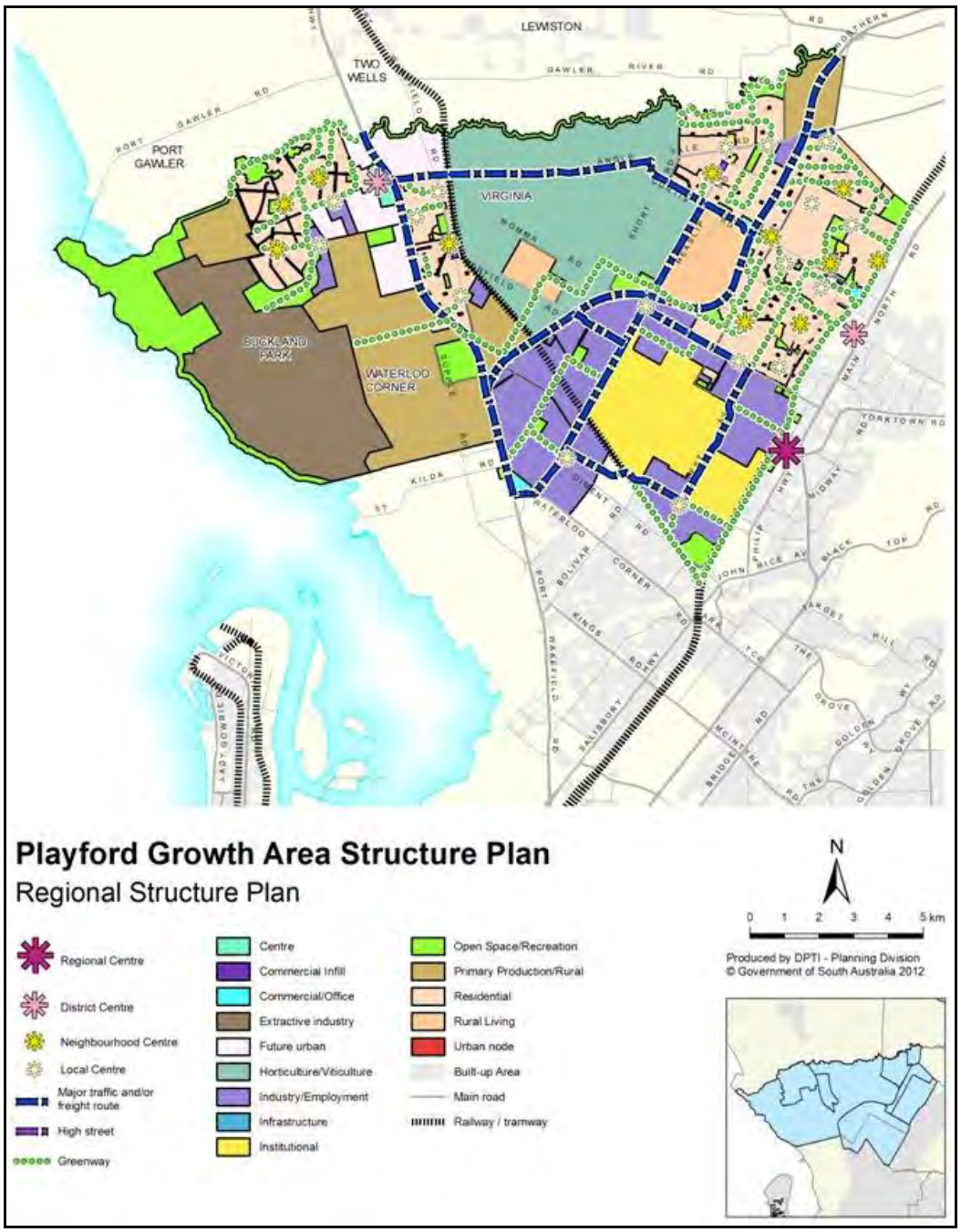


Figure 14: Draft Playford Growth Area Structure Plan

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 boulevarde 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 boulevarde into Precinct 2.

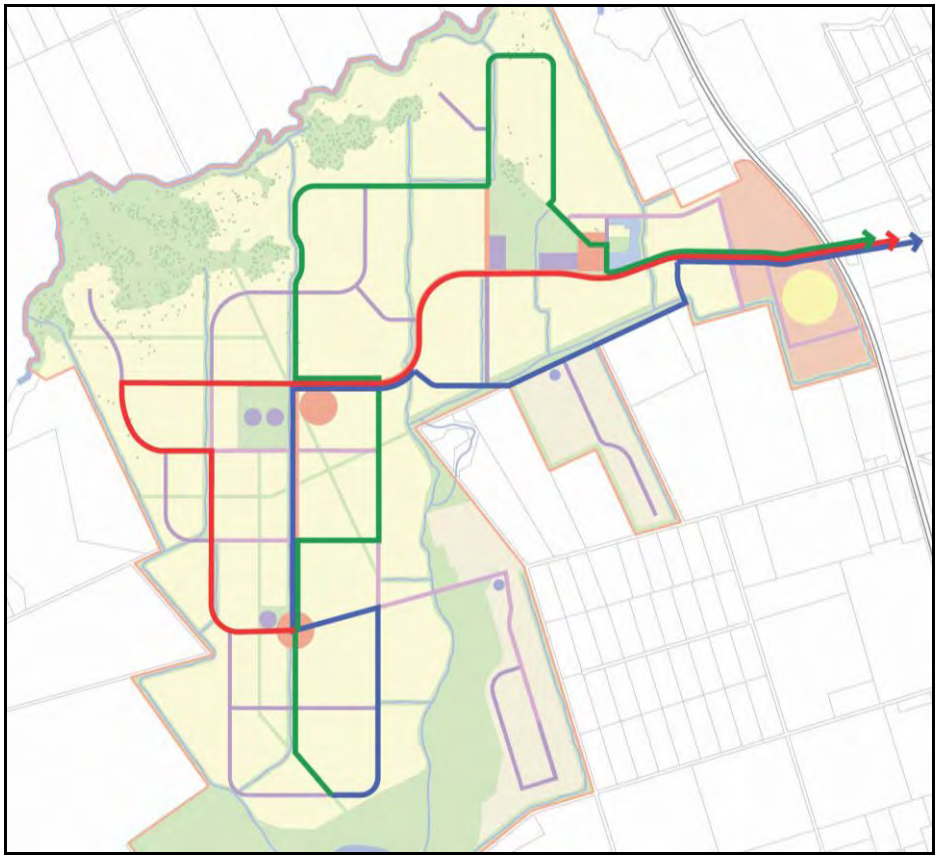


Figure 15: Amended masterplan bus routes

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.

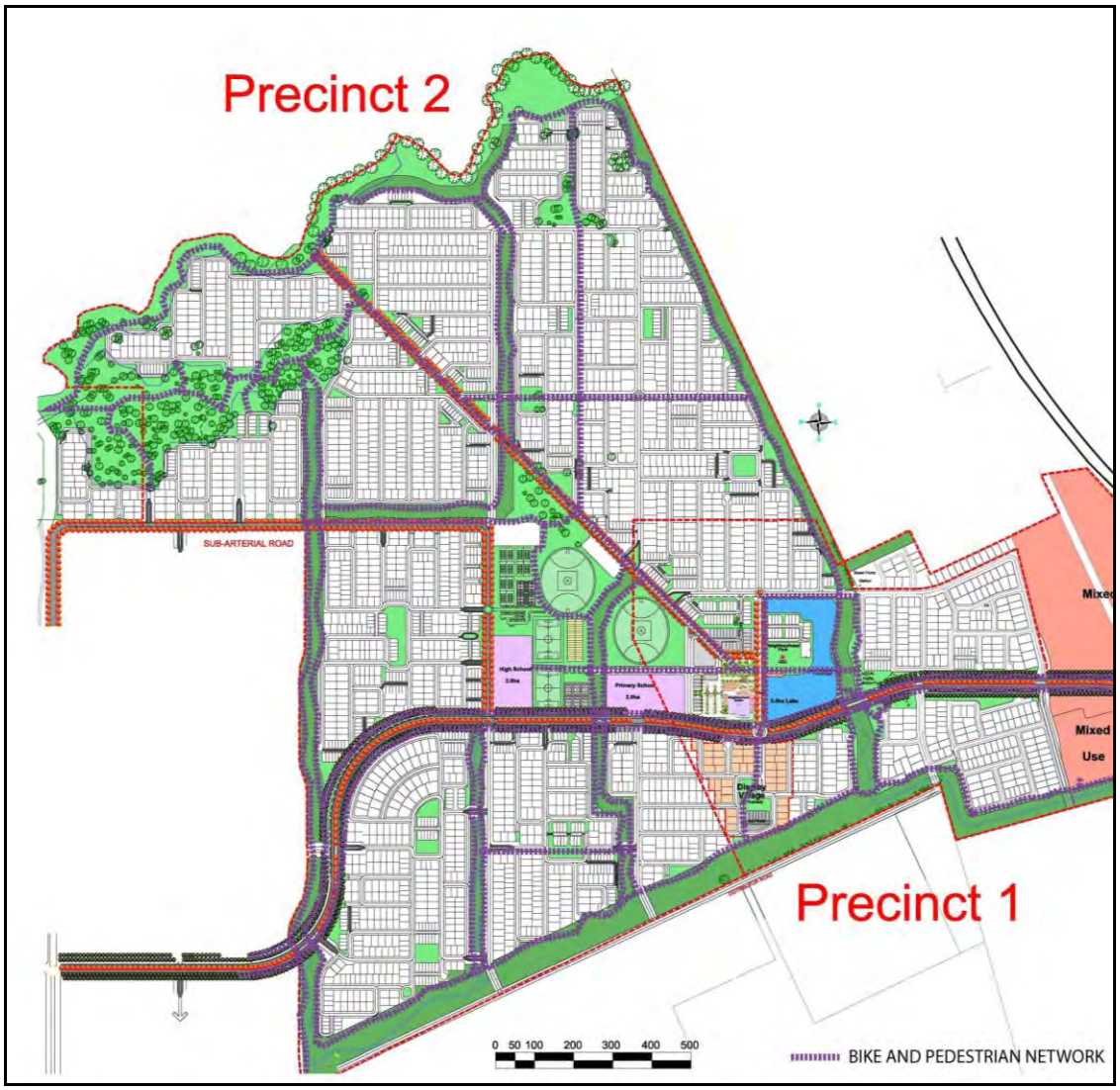


Figure 16: Bike and walk ways coordinated over Precincts 1 and 2

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.

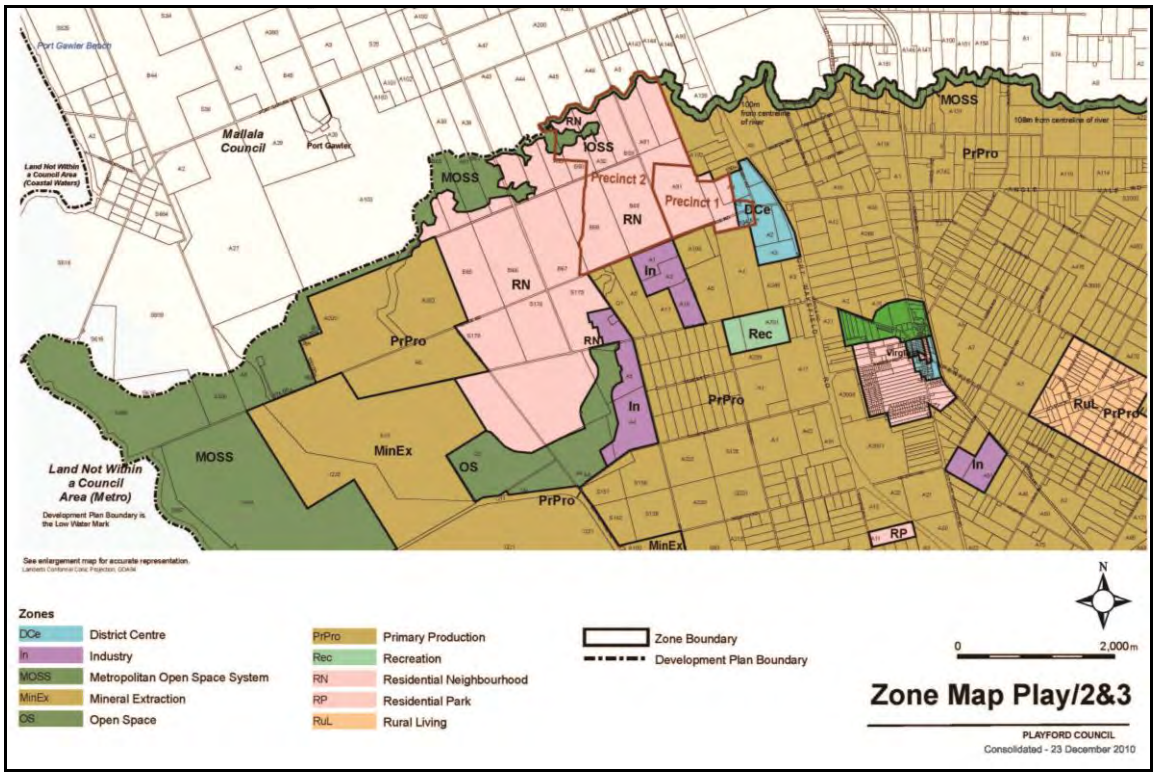


Figure 17: Precincts 1 and 2 with zones

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.

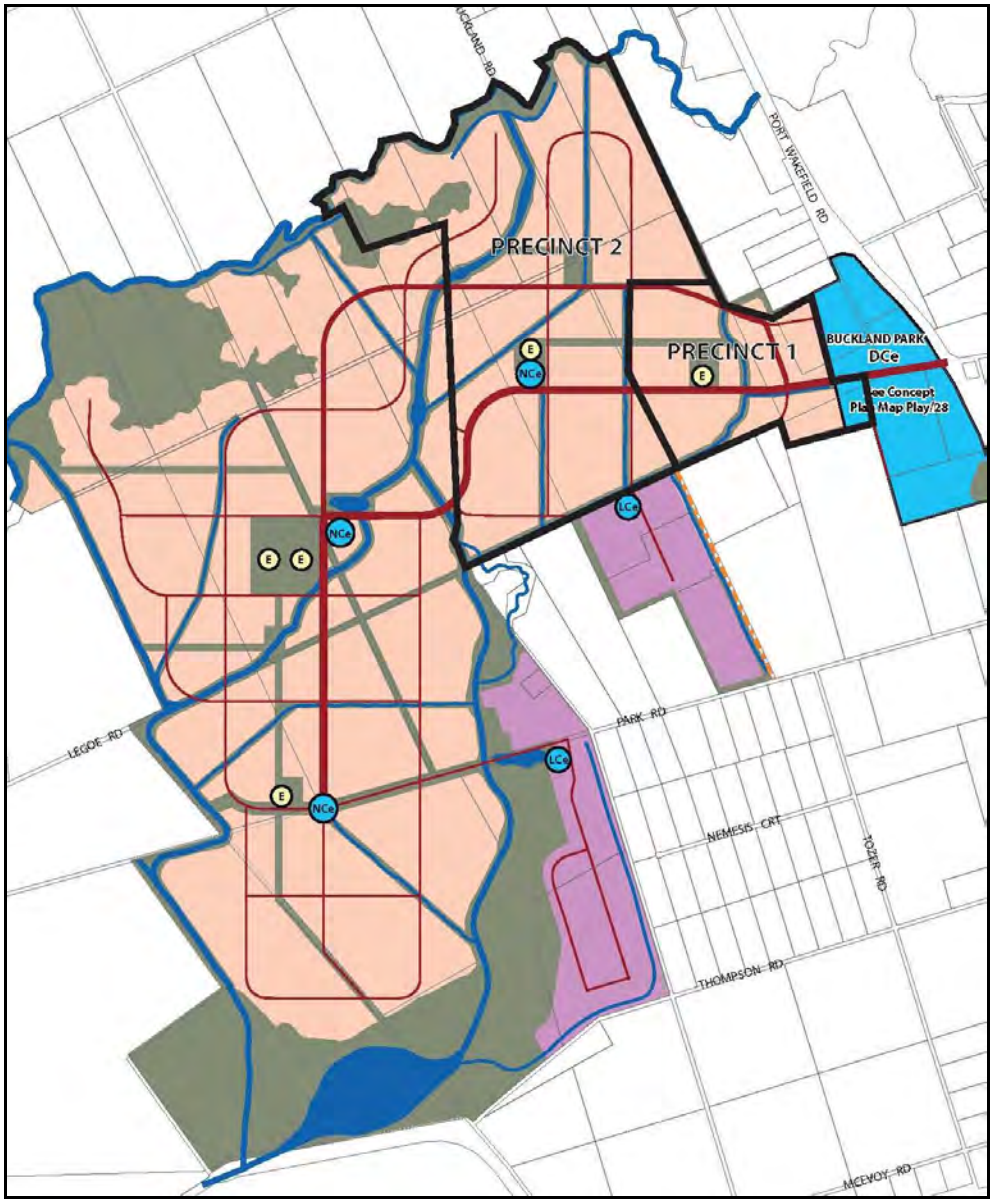


Figure 18: Precinct 2 and the Buckland Park Concept Plan

6.3 The Residential Neighbourhood zone

Table 2: Residential Neighbourhood zone objectives

OBJECTIVES		COMMENT
1	*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.*	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.
2	*Provision of increased residential densities within and adjacent to centres, public transport stops and public open spaces.*	Precinct 2 includes medium density sites near public transport routes and open space, and around the neighbourhood centre.
3	*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.*	15% (400) Affordable Housing is included, as illustrated in drawing *A035613LM Precinct 2 Affordable Housing Rev A.* 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.
4	*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.*	Precinct 2 can be provided with infrastructure and utilities in an orderly manner as envisaged in the *Buckland Park Concept Plan Map*. The proposed amended staging is consistent with the structure envisaged in the Concept Plan.
5	*Open space systems designed to provide multiple use reserve areas that promote water management, habitat retention and enhancement, and active and passive recreation.*	Precinct 2's open space will support a variety of uses, including bike and walking routes, water management, and active and passive recreation. As can be seen from Figures 4, 5, 10 and 12 these are connected to Precinct 1, and westward into future Precincts.
6	*Sustainable development outcomes through innovation in stormwater management, waste minimisation, water conservation, energy efficiency and urban biodiversity.*	A sustainable approach to storm and flood water, biodiversity, energy efficiency, and waste management will be implemented in Precinct 2.
7	*Land not used for sensitive urban purposes until potential adverse impacts from organics waste treatment and composting operations south of the zone are removed.*	Not applicable to Precinct 2.
8	*Development that contributes to the desired character of the zone.*	Precinct 2 is consistent with the zone's desired character (Table 3).

Table 3: Desired Character for Residential Neighbourhoods

ELEMENT		COMMENT
1	*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.*	Precinct 2's residential neighbourhoods are connected by roads and parks. The proposed community focus will foster a sense of community.
2	*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.*	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	*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.*	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	*To deliver housing diversity, including affordable and social housing products, innovative solutions in land division, housing design, access and parking will be encouraged.*	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	*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.*	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	*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.*	While Precinct 2 adjoins the community focus, it is not within its boundaries. Therefore this is not applicable.

ELEMENT		COMMENT
7	*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.*	The Precinct 2 land division accommodates a variety of open space: • Active sporting fields and courts. • Local parks • Linear connecting areas for bikes and walking. 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.
8	*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.*	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. In particular, the design facilitates connections to the Gawler River corridor, an important location of interest.
9	*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.*	Precinct 2 supports the main entry boulevarde as an important landscaped, movement corridor.
10	*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.*	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. Quality landscaping and lighting will be provided subject to detailed design in consultation with Playford Council.

ELEMENT		COMMENT
11	*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.*	WSUD principles are central to the design, and storm water management systems are being designed in consultation with Playford Council. Storm water will be directed to the Thompson Outfall Channel.

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^2 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
Detached	270 (minimum)	7	✓
Semi-detached	220 (minimum)	6	✓
Group dwelling	200 (minimum)	5	✓
Residential flat building (1 and 2 storey)	200 (average)	5	NA
Row dwelling and detached dwellings constructed boundary to boundary	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

MATTER FOR CONSIDERATION		RESPONSE
1	*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.*	DPTI has agreed to concept designs for the initial, interim and ultimate intersections. The intersection will be available to serve Precinct 2.
2	*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.*	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	*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.*	The Playford Growth Area Structure Plan nominates the provision of schools within the Masterplan site. In particular, a B-12 school can be accommodated within Precinct 2 generally in accordance with the Playford Growth Structure Plan. Discussions with both Dept. of Education and the private school sector will be ongoing. Land will be available for childcare providers within the community focus.
4	*Affordable Housing – Negotiations for the 15% affordable housing requirement would be ongoing for the life of the development.*	15% (400) of Precinct 2's residential allotments are nominated as Affordable Housing.
5	*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.*	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. 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.
6	*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.*	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^2 of community space within the neighbourhood centre. 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.
7	*Mosquitoes – A Management Plan for mosquitoes will be established for Stages 3 to 5 as detailed land division occurs.*	Not Applicable.

MATTER FOR CONSIDERATION		RESPONSE
8	*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.*	Management and exclusion of feral animals from the Gawler River corridor will be addressed in the biodiversity management strategy.
9	*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.*	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	*Potable Water – The Proponent will enter into agreements with SA Water in relation to the timing of water services to the Stages.*	Please see **Annexure 2.**
11	*Waste Water - The Proponent will enter into agreements with SA Water in relation to the timing of water services to the Stages.*	Please see **Annexure 2.**
12	*Recycled Water – For Stages 2 to 5 of the development the Proponent will prepare a strategy and designs with SA Water for their approval.*	Please see **Annexure 2.**
13	*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.*	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	*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.*	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. 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. 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.
15	*Electricity – Upgrades to the electricity will occur progressively as the Stages commence.* *Indicatively plans for a substation would be done with ETSA for Stage 2 and other upgrades would be required for Stages 3 to 5.*	On 20 June 2013, SA Power Networks confirmed electricity would be available to Precinct 2. **(Annexure 2**)
16	*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.*	On 9 July APA Group confirmed gas would be available to Precinct 2. **(Annexure 2)** Precinct 2 is not affected by the EPIC Pipeline.
17	*Telecommunications – The Proponent will work with Telstra to identify upgrades as needed.*	Walker is working with telecommunications providers to ensure utilities are provided in a timely manner.
18	*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.*	Precinct 2 is at 5.3 AHD to 11.8 AHD, therefore this is not applicable.

MATTER FOR CONSIDERATION		RESPONSE
19	*Any rezoning would consider buffer to adjacent horticultural activities and restricting intensification of horticulture.*	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	*A Schedule of Commitments will be entered into by the Walker Corporation for each stage.*	Please see information on infrastructure and services contained in this report.
21	*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.*	Precinct 1's schedule of infrastructure requirements has been satisfied. Walker is working toward complying with the authorisation's conditions. 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.

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

ANNEXURE TWO

INFRASTRUCTURE AGENCY CORRESPONDENCE

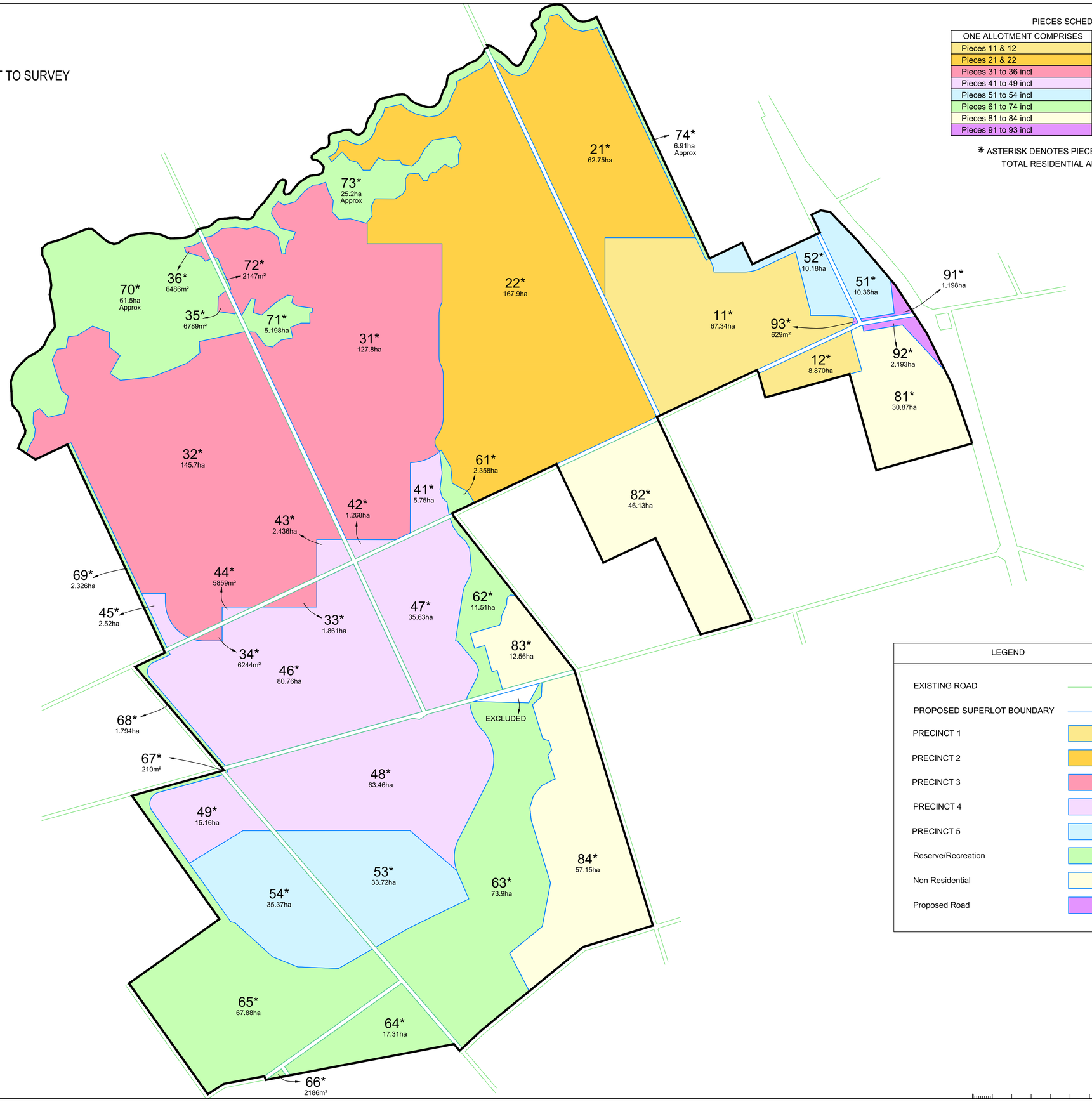
ANNEXURE THREE

GTA REPORT

ANNEXURE FOUR

WALLBRIDGE AND GILBERT REPORT

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 36 incl	277.31 ha
Pieces 41 to 49 incl	207.57 ha
Pieces 51 to 54 incl	89.64ha
Pieces 61 to 74 incl	276.4 ha approx
Pieces 81 to 84 incl	146.71ha
Pieces 91 to 93 incl	3.454ha

* 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

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N W E S

Sheet 1 of 3

Issue	Description	Drwn	Ckd.	Appd.	Date
D	Lots 21, 22 & 31. Lots renumbered.	RHF	GIH		18.06.2013
C	Lots 80 & 81	RHF	GIH		15.06.2011
B	Lot 60 removed	RHF	GIH		15.04.2011
A	Precinct 1 redesign	RHF	GIH		21.02.2011
6	Redesign	RIT	RAF		05.11.2009
5	Redesign	RIT	RAF		20.10.2009
4	Acces road, 25 & 26 changed	RIT	RAF		10.08.2009
3	Superlots 1 & 2 changed	RIT	RAF		02.03.2009
2	Road network deleted, superlots changed	RIT	RAF		27.02.2009
1	Road network updated	RIT	RAF		19.12.2008
0	Issued for review	RIT	RAF		11.11.2008

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Title
RIVERLEA

Status
CONCEPT PLAN
Superlots

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Drawn	Designed
RHF	
Project Code	Drawing No. / Issue
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SUBJECT TO SURVEY

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Sheet 2 of 3

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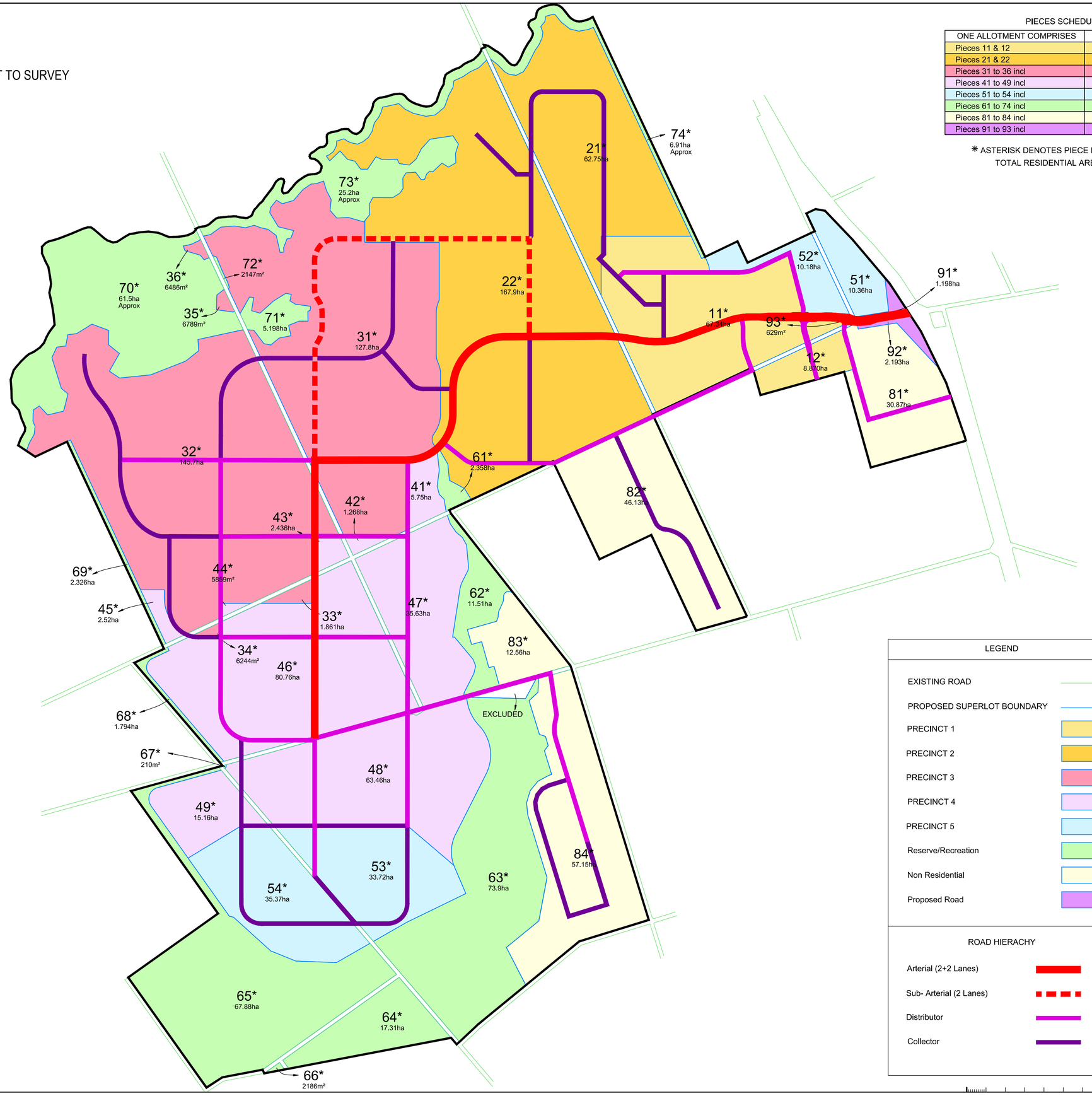

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ROAD HIERACHY

- Arterial (2+2 Lanes)
- Sub- Arterial (2 Lanes)
- Distributor
- Collector

100mm On Original A1

N W E S

Sheet 3 of 3

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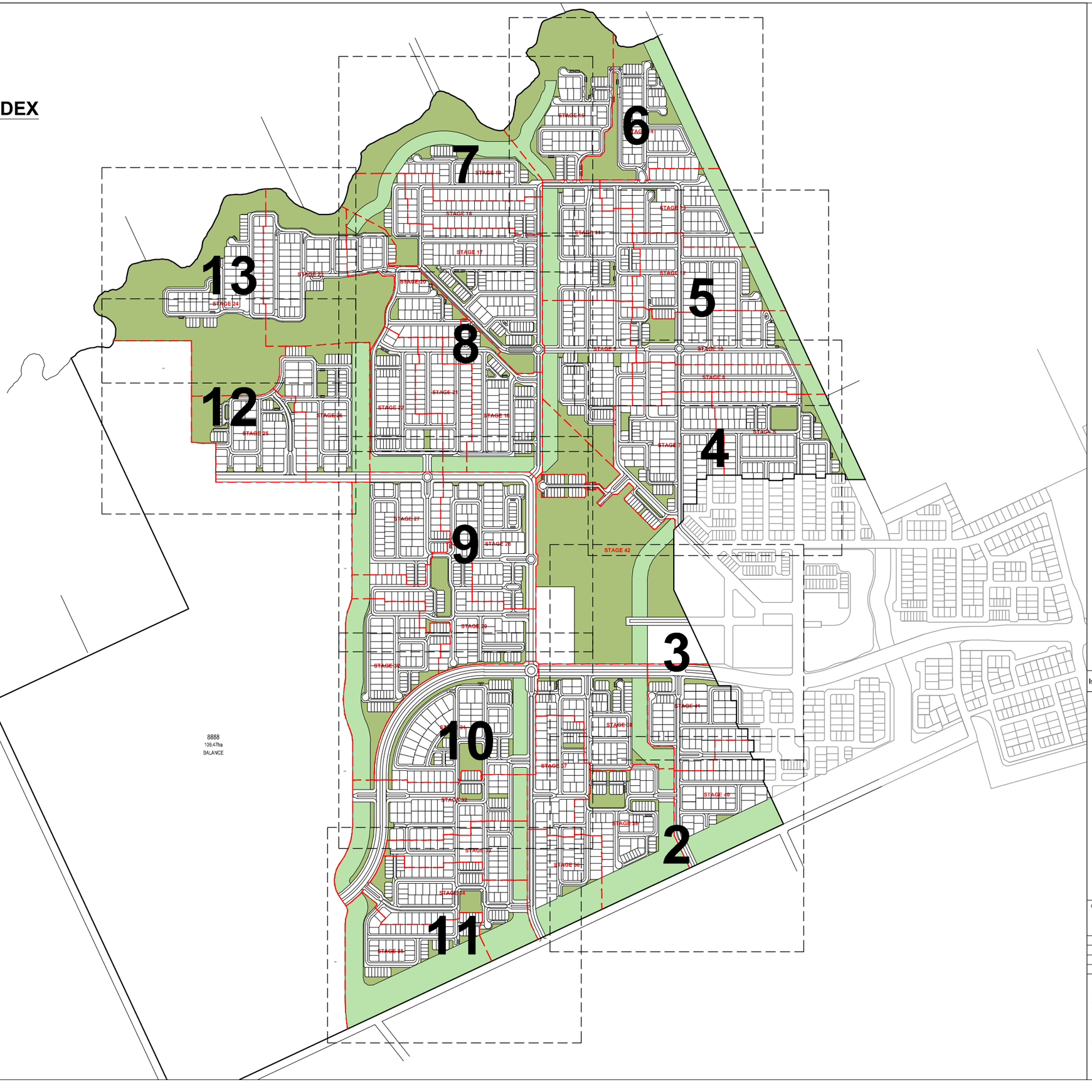

Development No. 292 / D / 13
City of Playford

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

C'sT 5868/774, 5868/780, 5868/771, 5868/775, 5868/785, 5868/770, 5868/782, 5868/767, 5868/766, 5868/768
PT CT 5868/769

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SHEET 1 of 13

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RIVERLEA
PRECINCT 2

Client

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Issue	Description	Drwn	Ckd.	Appd.	Date
C	2ND DRAFT AMENDMENTS	RHF	GIH		26.09.2013
B	1ST DRAFT AMENDMENTS	RHF	GIH		20.08.2013
A	1ST ISSUE	RHF	GIH		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%)	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.

Original Sheet Size A1

Glenn Ian Hordacre
LICENSED SURVEYOR

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

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+ Property + Land Development +
+ Construction + Mining +
+ Spatial Information Management +

Alexander Symonds Surveying Consultants

STAGE 30

STAGE 31

STAGE 32

STAGE 37

RIVERLEA 36.6 WIDE BOULEVARD

RIVERLEA 36.6 WIDE BOULEVARD

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N W E S

SHEET 10 of 13

0 10 20 40 60 80 100 m

1:1000 @ A1

RIVERLEA
PRECINCT 2

Client

walker

Walker Corporation Pty Ltd
ABN 95 001 176 263

G.P.O. Box 4073
Sydney NSW 2001

Level 21, Governor Macquarie Tower
1 Farrer Place Sydney NSW 2000

Telephone (02) 8273 9600
Facsimile (02) 9252 7400
Web walkercorp.com.au

Issue	Description	Drwn	Ckd.	Appd.	Date
C	2ND DRAFT AMENDMENTS	RHF	GIH		26.09.2013
B	1ST DRAFT AMENDMENTS	RHF	GIH		20.08.2013
A	1ST ISSUE	RHF	GIH		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%)	67.185ha
(total reserve less 50% of Drainage Reserves)	
Length of new roads	41.69km

Contour interval 1m. Datum AHD.

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Original Sheet Size A1

Glenn Ian Hordacre
LICENSED SURVEYOR

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

Alexander & Symonds Pty Ltd
11 King William Street Kent Town,
South Australia 5067
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T (08) 8130 1666
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+ Construction + Mining +
+ Spatial Information Management +

Alexander Symonds Surveying Consultants

STAGE 33

STAGE 34

STAGE 35

STAGE 36

LEGOE ROAD

BROOKS ROAD

8888
109.47ha
BALANCE

8099
5.271ha

8098
1198m²

8100
541m²

8101
3217m²

8102
1196m²

8103
237m²

8104
941m²

8088
1.257ha

8094
2212m²

8095
1.074ha

8096
3379m²

8097
2743m²

Development No. 292 / D / 13
City of Playford

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Hundred of Port Adelaide
in the area named
BUCKLAND PARK

C'sT 5868/774, 5868/780, 5868/771, 5868/775, 5868/785, 5868/770, 5868/782, 5868/767, 5868/766, 5868/768
PT CT 5868/769

SHEET 11 of 13

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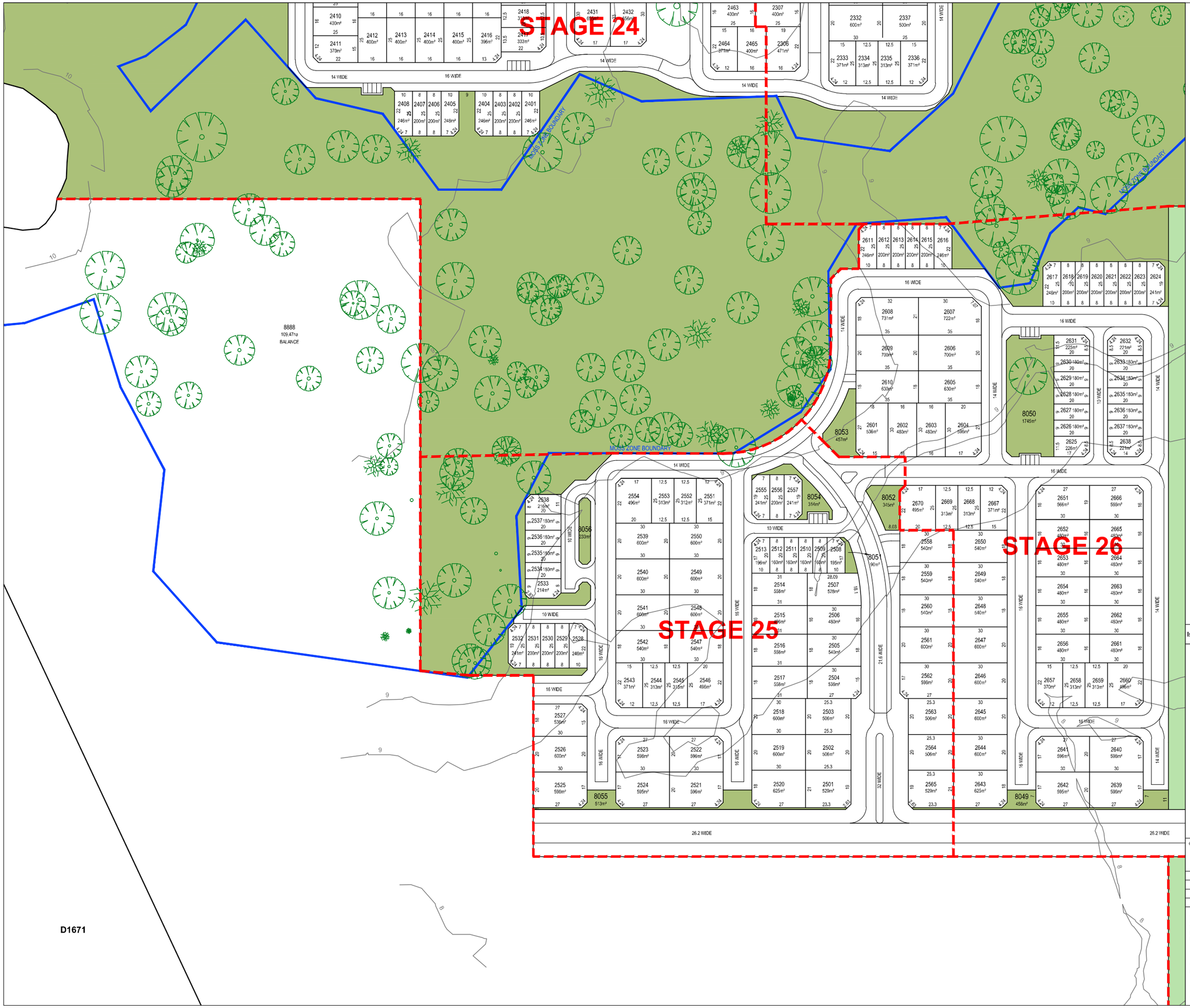

Development No. 292 / D / 13
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STAGE 37

STAGE 36

STAGE 39

STAGE 40

8082 717m²
8083 314m²
8084 945m²
8085 921m²
8089 3543m²
8090 720m²
8091 541m²
8092 1.879ha
8093 319m²
8104 941m²
8105 3.582ha

STOKES ROAD
SMITH ROAD
292/D019/12
STURT
WALK
PERCIVAL STREET
STOKES CIRCU
BYRON PLACE
CLOSED ROAD
BUCKLAND ROAD
LEGOE ROAD

Development No. 292 / D / 13
City of Playford

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STAGE 42

STAGE 41

STAGE 38

8062
11.948ha

8063
1.069ha

8064
1.267ha

8071
4000m²

8072
730m²

8073
185m²

8074
1118m²

8075
1.389ha

8082
717m²

8083
314m²

8084

4201
1.351 ha
Part School

4202
2.002 ha
School

292/D019/12

BOOBOWRIE WAY

RIVERLEA BOULEVARD

ARTIPENA ROAD

STEPHEN CRESCENT

BROWNE STREET

JOSEPH BROOKS DRIVE

STOKES CIRCUIT

SMITH ROAD

CLOSED ROAD

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City of Playford

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N W E S

SHEET 3 of 13

0 10 20 40 60 80 100 m

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RIVERLEA
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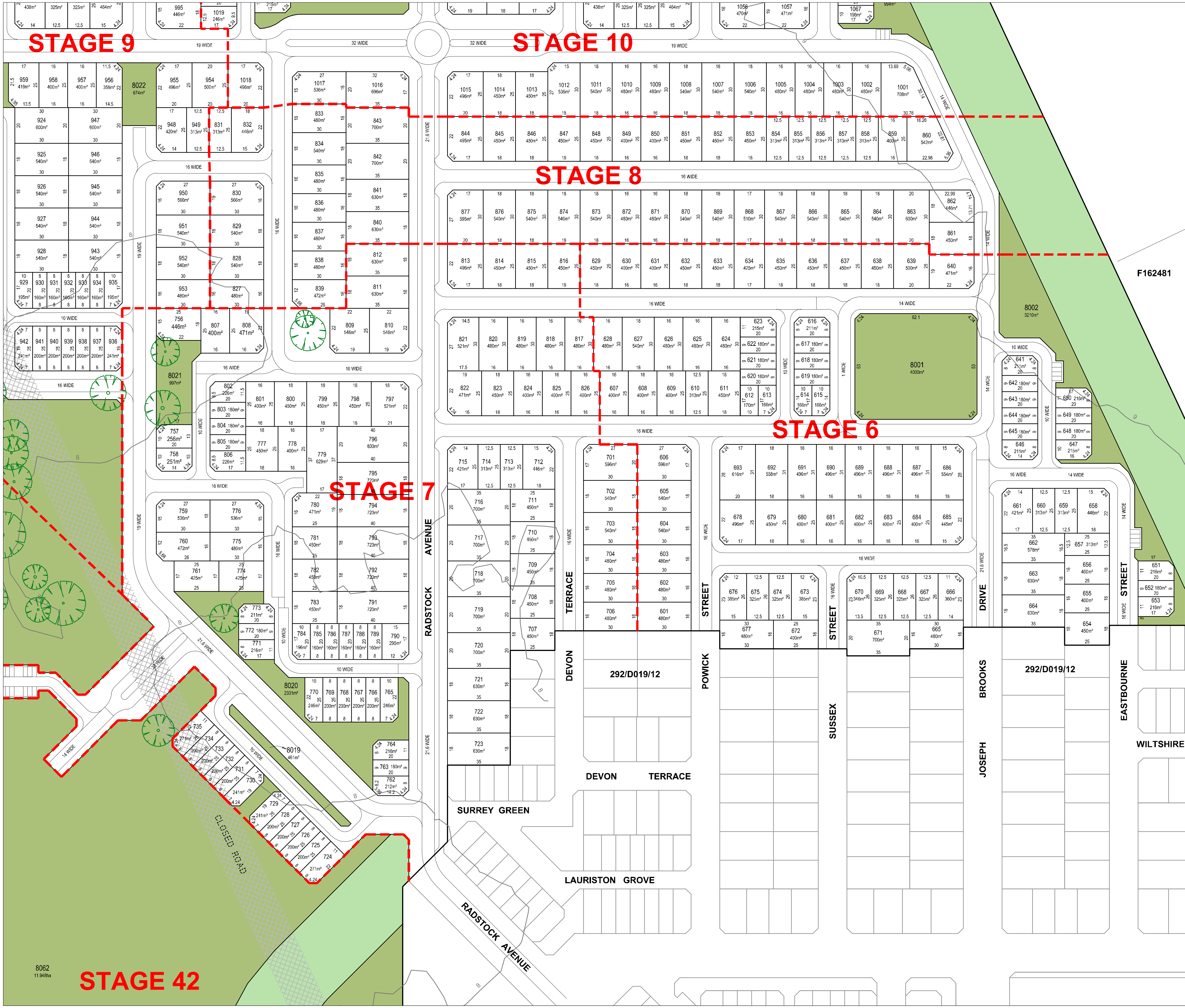

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SHEET 4 of 13

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STAGE 13

STAGE 11

STAGE 12

STAGE 9

STAGE 10

STAGE 8

F162486

Development No. 292 / D / 13
City of Playford

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N W E S

SHEET 5 of 13

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1:1000 @ A1

RIVERLEA
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F162492

GAWLER RIVER

MOSS ZONE BOUNDARY

STAGE 15

STAGE 14

STAGE 13

STAGE 11

8008 178m²

8009 3058m²

8010 1.120ha

8011 341m²

8012 140m²

8013 3.051ha

8014 2635m²

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N W E S

SHEET 7 of 13

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RIVERLEA
PRECINCT 2

BUCKLAND ROAD
CLOSED ROAD
D18929
F103782
GAWLER RIVER
MOSS ZONE BOUNDARY
STAGE 15
STAGE 19
STAGE 18
STAGE 17
STAGE
8013 3.051ha
8014 2635m²
8015 3321m²
8026 132m²
8027 291m²
8028 7472m²
8029 1381m²
8012 140m²

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STAGE 17

STAGE 20

STAGE 21

STAGE 22

STAGE 16

Development No. 292 / D / 13
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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.

Original Sheet Size A1

Glenn Ian Hordacre
LICENSED SURVEYOR

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

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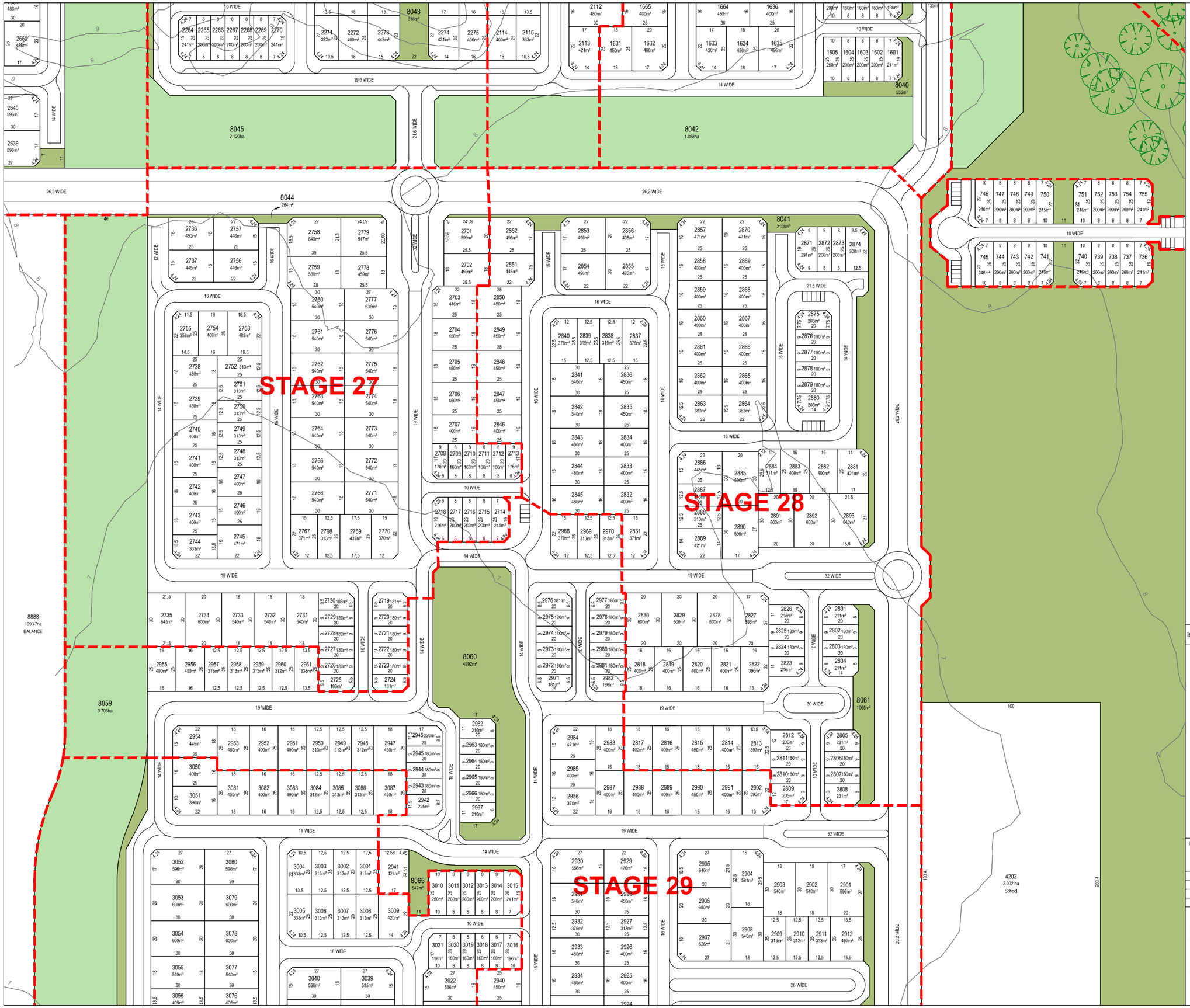
+ Property + Land Development +
+ Construction + Mining +
+ Spatial Information Management +

Alexander Symonds Surveying Consultants



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

C'sT 5868/774, 5868/780, 5868/771, 5868/775, 5868/785, 5868/770, 5868/782, 5868/767, 5868/766, 5868/768
PT CT 5868/769

N W E S

SHEET 9 of 13

0 10 20 40 60 80 100 m

1:1000 @ A1

RIVERLEA
PRECINCT 2

Issue	Description	Drwn	Ckd.	Appd.	Date
C	2ND DRAFT AMENDMENTS	RHF	GIH		26.09.2013
B	1ST DRAFT AMENDMENTS	RHF	GIH		20.08.2013
A	1ST ISSUE	RHF	GIH		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%) 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.

Original Sheet Size A1

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Client

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+ Spatial Information Management +

Alexander Symonds Surveying Consultants

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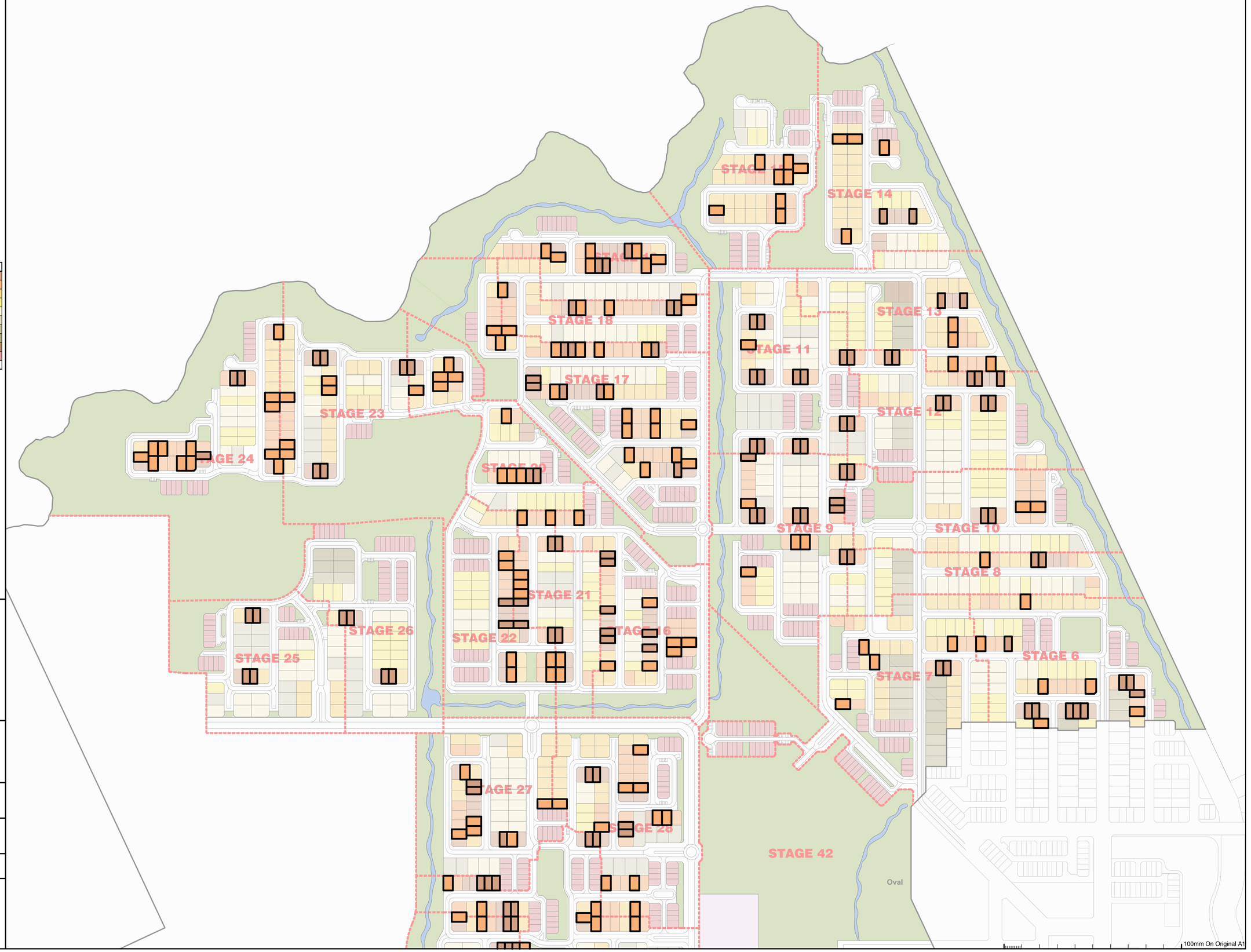
RIVERLEA

LEGEND

Allotment Type	Width	Depth	Area m²	Total	Total%
Small Courtyard	12.5	25	312	330	12.00%
Medium Courtyard	16	25	400	456	17.00%
Large Courtyard	18	25	450	325	12.00%
Small Traditional	16	30	480	275	10.00%
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	20	0.50%
Large Estate	22	35	770	12	0.50%
Medium Density	8	25	200	781	30.00%
Total				2664	100%

0 30 60 120 180 240 m

1:3000



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Title

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

Project

RIVERLEA

Project Code	Drawing No.	Rev
A035613.0000	A035613LM	A

Revison Date

18 October 2013

Surveyor

Alexander & Symonds Pty Ltd
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RIVERLEA

LEGEND

Allotment Type	Width	Depth	Area m²	Total	Total%
Small Courtyard	12.5	25	312	330	12.00%
Medium Courtyard	16	25	400	456	17.00%
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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	20	0.50%
Large Estate	22	35	770	12	0.50%
Medium Density	8	25	200	781	30.00%
Total				2664	100%

0 30 60 120 180 240 m

1:3000

Client

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Title

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

Project

RIVERLEA

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RIVERLEA

LEGEND

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Total				2664	100%

0 30 60 120 180 240 m

1:3000

Client

walker

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Title

PRECINCT 2
Residential Allotment Mix
Modification
Sheet 1 of 2

Project

RIVERLEA

Project Code	Drawing No.	Rev
A035613.0000	A035613LM	A

Revison Date

18 October 2013

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Alexander Symonds Surveying Consultants

Allotment Type	Width	Depth	Area m²	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	6	12	4	18	13	4	10	2	15	19	7	12	7	9	8	10	7	6	6	10	10	16	14	4	7	11	9	12	13	4	8	15	2	5	330	12%
Medium Courtyard	16	25	400	17	11	5	18	12	8	12	11	5	17	21	38	17	15	12	14	14	9	23	0	0	11	28	20	8	6	9	10	10	8	6	11	17	5	13	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	11	8	3	10	8	3	4	4	325	12%
Small Traditional	16	30	480	15	12	11	7	13	9	17	15	6	2	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	2	0	0	0	0	2	0	0	0	0	0	0	0	4	2	29	1%
Medium Estate	20	35	700	1	6	2	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	1	0	0	0	0	0	0	0	2	0	20	0.5%
Large Estate	22	35	770	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	12	0.5%
Medium Density	8	25	200	25	58	0	29	16	24	21	0	21	21	43	53	10	11	15	0	28	5	15	20	28	23	26	33	35	32	24	0	36	31	0	12	33	39	2	12	781	30%
Total				93	126	51	95	67	87	93	61	67	62	96	142	54	56	58	49	75	60	65	65	70	79	93	92	87	83	75	45	79	63	44	61	73	79	54	65	2664	100%

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RIVERLEA

LEGEND

Allotment Type	Width	Depth	Area m²	Total	Total%
Small Courtyard	12.5	25	312	330	12%
Medium Courtyard	16	25	400	456	17%
Large Courtyard	18	25	450	325	12%
Small Traditional	16	30	480	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	20	0.5%
Large Estate	22	35	770	12	0.5%
Medium Density	8	25	200	781	30%
Total				2664	100%

0 30 60 120 180 240 m

1:3000

Client

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Title

PRECINCT 2
Residential Allotment Mix
Modification
Sheet 2 of 2

Project

RIVERLEA

Project Code	Drawing No.	Rev
A035613.0000	A035613LM	A

Revison Date

18 October 2013

Surveyor

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Allotment Type	Width	Depth	Area m²	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	6	12	4	18	13	4	10	2	15	19	7	12	7	9	8	10	7	6	6	10	10	16	14	4	7	11	9	12	13	4	8	15	2	5	330	12%
Medium Courtyard	16	25	400	17	11	5	18	12	8	12	11	5	17	21	38	17	15	12	14	14	9	23	0	0	11	28	20	8	6	9	10	10	8	6	11	17	5	13	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	11	8	3	10	8	3	4	4	325	12%
Small Traditional	16	30	480	15	12	11	7	13	9	17	15	6	2	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	2	0	0	0	0	2	0	0	0	0	0	0	0	0	4	2	29	1%
Medium Estate	20	35	700	1	6	2	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	20	0.5%
Large Estate	22	35	770	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	12	0.5%
Medium Density	8	25	200	25	58	0	29	16	24	21	0	21	21	43	53	10	11	15	0	28	5	15	20	28	23	26	33	35	32	24	0	36	31	0	12	33	39	2	12	781	30%
Total				93	126	51	95	67	87	93	61	67	62	96	142	54	56	58	49	75	60	65	65	70	79	93	92	87	83	75	45	79	63	44	61	73	79	54	65	2664	100%

N

W E

S

RIVERLEA

LEGEND

Allotment Type	Width	Depth	Area m²	Total	Total%
Small Courtyard	12.5	25	312	330	12%
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Large Estate	22	35	770	12	0.5%
Medium Density	8	25	200	781	30%
Total				2664	100%

0 30 60 120 180 240 m

1:3000

Client

walker

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Title

PRECINCT 2
Residential Allotment Mix Modification
Sheet 1 of 2

Project

RIVERLEA

Project Code	Drawing No.	Rev
A035613.0000	A035613LM	A

Revison Date

18 October 2013

Surveyor
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STAGE 15
STAGE 14
STAGE 19
STAGE 18
STAGE 13
STAGE 11
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STAGE 42
Oval

100mm On Original A1

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W E
S

RIVERLEA

LEGEND

Allotment Type	Width	Depth	Area m²	Total	Total%
Small Courtyard	12.5	25	312	330	12%
Medium Courtyard	16	25	400	456	17%
Large Courtyard	18	25	450	325	12%
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Total				2664	100%

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1:3000

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PRECINCT 2
Residential Allotment Mix
Modification
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STAGE 25
STAGE 26
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STAGE 16
STAGE 6
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STAGE 27
STAGE 28
STAGE 42
Oval
School
School
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STAGE 36
STAGE 34
STAGE 35

100mm On Original A1

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RIVERLEA

LEGEND

Pedestrian and Cycling Path (29.5km)

0 30 60 120 180 240 m

1:3000

Client

Walker Corporation Pty Ltd
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Title

PRECINCT 2
Residential
Pedestrian and Cycling Network
Sheet 1 of 2

Project

RIVERLEA

Project Code	Drawing No.	Rev
A035613.0000	A035613PC	A

Revison Date

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STAGE 42
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STAGE 12
STAGE 9
STAGE 10
STAGE 8
STAGE 7
STAGE 6
Oval
GAWLER RIVER
DEVON TERRACE
SURREY GREEN
LAURISTON GROVE
WILTSHIRE GROVE
WORCESTER PLACE
GOODWOOD WAY

100mm On Original A1

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W E

S

RIVERLEA

LEGEND

Pedestrian and Cycling Path (29.5km)

0 30 60 120 180 240 m

1:3000

Client

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PRECINCT 2
Residential
Pedestrian and Cycling Network
Sheet 2 of 2

Project

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W E

S

RIVERLEA

LEGEND

Areas of Special Fencing Control

0 30 60 120 180 240 m

1:3000

Client

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Title

PRECINCT 2
Residential
Special Fencing Control
Sheet 1 of 2

Project

RIVERLEA

Project Code	Drawing No.	Rev
A035613.0000	A035613FC	A

Revison Date

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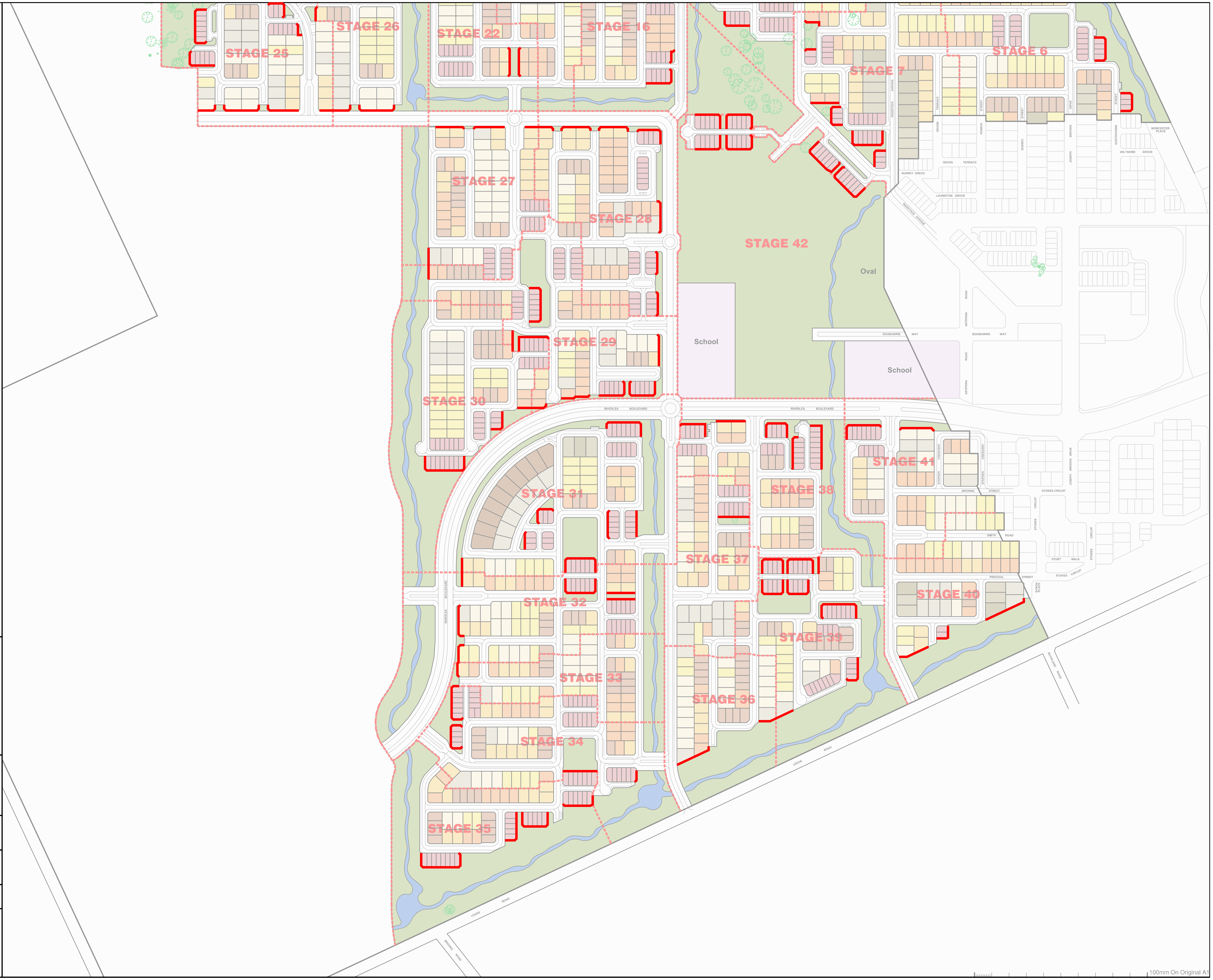
STAGE 25
STAGE 7
STAGE 27
STAGE 28
STAGE 42
Oval

100mm On Original A1

RIVERLEA



LEGEND

Areas of Special Fencing Control

0 30 60 120 180 240 m

1:3000

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Sydney NSW 2001
Level 21, Governor Macquarie Tower
1 Farrer Place Sydney NSW 2000

Telephone (02) 8273 9600
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Web walkercorp.com.au

Title

PRECINCT 2
Residential
Special Fencing Control
Sheet 2 of 2

Project

RIVERLEA

Project Code	Drawing No.	Rev
A035613.0000	A035613FC	A

Revison Date

18 October 2013

Surveyor

Alexander & Symonds Pty Ltd
11 King William Street Kent Town,
South Australia 5067
PO Box 1000 Kent Town, SA 5071
DX 209 ABN 93007 753 988

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Alexander Symonds Surveying Consultants

N

W E

S

0 100 200 400 600 800 m

1:10,000 @ A1

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 900.

Client

walker

Walker Corporation Pty Ltd
ABN 95 001 176 263

G.P.O. Box 4073
Sydney NSW 2001

Level 21, Governor Macquarie Tower
1 Farrer Place Sydney NSW 2000

Telephone (02) 8273 9600
Facsimile (02) 9252 7400
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Title

PROPOSED BUS ROUTE STRATEGY 2031

Project

RIVERLEA

Project Code	Drawing No.	Rev
A056410.0000	A056410BR	B

Revison Date

31 July 2013

Surveyor

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SA Water

SOUTH AUSTRALIAN
WATER CORPORATION

SA Water House
250 Victoria Square
Adelaide South Australia 5000

GPO Box 1751
Adelaide SA 5001

Telephone +61 8 1300 650 950

ABN 69 336 525 019

31 July 2013

Our Ref Buckland Park

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

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

Riverlea
Precinct 2

Traffic Assessment

transportation planning, design and delivery

13A1177000 10/11/14

GTAconsultants

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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Table of Contents

Tables

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:

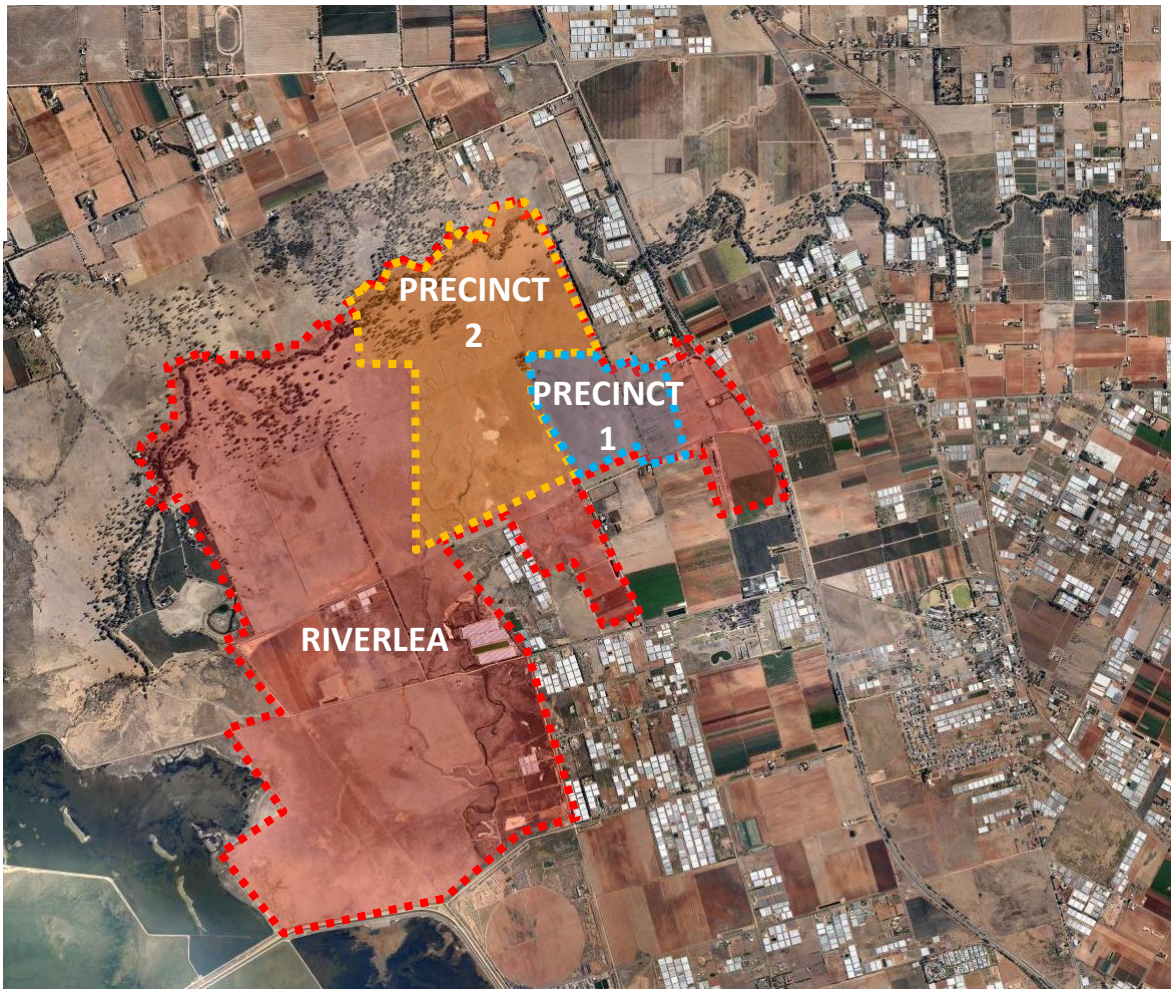
- Masterplan for the proposed development provided by Walker Corp (dated 4th June 2013)
- *'Buckland Park Traffic Impact Assessment'* Parsons Brinckerhoff Australia Pty Ltd, 1 April 2009
- *'Buckland Park Boulevard Intersection Operation Review'* GTA Consultants, 24 August 2011
- various technical data 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 care 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[1] 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 carried approximately 2,500 vehicles per day[1] 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.

[1] '*Annual Average Daily Traffic Estimates 24 hour two-way flows*' DPTI 01 July 2013

3. Development Proposal

3.1 Masterplan

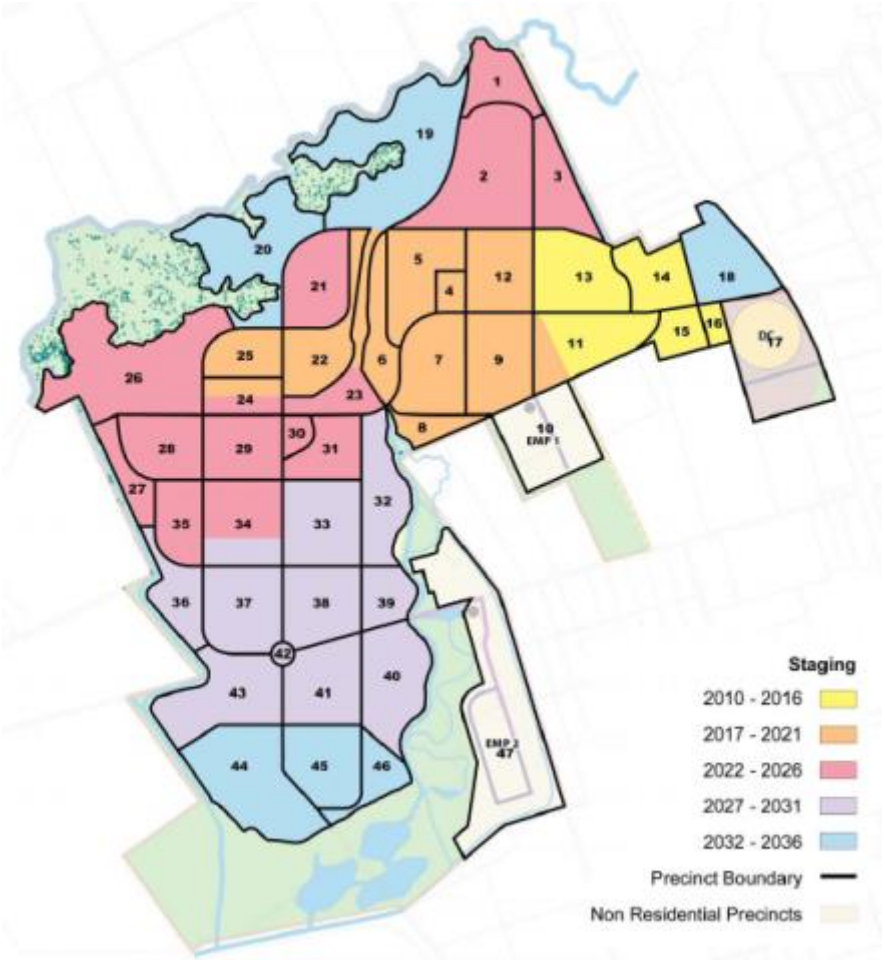
A master plan has been developed for Riverlea to include:

- 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

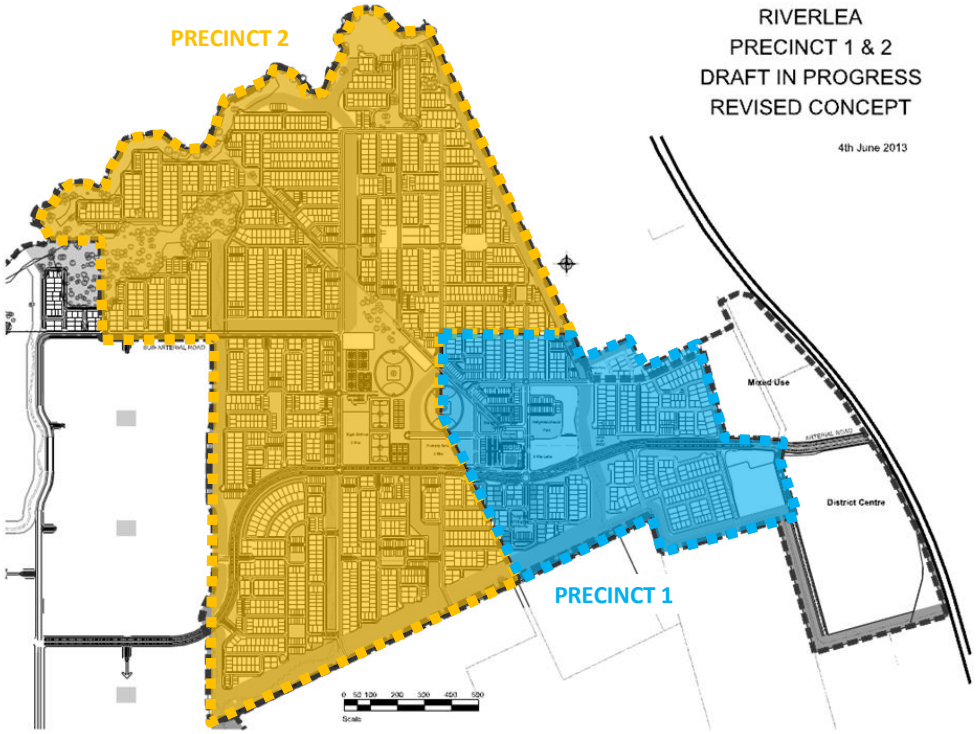
The revised proposal seeks to modify Precinct 2 of the proposed Riverlea Township. The revised Precinct 2 is proposed to comprise approximately 2,630 residential allotments and medium density apartments, a primary and secondary school, and be situated around the proposed Precinct 1.

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 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	*0.85 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 & 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

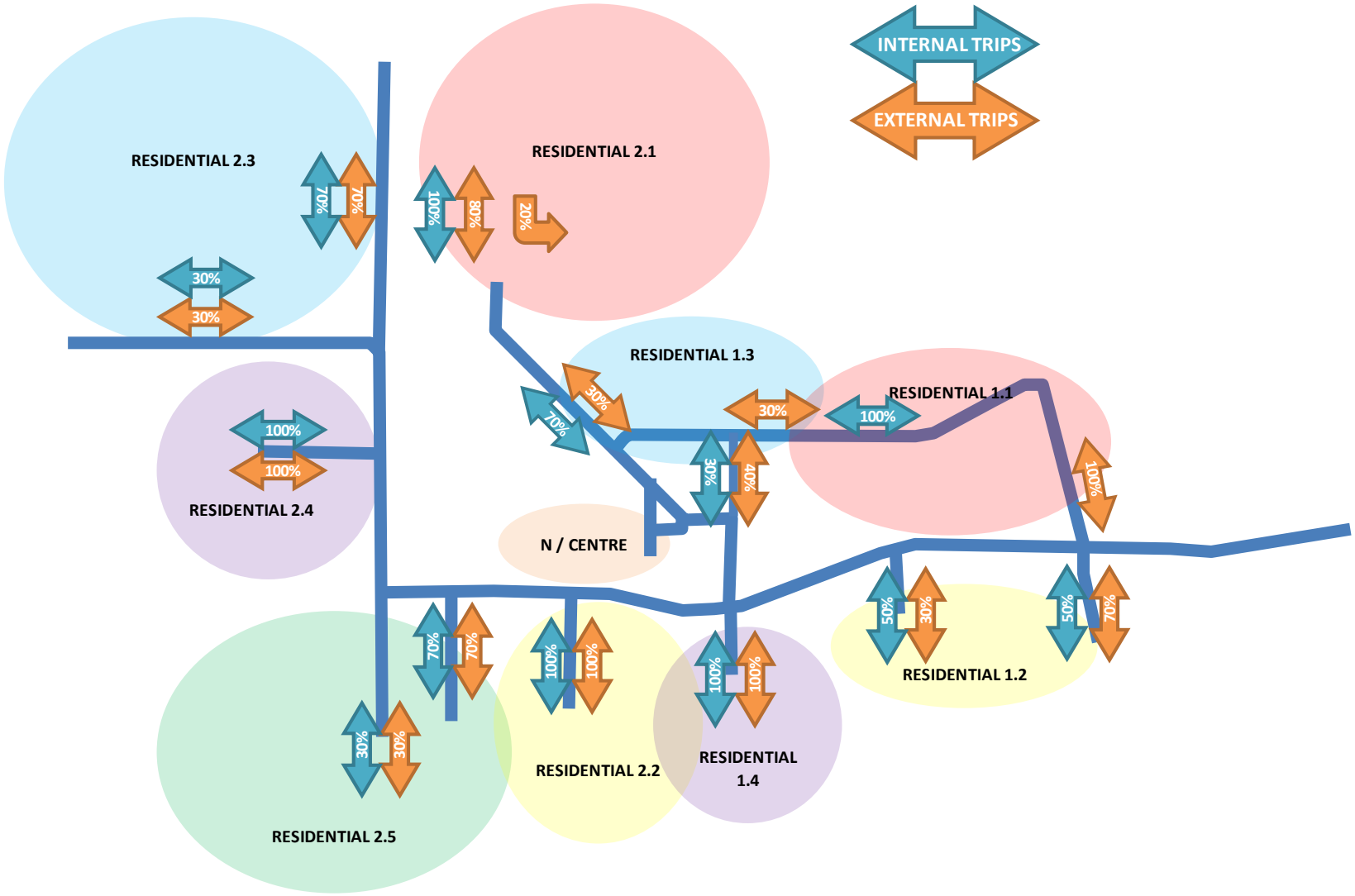
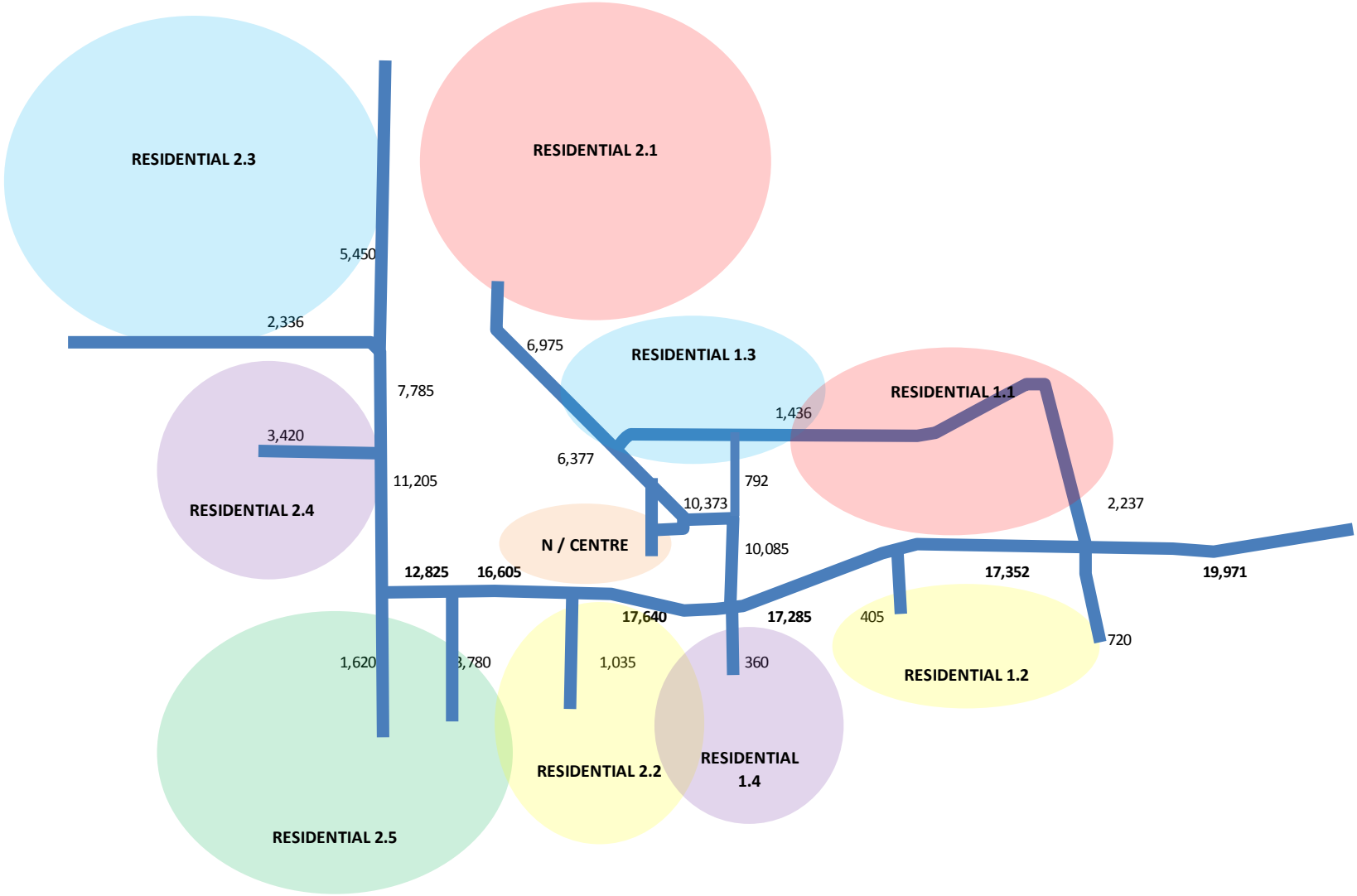


Figure 4.2: Anticipated Daily Traffic Volumes



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.

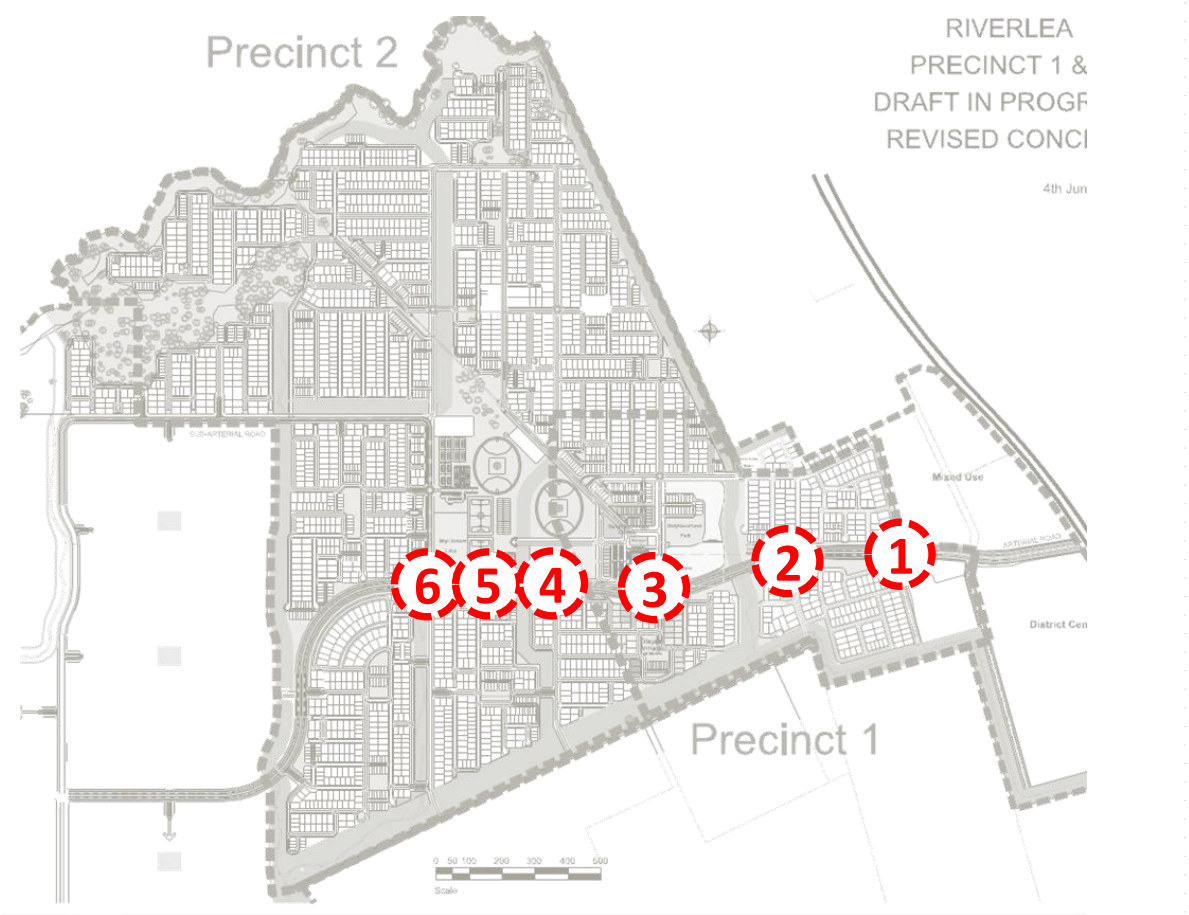
4.3 Traffic Impact

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

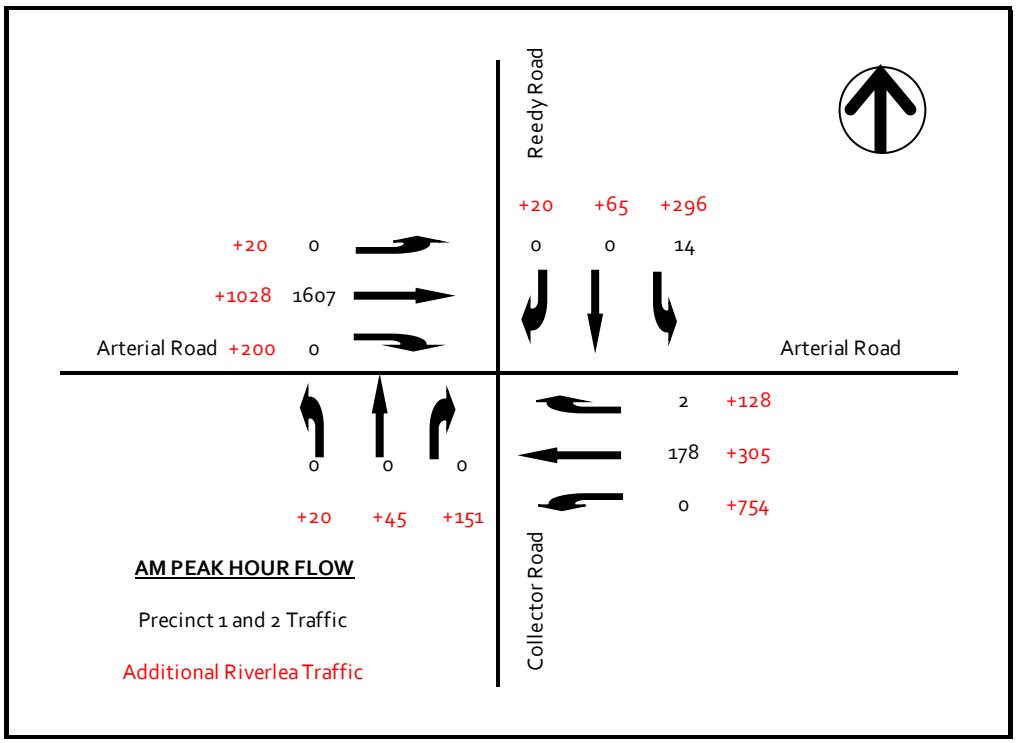
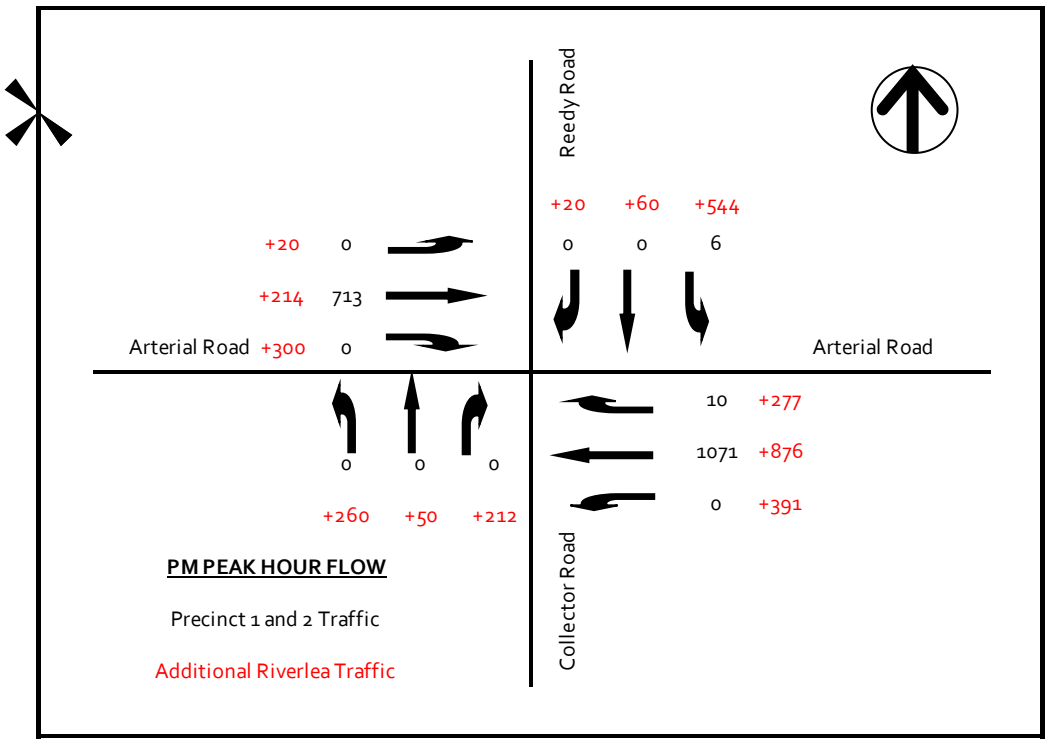


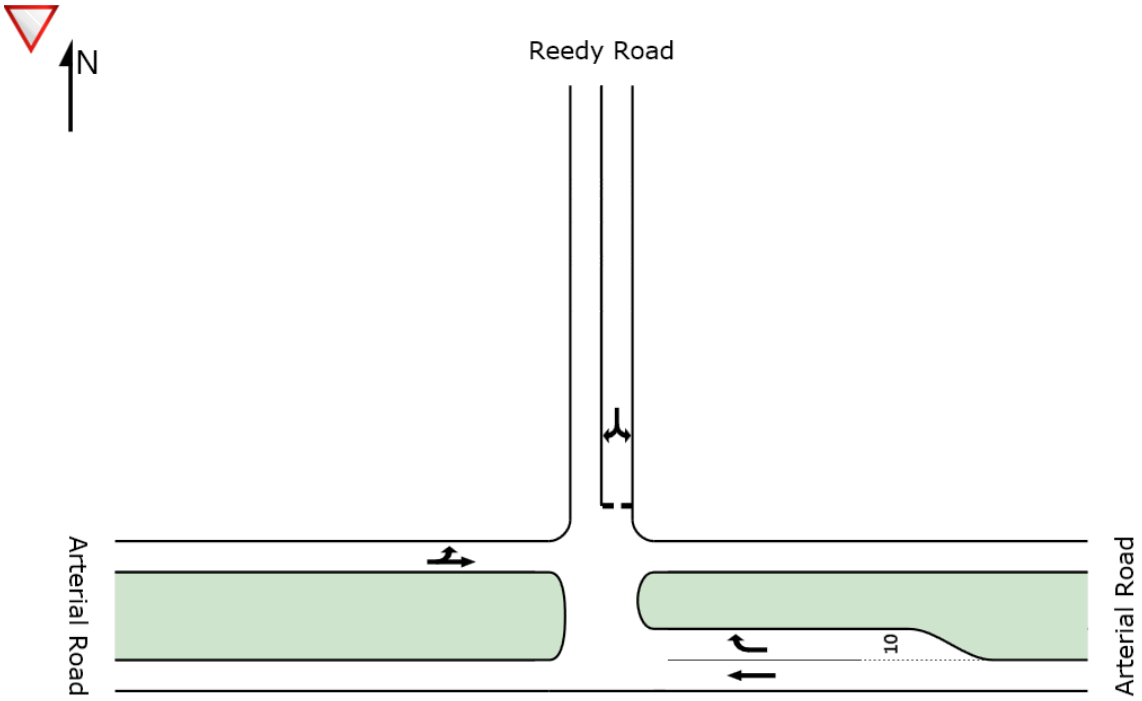
Figure 4.5: PM Peak Hour Turning Movement Volumes – Reedy Road Intersection



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.

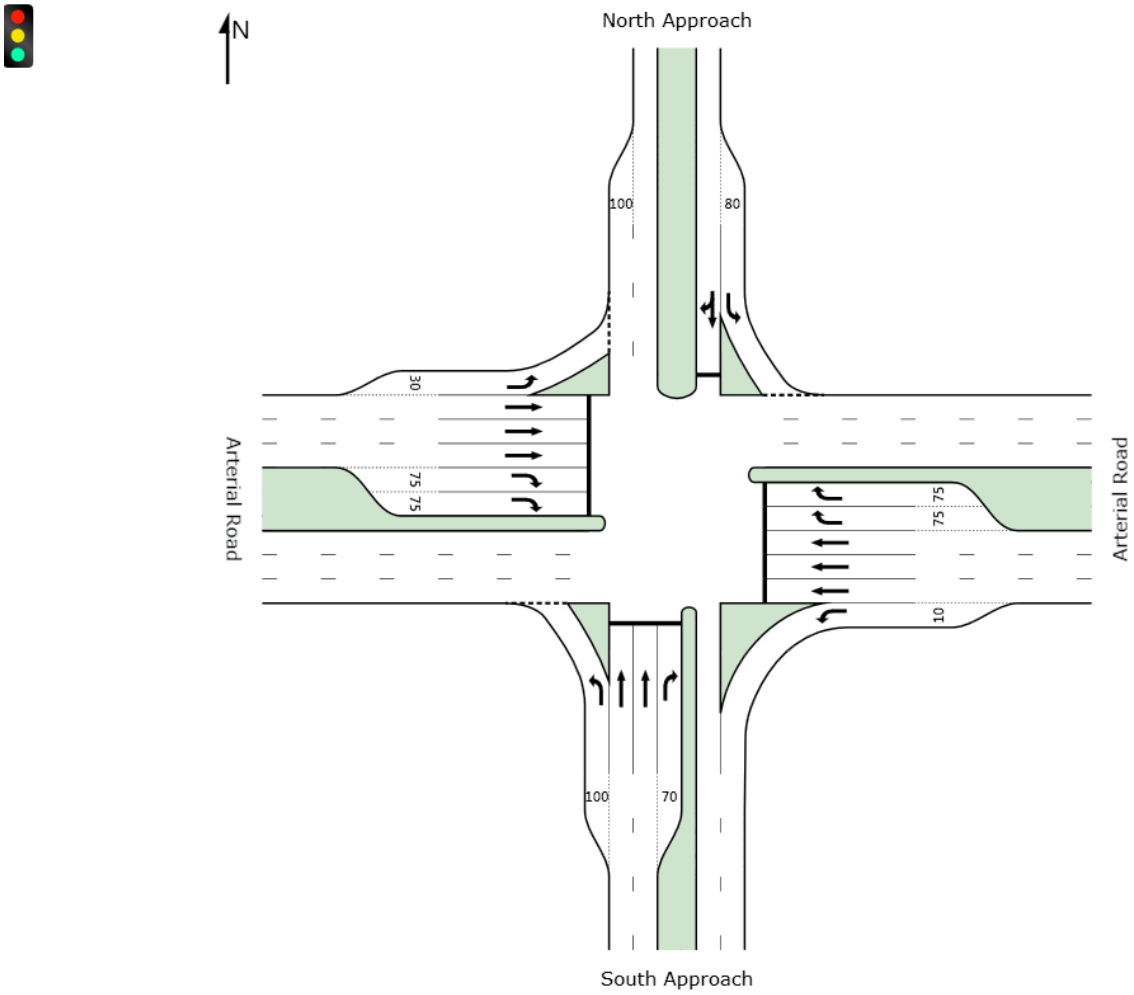
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.6 and Figure 4.7 respectively.

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)	95th 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 95th 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 95th 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

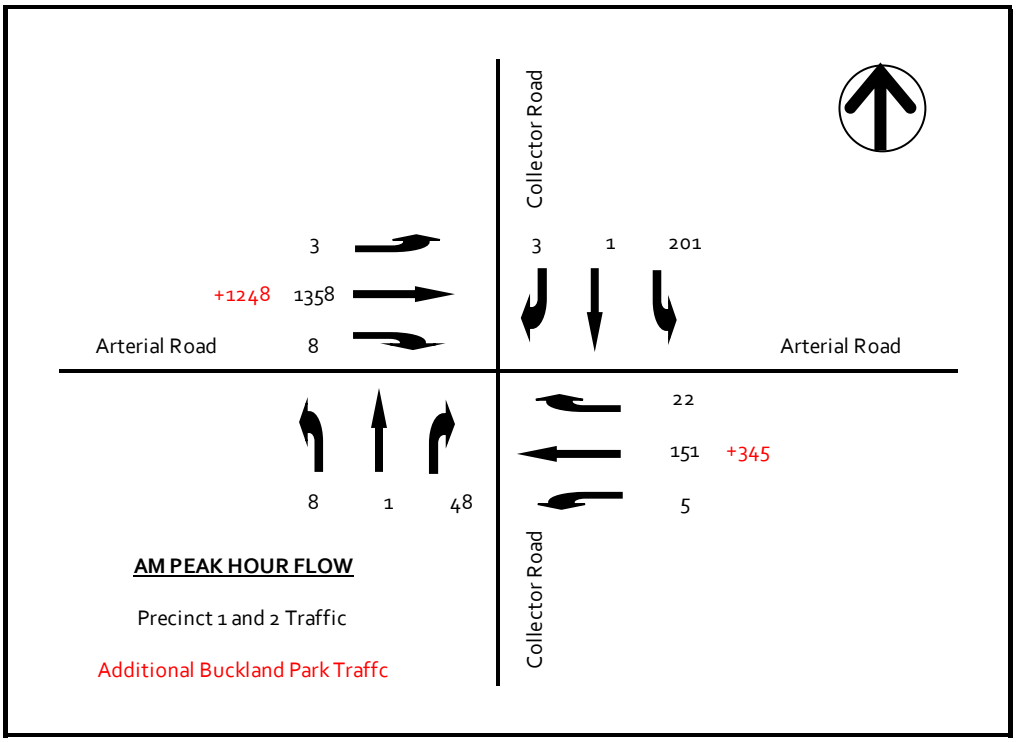
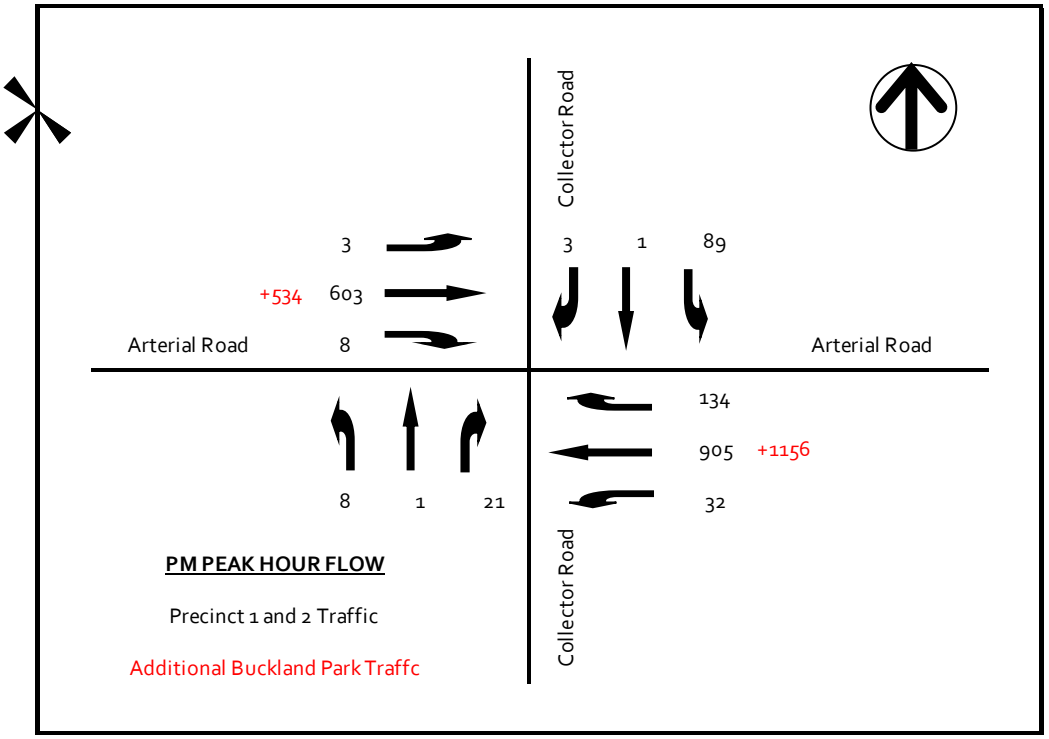


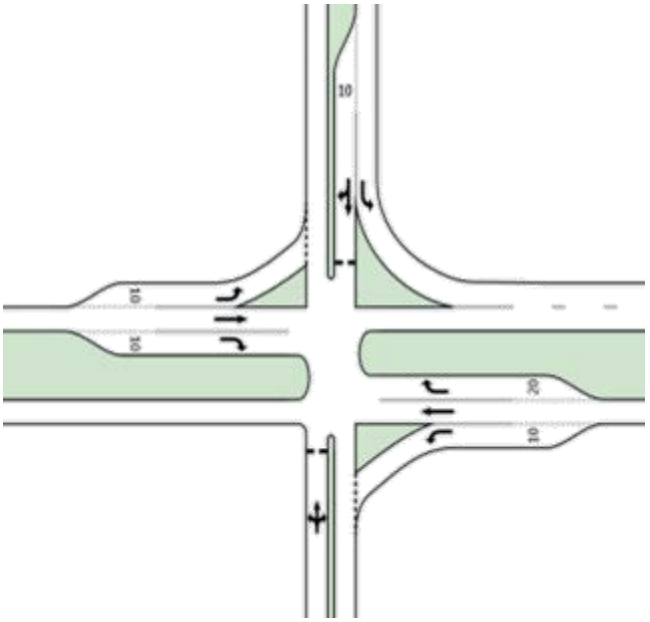
Figure 4.9: PM Peak Hour Turning Movement Volumes – Intersection 1



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.

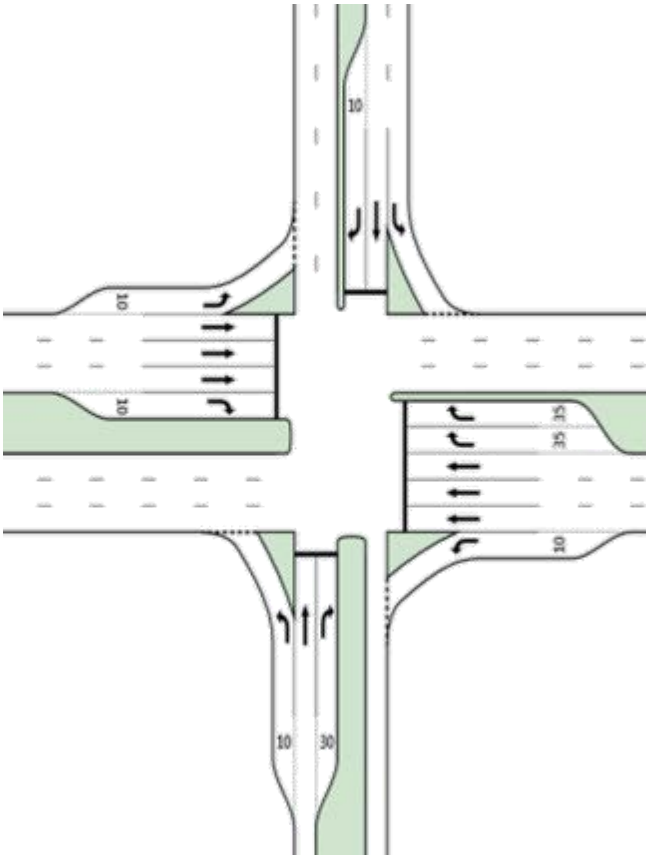
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.10 and Figure 4.11 respectively.

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)	95th 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 95th 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

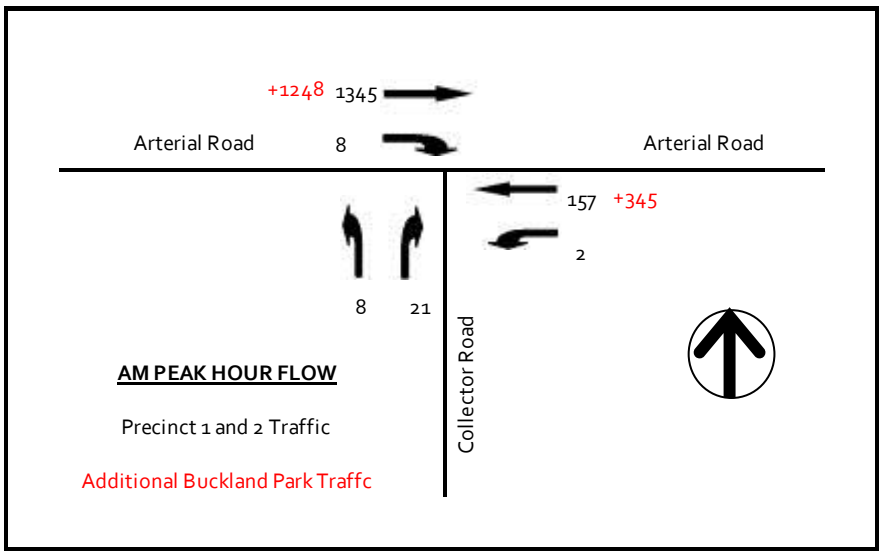
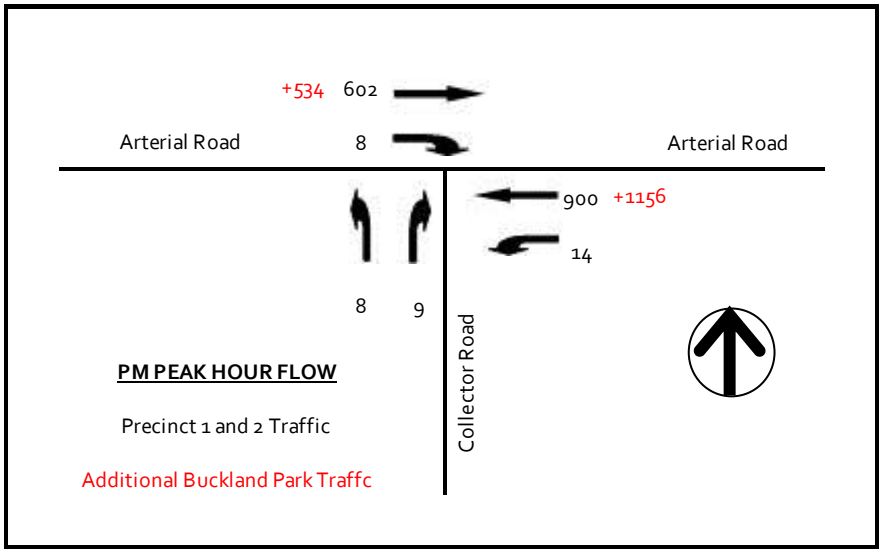


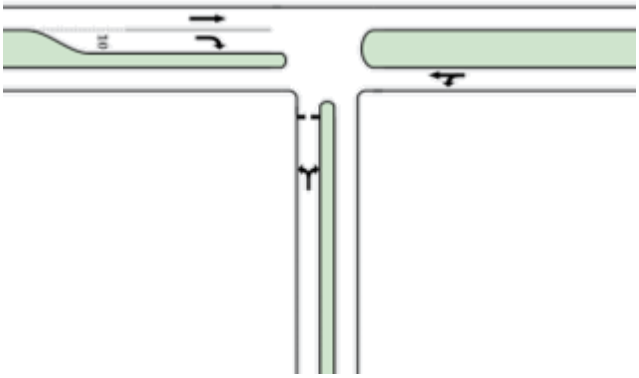
Figure 4.13: PM Peak Hour Turning Movement Volumes – Intersection 2



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.

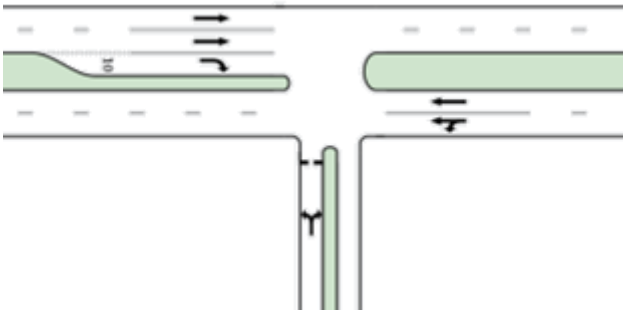
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.14 and Figure 4.15 respectively.

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)	95th 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

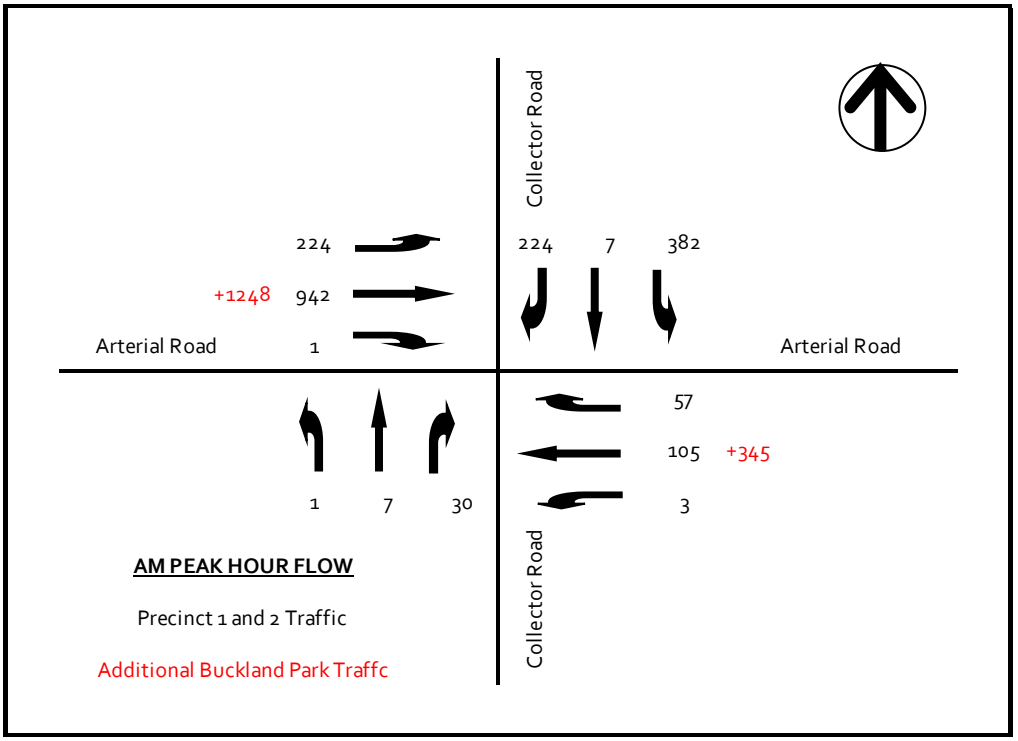
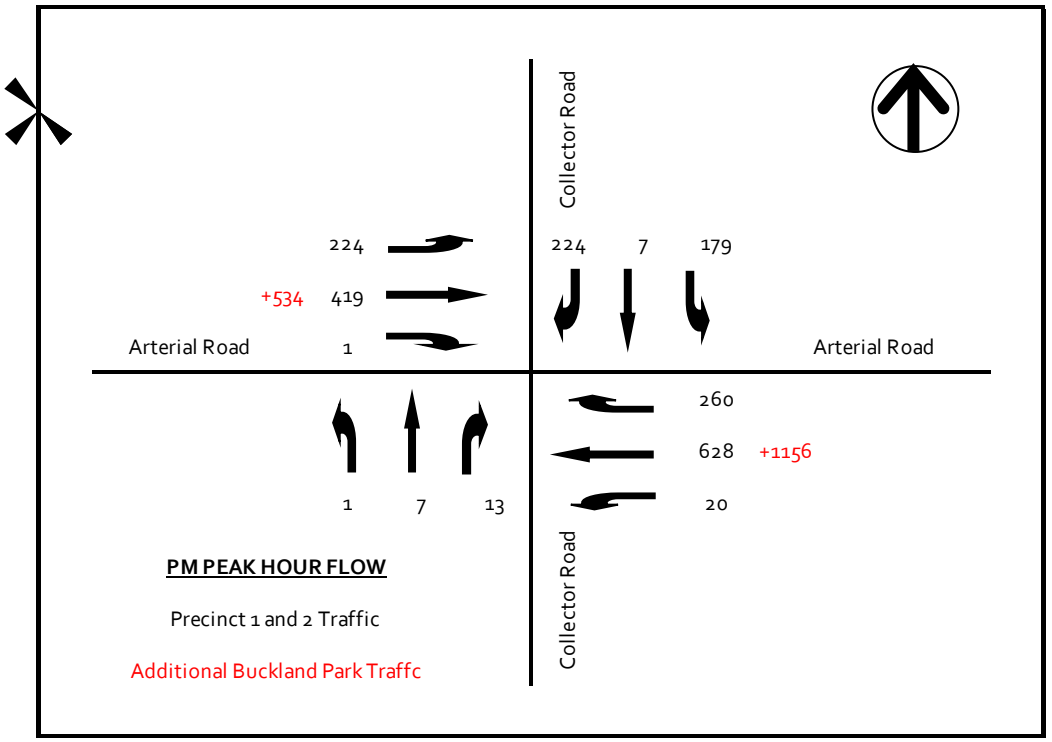


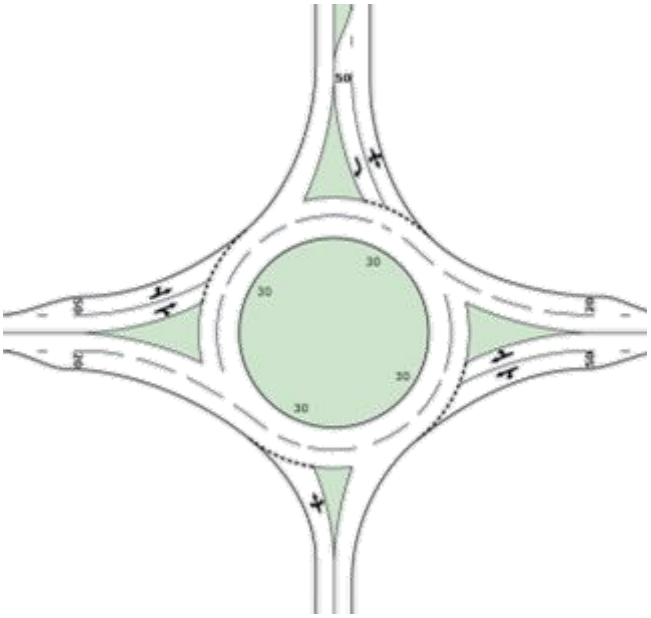
Figure 4.17: PM Peak Hour Turning Movement Volumes – Intersection 3



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.

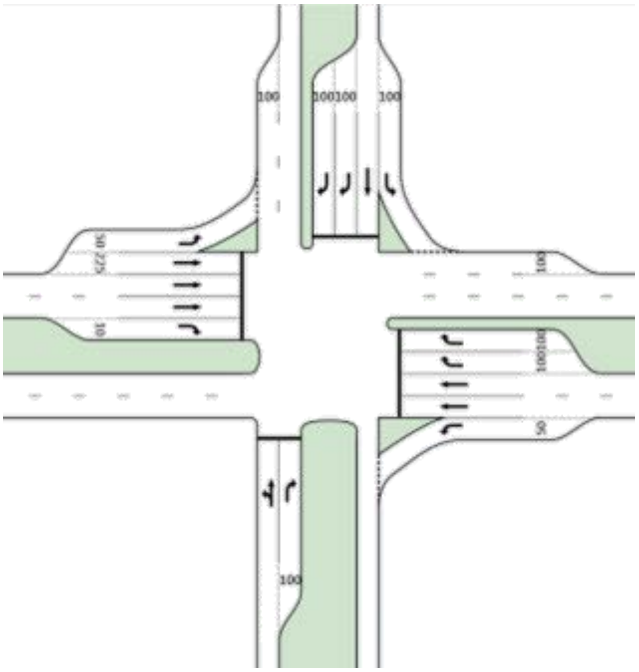
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.18 and Figure 4.19 respectively.

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 10 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)	95th 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 95th 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

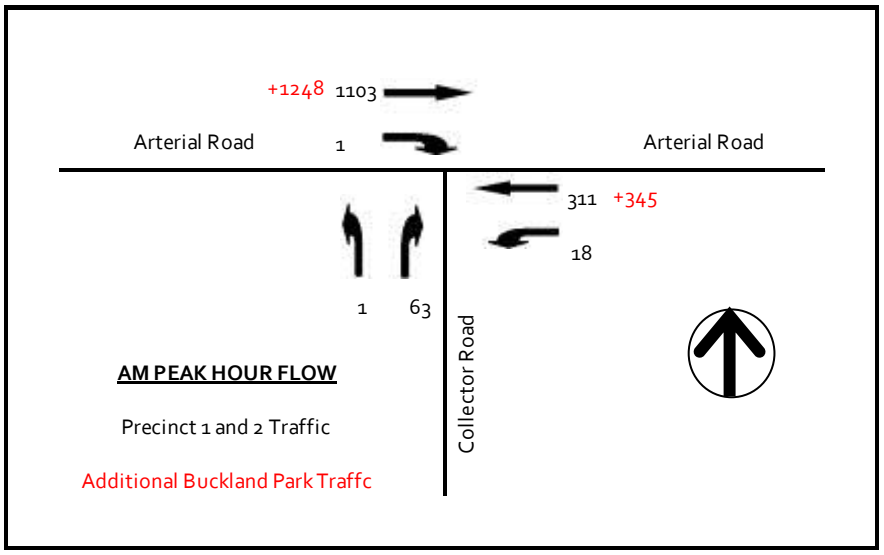
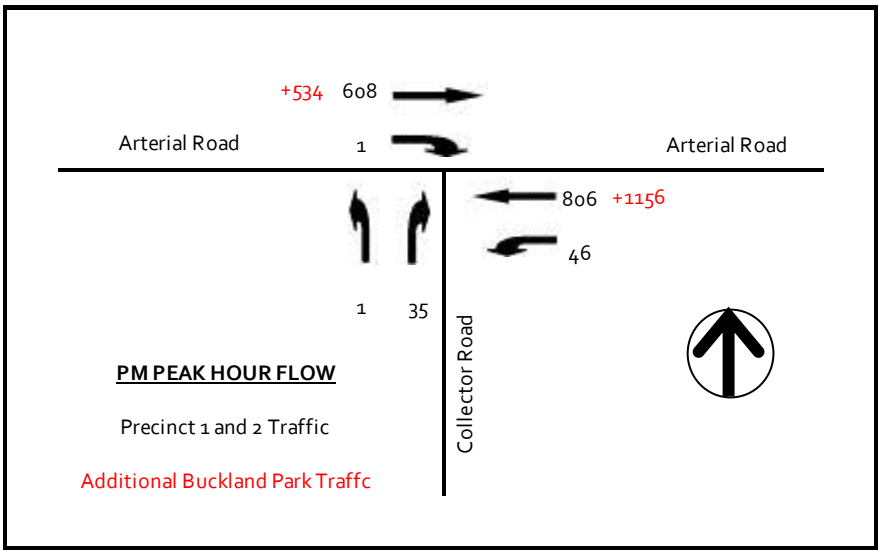


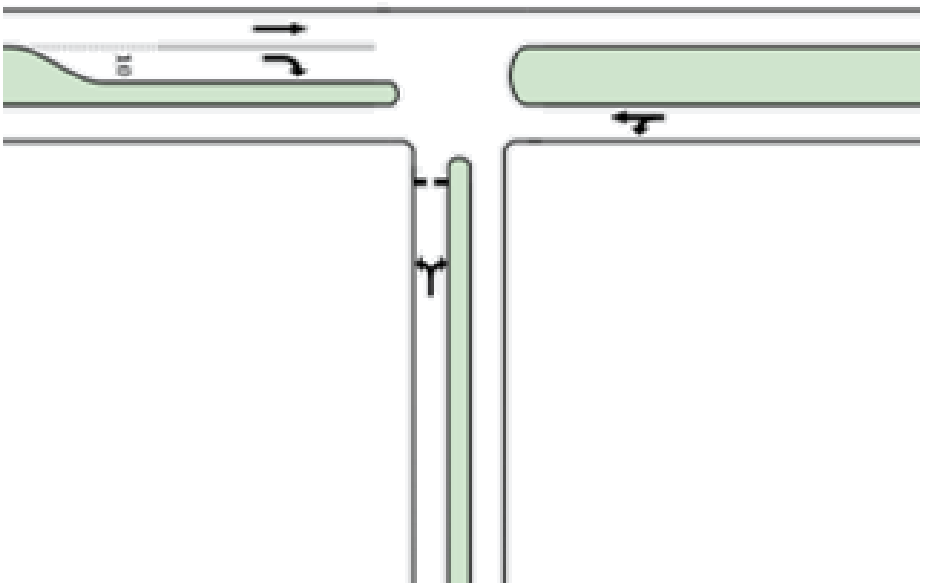
Figure 4.21: PM Peak Hour Turning Movement Volumes – Intersection 4



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.

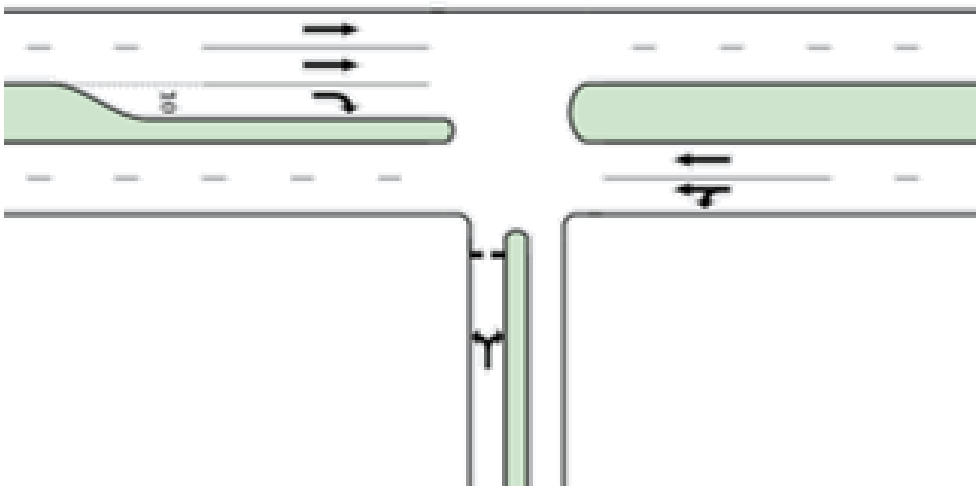
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.22 and Figure 4.23 respectively.

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)	95th 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 95th 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

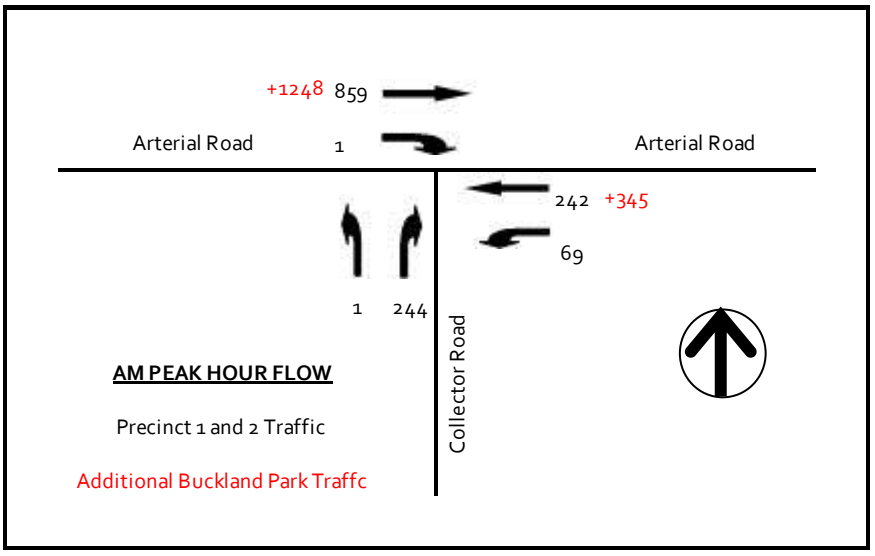
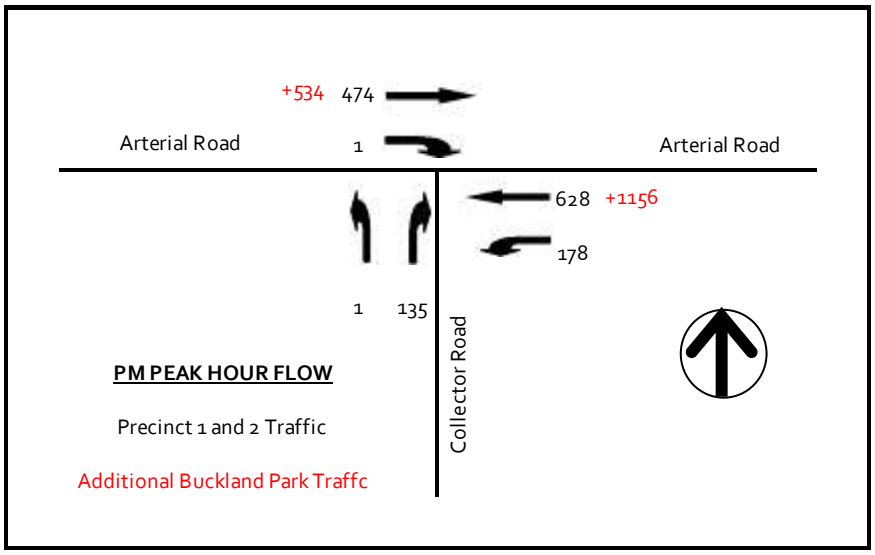


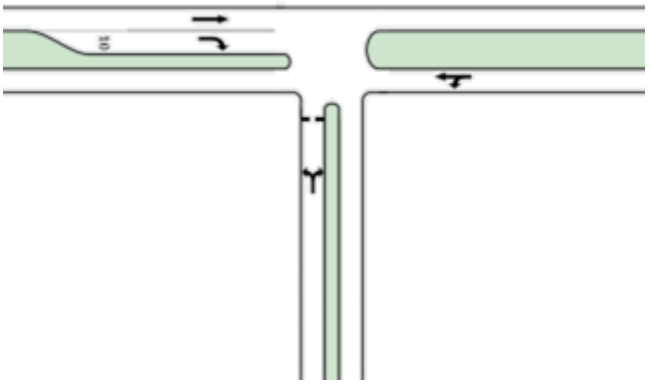
Figure 4.25: PM Peak Hour Turning Movement Volumes – Intersection 5



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.

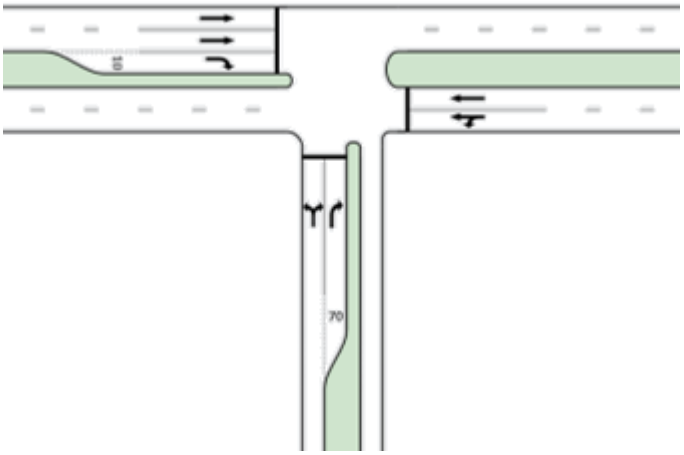
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.26 and Figure 4.27 respectively.

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)	95th 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. 95th 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

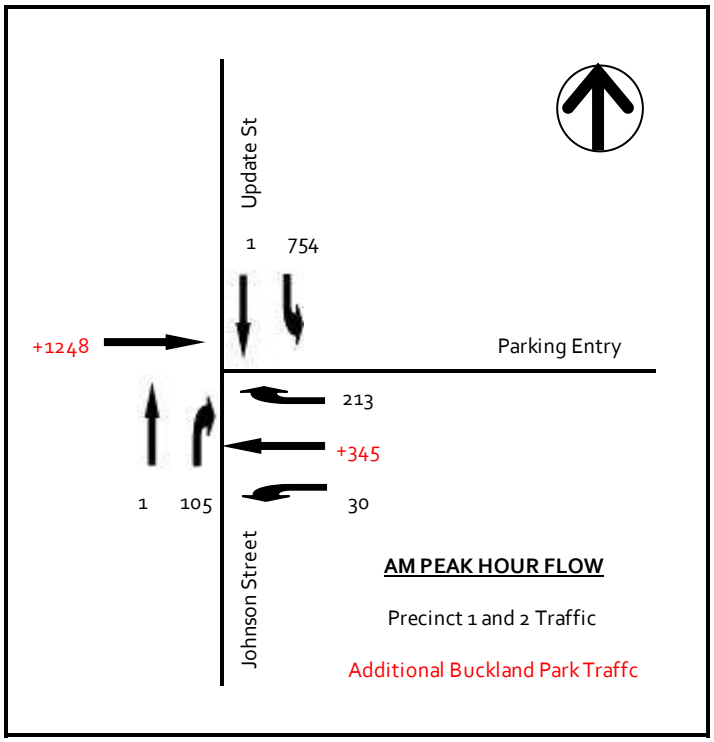
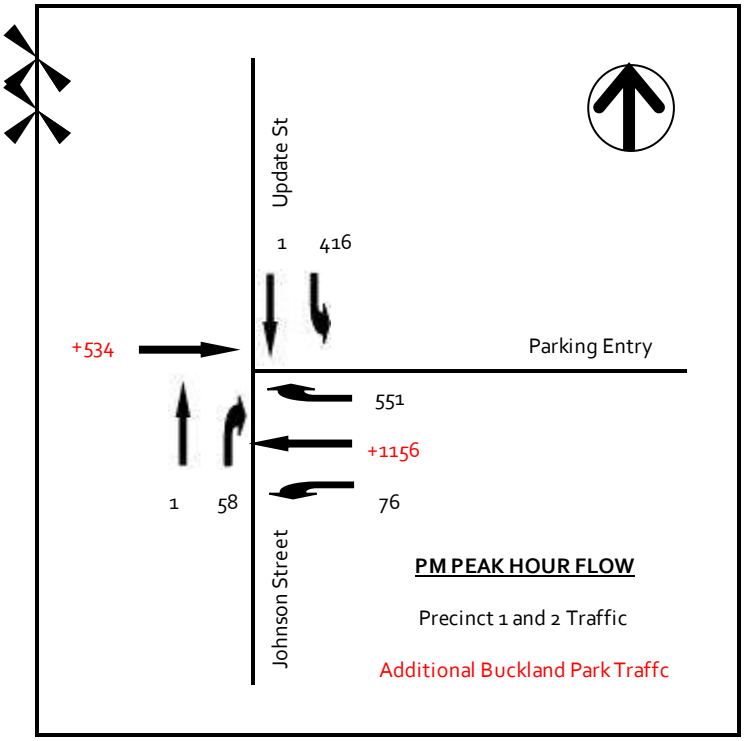


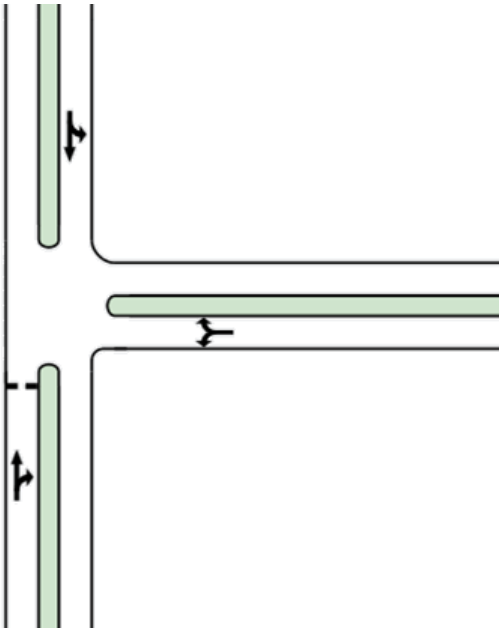
Figure 4.29: PM Peak Hour Turning Movement Volumes – Intersection 6



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.

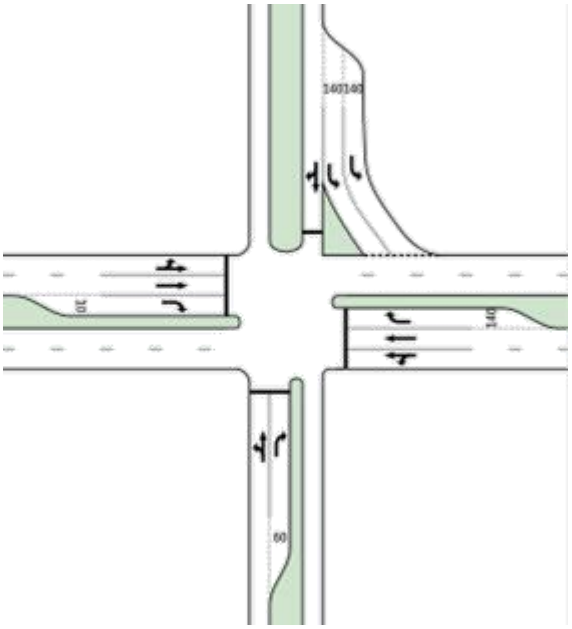
The "Precinct 1 and 2" and "Ultimate" intersection layouts are shown in Figure 4.30 and Figure 4.31 respectively.

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)	95th 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

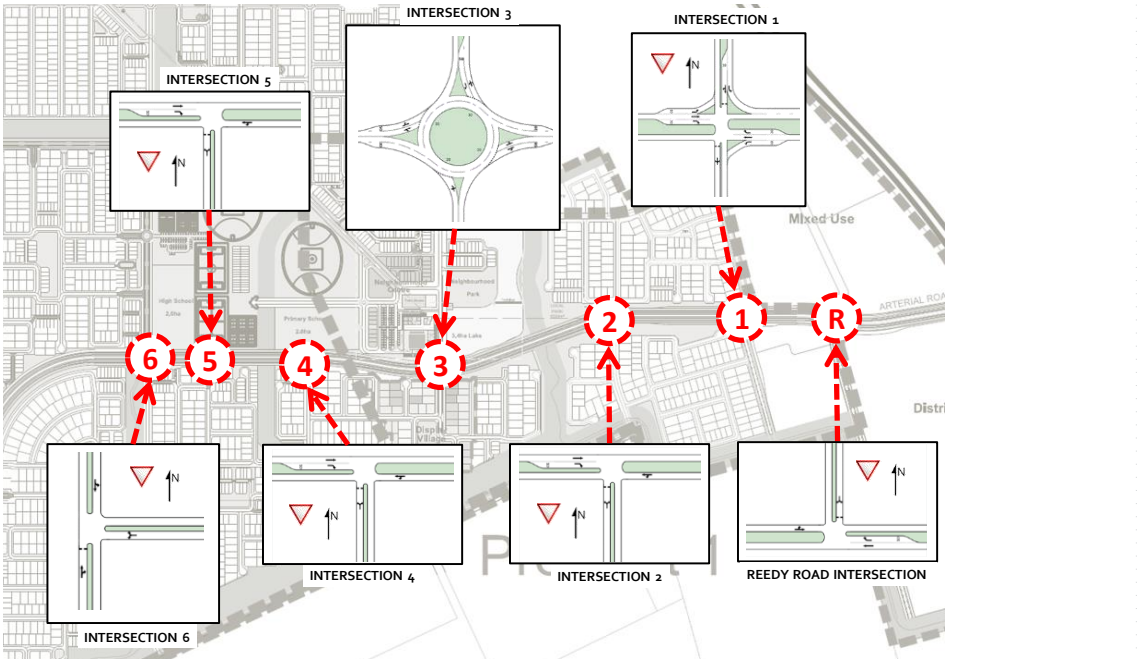
The above analysis indicates the realigned T-junction will have an average delay of less than 10 seconds in the "Precinct 1 and 2" scenario. However queue lengths up to 28 and 18 metres are anticipated along the northern approach during the AM and PM peaks respectively. However, GTA considers these results 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. 95th 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

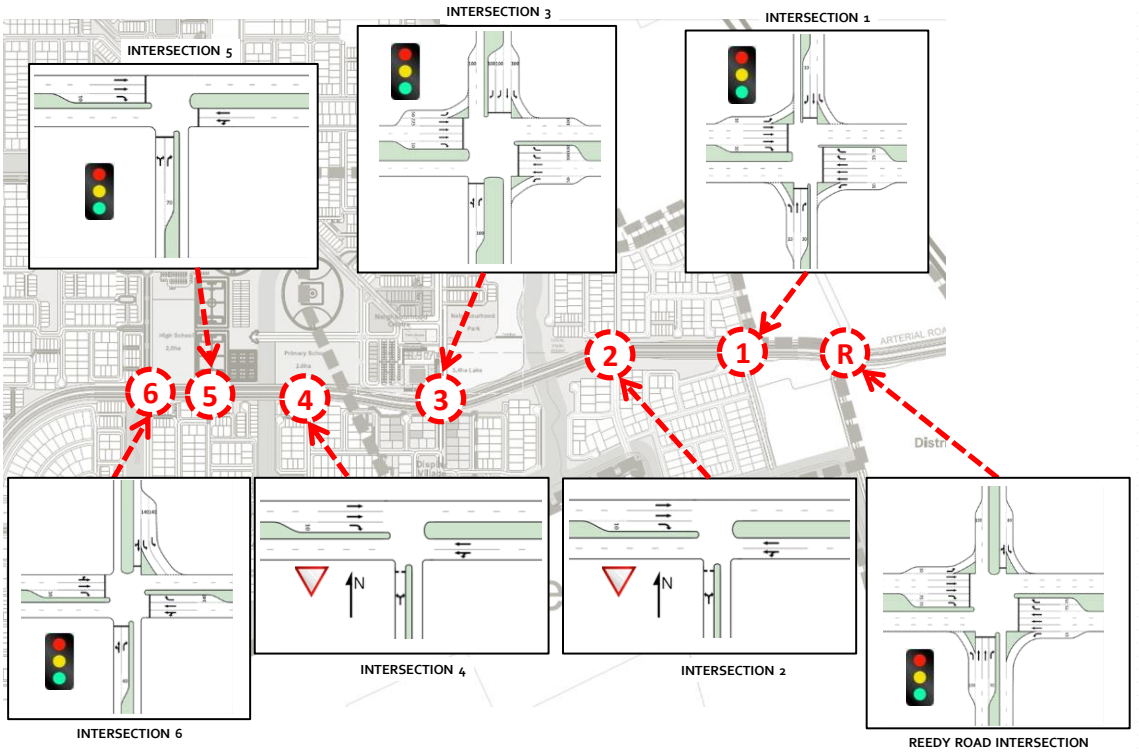
Based on the above, Figure 4.32 and Figure 4.33 present the intersection layout arrangements for the "Precinct 1 and 2" and "Ultimate" scenarios respectively.

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.

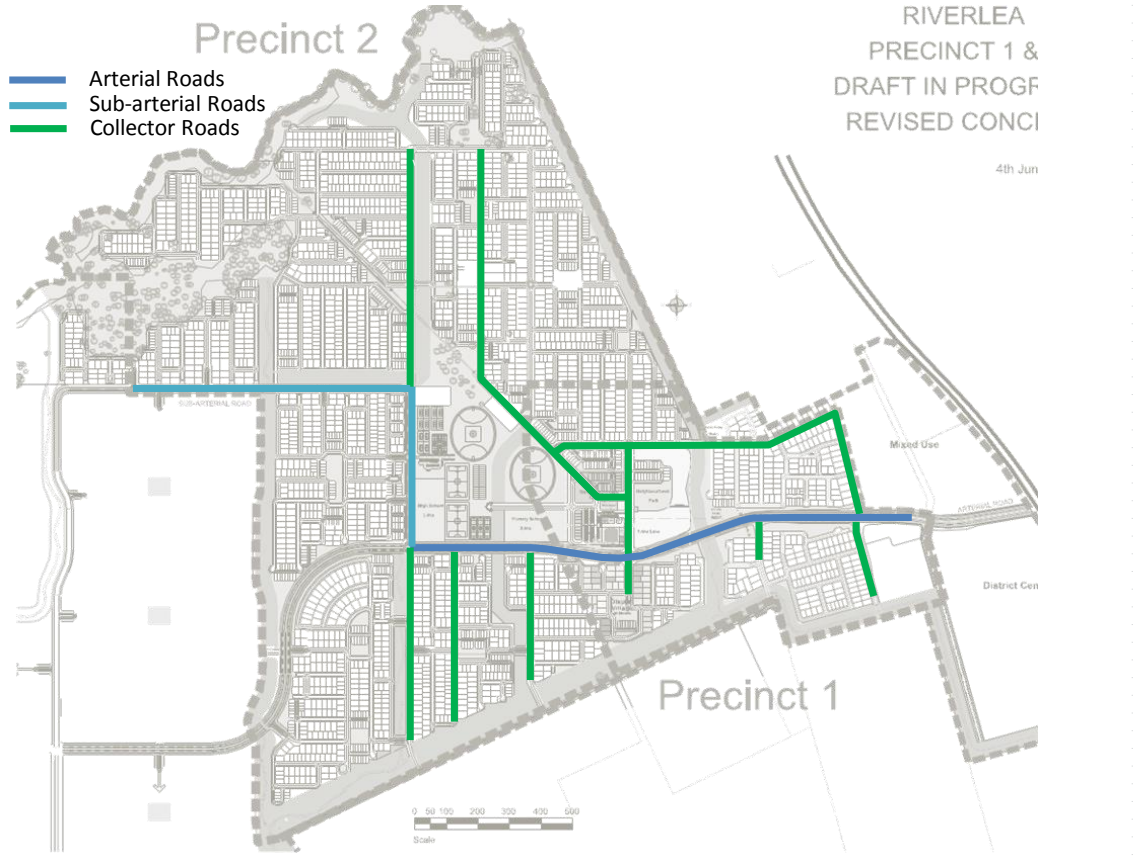
Further to the above, given the flow on the northern approach to intersection 6, additional approach lanes should be considered beyond Precinct 2.

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

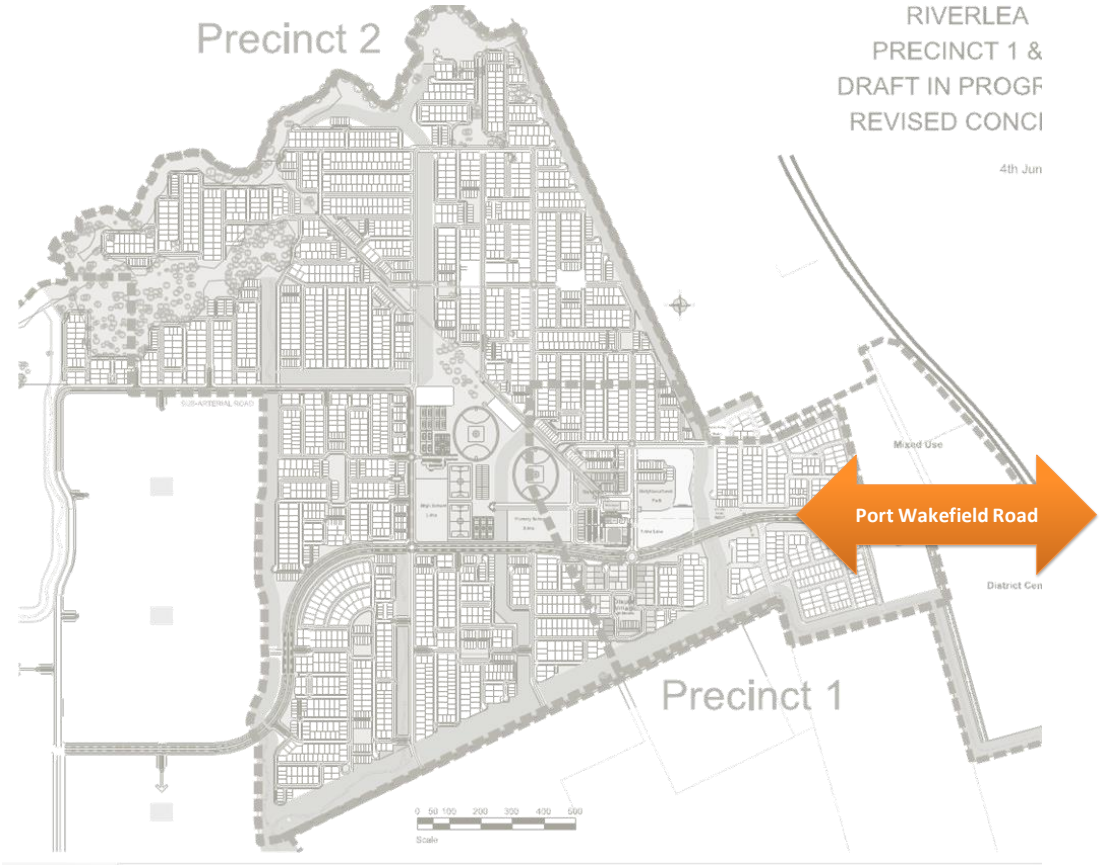


5.2 Site Access

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.

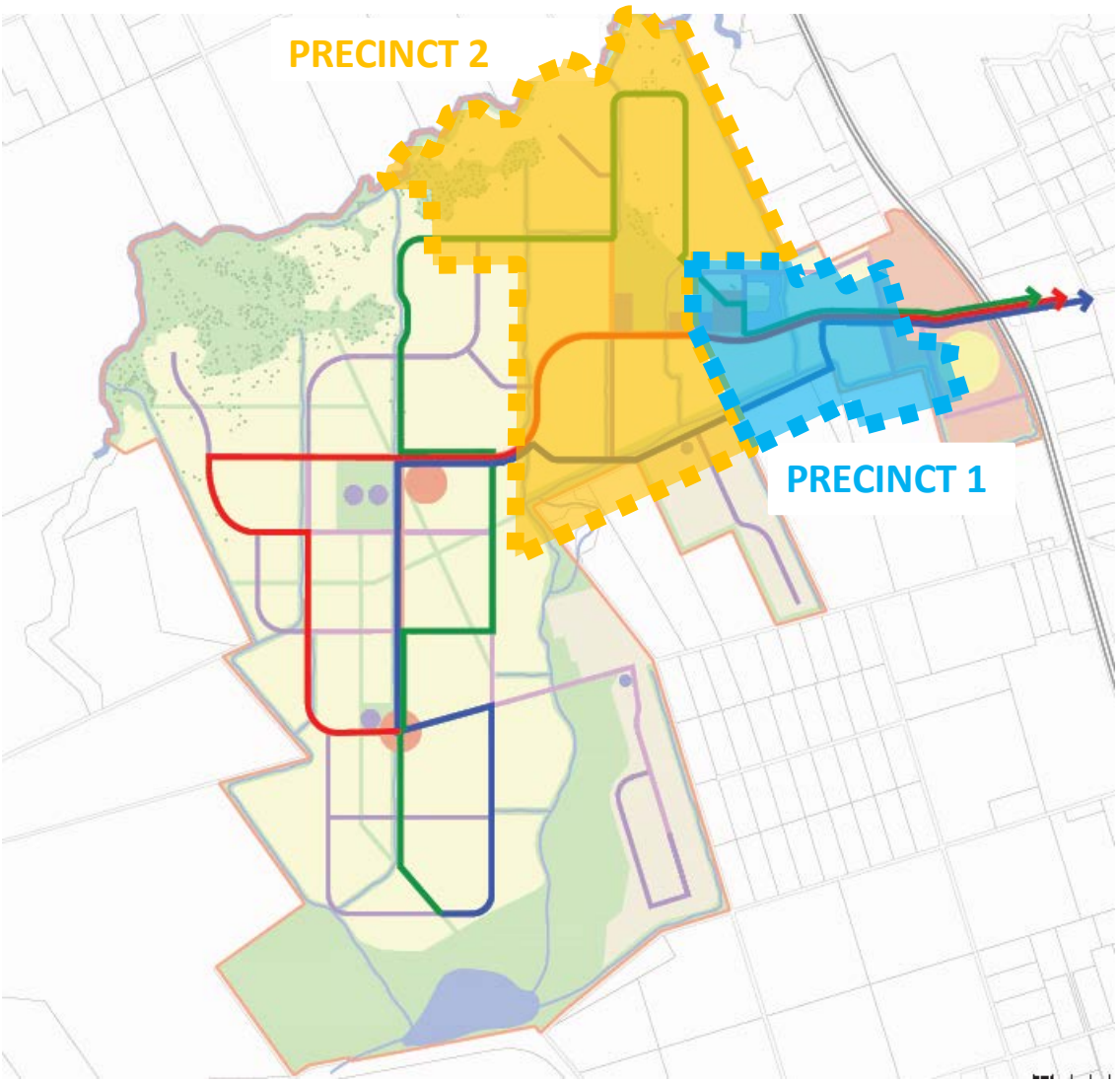
5.7 Street Gradients for Vehicles

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 Munno 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.

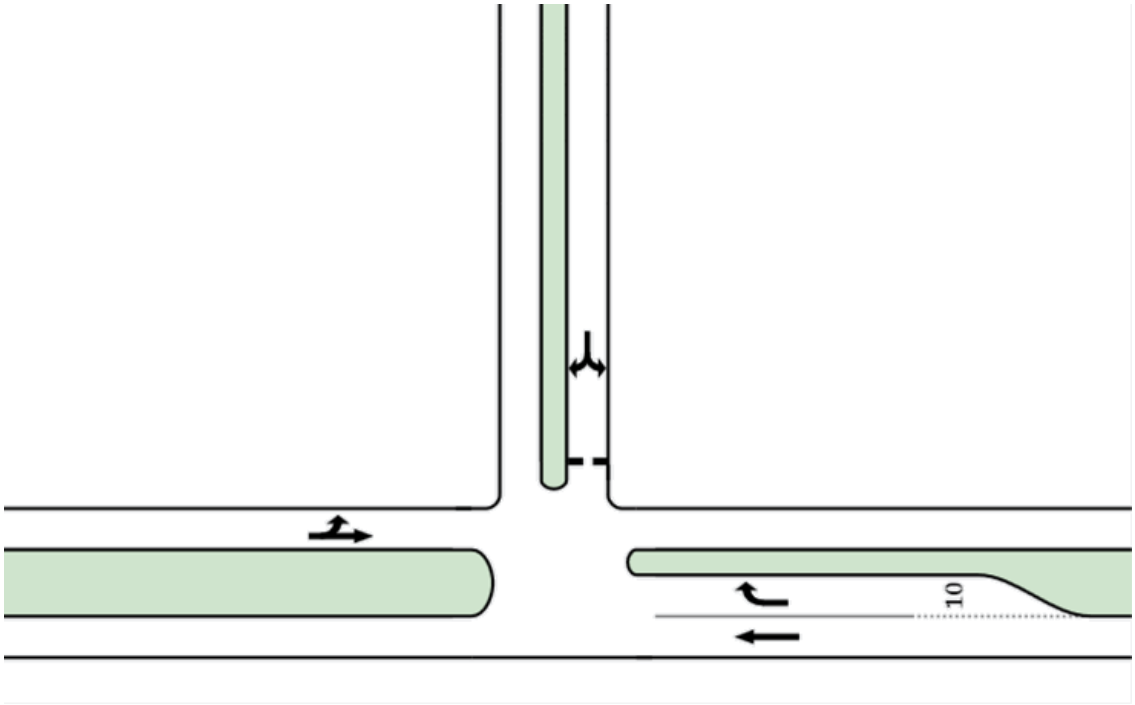
v The configurations of the street network will be conducive to a low speed environment of less than 40km/h on the minor streets.

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

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
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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Arterial Road											
5	T	178	0.0	0.091	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	2	0.0	0.040	71.8	LOS F	0.1	0.7	0.97	0.99	19.4
Approach		180	0.0	0.091	0.8	NA	0.1	0.7	0.01	0.01	58.7
North East: Median											
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
North: Reedy Road											
7	L	14	0.0	1.000[4]	579.5	LOS F	3.4	23.7	1.00	1.14	3.5
9	R	1	0.0	1.000[4]	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
West: Arterial Road											
10	L	1	0.0	0.825	7.4	LOS A	0.0	0.0	0.00	1.19	48.6
11	T	1607	0.0	0.825	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		1608	0.0	0.825	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.

4 x = 1.00 due to minimum capacity

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

MOVEMENT SUMMARY

Site: BaseCase-PM

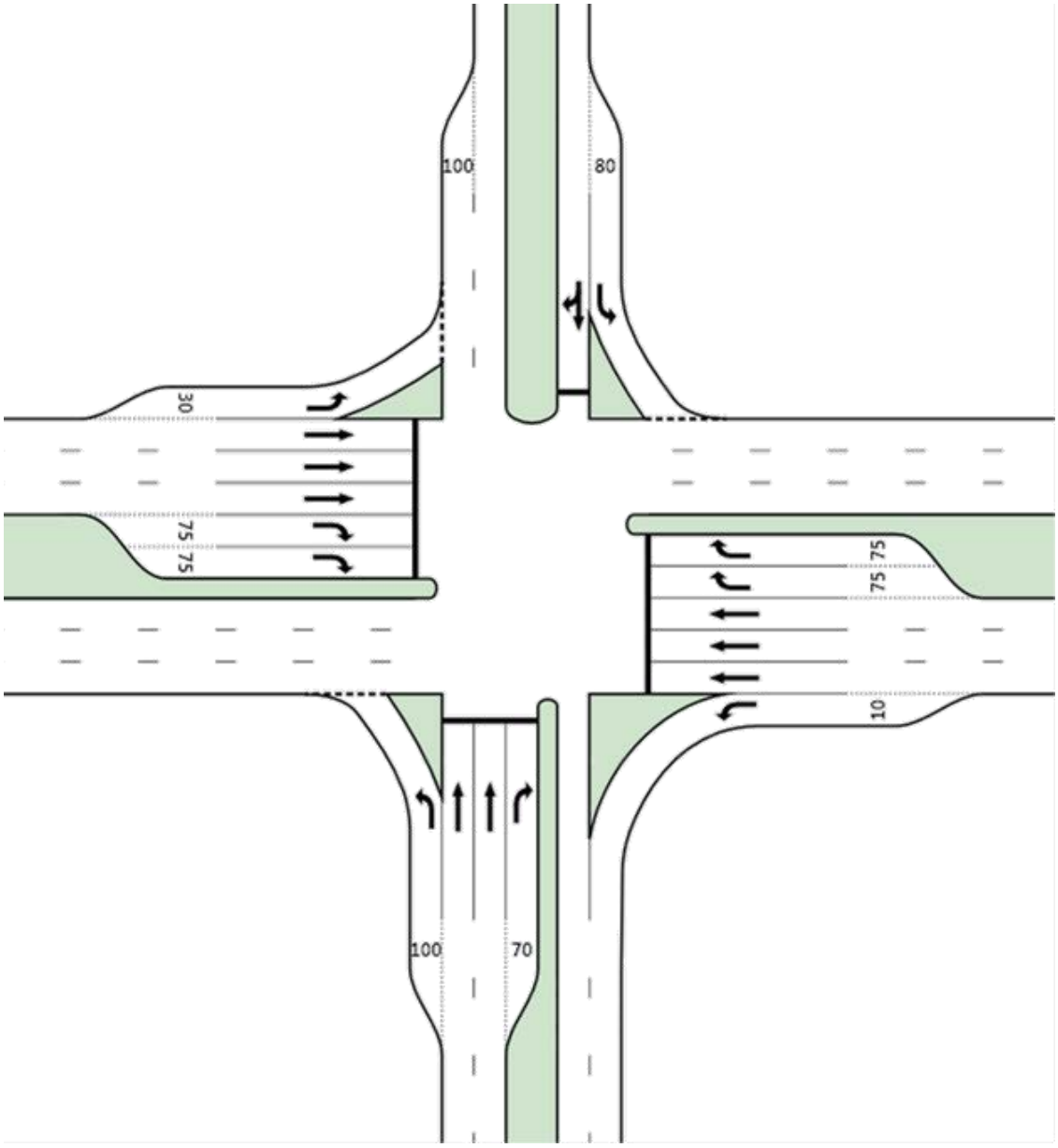
Reedy Road Intersection
BaseCase
PM Peak Hour
Giveway / Yield (Two-Way)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Arterial Road											
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	59.8
North East: Median											
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
North: Reedy Road											
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
West: Arterial Road											
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	59.8

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.

"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 %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue 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	0.816	46.1	LOS D	5.8	40.8	1.00	0.97	24.8
Approach		216	0.0	0.816	39.2	LOS C	5.8	40.8	0.91	0.87	26.6
East: Arterial Road											
4	L	754	0.0	0.406	7.6	X	X	X	X	0.60	49.7
5	T	483	0.0	0.222	16.3	LOS B	3.8	26.5	0.72	0.59	39.5
6	R	130	0.0	0.517	43.3	LOS D	2.9	20.4	0.99	0.76	27.4
Approach		1367	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	18.4	LOS B	6.8	47.7	0.78	0.79	35.9
8	T	65	0.0	0.362	31.9	LOS C	2.8	19.8	0.96	0.74	27.4
9	R	20	0.0	0.362	38.5	LOS C	2.8	19.8	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	8.4	LOS A	0.1	0.6	0.21	0.63	48.6
11	T	2635	0.0	0.852	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	2.8	19.6	0.84	0.76	32.5
Approach		2855	0.0	0.852	22.4	LOS B	30.6	213.9	0.92	0.94	35.3
All Vehicles		4833	0.0	0.852	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 %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: South Approach											
1	L	260	0.0	0.280	13.5	LOS A	3.2	22.3	0.62	0.73	43.7
2	T	50	0.0	0.097	20.1	LOS B	0.7	4.6	0.88	0.63	32.6
3	R	212	0.0	0.835	36.5	LOS C	6.1	42.7	1.00	1.00	30.1
Approach		522	0.0	0.835	23.5	LOS B	6.1	42.7	0.80	0.83	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	0.851	23.1	LOS B	16.9	118.0	0.99	1.05	34.6
6	R	287	0.0	0.543	27.9	LOS B	4.3	30.0	0.94	0.79	31.0
Approach		2470	0.0	0.851	20.9	LOS B	16.9	118.0	0.82	0.93	35.3
North: North Approach											
7	L	550	0.0	0.548	10.9	LOS A	5.2	36.4	0.61	0.77	46.1
8	T	60	0.0	0.288	21.3	LOS B	1.8	12.9	0.92	0.71	31.8
9	R	20	0.0	0.288	28.9	LOS C	1.8	12.9	0.92	0.76	34.4
Approach		630	0.0	0.548	12.4	LOS A	5.2	36.4	0.65	0.76	43.8
West: Arterial Road											
10	L	20	0.0	0.026	8.0	LOS A	0.1	0.7	0.34	0.62	43.1
11	T	927	0.0	0.528	16.3	LOS B	6.5	45.5	0.88	0.74	39.1
12	R	300	0.0	0.673	32.4	LOS C	3.9	27.5	1.00	0.87	29.3
Approach		1247	0.0	0.673	20.0	LOS B	6.5	45.5	0.90	0.77	36.2
All Vehicles		4869	0.0	0.851	19.9	LOS B	16.9	118.0	0.82	0.86	36.6

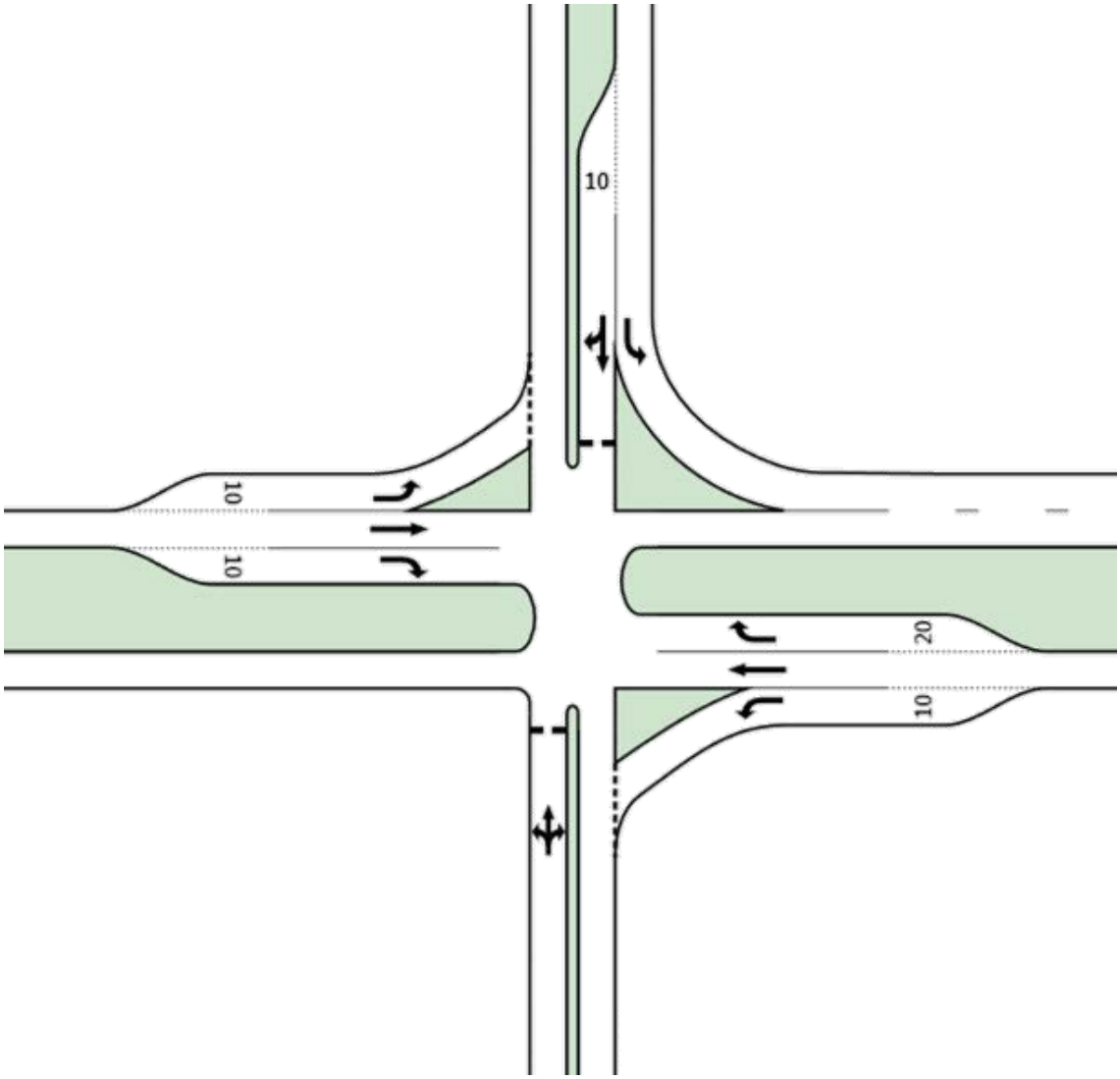
X: Not applicable for Continuous movement.

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
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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
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	0.86	35.6
3	R	51	0.0	0.174	17.8	LOS B	0.6	4.4	0.71	0.68	36.2
Approach		60	0.0	0.174	17.9	LOS B	0.6	4.4	0.71	0.84	36.1
East: Arterial Road											
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	0.082	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	23	0.0	0.180	36.1	LOS C	0.5	3.7	0.94	0.98	29.2
Approach		187	0.0	0.180	4.6	NA	0.5	3.7	0.12	0.14	53.0
North East: Median											
24	L	1	0.0	0.016	14.9	LOS B	0.0	0.3	0.79	0.89	36.8
26	R	3	0.0	0.016	15.6	LOS B	0.0	0.3	0.79	0.89	37.5
Approach		4	0.0	0.016	15.4	LOS B	0.0	0.3	0.79	0.89	37.3
North: Collector Road											
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	0.83	0.87	35.2
9	R	3	0.0	0.014	18.5	LOS B	0.0	0.3	0.83	0.88	35.8
Approach		216	0.0	0.114	5.9	LOS A	0.0	0.3	0.02	0.54	43.9
West: Arterial Road											
10	L	3	0.0	0.005	6.8	LOS A	0.0	0.1	0.11	0.53	48.8
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
South West: Median											
30	L	1	0.0	0.121	10.1	LOS A	0.3	1.9	0.65	0.50	40.4
32	R	51	0.0	0.121	10.5	LOS A	0.3	1.9	0.65	0.82	41.1
Approach		52	0.0	0.121	10.5	LOS A	0.3	1.9	0.65	0.81	41.0
All Vehicles		1960	0.0	0.733	2.0	NA	0.6	4.4	0.05	0.12	55.2

X: Not applicable for Continuous movement.

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

MOVEMENT SUMMARY

Site: BaseCase-PM

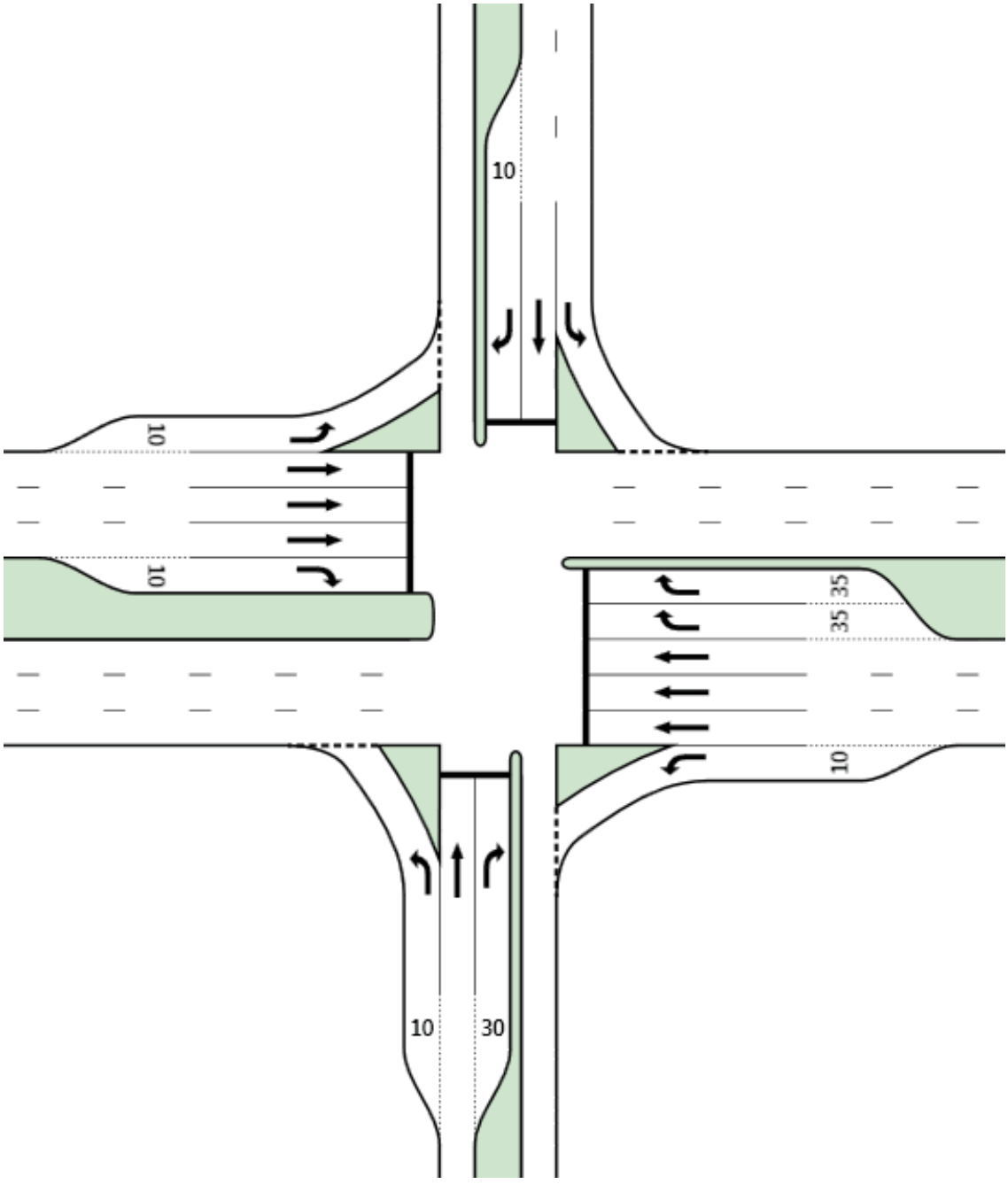
Intersection 1
BaseCase
PM Peak Hour
Giveway / Yield (Two-Way)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	8	0.0	0.110	20.2	LOS B	0.4	2.7	0.84	0.95	34.9
2	T	1	0.0	0.110	18.8	LOS B	0.4	2.7	0.84	0.92	34.3
3	R	22	0.0	0.110	19.9	LOS B	0.4	2.7	0.84	0.93	35.0
Approach		32	0.0	0.110	19.9	LOS B	0.4	2.7	0.84	0.94	34.9
East: Arterial Road											
4	L	33	0.0	0.049	6.8	LOS A	0.1	0.8	0.17	0.50	48.5
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	0.80	45.7
Approach		1126	0.0	0.489	1.5	NA	0.7	4.6	0.08	0.11	57.4
North East: Median											
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	0.81	41.4
Approach		4	0.0	0.010	10.0	LOS A	0.0	0.2	0.64	0.76	41.2
North: Collector Road											
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	0.86	0.91	33.9
9	R	3	0.0	0.016	20.8	LOS B	0.1	0.4	0.86	0.93	34.5
Approach		98	0.0	0.050	6.3	LOS A	0.1	0.4	0.04	0.55	43.6
West: Arterial Road											
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	0.82	42.7
Approach		646	0.0	0.326	0.2	NA	0.1	0.4	0.01	0.01	59.6
South West: Median											
30	L	1	0.0	0.062	11.0	LOS A	0.1	1.0	0.71	0.85	39.7
32	R	22	0.0	0.062	11.5	LOS A	0.1	1.0	0.71	0.85	40.3
Approach		23	0.0	0.062	11.5	LOS A	0.1	1.0	0.71	0.85	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 %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue 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	0.58	44.0
2	T	1	0.0	0.011	59.8	LOS E	0.1	0.4	0.97	0.57	19.9
3	R	51	0.0	0.506	70.6	LOS F	3.1	21.6	1.00	0.74	19.4
Approach		60	0.0	0.506	61.5	LOS E	3.1	21.6	0.88	0.71	21.1
East: Arterial Road											
4	L	5	0.0	0.010	7.0	LOS A	0.0	0.1	0.10	0.58	48.9
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	0.208	69.4	LOS E	1.2	8.1	0.99	0.69	19.9
Approach		551	0.0	0.208	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	59.8	LOS E	0.1	0.4	0.97	0.57	19.9
9	R	3	0.0	0.080	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	0.58	49.2
11	T	2743	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		3581	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

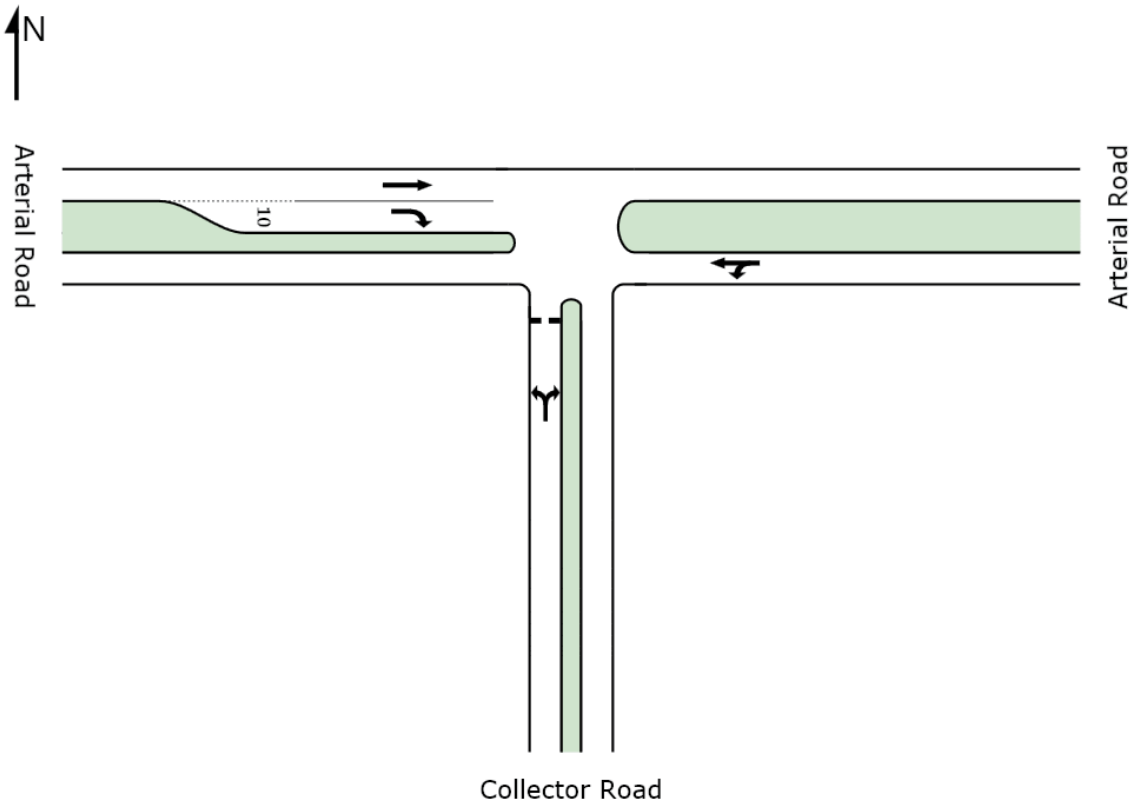
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	8	0.0	0.062	9.1	LOS A	0.1	0.7	0.26	0.60	42.3
2	T	1	0.0	0.011	59.8	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	52.8	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	29.3	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	59.8	LOS E	0.1	0.4	0.97	0.57	19.9
9	R	3	0.0	0.080	67.3	LOS E	0.2	1.3	0.97	0.61	20.0
Approach		98	0.0	0.084	11.9	LOS A	1.3	9.1	0.32	0.64	40.1
West: Arterial Road											
10	L	3	0.0	0.005	7.0	LOS A	0.0	0.0	0.05	0.58	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		1208	0.0	0.546	29.2	LOS C	16.0	111.7	0.74	0.64	32.0
All Vehicles		3682	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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	8	0.0	0.077	15.8	LOS B	0.3	1.9	0.58	0.60	37.3
3	R	22	0.0	0.077	15.9	LOS B	0.3	1.9	0.58	0.85	37.2
Approach		31	0.0	0.077	15.9	LOS B	0.3	1.9	0.58	0.78	37.2
East: Arterial Road											
4	L	2	0.0	0.086	7.4	LOS A	0.0	0.0	0.00	1.17	48.6
5	T	165	0.0	0.086	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		167	0.0	0.086	0.1	NA	0.0	0.0	0.00	0.01	59.8
West: Arterial Road											
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
South West: Median											
32	R	22	0.0	0.051	11.0	LOS A	0.1	0.8	0.65	0.84	40.7
Approach		22	0.0	0.051	11.0	LOS A	0.1	0.8	0.65	0.84	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

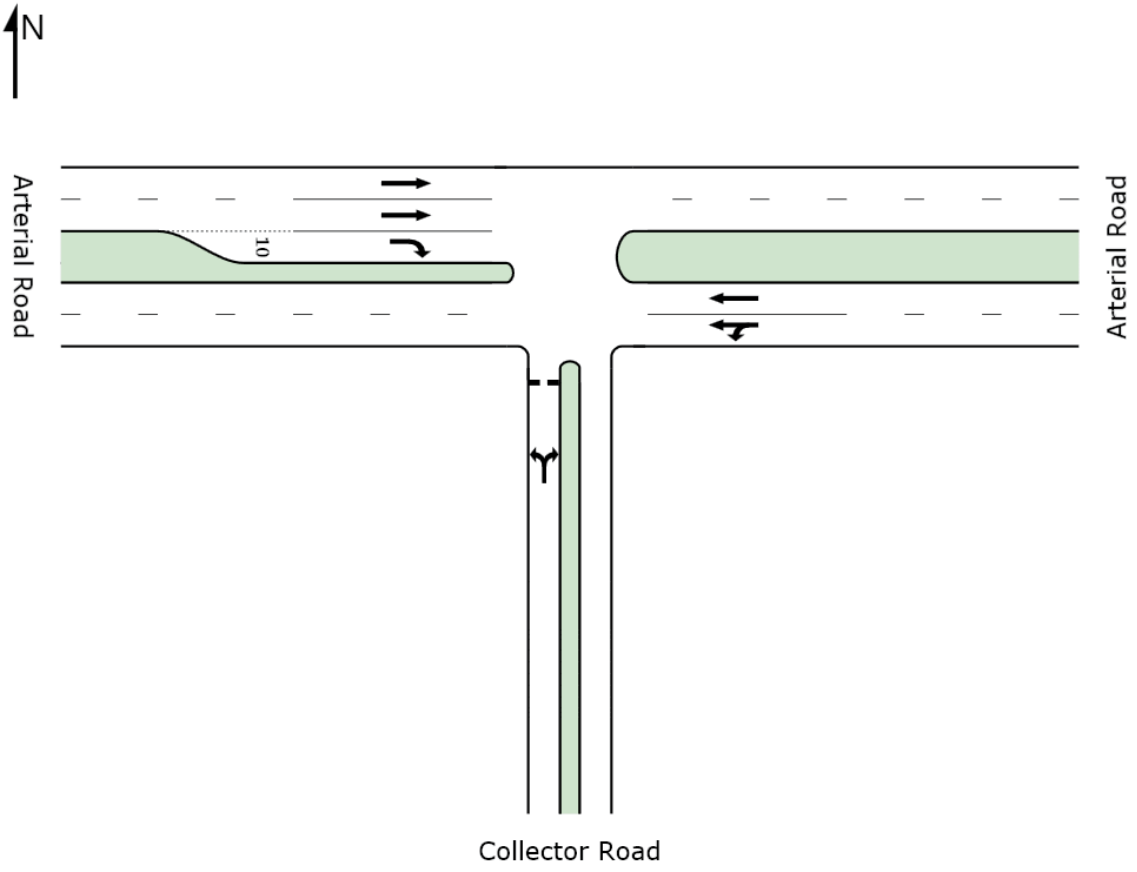
Intersection 2
BaseCase
PM Peak Period
Giveway / Yield (Two-Way)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	8	0.0	0.062	18.9	LOS B	0.2	1.4	0.81	0.93	35.4
3	R	9	0.0	0.062	19.1	LOS B	0.2	1.4	0.81	0.94	35.4
Approach		18	0.0	0.062	19.0	LOS B	0.2	1.4	0.81	0.93	35.4
East: Arterial Road											
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	59.8
West: Arterial Road											
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	0.83	42.4
Approach		642	0.0	0.325	0.2	NA	0.1	0.4	0.01	0.01	59.7
South West: Median											
32	R	9	0.0	0.022	10.8	LOS A	0.0	0.3	0.64	0.84	40.8
Approach		9	0.0	0.022	10.8	LOS A	0.0	0.3	0.64	0.84	40.8
All Vehicles		1632	0.0	0.494	0.4	NA	0.2	1.4	0.02	0.03	59.1

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
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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	8	0.0	0.855	280.6	LOS F	3.2	22.5	0.98	1.26	6.7
3	R	22	0.0	0.855	280.6	LOS F	3.2	22.5	0.98	1.15	6.7
Approach		31	0.0	0.855	280.6	LOS F	3.2	22.5	0.98	1.18	6.7
East: Arterial Road											
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	60.0
Approach		531	0.0	0.136	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Arterial Road											
11	T	2729	0.0	0.700	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	8	0.0	0.019	10.1	LOS A	0.0	0.3	0.42	0.66	45.8
Approach		2738	0.0	0.700	0.0	NA	0.0	0.3	0.00	0.00	59.9
South West: Median											
32	R	22	0.0	0.283	46.1	LOS D	0.6	4.5	0.95	1.00	24.6
Approach		22	0.0	0.283	46.1	LOS D	0.6	4.5	0.95	1.00	24.6
All Vehicles		3321	0.0	0.855	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
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

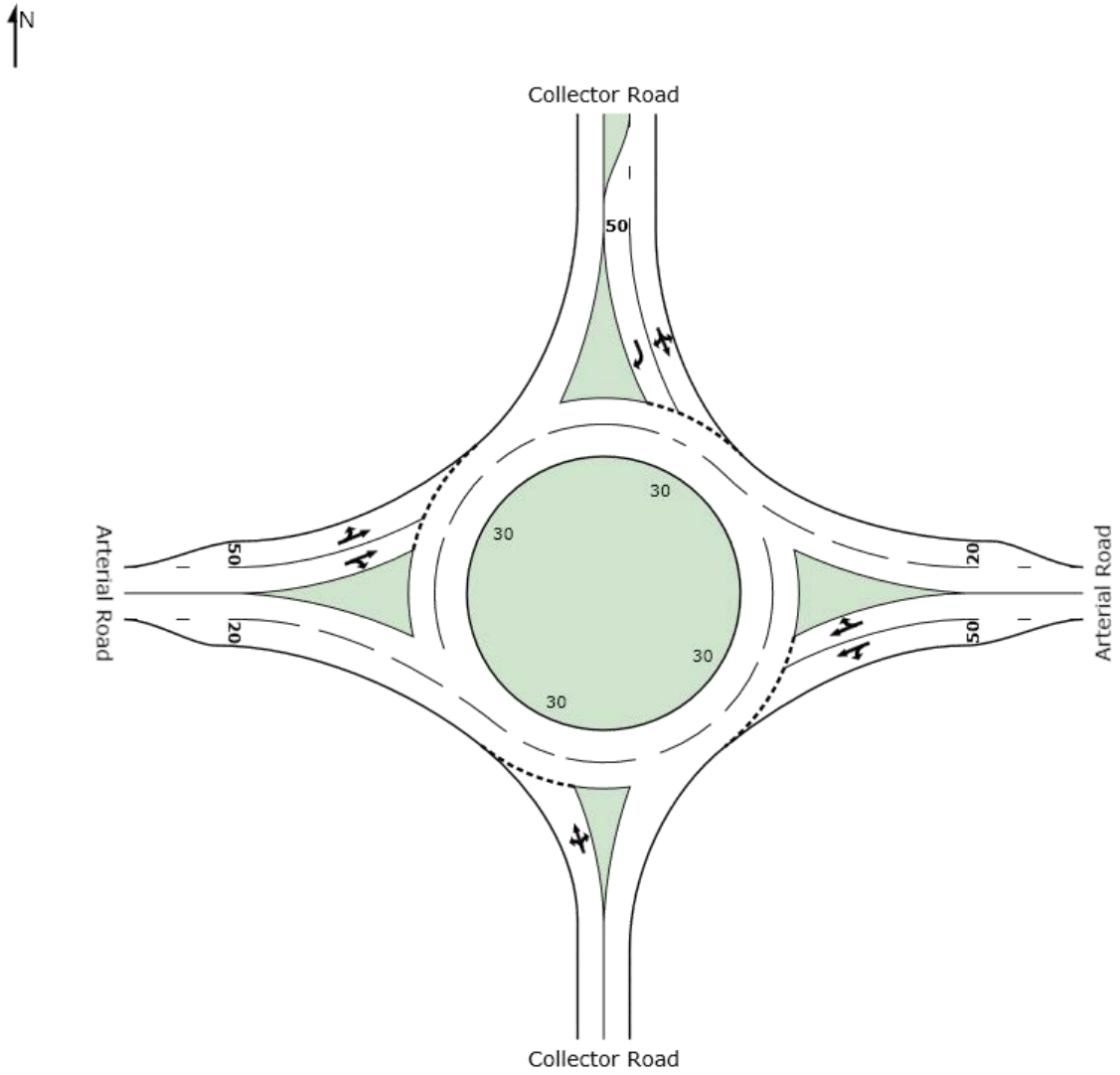
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	8	0.0	0.625	220.9	LOS F	1.8	12.7	0.99	1.05	8.3
3	R	9	0.0	0.625	220.8	LOS F	1.8	12.7	0.99	1.05	8.3
Approach		18	0.0	0.625	220.9	LOS F	1.8	12.7	0.99	1.05	8.3
East: Arterial Road											
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	60.0
Approach		2179	0.0	0.559	0.1	NA	0.0	0.0	0.00	0.01	59.9
West: Arterial Road											
11	T	1196	0.0	0.307	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
12	R	8	0.0	0.240	112.7	LOS F	0.6	4.1	0.98	1.00	14.0
Approach		1204	0.0	0.307	0.8	NA	0.6	4.1	0.01	0.01	58.7
South West: Median											
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

"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

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue 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	3.8	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	0.038	6.1	LOS A	0.2	1.2	0.42	0.56	49.4
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	0.90	1.04	35.7
Approach		645	0.0	0.596	17.8	LOS B	6.3	43.9	0.95	1.11	35.9
West: Arterial Road											
10	L	236	0.0	0.268	6.2	LOS A	1.1	8.0	0.27	0.51	50.1
11	T	992	0.0	0.639	4.9	LOS A	5.4	38.1	0.37	0.44	50.6
12	R	1	0.0	0.639	10.4	LOS A	5.4	38.1	0.37	0.84	46.5
Approach		1228	0.0	0.639	5.2	LOS A	5.4	38.1	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

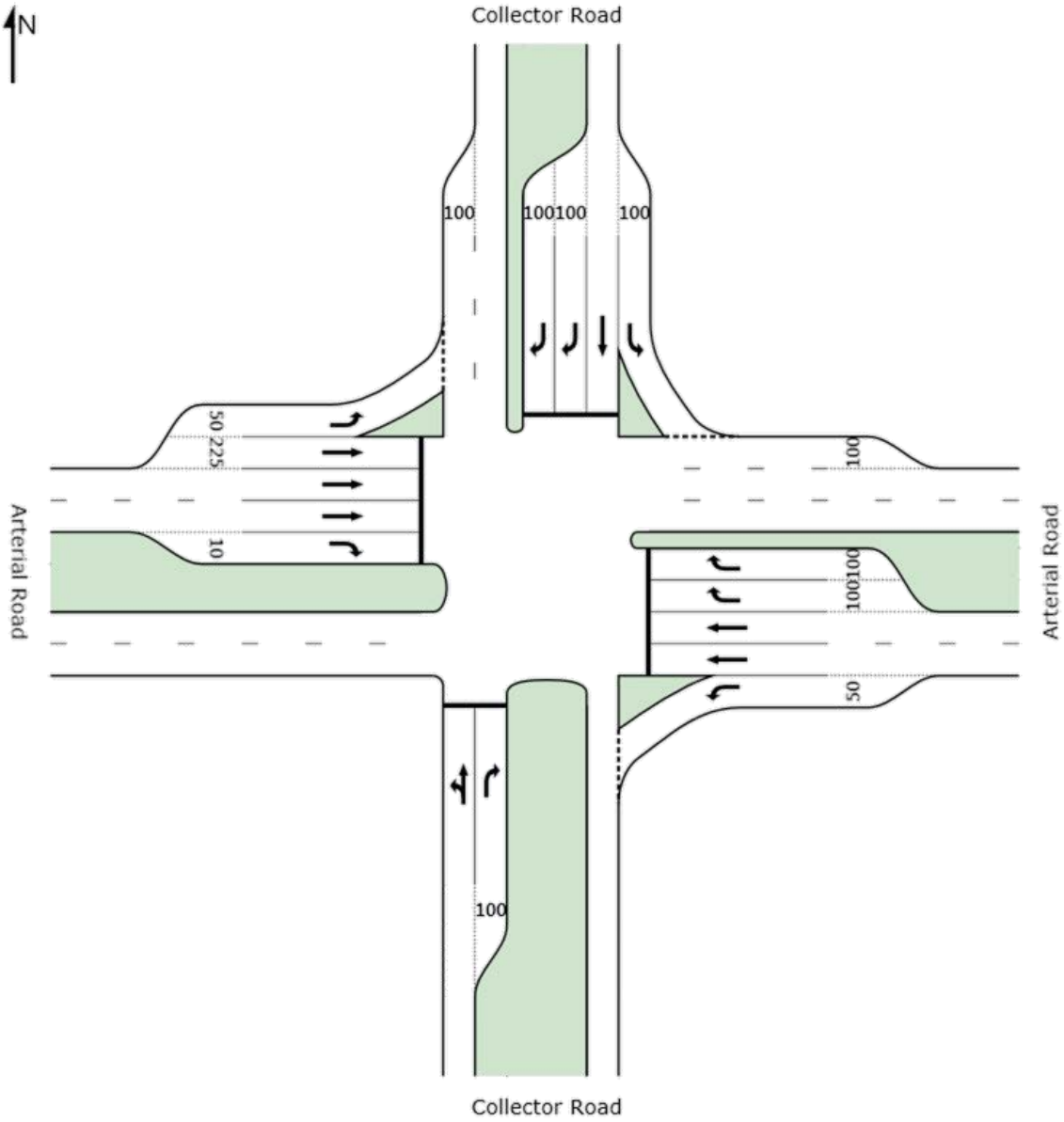
Intersection 3
BaseCase
PM Peak
Roundabout

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	1	0.0	0.039	9.5	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	0.82	39.1
Approach		22	0.0	0.039	12.6	LOS A	0.2	1.4	0.74	0.77	39.8
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	661	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	188	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	8.2	0.54	0.72	40.5
Approach		432	0.0	0.210	9.4	LOS A	1.2	8.2	0.54	0.68	41.7
West: Arterial Road											
10	L	236	0.0	0.233	6.2	LOS A	1.2	8.4	0.46	0.58	48.6
11	T	441	0.0	0.353	5.5	LOS A	2.1	14.9	0.49	0.51	49.8
12	R	1	0.0	0.353	11.0	LOS A	2.1	14.9	0.49	0.88	46.4
Approach		678	0.0	0.353	5.8	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

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	1	0.0	0.084	68.4	LOS E	0.5	3.4	0.98	0.67	20.1
2	T	7	0.0	0.084	61.3	LOS E	0.5	3.4	0.98	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
East: Arterial Road											
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	0.08	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
North: Collector Road											
7	L	402	0.0	0.568	10.4	LOS A	14.3	99.8	0.70	0.80	40.0
8	T	7	0.0	0.018	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	48.4	1.00	0.80	20.6
Approach		645	0.0	0.613	30.6	LOS C	14.3	99.8	0.81	0.80	29.4
West: Arterial Road											
10	L	236	0.0	0.188	7.8	LOS A	0.4	3.0	0.06	0.62	49.4
11	T	2305	0.0	0.622	2.4	LOS A	8.0	56.3	0.16	0.15	55.4
12	R	1	0.0	0.003	8.9	LOS A	0.0	0.0	0.08	0.61	47.0
Approach		2542	0.0	0.622	2.9	LOS A	8.0	56.3	0.15	0.19	54.8
All Vehicles		3764	0.0	0.622	8.4	LOS A	14.3	99.8	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

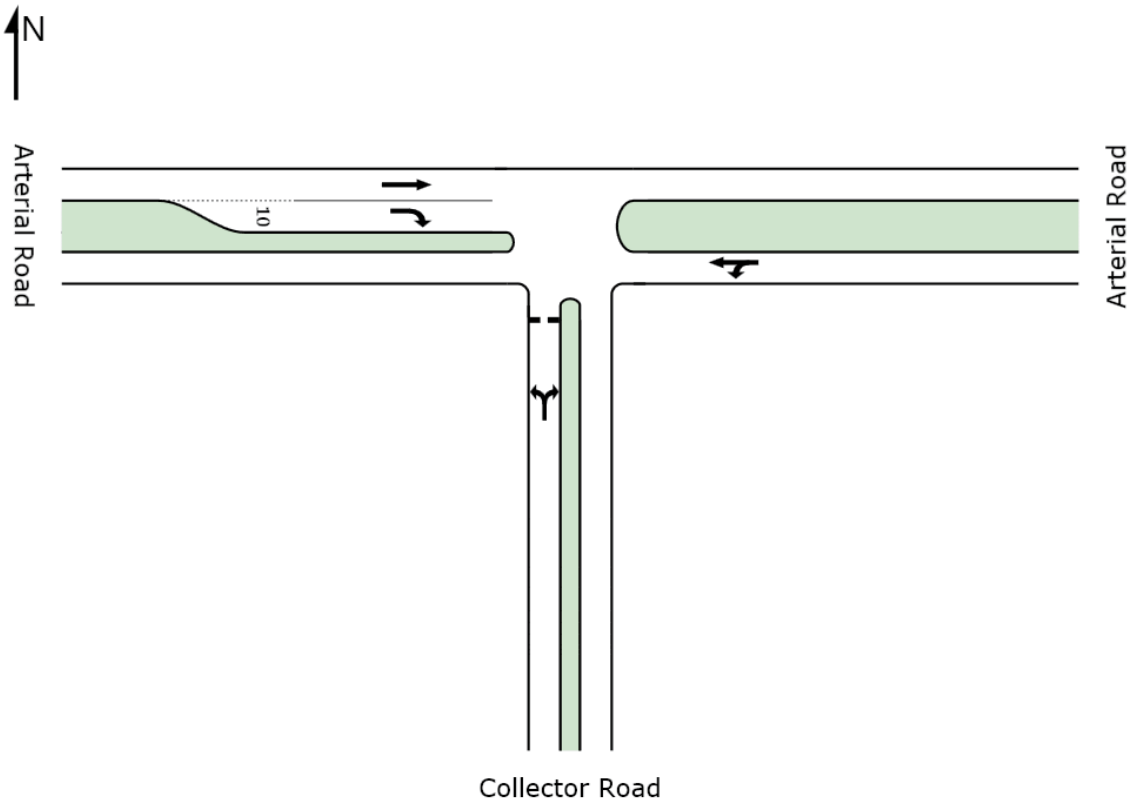
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	1	0.0	0.084	68.4	LOS E	0.5	3.4	0.98	0.67	20.1
2	T	7	0.0	0.084	61.3	LOS E	0.5	3.4	0.98	0.65	19.5
3	R	14	0.0	0.136	68.3	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	0.98	0.67	19.8
East: Arterial Road											
4	L	21	0.0	0.016	6.9	LOS A	0.0	0.2	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
North: Collector Road											
7	L	188	0.0	0.259	6.3	LOS A	1.2	8.6	0.17	0.59	43.3
8	T	7	0.0	0.018	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	48.4	1.00	0.80	20.6
Approach		432	0.0	0.613	38.7	LOS C	6.9	48.4	0.64	0.71	26.6
West: Arterial Road											
10	L	236	0.0	0.215	7.8	LOS A	0.4	3.0	0.06	0.62	49.4
11	T	1003	0.0	0.271	1.8	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	43.8
Approach		1240	0.0	0.271	2.9	LOS A	2.0	13.7	0.09	0.18	55.2
All Vehicles		3866	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
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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	1	0.0	0.183	17.6	LOS B	0.7	4.7	0.82	0.80	36.1
3	R	66	0.0	0.183	17.7	LOS B	0.7	4.7	0.82	0.94	36.1
Approach		67	0.0	0.183	17.7	LOS B	0.7	4.7	0.82	0.94	36.1
East: Arterial Road											
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
West: Arterial Road											
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	8.6	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
South West: Median											
32	R	66	0.0	0.140	10.7	LOS A	0.3	2.2	0.64	0.84	40.9
Approach		66	0.0	0.140	10.7	LOS A	0.3	2.2	0.64	0.84	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

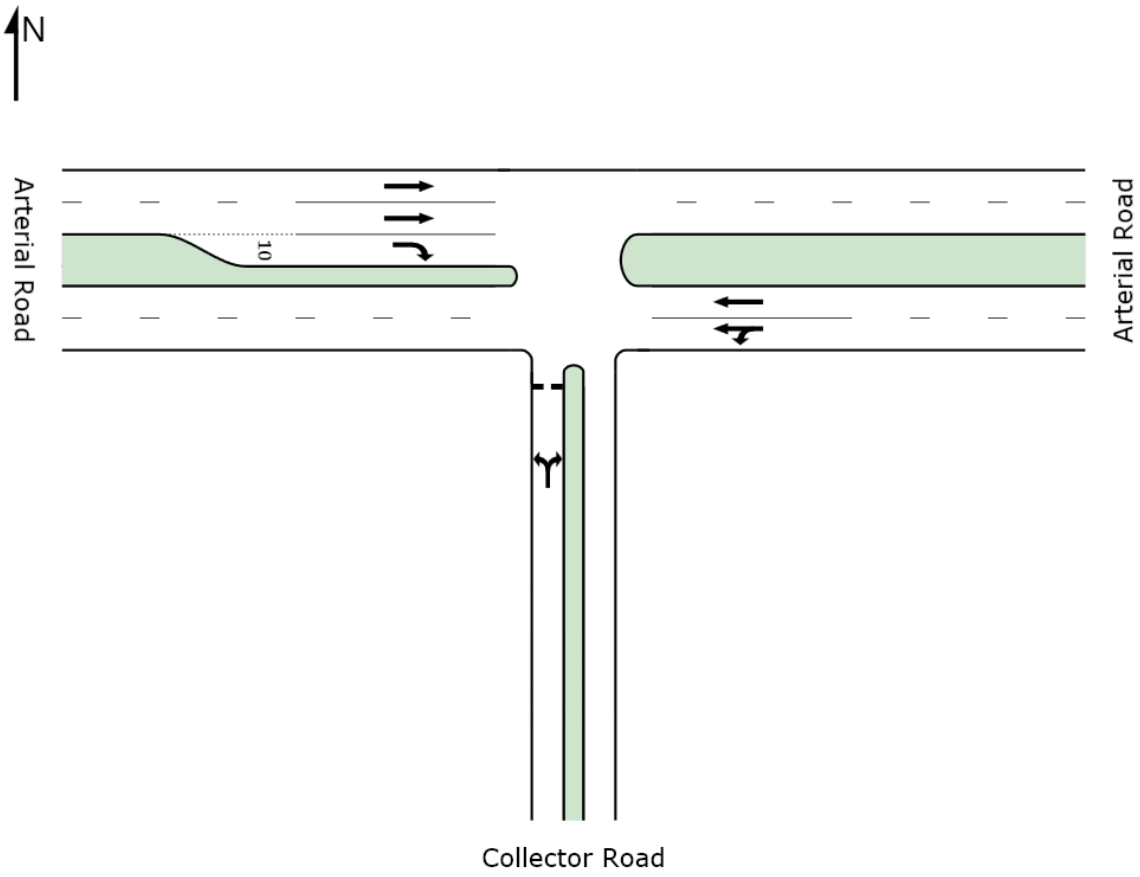
Intersection 4
Precinct 1&2
PM Peak Period
Giveway / Yield (Two-Way)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	1	0.0	0.106	17.6	LOS B	0.4	2.7	0.82	0.93	36.2
3	R	37	0.0	0.106	17.7	LOS B	0.4	2.7	0.82	0.94	36.1
Approach		38	0.0	0.106	17.7	LOS B	0.4	2.7	0.82	0.94	36.1
East: Arterial Road											
4	L	48	0.0	0.461	7.4	LOS A	0.0	0.0	0.00	1.13	48.6
5	T	848	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
West: Arterial Road											
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
South West: Median											
32	R	37	0.0	0.078	10.5	LOS A	0.2	1.2	0.62	0.83	41.1
Approach		37	0.0	0.078	10.5	LOS A	0.2	1.2	0.62	0.83	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
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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	1	0.0	1.107	293.9	LOS F	8.9	62.6	1.00	1.92	6.5
3	R	66	0.0	1.107	293.8	LOS F	8.9	62.6	1.00	1.64	6.5
Approach		67	0.0	1.107	293.8	LOS F	8.9	62.6	1.00	1.64	6.5
East: Arterial Road											
4	L	19	0.0	0.162	7.4	LOS A	0.0	0.0	0.00	1.13	48.6
5	T	691	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
West: Arterial Road											
11	T	2475	0.0	0.635	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	0.635	0.0	NA	0.0	0.0	0.00	0.00	60.0
South West: Median											
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	6.8	NA	8.9	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
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

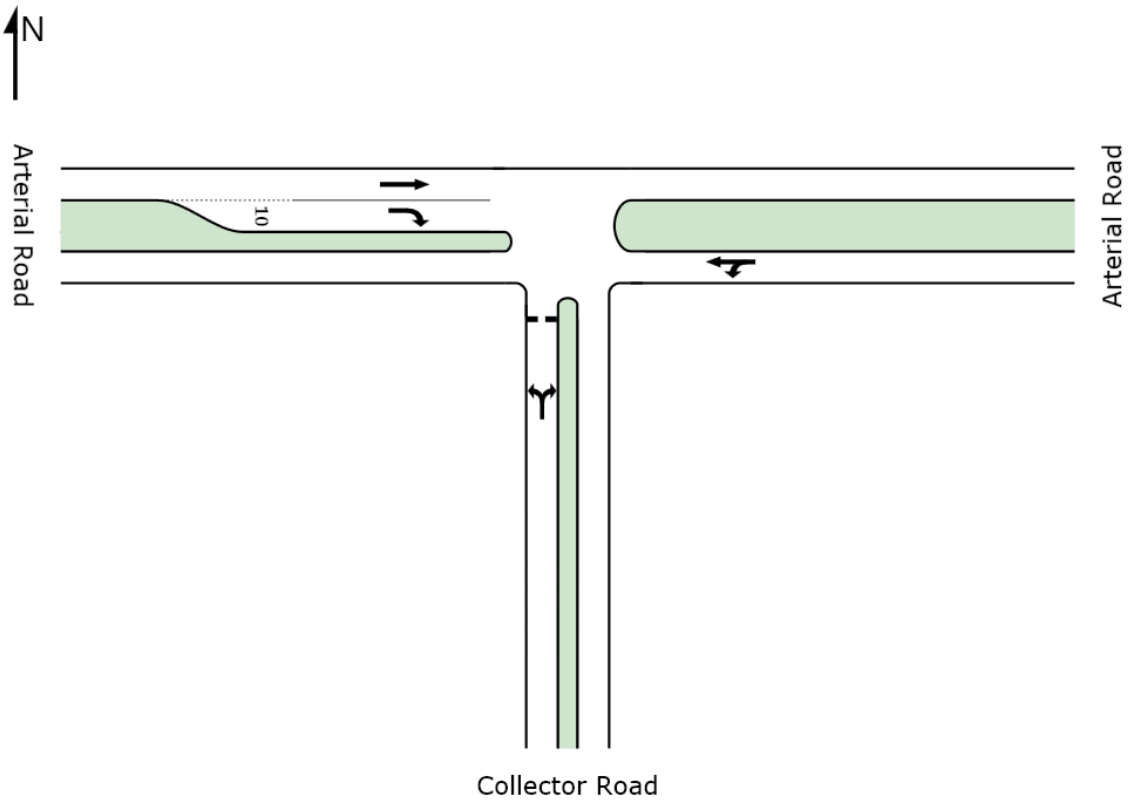
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	1	0.0	1.000[4]	326.9	LOS F	4.8	33.8	1.00	1.28	5.9
3	R	37	0.0	1.000[4]	326.9	LOS F	4.8	33.8	1.00	1.28	5.9
Approach		38	0.0	1.000	326.9	LOS F	4.8	33.8	1.00	1.28	5.9
East: Arterial Road											
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
West: Arterial Road											
11	T	1202	0.0	0.308	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	0.308	0.1	NA	0.1	0.4	0.00	0.00	59.9
South West: Median											
32	R	37	0.0	0.378	40.8	LOS C	0.9	6.3	0.95	1.01	26.1
Approach		37	0.0	0.378	40.8	LOS C	0.9	6.3	0.95	1.01	26.1
All Vehicles		3392	0.0	1.000	4.2	NA	4.8	33.8	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
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	95% Back of Queue 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	18.6	0.82	1.00	36.3
3	R	257	0.0	0.479	17.4	LOS B	2.7	18.6	0.82	1.07	36.3
Approach		258	0.0	0.479	17.4	LOS B	2.7	18.6	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	8.5	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	8.6	0.62	0.90	41.2
Approach		257	0.0	0.416	10.3	LOS A	1.2	8.6	0.62	0.90	41.2
All Vehicles		1747	0.0	0.479	4.4	NA	2.7	18.6	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

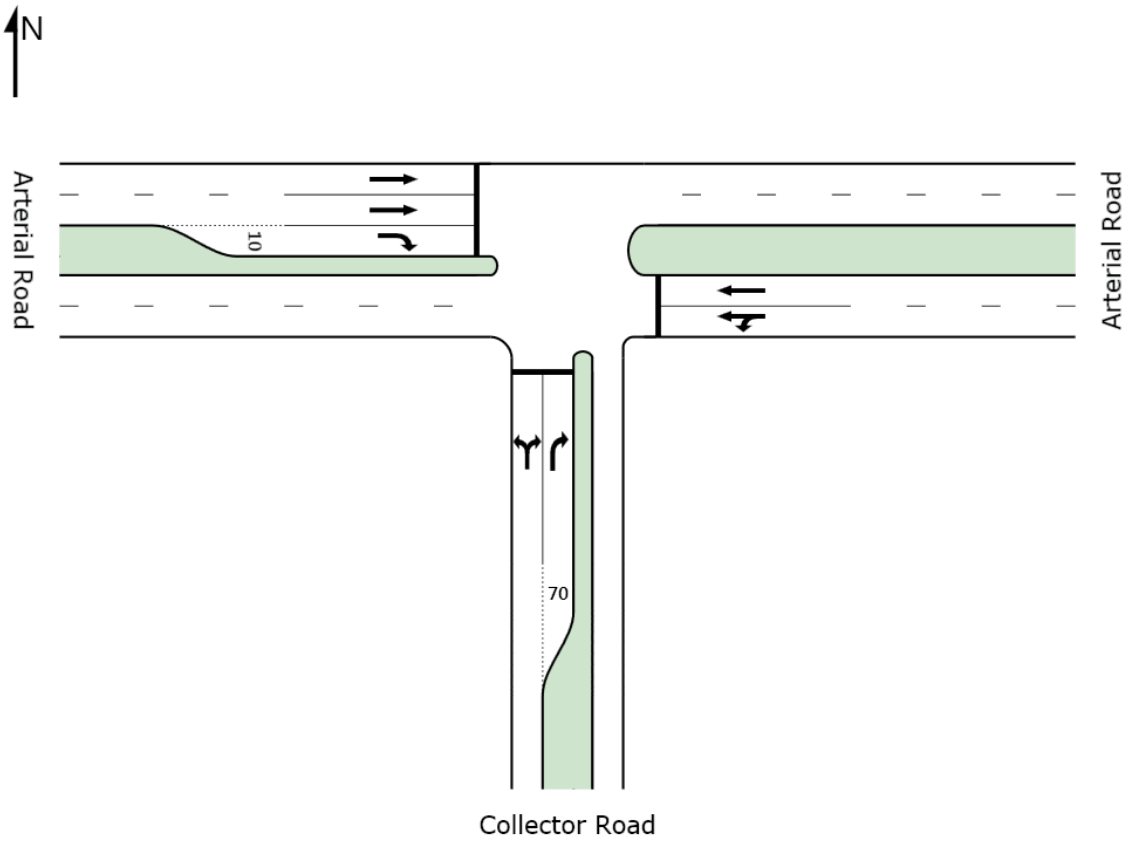
Intersection 5
BaseCase
PM Peak Period
Giveway / Yield (Two-Way)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	1	0.0	0.287	15.7	LOS B	1.3	8.8	0.78	0.96	37.3
3	R	142	0.0	0.287	15.8	LOS B	1.3	8.8	0.78	0.97	37.3
Approach		143	0.0	0.287	15.8	LOS B	1.3	8.8	0.78	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	0.82	41.9
Approach		142	0.0	0.230	9.4	LOS A	0.6	3.9	0.55	0.82	41.9
All Vehicles		1634	0.0	0.440	3.1	NA	1.3	8.8	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 v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue 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	0.84	19.9
3	R	257	0.0	0.694	66.9	LOS E	7.7	54.2	1.00	0.84	19.9
Approach		258	0.0	0.694	66.9	LOS E	7.7	54.2	1.00	0.84	19.9
East: Arterial Road											
4	L	73	0.0	0.222	8.2	LOS A	1.2	8.7	0.07	0.99	48.0
5	T	618	0.0	0.222	0.8	LOS A	1.3	8.8	0.07	0.06	58.3
Approach		691	0.0	0.222	1.5	LOS A	1.3	8.8	0.07	0.16	57.1
West: Arterial Road											
11	T	2215	0.0	0.710	1.5	LOS A	9.7	68.1	0.17	0.16	56.8
12	R	1	0.0	0.004	8.0	LOS A	0.0	0.0	0.05	0.63	48.0
Approach		2216	0.0	0.710	1.5	LOS A	9.7	68.1	0.17	0.16	56.8
All Vehicles		3164	0.0	0.710	6.8	LOS A	9.7	68.1	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

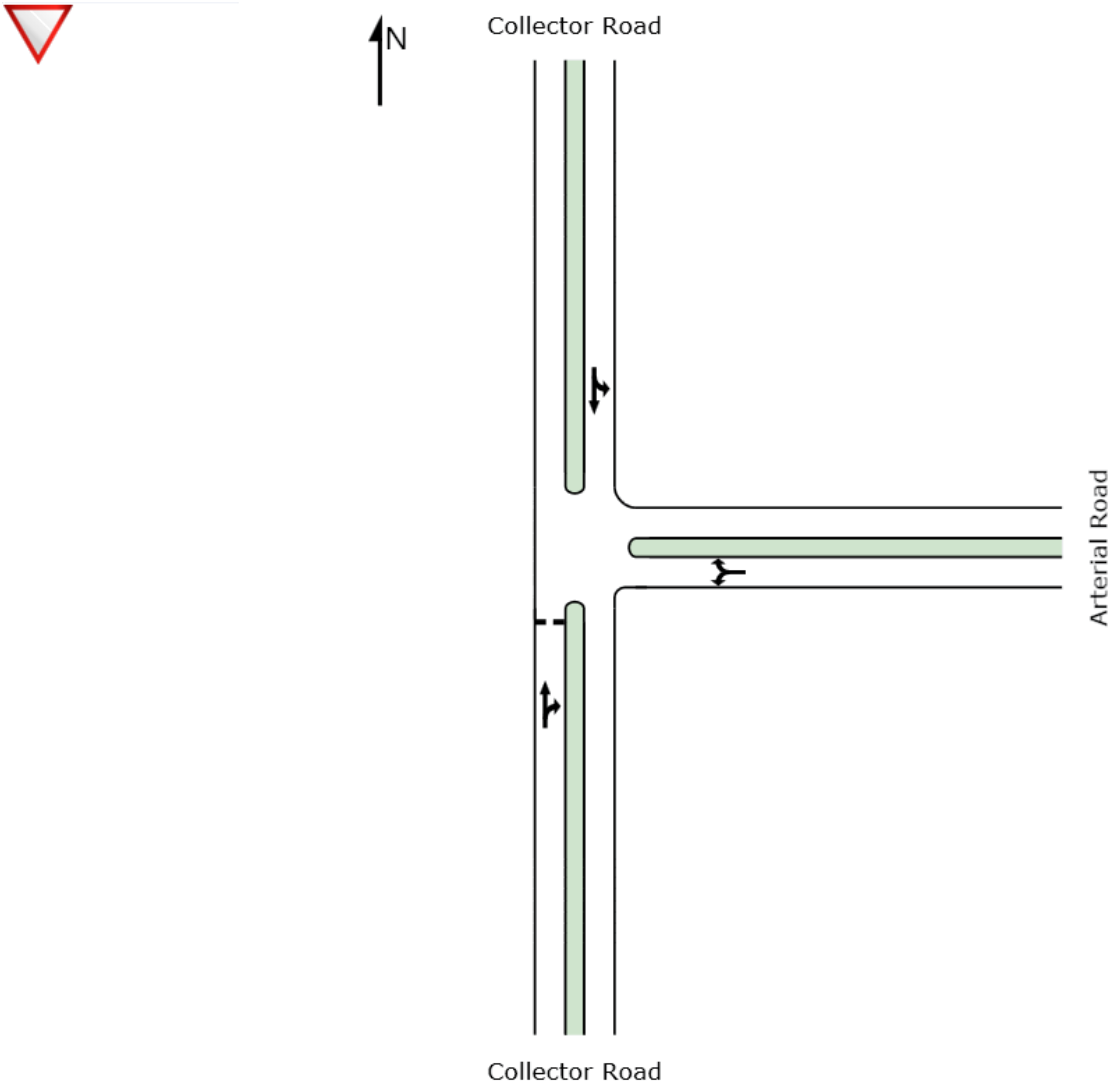
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
1	L	1	0.0	0.578	69.5	LOS E	4.3	30.3	1.00	0.78	19.4
3	R	142	0.0	0.578	69.4	LOS E	4.3	30.3	1.00	0.78	19.4
Approach		143	0.0	0.578	69.4	LOS E	4.3	30.3	1.00	0.78	19.4
East: Arterial Road											
4	L	187	0.0	0.638	8.6	LOS A	7.5	52.3	0.14	1.01	47.9
5	T	1878	0.0	0.638	1.1	LOS A	7.5	52.7	0.14	0.13	57.3
Approach		2065	0.0	0.638	1.8	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	0.08	0.07	58.4
12	R	1	0.0	0.016	8.1	LOS A	0.0	0.0	0.05	0.63	47.8
Approach		1073	0.0	0.330	0.7	LOS A	2.2	15.6	0.08	0.07	58.4
All Vehicles		3281	0.0	0.638	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
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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
2	T	1	0.0	0.188	11.0	LOS A	0.7	5.2	0.71	0.58	38.9
3	R	111	0.0	0.188	13.2	LOS A	0.7	5.2	0.71	0.90	39.1
Approach		112	0.0	0.188	13.2	LOS A	0.7	5.2	0.71	0.90	39.1
East: Arterial Road											
4	L	32	0.0	0.138	7.4	LOS A	0.0	0.0	0.00	0.63	48.6
6	R	224	0.0	0.138	7.6	LOS A	0.0	0.0	0.00	0.66	48.4
Approach		256	0.0	0.138	7.6	NA	0.0	0.0	0.00	0.66	48.5
North: Collector Road											
7	L	794	0.0	0.428	8.7	LOS A	4.0	27.9	0.53	0.30	42.0
8	T	1	0.0	0.428	1.6	LOS A	4.0	27.9	0.53	0.36	42.4
Approach		795	0.0	0.428	8.7	NA	4.0	27.9	0.53	0.30	42.0
All Vehicles		1162	0.0	0.428	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

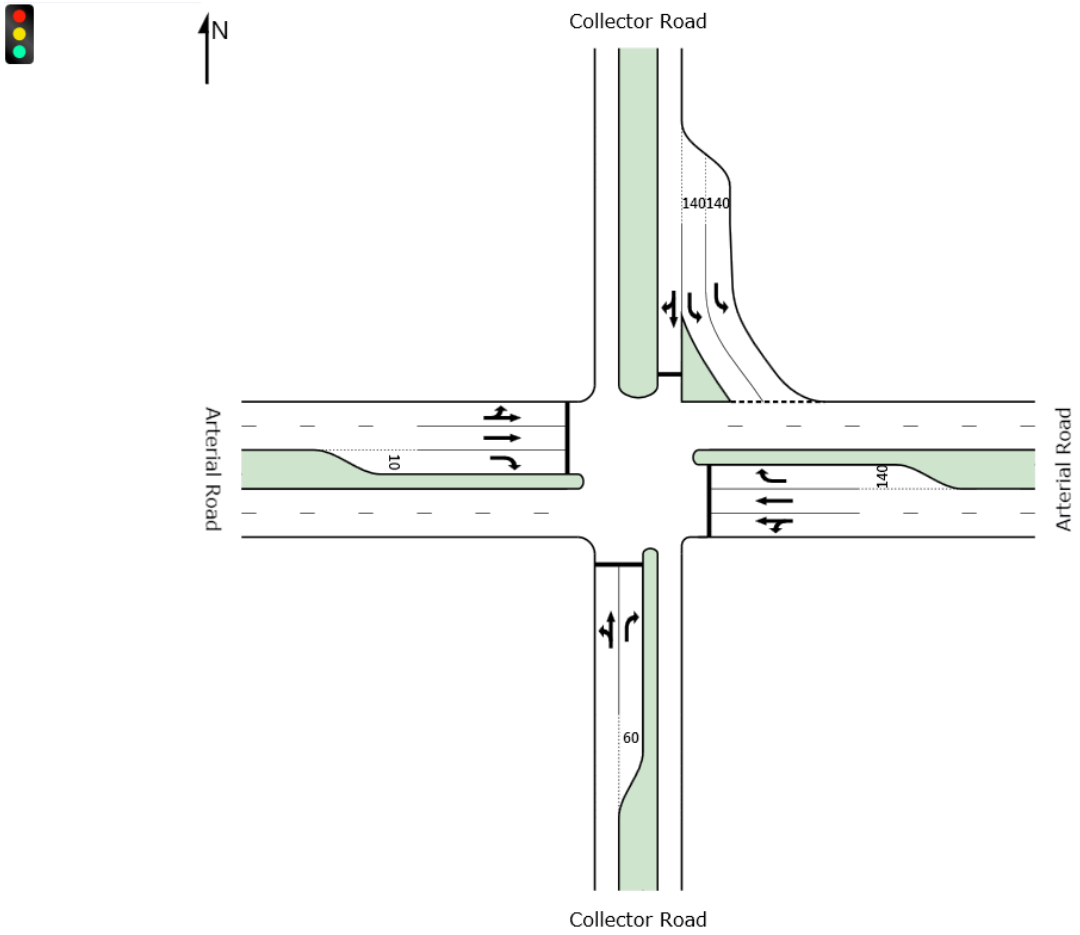
Intersection 6
BaseCase
PM Peak
Giveway / Yield (Two-Way)

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	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Collector Road											
2	T	1	0.0	0.108	11.0	LOS A	0.4	2.9	0.70	0.76	39.0
3	R	61	0.0	0.108	13.2	LOS A	0.4	2.9	0.70	0.90	39.1
Approach		62	0.0	0.108	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	580	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 veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue 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	0.8	0.93	0.63	22.5
2	T	1	0.0	0.012	53.7	LOS D	0.1	0.8	0.93	0.58	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	58.0
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	5.8	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	33.8
8	T	1	0.0	0.022	60.4	LOS E	0.1	0.8	0.97	0.59	19.5
9	R	1	0.0	0.022	68.4	LOS E	0.1	0.8	0.97	0.62	21.1
Approach		796	0.0	0.546	22.4	LOS B	16.8	117.4	0.82	0.84	33.7
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		2864	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)

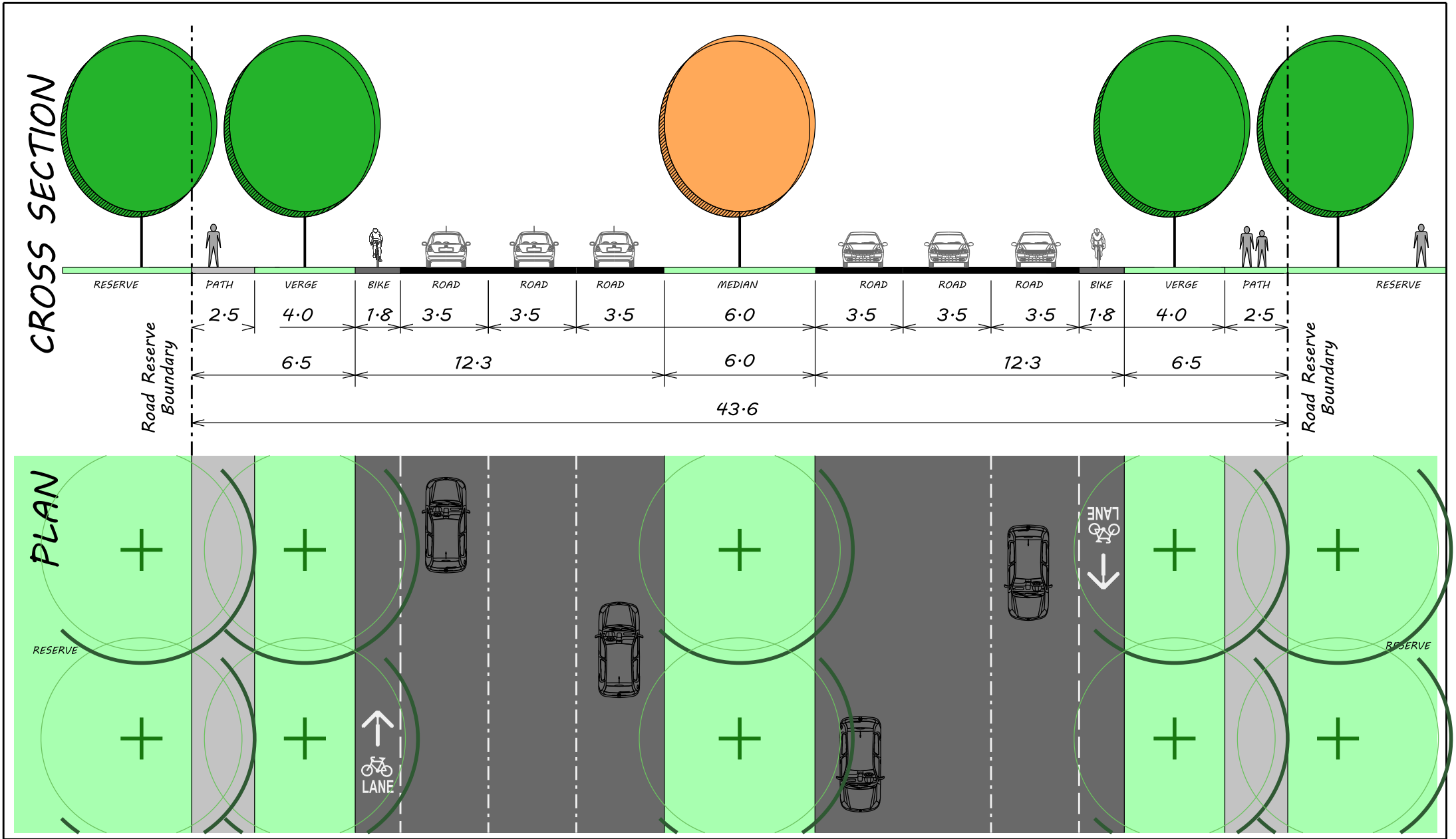
Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue 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	0.8	0.96	0.62	21.3
2	T	1	0.0	0.019	58.9	LOS E	0.1	0.8	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	580	0.0	0.598	8.7	LOS A	2.7	19.2	0.13	0.68	47.2
Approach		1877	0.0	0.598	3.8	LOS A	3.2	22.7	0.11	0.31	53.5
North: Collector Road											
7	L	438	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	0.8	0.97	0.59	19.5
9	R	1	0.0	0.022	68.4	LOS E	0.1	0.8	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	0.598	51.9	LOS D	14.7	102.9	0.94	0.86	25.9
11	T	562	0.0	0.598	43.7	LOS D	14.7	102.9	0.94	0.80	26.2
12	R	1	0.0	0.025	48.0	LOS D	0.1	0.4	0.78	0.65	25.9
Approach		564	0.0	0.598	43.7	LOS D	14.7	102.9	0.94	0.80	26.2
All Vehicles		2944	0.0	0.598	13.8	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



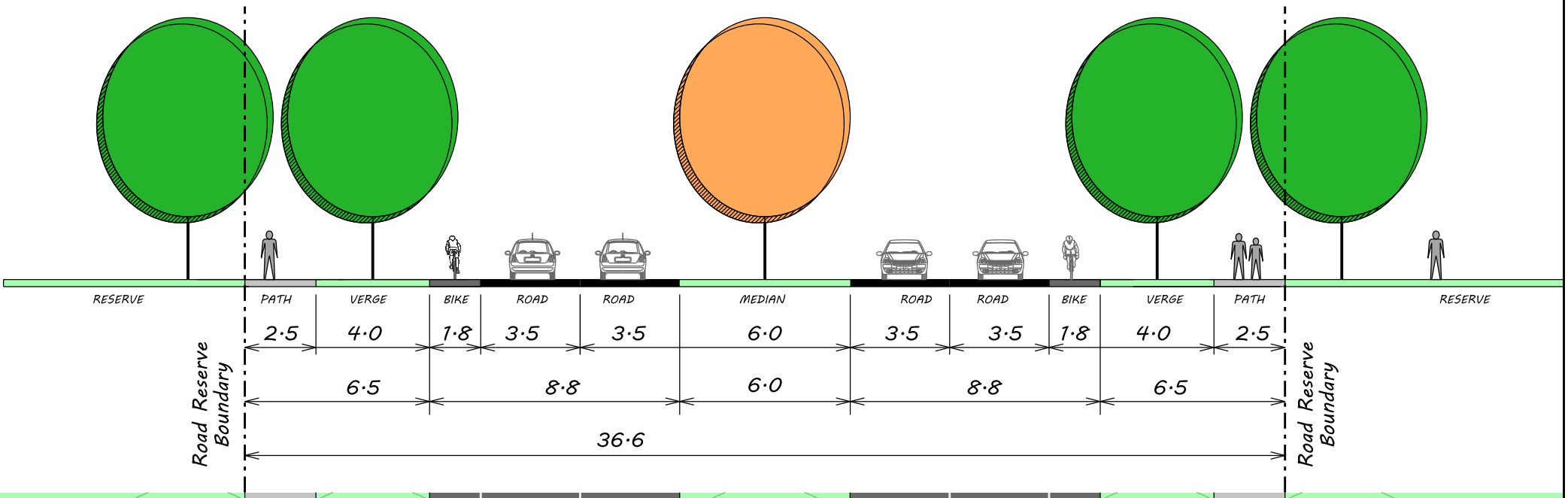
43·6m Arterial Road (3+3 lanes)

RIVERLEA

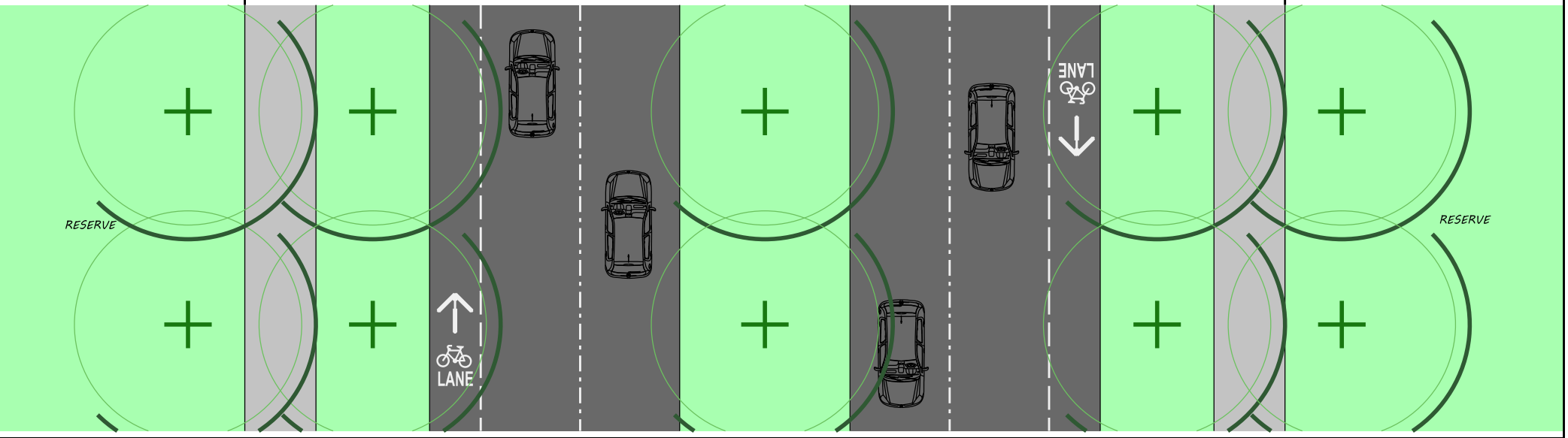
walker

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

CROSS SECTION



PLAN



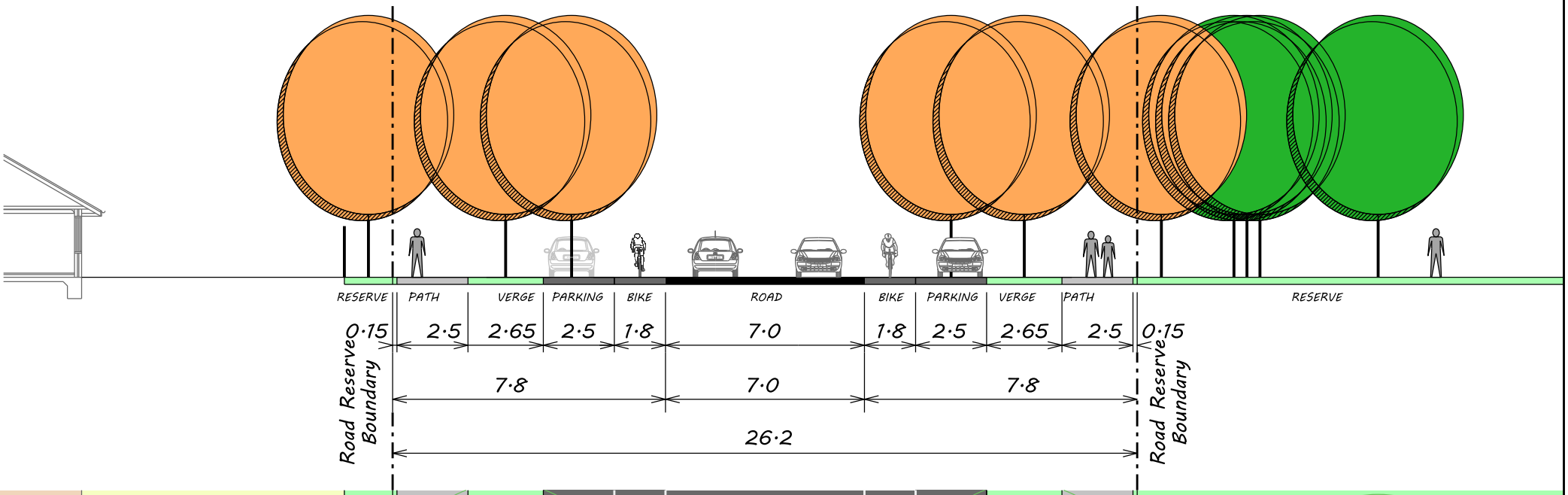
RIVERLEA

36·6m Arterial Road (2+2 lanes)

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

walker

CROSS SECTION



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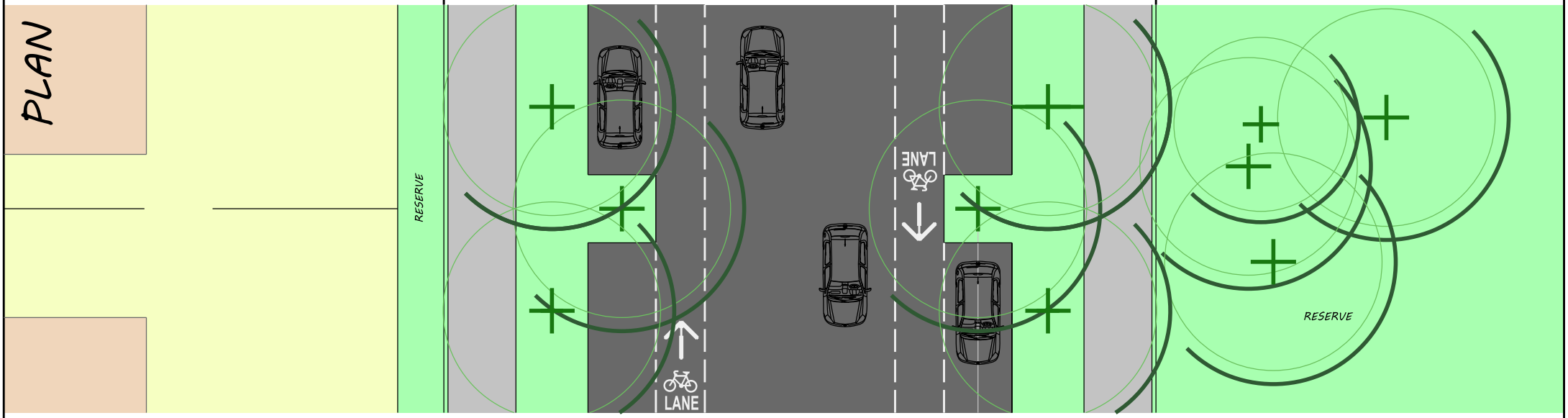


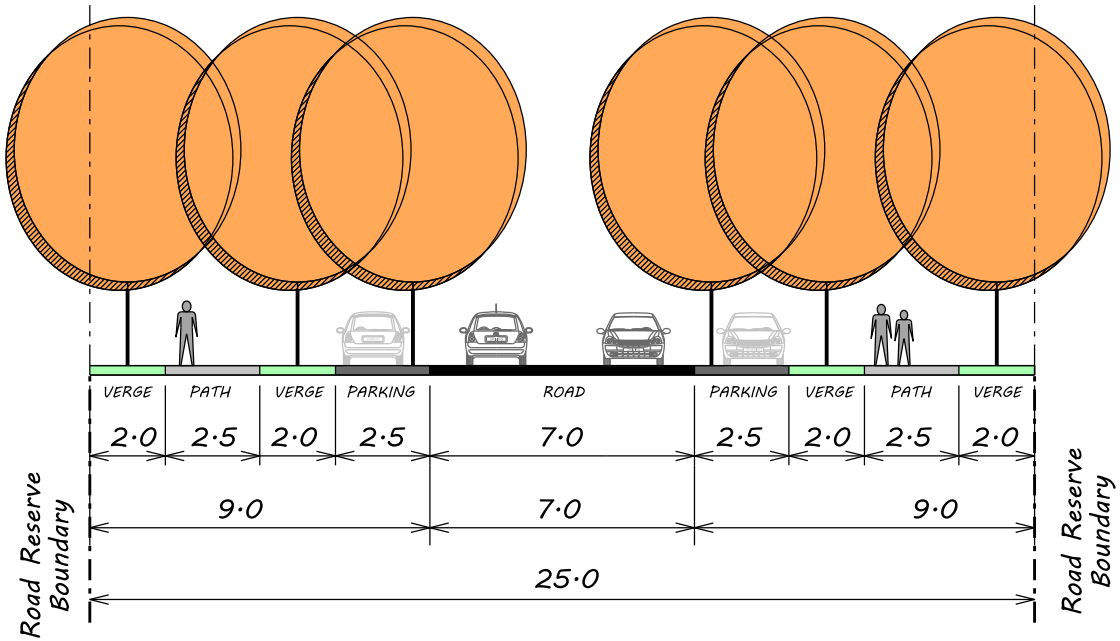
RIVERLEA

26·2m Sub Arterial Road

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

walker

CROSS SECTION



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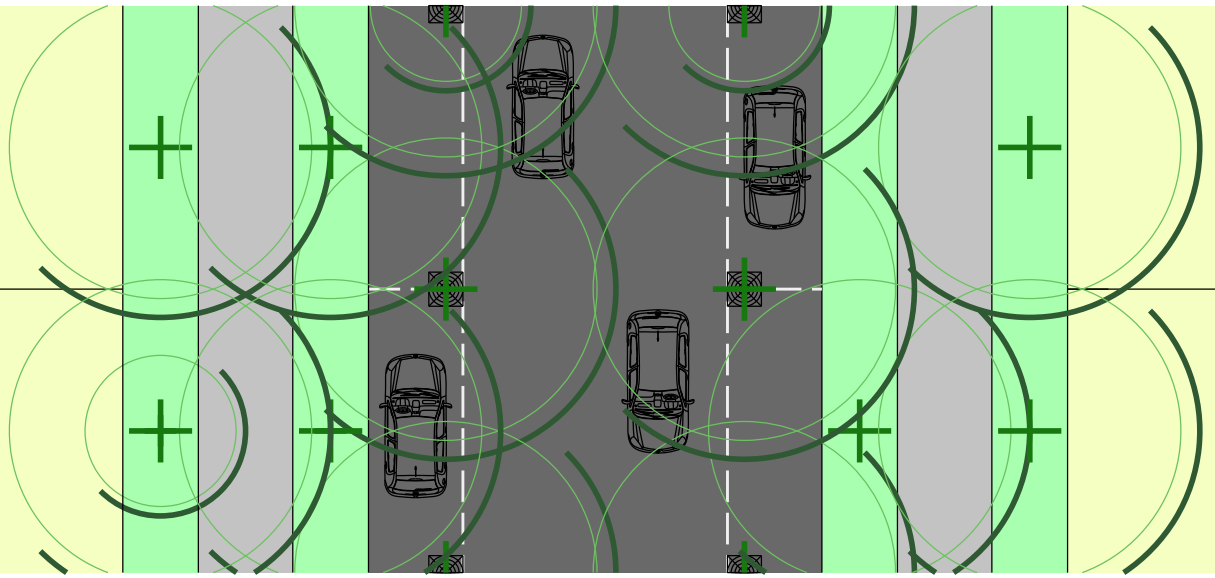


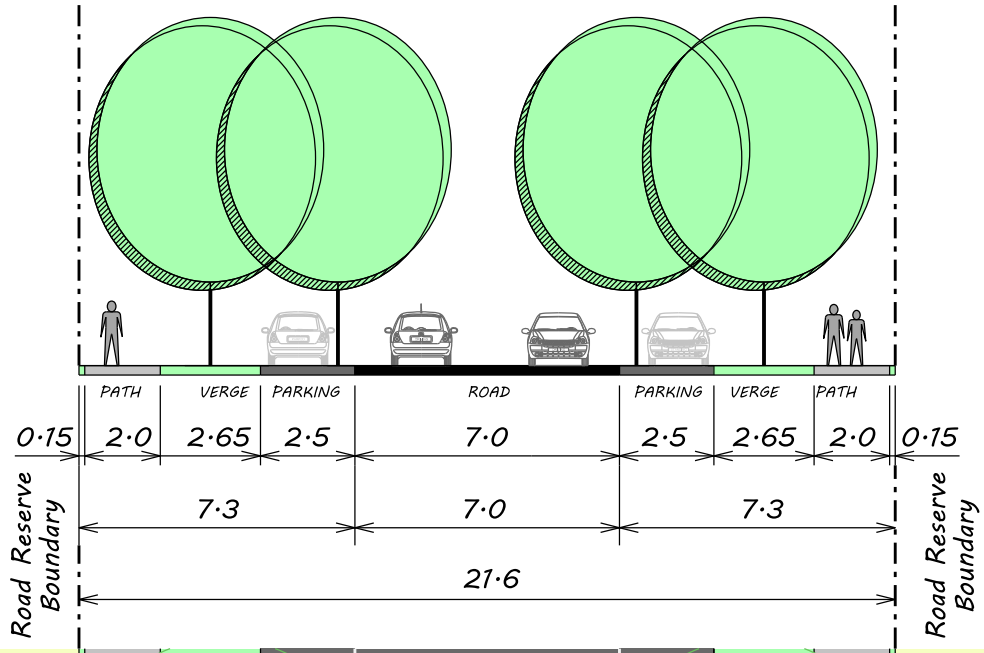
25·0m Diagonal Axis Road

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

RIVERLEA

walker

CROSS SECTION



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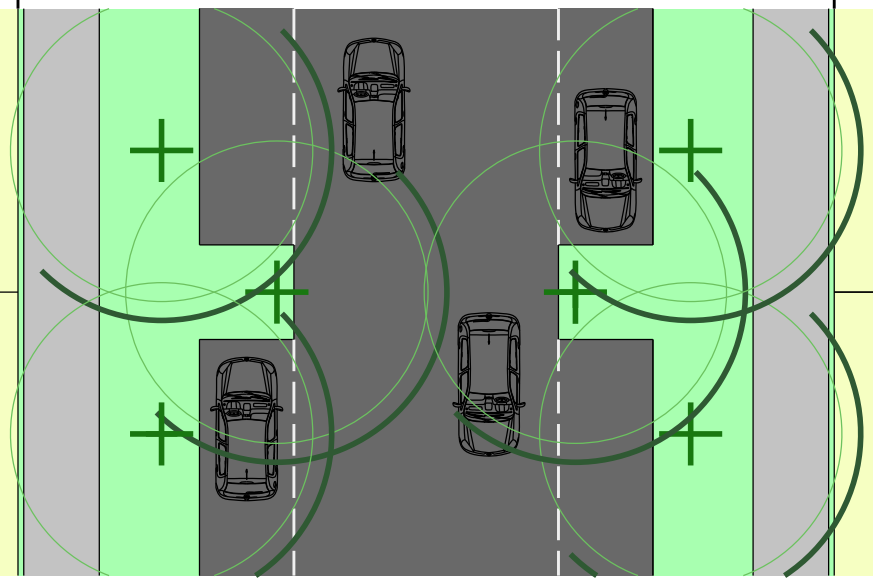


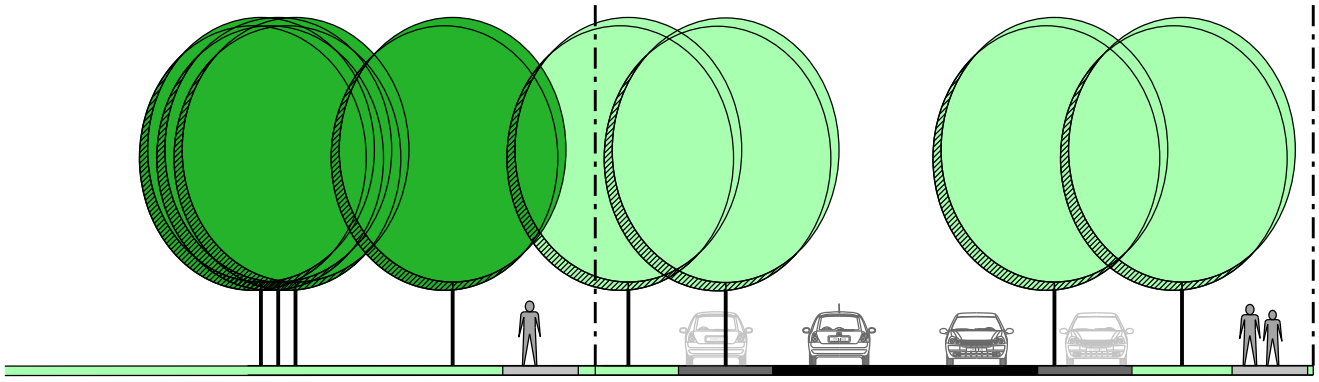
21·6m Distributor Road (type 1)

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

RIVERLEA

walker

CROSS SECTION



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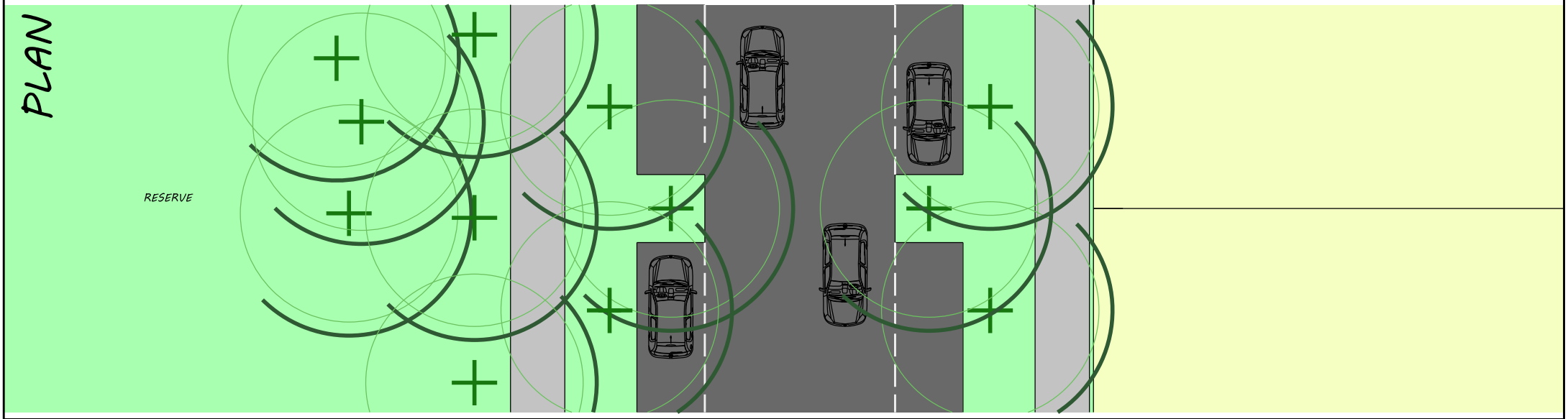


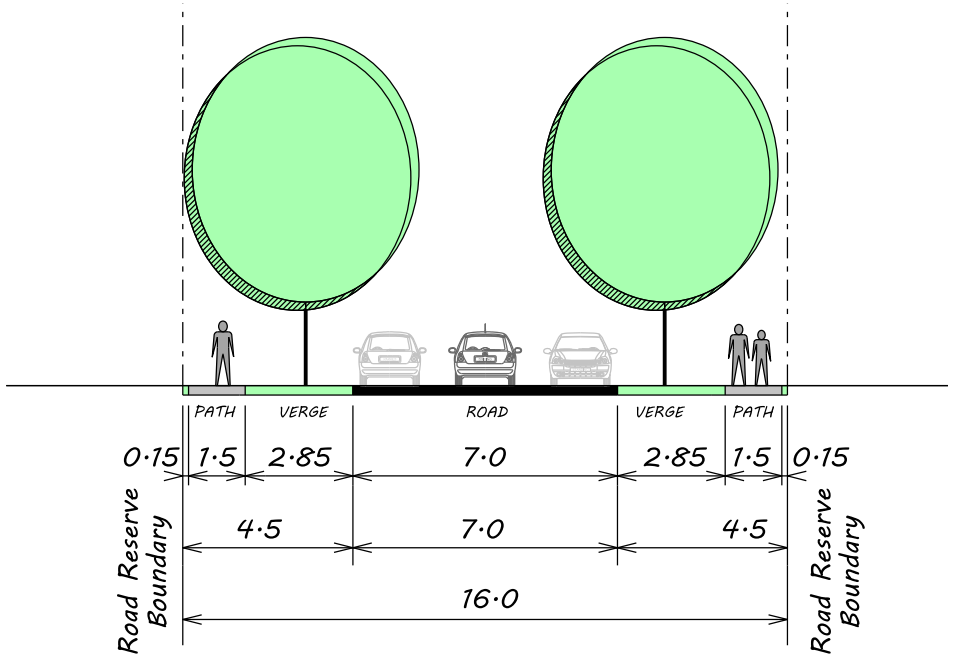
19·0m Distributor Road (type 2 - adjacent reserve)

RIVERLEA

walker

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

CROSS SECTION



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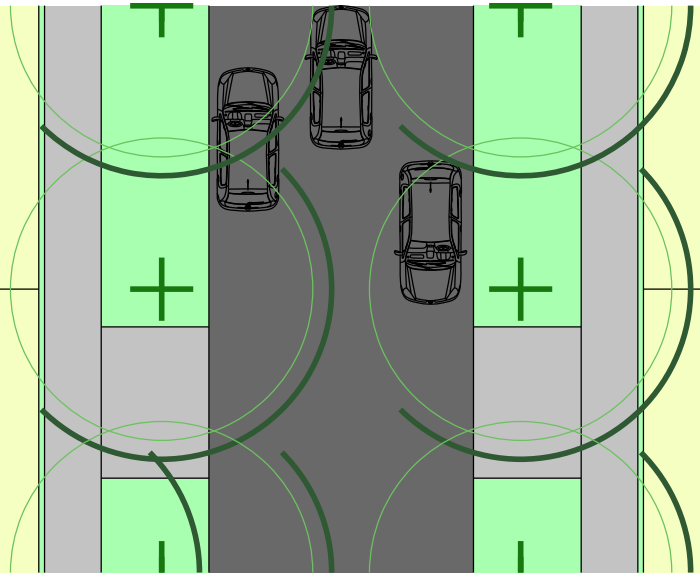


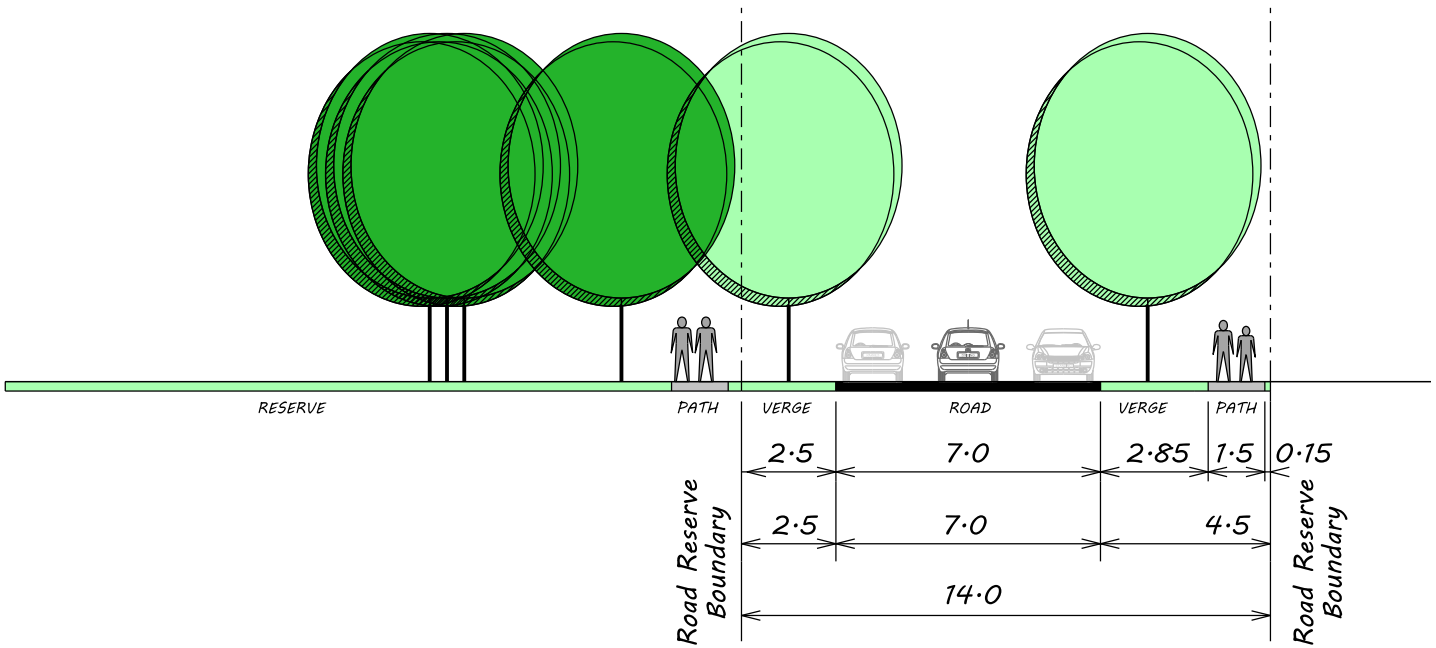
16·0m Local Road (type 1)

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

RIVERLEA

walker

CROSS SECTION



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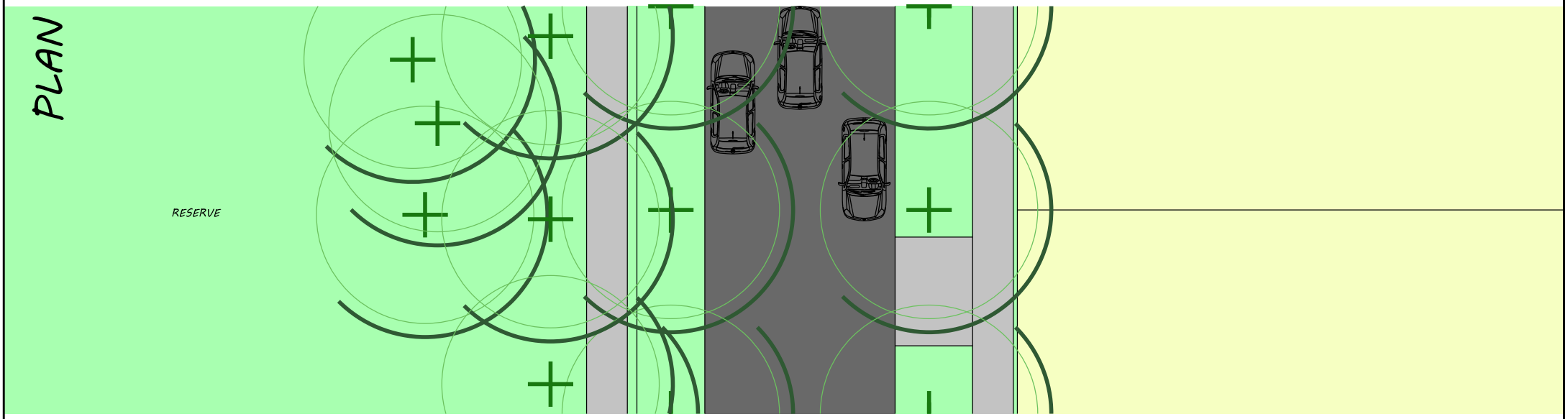


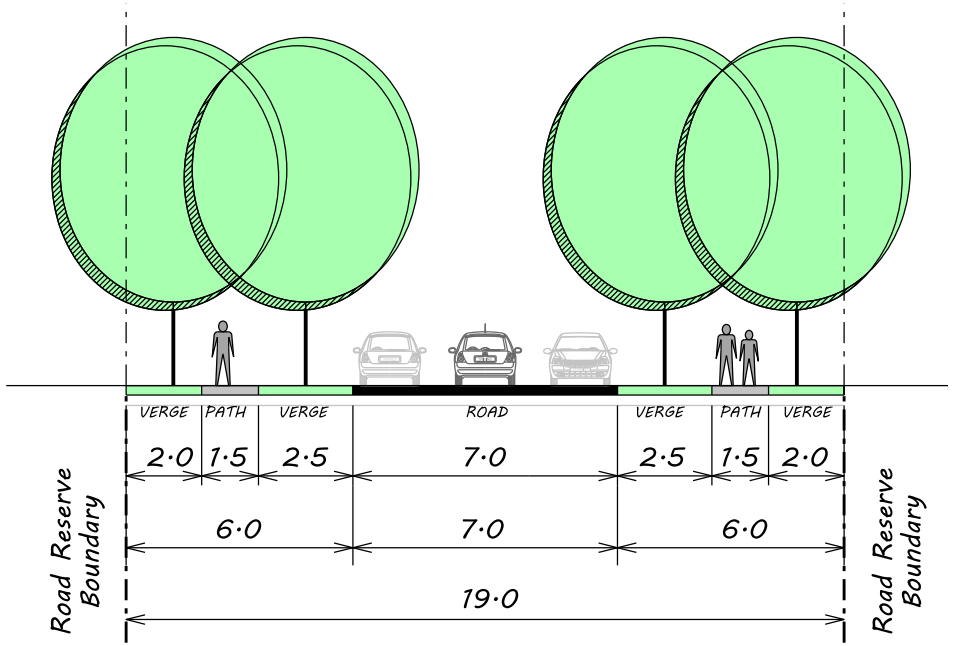
14·0m Local Road (type 2 - adjacent reserve)

RIVERLEA

walker

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

CROSS SECTION



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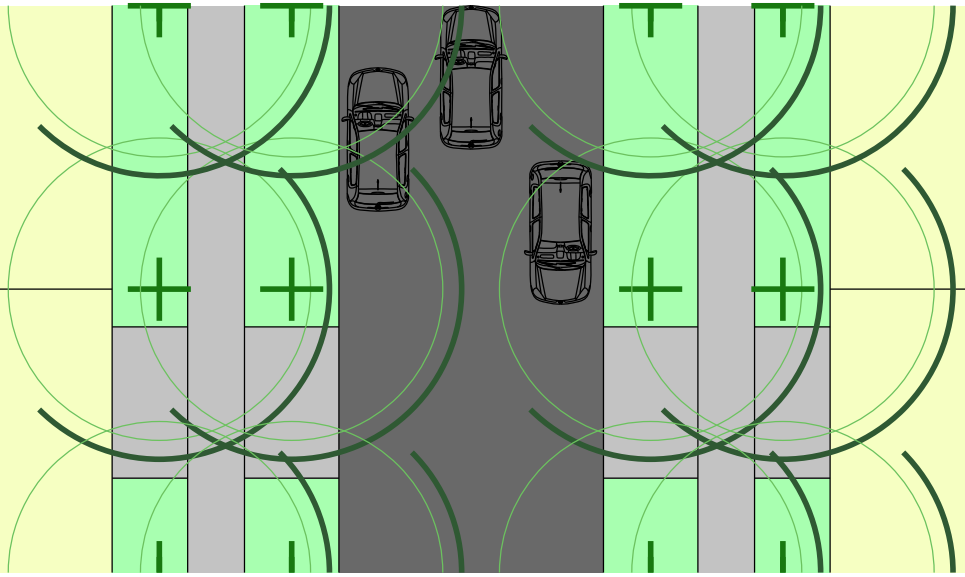


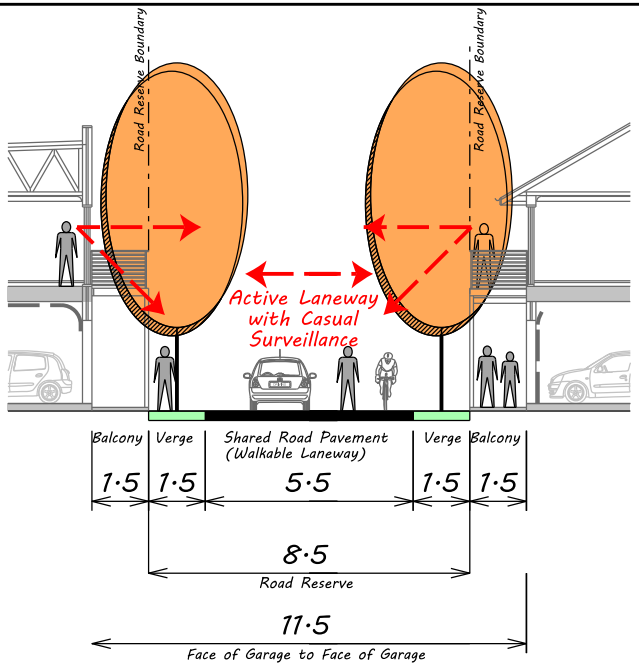
19·0m Local Road (type 3)
Key Pedestrian Route

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

RIVERLEA

walker

CROSS SECTION



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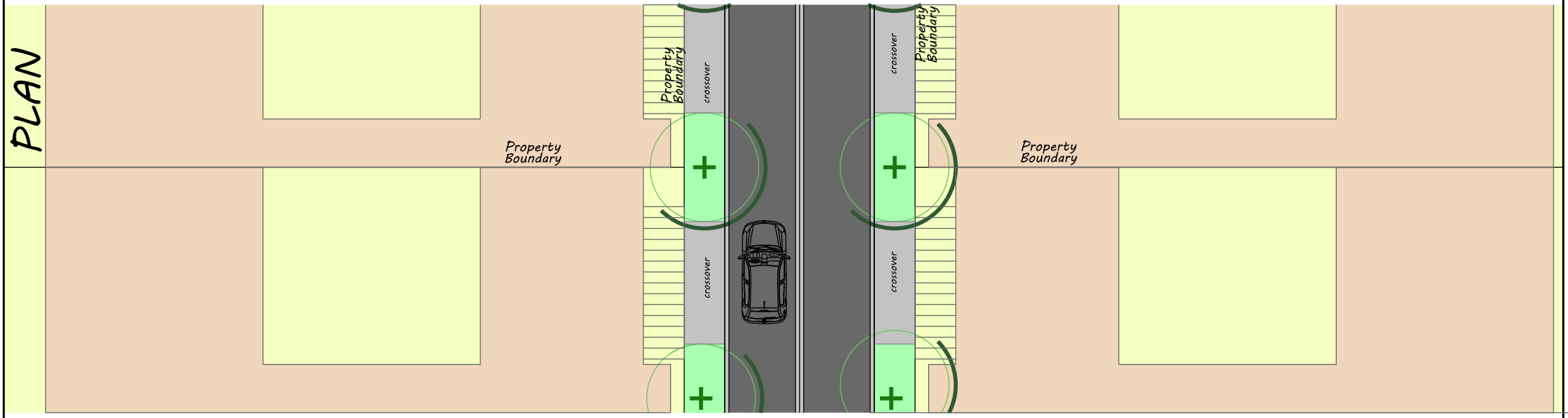


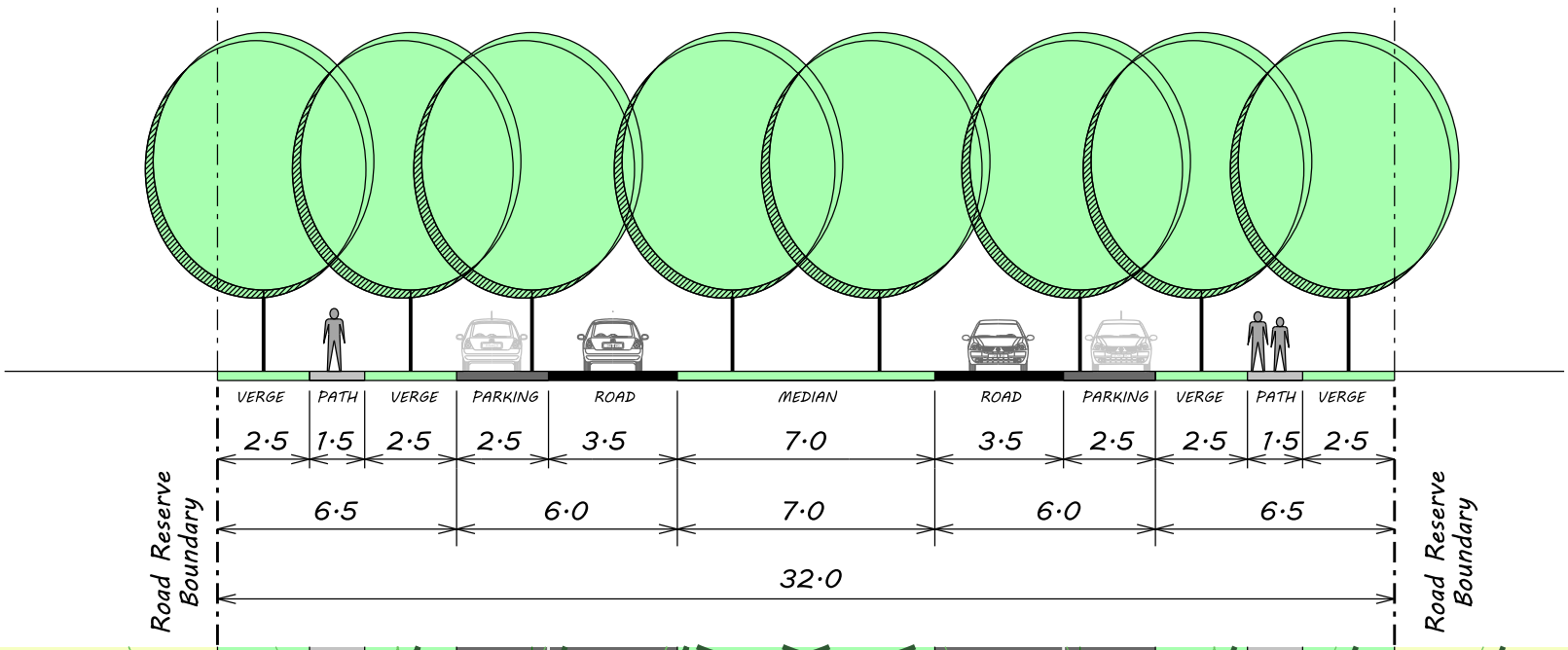
8·5m Wide Laneway

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

RIVERLEA

walker

CROSS SECTION



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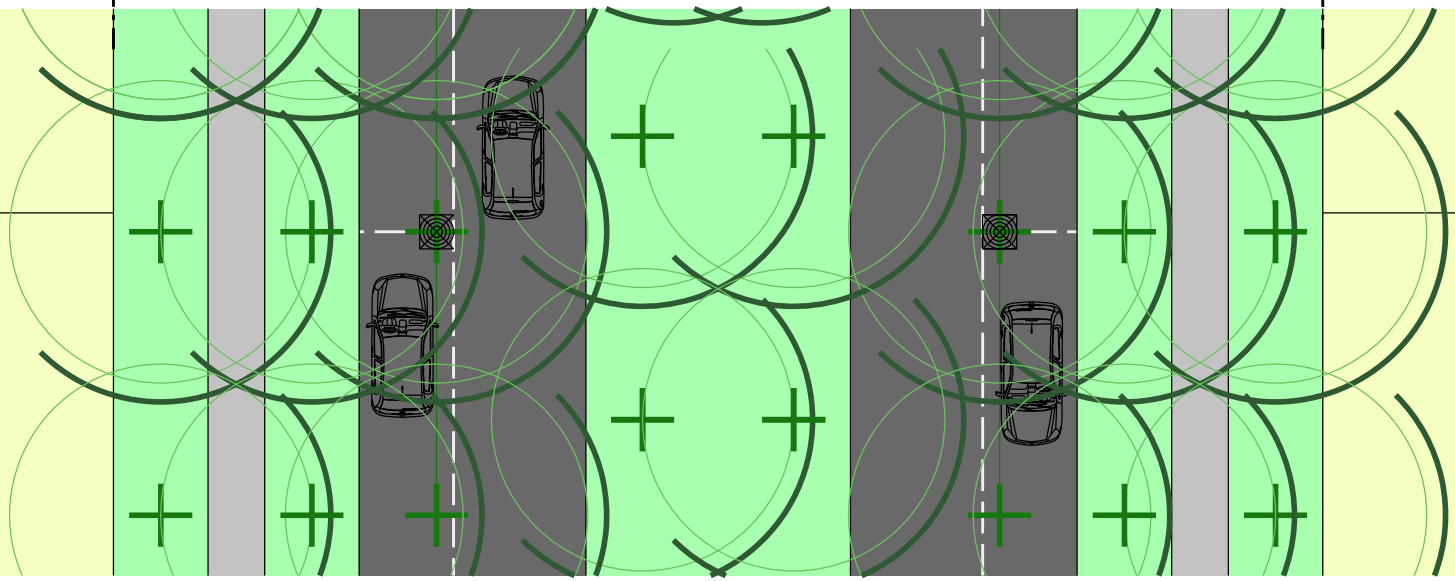
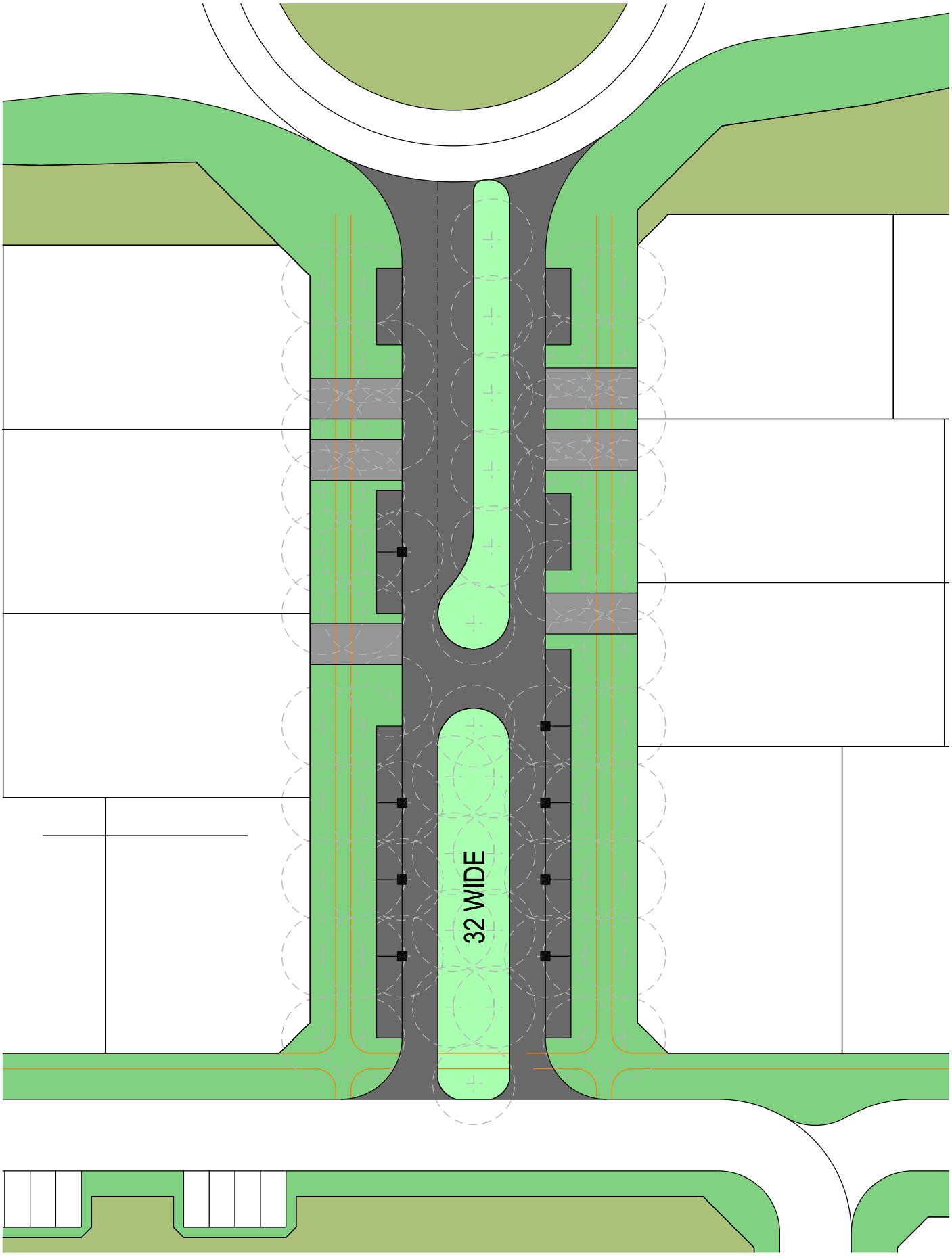


32·0m Wide Entrance Road

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

RIVERLEA

walker



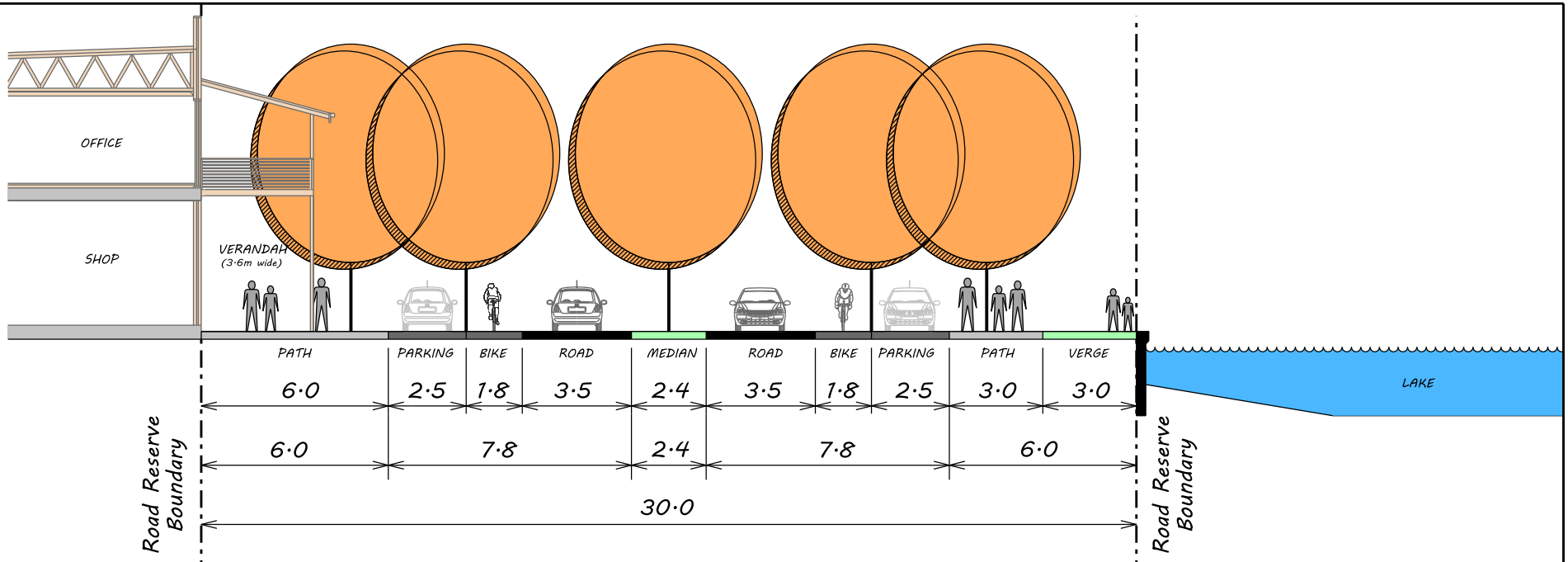
RIVERLEA

32·0m Entrance

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

walker

CROSS SECTION



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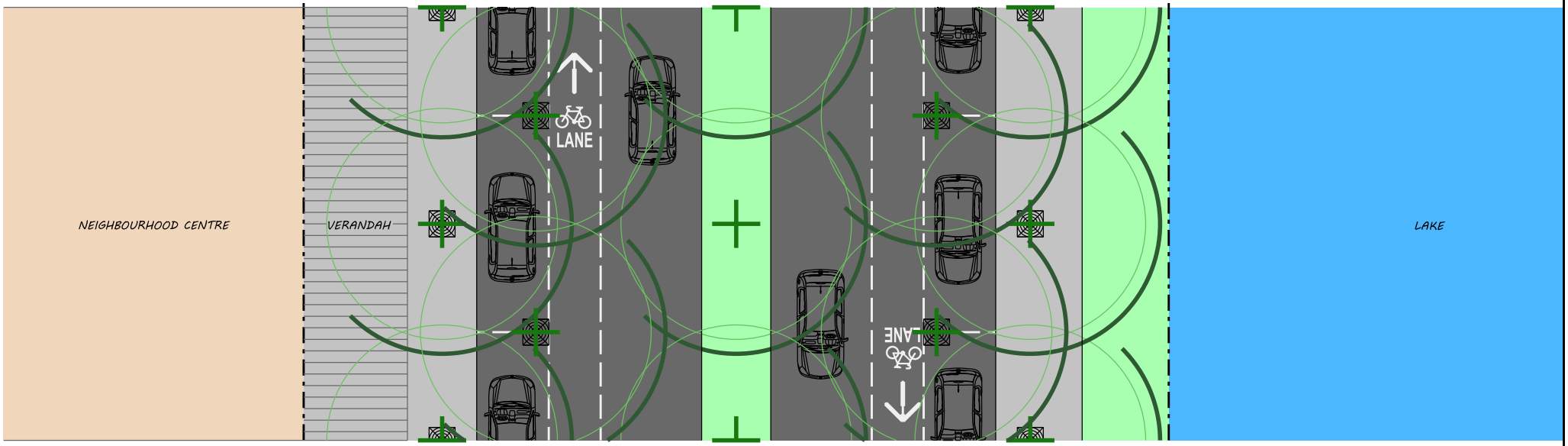


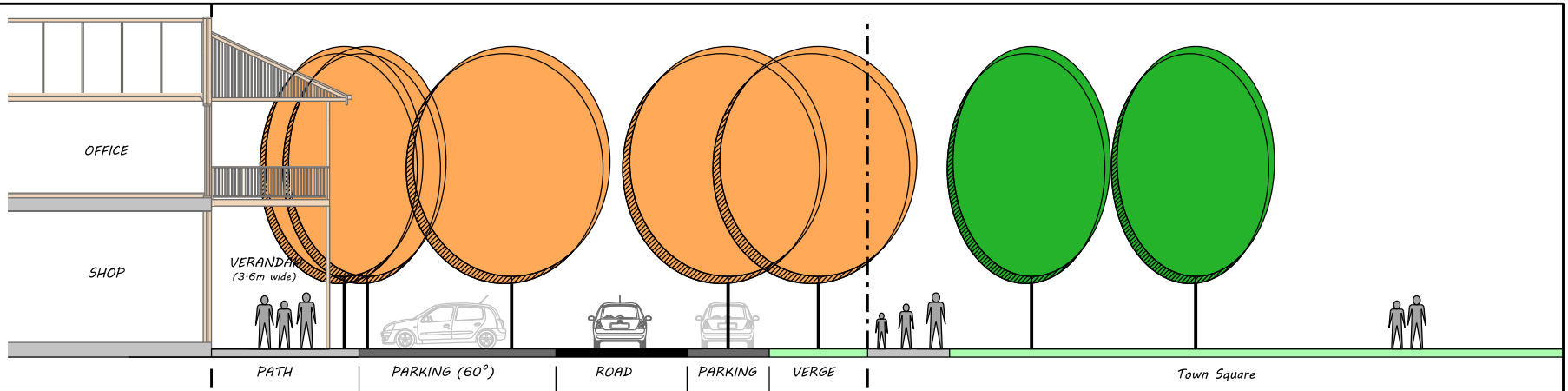
30·0m Wide Main Street

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

RIVERLEA

walker

CROSS SECTION



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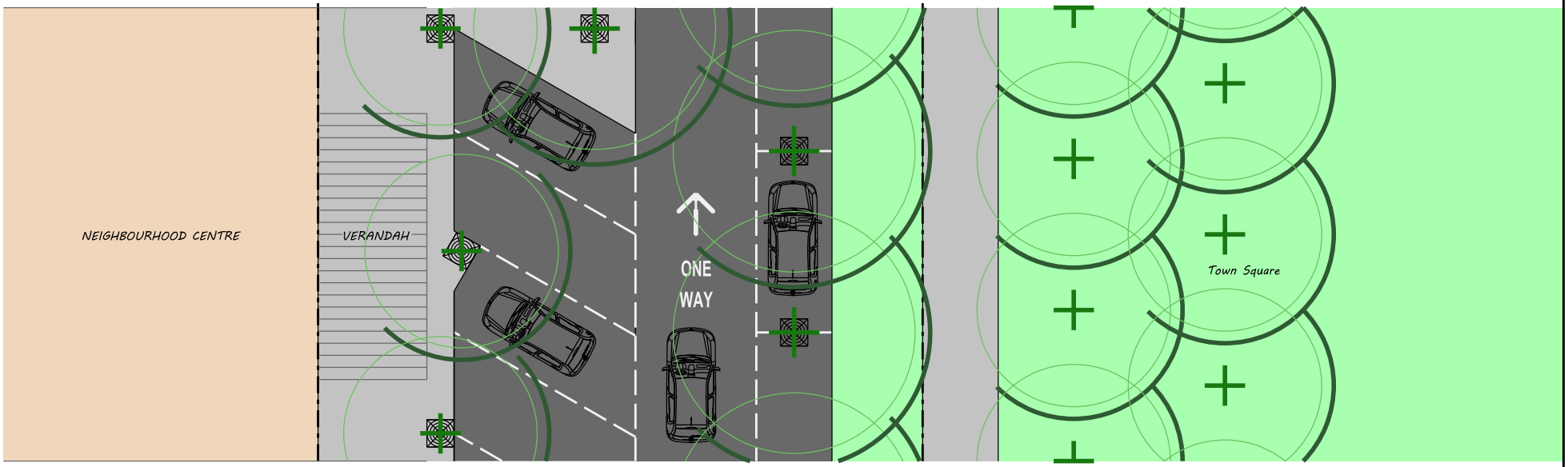

RIVERLEA

20·0m Wide Main Street

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

walker

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28th 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.

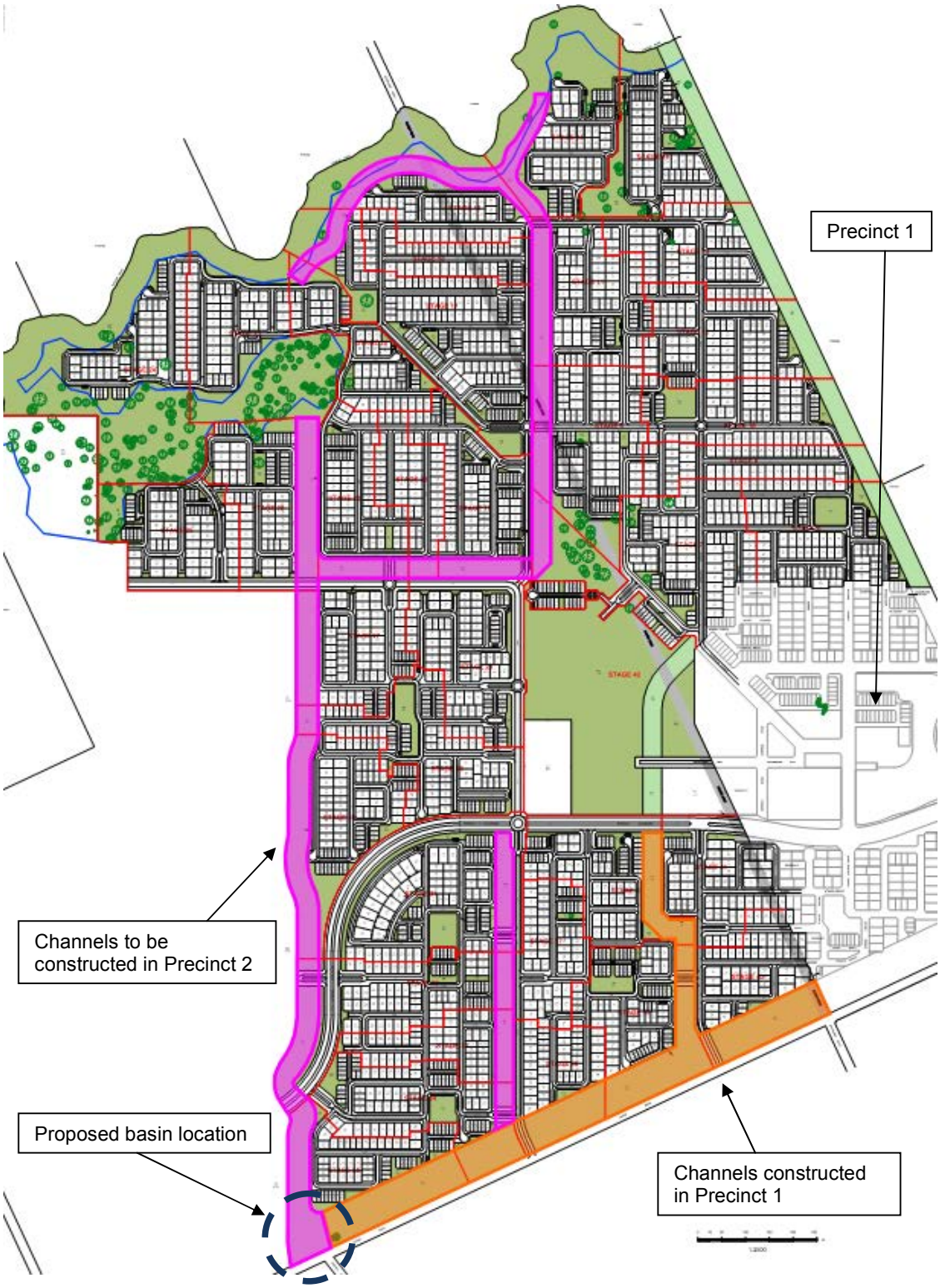

Figure 1 - Precinct 2 Locality Plan and Proposed Channel Layout

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^3/s	22.9 m^3/s

From Table 1 it can be seen that the maximum allowable outflow from the basin is 3.3 m^3/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^3/s, a detention basin with approximately 33,000m^3 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^3/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