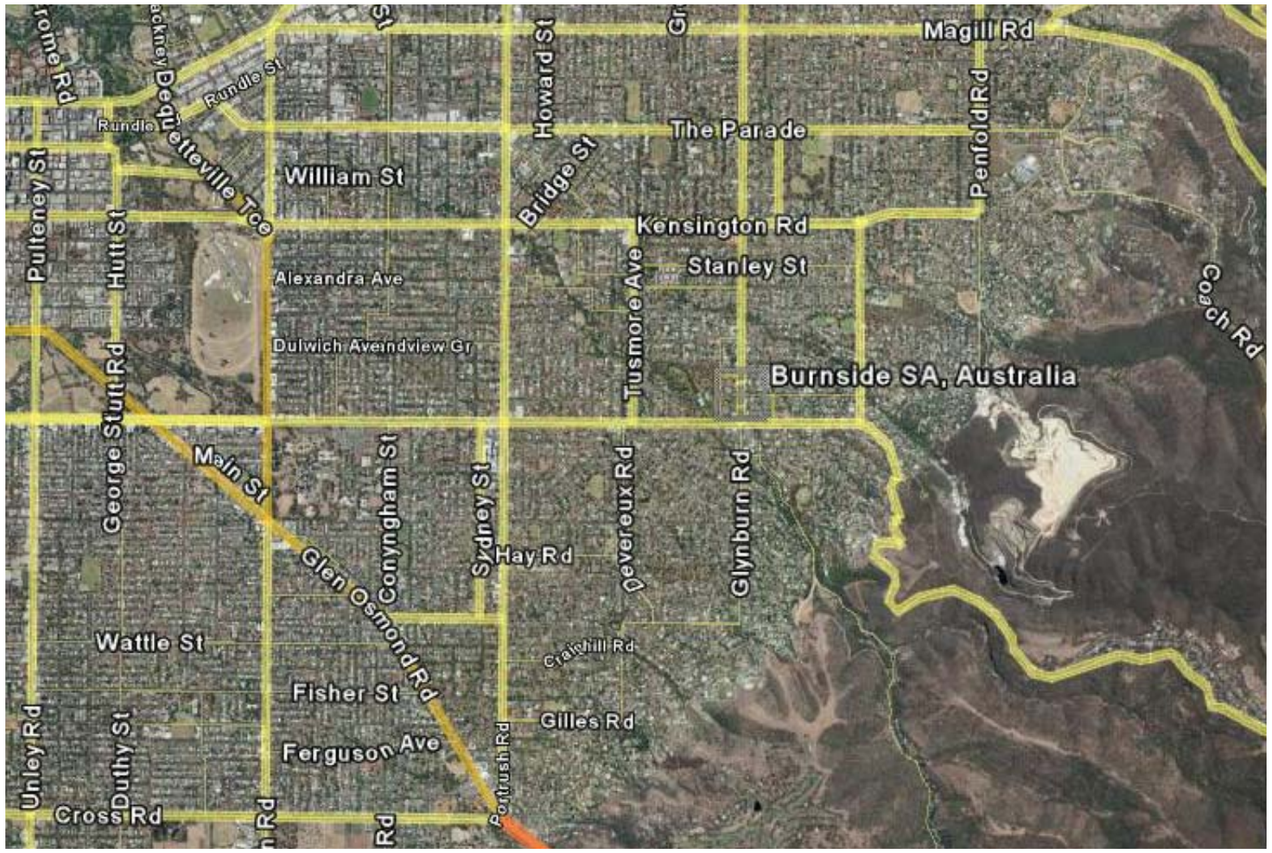
City of Burnside



BICYCLE STRATEGY

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prepared by

e hub@hubtt.com.au

w www.hubtt.com.au

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Overview

The Corporation of the City of Burnside has commissioned Hub Traffic and Transport to prepare a bicycle strategy, as required by the City's 2020 Vision strategic plan. This bicycle strategy builds on the Regional Area Bike Plan, prepared for the eastern councils in 1992, the Burnside elements of which were reviewed in 1995-1996. In preparing this strategy, Hub has:

- examined the earlier strategies, along with other key Council documents, particularly the 2020 Vision strategic plan, the Open Space Strategy, the Traffic and Parking Strategy and the Council's Development Plan.
- undertaken an extensive site survey of the area
- conducted a public consultation, using web-based and hard copy questionnaires
- gathered relevant infrastructure and traffic data (including bicycle counts and crash data) provided by the Council, Australia Bureau of Statistics and State government.

Burnside has the advantages of a relatively dense network of local streets, which provides many route options for cyclists. The local streets themselves are generally quiet and shady, providing pleasant cycling conditions – apart from at peak periods, especially during the school term. However arterial roads with high traffic volumes dissect the Council area. With few exceptions, the existing bike routes do not have facilities for crossing these roads.

The earlier bike strategies along with the State Government's BikeDirect network[1] have resulted in a reasonably extensive (nominal) network of bicycle routes. The current strategy makes only minor amendments to this network. Instead the emphasis of the current strategy is to:

- identify and design a spine of 'Super Routes' to provide high-quality commuter cycling facilities that also provide access to schools, with the remaining network forming ribs to this spine, for added connectivity and continuity;
- make the network more visible on the road, through means of road markings, minor infrastructure measures and signage;
- address the barriers to local bike access posed by arterial roads; and
- promote better integration of bicycle planning with Councils development planning, overall asset management, and recreational planning.

The proposed bicycle network is shown overleaf.

This Bicycle Strategy has been informed by a significant amount of work. The main section of this document presents the most relevant information, which is examined and documented in more detail in three separate supporting reports:

- Public consultation report
- Cycling activity report
- Site survey report.

The Appendix to this document provides a more detailed examination of design elements.

As a goal-oriented strategy, the most important element of this Strategy is the Action Plan.

The action plan

The Action Plan prepared to implement the strategy involves actions for both the Council and the State government. The Action Plan has the following goals:

- developing and strengthening the network – especially the Super Routes – through signage, design measures and bike parking;
- providing connections across arterial roads and through road closures;
- removing safety hazards;
- promoting integrated planning and cultural change within the Corporation, particularly with regards the Development Plan and by proposing a regional level Bicycle Plan Coordinator to oversee the implementation of the bicycle plans of the Eastern Region Alliance Councils; and
- promoting cycling through events, educational programs, wayfinding signage and working cooperatively with neighbouring councils.

Infrastructure measures have been prioritised into four categories: highest, high, medium and low. Numerous factors have produced this prioritisation, the most important of which are:

- the strategic importance of a route as part of forming a usable network, based around the Super Routes;
- the number of cyclists using routes;
- general traffic conditions;
- the crash record of the location; and
- filling in "gaps" along any route.

The highest priority actions have been identified for implementation over the term of the Action Plan, with lower priority actions identified separately to enable these to be actioned on an opportunistic basis (i.e. as part of programmed works or as other works arise).

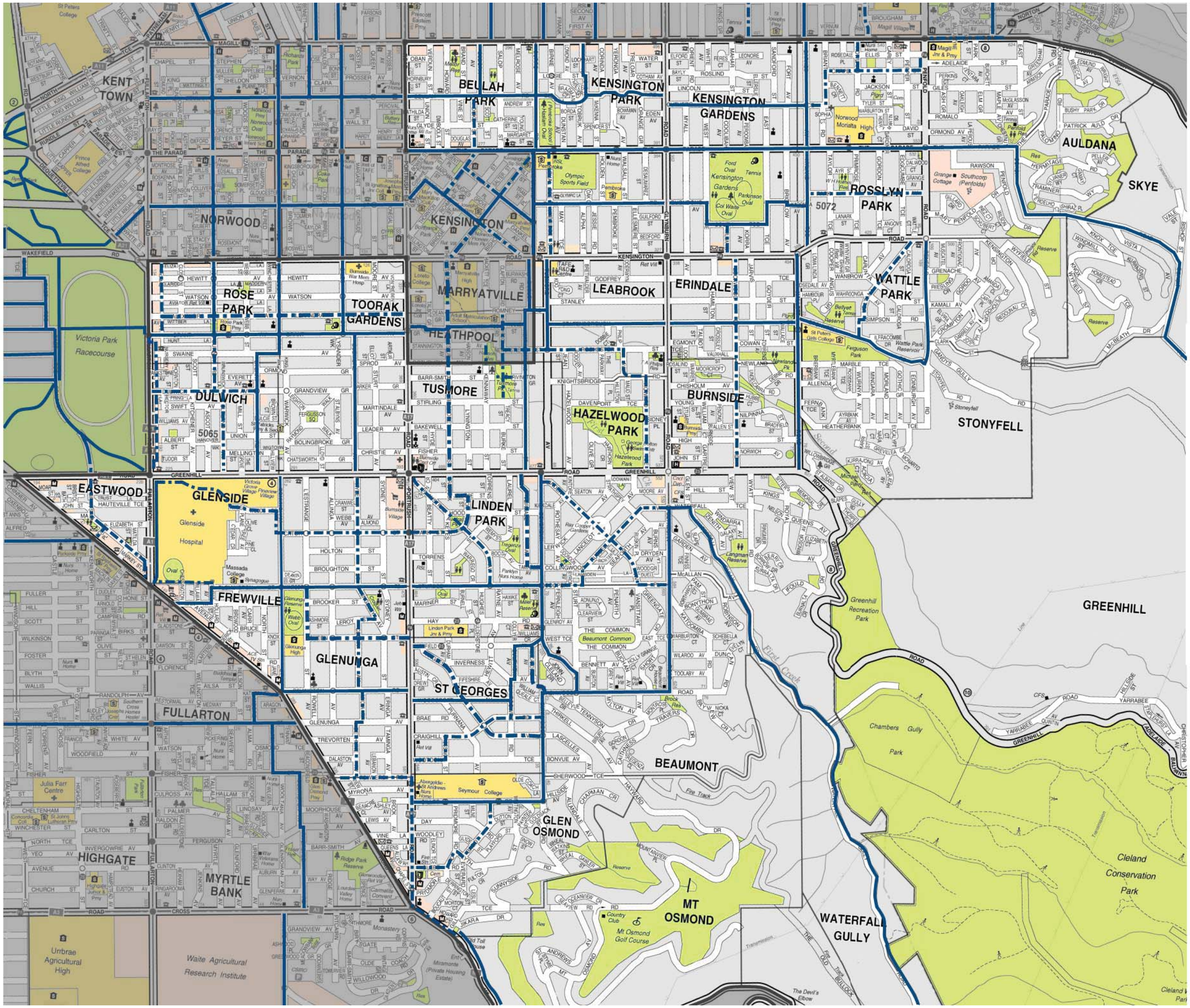
The Action Plan has been rendered as a series of maps showing how works link and their priorities. Infrastructure design considerations are provided as an Appendix with tables that itemise all recommended infrastructure measures.

While many details of the Action Plan will need to be further developed, the expenditure identified in the Action Plan comprises:

- Some $625,000 of non-recurrent capital expenditure for infrastructure works, of which $300,000 is an allowance for developing proposed Super Routes. These works will be staged over the life of the Action Plan. The State Bicycle Fund might fund half to two-thirds of capital items;
- Up to $15,500 of recurrent expenditure in the form of social marketing, bicycle counts and employment of a Regional Bike Plan Coordinator, some elements of which might overlap with initiatives of other sections of Council or attract grant funding; and
- An allowance of $10,000 for the review of this Bicycle Strategy following its substantial implementation.

Many other actions involve changes to current operations at no additional cost. Funding synergies are also possible by implementing actions as part of programmed works, or sharing funding through the Eastern Regional Alliance of Councils.

[1] The BikeDirect network is discussed in section 3.



PROPOSED NETWORK

BikeDirect routes

Council routes

Council area

1 Introduction

The City of Burnside has had a long record of planning for cycling. In 1977, the City prepared a Cycle Routes in Burnside plan, focused on cycling to school. In 1991, Council adopted the recommendations of the Regional Area Bicycle Plan for the Burnside area (expanding to include those for Kensington following council amalgamations). The bicycle plan was then reviewed for currency in 1995/1996.

Council's Vision 2020 (adopted in 2006) seeks to continue this record.

As Council's highest strategic document, Vision 2020 provides a new impetus to cycle planning for the City. In particular, Vision 2020 requires that the local road network be managed to decrease the number of traffic accidents by 20% and decrease the number of vehicles on local roads. This is despite the plan anticipating the population increasing by over 10% during the period of the plan, as well as including objectives to increase the levels of local activity in shops and recreational centres. Substitution of car trips by cycle trips will be an important contributor towards meeting this goal.

Cycle planning is addressed in Vision 2020 under the Strategic Direction of "Our Integrated Urban Form and Living Spaces" and in particular the desired outcome of "A safe and well maintained pedestrian and cycle network". The need for a review of cycling routes and facilities has been identified as part of achieving this outcome. Hub Traffic and Transport has been asked by the City of Burnside to undertake this review, as part of a larger review of the existing bicycle plan.

This bicycle plan is action-oriented, providing guidance to enable immediate implementation of projects that support the Vision 2020 goals. Nonetheless, sound decision-making processes support the selection and prioritisation of projects. Therefore, the development of this Strategy has involved:

- Reviewing relevant Council documents, to ensure that Council's cycle planning is supported by and in turn supports Council's strategic directions
- Undertaking community consultation, comprising a questionnaire survey of cyclists who live in or cycle through the Burnside area
- Reviewing available information to develop a profile of cycling activity in Burnside (this also involved consulting with schools regarding student cycling)
- Undertaking site visits of the existing cycle network and locations of interest identified through the previous stages (for example, locations with high cycling crash rates).

This report briefly summarises the results of this background data gathering and analysis (more in-depth reporting of these is provided in the Appendices), and in light of this reviews the existing bicycle plan to identify a prioritised action plan for cycle projects in Burnside.

During the consultation stage for this Strategy, a particular aim was identified for the Strategy, with a resolution of Council that:

> *"The draft Bicycle Strategy for the City of Burnside be revised to specifically encourage a commuter environment that allows children to ride safely to school."*

Child cyclists have traditionally been viewed as an important segment of the cycle population. In particular, facilities that provide safely for children also provide for novice, less confident or more safety-aware adult cyclists. This concept is encapsulated in the philosophy of '8 to 80" i.e. routes that are suitable for eight year olds to eighty year olds.

This implies a different approach to developing the cycle network than initially proposed, which has been addressed by the concept of 'Super Routes'. These are a spine of commuter routes that pass close to every school in the City of Burnside area, with local connection from the school to these routes to provide a high quality of infrastructure servicing the schools. This approach is proposed as a practical means of providing the infrastructure required. Although the Super Route focus is on schools, the Super Routes often also provide new or better access to local shops, for everyday cycling.

The term Super Route is adopted as a new term that draws from other concepts such as Bike Boulevards, cycle streets, shared zones, etc, but is not intended to mirror any one of these concepts in its entirety, but rather adopt design solutions appropriate to the individual route and also the Burnside cycling context (including South Australia's design and legal frameworks).

The detail of the philosophy, design and development of Super Routes is provided in the Appendix; in this report, they are simply identified.

The structure of this report is as follows:

- Section 1: this introduction
- Section 2: an overview of the key research findings
- Section 3: an overview of the content and implementation of the existing bicycle plan
- Section 4: an overview of suggested changes to the bicycle plan
- Section 5: the action plan, including an explanation of the approach to planning and prioritisation that has been adopted.

An extensive Appendix provides an overview to designing for cyclists before detailing the design concepts used to prepare the action plan, and presenting a detailed listing of all routes forming the cycle network with proposed works for routes (recommended and alternative options), crossings and route signage only.

This bicycle strategy has been informed by a significant amount of work. Additional documents providing background and support to this bicycle strategy are:

- Public consultation report
- Cycling activity report
- Site survey report.

2 Cycling in the City of Burnside

This section presents an overview of the results of research undertaken as part of the creation of this plan, namely:

- Review of council documents
- Review of available data regarding cycling rates and crash statistics
- Questionnaire survey of cyclists

The results of the site reviews are included in the following section, which examines the previous bicycle plan and its implementation.

2.1. Cycle planning

As well as the cycle plans of neighbouring council areas, current Burnside Council planning documents have been reviewed to generate a general understanding of the integration of cycle planning within Council policies and practices.

The Burnside Council documents that have been examined are:

- Council's Vision 2020
- City Wide Traffic Management and Parking Study (Technical Report)
- Burnside Open Space Strategy
- City of Burnside Development Plan
- Burnside Retail and Commercial Area Study
- Asset database (GIS)
- Regional Area Bicycle Plan and City of Burnside Bike Plan Review (these together form the existing bike strategy currently which this new bike plan is intended to supersede, and which is discussed in Section 0).

From these, it appears that while Council has implemented many of the recommendations of the RABP, including widespread signage of routes, planning for cyclists should be better integrated into Council's strategies and plans.

For example, Council's *Development Plan* notes under Objective 24:

> *"Encouragement of walking and cycling by provision of:*
>
> *(a) safe, convenient and legible movement networks to points of attraction; and*
>
> *(b) secure bicycle parking."*

And under General principle number 67: that, *"Where appropriate, development should provide safe and secure facilities for the parking of bicycles."*

With no further guidance about compliance with Objective 24 and principal 67, planners would have difficulty in interpreting these clauses and they are unlikely to have provided any particular benefit to cyclists.

The 2005 *City Wide Traffic Management and Parking Study* — which guides Council's approach to traffic management — acknowledges and even highlights cycling needs in the text, but should specifically guide staff to incorporate any provision for cyclists in proposed traffic engineering treatments or to examine the impact on cyclists in option assessment. Many if not most of the treatments proposed would negatively affect the cycling environment on local streets.

Burnside Council has been no worse than many other councils and agencies in this regard. To some extent, this reflects culture, the competing needs of stakeholders, difficulties encountered when projects were implemented, and even the poor availability of professional skills related to cycling.

It is evident that the culture is now changing, supported by what are now clearly growing cyclist numbers (as noted in the cycling activities report). Better strategic integration of cycle planning is already occurring, such as the incorporation of recreational cycling needs and cycle access in Council's recently developed Open Space Strategy. Burnside intends to prepare a traffic plan in the near future, which will use this Strategy as a guide to integrating cycling into its traffic planning. (And conversely, this Strategy may well require some amendment to better integrate with the new traffic plan.)

Better integration of cycling into the full range of Council's planning documents is recommended not only assist in ensuring that adequate provision is taken for cyclists across the board, but to provide the most efficient use of available resources while achieving this.

2.2. Cycle survey

Community consultation was undertaken as part of the review in the form of a questionnaire survey. The survey asked respondents to nominate their priorities against set responses, indicate routes and problem locations on a map, and provide any further comments.

The survey could be accessed either at the council offices, the Burnside library, or on-line and was advertised through the Eastern Courier during the course of the survey, from 11 December 2008 to 6 February 2009. The survey was also publicised through electronic newsletters directed at cyclists, via email lists, and a cycling forum. A more detailed report on the consultation is available as a supporting document.

The survey attracted 239 responses. The main findings from the analysis are:

- Those who went to the effort of filling in the questionnaire were typically keen bike riders (86% cycle at least weekly) and cycle commuters. They are also motorists: their most frequent trip type is as a car driver, but cycling is an important other mode.
- A significant amount of cycling occurring in Burnside is by people who live outside of Burnside itself — whose overall cycling patterns are similar to those of Burnside residents. Although commuting is the main trip type, the most popular reason for riding is for exercise and recreation. Enjoyment is also an important motivation.
- Safety is the most important factor in cyclists' route choices, with other factors being the convenience of the route (shortest, fastest) and how enjoyable the route is. The presence of bike lanes and bike paths are also significant influences on route choice. Very few cyclists have no alternative route to use, with the result that numerous routes are used.
- The most common forms of parking are the bike rail or rack, storage inside a building, and "other" (including street posts). These relate mainly to parking at workplaces, with most

respondents satisfied with their bike parking. However, none who most commonly visit shops are satisfied with their parking.

- Respondents clearly favour more bicycle lanes and off-road paths as the way in which Council should encourage cycling. Improving road surfaces is also desired, but remains behind creating new bicycle lanes.
- The majority of difficulties encountered by cyclists occur on arterial roads. These include:
  - difficulty crossing roads (particularly Kensington Road and Portrush Road, and where BikeDirect routes meet arterial roads)
  - narrow bicycle lanes and cars parking in bike lanes (the latter would certainly occur out of peak times in peak hour bike lanes)
  - poor road surfaces (particularly Greenhill Road and Waterfall Gully Road)
  - lack of bicycle lanes
  - to a lesser extent, squeeze points and traffic not giving way.

On local roads, a smattering of the above difficulties was noted. These mainly lie on BikeDirect routes and were investigated as part of the site visits of the existing network, but there were no well-highlighted locations for any of these difficulties. A lack of access through dead ends identified around Mount Osmond clearly refers to recreational cycling; it was argued that the Bullock Track attracts more cyclists than walkers and the sign prohibiting cycling should be removed.

In general, provision of bicycle parking did not attract significant comment except for a lack of bike parking at Burnside Village.

One element that should be noted is that routes are not used on the basis of council of residence or which agency is tasked with care and control for a road. Council boundaries are irrelevant in terms of routes used. While obvious, this is critical to providing usable cyclist routes.

2.3. Cycling activity in Burnside

The research and consultation provides a profile of cycling activity in Burnside. A more complete report on cycling activities can be found in the supporting documents. Briefly, the conclusions from this are:

- Adult commuter cycling (and probably university-based cycling) in Burnside has been increasing in recent years, though not as quickly as for other councils that border the Adelaide CBD.
- On-road cyclist volumes are related to the distance from the City, with commuter cycling rates and measured cyclist volumes increasing with proximity to the City.
- There has been a dramatic decline in the numbers of school students cycling to school since 1977. The remaining student cycling is higher in middle high school grades than senior high school grades. There is an indication of some increase in children's cycling in recent years, but not necessarily to schools.
- The emphasis of the 1977 Cycle Routes in Burnside plan on bike facilities to serve schools is no longer justified on the basis of student cyclist numbers, but there remains an argument for bike facilities that enhance the safety of these vulnerable road users. Schools are also an employment hub, with teachers cycle-commuting and/ or cycling between campuses.
- There is inadequate data to indicate how much recreational cycling or cycling to shops is done by Burnside residents and by others travelling through Burnside.
- BikeDirect routes on local streets present generally safe conditions for cyclists — and perhaps safer for cyclists than for motorists — with the exception of an area between Kensington Road, Greenhill Road, Fullarton Road and Portrush Road. It appears that road conditions – physical elements and/or vehicle numbers – account for the higher crash rate in this area, rather than cyclist numbers (although these are also relatively high).
- Crashes occur where local streets intersect with arterial roads, including when BikeDirect routes cross arterial roads.
- Cyclist crash patterns are generally different to motorist crash patterns. Most crashes are not the fault of the cyclist, particularly those on arterial roads, and the most frequent crash types are ones that cyclists would have difficulty avoiding even if adopting a defensive riding style.
- Many cyclists continue to use arterial roads (and The Parade), indicating that these direct routes are perceived to best serve their cycling needs, despite obvious high traffic volumes and speeds.
- Peak cycling times extend beyond current clearway times, suggesting a case for extending peak periods for bike lanes to 7:00am to 9:00am and 4:30pm to 6:30pm.

3 The previous bike strategy

3.1. Background

The bicycle strategy considered to be the immediately previous strategy to this document is a 1995/1996 review of the 1991 Regional Area Bicycle Plan (RABP).

The RABP was prepared for the City of Burnside, City of Kensington and Norwood, City of Payneham, Corporation of St Peters and Town of Walkerville. It therefore pre-dates the current form of the City of Burnside, but covers the area as well as adjoining council areas. It also covers roads under the care and control of the (then) Department of Road Transport.

The RABP established an area-wide bicycle network under two categories: a Principal Bicycle Way network providing cycle arterial routes and a Secondary Bicycle Way network providing for more local cycle travel. While a description of routes is provided, maps of the networks could not be located, due to the vintage of the document. The Principal Bicycle Way network has been largely adopted by the (now) Department for Planning, Transport and Infrastructure (DPTI) through its designation of streets as BikeDirect cycling routes. (The BikeDirect network indicates quieter streets and paths forming a regional cycle network, although BikeDirect mapping also shows bike lanes on arterial roads.)

The RABP also established treatment types and design guidelines, largely in accordance with the State Bicycle Committee South Australia (1987) and with guidance from other guidelines of a similar vintage, up to the outcomes of the 1990 Road Safety Forum.

A RABP report was reviewed by Frank Siow and Associates in 1995/1996. Most of the recommended changes are to routes that are not contained in the original RABP, indicating that some form of update or amendment occurred between 1991 and 1995/1996 — possibly during the process of Council adopting the RABP recommendations — although no record of such an update or amendment has been found. Again, a description of routes is provided in the 1995/1996 review, but a network plan is unavailable.

The current network, comprising BikeDirect routes and Council routes, is shown in Figure 1, overleaf. This does not show bicycle lanes on arterial roads.

The review of the RABP for Burnside found that many of the recommendations for Kensington and Norwood Council has been implemented, but progress on the RABP by adjoining Councils was described as "extremely slow". The review also examined linkage to the City of Unley and (then) City of Adelaide bicycle networks, and found that these were consistent with the City of Burnside's network.

The network changes proposed by the review generally amend the previous network to improve access, connectivity and safety. The review noted the "METNET" project being undertaken by the (then) BikeSouth, which appears to be the precursor to the BikeDirect network. Many of the amendments are incorporated into the existing BikeDirect network, although the review's recommended adoption of Regent Street as an alternative to Shipsters Road/ Gurrs Road is a notable exception.

The review recommended increasing the priority of a number of bicycle routes, and altered some routes to make use of pedestrian signals (pedestrian actuated crossings) as a means of achieving safe crossings of busy roads.

Bicycle parking needs, guidelines for new development (including designing local area traffic engineering devices for cyclists) and maintenance were all covered in the review, with encouragement programs identified as the area where Council had the greatest scope to increase cycling in the community. However part-funding of Bicycle Plan Co-ordinator positions by the (then) Department of Transport later lapsed, as did the Burnside Bicycle User Group (BUG), and a Bicycle Plan Co-ordinator position was never offered in Burnside.

The review also noted the new Austroads Guide to Engineering Practice Part 14: Bicycles (Austroads Part 14), as providing design guidelines for bicycle facilities. This was generally consistent with the standards that had previously been proposed. This has now been superseded, but the 1999 update is the reference document for practice in South Australia and fairly consistent with the 1996 edition.

3.2. Existing conditions

The 1995/1996 review of the 1991 RABP found that many recommendations had been implemented. As part of this review of the bicycle plan, all BikeDirect routes have been inspected (including arterial roads), Council cycle routes, identified cyclist crash locations and identified bicycle parking.

Existing treatments, including on arterial roads, are shown in Figure 2.

In summary, the RABP has mainly been implemented through signage of streets on the network, which is supportable from a traffic engineering perspective but has resulted in poor visibility of the network. In almost all cases the routes that appear in the RABP can be identified on the road, but only through blue signs (either Council or BikeDirect and sometimes both). These exist to enable cyclists to follow a route, not to protect cyclists. There are relatively few bike lanes or logos on the road.

The most important omission in the implementation of the RABP is the lack of bicycle facilities to enable safe and convenient crossings of major roads, the majority of which are under the care and control of the Department for Planning, Transport and Infrastructure (DPTI) and are arterial roads. While routes frequently lead close to pedestrian signals, the signals are not integrated into the overall route and are poorly used.

Finally, the RABP identified traffic works (such as the Portrush Road upgrade) as a means by which to address the lack of bicycle facilities. Generally, this did not occur (the Portrush Road upgrade providing a bicycle crossing at Beulah Road only) and on a local scale, traffic works such as the installation of mini-roundabouts has more often eroded the utility of routes for cyclists, albeit that these have arguably controlled traffic speed.

The major observations are provided in more detail (though still in a summary form) in terms of a "Strengths, Weaknesses, Opportunities Threats" (SWOT) analysis in Table 1, which follows Figures 1 and 2.

A more detailed account of site survey findings is presented in the supporting documents. This notes, amongst other things, that the high crash locations did not feature obvious design faults contributing to higher crash rates. Contributory factors were location-specific and would need to be treated on a case-by-case basis.

Figure 1

THE EXISTING CYCLE NETWORK

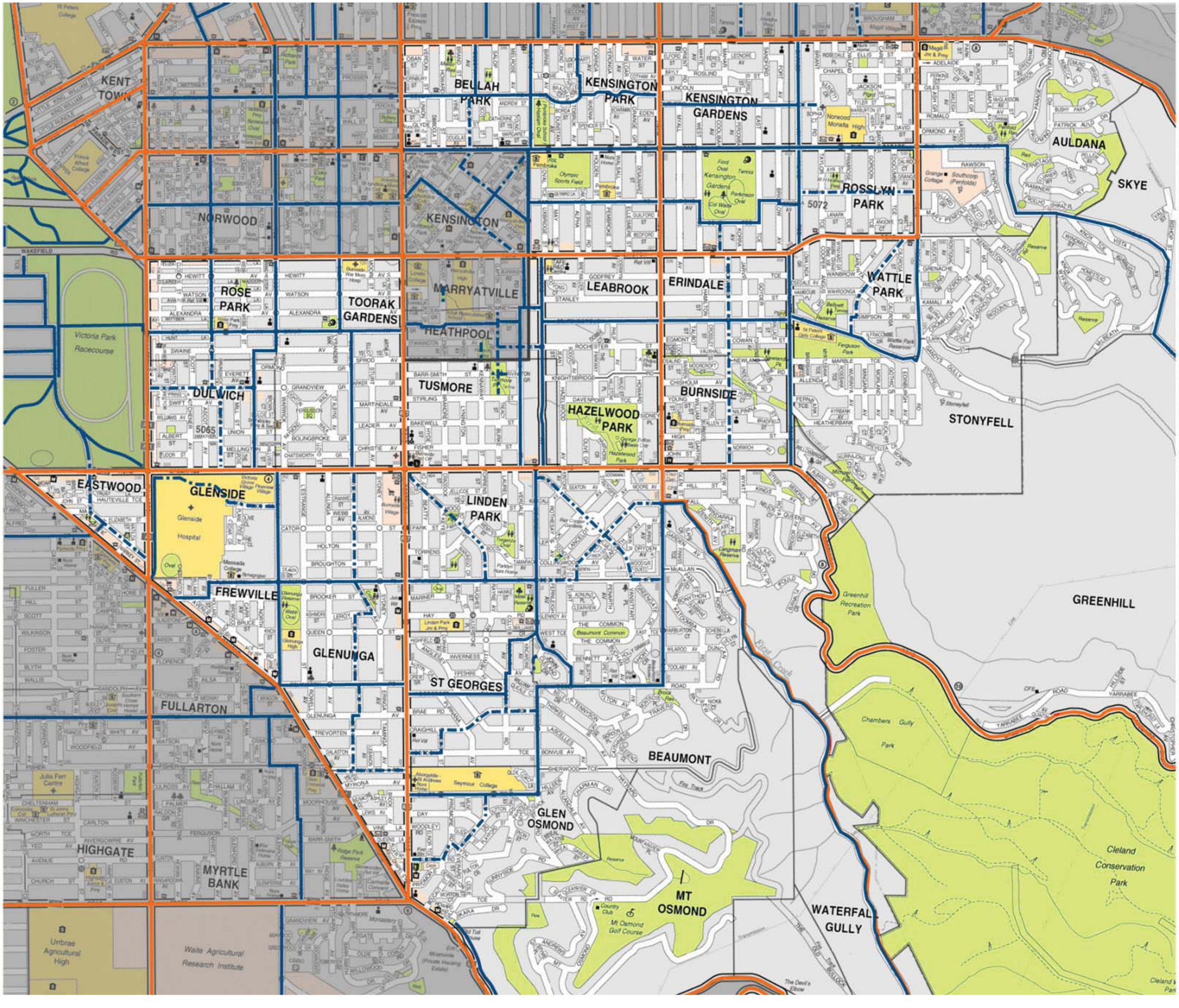


Figure 2

EXISTING CYCLE FACILITIES

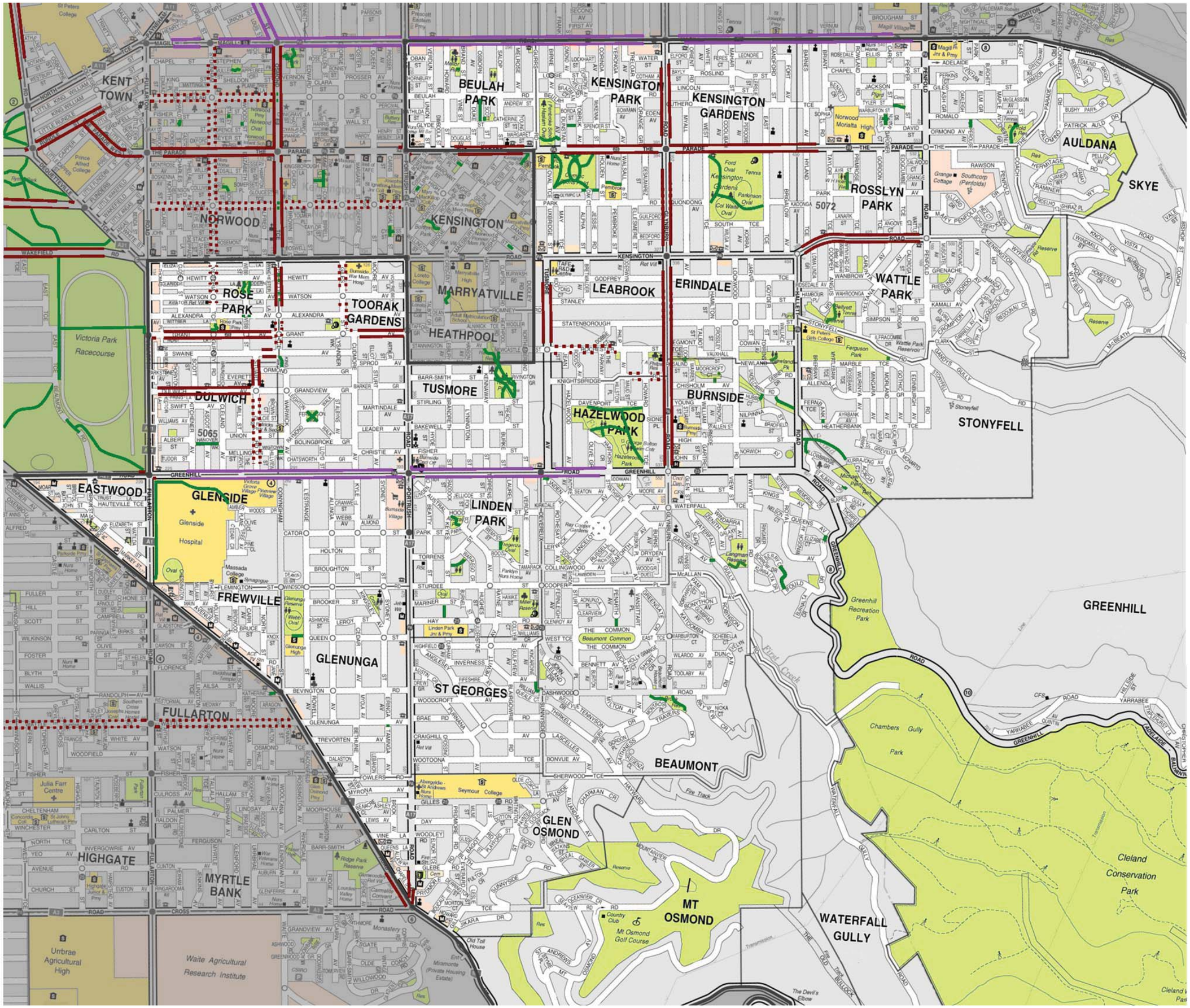


Table 1: SWOT analysis of existing conditions

STRENGTHS

- Burnside's local roads provide generally quiet traffic conditions for cycling. Burnside is a leafy suburb with many attractive residences and gardens, which provides for high amenity cycling on its local streets. The designated bike routes are also (and not surprisingly) generally well-suited to cycling.
- With a grid street network and relatively dense road network, adjacent routes frequently offer a similar level of service and route choice is wide. (But the grid is somewhat interrupted or discontinuous, and routes forming the cycling network tend to involve differing degrees of detour off a pure "desire line").
- Traffic signal control at arterial roads provides regular crossing opportunities and arterial roads offer direct routes (but poor amenity and frequently poor cycling conditions along the roads).
- Route signage has been installed on almost all Council and BikeDirect routes.
- Most schools have implemented traffic safety measures on streets adjoining frontages.
- While Burnside does not have extensive amounts of road closures or restrictive traffic engineering treatments, the few that do exist generally provide some means by which cycles could bypass these.
- Peak hour bicycle lanes are installed on many arterial roads, with time limits reflecting those of the concurrent clearways.
- Many of Burnside's (BikeDirect and Council) routes are located close to pedestrian signals on major roads, to provide crossing opportunities for cyclists.
- Although not planned around recreational cycling, the network provides access to recreational options.

OPPORTUNITIES

- Providing bicycle crossing treatments on arterial roads is the responsibility of DPTI. Identifying and prioritising crossing locations, and preferably developing crossing designs, would enable Council to lobby DPTI for these facilities. In many cases (e.g. along Portrush Road), it would be quite straightforward to provide such crossing facilities. DPTI will part or fully-fund certain treatments on arterial roads.
- There is an opportunity to develop links between cycling routes and pedestrian signals, to facilitate crossings of major roads.
- The Super Routes concept could create high quality routes relatively quickly and cheaply.
- Intersections are the most hazardous locations for cyclists and every effort should be made to provide treatments at intersections. There are numerous opportunities to extend bicycle facilities to intersections, amend intersection layouts to improve cyclist access.
- Improvements to major road intersections would typically benefit a high number of cyclists.
- Peak hour facilities could often be made full-time with little impact on traffic or on-street parking.
- A need for bicycle facilities has been identified as part of open space planning, and facilities such as a BMX park or mountain bike trails present opportunities to achieve other goals (such as youth engagement) while also supporting cycling activity.
- The commitment to cycling of adjoining Councils has been increasing in recent years, enabling greater regional connectivity of routes.
- Cycling numbers are increasing and, with this, the acceptance of providing for cyclists.
- Cut-throughs present an opportunity to use access that is unused by car traffic, reduces car traffic on adjoining streets and provides additional connectivity.
- Small changes in Council processes can lead to large improvements for cyclists.
- The frequent changes to the road network provide opportunities to improve cycling conditions at little extra cost.
- Implementation of the bike plan would create a visible bicycle network at relatively little cost.

WEAKNESSES

- Under traffic engineering guidelines, physical facilities are not required at low traffic volumes (less than 3,000 vehicles/day). Many of Council's routes do not have any physical facilities and are designated by signage only. However, the function of route signage is questionable. Cyclists would have to know which route they are following for the signage to provide navigational assistance. The signage is discrete, so that most drivers and many cyclists would not realise that they are on a designated route. In many cases, route signage is the only implementation of a route that has occurred and the bicycle network is not visible.
- Designated cycling routes are also frequently bus routes and streets adjoining schools are affected by school commuter traffic.
- Treatments at schools do not address parental safety concerns sufficiently to maximise cycling to school.
- Major roads (with volumes of 10,000 vehicles a day or more) form barriers to cycling that fragment the cycling network. There are very few locations in Burnside where cycle treatments have been implemented to assist cyclists to cross these major roads, despite the need for these being identified in the RABP.
- The implementation of routes has generally not extended to facilities at intersections. Perceptions of safety are not enhanced by the installation of traffic management devices such as roundabouts, which can be difficult or 'uncomfortable' for cyclists, despite resulting in lower traffic speeds.
- Bike lanes at intersections often commence later (or end earlier) than they need to. While lack of road width can mean that bike lanes cannot continue to the stop bar at intersections, or commence immediately on the other side, this is not the case for a significant proportion of particularly local road intersections.
- There are no links between routes and pedestrian signals. With an often poor level of service offered by these pedestrian signals, these are poorly used and could not be considered as part of a connected network.
- Many cyclists use arterial roads, in part to undertake crossings of other major roads. However major road intersections are locations where bike lanes are least likely to exist, as road width is given to (well-used) car turning lanes instead.
- The peak hour bicycle lanes that exist do not necessarily reflect peak cycling times.
- The few cut-throughs providing through access additional to roadways (e.g. from the end of a cul-de-sac to an adjoining street or through a road closure) are generally not incorporated into the cycle network.

THREATS

- Increasing population in and around Burnside may increase traffic on currently quiet streets.
- Things that negatively affect stakeholders (e.g. parking restrictions) can threaten the broad implementation of the bicycle plan.
- Failure to integrate cycle planning in Council's policies and processes would mean a less than optimal implementation of the bicycle plan. Work undertaken without due care and respect for cycling can erode the bicycle network.
- The cost to create a visible bicycle network could be high, given the lack of existing cycle routes.
- The lack of visible implementation of the previous bike plan may reflect a lack of understanding of cyclists' needs, or skills to address these needs in terms of design requirements, or central responsibility for implementation. (This also presents an opportunity for improvement.)
- Cycle routes connecting from other Council areas or roads under the care and control of DPTI cannot be directly addressed by Burnside. Instead, Burnside must engage with the responsible authority and is limited in its options in the absence of co-operation.
- While DPTI will fund (or part-fund) certain facilities, the budget available is limited.

4 The future bicycle network

4.1. Recommended changes to the bicycle network

The main elements of the bicycle network were identified almost two decades ago, taking into account cyclist travel patterns of the time. Since then, works have been implemented in Burnside, in adjoining Council areas and on DPTI roads, which further reinforce the utility of the identified network.

Nonetheless, it is recognised that while the routes identified within this document have been identified as the preferred technical solution, the choice of final alignment may be part of broader public consultation as part of the implementation of each particular route.

This is particularly the case for new routes and the Super Routes, noting that the latter are a different concept to that traditionally used in Adelaide. Initial consultation would be with the Ward Councillors and residents of the streets in question, and with any other agency or person that Council Administration considers would provide valid expert input. The extent of broader consultation would be based on the consideration of the initial feedback and technical analysis.

Overall, the existing cycle network is considered generally sound and, indeed, well recognised by existing cyclists – at least in parts. The greatest need is for connection of existing routes to enhance the useability of the network, rather than a major expansion of the bicycle network. Still, a few areas have been identified where the network would benefit from additional routes. The focus on Super Routes also results in some network changes. The proposed network changes are shown in Figure 3 and described here (numbered broadly from north to south).

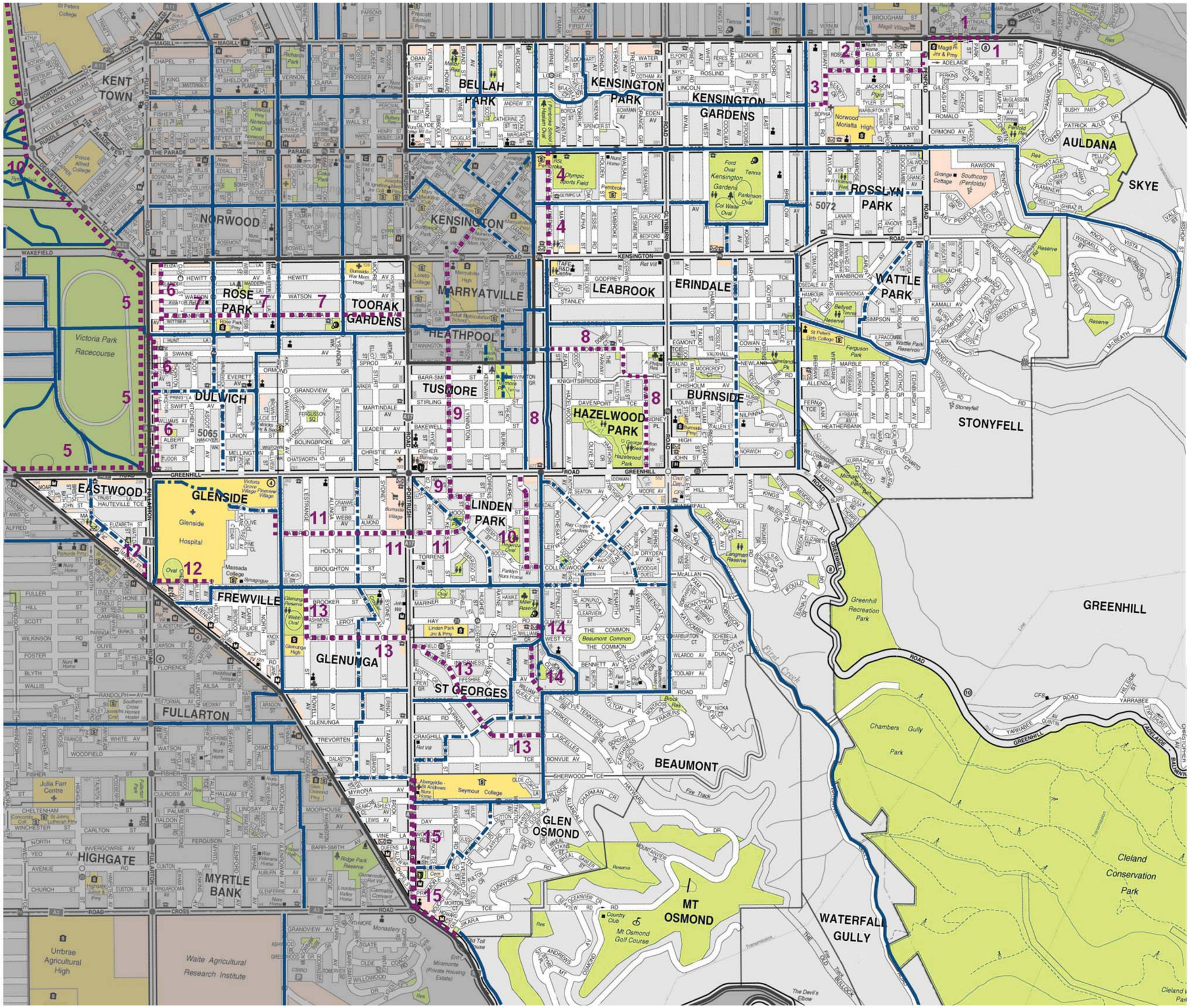
The network alterations will also result in some existing routes being given a lower priority in the cycle network. This is a conceptual change: any existing facilities on these routes will be retained.

1. There is a need for the network to more explicitly address the cycling demand for recreational use of New Norton Summit Road and the South Eastern Freeway shared use path.
   Although the routes shown are on DPTI roads (Magill Road, Portrush Road and the South Eastern Freeway), inclusion in Burnside's bicycle plan would provide focus on these highly-used routes. (Notably, DPTI's BikeDirect maps do not identify a means for accessing these routes).
   Provision of facilities along the footpath – a likely location for a link along the South Eastern Freeway – would also involve an overlap of responsibilities between DPTI and Council.
2. Rowland Road as a connection to Campbelltown City Council's Lorne Avenue route.
   The Lorne Avenue route is strategic, providing access to the University of South Australia's Magill Campus, while the route would also facilitate access to Magill Village.
   Campbelltown City Council is currently designing a crossing of Magill Road at Lorne Avenue, in part utilising the pedestrian signals. An additional treatment more suited to commuter cyclists and involving less anti-directional and uphill travel is proposed, but would need to be discussed with DPTI and Campbelltown.
3. Extending the Cuthero Terrace route using Briant, Chapel and Ellis Streets to Penfold Road, where pedestrian signals at Ellis Street provide access to Magill Junior and Primary School (children under the age of 12 can cycle on the western side of Penfold Road to reach these signals). This is part of a Super Route.
   The utility of this route would be increased by negotiating for a link through the car park of Kahlyn Private Hospital, to connect to Norwood Morialta High School from Cuthero Terrace and Briant Road. In the absence of this, access is possible from Rowland Road, off Chapel Street; the through-site link would short-cut some 600 metres of travel, including uphill travel.
4. Kensington Oval car park link to Oval Terrace and Uxbridge Street instead of Shipsters Road. This is part of a Super Route.
   The crossing of The Parade from Gurrs Road to Shipsters Road is difficult, as is the crossing of Kensington Road. In comparison, the route through the Kensington Oval car park, along Oval Terrace and Uxbridge Street has lower traffic volumes (almost a tenth those on Shipsters Road) and better ability to provide safe crossings at The Parade (via the pedestrian actuated crossing) and Kensington Road (via either the pedestrian actuated crossing or a median cut-through).
5. Park Lands perimeter route
   Although outside Burnside Council, the potential for a Park Lands perimeter route to provide an alternative to arterial roads around the City has been identified. Perimeter routes along Fullarton Road and Greenhill Road, in particular, would add functionality to Burnside's network.
6. Linking the Fullarton Road service roads south of Grant Avenue, and Thomas Place north of Grant Avenue, to form a route adjacent to Fullarton Road. A section of Thomas Place and Grant Avenue west of Thomas Place are part of a Super Route.
   This would be a feeder route to the Grant Avenue link across Fullarton Road, in lieu of any other such links or ongoing routes between Kensington Road and Greenhill Road. It also services the growing commercial uses along the Fullarton Road access road. An additional connection across Fullarton Road between Kensington Road and Greenhill Road may become feasible with redevelopment of Victoria Park.
7. Developing Alexandra Avenue with protected facilities for much of its length, as an alternative to Grant Avenue. This is a Super Route.
   Alexandra Avenue has lower traffic volumes than Grant Avenue and features speed control (road humps) west of Prescott Terrace. Its eastern end features a road narrowing (in comparison to Grant Avenue, which develops an extra lane on the approach to Portrush Road) and is better aligned to the pedestrian actuated signals.
8. Replacing the narrow southern section of Tusmore Avenue (which is duplicated by Northumberland Street) with a route along Rochester Street/ Philip Avenue/ Knightsbridge Road/ Howard Terrace. This is a Super Route.
   The north section of Tusmore Avenue is strategic due to the signals on Kensington Road, but the southern section has relatively high traffic volumes and does not provide significant connectivity additional to Northumberland Street.
   The proposal provides for a diagonal line of travel bypassing Greenhill Road to service the recreational cycling demand to Waterfall Gully Road (and reserves of this), as well as the Burnside pool. The apparent 'kink' into Philip Avenue/ Knightsbridge Road actually follows the curve of the road and would be the natural line of travel. The route also connects to the Newcastle Street route in Norwood Payneham St Peters.
   These sections of Rochester Street and Knightsbridge Road were part of original RABP routes (replaced as east-west routes by Statenborough Street) and already feature bicycle treatment.
9. Developing Brandeth Avenue as a link from Linden Park and route into the City of Norwood Payneham St Peters.
   This is an alternative to Portrush Road and provides access to Marryatville High School.

10. Using Verdale Avenue and Tamarack Avenue to bypass part of Devereux Road. This is part of a Super Route.
    These avenues have much lower traffic volumes than Devereux Road, which is also a bus route. A direct link across Greenhill Road to Northumberland Avenue creates convenient route for cyclists, encouraging use of this route.
11. Park Street to the City via Burnside Village. Part of this route is a Super Route.
    This uses Park Street from Austral Terrace to Portrush Road, using the traffic signals to access Cator Street (and hence Burnside Village); continuing along Cator Street to Conyngham Street, with a refuge on Conyngham Street; then as a shared path along the western side of Conyngham Street to the well-used Amber Woods Drive; connecting across the Glenside Hospital site via internal roads and paths to Adelaide City Council.
    This route would avoid the roundabout at Windsor Street/ Flemington Street/ Conyngham Street and school traffic in Windsor Street, while providing more direct access to Adelaide for residents north of Windsor Street and Sturdee Street. It also connects the Kyle Street route to the traffic signals at Portrush Road.
12. Access through the southern side of Glenside Hospital grounds and connecting to Eastside.
    This route was removed from the network in the 1995/96 review due to personal safety concerns; its reinstatement is conditional upon the redevelopment of the site addressing these issues and is consistent with the Glenside Campus Master Plan issued by the Department of Health in 2008.
    This route is shown extending across Fullarton Road to Main Street in Eastwood, making use of the existing footpath. An alternative might be connection at Elizabeth Street in conjunction with an upgrade of the main entry to the Glenside site, possibly with pedestrian signals coordinated with signal phasing at Glen Osmond Road and Greenhill Road.
    The route provides Eastwood residents with access to the Frewville shops, as well as providing more easterly residents with a route to Adelaide City Council via Eastwood.
13. L'Estrange Street/ Queen Street/ Angelsey Avenue. This is a Super Route.
    This route is propose as part of the Super Route philosophy of developing a spine of Super Routes that pass nearby schools, which are also suitable for commuter cycling. It connects into the Windsor Street/ Conyngham shared path/ Amber Woods Drive/ Glenside route. This Super Route has strategic value as an essentially diagonal route providing convenient radial access to the City, generally paralleling the very difficult Glen Osmond Road.
14. Quiet route bypass of Devereux Road via Kincardine Street. This is a Super Route.
    This makes use of a pedestrian cut-through from Dashwood Road to Kincardine Street and the Devereux Road access road adjacent to the shops near Hay Road, to provide a convenient and low traffic volume alternative to Devereux Road. It also provides good access to the shops and leads into Hay Road, and hence Linden Park Junior/ Primary School.
15. Cycle path and bicycle lane connections to the South-Eastern Freeway path.
    The cycle path to Crafers Interchange is a well-used facility protected from traffic for almost all of its length. However, it lacks even bicycle lane access to its starting point. There is some potential to construct a shared path link in the road verge or use existing footpaths, and/or provide bicycle lanes to connect into the local cycling network.

Figure 3

PROPOSED NETWORK AMENDMENTS (ADDITIONS)



4.2. Proposed Super Routes

The bicycle network is generally intended to service the schools as land uses of importance, but mainly comprises on-street bicycle lanes, advisory treatments and unsignalised crossings as cost-effective forms of infrastructure that can be installed quickly to develop the network. These are appropriate for confident on-street cyclists, but not necessarily for children, novice, 'low-stress' and less confident cyclists.

We have reviewed the location of schools and the proposed bicycle network, and the best approach to achieving Council's request involves:

- Identifying a few high-quality 'spines' that span the Council area in (generally) north-south and east-west directions, to which every school can be connected. These would be at a coarser network grade than the general bicycle network and have resulted in some amendments to the network initially proposed.
- Reviewing these spines to develop high-quality facilities, over and above the standard treatments originally envisaged.
- Providing connections from schools to the Super Route spines.
- Identifying an integrated management approach to cyclist issues around each school, including the connections to the spines – again to provide a high-quality result supportive of children's cycling. This approach would not only focus on infrastructure but consider behavioural issues through DPTI's "Way2Go" program.

Around primary schools, school children's cycling infrastructure can take the form of cycling on the existing footpath network (as children under the age of 12 are legally permitted to cycle on footpaths), subject to the safety issues associated with this.

Around secondary schools, infrastructure would use an approach to bicycle lanes that provides greater separation than the standard treatments.

Overall, however, the infrastructure proposed needs to relate to the particular issues relevant to the individual school and this is used as a higher principle than any other design philosophy.

The proposed Super Routes and their relationship to schools in Burnside (including some schools in the adjoining City of Norwood Payneham St Peters, which would be used by Burnside residents) are shown overleaf *in* Figure 4.

4.3. Possible longer term changes to the network

There may be a case for extension of the cycle network to provide a denser network of cycle routes in the longer term; or a change from network-based to area-wide based cycle planning.

Surveys of cyclists' routes, both in Burnside and in other council areas, reveal that the routes they use are typically spaced about 300 to 400 metres apart, whereas the current BikeDirect network (which is intended to facilitate regional rather than local trips) typically provides spacings that are twice this distance apart. The existing cycle network provides only a limited number of routes in addition to the BikeDirect routes. For a council attempting to promote cycling as a convenient mode for local travel, this is very relevant in terms of providing crossing points over major roads.

Currently, this situation is exacerbated by the lack of infrastructure related to the existing network; this plan is focused on developing these existing routes and connecting the routes to form a usable network. To some extent, the additional routes proposed will also assist in providing a denser network.

The feasibility or desirability of such a network has not been examined in any detail in this plan – apart from the route additions previously proposed.

More broadly still, given the large number of streets that provide good cycling conditions, an "every street is a bicycle street" approach could be adopted, for example through:

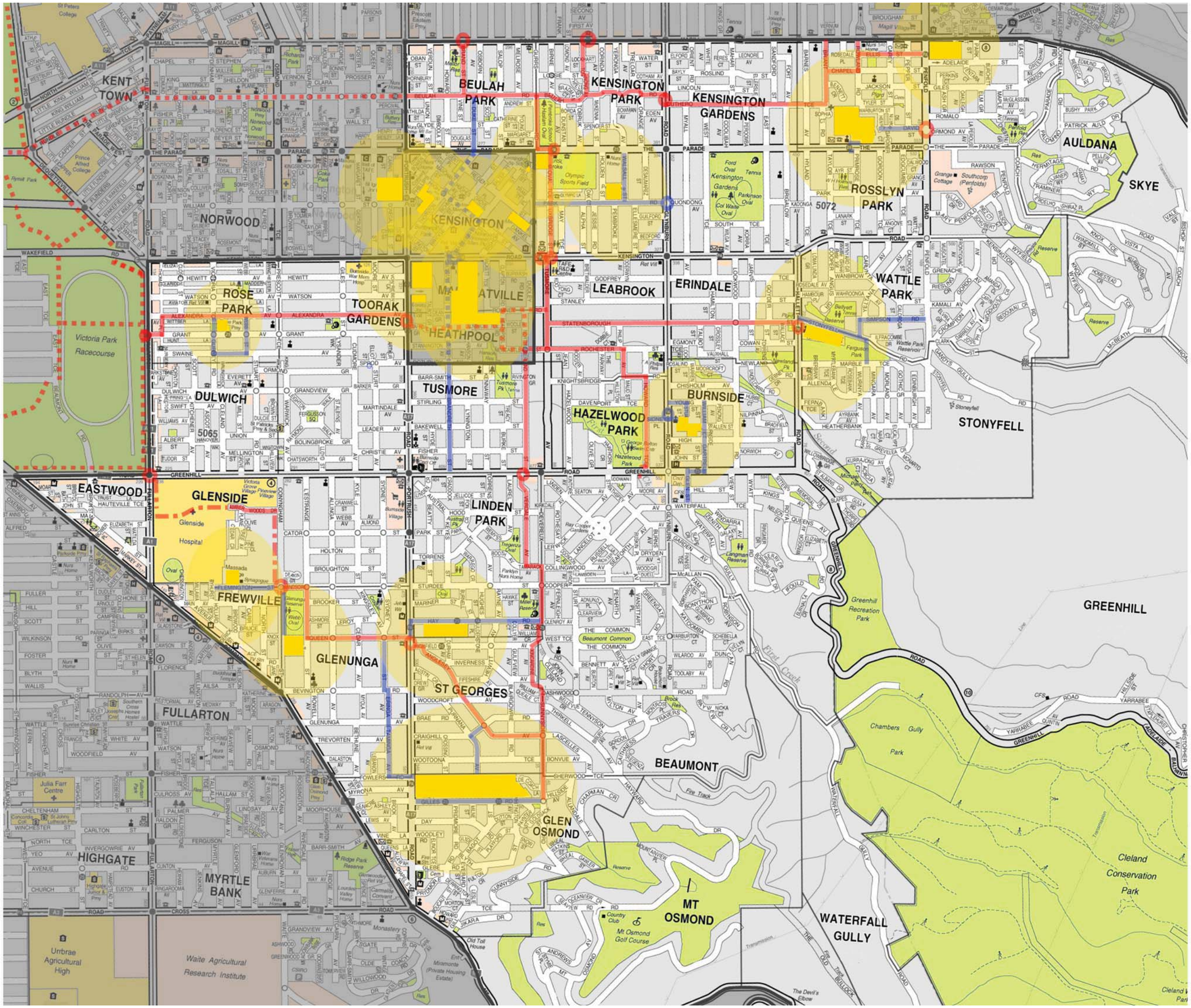
- adoption of area-wide 40 km/h (or less) speed zones
- significantly curtailing motor vehicle access in favour of bicycle access, with numerous road closures and other physical traffic control
- major street reconstruction, or widespread removal of on-street parking, to provide additional width for bicycle facilities; reconstruction should also narrow streets or otherwise change the streetscape to produce traffic calming effects.

The immediate need for the development of individual routes and facilities is considered to far outweigh any need for such broad scale measures at present and it is not considered warranted to pursue such measures at this stage. The desirability and feasibility of such options in the future would depend on future travel patterns and should be reviewed once the current network has been substantially developed.

In some cases, these approaches could be considered for achieving Super Routes, with the support of the local community.

Figure 4

PROPOSED SUPER ROUTES



5 The action plan

5.1. Approach

The research into cycling activity in Burnside undertaken as part of this strategy review indicates that while adult cycling has been increasing in Burnside in recent years, at least commuter levels remain modest compared with other inner-Adelaide suburbs. (Insufficient data exists to confirm trends for other types of cycling, particularly comparing cycling in Burnside to other Councils, but various data sources point to other forms of cycling increasing in recent years).

To achieve Council's Vision 2020 objective, Council will need to act so that it is not merely "feasible" to ride a bike for common trip purposes such as commuting or visiting shops, but "attractive". This implies a much greater visibility of the cycling network.

Council will also need to focus on all types of cyclists: cycling usually occurs recreationally and/or as a sport before it becomes a commuter or utility mode; and it's more effective to keep people cycling than to encourage those who stop to take up cycling again.

This current manifestation of Burnside's bike plan is action-oriented, with a well-defined action plan. From this review of cycling in Burnside, the greatest needs are:

- Connectivity, especially across hard-to-cross roads
- Safety, and the perception of safety (notably through the development of Super Routes)
- Increasing the awareness of cycle routes by providing on-road facilities (which is also related to both connectivity and perceptions of safety)
- Integrating planning for cyclists across Council processes.

It is proposed to implement the identified high priority works as quickly as possible. Since a network was first proposed in 1991, cyclists' needs for a well-connected network have increased as traffic volumes have increased, but this has not been matched by the installation of facilities. The approach in this action plan has been to identify the possible works for the routes comprising the cycle network, then to prioritise these works, with the high-priority works forming the main infrastructure element of the action plan.

To this has been added a component for non-infrastructure measures. While the effectiveness of implementation is often assessed against physical works completed, matching network development with non-infrastructure measures achieves the greatest utility from and use of the bicycle network. (This is the 'software' that enables best use of the infrastructure 'hardware'). These measures can also provide support for the network.

The action plan comprises a table of actions supported by a series of figures showing different types of prioritised infrastructure works (and highlighting those related to DPTI separately). A large amount of design information supports these and is contained in the Appendix.

Background data, comprising the principles used in the prioritisation and an explanation about the types of works, follows this section and precedes the action plan figures.

5.2. Principles of priority

The suggested principles for assigning priority to works are based on the results of the review of the bicycle plan, as previously outlined. These are detailed following, grouped under subheadings. For some factors – such as whether works can be implemented as part of other programmed works or works arising – it is not possible to prioritise works at this stage. These factors should be kept in mind and the action plan considered as a 'live' document whose priorities may change from those initially suggested.

While it is possible to undertake multi-criteria analyses of projects based on an objective scoring against individual factors, such analyses can be complicated to present and comprehend, and are more suited to longer term planning and broader networks. This approach has therefore not been adopted.

The following factors have been considered in assigning priorities.

Routes

The recommended bicycle network (comprising BikeDirect routes plus local Council routes) is as shown in Figure 3, including proposed routes. This also identifies connections into neighbouring council areas and forms the basis for providing bicycle facilities.

- The connectivity of a route to other routes and the continuity of a route, reflecting its role as part of a usable network, is a factor in its relative priority. This also relates to route linkage into neighbouring Councils. Super Routes (Figure 4) have a higher priority than other routes.
- Intersection locations are the most hazardous locations for cyclists and have higher priority than route development. Those on Super Routes have a higher priority than other intersections.
- While Burnside does not have extensive amounts of road closures, provision of access through closures will improve continuity and connectivity of routes. The priority for these should be considered in light of overall routes.

Crossing points

Safe crossing points of major roads have the greatest priority for the safety, continuity and connectivity of routes.

- At least one cycle crossing should be provided on major roads between sets of traffic signals (or multi-lane roundabouts, where these exist on a major road intersection rather than signals).
- Crossings of arterial roads where there is no or a solid median have a higher priority than those crossing locations with a wide, permeable median (such as Magill Road east).
- Crossings that are part of Super Routes have a higher priority than other routes.

Traffic conditions

Figure 5, overleaf, presents combined DPTI/ traffic volume information for City of Burnside roads.

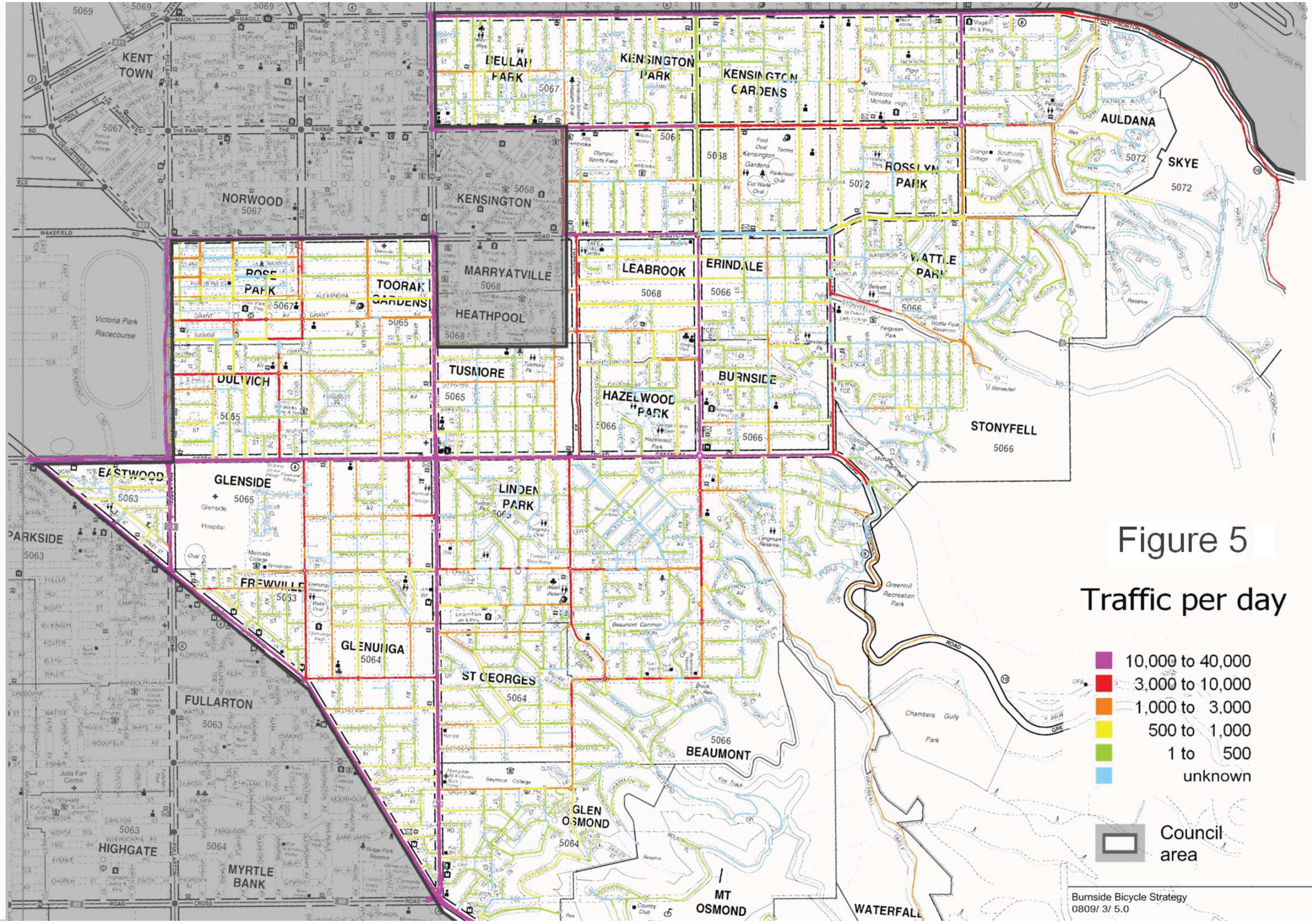


Figure 5
Traffic per day
10,000 to 40,000
3,000 to 10,000
1,000 to 3,000
500 to 1,000
1 to 500
unknown
Council area
KENT TOWN
NORWOOD
KENSINGTON
MARRYATVILLE
HEATHPOOL
DEULAH PARK
KENSINGTON PARK
KENSINGTON GARDENS
ROSSLYN PARK
AULDANA
SKYE
WATTLE PARK
ROSE PARK
TOORAK GARDENS
DULWICH
LEABROOK
ERINDALE
BURNSIDE
HAZELWOOD PARK
TUSMORE
STONYFELL
EASTWOOD
GLENSIDE
LINDEN PARK
PARKSIDE
FREWVILLE
GLENUNGA
ST GEORGES
FULLARTON
BEAUMONT
GLEN OSMOND
HIGHGATE
MYRTLE BANK
MT OSMOND
WATERFALL
Victoria Park Racecourse

- Streets with traffic volumes in excess of 3,000 vehicles a day (or the hourly equivalent, where peak volumes are high, such as around schools) are priority locations for bicycle facilities. This applies to streets being crossed, in the case of crossing facilities.
  Traffic volumes in excess of 10,000 vehicles a day give a higher priority, while significant use of the route by heavy vehicles increases the priority further.
- Measures to improve cycling along arterial roads have a high priority.
- Works addressing hazard locations have a high priority.

Cyclist volumes

Cyclist volumes can be examined directly where these are known, but this is rarely the case (particularly for weekend use). In the absence of detailed usage information, cyclist volumes are approximated by land uses and distance to known attractors.

- Works closer to the Adelaide CBD have a higher priority than those further away. (This will typically be approximated to 'zones', such as works west of Portrush Road having a higher priority than those in the zone between Portrush Road and Glynburn Road.)
- Priority between arterial roads relates to known cyclist volumes: Greenhill Road and Magill Road have higher priority than other arterial roads.
- Routes feeding in to New Norton Summit Road and the South-Eastern Bikeway have a high priority as these are known as significant recreational routes.

Resource efficiency

It is the case that the resources available to Council to implement this bicycle plan are limited and subject to competing demands. An efficient use of resources not only saves on direct expenditure but can also reduce the time taken to implement works.

- Treatments that can be implemented within the existing street width and management arrangements have priority over those that require significant changes to the width or street management.
- Works that can be implemented as part of other programmed works, including as part of maintenance works, can usually be implemented at a significantly reduced cost. Where integration with other programmed works is possible, the priority for these works increases.

Integrated planning

Integration of cycle planning across Council's policies and practices will enhance rather than erode the implementation of this bike plan.

- Coordination with other Council projects, or projects from other Councils, to provide improved results from implementation will increase a project's priority.

The resulting priorities are shown in Figures 6 to 13, and also included in the detailed works tables A1 and A2 and Figure A1 included in the Appendix.

5.3. Works types

Route works for cyclists can be broadly differentiated between:

- Integrated approaches appropriate for Super Routes – these are site specific.
- Protected facilities appropriate for Super Routes – these are site specific.
- Bicycle lanes – Exclusive space for cyclists, formed as an edge-lined space with logos, accompanied by "bike lane" signs. Use of these is governed by the Australian Road Rules. There are two main types:
  - exclusive on-road bike lanes (EBL)
  - on-road shared parking/ bicycle lanes (BCPL).
- Bicycle advisory treatments – These highlight to motorists where cyclists can be expected on the road, and highlight to cyclists where they are expected to be and also identify a route. These have no regulatory meaning under the Australian Road Rules. There are three types:
  - on-road advisory bike treatment with edge line (AT+E)
  - on-road advisory bike treatment with logo, where car parking demand is high (AT+LH)
  - on-road advisory bike treatment with logo, where car parking demand is minimal (AT+LM).
- Bicycle paths – Facilities located off the carriageway, differentiated from footpaths and designated for cycle use through signage. Use of these is governed by the Australian Road Rules. There are three main types:
  - Shared use paths (SUP) – Use is shared with pedestrians
  - Separated paths – Provided adjacent to but separately to pedestrian-only paths (footpaths), for cyclist use only
  - Exclusive paths – Provided with no additional provision for pedestrians, for cyclist use only.
- These route types are not differentiated in the figures that form the prioritised action plan, but are detailed in the Appendix, which also includes photos showing the different types.
- Intersection and crossing treatments vary widely, depending on local conditions. However, there is no 'good' treatment of a multi-lane roundabout, except path bypass for three leg roundabouts that would otherwise form a T-junction; or signalisation.

5.4. Action plan table

Table 2, overleaf, presents the action plan. This refers to and is supported by the action plan figures, which are discussed following Table 2 and presented in the pages after this. The costs provided are indicative and subject to grant funding by state government. The capital works expenditure will also be staged over the life of the action plan.

All actions in the action plan have a high priority. Apart from the Super Routes, the main prioritisation of works is contained in the action plan figures, while social marketing actions are itemised separately in the social marketing action plan. For other actions, timeframes are not generally specified; the actual timing will respond to external and internal conditions and priorities. These include opportunities to leverage off other activities occurring in other sections of Council, to provide a more efficient delivery; and the results of negotiation with DPTI and other Councils.

It is recommended that a balance of actions from the different action areas – network, connections, safety, integrated planning and cultural change, and education and promotion – be implemented each year, rather than all actions from only a few action areas.

Table 2: Action Plan

	Ref	Action	Cost
Network (N)	N1	Adopt the cycle network in Figure 8 immediately as the basis for implementing cycle works, with priority as per Figures 10 to 13.	(Internal cost)
	N2	Implement highest and high priority routes in Figures 10 to 13. - Review the approach to works to increase the durability of works created. - Review the network for currency as part of a general review of this plan (see I7). - Provide separate annual funding for Super Routes.	$210,000 $300,000
	N3	Engage with DPTI's "Way2Go" program to address network and safety issues around schools.	(Internal cost)
	N4	Provide route signage in accordance with a new signage strategy (see E3).	$40,000
	N5	Negotiate with DPTI to investigate innovative treatments for mini-roundabouts as per the Appendix.	(Internal cost)
	N6	Treat mini-roundabouts on network routes as negotiated with DPTI. (See Appendix for details.) Priority for treatment to be Super Routes first, then based on the distance from Adelaide CBD.	$20,000
	N7	Ensure that cycle destinations have convenient, well-designed bicycle parking rails in accordance with relevant rates and standards, including weather protection: - Provide bicycle rails for retro-fitting to public facilities; - Negotiate with property owners, notably Burnside Village, regarding locating these; - Liaise with schools to access TravelSmart funding to improve facilities, including providing shelter, as required; - Investigate options for under-cover parking stations for commuters at high employment locations.	(internal cost)
	N8	Develop and implement a program of counting cyclist to provide additional information about cyclist use of routes.	Up to $5,000/ year
	N9	Negotiate with DPTI to investigate options for improving DPTI roads. - Request that DPTI reinstate bike facilities on Magill Rd affected by road maintenance (see site survey report).	(Internal cost)
Connections (C)	C1	Adopt Figure 6 immediately as Burnside's priorities to improve DPTI/ DPTI road intersections and Figure 6 as Burnside's priorities to improve DPTI routes.	(Internal cost)
	C2	Adopt Figure 8 immediately as Burnside's priorities to improve DPTI/ local road crossings.	(Internal cost)
	C3	Negotiate with DPTI to investigate options for improving DPTI/DPTI road intersections. - Lobby to change Greenhill Rd/Glynburn Rd roundabout to signals, or for partial signalisation. - Lobby for high priority for cyclists through Britannia roundabout in any proposed redesign.	(Internal cost)
	C4	Implement design concepts in the Appendix for connections with routes: - Highest and high priority (assume $5,000 each); - Review medium and low priority concepts as part of a general review of this plan (see I7).	$30,000
	C5	Review road closures and links from culs-de-sac for opportunities to provide/ improve cut-throughs and bypasses and connectivity. (See Figures 9 to 13 for locations of some of these.) Construct improvements.	$25,000

	Ref	Action	Cost
Safety (S)	S1	Apply for cycling Black Spot funding to address identified locations and issues. - Review crash statistics and audit unsafe locations for future applications.	(Internal cost)
	S2	Monitor speeds on cycle routes and provide cycle-friendly traffic management devices to manage speeds, as required.	(Internal cost)
	S3	Review pavement condition standards for adequacy for cyclists, and encourage cyclists to report pavement issues on arterial roads to DPTI.	(Internal cost)
Integrated planning and cultural change (I)	I1	Amend the Development Plan within 12 months of adopting this plan, regarding: - Bicycle parking (as per Austroads Part 14 recommendations); - Cycle network (requiring linkage to this); - Through-site links (required at ends of culs-de-sac and street closures, and incentives to develop through sites noted in this document: Kahlyn Private Hospital car park, Uxbridge Terrace to Kensington Road, also Uxbridge Terrace to Shipsters Road, Tusmore Avenue to Dudley Street).	(Internal cost)
	I2	Prepare guidelines for development planners about how to satisfy cycle elements of the development plan, within 6 months of amending the Development Plan.	(Internal cost)
	I3	Negotiate with adjoining councils to improve connections. - Lobby ACC to improve access through events in the East Park Lands. - Support appropriate proposals for a Park Lands perimeter route.	(Internal cost)
	I4	Initiate or support a forum for councils to discuss cycling issues, to provide regional coordination. (See also I5)	(Internal cost)
	I5	Support a regional Bicycle plan coordinator position shared with adjoining Councils, to provide input across planning and generate cultural change. Duties could include: - Providing comment/ input to strategies and plans; - Providing design advice as required, including when developing design proposals; - Commenting on major development proposals; - Providing staff training; - Negotiating with DPTI; - Undertaking some elements of the implementation of this Action Plan, e.g. developing a new signage strategy, input to Social Marketing Program.	Potential $10,000/ year
	I6	Support staff development through attendance at events such as the Australian Cycling Conference and/or relevant seminars.	$500/ year
	I7	Review this bicycle plan after it has been substantially implemented.	$10,000
	I8	Liaise with open space and recreational planners to ensure cycling and other facilities are supported with bicycle routes connected to the cycle network.	(Internal cost)
	I9	Review maintenance procedures to take into account cyclists. - Provide cyclist detours and bypasses when works interrupt or sever cycle routes, or cycle facilities on routes. - On steep roads, enhance maintenance of 2.0 metres of the kerbside road pavement closest to the kerb for downhill traffic. - Review maintenance procedures regarding use of thermoplastic and renewal of line marking.	(Internal cost)

	Ref	Action	Cost
Education and promotion (E)	E1	Prepare and implement a Social Marketing Program (i.e. plan to encourage community and visitor cycling) in accordance with the principles and action plan detailed in the following pages.	Up to $20,000/ year
	E2	Make development plan guidelines available to developers and architects, within 6 months of developing these.	$5,000
	E3	Develop an additional signage strategy for destination and route-based signage.	$5,000
	E4	Develop a "Burnside suite" cycle rail as a public art initiative, e.g. through a competition.	$2,000
	E5	Investigate options to create a regional "ring route" recreational trail with other Councils, using quiet and attractive local streets linking desirable facilities.	(Internal cost)
	E6	Support Bike Art Adelaide or similar through existing community event/ public arts funding.	(Internal cost)

5.5. Social Marketing Program

Burnside's goal of attracting more riders and reducing the dominance of motor vehicles as a form of transport by encourage more transit and bicycle use is achieved only in part through the provision of infrastructure. Other important aspects are encouragement, education and enforcement – what is termed in this document as the social marketing of bicycling.

Cycling on roads is often seen in a negative light despite the positive aspects. There is evidence that younger people are not learning to ride a bicycle at all for reasons including a fear for the personal (i.e. abduction) and physical safety of the children. Changes in patterns for travelling to school also play a part as more and more children are attending schools some distance from their residence, being dropped off or taking public transport over bicycling.

The image of cycling is that at arriving at the destination the bicyclist is at times sweaty, with bad hair and inappropriately dressed. These and other negative perceptions related to safety, travel time, bicycle theft, etc, typically have an element of truth to them. However, they need to be put into perspective. For example:

- Injury rates reduce as the experience of the cyclist grows and cyclist numbers increase, while the health benefits of cycling lead to an increase in about 12 life years being gained for each cyclist for every life year lost due to crashes
- Regular cycling has been shown to adds two years to the average cyclist's lifespan and seven years of 'productive' life (as opposed to years subject to high medical intervention, etc)
- It usually takes much less time for short to medium length trips in urban areas
- The risk of abduction or personal crime against a cyclist is no greater than for a pedestrian – and arguably less, as cyclists move more quickly than pedestrians and can be harder for an attacker to stop
- End of trip facilities are improving all the time. For example, the City of Adelaide has free parking for bicyclists in the CBD and more and more businesses are providing a shower facility for their employees.

The Social Marketing Program is intended to help address and correct these negative perceptions. The program should provide continued engagement with the community throughout the year, including through events that promote the positive aspects of bicycling; and encouraging all forms of bicycling programs. The program should focus on key segments of the community (e.g. schools, universities and key employers) and tailor events, education (including safety training) and promotional activities to the specific needs of these markets.

The creation of a supportive environment for cycling is best achieved using a "four E's" approach combining engineering (infrastructure) with education, enforcement and encouragement. This recognises that to get the most out of the 'hardware' of infrastructure requires the right social 'software'. For example, approaches to increasing cycling to schools are more effective if the 'engineering' elements (safe routes to schools, secure bicycle parking) are complemented by education (TravelSmart programs, cycle proficiency training) and encouragement (ride to school events). This extends outside the school: parents need to have confidence in the engineering, require education about the benefits of cycling, and encouragement to allow their children to try cycling, or to cycle with their children to school.

5.5.1 The other three E's...

Education

The real risks, benefits and even laws relating to cycling are poorly understood by the majority of the community. Education aims to increase awareness of these, and in so doing, overcome barriers to the take-up of cycling.

- One way to increase bicycle use is to increase the level of perception of cyclists as legitimate and safe users of any road. Signs, bumper stickers, licence plates, and public service announcements all bring cycling as transport into the public awareness.
- There are many negative stereotypes of what "a cyclist" is and can be. These add to tensions between motorists and cyclists, create barriers to non-cyclists taking up cycling, and are perpetuated in the popular media.
- As noted, the benefits of cycling far outweigh the risks. Increased awareness of the real risks and benefits will further encourage cycling, while greater numbers of cyclists on the roads contribute to safer conditions, in a form of 'virtuous' feedback loop.
- Education targeting road user behaviour must target both motorists and cyclists to increase awareness of the laws and the practice of bicycling without creating a backlash against cyclists. Most crashes occur due to a motorist's failure to observe the road rules, but contributing to this

are a lack of understanding of cyclist behaviour, which is not aided with cyclists failing to appreciate the effect of their behaviour on perceptions of other road users.

- Safety education programs can be combined with enforcement programs and engineering measures that focus on causal factors of crashes.

Enforcement

Bicycle facilities are effective at avoiding crashes only when designed and used correctly. Bicyclists must ride in the correct direction, obey traffic signals and signs and indicate when required. Motorists must give way when required and not drive or park in designated bicycle lanes.

Council has a limited ability to directly undertake enforcement activities, except in relation to parking. However, there are other means of educating about and encouraging compliance with the road rules relating to cycling.

An effective campaign will take a balanced approach to improving behaviours of both road users. Motorist behaviours that should be targeted include:

- Turning left and right in front of bicyclists
- Passing too close to bicyclists
- Parking in (active) bicycle lanes
- Opening doors of parked vehicles in front of bicyclists.

Cyclist behaviours that should be targeted include:

- Ignoring traffic control regulations (all posted regulations)
- Riding the wrong way on a street
- Riding with no lights at night.

However, enforcement messages must be carefully construed to avoid 'blaming' the cyclist: many motorists share the perception that cyclist behaviour is the main contributor to crashes, when this is not the case, with cyclist behaviour being the main contributor in avoiding crashes. Cyclist safety is a responsibility to be shared among all road users.

Encouragement

Encouragement promotes cycling by creating and/ or sponsoring promotional campaigns and benefits for bicyclists.

Encouragement includes holding encouragement events, providing incentives, and providing information and/or maps with recommended bicycling routes. The most high-profile encouragement event in Adelaide would have to be the Tour Down Under, which promotes cycling as a positive activity and includes community ride events that encourage participation.

Both public agencies and private employers can encourage bicycle transportation by providing for bicyclists' needs such as:

- convenient (e.g. on-site), weatherproof and secure bicycle parking
- showers, changing rooms and locker facilities
- public transport tickets as part of salary packaging (as opposed to taking the option of a vehicle as part of the employment package), with pool vehicles or cab-charge available for remote meetings
- use of pool vehicles or cab-charge when a cycling employee attends late meetings
- provision of a bicycle fleet as well as pool cars
- institute 'wellness days' to reward people who maintain good health, in lieu of sick days foregone
- flexitime to allow cyclists to avoid peak traffic.

Ride-to-Work Day is an example of an encouragement event and can become an inter-Council challenge – numbers and distance travelled per employee.

5.5.2 Social Marketing Action Plan

Table 3, below, presents a social marketing action plan as a basis for implementing a social marketing program. There are clear synergies possible through regional coordination (see I4 and SM6), however the degree of interest and likely active involvement of adjoining Councils will vary between Councils and cannot be predicted at this stage.

As with infrastructure works, there may also be opportunities by which actions proposed by or arising in other sections of Council can be leveraged to provide a more efficient delivery of social marketing actions.

Table 3: Social Marketing Action Plan

Action	Priority and resources	Concept cost
SM1 Enhance the web page to include more information on bike routes and better mapping including end of trip facilities. - Consider supporting a 'cycling portal' as a one-stop webpage for cycling in South Australia, with other agencies.	High Internal resources	External $500 Internal $1,000
SM2 Promote Ride to Work day, including an inter-Council challenge.	High Internal resources	Internal $500
SM3 Promote cycling at City events either directly or via providing the opportunity to other organisations.	Medium Internal resources	External $3,000 Internal $1,000
SM4 Prepare and distribute in concert with other Eastern Region Alliance partners, a recreational cycling guide/ pamphlet highlighting routes for all levels. - Include a positive message about cycling and enjoyment of the activity.	Medium External (map development) and shared internal resources	External $5,000 Internal $2,000
SM5 Prepare a one-page leaflet about bike lanes and advisory treatments, including road rules related to these, and include in letterbox drops to residents as part of consultation on projects featuring bike facilities.	Medium External (leaflet development) and shared internal resources	External $5,000 Internal $2,000
SM6 Raise the development of a regional approach to a social marketing plan at a regional forum of councils to discuss cycling issues, to maximise the effectiveness of approaches. (See I4.)	Medium Internal resources	External $500 Internal $1,000
SM7 Sponsor one or several bicycle promotion events such as a bicycle fun ride, a bicycle expo, Bike Art Adelaide. - Consider a competition amongst children or youths to define what a "cyclist" is, in a positive way, and publicise the results.	Low Internal resources	External $5,000 Internal $2,000

5.6. Action plan figures

The action plan figures show locations and priorities for suggested infrastructure works – which are further detailed in the Appendix. The figures are:

- Figure 6 – Intersections of DPTI controlled roads with other DPTI controlled roads.
- Figure 7 – Bicycle facilities along DPTI roads.
  This comprises amendment to existing peak hour bicycle lanes, opportunities to provide additional facilities, and alteration to road management.

For both of these, design solutions need to be developed in consultation with DPTI, which would also provide funding towards any agreed alterations. All locations have been examined briefly, but design concepts have not been developed to any detail or comprehensively documented as designs must be acceptable to DPTI and this is best achieved by working with DPTI in concept development.

Some locations also affect adjoining councils' bicycle networks and these councils must also be consulted to develop solutions for the overall route.

The prioritisation of the locations presented in these figures provides a starting point for discussions with DPTI.

- Figure 8 – Crossings of DPTI roads at junctions with local roads.

These crossings are usually critical to developing the connectivity required to transform a set of routes into a usable network and hence the feasibility of routes. Although these also require agreement with DPTI, design options have been considered for DPTI/ local road junctions.

Again, some locations will affect adjoining councils and consultation will be required for these.

DPTI is likely to consider the prioritisation presented in this figure as representing a firmer basis for crossing treatments than for DPTI/ DPTI intersections.

This figure includes local road Super Route crossings with DPTI roads.

- Figures 9 to 13 – General works on local roads.

This set of figures (figure 9 being the key map and figures 10 to 13 being detail maps) is based around the network of cycle routes on local roads, and the intersection and crossing treatments that support these. While the route and intersection/ crossing works are presented separately for clarity, it is important to the continuity of the route that they be considered in tandem.

As the Super Routes use a different approach to works, these are not included in these general works figures.

The route works are slightly complicated by inclusion of some works involving DPTI roads, which have their own priority; the priorities involved in figures 9 to 13 use the priority already determined for the DPTI works as part of their prioritisation.

The Park Lands perimeter route is outside the Burnside Council area and is not included in these figures.

- Appendix: Tables A1 and A2 and figure A1.

The Appendix documents the detail of the works proposed, including the decision-making process. Route works contained in Table A1 in the Appendix are grouped into sub-areas defined by suburbs and these sub-areas coloured or shaded as per Figure 9. (No works are proposed for Stonyfell, Greenhill, Beaumont, Mt Osmond or Waterfall Gully, which are therefore not coloured or shaded in Figure 9.)

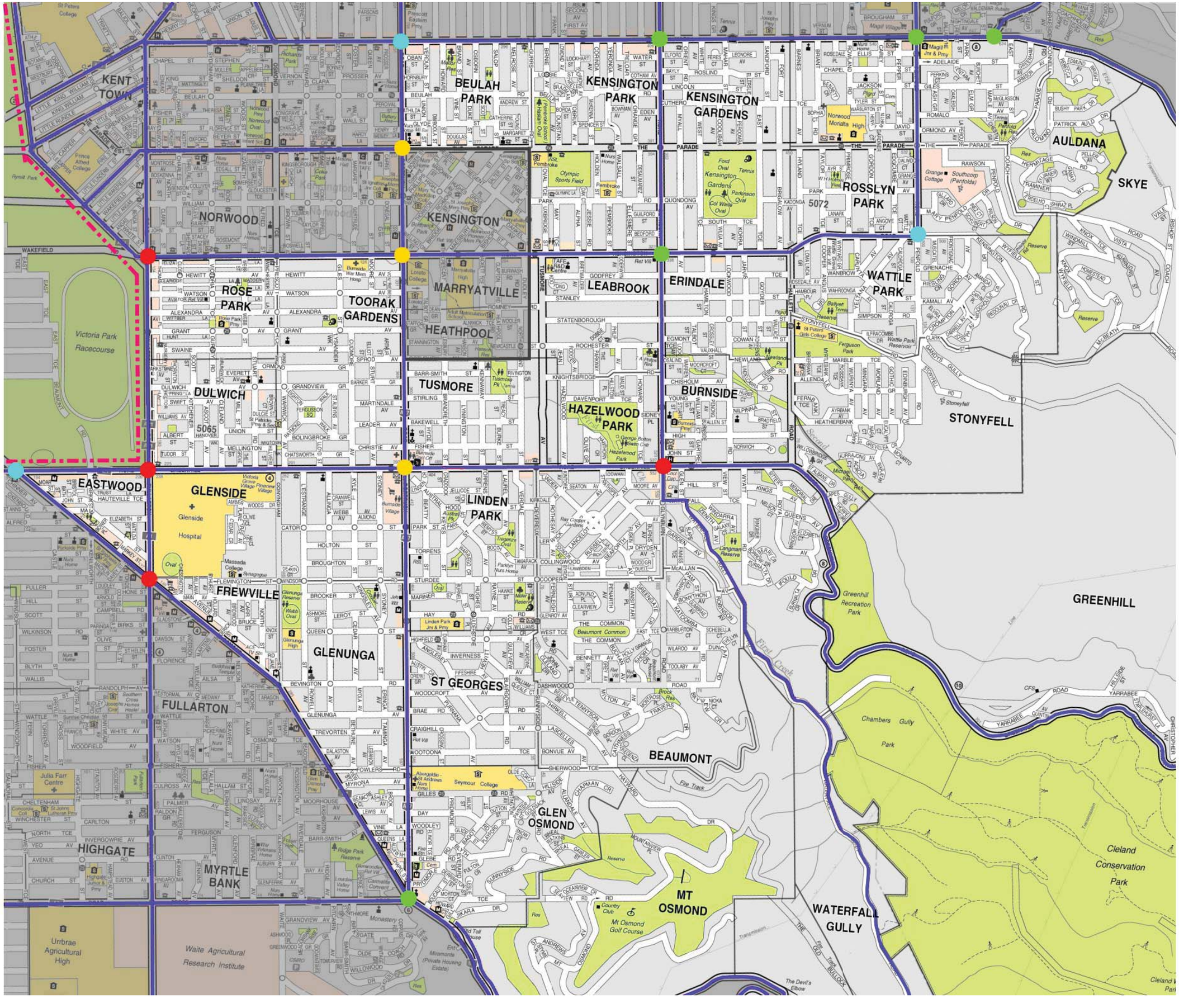
In many cases, alternative options are identified for works, with the adopted treatment depending on stakeholder feedback. All works shown in figures 9 to 13 are examined in the documentation in the Appendix.

It should be noted that figures 9 to 13 are based on road width information provided in Burnside's asset management database. However, a few inaccuracies in these widths have been noted, including different widths recorded for the same street section. It is beyond the scope of this plan to audit widths of even the designated cycle routes and road widths and the feasibility of treatments will therefore need to be proven up in the design stage.

Similarly, design of the Super Routes needs to respond to individual circumstances. Indicative plans of the type of treatments that could be applied and the type of streetscape changes that might occur are provided in the Appendix. These are not comprehensive and are intended to be indicative only, with a detailed concept development stage required, including consultation with local residents.

Figure 6

DPTI ROAD/ DPTI ROAD PRIORITIES



Roads under the care and control of DPTI

Highest priority

High priority

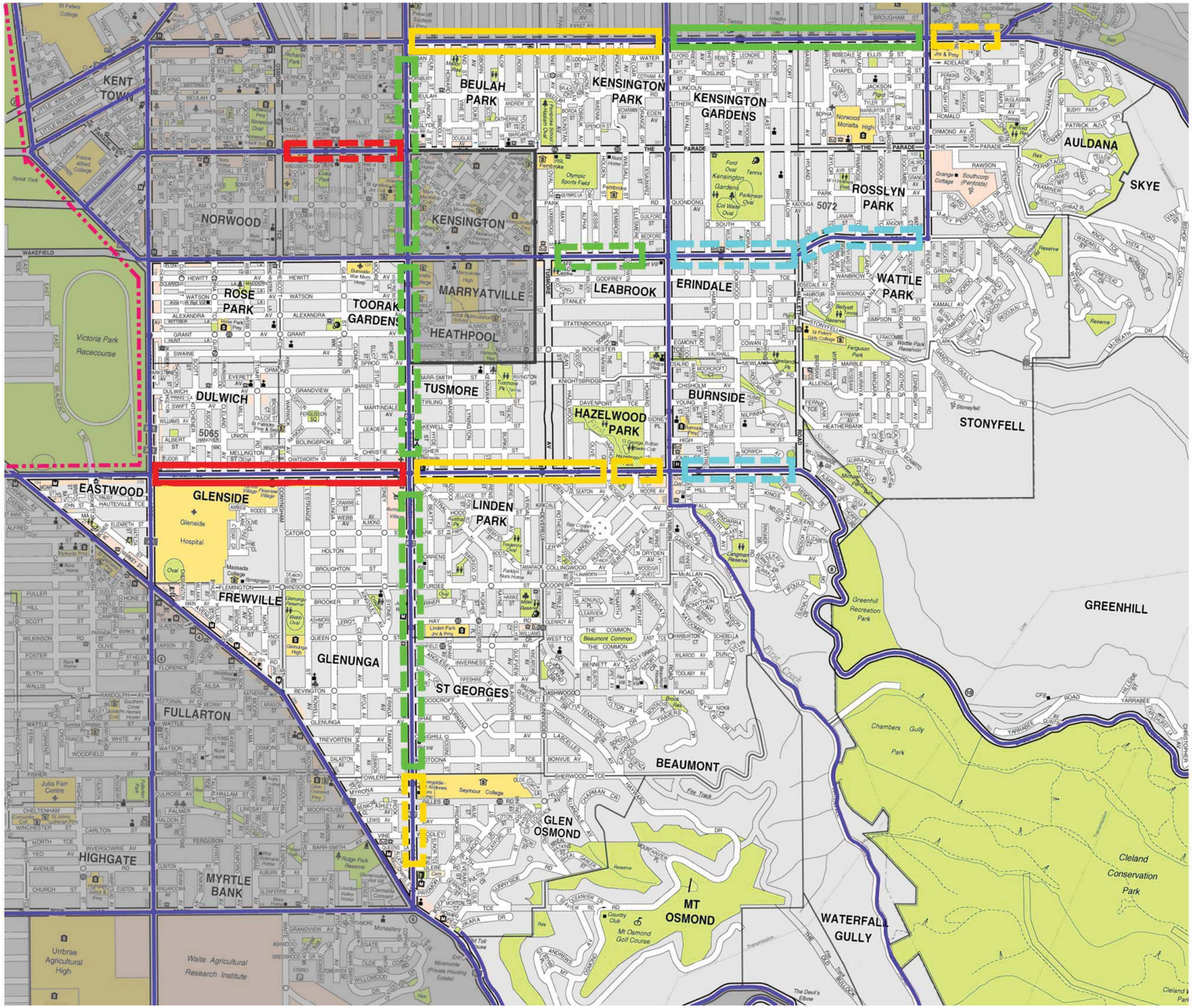
Medium priority

Low priority

Council area

Figure 7

FACILITIES ON DPTI ROADS



Review peak hour bike lanes for opportunities to extend operating times

Review route for opportunity to install bike lanes

Roads under the care and control of DPTI

Highest priority

High priority

Medium priority

Low priority

Council area

Figure 8

DPTI / LOCAL ROAD PRIORITIES

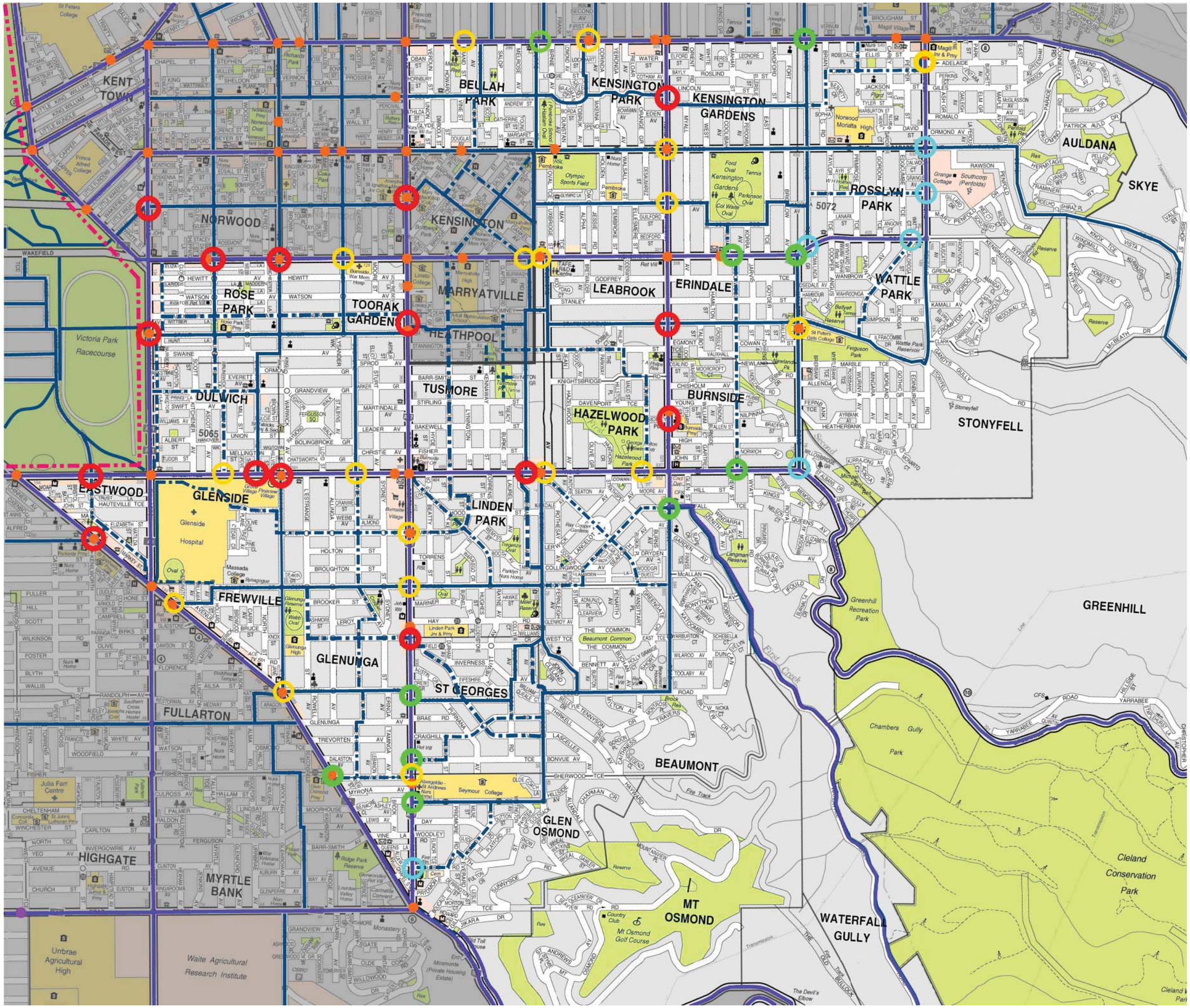
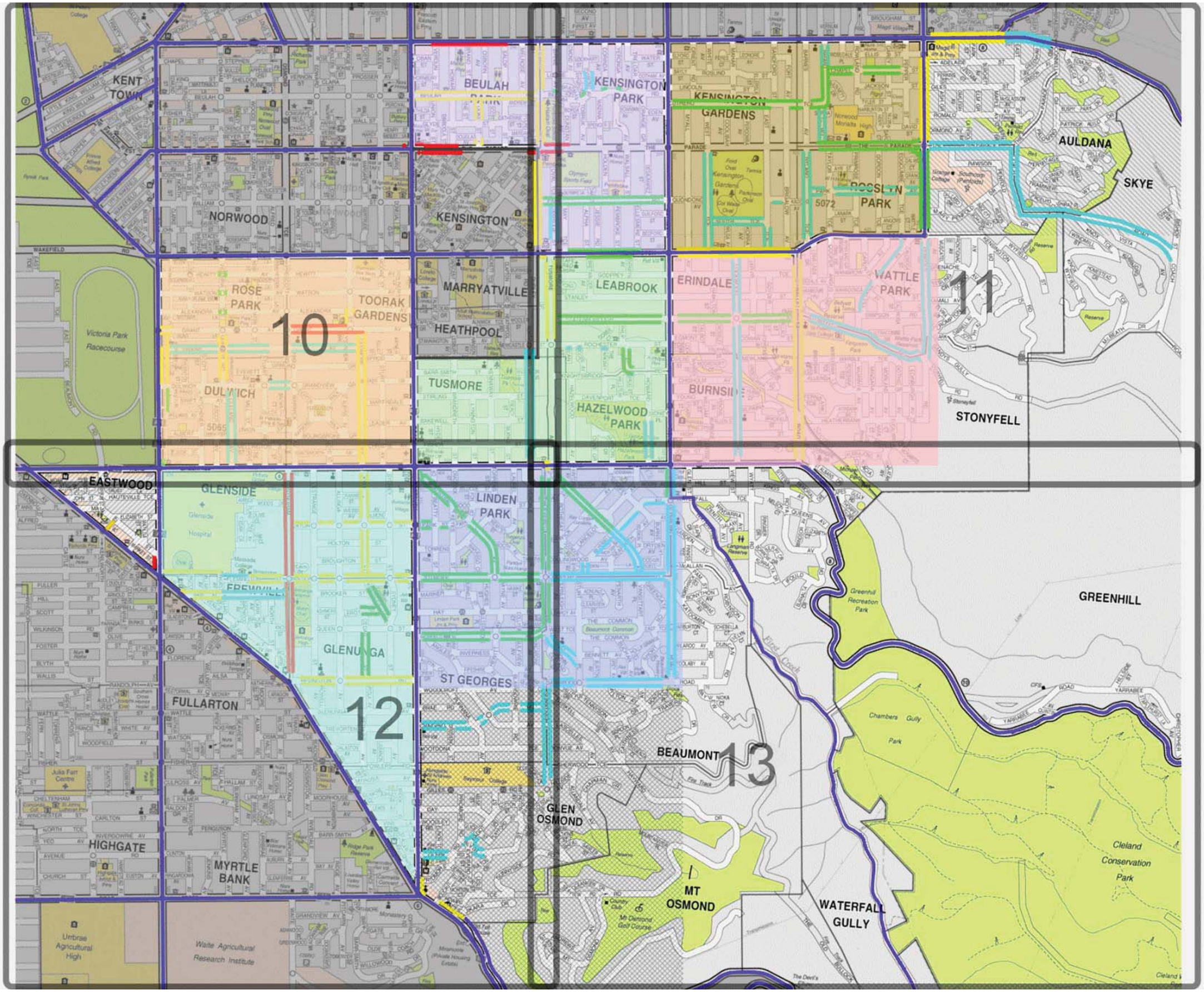


Figure 9

LOCAL ROAD ROUTE PRIORITIES - key map



9 Detailed map (Colour/ shading as per Table A1)

- Highest priority
- High priority
- Medium priority
- Low priority
- DPTI controlled roads
- Council area

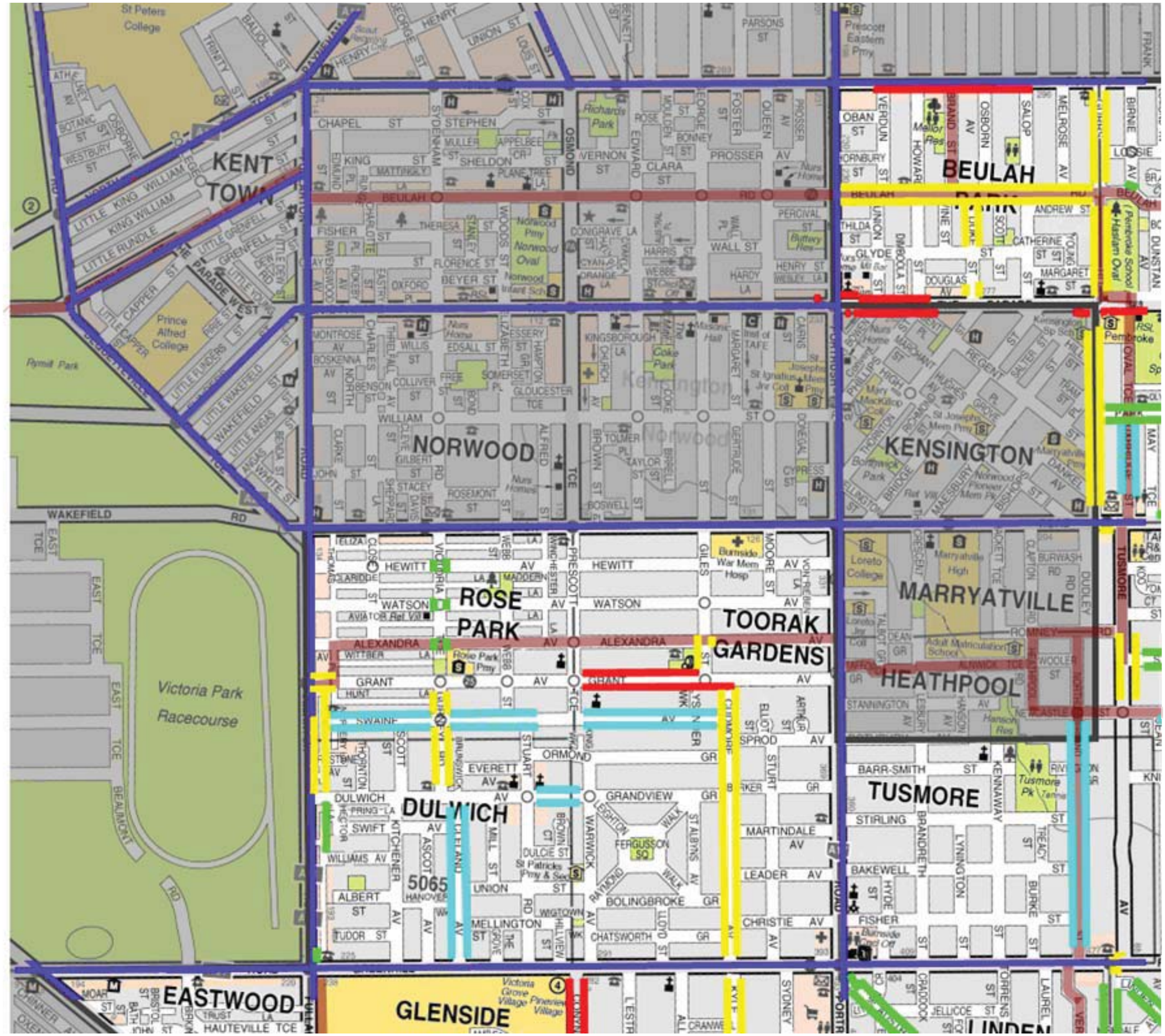


Figure 10

LOCAL ROAD ROUTE PRIORITIES

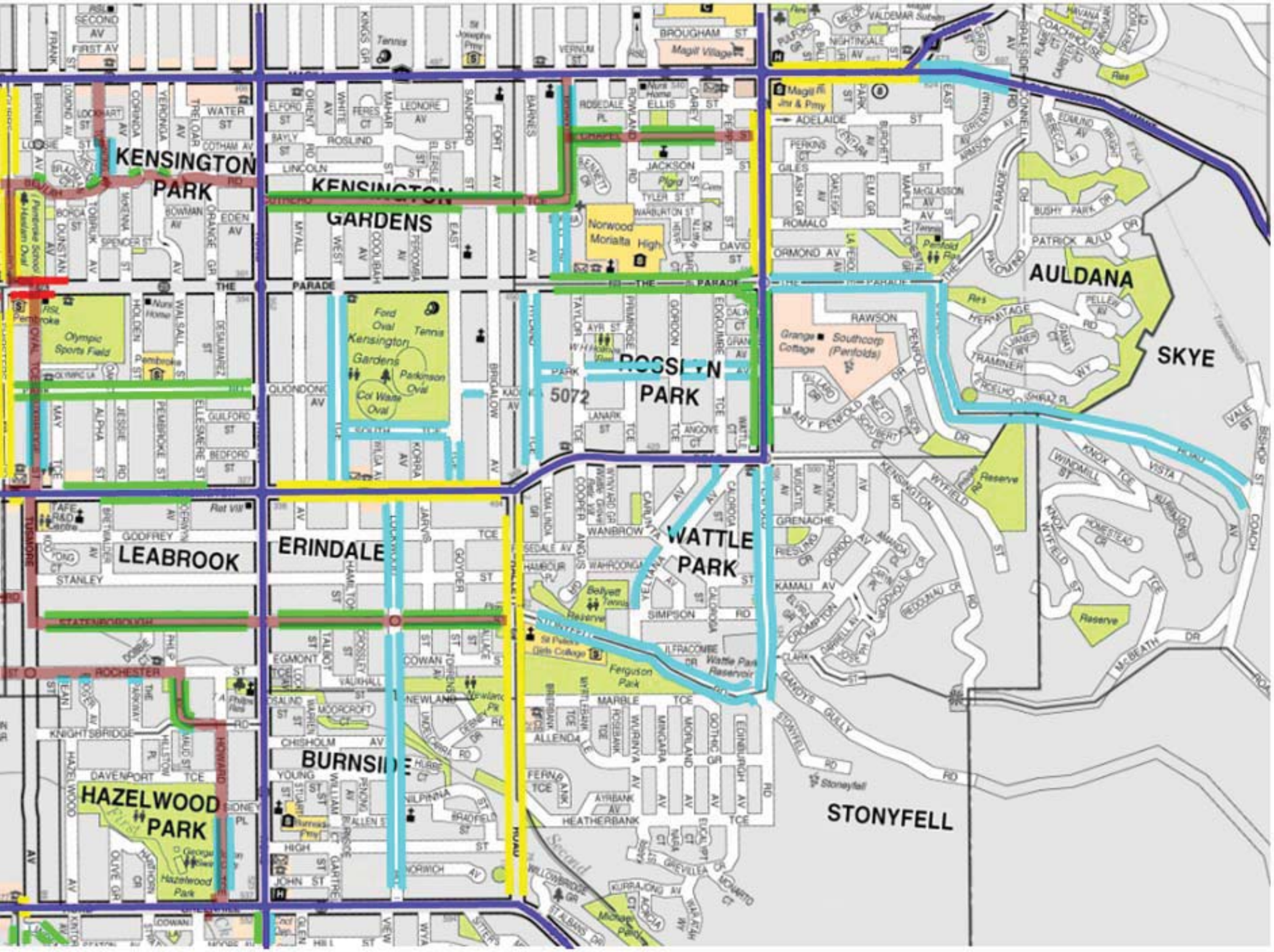
- north-west quadrant

- Highest priority
- High priority
- Medium priority
- Low priority
- DPTI controlled roads
- Super Routes
- Council area

Figure 11

LOCAL ROAD ROUTE PRIORITIES

- north-east quadrant



- Highest priority
- High priority
- Medium priority
- Low priority
- DPTI controlled roads
- Super Routes roads
- Council area

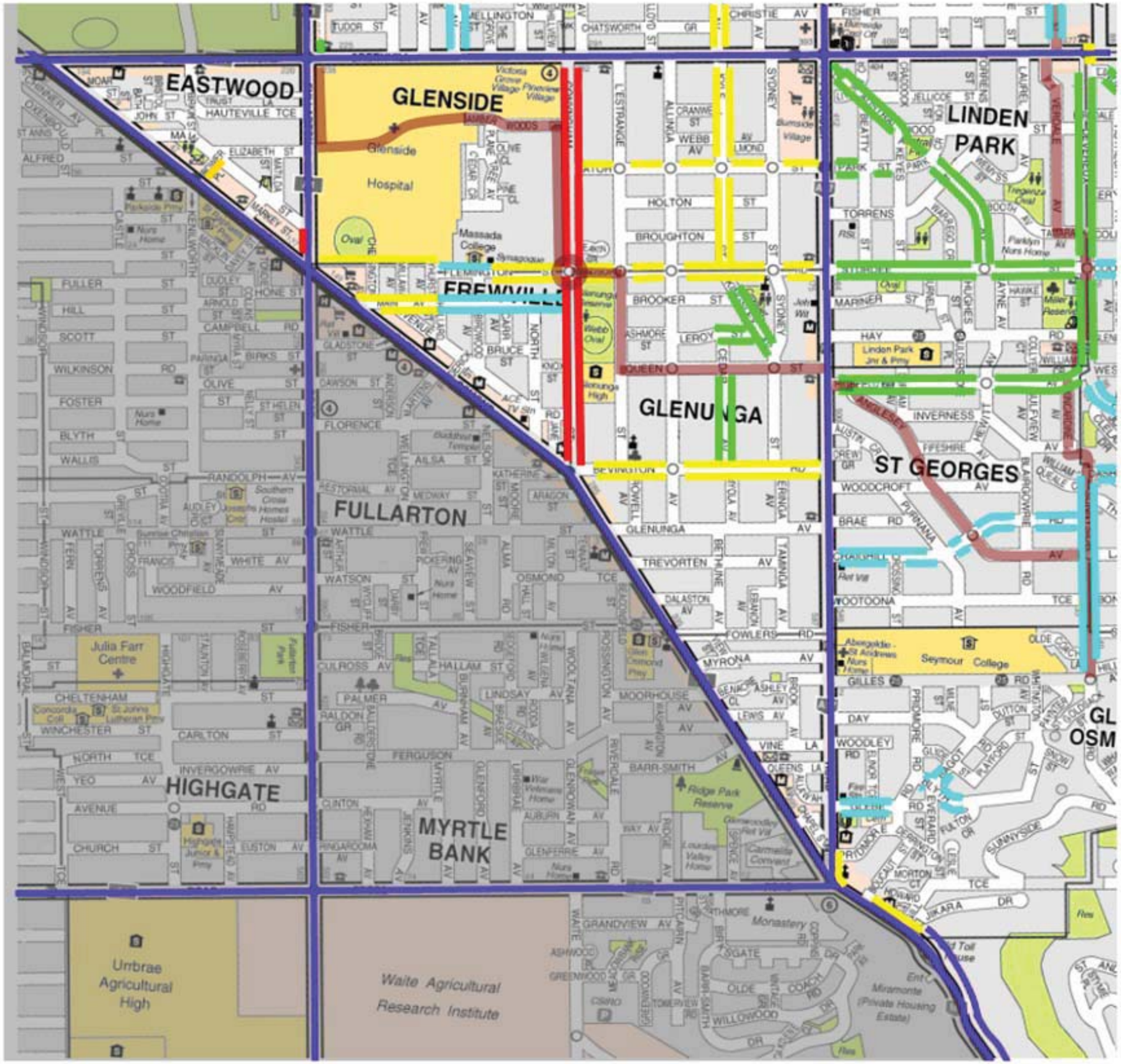


Figure 12

LOCAL ROAD ROUTE PRIORITIES

- south-west quadrant

- Highest priority
- High priority
- Medium priority
- Low priority

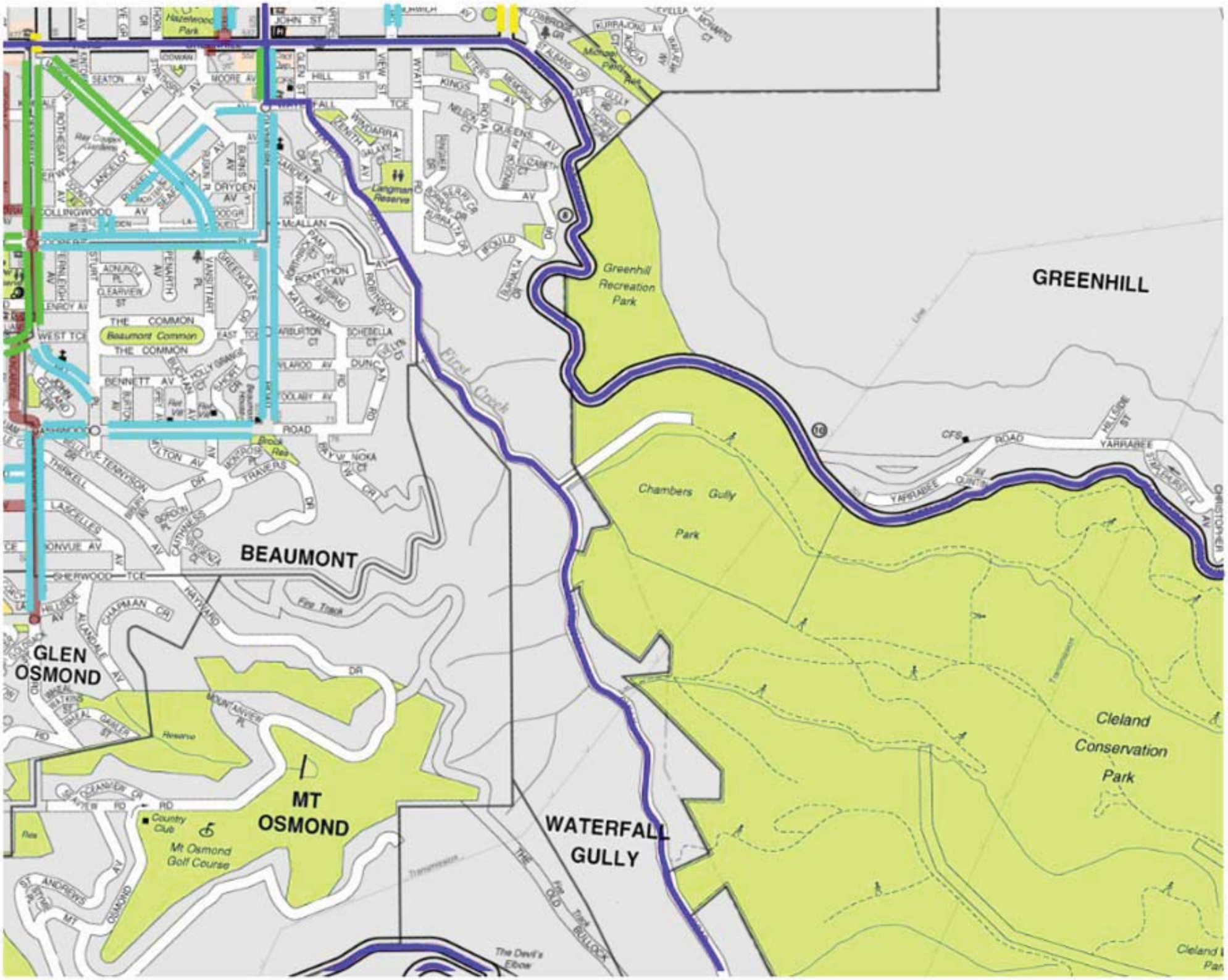
DPTI controlled roads

Super Routes

Council area

Figure 13

LOCAL ROAD ROUTE PRIORITIES - south-east quadrant



- Highest priority
- High priority
- Medium priority
- Low priority
- DPTI controlled roads
- Super Routes
- Council area

Appendix: Concept designs

This section presents some background to designing for cycling and design considerations for Burnside works before itemising the route and crossing infrastructure options based on these design guidelines.

Contents

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1.1. Design standards and guidelines

Design standards and guidelines covering bicycle facilities in Australia can be considered as a hierarchy, with higher levels in the hierarchy reflecting greater amounts of uniformity and reduced flexibility.

The technical requirements for bicycle treatments are contained in various **Australian Standards**, such as *AS1742.9 Manual of Uniform Traffic Control Devices Part 9: Bicycle facilities*, and *AS 2890.3 Parking facilities Part 3: Bicycle parking facilities*. As with other standards, these focus on the facilities and treatments rather than providing guidance on where and when they should be used. They also do not reflect variations in traffic engineering practice between the states.

Similarly, the **Australian Road Rules** contain descriptions of bicycle facilities as part of assigning road rules to the use of such facilities — and in so doing, provide some design guidance. Although the road rules are nominally uniform across Australia, there are some areas in which these can be 'customised' by different states and this has occurred in relation to cycling: a helmet is not required for cycling on off-road paths in the Northern Territory, but is required in all other states and territories, except that South Australia allows exemption on religious or medical grounds; ages and groups who are legally permitted to cycle on footpaths varies between the states. (In South Australia, footpath cycling is limited to children under the age of 12). Whether bicycles can use bus lanes also varies between the states. In South Australia, cyclists are allowed in "bus" lanes but not "bus only" lanes.

More generally, bicycles are classified as vehicles under the Australian Road Rules and the road rules apply similarly to cyclists as to motorists (with some exceptions, such as cyclists are not legally required to indicate when turning left).

Austroads, the association of Australian and New Zealand road transport and traffic authorities, publishes a series of documents that provide guidance for traffic engineers. The **Guide to Traffic Management, Guide to Road Design and Guide to Road Safety** reflect best practice and accepted engineering practice. The cycling aspects of these guides have now been collected into a single document for easy reference: Cycling Aspects of Austroads Guides.

The above standards and guidelines are accepted by the Department for Planning, Transport and Infrastructure (DPTI) for application in South Australia. The following standards and guidelines are not necessarily accepted and cannot be applied without an understanding of the concepts contained therein. Negotiation with DPTI may also be required to apply any of the suggested treatments.

State-based engineering guidelines reflect local traffic engineering conditions and practice. Those relating to cycling customise traffic engineering practice and/or cover treatments not contained in Austroads Part 14. For example, New South Wales' Road and Traffic Authority publishes *Bicycle Guidelines*, while VicRoads publishes a series of Cycle notes. These guidelines do not necessarily reflect acceptable practice in South Australia. For example, VicRoads' Cycle Notes No. 5, published in 2000, includes guidance on providing "bicycle storage boxes" (explained below) in front of general traffic lanes, where there is no bicycle lane. This is, in fact, not supported under the Australian Road Rules as currently enacted in South Australia.

Other state-based guidelines may be relevant, though not focused on cycling. Design standards for shared zones are one example.

Organisations may have **agency-specific** policies or guidelines, typically covering aspects of traffic engineering omitted from or poorly covered in Austroads' Guides, and/or agency practice in regard to certain aspects of traffic engineering for cyclists. Typical examples include urban design policies, in terms of materials used for shared use paths or bicycle rail designs; and asset management standards for construction and maintenance. Adelaide City Council's *Strategic Bicycle Plan 2002* included a design section following on from a review of international best practice. Guidelines or policies are used by DPTI — such as regarding tapering bicycle lanes at their start or end — although this has not been documented as a state-specific set of guidelines.

International practice can be considered, but with caution due to the different traffic engineering standards and regulatory frameworks that exist overseas compared to Australia. For example, roundabouts on continental Europe generally have a better safety performance than those in Australia or the United Kingdom, as the former are based on roads entering radially into the roundabout while the latter are based on roads entering tangentially into the roundabout. The radial form generally results in lower speeds and a better safety performance. Similarly, bicycle paths are provided in the footpath area in Denmark, where cyclists have priority over minor intersections. (They have no such priority in Australia). Studies have shown that intersections and driveways are significant conflict points for cyclists on footpaths — indeed safety is typically lower than for cyclists on roadways. This difference in the regulatory framework could have significant impacts on the safety of such a treatment.

International research and studies can provide additional information on cyclist treatments that makes these more useful than practice documents, as they tend to include design details and may review different approaches to these as part of the overall research. The OECD's *Safety of Vulnerable Road Users* is an excellent example. The Velo-City series of international cycle conferences also presents research into cycling, including engineering treatments and cycle safety.

1.2. Designing for cyclists

In South Australia, designing for cyclists is guided by Austroads Guidelines (as noted previously). Nonetheless, an overview is presented here to provide an understanding of the design solutions presented later on.

Essentially, cycle networks are formed of routes and intersections or crossings.

There are essentially three general philosophies to providing cycling routes. There is little consistency in the use of the terminology, but these are:

- Separation – removing cyclists from general traffic, but not physically preventing interaction, e.g. bicycle lanes created with paint providing separation of the cyclist and vehicle operating spaces
- Protection – providing physical separation of cyclists from general traffic e.g. with cyclist-only paths or kerbing
- Integration – cyclists operate with general traffic.

In practice, these philosophies have a degree of overlap and should be tailored to the local circumstances. For example, the Mike Turtur Bikeway (running from King William Road in Unley to Jetty Road in Glenelg, alongside the tramline) has sections of **protected** off-road path (shared with pedestrians), interspersed with **integrated** use of low traffic volume/speed streets such as Railway

Terrace South; but at King William Road, near Greenhill Road, the ongoing route is provided via a section of bicycle lane, which is **separated (**but not protected) from general traffic.

Protection and separation also lie on a spectrum. While a kerb provides obvious protection, there are some treatments that increase the degree of separation but do not physically prevent all intrusion into the bicycle facility. And even protected facilities must cross streets and side streets, where they are rarely truly protected (e.g. removed from traffic by a bridge) but may benefit from a higher degree of separation given by traffic signals.

Example of a treatment with increased separation, Albert Street, Melbourne

While child, novice, less confident and more safety-aware cyclists and parents of child cyclists will often favour protection as a philosophy, full protection is only really practical on a large scale through linear corridors that do not have traffic, such as the River Torrens Linear Park.

In any other area with streets and roads (which is most of the inhabited area), cycle traffic will have to cross vehicular traffic at some point. In these areas, protection can (ironically) reduce safety and increase risk. This is because most risk occurs when vehicular traffic and cycle traffic flows cross – referred to in traffic engineering as 'conflict locations'. Protection tends to put cyclists in locations where traffic is not expecting conflict, or will have difficulty in seeing cyclists. For example, for footpaths, major conflict locations are residential driveways. Various studies have found that cyclists are safer using streets than footpaths because of the risk from vehicles backing out of driveways or turning into driveways. (Despite this, children under the age of 12 are permitted to use footpaths because they are considered to not have the 'traffic sense' necessary to safely use streets.)

Protection is also a (potentially very) high cost solution. For example, Melbourne City Council has estimated that for La Trobe Street, the costs would be[1]:

- $2.4 million for protected bicycle lanes
- $0.35 million for separated bicycle lanes.

This would be fairly standard comparative costs. On this basis, around six or seven kilometres of separated bicycle lanes could be provided for the same cost as one kilometre of protected bicycle lane. Where this means that a functional network could be installed instead of a single route, the coverage given by separation would more than make up for the lower degree of physical protection provided compared to protection.

Other disadvantages of protected facilities are:

- greater space requirements – in Burnside, use of the verges would be difficult due to the mature tree plantings. Protection could be achieved by removing use of the road width, but in many cases, this would be achieved only by removing parking
- maintenance – separated facilities are 'swept' by being driven over, as car tyres flick debris off the main road surface (hence debris collect at road edges); road pavements are flexible, so traffic assists in keeping them in good order; paths adjoining planting are vulnerable to infiltration from weeds, pavement lifting from roots and accumulation of debris from trees. These add up to a higher maintenance requirement, often resulting in poor pavement surfaces and single-vehicle crashes are often much higher in off-street environments than on-street environments
- poor lighting – off-street environments are typically poorly lit compared to streets and lighting is expensive to provide and maintain
- drainage impacts – creating a footpath-level bike lane from the road would have associated with it a need for significant changes to drainage, at significant cost.

Hence protected facilities need to be carefully considered and designed, noting their greater potential to increase cycling levels than separated facilities.

In South Australia in general, separated and protected cycle routes can be considered as:

- On-road facilities (separated) – provided on the road carriageway
- Off-road facilities (protected) – provided through reserves, in verges similarly to footpaths, through road closures, etc.

Both on-road and off-road facilities are further classified depending on their characteristics and are discussed further in the coming pages.

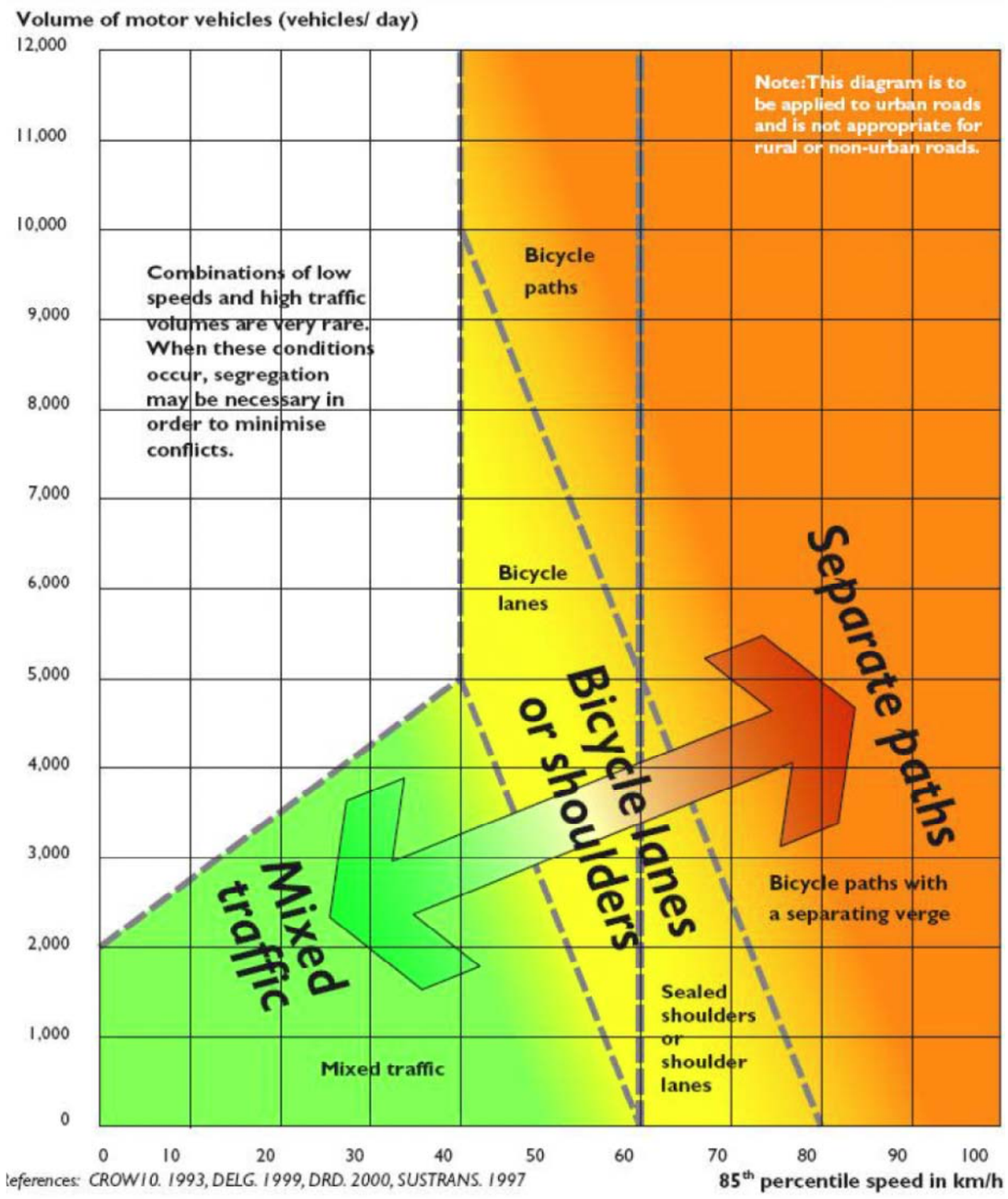
International research indicates that **integration** can be safe for all types of cyclists when traffic speeds reduce to around 30km/h and traffic volumes are not too high (below about 4,000 vehicles a day). It is a particularly useful strategy for locations where separated or protected facilities cannot be provided, and to provide for child, novice, less confident or more safety-aware adult cyclists.

An example of conditions conducive to integration ("mixed traffic"), separation ("bicycle lanes or shoulders") and protection ("separate paths") is shown in the diagram following, taken from Austroads' *Cycling Aspects of Austroads Guides* (p13).

However, with an integrated approach, the street must provide this environment at all times. Techniques to create such an environment can have a high cost associated with them, such as removing kerbs (with attendant changes in drainage) or changing the alignment of roads. For longer routes, achieving a 30km/h speed environment will also make the route less convenient for motorists. This assists cyclists but needs to be carefully considered.

The possibility for using **integration** and **protection** more generally are discussed with respect to the Super Routes concept in Section 1.5.

[1] 'Danish a sweet thought for city cyclists', Carey, The Age (www.theage.com.au/victoria/danish-a-sweet-thought-for-city-cyclists-20120415-1x1jf.html accessed 17 April 2012).



1.2.1 On-road facilities

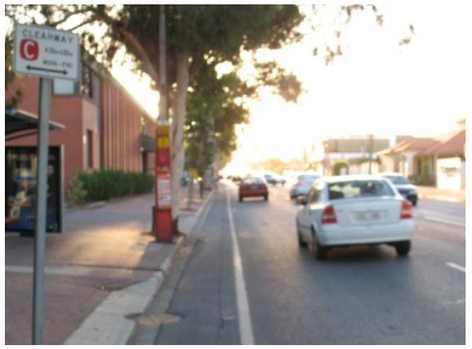
On-road facilities can be classified as **bicycle lanes** or **advisory treatments**. These will often look very similar to users, but a bicycle lane has associated with it a regulatory status under the Australian Road Rules in a similar way to traffic lanes, while an advisory treatment provides on-road space and advises motorists to expect that cyclists will use this area of the road. Bicycle lane signage gives bicycle lanes their status under the Australian Road Rules.

On-road provision for cyclists on streets with a posted speed limit of up to 60km/h ranges through (in order of space requirements):

- on-road shared parking/ bicycle lanes (BCPL): desirable width 4.2 metres; acceptable width 3.7 to 4.5 metres (comprising parking at 2.1 to 2.5 metres, safety strip 0.4 to 1.0 metre, bicycle lane 1.2 to 1.5 metres).
  (It is also suggested that a sub-minimal 3.5 metre BCPL could be marked adjacent to a 2.9 metre travel lane if space is limited, traffic volumes are low, few heavy vehicles use the street and the street is zoned at up to 60km/h; or an advisory treatment used.)

Examples of BCPL treatments: left, with on-street parking; right, with indented parking (Glynburn Road).

- exclusive on-road bike lanes (EBL): desirable width 1.5 metres; acceptable width 1.2-2.5 metres; 1.0 metre at squeeze points, for short distances



Example of EBL treatment: peak period EBL provided during clearway times, Magill Road. The effectiveness of this on disciplining traffic and keeping a kerbside space clear for cyclists can be clearly seen.

- on-road advisory bike treatment with edge line (AT+E): 3.3 to 3.7 metres (comprising car parking 2.1 to 2.5 metres, bicycle pavement symbol 1.2 metres).

Example of AT+E treatment, Sydenham Road, Norwood. Dashed lines and logos are provided where the treatment is carried over a side street.

- on-road advisory bike treatment with logo, where car parking demand is high (AT+LH): 3.0 to 3.2 metres

Example of AT+LH treatment, Beulah Road, Norwood.

- on-road advisory bike treatment with logo, where car parking demand is minimal (AT+LM): 3.7 metres (NB unlike the other treatments, this width is not provided in addition to an adjacent travel lane but specifies a minimum travel lane width).

Example of AT+LM treatment, Alnwick Terrace, Heathpool. Treatment is provided where parking has been prohibited.

Generally, the minimum width is recommended for use only when the average traffic speed is less than 50kph, the parked vehicles (if any) are mainly cars, parking turnover is low or space is limited.

It is assumed that the minimum travel (general car) lane width is 3.0 metres, but widths down to as little as 2.8 metres in quiet streets that are not bus routes. On roads with no centre-line, a single carriageway width for both directions of travel of down to 5.5 metres could be assumed.

On multi-lane roads, where parking demand is minimal, or if clearways have been provided, wide kerbside lanes are another treatment option (3.7 metres minimum adjacent to a 3.0 metre central lane on four-lane roads with no median; 3.7 metres minimum adjacent to a 3.1 metre central lane and with a 3.2 metre median lane, on four-lane roads with a median)

Lane widths between 3.0 metres and 3.7 metres may encourage motorists to "squeeze" past cyclists even if insufficient space exists, and should be avoided. Instead, a 3.0 metre lane width that enables cyclists to occupy the street and "defend" their space may be preferable, but routes with such widths should not be promoted to child and inexperienced cyclists.

Reducing traffic speeds reduces the potential for both crashes and injuries. From international studies, integration of cyclists and pedestrians — including children — with traffic is safe at traffic speeds of up to 30km/h. Shared zones have a speed limit of 10km/h and certain rules regarding street design (related to the likelihood of vehicles exceeding the speed limit) and are typically expensive to implement. Designing for speeds of 30 km/h can produce the same effect at a much lower cost.

The removal of parking to provide space for bicycle facilities is usually contentious and is proposed where the safety benefits for cyclists are considered to outweigh the inconvenience caused to motorists, including through peak-hour (or out-of-peak) facilities.

Other treatments include bypasses for traffic control devices such as one lane angled slow points. These bypasses should meet the width requirements of exclusive bike lanes, or exclusive bicycle paths.

While road widths may vary along a road, it is preferable to try to maintain the same treatment along its length, or at least along reasonably long sections.

1.2.2 Off-road facilities

Off-road facilities comprise different types of paths:

- Shared use paths (SUP): can be used by pedestrians as well as cyclists and in South Australia. Desirably 3.0 metres wide, though widths as low as 2.0 metres are supported in constrained conditions and low-demand situations.
  (In NSW, the RTA has been sued over conflicts occurring on paths that have been provided at sub-minimal width (e.g. using the 'constrained condition' width for long sections), while other states are embarking on area-wide path widening programs as cyclist demand has increased.)
- Separated paths: provided adjacent to but separately to pedestrian-only paths (footpaths). Desirably 2.5 metres adjacent to a 2.0 metre footpath; acceptable 2.0-3.0 metres adjacent to 1.5 metres +; or desirably 1.5 metres and acceptable 1.2 to 2.0 metres if provided for one-way travel only, adjacent to a desirably 1.5 metres but acceptably 1.2 metres+ footpath.
  Due to difficulty in enforcing separation, and the greater widths required for separate walking and cycling paths over a combined shared use path, these are rarely used as a major path type and typically provide cyclist access through areas that already have or are bypassed by pedestrian routes, or where it is desirable to maintain separation, such as a cyclist cut-through at a street closure.
- Exclusive paths: provided for cyclists with no additional provision for pedestrians. (Essentially the same as for separated paths, but provided at some distance from or in isolation from a footpath.) For low to moderate demand, desirably 2.5 metres but acceptable at 2.0-3.0 metres.

1.2.3 Intersections and crossings

Due to the variability in road design and traffic conditions at intersections and crossing points, particular treatments will be tailored to the particular location and traffic conditions. There is a suite of different types of facilities that can be used and design details for intersections are presented in Austroads Part 14. Generally, though:

- Intersections are hazard locations for cyclists as these are where conflicting traffic movements occur (cars travelling across the path of travel of bikes and vice versa, merging movements) and road users are faced with complicated movements to understand and predict.

  The approach to designing intersection treatments for cyclists is essentially to place them in a space separated from cars and where cyclists are visible, and if necessary to provide special phasing for cyclists at signalised intersections.

- As cyclists are small vehicles with often low speed, they are less able to match gaps presented in traffic or 'assert' their presence when crossing roads. This is more so the case as cyclists typically approach crossing locations from the kerbside of the approach road and may have to negotiate left-turning traffic in the approach road as part of the crossing. Busy roads — particularly multi-lane roads — can therefore form a barrier to travel.
- Crossing treatments focus on assisting cyclists to locate appropriately on approach roads, crossing the two directions of travel in the road in separate stages, and provide areas sheltered from motorist incursion to stand while waiting for appropriate gaps. There are also design details associated with cyclist use of pedestrian signals that may be relevant.

1.2.4 Super Routes

The concept behind 'Super Routes' is that standard separated facilities are not perceived as providing a sufficient level of protection necessary to encourage cycling amongst child, novice, less confident or more safety-aware cyclists, and parents of child cyclists.

Super Routes use *protection* and *integration* to provide a different level of perceived protection, compared to the separation used more commonly on other routes. This leads to a different philosophy being applied to the design concepts.

The application of these approaches, along with separation where appropriate, creates the overall Super Route. General design concepts are discussed in more detail in Section 1.5.

Super Routes form the 'spine' for more local access, particularly to schools: the Super Routes network has been designed to take Super Routes within reasonable proximity of all primary and high schools in Burnside.

1.3. Supplementary designs

While the standards and guidelines outlined previously provide the basis for traffic engineering for cyclists, there are other design concepts that could be considered for certain circumstances. Hub has been asked to provide guidance on design options that are not well specified in the standards and guidelines.

1.3.1 Signage

Burnside's cycle network is extensively signed using BikeDirect and Council bicycle signs. An example of such route signage is shown at right.

Route signage: Tusmore Ave/ Statenborough St. BikeDirect signage is in the form of a blue triangle pointing the direction of the ongoing route. Council signage comprises larger white on blue signage, providing the same information. This type of route signage is provided at intersection locations to guide cyclists.

While Council route signage would be useful where no BikeDirect signage exists, the amount and utility of information provided by the addition of Council signage to BikeDirect signage in the above example is questionable. With both BikeDirect and Council signage, cyclists would need to be aware of the route they had already selected, with at least a reasonable understanding of where they are heading. This form of route signage also has poor visibility to non-cyclists, in terms of indicating that a route is a designated or priority cycling route; on the other hand, it also represents a duplication of signage.

Alternative route signage can, through symbols and colours as well as words, can brand routes and thus enable additional information to be communicated. Examples in Adelaide include the West Unley Commuter Route and River Torrens Linear Path. Branding:

- helps cyclists follow a particular route where a route choice may emerge (such as the one in the photo shown above).
- can indicate where the route goes, by including a suburb name, feature or direction.
- usually indicates continuity and a high standard of treatment along the route. This is valuable information to cyclists, given often variable standards of treatment and continuity.
- can indicate route type or design conditions, such as indicated by a commuter route as opposed to a recreational route.
- Is usually associated with better visibility and thus helps promote the route.

Longer distance, continuous routes forming an arterial function for cyclists lend themselves to branding. In Burnside, the routes starting as Beulah Road and Grant Avenue and William Street would be closest to reaching this sort of standard.

Signage also frequently includes distance information. While commonly provided in route length — which needs greater accuracy than for vehicles — time can be provided instead. Time indications provide a better promotional role as non-cyclists and novice cyclists tend to overestimate how long it takes to ride a certain distance, while motorists underestimate the required time. Time is more

subjective, as it relates to the fitness of the individual, but can also be more consistent and accurate across signage as it can include the effect of gradients on travel time.

The Berkeley Bike Boulevard concept includes identification of seven types of signage to support the concept. (See www.ci.berkeley.ca.us/ContentDisplay.aspx?id=6684.)

The Office of Cycling and Walking is currently trialling the use of "sharrows" for directional information. These are on-street markings comprising a bicycle logo and arrowhead pointing straight, left or right.

1.3.2 Roundabouts

Roundabouts are an intersection treatment of particular impact on cyclists. For cyclists, roundabouts have the disadvantage over other forms of intersection treatment, of:

- Maintaining free-flowing traffic
- Directing motorists towards the left of the lane on the approach, reducing cyclist road space and 'squeezing' cyclists
- Reducing space through the intersection itself, and the predictability of where a car will locate within the travel lane
- Introducing cyclists into a more complex situation, where motorists may be less likely to see a cyclist
- For multi-lane roundabouts, causing conflict. The rules regarding cyclist use of roundabouts are different than for motorists, as cyclists can turn right from the left hand lane of a roundabout. This reflects the different performance characteristics of bikes compared to cars, but is poorly known by motorists.
  Further, cyclist continuing right over a leg of the roundabout is required to give way to a car exiting on that leg, with the speed differential between cyclists and motorists frequently (indeed, virtually inevitably) leading to such motorists cutting in front of cyclists. In this situation, cyclists have only a limited ability to see a motorist and take evasive action.
  An alternative for cyclists is to act in the same way as a motorist and take the right turn lane, which involves crossing a lane of traffic at both the approach and when entering the roundabout. Finally, whichever lane is used, roundabout design tends to promote motorists sharing the travel lane with cyclists despite such lanes being narrow for this.

Not surprisingly, cyclists generally dislike roundabouts. However, in traffic engineering practice the improved safety to other modes is often considered to outweigh the negative safety impacts on cyclists.

Austroad Part 14 provides a discussion on roundabouts and how these can be treated. (Bike lanes should **NOT** be provided in roundabouts.) Under the guidelines, both multi-lane roundabouts in Burnside (Greenhill Road/ Glynburn Road and Britannia roundabout) should be provided with some type of treatment.

- Clearly, the issues related to Britannia roundabout are vexed; however, cyclist access and safety should be included in any plans to upgrade the roundabout.
- For Greenhill Road/ Glynburn Road, signalisation or replacement of the roundabout with signals would be the most desirable outcome as insufficient reserve exists to implement path treatments. Further, un-signalised crossing is a safety concern for children crossing Greenhill Road to access Burnside Primary School.

It should also be noted that the difficulties presented to cyclists by multi-lane roundabouts can be less than those presented to pedestrians. At least cyclists who adopt an assertive stance as road users can act as vehicles with the protection of the Australian Road Rules. Pedestrians attempting to cross a road at a multi-lane roundabout have no such option and may simply not be able to cross safely.

There is a lack of bicycle provision at single-lane roundabouts in South Australia. By contrast, the example at right from Indooroopilly, Queensland (aerial image from Google Earth) shows short bicycle lanes provided at the roundabout when no lanes are provided on the connecting roads. This would be more difficult to achieve at mini-roundabouts.

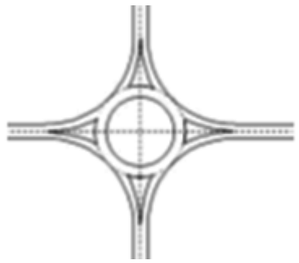
Mini roundabouts

Mini-roundabouts are a common traffic management device used to reduce speeds on local streets. These generally have a better safety performance for cyclists than larger and multi-lane roundabouts, due to speed reduction and the reasonably good visibility offered at mini-roundabouts, and arguably produce better cycling conditions overall through the management of traffic speed.

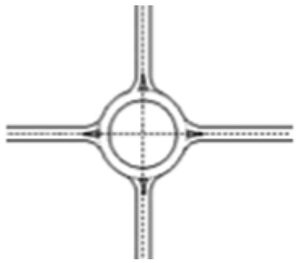
Nonetheless, a common cyclist complaint is the experience of being "squeezed out" at the approach to mini-roundabouts, or by motorists who overtake cyclists within the roundabout. The design options to address these issues are limited.

In Australia, roundabouts are designed so that motorists are 'deflected' from a straight-through path of travel by the roundabout, and lanes are narrowed to reduce traffic speeds.

This type of design follows the British system: the entry and exit lanes are designed to touch the circulating roundabout at a tangent. On continental Europe, roundabouts are often designed radially: the entry and exit lanes are designed to touch the circulating roadway like a radius. The difference between these two design bases is shown below.



Tangential design



Radial design

The radial design produces lower traffic speeds and less deflection left when entering the roundabout. However, it is not clear that this produces a significant difference for mini-roundabouts. For mini-roundabouts, the radial design can be adapted to South Australian guidelines, as shown following. The radial form may arguably be more 'comfortable' for cyclists than the tangential form.

Radial roundabout, Beulah Road/Sydenham Road (Image: Google Earth)

Tangential roundabout, William Street/ Elizabeth Street (Image: Google Earth)

Alternative design treatments include:

- 'Fried egg' roundabout – used extensively in Victoria, the raised central island is surrounded by a flush concrete area. Behaviourally, motorists tend not to use this flush space except if necessary. This nominally enables a wider lane width to be provided without leading to higher traffic speeds, and this space could be used by motorists if they encounter a cyclist in the roundabout. This also enables "tighter" roundabouts to be provided on routes used by heavy vehicles such as buses than would otherwise be the case, leading to lower speeds. Disadvantages are that motorists may become accustomed to these roundabouts and begin to use the flush concrete area regularly, leading to higher speeds; and the concrete becomes discoloured over time, eroding the effect. The fried-egg roundabout is contrasted with its local cousin in the following photographs.

'Fried-egg" roundabout, Hamilton, Victoria

South Australian mini-roundabout, Grant Ave

- In the United Kingdom, the term 'mini-roundabout' refers to a roundabout with a maximum island size of 4 metres. The mini-roundabout is essentially flush and can (and is) over-run by vehicles. The mini-roundabout guides traffic priority without providing a physical barrier to vehicles. The lack of physical barrier reduces the potential for a cyclist to be squeezed for space, but the treatment is aimed at achieving the safety benefits of roundabouts relating to separating turning movements rather than lowering traffic speeds and could not be considered to carry out the latter function. An example of a British mini-roundabout is shown following.

Source: Wikipedia. Photographed by Norman Rogers in September 2004

A similar form of mini-roundabout is also possible in South Australia, with a raised but mountable island.

- Four-way stop – this produces lower speeds due to the need for traffic to stop on all approaches, but does not create the narrowing or deflection of roundabouts. These are not used extensively in Australia, though they have been trialled with success in New South Wales. (In South Africa, a four-way stop situation is indicated with the number "4" or "4 way" beneath the stop sign.) Advantages to cyclists are the removal of squeeze point issues; however, cyclists must also stop at stop signs and may find this disruptive to their travel.
  A less disruptive alternative is a four-way give way. This is known as "filter-in-turn" in Guernsey and Jersey, and all-way yield in the USA. In Burnside, the application of this would basically remove priority from one direction of traffic, formalising the standard priority expected at uncontrolled intersections, with give way line-marking and signs to 'remind' vehicles that they can expect intersecting traffic. To a large degree, this provides the same result as installing mini-roundabouts, as vehicles can often negotiate mini-roundabouts at travelling speeds.
  Road users can find the concept of four-way control confronting. The treatment is very low cost compared to constructing devices such as roundabouts.

- Raised platform treatment – this uses the speed management effects of a speed hump to create the same speed reduction of a mini-roundabout. An example of the treatment in Prahran, Melbourne, is shown at right (photo courtesy of Glenorchy City Council, via Cycling South website).

  For cyclists, the treatment removes the squeeze point and maintains road width through the intersection. Unlike a roundabout, priority is assigned to one street over the intersecting street.

  In this example, the street running left to right has priority over the street running top to bottom of page. This also means that traffic flow is interrupted rather than continuous, providing gaps in traffic. This can be advantageous or problematic at any one location, and have flow-on effects through the network.

- Logo treatment – (See also 1.3.4, below). This approach is to provide a large bicycle logo mid-lane at the approach to the intersection, to: raise motorists' awareness; indicate to cyclists that the roundabout is on a continuing cycle route; and encourage cyclists to adopt a location on the road where they are less likely to be squeezed.

Acceptance of a different design approach for roundabouts is unlikely in the short term.

A variant of the logo treatment that would meet South Australian standards is to provide a 1.2 metre wide bicycle logo adjacent to the kerb on the approach to the roundabout, at the last point where the traffic lane measures 3.7 metres in width – and similarly for the earliest point at which 3.7 metres is met on the departure from roundabouts – measured perpendicular to the splitter island. This would comply with advisory treatment guidelines. The use of thermoplastic would provide a more durable logo, as these are likely to be subject to motor vehicle traffic, however the cost of thermoplastic markings is typically 3 to 4 times that of traditional paint.

The treatment is intended to highlight the presence of cyclists and encourage motorists to travel away from the kerb as much as possible. It would also advise cyclists that they are on an ongoing

cycle route. This application would be similar in many ways to concept underlying the "Bicycle Friendly Zones" used extensively in Brisbane.

Despite this, the provision of roundabouts can have positive safety benefits if they result in reduced vehicular speed. For mini-roundabouts and multi-lane roundabouts, though, any safety benefits from installing roundabouts are lower for cyclists than for other modes.

1.3.3 Bike boxes

A "bike box" (known as advanced stop line treatments in Austroads Part 14) is a storage area in front of traffic. It enables cyclists who have advanced to the stop line (e.g. through stopped vehicles, or by using an adjacent left turn lane) to stop in front of car traffic, where they are most visible. Bike boxes can also enable cyclists to access through or right turn lanes from a kerbside position at the front of traffic rather than by crossing one or more lanes of traffic. Their installation has associated with it a known safety benefit.

In South Australia, bike boxes can only be installed if accompanied by bicycle lanes leading to the bike box. Bike boxes to be installed without bicycle lanes would provide priority even where road space is not available for bicycle lanes. An amendment to the Australian Road Rules to permit this is being investigated by DPTI and presents opportunities to improve signalised intersections.

1.3.4 Logo treatments

In many countries worldwide, logos are used to promote certain streets for cycle use.

One of the better documented examples is of the Berkeley Bike Boulevards. This is a concept of providing a high profile to a set of seven quiet streets in the cycle network. These are called "bike boulevards" and are essentially the spine routes for the network. Signage (previously mentioned), route branding, traffic calming and marking of logos is used to designate the bike boulevards. An example of the logo used is shown below.

Berkeley Bicycle Boulevard logo
From www.ci.berkeley.ca.us/ContentDisplay.aspx?id=6684

The actual impact of this is minimal in terms of site conditions; it is a behavioural and promotional measure.

In Australia, Queensland uses 1.2 metre wide yellow bicycle logos in a system known as "Bicycle Friendly Zones". The symbols are located to a protocol which aims to show "the likely path of travel of cyclists under normal traffic conditions". In part, these designate advisory treatments as per Austroads Part 14 (the logo is the same size and layout as that recommended for treatments in Austroads Part 14), but (generally) uses a yellow colouration to differentiate the advisory treatment from formal bicycle facilities.

However the logo treatment is also used in other locations, including narrow streets. An example, taken from a paper by Michael Yeates, is shown at left, below. A similar application, in Sydney, is shown at right. There are some installations in Adelaide City Council, on Grenfell Street and Flinders Street, within left turn lanes.

Given use in Australia, it should be possible to adopt a similar system in South Australia. The aims of the approach are essentially the same as advisory treatments, namely to raise motorists' awareness of cyclists and where they can be expected to be located; and to indicate to cyclists the presence of a continuing cycle route and where motorists will expect to encounter cyclists. An ancillary effect may be to encourage cyclists to adopt a location on the road where they are less likely to be squeezed, where space is limited.

As this approach is not included in Austroads Part 14, it could not be adopted immediately and negotiation with DPTI is required on aims and application details, before these could be implemented. These would be a means of addressing issues in streets that could not otherwise be treated with the standard suite of treatments (see Table A3).

1.4. Cycle plan concept designs

Tables 3 and 4 in this Appendix list concept design options for routes and intersections/crossings respectively, with commentary. These are separated by whether they involve DPTI roads only, DPTI roads plus local roads, or local roads only. A general discussion of opportunities for providing bicycle treatments follows.

1.4.1 DPTI/ DPTI road intersections

Full-time bicycle lanes are especially beneficial on the approach to and departure from intersections and every effort should be made to provide full-time bicycle lanes at signalised intersections and within 20 metres of intersections. While DPTI has previously examined its intersections for the ability to provide for cyclists, a review of these intersections is warranted.

- An amendment to usage of bike boxes without bike lanes would provide a new means for improving cyclist conditions at intersections.
- Intersection designs have typically not included alterations to the kerb line. For example, at Greenhill Road/Tusmore Avenue, the parking area could be used by cyclists when vehicles are not parked, except for a kerb protuberance. A more widespread example is to indent the kerb line to provide a waiting area for cyclists, with a bicycle button used to call a cyclist phase, which could be used where road width is limited, such as on Glynburn Road. The cost-benefit of these will depend on objects within the road reserve that might need to be removed or relocated to provide sufficient space for the bicycle bay (and a lead-in treatment, if necessary) such as street trees, stobie poles and traffic signals.
- In some locations, bicycle lanes could be provided for short sections over slip lanes. This would improve cyclist priority over turning traffic.
- There are also site-specific opportunities to provide bicycle lanes. For example, the peak hour bicycle lane on the south side of Greenhill Road west of Portrush Road usually has parked cars outside of clearway hours, affecting sight distance at Sydney Street. Between Portrush Road and pedestrian signals servicing Burnside Village, no parking is allowed and the bicycle lane could be made full-time. (This is common on the approach to pedestrian signals.) Kerb space for about six cars to park remains. These could be removed, or perhaps some reduction in the adjacent central median used to provide additional on-road space for cyclists.
- Multi-lane roundabouts have significant impacts on cyclists. While these may function well from a traffic flow perspective, a review of crash statistics has shown that the two multi-lane roundabouts in Burnside are crash locations. There is a case to replace these with traffic signals on the basis of safety. If this cannot be readily achieved — and it is acknowledged that redesign of the Britannia Roundabout would be contentious, expensive and difficult and has been examined previously — then alternative access or treatments for cyclists should be provided nearby.
  For Kensington Road, a crossing point that assists cyclists to access Clarke Street or Charles Street to the north, and Thomas Place or Hewitt Street to the south, would provide a cyclist bypass of the roundabout (an additional treatment is required at William Street/ Fullarton Road to make the best use of this).
  For Greenhill Road/ Glynburn Road, signalising the roundabout would probably be preferable to providing pedestrian signals on the north, west and east sides of the roundabout to provide the required access to Burnside Primary School, Hazelwood Park and the commercial development in this area.

1.4.2 DPTI roads

DPTI has usually examined its roads and intersections for opportunities to provide cyclist treatments, and indeed installed these across its network. The opportunities to improve DPTI roads would therefore seem limited. But many opportunities to improve the cycling environment remain. In particular, for the existing peak hour bicycle lanes, there are opportunities to change the form or operating times to create full-time facilities.

- There are sections of roads with extensive off-street parking, where on-street parking is not highly used but a few parked vehicles force cyclists to veer into the stream of traffic. Removal of on-street parking would not significantly affect motorists, but the change from peak hour to all day protection would significantly improve conditions for cyclists. Locations include the northern side of Magill Road between St Bernards Road and Lorne Avenue.
- In some locations, footpaths are wide but not well-used and the demand for on-street parking is low. Indenting a few car parking spaces could enable bicycle lanes to be made full-time. Even semi-indented spaces would increase the lane width for passing cyclists.
- There are some locations where bicycle lanes could easily be provided, such as Magill Road between Penfold Road and New Norton Summit Road. Without other traffic issues, these locations simply may have been overlooked for cyclists.
- Portrush Road was upgraded without bicycle lanes but with a wide (3.7 metre) central median. While the cost of providing bike lanes is prohibitive in the absence of a major upgrade, the Portrush Road median will need to be trenched to underground the new water pipeline from the desalination plant. This could be an opportunity to reinstate the median at a narrower width, enabling bicycle facilities to be provided on one or both sides of the road.

For roads under DPTI's care and control, any works must meet with DPTI's standards and have its approval. It is therefore appropriate for DPTI to undertake design work - but Council can provide input.

1.4.3 DPTI major road/ local road intersections and crossings

Major roads with high traffic volumes and speeds for barriers to cyclists wishing to cross such roads – particularly those with multiple lanes of traffic in each direction, and particularly if a solid (rather than painted) median prevents access across the road.

DPTI roads are generally such major roads, with traffic volumes typically between 10,000 and 40,000 vehicles a day experienced on its arterial roads.

Any works involving DPTI roads must have the approval of DPTI, who will also provide full funding for cycle facilities on DPTI roads. Council's bicycle plan advises DPTI on Council's priorities for treatment where local roads intersect or join with DPTI roads.

As these have not been previously examined within the Burnside area, considerable potential for improvements to be made to local connectivity by addressing access issues at DPTI/ local road intersections. There are numerous opportunities for improvement:

- Bicycle access can easily be provided across solid medians in most circumstances.
- In some locations, pedestrian signals are provided that could be linked to cycle routes to provide protected crossing.
- There are many local roads in which stand-up lanes can be created on the approach to DPTI roads.

1.4.4 Council major/ local road intersections and crossings

Council also has care and control of what would be considered major roads to cyclists, with volumes from 5,000 to 10,000 vehicles a day. These are also difficult to cross as these are less likely than DPTI roads to host pedestrian signals, which both provide protected crossing opportunities and interrupt traffic flow to the benefit of downstream crossing traffic.

For example, while Portrush Road (with around 30,000 vehicles a day) features two signalised locations between signals at Kensington Road and Greenhill Road, the parallel Hallett Road (with around (10,000 vehicles a day) features only a single set of signals over the same length, with no signals at either Kensington or Greenhill Roads. Figure 7 of the main report shows the locations of traffic signals as well as the priorities for DPTI/ local road crossings.

Council's major roads are more likely to feature roundabouts as traffic management devices.

Council's major roads may also be difficult to cross in peak hour conditions, when traffic flows can become more similar to those on arterial roads even though daily traffic flows remain lower.

As for DPTI /local road locations, there are significant opportunities for considerable improvements to be made to local connectivity by addressing access issues at DPTI/ local road intersections. Compared to DPTI/ local roads, there is more opportunity to achieve at least a 1.0 metre painted median in the Council major road, providing shelter for crossing and turning cyclists.

1.4.5 Local roads

While the ability to provide formal bike lanes over the entire network of routes is limited, most routes can support at least advisory treatments.

- In considering treatments along local roads, road and reserve widths — and thus ability to provide bicycle treatments — often vary along roads, as do factors such as number and proximity of side streets, driveway location and bus stop location (all of which lead to a prohibition on on-street parking). This may provide opportunities to install sections of bicycle treatments.
- Many local streets have only low parking demands at most times, but still provide valued opportunities for occasional parking. On commuter routes, peak hour bicycle facilities can provide cycle treatment in the period of most utility to cyclists, but allow parking at other times. To date, no peak hour bicycle facilities exist apart from peak hour bicycle lanes coordinated with clearway times on some arterial roads.
- Where two equivalent treatments cannot be accommodated within the existing road width, it may be possible to provide some treatment on one side of the road, either providing a facility where it is most needed or at least indicating the continuity of a route.
  This approach needs to be treated with caution, however, as asymmetrical road treatment can lead to different road environments depending on when or whether car parking is present. For example, an advisory treatment on one side of a road that requires the lane width to be reduced on the other side of the road may result in an improved environment on the treated side of the road when cars are parked, but create a worse environment on the other side of the road at all times. If car parking rates are low, the disbenefit would outweigh the benefit.
  Should an asymmetrical treatment be considered appropriate, and with all things being equal (though they often are not), in areas with little to slight gradient the higher level facility should be provided for the uphill direction of travel, as cyclists require more space when travelling uphill.
- Where a treatment cannot be provided and gradients are reasonably steep, cyclists travelling at speed downhill will have difficulty judging the quality of the road surface. A better road pavement provided adjacent to the kerb in the downhill direction of travel, for a width of up to 2.0 metres (or reflecting the likely travel path of cyclists) will improve cycling conditions even in the absence of bicycle facilities.
- Burnsides local roads often have wide verges that could be utilised to provide extra road space, most commonly by indenting or semi-indenting car parking between driveways and street trees. While this would be a high cost strategy to adopt for long stretches of street, it can be used to widen small sections of road to provide a continuous treatment.
- Roads that are too narrow to provide bicycle facilities are typically also very low volume and have low speeds that are well-suited to cycling.

1.5. Super Routes

Four Super Routes are proposed:

- Beulah Road/Cuthero Terrace/ Chapel Street/ Ellis Street ("North Burnside Commuter Route") – This links to Adelaide City Council area via the adjoining City of Norwood Payneham St Peters. Beulah Road has been proposed in DPTI terminology as a Bike Boulevard.
- Alexandra Avenue/ Stafford Grove/ Alnwick Terrace ("Central Burnside Commuter Route), splitting with a number of route alternatives at Northumberland Avenue and Tusmore Avenue to provide an eastern route via Statenborough Street, or a south-eastern route via Rochester Street/ Philip Avenue/ Knightsbridge Road/ Howard Terrace and across Greenhill Road – This includes a section through the adjoining City of Norwood Payneham St Peters.
- Amber Woods Drive/ Conyngham Street/ Windsor Road/ L'Estrange Street/ Queen Street/ Anglesey Avenue ("South Burnside Commuter Route") - This links to Adelaide City Council area via the Glenside Hospital site and follows a radial north-west/south-east alignment.
- Gurrs Road/ Kensington Oval car park/ Oval Terrace/ Uxbridge Street/ Tusmore Avenue/ Northumberland Avenue/ Verdale Avenue/ Devereux Road/ Kincardine Avenue/ cut through/ Sunnyside Road ("Burnside Connector Route")

In virtually all cases, the Super Routes have appropriate traffic volumes for integration with cyclists, however the speed environment is too high along the route or in sections of the route.

The general approach to achieving the Super Routes is to:

- select the most appropriate route to achieve the required aims;
- install treatments that facilitate integration by reducing the speed of the road environment;
- provide protected facilities when appropriate; and
- provide treatments that highlight that the route being used is different in nature to other streets.

Individually, these are fairly standard treatments; the standard and combination of these used to produce the overall Super Routes is a crucial point in achieving the Super Routes. The proposal is also to use cost-effective treatments that enable Council to feasibly develop these Super Routes.

The application of these principles resulting in streetscape changes need to be tested with the community. Indicative 'strip maps' of each of the Super Routes, illustrating a possible means of achieving each Super Route, are provided in Figures xx to yy. These are not necessarily the optimum means of achieving each Super Route and the feasibility of individual elements (in respect of underground services) has not been assessed. The design development related to Super Routes will require a more detailed design process involving Council, residents and any other local stakeholders.

Expanding the general approach slightly, further guidance is provided as follows.

1.5.1 Selected routes

Route selection attempts to balance route functionality (directness of routes, proximity to desired services, spacing in a network, ongoing linkages) with street characteristics (speed environment, traffic volumes, traffic speeds) to achieve the best result for cyclists.

A particular element of this worth highlighting is the use of 'cut throughs' to add functionality while bypassing poor street characteristics.

Alternative parallel routes can also be proposed to avoid poor street characteristics, but it is often the case that this cannot be achieved while maintaining adequate functionality.

1.5.2 Integration (speed environment)

For major routes where insufficient width exists for dedicated cycling facilities, and where traffic volumes are moderate (under about 4,000 vehicles a day and heavy vehicles do not form a large part of traffic) a safe cycling environment can be created if the road speed environment can be reduced to around 30km/h. This is more appropriately achieved through streetscape improvements that encourage adoption of (relatively) low speed, with use of traffic calming to reinforce this. Area wide 40km/h precincts can be used but a low posted speed is not sufficient in itself to create the required speed environment.

The approach to moderating the speed environment is generally as per Local Area Traffic Management (LATM) guidelines produced by DPTI[2], however with two additional guidelines proposed:

- that clear, straight sightlines along a street should preferably be no greater than 200m-250m if no horizontal deflection (speed bump or plateau) is used – the aim of this guideline is to moderate the impression that the route is an appropriate longer-distance vehicle route, instead of serving local traffic only
- similarly, that a curvilinear path of travel is preferable to straight travel, particularly for shorter streets, narrower streets or where opportunities to exit the route exist – this extends to a perception of curvilinear travel, i.e. where a clear travel lane is maintained but alternating treatments give an impression that travel is not linear
- that street widths should be minimised – this is not intended to lead to a large-scale program of street narrowing but to accept that street width is an important parameter affecting the overall speed environment and further note that the application of simple guidelines (2.3m parking + 3.0m travel lane, for example) is not necessarily appropriate. This is evident in the number of existing streets with parking on both sides but widths of, say, 8.5m; or with parking on one side of the street and widths of, say, 6.5m. So where a treatment might create or rely upon such conditions, even for a short section, the adequacy of the width should be assessed as appropriate to the street, not to simple guidelines.

Some LATM treatments are often expensive to install, particularly when used along a length of street at specified spacings; while others will not be supported by the local community due to their impact on parking or the potential that they increase traffic noise as vehicles brake and accelerate.

There can also be time and hence cost penalties to developing LATM proposals in satisfying DPTI requirements.

The proposed approach is therefore to use a limited set of streetscape treatments intended to:

- Improve the streetscape and hence provide a positive 'dividend' for local communities, with little other impact on their amenity
- Be reasonably cost-effective
- Not require DPTI approval.

This approach lends itself mainly to four types of treatments, as follows.

[2] As per the Code of Technical Requirements for the Legal Use of Traffic Control Devices.

1) Street trees planted in kerb protuberances or directly into the carriageway

Parking restrictions at intersections create a local widening that can be used to provide kerb build outs or extensions (properly called protuberances). This can also reduce crossing distances for pedestrians.

Trees planted directly into the carriageway are located to minimise impact on parking and where gaps in the canopy exist. These will typically be planted into either a small kerbed area (examples of these are seen in Glynburn Road, south of Elford Street) with a pavement cut of 1.0m x 1.0m to provide room for growth, but can be planted closer to the kerb if necessary, with a localised change in the kerbline to create the planting space (this approach has been used successfully in the City of Holdfast Bay).

At intersections, trees should be placed in kerb protuberances so that they do not reduce the sight distance at the minor street.

Trees can be located to create a chicane or change in alignment of the street. A change in alignment should not direct traffic closer to the throat of minor streets, as this potentially increases the crash risk at these locations.

2) Contrasting pavement

These are applied at the start/end of a street section as a threshold treatment, i.e. highlighting to motorists that they are entering a particular type of street; where minor streets intersect with the route, highlighting the presence of the minor street and breaking up the continuity Contrasting pavement treatments should not create the impression of a pedestrian crossing point (where this isn't appropriate).

Kerb protuberances that narrow the overall carriageway width assist in creating the impression that lower speeds are appropriate; contrasting pavements located between kerb protuberances will enhance this impression. This impression can be increased where parking is indented, where it should be retained as bitumen against the contrasting pavement. An example of this is when trees are provided in a kerb protuberance on either side of a minor street and the contrasting pavement extends past the kerb protuberances.

Maintenance of a contrasting pavement treatment needs to be taken into consideration. Brick paving often becomes loose and deforms, while the contrasting appearance reduces as tyre rubber accumulates over the pavement. Pavement paint used for creating green bicycle lanes has a particularly poor life expectancy. A proprietary product known as DuraTherm overcomes this issue by etching the bitumen pavement and creating a brick 'look' that otherwise has an expected lifespan of about the same as the bitumen.

A particularly effective treatment contrasting pavement treatment is noted at the threshold of Sturdee Street, near Portrush Road. This treatment has bricks laid at two different levels, in strips, creating a 'rumble strip' effect that provides positive feedback to drivers even though the contrast has reduced over time. It also appears to be wearing very well. The height different is classified as a pedestrian hazard if maintained across a pedestrian path of travel (the existing example does not have the raised bricks across the pedestrian crosswalk area). If this treatment is used more broadly, a strip of level brick paving should also be maintained at the edge where cyclists can be expected, outside the general wheel path.

3) Central median

A central median is one way of interrupting a clear, straight sightline by requiring cars to travel further to either side. It also narrows the travel lane, contributing to the perception of a slower speed environment. Medians can be provided at any width, depending on the width of the carriageway, but have an impact on turning movements (including accessing driveways) so have limited application. Medians can range from back-to-back kerb (0.4m) upwards; the wider they are, the greater the impact on clear, straight sightlines.

Landscaping in a median greens and softens the street and vegetation that overhangs the edges can further reduce the perception of travel lane width while still being traversable. A median provided with a flush kerb edge can create less of a hazard for cars that might overrun into the median, where the travel lane is constrained. The landscaped strip is preferred, but should be at a slightly lower level than the carriageway, to reduce the amount of debris that might wash onto the carriageway.

To support landscaping, medians or landscaped strips should have a minimum width of 1.0m. Low maintenance landscaping is preferred as working within the roadway presents an OH&S hazard to horticultural staff.

Large medians can support trees and can be short enough to be regarded more as 'islands' than true medians. The use of trees in medians is particularly effective in changing the sight line but is likely to have a greater effect on parking and driveways as street width will typically not be sufficient to support a treed median in addition to maintaining on-street parking.

4) Kerb extensions

In some locations, particular street features may lend themselves to constructing kerb extensions for reasons other than as part of street tree plantings.

In Burnside, this typically involves trees planted at the kerbside that have grown into the carriageway. Formalising this with a kerb extension would better protect the tree, clarify conditions for motorists and also create a localised street narrowing.

1.5.3 Protected facilities

As noted, there are several limitations to providing protection appropriately and at a reasonable cost. However, there are some appropriate locations for protection. These are:

- wide streets, where the carriageway width is sufficient that some can be reallocated to a protected facility without major loss of on-street parking
- at pedestrian actuated crossings, where car parking is banned on the approach and departure, leading to unused road space that can be reallocated
- where the footpath/verge is wide enough to support shared use paths, particularly to link to pedestrian/cyclist refuges to cross main roads
- in the form of cut-throughs that run between properties or through street closures.

1.5.4 Route designation

Signage plays an important part in identifying the route, both to assist with wayfinding and to indicate that particular circumstances exist along a route.

The main form of route designation proposed is the use of "sharrows", basically large (1.2m wide) bicycle logos with a double arrow head indicating the ongoing path of travel. These are applied on street and road surfaces. Their use is currently being trialled by DPTI.

Guidance in the use of sharrows is provided by American practice (European practice tends to use signage and some logos similar to Australian regulatory practice). The American practice includes indicative spacings and distances from decision points (intersections) that sharrows should be applied. A spacing of about 50m has been adopted for the concept layouts and positioning is indicative only.

Where formal bicycle lanes or shared use paths are proposed, regulatory logos are required and sharrows are not proposed in addition to these.

In South Australia, small signs are also used to indicate locations of ongoing routes. A signage strategy has been recommended as part of the Bicycle Strategy, however an interim approach would be to change those signs that point to Super Routes to use a different colour (e.g. red instead of green or blue, and one discernably different to people with colour blindness) and also a simple designation for the Super Routes e.g. SR1, SR2, SR3, SR4.

1.6. Concept details

Super Route design options are described first, followed by tables for more standard treatments.

Table A1 in this Appendix lists concept design options for routes apart from Super Routes.

Table A1 is complemented by Table A2, which addresses intersections and crossing locations; and made complete by Table A3, which lists those routes for which no on-road treatment is recommended.

1.6.1 Super Routes

Indicative 'strip maps' of some of the Super Routes are provided in Figure 1 to Figure 11, illustrating how design concepts could be applied in developing Super Routes. Figure 1 also presents the legend.

The Super Route streets have traffic volumes below 4,000 vehicles/day unless indicated otherwise.

The following commentary is indicative only as significant additional design development and consultation with local residents would be required before these could be endorsed. This represents a significant body of additional work. The commentary provided describes concepts being applied and to indicate the general feasibility of these.

Note, all routes are proposed to have sharrows as route marking; these are not noted in the descriptions of each Super Route.

All design elements are shown indicatively only. In particular, sharrows are shown at larger than real-life, to assist with visibility. Trees shown with a central trunk are used to indicate that the tree is positioned beyond the existing kerb line, either in a kerb protuberance or directly into the carriageway. Refuges do not indicate the need for realignment of the travel lane on the approach/ departure. Contrasting pavement treatments are shown in a yellow/orange colouration for visibility, but the actual contrasting pavement used should be determined with respect to local conditions.

NORTH BURNSIDE COMMUTER ROUTE

Beulah Road: Portrush Road to Gurrs Road

This section of Beulah Road starts at its western end at almost 12m but rapidly transitions to 11.7m, as far as Osborne Avenue/Scott Street. East of this, it is generally 9.6m wide. Parallel parking exists on both sides of Beulah Road, constrained at some side street locations where kerb protuberances have been constructed. Roundabouts have been installed as a speed control measure.

Trees are placed in new kerb protuberances at Portrush Road and Melrose Avenue; in existing roundabouts; and within the carriageway (either directly or with kerb protuberances), minimising loss of parking.

A contrasting pavement treatment is proposed at side street thresholds to provide a complementary and supporting change in the street environment.

Overall, either a tree or contrasting pavement treatment occurs about every 50 metres.

Figure 1:
Beulah Road, Portrush Road to Gurrs Road

LEGEND

- Coloured pavement treatment
- Tree (in new kerb extension or carriageway)
- Tree (within existing kerb line)
- Median landscaping
- "Sharrow" directional pavement marking
- New kerb
- Centre line marking
- Shared use path
- Possible path concept
- Protected bicycle facility
- Bicycle lane (new or improved)
- Peak hour bicycle lane

Figure 2: Beulah Road, Gurrs Road to Glynburn Road

Beulah Road: Gurrs Road to Glynburn Road

This section is about 8.0m to 8.8m in width between the kerbs and has a curvilinear (i.e. not straight) alignment. On-street parking is minimal but exists in some wider, straighter sections. Instead of roundabouts, back-to-back kerb and pavement bar medians are used to help moderate speeds.

In general, the approach is similar to the western section of Beulah Road, however instead of trees in roundabouts, it is proposed that replacing sections of the medians with a 1.2m central landscaping strip.

A row of trees just west of Glynburn Road are intended to reinforce a threshold treatment for motorists turning into Beulah Road. There are few other opportunities to introduce trees into Beulah Road, particularly within the carriageway. Contrasting pavement treatments are used to provide reinforcement to the median treatment.

CENTRAL BURNSIDE COMMUTER ROUTE

Alexandra Avenue: Fullarton Road to Prescott Terrace

This section of Alexandra Avenue features a wide carriageway (7.6m to 8.2m for a single direction of travel) either side of a wide median. Both sides of Alexandra Avenue feature speed bumps. Most properties are serviced from laneways north and south of Alexandra Avenue, giving rise to relatively few driveway crossovers. Parallel parking exists on both one-way carriageways.

The concept is to provide protected facilities adjacent to the kerb, with a 0.5m separator to parallel parking. A 1.9m protected one-way cycle facility on each side, protected by a 0.6m constructed separator, would leave sufficient carriageway width for a 2.1m parking and 3.0m travel lane in the minimum width sections.

One issue regarding a protected facility would be its impact on garbage collection. As there are few driveways, there are also few locations that ramp to the roadway. Currently, the low kerbs facilitate access; this should be taken into consideration in any kerb reconstruction proposal.

Residents would need the ability to be able to mount the separator to leave wheelie bins in the parking area. This could be achieved by providing a laid back kerb.

The alternative would be by marking the separator as a flush road marking – using line marking, DuraTherm, or potentially up to a contrasting pavement – with flexible posts preventing cars from accessing the cycle facility. This could be protected with a short section of back-to-back kerb at intersections for greater overall protection. Education would need to be undertaken to discourage wheelie bins being placed on the separator instead of the parking area for collection, as they would be likely to impinge in the cycle facility either when first placed or after emptying.

A connection via Thomas Place is required to access Grant Avenue and the onwards signal-controlled link to Victoria Park.

It appears that better transitioning of the existing bicycle lane may just provide sufficient width for a form of refuge on Grant Avenue at Thomas Place, to assist cyclists to cross to the south side of Grant Avenue.

However, it is noted that the Grant Avenue departure from Fullarton Road is two lanes wide when only one lane is required. Subject to design around bus turning movements, removal of about five parking spaces on the northern side of Grant Avenue between Fullarton Road and Thomas Place should enable the existing bicycle lane on the south side of Grant Avenue to be continued to Fullarton Road. (One to two spaces of this parking should be removed in any case, as the parking is closer to Fullarton Road than allowable under the Australian Road Rules.)

The bicycle lane on the northern side is less critical as cyclists cross from Victoria Park under some signal protection but there might also be opportunity to extend this.

Pathways are required to assist cyclists (and pedestrians) to travel safely around the roundabout at Prescott Terrace.

Alexandra Avenue: Prescott Terrace to Giles Street

This section of Alexandra Avenue is about 8.5m wide and features parallel parking on both sides, between driveways. The street planting is mature and reasonably dense.

It is proposed to plant two trees in the carriageway, where there are gaps in the street tree canopy, to achieve the objective of interrupting the clear, straight sightlines down the street.

Contrasting pavement at either end provides a threshold treatment. A mid-block contrasting pavement treatment complements the trees.

Alexandra Avenue: Giles Street to Portrush Road

The eastern end of Alexandra Avenue is also wide, at 13.7m. While not serviced by laneways, the blocks are slightly wider than average, similarly minimising driveway interactions. It has parallel parking and a road narrowing at Portrush Road, leading in to a pedestrian actuated crossing.

In this case a 5.5m travel lane for two-way traffic would enable adequate width for protected facilities.

Figure 3: Alexandra Avenue, Fullarton Road to Portrush Road

Portrush Road to Tusmore Avenue

This section of the route runs mainly through the City of Norwood Payneham St Peters and a design concept has not been prepared for this. There is no direct linkage between Portrush Road and Tusmore Avenue, hence parallel options are proposed at the eastern end of this section, feeding into Statenborough Street and Rochester Street. The latter route veers south-west and across Greenhill Road.

Romney Road

A small section of Romney Road lies within the City of Burnside. This has a width of 8.35m and parallel parking on both sides. Power lines run on the southern side of the street.

Extending the kerb protuberances on Tusmore Avenue into Romney Road could narrow the entrance to the street to 6.5m and enable pedestrian kerb ramps compliant with current standards to be installed.

Alternatively, an asymmetric design with the width assigned to a single northern protuberance could possibly host a tree and assist in moving motorists away from a straight-through line of travel along Romney Road.

The preferred approach should be determined with respect to a treatment along all of Romney Road.

Statenborough Street, Tusmore Avenue to Glynburn Road

Tusmore Avenue crossing

There is no easy and obvious means to improve crossings of Tusmore Avenue, at Statenborough Street, Romney Road or between these. A small bicycle lane provided adjacent to the splitter island would provide some assistance. Between Romney Road and Statenborough Street, child cyclists are allowed to ride on the footpaths and bicycle lanes exist for other cyclists. Given that traffic volumes in Tusmore Avenue are reasonably moderate, the existing bicycle lanes could be improved by marking with green pavement colour and line-marking a separation strip to parking.

Otherwise, the removal of parking would enable changing the bicycle lanes to protected facilities. This would involve the loss of about four spaces on the eastern side and three on the western side.

Statenborough Street

Statenborough Street is nominally 12.95m wide, with parallel parking on both sides. There is a localised narrowing at the west end, at a major drain; between this and Coopers Avenue, parking on the north side is line-marked; other parking is unmarked. Street plantings exist but the overall canopy is variable.

Statenborough Street is wide, but slightly too narrow under traditional conditions for protected facilities while retaining car parking. An alternative approach would be to install protected facilities adjacent to the kerb, leaving a 7.7m carriageway width available for traffic and parking on both sides of the street. This would result in a major change in the streetscape and would need to be discussed with residents.

An alternative approach is illustrated.

The general approach is to use a landscaped strip to break up the clear, straight sightline. Trees placed in new kerb protuberances are located at Tusmore Avenue and Glynburn Road to set the overall street environment and reinforced by trees in new kerb protuberances at Coopers Avenue and Philip Avenue, reinforced by a contrasting pavement treatment.

There appear to be a number of locations where trees can be placed directly in the carriageway without affecting parking, either because the distance between driveways is insufficient for parking or the length of kerb is not equivalent to a whole number of car parking spaces, e.g. greater than one car space but less than two (and so on).

Reasonably frequent plantings (every 50m or so) are used to create greater enclosure of the space and hence a low speed environment. However, a detailed assessment has not been conducted of the nominal locations; the feasibility of these will need to be verified on-site.

As these trees are often adjacent to driveways, the feasibility of proposed tree plantings also needs to take into account protection of trees and turns into and out of driveways.

With the support of residents, additional tree planting locations may be feasible where a loss of parking is accepted.

Statenborough Street, Glynburn Road to Lockwwod Road

This section of Statenborough Street is 7.4m wide, with parallel parking on both sides. A review of aerial photography from 2009 to 2012 indicates very low levels of on-street parking and some use of the large verge for car parking.

It is unusual in that the tree plantings in the wide verge are, with the exception of the northern verge for a distance of about 40m from Glynburn Road, located at the property side of the verge. Trees are also in line with the stobie poles. This gives the street a distinctly different character to other streets in Burnside and a very consistent streetscape, which should be respected.

There are opportunities to provide bicycle infrastructure, notably a shared path within the verge, adjacent to the kerb. As this would be located on the kerb side of street trees, this would not be subject to high driveway conflict and would be reasonably well placed for side street crossings.

However, installing such paths would result in a loss of grassed verge and water infiltration area, which is not necessarily desirable.

Instead, given the narrowness of the street, 1.4m kerb protuberance are proposed to create a curvilinear alignment for car travel, but without hosting trees that would change the streetscape. The travel lane width adjacent to protuberances would be maintained at about 6m for two-way travel i.e. not particularly narrow.

- A kerb protuberance on the north side at Glynburn Road would assist in improving sight distance to the right. A similar treatment to Alexandra Avenue at Portrush Road is proposed, i.e. a kerb extension of 0.9m, leaving a clear width of 6.5m. For drainage reasons, the kerb protuberance would probably commence at a side entry pit location about 12m east of Glynburn Road.
- The spacing between Talbot, Hamilton and Crossley Streets is well suited to creating alternating alignments to reduce car speeds (similarly to German practice in creating 'bicycle streets') – a dashed centre line is shown to illustrate the changing vehicle path.
- Ideally, a further narrowing or kerb protuberance should be located mid-way between Glynburn Road and Talbot Street. This is shown extending over a driveway to minimise the impact on parking i.e. the driveway would extend across the kerb protuberance. This would affect parking on the southern side of the street, between the two driveways.

- A tree in the roundabout at Lockwood Road would not overly impinge on the streetscape and arguably reinforces the character of this section of Statenborough Street as being distinct from other sections.

While this proposal would affect car parking, the locations of kerb protuberances are intended to minimise this impact and review of aerial photography from 2009 to 2012 indicates generally low on-street parking demand.

An alternative approach would be to use contrasting pavement treatments at similar locations. This is likely to be less effective unless the treatment provides positive feedback (e.g. similarly to the treatment at Sturdee Street/Portrush Road).

Statenborough Street, Lockwood Road to Hallett Road

This section varies between 10.85m and 10.95m in width, with parallel parking on both sides. Tree plantings are relatively comprehensive and mature, though some variability in tree types.

Because of the maturity of the tree plantings, there is limited opportunity to introduce more trees in kerb protuberances. Other kerb protuberances are used in addition to these to create an overall impression of a narrower street width.

Two sections of landscaped strips are used to break up the clear, straight sightline.

East of Wallace Street, a protuberance is used to protect a large tree (and cars from the tree) on the northern side of Statenborough Street. In addition to kerb protuberances at Wallace Street and a new splitter island at Hallett Road, this enhances the current perception of a change in the road alignment.

Hallett Road

Hallett Road is 11.9m wide at Statenborough Street.

The splitter island assists cyclists to cross Statenborough Street to reach the footpath and hence the pedestrian actuated crossing in Hallett Road. The footpath is very wide in this section and can be converted to a shared use path. The existing kerb ramp should be widened at Statenborough Street, to suit. A similar section of shared use path connects to the school entrance on the northern side of Hallett Road.

In this section of Hallett Road, short lengths of protected facility is proposed where the 'no standing' restriction exists, to provide additional access to the pedestrian actuated crossing during peak school periods. This could be provided on each side of Hallett Road at 2.0m plus 0.4m back to back kerb for separation plus line marking 0.1m off the separator, while still leaving a 3.45m wide travel lane in each direction. The protected facility is proposed for one-way travel only (westbound), for cyclists to travel in the same direction as traffic.

A bicycle button should be provided at the kerb side on the eastern carriageway, to enable cyclists to actuate the pedestrian lights from the carriageway.

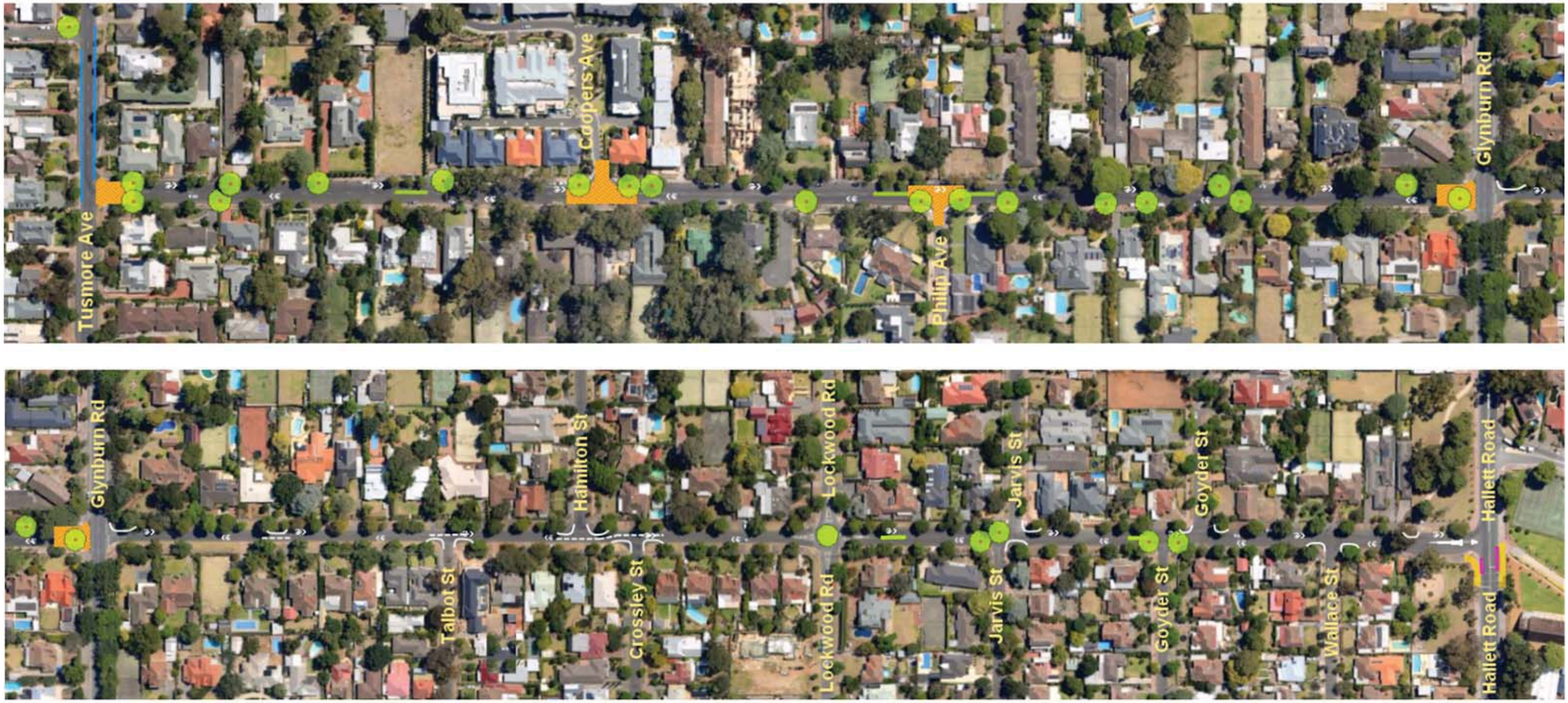


Figure 4: Statenborough Street, Tusmore Avenue to Hallett Road

Tusmore Avenue to Greenhill Road via Rochester St, Philip Ave, Knightsbridge Rd and Howard Tce

Rochester Street

Between Tusmore Avenue and Philip Avenue, Rochester Street is 12.9m wide with parallel parking on both sides, and is also a bus route. An edge line and bicycle logos provide an advisory bicycle treatment adjacent to parking. About 42m on the north side of Rochester Street, west of Jean Street, consists of driveways with no parking. Power lines are mainly on the northern side of the street.

There is sufficient space at the roundabout at Tusmore Street to provide a shared use path around its perimeter, as part of connecting to the onwards routes in Newcastle Street and Tusmore Avenue.

The approach is to use trees and kerb protuberances coupled with contrasting pavement where general parking is not permitted, to create streetscape narrowings, with threshold treatments at minor streets to break up the continuity of the street.

Philip Avenue

Between Rochester Street and Knightsbridge Avenue (a distance of about 170m), Philip Avenue is about 9m wide, with parallel parking on both sides between these intersections. (It appears to have been narrowed recently.) This is narrow for a bus route.

There is a possible opportunity to place two trees in the carriageway, about half way along Philip Avenue, to create a localised street narrowing. This would be a minor treatment allowing trees to be located to create a more enclosed street environment, but without creating a squeeze point for cyclists e.g. by indenting the kerb slightly, so that 0.75m is maintained past the planter pit. The feasibility of this needs to be double-checked against the new street width and local drainage conditions.

The northern section of Philip Avenue has no parking and exclusive bicycle lanes should be installed. As buses are allowed to stop in bicycle lanes, these should extend over bus stops to assist in discouraging cars from parking at bus stops.

Consideration should be given to removal of the one parking space between the bus stop and the proposed street narrowing, to create a more continuous treatment. There are then three spaces at the southern end and a further space that appears to service a post box. These may well be highly valued, given the absence of parking elsewhere on this side of the street, but do not appear to support commercial land uses. Depending on their usage, at least a peak hour bicycle lanes should be considered.

Knightsbridge Road

Between Glynburn Road and Philip Avenue (including to Howard Terrace), Knightsbridge Road is 14.8m wide. The parking area is currently marked as an advisory bicycle treatment, although formal bicycle lanes could be provided with this width.

The width is sufficient to provide protected facilities on each side of the road, but it would be very difficult to integrate the type of facility possible with the bus stops, unless the protected facility were constructed through constructing a path at footpath level – which could be very expensive due to the impact on drainage and reasonably narrow due to the travel lane width that needs to be retained for buses.

Instead, bicycle lanes are proposed adjacent to car parking, with a chevroned separating strip or use of green pavement on the bicycle lanes.

Exclusive bicycle lanes could also be accommodated around the curve to Philip Street, also having a green pavement treatment. Such bicycle lanes would reinforce the perception of a narrow street.

In this case, the use of sharrows is not compatible with bicycle lanes.

Howard Terrace

Between Knightsbridge Road and Sidney Place, Howard Terrace is about 6.5m wide, with parallel parking allowed on the eastern side.

This is a generally narrow width potentially conducive to low speeds, but is still straight and uninterrupted. A curvilinear travel path could be achieved by allowing parking to alternate between the east and west sides of the street. In particular, about 45m north of Davenport Terrace, the length of kerb between driveways is greater on the western side compared to the eastern. This could possibly result in an additional car parking space being provided.

A tree on the north-western corner of the Davenport Terrace intersection intrudes into the roadway; a kerb protuberance could be used to formalise this informal road narrowing, to effectively a one-lane slow point. This should have a section of path to enable cyclists to bypass the narrow point.

A contrasting pavement treatment at Davenport Terrace would assist to highlight the road narrowing point.

Howard Terrace then widens to 9.2m between Sidney Place and Greenhill Road.

The general approach for this section is to enhance the character of the street and its proximity to Hazelwood Park by locating trees every 50m to 80m.

On the eastern side, these would probably be located directly in the carriageway, or at least in small kerb protuberances, to minimise the impact on parking; an initial examination indicates that plantings could be achieved with no loss of parking on this side of the street, by placement between driveways and as kerb lengths are not multiples of complete parking spaces.

To achieve street narrowings, these would be complemented by trees in protuberances on the western side, formalising the car parking even when cars are not parked. Although this would have an impact on parking, both sides of the street have resident permit parking only and thus provide copious parking for residences on a single side of the street.

The southern-most narrowing should be about 10m from Greenhill Road, to allow cars to turn easily from Greenhill Road before slowing at the narrowing.

Greenhill Road

There is a pedestrian refuge in Greenhill Road, about 20-25m west of Howard Terrace. Short sections of footpath connect to this on either side of Greenhill Road, connecting Howard Terrace to Lancelot Avenue on the south side of Greenhill Road.

For cyclists, the path on the northern side should be widened and aligned into Howard Terrace (rather than the Howard Terrace/Greenhill Road junction). Ideally, a new path would be created on the southern side, between the existing footpath and the kerb. This positions the path away from the driveway conflict area.

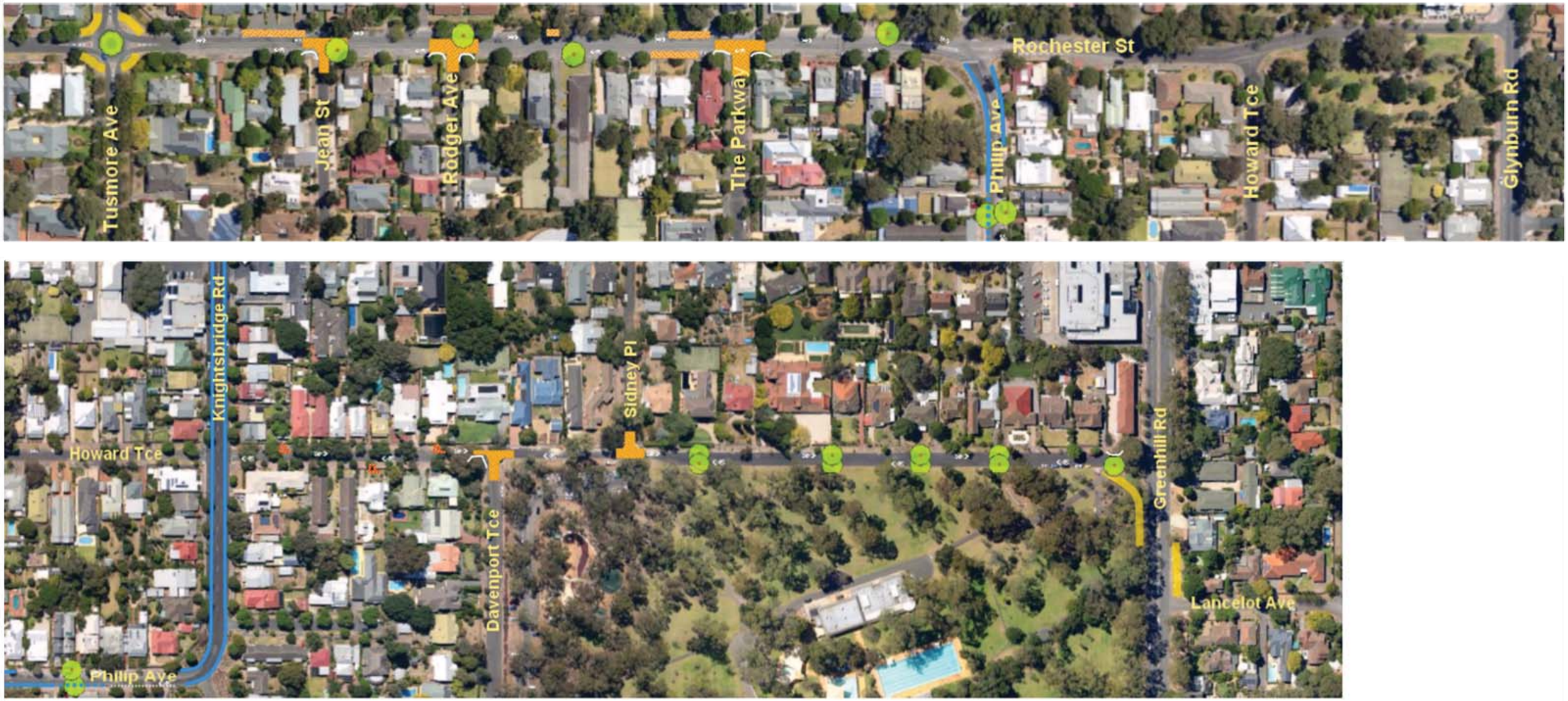


Figure 5: Tusmore Avenue to Greenhill Road via Rochester St, Philip Ave, Knightsbridge Rd and Howard Tce

SOUTH BURNSIDE COMMUTER ROUTE

Greenhill Road/Fullarton Road to Conyngham Street via Glenside and Amber Woods Drive

Glenside

The Glenside site is outside Council's control, being a State government site.

This features a shared use path from Greenhill Road south on the eastern side of Fullarton Road, leading into the Glenside road network. This path needs improvement for adequate connection. The internal road network has little traffic and is a 10km/h shared zone environment. This connects to Amber Woods Drive.

Amber Woods Drive

From Glenside to Conyngham Street, Amber Woods Drive has a width of about 7.2m, with an angled alignment that does not give rise to a long clear, straight section of street and with landscaping that overhangs into the carriageway. It is also broken up by contrasting pavement treatments.

As such, it is well suited to cycling and the only proposed change to this street is the addition of sharrows.

Conyngham Street, Amber Woods Drive to Windsor Road

Between Amber Woods Drive and Windsor Street, Conyngham Street has a width of 10.0m and parallel parking on both sides. It is quite a major street, with a traffic volume of over 6,000 vehicles a day.

While on-street bicycle lanes can be provided, these are not ideal in terms of the Super Route concept.

Instead, it is noted that Conyngham Street is located adjacent to wide landscaped verges that are generally unused and that there is potential to provide a shared path within this verge, with the cooperation of a relatively few landholders. A model has been employed in Denmark where landholders have ceded access across privately held property in return for Council providing cycle infrastructure where it otherwise would not be able to, due to costs of land acquisition, etc. The key to such an approach is that the landholder sees value in the infrastructure developed. In this case, a shared use path would assist employees and visitors to reach the businesses located on Conyngham Street.

If achievable, this would enable a shared use path to be constructed to the west of the Conyngham Street carriageway. If not achievable, adults would be required to use the bicycle lanes provided while children would be allowed to use the existing footpath. This is not ideal but reasonably safe given few driveway crossovers, little pedestrian demand and good sight distances.

Windsor Road roundabout

This roundabout is quite large and a circulating pathway is proposed to enable its safe negotiation, providing integration to Flemington Street.

Windsor Road, Conyngham Street to L'Estrange Street

Windsor Road is 8.5m wide with parallel parking on both sides, including indented parking at its eastern end. The wide verge on the northern side (approx. 4m) is planted mainly towards the property line. The narrower verge on the southern side is planted with eucalypts, more centrally.

There is an obvious opportunity to provide a shared use path within the Glenunga Reserve, south of Windsor Road, however this has not been tested with the community and may not be feasible. In a similar vein, a one-way facility on either side of Windsor Street could be provided. This would reduce the path width required from Glenunga Reserve, but replace it with use of the verge on the northern side of Windsor Road.

On-Street options are complicated by traffic related to Glenunga International High School.

A slower driving environment is created by locating two kerb protuberances west of the indented parking. The northern protuberance could support a tree, but the canopy is too great for the southern canopy to support a tree. A contrasting pavement treatment reinforces the street environment towards the eastern end of the street. A tree in the roundabout at L'Estrange Street breaks the clear sightline alone Windsor Road.

L'Estrange Street, Windsor Road to Queen Street

This section of L'Estrange Street is 11.0m wide and runs along the eastern side of Glenunga Reserve to Queen Street – and Glenunga International High School. It has parallel parking on both sides.

There are obvious opportunities to provide additional trees in kerb protuberances on the west side of L'Estrange Street and at side streets. Opportunities on the eastern side may be more limited due to the established tree canopy but should be able to be found, with minimal impact on parking.

At Queen Street/ the car park entrance to Glenunga International High School, kerb protuberances without trees are probably more appropriate, to maintain sight distances. These would reduce the crossing distance for pedestrians to cross L'Estrange Street. A contrasting pavement treatment would enhance the recognition of this intersection.

Figure 6: Greenhill Road/ Fullarton Road to Conyngham Street via Glenside site and Amber Woods Drive

Figure 7: Conyngham Street, Amber Woods Drive to Knox Street;

Windsor Street, Conyngham Street to L'Estrange Street;

L'Estrange Street, Windsor Street to Queen Street

Queen Street, L'Estrange Street to Portrush Road

Queen Street varies between 7.2m and 7.9m in width and has parallel parking allowed on both sides, though two cars could not park on either side of the street at the same time and still maintain two-way travel between them. It has roundabouts at two of the three junctions between L'Estrange Street and Portrush Road. Powerlines run mainly on the southern side of the street and while it features mature jacaranda plantings on the north side, the plantings are less well established on the south. Crossing streets break the street length to sections of about 150m to 160m.

Given the narrowness of the street, the general approach is to locate trees in the carriageway to create a slightly curvilinear alignment (indicated with a dashed line). Trees are located to minimise impact on parking by placement where the kerb is too short for car parking and opposite driveways, where possible. For a 7.2m carriageway width, a 1.0m tree pit maintains 6.0m clear for two-way travel with 0.2m to spare (ideally allocated 0.1m to the tree pit plus 0.1m line marking off the edge of this).

Two tree placements are proposed for the western end as this is closer to Glenunga International High School and local conditions are conducive to this.

The roundabouts provide for vehicle slowing at Allinga Avenue and Sydney Street, but not Cedar Avenue. Here, kerb protuberances on one side would direct traffic closer to the throat of the street on the opposite side. Instead, small kerb protuberances of about 0.7m on both sides would create a localised narrow point with no impact on car parking (as this is not allowed at this point) and still allowing some landscaping to be provided in these.

Queen Street is reasonably wide on the approach to Portrush Road, with a relaxed turning radius from the arterial road, with a reasonable down gradient. A splitter island is proposed at Portrush Road, with a short section of bicycle lane leading into this, to access the Portrush Road crossing (described following). This enables cyclists to either move into the centre of Queen Street as they approach Portrush Road or, if they are unable to, to cross from the kerb side once they are at Portrush Road.

Portrush Road

Two 'seagull island' crossings of Portrush Road are proposed. One is at Queen Street, the other at the continuing route at Highfield Avenue.

This design is suited to T-junction locations where a central median or turn lane is provided. An example on Greenhill Road is at Porter Street. Essentially, the treatment modifies the turn movement for cars but otherwise allows all existing turns to remain, and provides a refuge for cyclists to cross the road.

Bicycle lanes are proposed to connect the two seagull islands. These could be achieved by semi-indenting the parking to provide the required lane width – about 1.7m. The southern footpath is about 3.0m wide, hence indenting parking bays will result in only a minimum width footpath remaining. Only a few parking bays should be provided using this approach (notably where the footpath adjoins additional pavement at the southern end). It is arguable that these parking spaces are not critical for the adjoining shops, given that an off-street car park is provided just south of these shops, however they are likely to be highly valued by the shop owners.

On the eastern side, there appears to be sufficient verge width to semi-indent parking, albeit that car doors would then open directly onto the footpath.

An alternative approach to semi-indenting parking would be to implement peak hour bicycle lanes. This is likely to be less acceptable to the delicatessen, but reasonably acceptable for the other shops and the residences on the eastern side.

Another alternative that would not affect parking would be to provide a bicycle path within the median between Queen Street and Anglesey Avenue. This would need pedestrian fence protection but could arguably work well. It is likely to be unacceptable to DPTI.

Anglesey Avenue, Portrush Road to Sunnyside Road via Highfield Avenue

Highfield Avenue

The route uses the street-calmed Highfield Avenue for only a short section before turning into Anglesey Avenue; no treatment of this section is proposed.

Anglesey Avenue

Anglesey Avenue is 7.95m wide from Highfield Avenue to Inverness Avenue, reducing to 7.85m in width to Woodcroft Avenue and 7.8m to Craighill Road (which features a roundabout), and 7.9m to Sunnyside Road (which features a roundabout). Parallel parking is generally allowed on both sides of the street.

Anglesey Avenue has a marked uphill gradient and the alignment alters, precluding clear, straight sightlines for much of its length.

Due to the gradient, care has to be taken in locating kerb protuberances. Nonetheless, some narrowings are proposed, taking the form of a contrasting pavement with short sections of 0.6m to 0.7m wide protuberances, leaving 6.5m for two-way travel lanes between these.

The geometries of the side street intersections are also very open and these should be reviewed with a view to tightening the geometries and hence speeds into/out of Anglesey Avenue.

Bicycle lanes are proposed in the existing 'no standing' on the approach to Highfield Avenue, extending as peak hour bicycle lanes on the south-western side, reflecting the existing peak hour standing restrictions.

On the curved section between Craighill Road and Sunnyside Road, providing short sections of minimum-width, full-time bicycle lanes around the curve will assist in creating the perception of a narrower roadway without affecting parking or introducing solid streetscape elements.

Craighill Road, Anglesey Road to Sunnyside Road

This is part of the existing bicycle network and may be used instead of Anglesey Avenue from Sunnyside Road. Between Anglesey Avenue and Sunnyside Road, Craighill Road is 7.9m to 7.95m wide.

The design concept is as for Anglesey Avenue, with a threshold treatment at Sunnyside Road.

Sunnyside Road

This would be as for the Burnside Connector Route.

Figure 8: Queen Street, Conyngham Street to Portrush Road

Figure 9: Anglesea Avenue, Highfield Avenue to Sunnyside Road

BURNSIDE CONNECTOR ROUTE

Gurrs Road/Toowong Avenue/Osborn Street, Magill Road to Beulah Road

The onward route into Campbelltown from Gurrs Road is via Breaker Street. There is little opportunity to upgrade cycling conditions in Magill Road. Instead, Toowong Avenue (to the east) and Brand Street (to the west) provide connection to Magill Road instead of Gurrs Road.

Toowong Avenue is located about 300m east of Gurrs Road and is accessed via the North Burnside Commuter Route, via Beulah Road. There is a pedestrian actuated crossing on Magill Road about 25m east of Toowong Avenue, with the continuing route in the City of Campbelltown (Green Street) being a further 25m east.

(It is noted that between bus stops and driveways, there is no on-street parking between Gurrs Road and Breaker Street. The peak hour cycle lanes in Magill Road should therefore be converted to full-time bicycle lanes.)

Brand Avenue is located about 450m west of Gurrs Road and is accessed via the North Burnside Commuter Route, via Beulah Road.

Magill Road: Toowong Avenue to Green Street

Between the 'no standing' provisions relating to the pedestrian actuated crossing, driveway locations and 'no standing' related to Toowong Avenue and Green Street (and, on the northern side, a bus stop) there is possibly only one on-street parking between Toowong Avenue and the pedestrian actuated crossing, and similarly between the pedestrian actuated crossing and Green Street.

The Magill Road bicycle lanes, which are part-time only, should be upgraded to full-time bicycle lanes in this area and marked with a green pavement treatment to highlight this status. This will assist with eastbound travel on the northern side and westbound travel on the southern side only (i.e. with the direction of car traffic flow).

The southern footpath is quite wide and, as it would only be used for uphill travel, it is proposed that this be converted to at least a peak hour shared use path. The situation on the northern footpath is complicated by the presence of a bus stop and driveway to a rear car park; it is suggested that use of the car park as a cut-through to Green Street would occur informally and should not be discouraged.

The pedestrian actuated crossing should be widened and a cycle lantern incorporated to accommodate cycle traffic.

Magill Road: Brand Street to Salop Street

Although Osborn Avenue is a nominated leading on to Ashbrook Avenue, Brand Street is proposed instead to enable a pedestrian actuated crossing to be installed.

Osborn Avenue is located roughly centrally between the next pedestrian crossing opportunities at lights at Portrush Road (450m further west) and the pedestrian actuated crossing at Toowong Avenue (670m further east). Hence there is a length of some 1,100m with no signalised pedestrian crossings between Toowong Avenue and Portrush Road and one is considered warranted. However, because of a driveway access, it is not feasible to provide such a crossing east of Osborn Avenue and the kerb length is short to provide one to its west; the next opportunity is between Brand Street and Avonmore Avenue. (The next crossing location east would Salop Street. While more centrally located between pedestrian crossing opportunities and providing access to Ashbrook Avenue, Brand Street more directly services shops on Magill Road; adjoins Mellor Reserve; and provides better access to Duke Street, and hence connection into the City of Norwood Payneham St Peters.)

It is noted that, apart from the two corner properties, the southern verge between Osborne and Brand Streets is very wide and could support a shared use path. On the northern side, extensive off-street parking between Osborne Avenue and Brand Street justifies the bicycle lane being converted to full-time.

Toowong Avenue, Magill Road to Lossie Street

Toowong Avenue is 6.5m wide from Magill road to Lossie Street, with parallel parking allowed on both sides of the street.

To some extent, parking staggered between driveways creates a curvilinear alignment. However, when cars are not parked, a clear, straight street results. The approach is to introduce contrasting pavement treatments to break up the perceived road width. With the support of residents, there may be a location or two where trees could be planted in the carriageway, maintaining a clear 5.5m width for two-way travel.

An indicative tree location is shown at the northern end of Toowong Avenue, within the 10m of 'no standing' leading up to Magill Road but about 8m south of the intersection, to ensure that this does not prevent cars turning off Magill Road from doing so at an appropriate speed.

A similar location at the southern end is between two driveways; there should be no impact on parking on the western side as the kerb length is longer than required for one car but less than required for two.

Toowong Avenue, Lossie Street to Beulah Road

Toowong Avenue curves at Lossie Street and widens to 8.4m wide to Beulah Road, with parallel parking allowed on both sides of the street.

Again, a street tree proposed to narrow the throat of the street at Beulah Road is proposed within the 'no standing' zone but back from Beulah Road, this time in respect of the angled geometry coming off Beulah Road. A small space nearby on the eastern side could conceivably host a street tree and alternating trees between the eastern and western sides of the street would assist in protecting parking on both sides of the street as well as creating the perception of a curvilinear alignment, although 1.0m tree pits could be provided on both sides of the street and still maintain a 6.4m clear travel lane width between these, for two-way traffic.

Brand Street, Magill Road to Beulah Road

Brand Street is 8.7m wide with parallel parking on both sides. It has a consistent street planting on the eastern side, though the verge is narrow.

Street tree pits or kerb protuberances 1.3m wide would leave 6.1m clear for two-way traffic.

The approach is to locate a single tree at each end of the street. The southern one is complemented by a kerb protuberance; the northern one is not, as it is south of the 'no standing' zone and it is undesirable to narrow Brand Street to a minimum width, given cars likely to be turning off Magill Road. Trees are then paired to create narrowings at two points along the street; the southern location appears to have good potential and it is assumed a northern location could be identified to suit, noting that the reserve provides space on the western side of the street.

Toowong Avenue

Brand Street

Figure 10: Toowong Avenue,
Magill Road to Beulah Road;

Brand Street,
Magill Road to Beulah Road

Gurrs Road, Beulah Road to The Parade

Gurrs Road

Between Beulah Road and The Parade, Gurrs Road is 8.0m in width, with parallel parking allowed on both sides of the road, although residences are located on the western side only.

There is likely to be some sensitivity regarding parking servicing the nearby oval and residents should be carefully consulted on any changes.

A 1.0m tree pit in the carriageway on one side of the road would leave a 7.0m clear carriageway, or about 5.5m clear with parking on one side. This is sufficient for two-way traffic.

Staggered pairs of trees near Andrew Street and Margaret help to provide an impression of a closed in environment and curvilinear travel path. A tree at the southern end of Gurrs Road would have no impact on parking on the western side, which is 'no standing', and minimal on the eastern side; but would complement an existing street tree and form a threshold treatment for Gurrs Road, off The Parade.

The Parade

At Gurrs Road, The Parade is 17.8m wide, hosting a pedestrian actuated crossing with central median, mainly servicing Pembroke College. On the approach and departure to the crossing, The Parade is configured with two travel lanes wide; north and south of this area, it has only one travel lane plus bicycle lane and parallel parking (also used for bus stops).

Additional travel lanes are often developed at signals, to increase capacity. It is queried whether this is really required at this point. Even so, the kerbside lane is about 4m wide. Narrowing the travel lanes should enable at least a minimum width full-time bicycle lane to be provided.

The footpaths are set within reasonably wide verges with gravel strips hosting street trees. These gravel strips should be widened with a permeable pavement allowing water infiltration and shared use permitted. Given the high pedestrian demand of Pembroke College, the resulting path width is likely to be insufficient to cater to total demand, but the bicycle lanes should assist in alleviating this situation.

The median in The Parade should also be widened to accommodate bicycles and a bicycle lantern added to the pedestrian actuated crossing, with bicycle buttons that can be actuated from the road side and suitable kerb ramps.

Kensington Oval car park, The Parade to Oval Terrace

The Kensington Oval car park provides an ideal low trafficked, low speed environment for cycling. A connection to Oval Terrace has been closed with a gate. Replacement/ redesign of the gate would provide cycle access to Oval Terrace.

Oval Terrace, Kensington Oval car park to Park Road

Oval Terrace is 7.3m wide and lightly trafficked as it is not a through route, despite being located close to Pembroke College. Parallel parking is permitted, but restricted in peak school hours. An indented bus zone is provided on the eastern side.

Although potentially overkill for the street environment, peak hour bicycle lanes could be provided in Oval Terrace.

Otherwise, 0.5m kerb protuberances at Park Road and extending into Park Road are desirable to reinforce the nature of the street, subject to bus turning requirements. These would also assist crossing Park Road to the continuing route of Uxbridge Street.

Uxbridge Street, Park Road to Kensington Road

Uxbridge Street is 10.0m wide, widening slightly on the eastern side on the approach to Kensington Road to provide indented parking. Parking is allowed on the western side of the street but little parking is allowed on the eastern except at its southern end. Powerlines are located on the western side of the street. Mature eucalypt plantings are located on the eastern side of the street, with plantings on the west being affected by powerlines.

Allowing parking on both sides of the street would reduce the apparent street width, but it is assumed that the current configuration reflects parking difficulties previously encountered.

It is instead proposed to locate trees in the carriageway on the western side at the entry/exit to the street and about mid-way along the street. (It appears that there may be opportunities to introduce trees in the mid-point of the kerb length without reducing parking, however there may be issues with existing trees. A location in the carriageway would be less affected by powerlines but may require protection from car intrusion.)

Kerb extensions on the eastern side of the street assist in narrowing the overall perception of the street.

Kensington Road crossing

There is a pedestrian actuated crossing at Kensington Road, with reasonably wide footpath on the southern side of Kensington Road – although some landscaping needs to be cut back to allow an appropriate path alignment. A parking indent that services about three vehicles is provided here. It is likely that these on-street spaces are highly valued, despite the visible parking adjacent, but if these could be removed, this would improve the width for construction of a path.

Crossing is via the pedestrian actuated crossing. The best cyclist access to Uxbridge Street is then through a private car park. Efforts should be made to ensure that this access is retained, including in any redevelopment proposal, as it provides a bypass for Kensington Road. The northern footpath is reasonably wide but used for outdoor dining purposes between the car park driveway and the Uxbridge Street junction.

Oval Terrace, Kensington Oval car park to Park Road

Gurrs Road, Beulah Road to The Parade

Uxbridge Street, Park Road to Kensington Road

Figure 11: Gurrs Road, Oval Terrace and Uxbridge Street

Tusmore Avenue, Kensington Road to Statenborough Street

A concept has not been prepared for this section of the Burnside Connector Route.

Tusmore Avenue carries around 5,500 to 5,800 vehicles a day along its length, peaking at over 6,000 vehicles a day near Statenborough Street/Romney Road and reducing to about 3,700 vehicles a day south of Rochester Street. It features bicycle lanes next to indented parking from Godfrey Terrace to Rochester Street, but there are no facilities between Godfrey Terrace and Kensington Road.

Due to the high traffic volumes, an alternative parallel route is suggested as the most appropriate treatment. Northumberland Street is accessed at Romney Road and continues to Greenhill Road. Its attractiveness as a route with a minimal detour length is increased by connection across Greenhill Road to Verdale Avenue, as an alternative to Devereux Road. Devereux Road is 11.1m wide with parking on both sides, bus traffic and traffic volumes peaking at over 6,300 vehicles a day between Greenhill Road and Hood Street, reducing to around 5,500 vehicles a day south of Collingwood Avenue; hence integration is also not suitable for Devereux Road.

Tusmore Avenue crosses Statenborough and Rochester Streets, which are part of the Central Burnside Commuter Route. The section of Tusmore Avenue between these two streets is discussed under the Central Burnside Commuter Route concept.

Kensington Road to Godfrey Terrace

This section is 10.3m wide, widening on the approach to Kensington Road, with a painted and constructed median and no parking on either side. Given traffic volumes, the most appropriate treatment in this section is a protected facility.

On the eastern side, the footpath could be widened to the verge side generally (leaving a buffer between the kerb and path), but would need to pass around and behind the bus stop. The connection between the path and onward route is of critical importance; a plateau across Godfrey Terrace is recommended.

There may also be potential to extend the existing bicycle lane, for those who prefer on-street cycling, cutting back the protuberance just north of Godfrey Street to provide the required street width.

A path on the western footpath is more difficult to achieve and would need careful design, particularly at the bus stop location, which coincides with the road widening on the approach to Kensington Road. The left and right turn lanes amount to some 7m; even taking into consideration bus use of the kerbside lane, it should be possible to reduce the lane widths to reduce this overall width. This would allow for an extension of the kerb to allow for a minimal path width.

While trees are not optimally located in the western verge, it is recommended that the mature plantings be retained and the path deviated around these. There is the potential to relocate new, immature plantings more appropriately.

A desirable alternative is access through Marryatville Shopping Centre car park to access Dudley Street, however this would need to be negotiated with management. Formal access agreements for public access of private open space are common in Perth and could form a basis for negotiations and addressing issues such as legal liability for access on private land. The positive economic benefit for the shopping centre owners from encouraging cyclists as customers should be highlighted. Dudley Street leads almost directly into Northumberland Street.

Godfrey Terrace to Statenborough Street

Although the Burnside Connector Route only extends to Romney Road, route improvements should be extended to Statenborough Street as much as possible, to connect into the Central Burnside Commuter Route.

From Godfrey Terrace to Rochester Street, Tusmore Avenue gradually widens from 13.1m to 13.5m, disposed as two travel lanes with bicycle lanes and indented parking.

There is little scope to improve cycling conditions in Tusmore Avenue without significant removal of parking and cutting back kerb protuberances – which is not suggested.

Achieving a convenient right hand turn from Tusmore Avenue into Romney Road is critical for the functioning of this route. It is proposed that kerb protuberances on the east and west of the junction be cut back as much as practicable, without affecting street trees, to enable a cyclist right turn facility to be installed. This would have an impact on parking, reducing parking south of Romney Road by 1 or 2 spaces on each side of the road, and 5 or 6 spaces on the western side, north of Romney Road. The indented bus bay on the eastern side would need to be moved slightly further north, probably by cutting back the kerb protuberance at Stanley Street to provide for the bus run in.

Along Tusmore Avenue generally, a separation strip should be marked between the bicycle lane and parking. This could be achieved by marking the bicycle lanes with green pavement paint, or painting chevrons between the car parking and the bicycle travel lane. The former is more distinctive, but the green paint is known to have a poor maintenance performance.

A possible method of increasing the degree of protection to the bicycle lanes is to run a lien of audio-tactile line-marking in the roadway, about 0.2m outside the line of the bicycle lane and coloured grey to match the bitumen. The reason for this is that car mirrors overhang from the body of the car and could intrude into bicycle lanes. Normally, bicycle lanes do not provide any audible or sensory feedback about road positioning. Audio-tactile line-marking does. This would assist drivers from encroaching into the bicycle lanes.

Northumberland Street, Romney Road to Greenhill Road

Northumberland Street is 9.1m wide, has between 1,600 and 3,000 vehicles a day and is also a bus route. It is long and straight, with mature tree plantings.

Integration would be a suitable approach for this street.

Greenhill Road

Northumberland Street is separated by about 20m to 25m from Verdale Avenue. Between these streets, Greenhill Road has a wide median sheltering right turn lanes and peak hour bicycle lanes.

Although parking width is provided on the south side of Greenhill Road, the driveway and bus stop locations are such that there is no parking between Northumberland Street and Verdale Avenue.

The bicycle lanes should be made full-time between Northumberland Street and Verdale Avenue, noting that buses can set down/pick up in bicycle lanes. There may also be an opportunity to provide more protection on the southern side, using the parking lane width. This would be subject to bus servicing requirements and possible issues related to the desirability of maintaining the position of cyclists unchanged within the Greenhill Road corridor.

The verges are also wide and there is potential to at least widen footpaths to cater to child cyclists using the footpath between these streets, however tree plantings reduce the effective verge width and driveways are wide. Careful design is required over the driveway conflict zones.

Seagull crossing islands should be installed at both Northumberland Street and Verdale Avenue to assist cyclists to cross Greenhill Road. This could also assist bus patrons.

Verdale Avenue, Greenhill Road to Devereux Road

Verdale Avenue is 7.9m wide with under 650 vehicles a day. It has a significant curve towards the northern end.

Integration would be a suitable approach for this street.

Devereux Road, Verdale Avenue to Highfield Avenue

Verdale Avenue to Hay Road

Devereux Road is 11.1m wide with parking on both sides, bus traffic and traffic volumes peaking at over 6,300 vehicles a day between Greenhill Road and Hood Street. As such, integration is not considered an appropriate approach and alternatives would be preferable. Devereux Road has an uphill gradient for southbound travel and curves from about William Crescent, to meet Dashwood Road.

Verdale Avenue is proposed as an alternative parallel route from Greenhill Road to Tamarack Avenue – a distance of over half a kilometre. The use of the route is facilitated by ease of access across Greenhill Road into Northumberland Street.

South of Tamarack Avenue, traffic volumes on Devereux Road reduce slightly to around 5,500 vehicles a day. The eastern verge is around 5.5m wide, but hosts tree plantings and has a slight uphill grade to the east.

It is proposed that parking be indented on the eastern side, between Collingwood Avenue and Hay Road. This would enable bicycle lanes to be provided adjacent to parking on both sides of Devereux Road. Path should be installed around the roundabout at Cooper Place/Sturdee Street, and line marking at the nose of the splitter islands to encourage on-street cyclists to position in the middle of the lane.

Hay Road to Williams Crescent

A service road is provided on the west side of Devereux Road and would be a desirable alternative to the main roadway. This can be accessed easily for northbound cyclists or southbound cyclists turning from Hay Road. Southbound cyclists travelling on the eastern side of Devereux Road could be directed to use a school crossing near Glenroy Avenue and the ramp from this improved to provide access to the service road. Subject to pedestrian use at other times of the day and week, it is desirable to upgrade this to a pedestrian actuated crossing.

Williams Crescent to Highfields Avenue

The western verge is wide and a section of shared use path should be provided in the verge.

Highfield Avenue/ Kincardine Avenue

These minor streets provide access to a cut-through to Sunnyside Road, effectively bypassing the southern section of Devereux Road, Sturt Place and Dashwood Road. As a more direct connection, this is a desirable route, however it is narrow and could be considered to pose personal security issues at night (although neighbouring houses provide some passive surveillance). Overhanging vegetation should be cut back to provide the maximum sightlines available and convex mirrors installed on corners.

1.6.2 Table A1 - routes

These routes exclude Super Route concepts, which are whole of street concepts

The routes are divided into areas to facilitate location of the route nominated, and the areas alternately shaded and unshaded. The roads and streets are listed alphabetically within the areas, with sections generally proceeding from west to east and north to south.

The table headings are:

- Priority - as per figures 9 to 13 of the main report
- Street - name of the street or road
- From, To - delineates the road section being examined, taken from the asset management database. Use of the word "and" in italics before consecutive sections of a road indicate that the recommended option is repeated in these sections; this is intended to assist in reading the table. Where only a section of road is identified in the cycle network, treatment of the entire road has still been undertaken, as part of an aim of providing continuous routes when these are implemented. These sections are identified in the comments field as providing continuity for the route and have been assigned a low priority.
- Width - taken from the asset management database; listed widths are for a road section of consistent width. In some locations, the road width varied frequently between consecutive sections but not significantly. These are shown with a range of widths - such as 7.20 metres to 7.40 metres - over the larger range, rather than a long list of similar roads.
  The road widths used are not entirely reliable. A spot-measurement of Conyngham Street revealed a discrepancy between the measured and listed width (subsequent measurements of Beulah Road and Kensington Road were consistent with given values); a few streets are listed with two different widths; in many locations, the road profile varies close to intersections or where indented parking exists, but this is not reflected in the road widths given. Widths would be confirmed as part of detailed treatment design.
- Length - measured from aerial maps. This length reflects the length of road likely to be treated with the proposed treatment rather than the total length of the road, although the two are typically similar. This value is given to the nearest 10 metres.
- Side 1, Side 2 - the type of treatment suggested by side of the street. Where different treatments are suggested, the relevant side of the street is nominated in brackets following the suggested treatment. Where multiple options are suggested, the option listed first is that recommended; alternatives are listed with the word "OR" in front of them, and in italics. Use of the word "AND" means that the recommended treatment varies in the nominated road section.
- Required width – the minimum width required for the type of treatment recommended, under Austroads Part 14. This shows whether the recommended treatment is close to minimum width conditions and provides additional information for the notice of subsequent treatment designers. The required road width is generally based on the design assumptions noted in section 1.2.
- Est. Cost – the treatment cost has been estimated on the basis of $7/metre for bicycle lanes and advisory treatments (including design costs), assuming treatment on both sides of the road; and $250/ metre for shared use paths having an assumed width of 3 metres. These costs are based on the most recent costs incurred by Adelaide City Council. These are indicative and broad-brush costs only. It is assumed that works on DPTI roads would be at no cost to Council.
- Comments – these provide further explanation of the recommended treatment, including factors affecting decision-making and further detail about how a treatment may vary along a street section.

Table A1 commences overleaf. Only routes for which on-road treatment options were identified are provided in Table A1. In Table A1:

- Streets that are part of Super Routes are highlighted in yellow.
- Colouring or shading of works grouped by area is as per Figure 9 of the main document, to assist in cross-referencing figures 9 to 13 with the works. As shading over text using a pattern affects readability, the shading has been only partially applied to entries in Table A1.
- Bold type indicates that the works have been prioritised as highest or high and should be implemented as part of the Bicycle Strategy.
- Works in plain text are medium or low priority works, provided to enable these to be provided in an opportunistic way as other projects arise.

Table A1: Detailed route works

PRIORITY	STREET		FROM	TO	WIDTH	LENGTH		SIDE 1	SIDE 2	REQ'D WIDTH	EST. COST	COMMENTS
Rose Park/ Dulwich/ Toorak Gardens												
low	Cleland Ave		Dulwich Ave	Swift Ave	13.60	70		AT+E	AT+E	12.60	$980	Highest level of protection possible on both sides, for entire street length.
low		*and*	Swift Ave	Mellington St	12.80	280		AT+E	AT+E	12.60	$3,920	
low		*and*	Mellington St	Greenhill Rd	13.20	120		AT+E	AT+E	12.60	$1,680	
high	**Cudmore Ave**		**Grant Ave**	**Sprod Ave**	**7.75**	**170**		**AT+LM**	**AT+LM**	**7.40**	**$2,380**	
high		***and***	**Sprod Ave**	**Ormond Gve**	**7.95**	**50**		**AT+LM**	**AT+LM**	**7.40**	**$700**	
high		***and***	**Ormond Gve**	**Grandview Gve**	**7.70**	**120**		**AT+LM**	**AT+LM**	**7.40**	**$1,680**	
high		***and***	**Grandview Gve**	**Martindale Ave**	**8.20**	**120**		**AT+LM**	**AT+LM**	**7.40**	**$1,680**	
high		***and***	**Martindale Ave**	**Greenhill Rd**	**7.95**	**400**		**AT+LM**	**AT+LM**	**7.40**	**$5,600**	**Transition to intersection treatment.**
high	**Fullarton Service Rd**		**Grant Ave**	**Northern end near Grant Ave**		**20**		**SUP**		**3.00**	**$5,000**	**Service road to Grant Ave crossing point.**
high			**Northern end near Grant Ave**	**Swaine Ave**	**10.00**	**60**		**EBL**	**EBL**	**8.40**	**$840**	**No parking section. Could have 5.5m travel lane.**
high				**Nominally 10.00m, but varies**		**30**	***AND***	**nothing (west)**	**EBL (east)**		**$210**	**Transition to intersection treatment: EBL through no parking and over Swaine Ave (both sides of service road).**
high			**Swaine Ave**	**Fullarton Rd at no. 163**	**10.70**	**30**		**EBL**	**EBL**	**8.40**	**$420**	**Remove one car park space to provide EBL both sides from Swaine over service road entry; transition to adjoining treatments.**
high			**Fullarton Rd at no. 163**	**Dulwich Ave**	**8.00**	**150**		**EBL (west)**	**AT+LM (east)**	**7.90**	**$2,100**	**Uses no parking on west. Mark cut-through for cyclist use.**
medium			Dulwich Ave	Williams Ave	8.60	170		nothing (west)	AT+LM (east)	8.60	$1,190	Uses no parking on east, assumes 2.1m marked parking on west, central travel lane equivalent to 5.8m.
medium			Southern end	Greenhill Rd		70		SUP		2.50	$5,000	Consider cut-through at end of service road, shared use path in Fullarton Rd reserve to signals at Greenhill Rd. Ped numbers low and reserve generally wide, but would remove landscaping.
high	**Giles St**		**Alexandra Ave**	**Grant Ave**	**13.00**	**80**		**AT+E**	**AT+E**	**12.60**	**$1,120**	**Provide on western side, extend on east and west over Alexandra Ave to match.**
							OR	*BCPL (west)*	*AT+E (east)*	13.00		To match parking layout.
low	Grandview Gve		Stuart Rd	Warwick Ave	9.05	150		AT+LM	AT+LM	7.40	$2,100	(To provide continuous treatment along the street.)
highest	**Grant Ave**		**Prescott Tce**	**Giles St**	**11.25**	**340**		**BCPL**	**AT+LM**	**10.40**	**$4,760**	
highest							***OR***	***AT+LH***	***AT+LH***	**12.00**		**Semi-indent parking bays 1.0 metre wide on one side between street As above but indent by 0.5 metres either side. More expensive but more symmetrical.**
highest							***OR***	***BCPL***	***EBL***	***10.90***		**Indent parking bays 2.1 metres wide on EBL side. May be narrow adjacent footpath.**
highest							***OR***	***EBL (peak)***	***EBL (peak)***	**8.40**		**Would suit commuter cyclists, but no facility out of peak.**
highest			**Giles St**	**Cudmore Ave**	**14.40**	**40**		**Other**			**$280**	**Extend southern side bike lane from east across Cudmore Ave, through bus lane (buses can stop in bike lanes).**
highest							**AND**	**Other**				**Extend northern side bike lane marking, change entry taper to dashed line marking.**
high			**Fullarton Rd**	**Thomas Pl**	**13.90**	**60**		**EBL (south)**	**BCPL (north)**	**13.90**		**Two travel lanes approaching Fullarton Road. Transition BCPL on southern side to EBL. Extend BCPL on northern side to intersection, as EBL at intersection transitioning to AT+E, EBL over Thomas Pl to allow for refuge, then to existing BCPL.**
high							**AND**	**EBL (south)**	**AT+E (north)**	**13.50**		
high	**Gurney Rd**		**Grant Ave**	**Swaine Ave**	**14.05**	**70**		**AT+E**	**AT+E**	**12.60**	**$980**	**To match treatment further south.**
high							***OR***	***AT+LH***	***AT+LH***	**12.00**		
high		***and***	**Swaine Ave**	**Dulwich Ave**	**12.40**	**170**		**AT+E**	**AT+E**	**12.60**	**$2,380**	**2.9 metre travel lanes (not a bus route). Consider path over squeeze point, east side.**
high							***OR***	***AT+LH***	***AT+LH***	**12.00**		**2.9m travel lanes not required.**
	Kensington Rd		**Close St**	**Prescott Tce**	**15.50**	**580**		**nothing**	**nothing**		**State govt**	**Without ongoing facilities and crossings, short facility not recommended;**
			Prescott Tce	**Portrush Rd**	**14.50**	**710**		**nothing**	**nothing**		**State govt**	**provide 1.0m painted median to assist cyclists to cross Kensington Rd.**
low	Swaine Ave		Fullarton Rd service road	Gurney Rd	14.10	360		BCPL	BCPL	13.40	$5,040	(To provide continuous treatment along the street.)
low		*and*	Gurney Rd	Stuart Rd	13.75	250		BCPL	BCPL	13.40	$3,500	(To provide continuous treatment along the street.)
low			Prescott Tce	Cudmore Ave	9.20	440		AT+LM	AT+LM	7.40	$6,160	(To provide continuous treatment along the street.)
medium	Victoria Tce		Kensington Rd	Hewitt Ave	13.40	100		AT+E	AT+E	12.60	$1,400	Continue existing AT+E over side streets and up to Alexandra Ave.
medium		*and*	Hewitt Ave	Watson Ave	13.10	100		AT+E	AT+E	12.60	$1,400	Continue existing AT+E over side streets and up to Alexandra Ave.
medium							*OR*	*BCPL*	*BCPL*	13.40		Semi-indent parking bays on one side of street, or replace upright kerb with spoon drain enabling cars to park further off carriageway both sides. Enables highest provision for cyclists, but at a higher cost.
medium			Watson Ave	Alexandra Ave	13.70	90		BCPL	BCPL	13.40	$1,260	In place of AT+E. Extend over Aviator Ln.
medium							AND	EBL	EBL	8.40	$280	Provide EBL over Alexandra Ave median and to paths at Rose Park Primary School (parking already prohibited).
medium			Alexandra Ave	Rose Pk Primary School	13.70	40						See intersection treatment.

BCPL = bicycle car park lane
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AT+E = advisory treatment with edge line

AT+LH = advisory treatment with logo (high parking demand)
AT+LM = advisory treatment with logo (minimal parking demand)

Table A1: Detailed route works

PRIORITY	STREET	FROM	TO	WIDTH	LENGTH	SIDE 1	SIDE 2	REQ'D WIDTH	EST. COST	COMMENTS
Eastwood										
highest	***Fullarton Rd***	***Main St***	***Glen Osmond Rd***		**120**	**SUP (west)**		**3.00**	**$1,000**	**Sign footpath for shared use. Consider alternative access and linkage to Glenside path as part of Glenside upgrade (e.g. via Elizabeth St, if a main entry is provided opposite).**
Glenside/ Frewville/ Glenunga										
low	Amber Woods Dr	Plane Tree Ave	Conyngham St	7.20	220	SUP (south)		2.50	$55,000	Route signage; monitor traffic speed, consider traffic device to moderate speed if required. Shared use path as a longer term facility, joining local road network at Plane Tree Ave.
high	**Bevington Rd**	**Conyngham St**	**Rowell Ave**	**10.10**	**150**	**EBL (north)**	**AT+LH (south)**	**10.20**	**$2,100**	**EBL based around parking restrictions or extending these to full-time, with northern travel lane 2.9 metres (Bevington Rd is not a bus route).**
high					***OR***	***AT+LM (north)***	***AT+E (south)***	**10.00**		**Reflects parking restrictions north side.**
high					***OR***	***AT+LM (north)***	***AT+LM (south)***	**9.70**		**Symmetrical treatment, AT+LM less visible than AT+E.**
high		**Rowell Ave**	**Sydney St**	**10.10**	**410**	**AT+LM**	**AT+LM**	**7.40**	**$5,740**	**Assume parking demand drops off with distance from Glen Osmond Rd.**
high		***and*** **Sydney St**	**Portrush Rd**	**9.60**	**110**	**AT+LM**	**AT+LM**	**7.40**	**$1,540**	**No indication of high parking demand near Portrush Rd, as no nearby commercial development. Transition to DTEI/ local intersection treatment via EBL in no parking section.**
high	**Cator St**	**Conyngham St**	**L'Estrange St**	**7.05**	**140**	**nothing (south)**	**AT+LM (north)**	**6.70**	**$980**	**Park and development with internal roadway on southern side, which is also downhill side (lower speed differential with traffic.)**
high		**L'Estrange St**	**Kyle St**	**6.05**	**260**	**nothing (south)**	**AT+LM (north)**	**6.70**	**$1,820**	**To match other sections of the street. Semi-indent parking south side.**
high		**Kyle St**	**Sydney St**	**7.05**	**110**	**nothing (south)**	**AT+LM (north)**	**6.70**	**$770**	**To match other sections of the street.**
high		**Sydney St**	**Portrush Rd**	**7.25**	**100**	**nothing (south)**	**AT+LM (north)**	**6.70**	**$700**	**No parking north side, off-street parking at Burnside Village.**
high					***OR***	***AT+LM (south)***	***EBL (north)***	**7.90**		**Semi-indent parking south side.**
medium	Cedar Ave	Queen St	Bevington Rd	7.60	310	AT+LM	AT+LM	7.40	$4,340	
highest	**Conyngham St**	**Greenhill Rd**	**Entrance To Pineview Gr**	**11.65**	**50**	**EBL**	**EBL**	**11.40**	**$700**	**Already no parking west side, mostly no parking east side. Remove all parking this section as residential is off internal roadways. Provide occasional indented bay if required or with future development on east.**
highest		**Pineview Entrance**	**Windsor Rd**	**10.00**	**560**	**BCPL (west)**	**AT+LM (east)**	**10.40**	**$7,840**	**Road measured at 10.4 metres.**
					OR	***AT+LH (west)***	***EBL (east)***	***10.20***		**Peak facilities not recommended due to strategic location of Conyngham**
high		**Amberwoods Dr**	**Cator St**	**10.00**	**130**	**SUP (west)**		**3.00**	**$32,500**	**Section of above with shared use path western side.**
highest		**Windsor Rd**	**Main Ave**	**11.75**	**80**	**EBL**	**EBL**	**8.40**	**$1,120**	**No parking through this section as parking is set back from the road. Could have BCPL on west to match section from Knox St.**
					OR	***BCPL (west)***	***EBL (east)***	***10.90***		
highest		**Main Ave**	**Knox St**	**11.75**	**210**	**BCPL (west)**	**EBL (east)**	**10.90**		**Part time bike lanes on east, around bus parking.**
highest		**Knox St**	**Glen Osmond Rd**	**10.05**	**290**	**AT+E (west)**	**AT+LM (east)**	**10.00**		**Provide occasional indented parking bay east side, if required. Transition**
highest	**Flemington St**	**Byhurst Ave**	**Birdwood Ave**	**6.30**	**250**	**nothing**	**nothing**			**Monitor traffic speed, consider traffic device to moderate speed if required. Connect to Glenside path.**
low					50 AND	SUP			$12,500	Consider SUP north side from Glenside path to Birdwood Ave.
high		**Birdwood Ave**	**Conyngham St**	**8.80**	**140**	**AT+LM**	**AT+LM**	**7.40**	**$1,960**	
high	**Glenside path**	**Flemington St**	**Fullarton Rd**		**430**	**SUP**				**Provide as part of Glenside redevelopment, with improved surface and connetion.**
medium	Kingsley Ave (divided	Windsor Rd	mid-block (east)		50		EBL	4.50	$350	No parking required. Consider contra-flow treatment to Cedar Ave.
medium	road section)	Windsor Rd	mid-block (west)		60	BCPL		6.70	$420	Indented parking provided. May need to trim island and instate pavement, up to 1 metre width.
medium	Kingsley Ave	mid-block	Brooker St	9.00	60	AT+LM	AT+LM	7.40	$840	Transition to indented parking.
medium		Brooker St	Leroy St	9.50	120	AT+LM (west)	AT+LH (east)	9.70	$1,680	Parking on west edge-lined, but standard residential; parking on east likely to have peaks due to tennis courts, crochet club. Central 5.8m lane instead of two 3m lanes.
medium					*OR*	*AT+LM*	*AT+LM*	7.40		Symmetrical, match to adjacent section.
medium					*OR*	*AT+E (west)*	*nothing (east)*	9.30	$840	To match indented parking on west (edge-lined); no parking on east.
medium		Leroy St	Sydney St	9.80	60	AT+LM	AT+LM	7.40	$840	(To provide continuous treatment along the street). Match to adjacent section.
medium					*OR*	*AT+E (west)*	*nothing (east)*	9.30	$420	(To provide continuous treatment along the street). To match indented parking on west (edge-lined); no parking on east.

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EBL = exclusive bike lane

AT+E = advisory treatment with edge line

AT+LH = advisory treatment with logo (high parking demand)
AT+LM = advisory treatment with logo (minimal parking demand)

Table A1: Detailed route works

PRIORITY	STREET		FROM	TO	WIDTH	LENGTH		SIDE 1	SIDE 2	REQ'D WIDTH	EST. COST	COMMENTS
high	**Kyle St**		**Greenhill Rd**	**Windsor Rd**	**7.70**	**640**		**AT+LM**	**AT+LM**	**7.40**	**$8,960**	
high			**Cedar Ave**	**Kingsley Ave**	**7.50**	**100**		**AT+LM**	**AT+LM**	**7.40**	**$1,400**	
high	**Main Ave**		**Glen Osmond Rd**	**Chessington Ave**	**7.75**	**50**		**AT+LM**	**AT+LM**	**7.40**	**$700**	**May change with Glenside redevelopment.**
high						**70**	**AND**	**SUP (north)**		**2.50**	**$17,500**	**To link to ped signals at Glen Osmond Rd, using existing footpath, with turning bay at Chessington Ave. SUP to continue over car park entry/ exit. May change with Glenside redevelopment.**
high		***and***	**Chessington Ave**	**Avenue Rd**	**7.70**	**50**		**AT+LM**	**AT+LM**	**7.40**	**$700**	**Consider turning lane at Chessington Ave.**
high		***and***	**Avenue Rd**	**Byhurst Ave**	**7.40**	**110**		**AT+LM**	**AT+LM**	**7.40**	**$1,540**	
low		*and*	Byhurst Ave	Conyngham St Service Rd	7.60	400		AT+LM	AT+LM	7.40	$5,600	(To provide continuous treatment along the street)
high	**Windsor Rd**		**Conyngham St**	**indented parking bay (south)**	**8.50**	**50**		**AT+LM**	**AT+LM**	**7.40**	**$700**	**Assume low parking demand away from oval where no indented parking is provided.**
high			**indented parking bay (south)**	**L'Estrange St**	**8.50**	**60**		**AT+LM (north)**	**BCPL (south)**	**10.40**	**$840**	**Assuming indented parking on south side is 2.1m additional to nominal width (10.6m total).**
high			**L'Estrange St**	**Portrush Rd**	**8.00**	**600**		**AT+LM**	**AT+LM**	**7.40**	**$8,400**	**Transition to DTEI/ local road intersection treatment.**
Beulah Park/ Kensington Park												
high	**Beulah Rd**		**Portrush Rd**	**Howard St**	**11.95**	**210**		**AT+LM**	**AT+LM**	**7.40**	**$2,940**	
high							***OR***	***BCPL (north)***	***AT+LM***	**10.40**		**BCPL uphill side. Remove parking edge-line south side. Transition to DTEI/ local road connection at Portrush Rd.**
high		***and***	**Howard St**	**Osborn Ave**	**11.70**	**190**		**BCPL (north)**	**AT+LM**	**10.40**	**$2,660**	
high			**Osborn Ave**	**Scott St**	**9.80**	**30**		**AT+LM**	**AT+LM**	**7.40**	**$420**	
high		***and***	**Scott St**	**Gurrs Rd**	**9.60**	**280**		**AT+LM**	**AT+LM**	**7.40**	**$3,920**	
medium		*and*	Gurrs Rd	Glynburn Rd	8.00 to 8.8	810		AT+LM	AT+LM	7.40	$11,340	No parking at western end. Actual road width may be narrower due to pavement bars. Remove bars/ line-marking over throat of Birnie Ave, Corinda Ave and Yeronga Ave, provide bike lane marking to create areas where cars can pass bikes. Widen path Bradman Ct to Toowong Ave, provide one-way
high	**Duke St**		**Beulah Rd**	**Glyde St**	**7.75**	**150**		**AT+LM**	**AT+LM**	**7.40**	**$2,100**	
high			**Douglas Ave**	**The Parade**	**7.40**	**70**		**AT+LM**	**AT+LM**	**7.40**	**$980**	
high	**Gurrs Rd**		**Magill Rd**	**Lossie St**	**8.40**	**210**		**AT+LM**	**AT+LM**	**7.40**	**$2,940**	
high		***and***	**Lossie St**	**Beulah Rd**	**8.30**	**100**		**AT+LM**	**AT+LM**	**7.40**	**$1,400**	
high		***and***	**Beulah Rd**	**Andrew St**	**8.00**	**30**		**AT+LM**	**AT+LM**	**7.40**	**$420**	
high		***and***	**Andrew St**	**Margaret St**	**7.90**	**170**		**AT+LM**	**AT+LM**	**7.40**	**$2,380**	
high		***and***	**Margaret St**	**The Parade**	**8.00**	**80**		**AT+LM**	**AT+LM**	**7.40**	**$1,120**	
low	Kensington Rd		Uxbridge St	May Tce		50		BCPL (out of peak) (north)	EBL (out of peak) (south)	12.80	$700	Low priority due to lack of connecting intersection treatments or routes, would increase if a through site link is developed from Uxbridge St to Shipsters Rd. Kensington Rd widens on the north side in this section, and there are only 2 car park spaces on-street. A BCPL may be possible out of peak.
low			May Tce	Glynburn Rd	11.50	580		EBL (out of peak)	EBL (out of peak)	8.40	$8,120	Low priority due to lack of connecting intersection treatments or routes, would increase with such facilities. This very narrow section of Kensington Rd has clearway conditions. Extensive off-street parking is provided near Tusmore Ave and parking demand drops quickly east of Uxbridge St. Continuity of the EBLs over side streets would provide some protection for cyclists.
low							*OR*	*EBL (out of peak)*	*EBL (out of peak)*	8.40		
highest	**Magill Rd**		**Verdun St**	**Salop St**	**15.00**	**440**		**Ban right turns**				**Crash cluster seems to be due to commuters turning right from Magill Rd into side streets not seeing cyclists, with traffic flows in Magill Rd encouraging short gap acceptance. The AM peak is worst due to traffic flows and sun position. Ban turns in at least in the AM peak. Alternative access via Portrush Rd and Beulah Rd, but right turns at Portrush Rd could lead to queues exceeding storage. Monitor. Consider providing green bike lanes across side streets; would advise regular users of bike lane.**
highest							***OR***	***Other***			**State govt**	**Infrastructure responses - coloured bike lanes, narrowing of side streets - are not considered likely to be successful, as traffic flows and sun position lead to this issue and would not be addressed.**
medium	Toowong Ave		Lossie St	Beulah Rd	8.40	130		AT+LM	AT+LM	7.40		$1,820

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AT+E = advisory treatment with edge line

AT+LH = advisory treatment with logo (high parking demand)
AT+LM = advisory treatment with logo (minimal parking demand)

Table A1: Detailed route works

PRIORITY	STREET		FROM	TO	WIDTH	LENGTH		SIDE 1	SIDE 2	REQ'D WIDTH	EST. COST	COMMENTS
highest	**The Parade**		**Portrush Rd**	**Union St**	**13.50**			**Other**			**State govt**	**Extend no parking east of Union St to 10 metres (existing no parking west of Union St), provide EBL from end of new path over Union St, transitioning to start of parking. Mark out of peak BCPL from Bowen to slip lane, becoming two lanes with wide kerbside lane in peak. Transition to DTEI/ local road treatment.**
highest			**Union St**	**Amery Ln**	**12.40**	**20**		**AT+LH**	**AT+LH**	**12.00**	**$280**	**Highest provision possible on both sides of street.**
highest							***OR***	***AT+E (north)***	***AT+LH (south)***	**12.30**		**Higher provision for uphill direction of travel.**
highest		***and***	**Amery Ln**	**Dimboola St**	**12.80**	**30**		**AT+LH**	**AT+LH**	**12.00**	**$420**	
highest							***OR***	***AT+E (north)***	***AT+LH (south)***	**12.30**		
highest		***and***	**Dimboola St**	**Howard St**	**12.30**	**30**		**AT+LH**	**AT+LH**	**12.00**	**$420**	**Transition to BCPL to east.**
highest							***OR***	***AT+E (north)***	***AT+LH (south)***	**12.30**		**Transition to BCPL to east.**
highest			**Howard St**	**Duke St**	**14.10**			**Other**			**State govt**	**Extend bike facilities to Howard St (north side) and Regent Pl (south side), as EBL with chevron to locate facility away from kerb line as required to match to adjacent treatment.**
highest			**Salop St**	**Gurrs Rd**	**15.00**			**Other**			**State govt**	**Provide EBL through bus/ no standing zone west of Shipsters Rd, transition to BCPL to west.**
highest			**Gurrs Rd**	**Tobruk Ave**	**17.80**			**Other**			**State govt**	**Provide EBL through bus/ no standing zones, transition to BCPL to east.**
medium	Park Rd		Shipsters Rd	Uxbridge St	14.00	70		AT+LH	AT+LH	*12.00*	$980	Symmetrical, and to match other sections.
medium							*OR*	*AT+E (north)*	*AT+LH (south)*	12.30		Higher provision possible on one side, reduces impact on existing edge-lined parking.
medium		*and*	Uxbridge St	May Tce	12.20	40		AT+LH	AT+LH	*12.00*	$560	Travel lanes 2.9m each, not a bus route.
medium							*OR*	*AT+E (north)*	*AT+LH (south)*	12.30		
medium		*and*	May Tce	Alpha St	12.00	120		AT+LH	AT+LH	*12.00*	$1,680	Indent car parking for AT+E, AT+LH option.
medium							*OR*	*AT+E (north)*	*AT+LH (south)*	12.30		
medium		*and*	Alpha St	Oak Crt	12.50	20		AT+LH	AT+LH	*12.00*	$280	
medium							*OR*	*AT+E (north)*	*AT+LH (south)*	12.30		
medium		*and*	Oak Crt	Holden St	12.30	70		AT+LH	AT+LH	*12.00*	$980	
medium							*OR*	*AT+E (north)*	*AT+LH (south)*	12.30		
medium			Holden St	Pembroke St	12.60	50		AT+E	AT+E	12.60	$700	Higher provision near school. Also matches existing edge-lined parking.
medium							*OR*	*AT+LH*	*AT+LH*	12.00		To match other sections.
medium		*and*	Pembroke St	Walsall St	12.70	50		AT+E	AT+E	12.60	$700	
medium							*OR*	*AT+LH*	*AT+LH*	12.00		
medium			Walsall St	Ellesmere St	12.40	40		AT+LH	AT+LH	*12.00*	$560	
medium							*OR*	*AT+E (north)*	*AT+LH (south)*	12.30		Continues AT+E on north side., but not symmetrical treatment.
medium			Ellesmere St	Glynburn Rd	11.70	180		AT+LM	AT+LM	7.40	$2,520	Transition to EBL in no parking area near Glynburn Rd, intersection treatment.
medium							*OR*	*AT+E (north)*	*AT+LM (south)*	10.00		Continues AT+E on north side., but not symmetrical treatment.
Kensington Gardens/ Rosslyn Park/ Magill												
low	Briant Rd		Magill Rd	Chapel St	8.50	190		AT+LM	AT+LM	7.40	$2,660	(To provide continuous treatment along the street.)
medium			Chapel St	Bennett Cres	10.30	70		AT+LM	AT+LM	7.40	$980	Symmetrical.
medium							*OR*	AT+E (west)	AT+LM (east)	10.00		Higher provision possible for uphill travel, but asymmetrical.
medium		*and*	Bennett Cres	South Edge Cuthero Tce	11.80	140		AT+LM	AT+LM	7.40	$1,960	
medium							*OR*	*AT+E (west)*	*AT+LM (east)*	10.00		
medium		*and*	South Edge Cuthero Tce	Sophia Crt	10.30	30		AT+LM	AT+LM	7.40	$420	
medium								*OR*	*AT+E (west)*	*AT+LM (east)*		
low			Sophia Crt	The Parade	7.60	180		AT+LM	AT+LM	7.40	$2,520	(To provide continuous treatment along the street.)
medium	Chapel St		Briant Rd	Rowland Rd	7.90	180		AT+LM	AT+LM	7.40	$2,520	
medium		*and*	Rowland Rd	Pepper St	8.00	290		AT+LM	AT+LM	7.40	$4,060	AT+E or BCPL over short indented parking area may be appropriate north side.
medium	Cuthero Tce		Glynburn Rd	Myall Ave	7.90	110		AT+LM	AT+LM	7.40	$1,540	
medium		*and*	Myall Ave	West Tce	7.60	110		AT+LM	AT+LM	7.40	$1,540	
medium		*and*	West Tce	Coolibah Ave	7.50	110		AT+LM	AT+LM	7.40	$1,540	
medium		*and*	Coolibah Ave	Mahar St	10.30	30		AT+LM	AT+LM	7.40	$420	
medium		*and*	Mahar St	Sandford St	7.40	250		AT+LM	AT+LM	7.40	$3,500	
medium			Sandford St	Brigalow Ave	7.30	50		AT+LM (north)	nothing (south)		$350	Treatment not possible both sides, continue on uphill side.
medium			Brigalow Ave	Barnes Ave	7.80	100		AT+LM	AT+LM	7.40	$1,400	
medium		*and*	Barnes Ave	Briant Rd	7.50	80		AT+LM	AT+LM	7.40	$1,120	
low	Hyland Tce		The Parade	Kadonga Ave	7.90	330		AT+LM	AT+LM	7.40	$4,620	
low		*and*	Kadonga Ave	Kensington Rd	7.50	250		AT+LM	AT+LM	7.40	$3,500	

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AT+LM = advisory treatment with logo (minimal parking demand)

Table A1: Detailed route works

PRIORITY	STREET		FROM	TO	WIDTH	LENGTH		SIDE 1	SIDE 2	REQ'D WIDTH	EST. COST	COMMENTS
low	Kadonga Ave		East Tce	Brigalow Ave	7.20	110		AT+LM (south)	nothing		$770	Do not mark road centre line. Provides continuity for side with extensive no parking.
low							*OR*	*nothing*	*nothing*			
medium	Kensington Rd		Glynburn Rd	Hamilton St	13.90	240		AT+E	AT+E	12.60	$3,360	Becomes wide kerbside lane in clearways times.
medium							*OR*	*BCPL*	*BCPL*	13.40		As Kensington Rd is only one lane into the intersection at Hallett Rd, one travel lane arguably provides sufficient capacity and BCPL can be full-time. Otherwise, becomes wide kerbside lane in peak. While it is recommended not to encourage cycling on Kensington Rd near the City (where facilities cannot be provided), this would match to the treatment further east.
medium			Hamilton St	Lockwood	16.0?	120		BCPL	BCPL		$1,680	Car parking is indented on the south side, with a road width at least 2 metres wider for this section. A full-time BCPL enables cyclists from Lockwood Rd to access both Wilga Ave and the shopping centre on the other side of the ped signals mid-block in this section. A 1.0 metre painted median should be provided to assist cyclists to cross Kensington Rd.
medium			Lockwood	Hallett Rd	13.90	330		BCPL	BCPL	13.40	$4,620	Additional travel lane in peak not required; replace clearway signs with BCPL signs.
low	Park Ave		Hyland Tce	Penfold Rd	9.00 to 9.40	700		AT+LM	AT+LM	7.40	$9,800	
high	**Penfold Rd**		**Magill Rd**	**Adelaide St**	**11.3**	**110**		**EBL (peak)**	**EBL (peak)**	**8.40**	**$1,540**	**(To provide continuous treatment along the street.) Parking demand is not high out of peak; the EBL would continue to provide some protection to cyclists out of peak, especially over side streets.**
high		***and***	**Adelaide St**	**Chapel St**	**11.3**	**50**		**EBL (peak)**	**EBL (peak)**	**8.40**	**$700**	**Transition to intersection treatment Chapel St.**
high		***and***	**Chapel St**	**The Parade**	**11.3**	**110**		**EBL (peak)**	**EBL (peak)**	**8.40**	**$1,540**	**(To provide continuous treatment along the street.)**
medium			The Parade	Park Ave	11.5	440		BCPL (west)	EBL	10.90	$6,160	No real parking demand associated with Penfolds Estate
medium			Park Ave	Kensington Rd	11.5	240		EBL (peak)	EBL (peak)	8.40	$3,360	(To provide continuous treatment along the street.) Peak period. Parking demand is not high out of peak; the EBL would continue to provide some protection to cyclists out of peak, especially over side streets.
low	South Tce		West Tce	Wilga Ave	8.20	100		AT+LM	AT+LM	7.40	$1,400	
low		*and*	Wilga Ave	Korra Ave	8.40	100		AT+LM	AT+LM	7.40	$1,400	
low		*and*	Korra Ave	East Tce	8.10	100		AT+LM	AT+LM	7.40	$1,400	
medium	The Parade		Barnes Ave	Taylor Tce	13.10	70		AT+E	AT+E	12.60	$980	Highest provision possible on both sides of the street. Transition to BCPL to west. Edge line exists south side of street, but appears narrow and no logos. Remove pavement bars and reduce painted median at Taylor Tce to 0.5m if required.
medium			Taylor Tce	Penfold Rd	12.00 to 12.30	460	*OR*	AT+LH *EBL (peak)*	AT+LH *EBL (peak)*	12.00 8.40	$6,440	Parking generally provided with edge line south side, continuing over side streets, and long edge lined bays north side. Peak EBL (essentially signing parking) would require less scrubbing of line marking but no full-time facility.
medium						120	AND	EBL	EBL	8.40	$1,680	Divided road section. Verify widths, appears feasible. Link to intersection treatment.
low	West Tce		The Parade	Quondong Ave	9.90	320		AT+LM	AT+LM	7.40	$4,480	Connect to intersection treatment. Add "bikes crossing" signs.
low		*and*	Quondong Ave	South Tce	9.70	120		AT+LM	AT+LM	7.40	$1,680	
low		*and*	South Tce	Kensington Rd	7.40	170		AT+LM	AT+LM	7.40	$2,380	
~~Auldana/ Skye~~												
~~low~~	~~Coach Rd~~		~~The Parade~~	~~Verdelho Crt~~	8.80	590		AT+LM	AT+LM	7.40	$8,260	
~~low~~			~~Verdelho Ct~~	~~Bishop St~~	9.30	750		AT+LM	AT+LM	7.40	$10,500	
~~low~~							*OR*	*EBL (uphill)*	*AT+LM (downhill)*	8.40		Asymmetrical treatment. Most parking demand is on the southern side (downhill direction). Bicycle facilities may give an impression of a narrower road, moderating traffic speeds. At high gradients, an uphill EBL is desirable (though should be above minimum width), while an EBL would be narrow for (relatively) high speed cyclists to stay within.
~~high~~	**~~Magill Rd~~**		**~~Barnes Ave~~**	**~~New Norton Summit Rd~~**	**14.20**	**380**		**BCPL**	**BCPL**	**13.40**	**State govt**	**Transition to intersection treatment, Penfold Rd, New Norton Summit Rd.**
~~low~~		*and*	~~New Norton Summit Rd~~	~~East St~~	14.20	130		BCPL	BCPL	13.40	$1,820	(To provide continuing treatment.) Bike lanes in this section may present a narrower road and help moderate traffic speeds at New Norton Summit Rd. Continue as EBL over New Norton Summit Rd.
~~low~~	~~The Parade~~		~~Penfold Rd~~	~~Rawson Penfold Dr~~	9.40	110		AT+LM	AT+LM	7.40	$1,540	See intersection treatment.
~~low~~			~~Rawson Penfold Dr~~	~~Coach Rd~~	9.10	360		AT+LM	AT+LM	7.40	$5,040	Consider widening median at Coach Rd to provide cyclist turning lane.

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Table A1: Detailed route works

PRIORITY	STREET	FROM	TO	WIDTH	LENGTH	SIDE 1	SIDE 2	REQ'D WIDTH	EST. COST	COMMENTS
Tusmore/ Leabrook/ Hazelwood Park										
low	Howard Tce	Sidney Pl	Greenhill Rd	9.20	300	EBL (west)	AT+LM (east)	7.90	$4,200	Parking is banned west side in summer; provide EBL during parking ban. Transition to median crossing, Greenhill Rd.
low	Knightsbridge Rd	Maud St	Howard Tce	14.80	20	AT+E (exists)	AT+E (exists)	12.60	$280	Continue existing AT+E over Howard Tce.
low	Northumberland St	Council Boundary	Stirling St	9.20	280	AT+LM	AT+LM	7.40	$3,920	Extend to Newcastle St, with Norwood Payneham St Peters.
low	*and*	Stirling St	Greenhill Rd	9.10	430	AT+LM	AT+LM	7.40	$6,020	
medium	Philip Ave	Rochester St	Knightsbridge Rd	10.30	160	AT+E	AT+LM	10.00	$7,490	Transition to EBL on departure from Rochester St. Provide one-way separated bike path over build out, east side of Knightsbridge Rd intersection, transitioning into advisory treatment to east.
low	Rochester St	Tusmore Ave	Philip St	12.90	50	AT+E (exists)	AT+E (exists)	12.60	$700	Continue existing AT+E over Jean St, Rodger Ave and The Parkway.
high	**Shipsters Rd**	**The Parade**	**Park Road**	**10.40**	**300**	**BCPL (west)**	**AT+LM (east)**	**10.40**	**$4,200**	**Asymmetrical treatment. Highest full-time provision possible in the street, only acceptable if low demand for parking exists or is encouraged on east side. Two schools on west side, so assumed highest parking demand. Transition to intersection treatment.**
high					***OR***	***EBL (peak)***	***EBL (peak)***			**Using parking area. Could be difficult to enforce due to parking demand around schools.**
high					***OR***	***AT+E (west)***	***AT+LM (east)***	**10.00**		**Asymmetrical treatment. Highest full-time provision for the entire street without reducing travel lanes below 3m, only acceptable if low demand for parking exists or is encouraged on east side.**
high					***OR***	***AT+LH (west)***	***AT+LM (east)***	**9.70**		**Provides more symmetrical appearance and above minimum widths.**
high	***and***	**Park Rd**	**Kensington Rd**	**10.35**	**290**	**BCPL (west)**	**AT+LM (east)**	**10.35**	**$4,060**	**As for previous section, with 2.95m travel lane.**
high					***OR***	***EBL (peak)***	***EBL (peak)***			**Peak hour bike lanes using parking.**
high					***OR***	***AT+E (east)***	***AT+LM (east)***	**10.00**		
high					***OR***	***AT+LH (west)***	***AT+LM (east)***	**9.70**		
high					**AND**	**Other**				**Amend Dev Plan to encourage through site linkage from Shipsters Rd to laneway and Uxbridge St.**
medium	Statenborough St	Tusmore Ave	Dobbie Ct	13.20	350	AT+E	AT+E	12.60	$4,900	Highest provision possible on both sides. Note width varies at western end, due to development. Review when complete.
medium		Dobbie Crt	Glynburn Rd	12.95	360	AT+E	AT+E	12.60	$5,040	
high	**Tusmore Ave**	**Kensington Rd**	**Godfrey Tce**	**10.30**	**60**	**AT+LM**	**AT+LM**		**$840**	**No standing west, painted median. Review road design. Could support wide kerbside lane (equivalent to AT+LM) both sides plus 2.9m median.**
high		**Godfrey Tce**	**Rochester St**	**13.10 to 13.50**		**Other**				**Consider replacing short sections of existing bike lane with AT+E, with 2.85 travel lanes to develop 1.0m painted median to assist crossing over Tusmore Ave at Romney Rd, Statenborough St.**
low	Uxbridge St	Park Rd	laneway	10.00	270	AT+LM	AT+LM	7.40	$3,780	Laneway to Uxbridge St is well aligned with ped signals, but Uxbridge St has poor onwards access to west. Enable use without making preferred route. Provide cyclist right turn bay from Uxbridge St into laneway. (No parking exists on west at this point.)

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Table A1: Detailed route works

PRIORITY	STREET	FROM	TO	WIDTH	LENGTH	SIDE 1	SIDE 2	REQ'D WIDTH	EST. COST	COMMENTS
Erindale/ Wattle Park/ Burnside										
high	Hallett Rd	Kensington Rd	Godfrey Tce	11.75	90	AT+E (west)	AT+LM (east)	10.00	$1,260	Parking indented west side, becomes left turn lane. Large protuberances at Godfrey Tce.
high		Godfrey Tce	Hambour Pl	11.75	40	EBL	EBL	8.40	$560	Little parking due to bus stops, intersections. Parking for residents in side streets feasible. Could be peak EBL if impact on parking not acceptable.
high					*OR*	*AT+E (west)*	*AT+LM (east)*	10.00		Kerbline changes west, AT+E would provide guidance.
high		(assume	Hambour Pl	Stanley St	11.90) 40	EBL (peak)	EBL (peak)	8.40	$560	Parking demand is not high out of peak; EBL would continue to provide some protection to cyclists out of peak, especially over side streets.
high					*OR*	*AT+LM*	*AT+LM*	7.40		Symmetrical full-time treatment.
high					*OR*	*AT+E (west)*	*AT+LM (east)*	10.00		Matches to other section.
high		*and*	Stanley St	Stonyfell Rd	11.90 60	EBL (peak)	EBL (peak)	8.40	$840	See intersection treatment Stonyfell Rd.
high					*OR*	*AT+LM*	*AT+LM*	7.40		
high					*OR*	*AT+E (west)*	*AT+LM (east)*	10.00		
high			Stonyfell Rd	Statenborough St	11.75 30	EBL	EBL	8.40	$420	No parking due to proximity of intersections.
		(or	Stonyfell Rd	Statenborough St	11.90)					
high			Statenborough St	Cowan St	11.35 110	EBL (west)	BCPL (east)	10.90	$1,540	EBL through no parking, bus stop, to ped signals. BCPL past indented parking, EBL may be possible where parking is not indented (or permitted).
high			Cowan St	Marble Tce	13.45 110	BCPL	BCPL	13.40	$1,540	Continue as EBL over side streets.
high		*and*	Marble Tce	Allendale Gr	14.70 110	BCPL	BCPL	13.40	$1,540	
high			Allendale Gr	Fernbank Tce	9.10 110	EBL	EBL	8.40	$1,540	Peak period if required.
high		*and*	Fernbank Tce	High St	9.00 250	EBL	EBL	8.40	$3,500	Trim painted median at Heatherbank Tce, or provide SUP reserve side, if required.
high			High St	Greenhill Rd	14.20 160	BCPL	BCPL	13.40	$2,240	Transition to EBL approaching Greenhill Rd.
low	Lockwood Rd		Kensington Rd	Newland Rd	7.80 650	AT+LM	AT+LM	7.40	$9,100	Excludes angled parking near Newland Rd.
low		*and*	Newland Rd	High St	11.10 420	AT+LM	AT+LM	7.40	$5,880	
low					*OR*	*EBL (peak)*	*EBL (peak)*	8.40		Parking demand is not high out of peak; EBL would continue to provide some protection to cyclists out of peak, especially over side streets.
low					*OR*	*AT+E (east)*	*AT+LM (west)*	10.00		Asymmetrical treatment. Lockwood Rd rises at its south end to meet Greenhill Rd, higher level of treatment could be provided for uphill travel. Also allows 1.0 metre wide painted median to be installed at side streets if required in future.
low		*and*	High St	Greenhill Rd	11.00 170	AT+LM	AT+LM	7.40	$2,380	Symmetrical, match to other section.
low					*OR*	*EBL (peak)*	*EBL (peak)*	8.40		
low					*OR*	*AT+E (east)*	*AT+LM (west)*	10.00		Higher provision could be provided on one side.
low	Penfold Rd		Kensington Rd	Carunta St	12.00 320	AT+LM	AT+LM	7.40	$4,480	Symmetrical, match to other section.
low					*OR*	*AT+LM (west)*	*AT+E (east)*	10.00		Match to BCPL section.
low		*and*	Carunta St	Simpson Rd	12.10 80	AT+LM	AT+LM	7.40	$1,120	
low					*OR*	*AT+LM (west)*	*AT+E (east)*	10.00		
low			Simpson Rd	Stonyfell Rd	12.10 250	AT+LM	AT+LM	7.40	$3,500	
low					*OR*	*AT+LM (west)*	*BCPL (east)*	10.40		Reservoir to west, low parking demand.
low					90 AND	EBL	EBL		$1,260	No parking east: bus stop, driveways, Clark St intersection. Consider extending to start of housing south of Clark St. Match on west, possibly peak hour on this side.
medium	Statenborough St		Glynburn Rd	Lockwood Rd	7.40 380	AT+LM	AT+LM	7.40	$5,320	
medium			Lockwood Rd	Goyder St	10.95 150	AT+LM	AT+LM	7.40	$2,100	Match to other section. AT+LH or AT+E could be provided one side, if one side has higher parking demand, but not a symmetrical treatment.
medium					*OR*	*EBL (peak)*	*EBL (peak)*	8.40		Parking demand is not high out of peak; EBL would continue to provide some protection to cyclists out of peak, especially over side streets.
medium		*and*	Goyder St	Hallett Rd	10.85 160	AT+LM	AT+LM	7.40	$2,240	
medium					*OR*	*EBL (peak)*	*EBL (peak)*	8.40		
low	Stonyfell Rd		Hallett Rd	Penfold Rd	8.90 to 9.85 800	EBL (peak)	EBL (peak)	8.40	$12,000	Replace islands at car parking with painted islands, or cut back to remove squeeze point, or provide cyclist cut-through or path over islands. Sign parking as peak EBL, would continue to provide some protection to cyclists out of peak. Could replace edge-lined parking with AT+E (north side), but would create narrow lane on south.
low	Yeltana Ave		Caloroga St	Wahroonga Ave	7.30 290	AT+LM (west)	nothing	6.70	$4,060	Yeltana Ave climbs from Caloroga St to Simpson Rd, provide facility for uphill travel. Do not mark road centre line. Provide SUP west side of Caloroga St from Yeltana Ave to Kensington Rd.
low			Wahroonga Ave	Simpson Rd	7.20 160	AT+LM (west)	nothing	6.70	$2,240	

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PRIORITY	STREET	FROM	TO	WIDTH	LENGTH	SIDE 1	SIDE 2	REQ'D WIDTH	EST. COST	COMMENTS
Linden Park/ St Georges										
medium	Austral Ave	End of Austral Ave	Jellicoe St & Beatty St	11.10	100	AT+E (west)	AT+LM (east)	10.00	$1,400	Appears to be well-used for parking on west. Add "bicycles excepted" subplate to "no through road" sign at Linden Cres.
medium					15 AND	SUP		2.50	$3,750	Widen path from car park to Greenhill rd/ Portrush Rd intersection.
medium		Jellicoe St & Beatty St	Hood St & Keyes St	9.20	130	AT+LM	AT+LM	7.40	$1,820	
medium					100 AND	SUP		3.00	$25,000	Widen path from Austral Ave west of Hood St to Park Ave. Provide wide kerb ramp to access.
medium		Park Cres	Sturdee St	9.10	420	AT+LM	AT+LM	7.40	$5,880	
low	Cooper Pl	Devereux Rd	Glynburn Rd	10.90 to 11.10	700	EBL (peak)	EBL (peak)	8.40	$9,800	Parking demand is not high out of peak; EBL would continue to provide some protection to cyclists out of peak, especially over side streets. Essentially sign existing parking.
low	Dashwood Rd	Sunnyside Rd	Sturt Pl	11.75	130	EBL (peak)	EBL (peak)	8.40	$1,820	Parking demand is not high out of peak; EBL would continue to provide some protection to cyclists out of peak, especially over side streets. Essentially sign existing parking.
low		Sturt Pl	Caithness Ave	12.90	320	AT+E	AT+E	12.60	$4,480	EBL over bus terminus.
low		Caithness Ave	Glynburn Rd	11.80	150	EBL (peak)	EBL (peak)	8.40	$2,100	
medium	Devereux Rd	Greenhill Rd	Linden Ave	13.50	40				$560	Part of intersection treatment. Consider SUP as alternative access to Linden Ave from Greenhill Rd (see Greenhill Rd/ Tusmore Ave/ Devereux Rd crossing).
medium		Linden Ave	Sturdee St	11.10	610	EBL (peak)	EBL (peak)	8.40	$8,540	Parking demand is not high out of peak; EBL would continue to provide some protection to cyclists out of peak, especially over side streets.
medium					*OR*	*AT+LH*	*AT+LM*	9.70		Little parking used, but treatment not symmetrical.
medium		Sturdee St	Hay Rd	11.90	190	EBL (peak)	EBL (peak)	8.40	$2,660	Parking demand is not high out of peak; EBL would continue to provide some protection to cyclists out of peak, especially over side streets.
medium					*OR*	*Other*		10.20		Mark parking both sides, 2.1m wide, to form de facto EBLs that become parking when used.
medium		Hay Rd	Williams Cres	11.50	70	EBL	EBL	8.40	$980	Bus stops and ped signals, so little parking in this section.
medium		Williams Cres	West Tce	11.30	30	AT+LM	AT+LM	7.40	$420	Symmetrical treatment.
medium					*OR*	*EBL (west)*	*BCPL (east)*	10.9		Higher level of treatment both sides, matches to adjacent treatments. No houses on west front Devereux Rd, parking would mainly be on side streets.
low		West Tce	Sturt Pce	9.70	300	AT+LM	AT+LM	7.40	$4,200	
medium	Glynburn Rd	Greenhill Rd	Waterfall Tce		150	AT+E	AT+E	12.60	$2,100	Verify road width. Edge line exists adjacent car parking at north west end, add logos to form AT+E or signage to form BCPL. Continue as EBL south over Moore Ave. Provide edge line treatment (AT+E or BCPL) south to roundabout. On east, provide EBL south from no parking north of car park driveway past angled parking, bus stop. Match to edeline treatment towards roundabout, add logos to form AT+E or signage to form BCPL. Consider realigning and reducing width of painted median from roundabout, mark chevroned area as EBL and use width to change adjacent parking (2 spaces) to AT+E to driveway. OR semi-indent this parking to provide width for AT+E. OR remove parking.
low		Waterfall Tce	Seaforth Ave	9.70	80				$560	
low	Glynburn Rd West	Seaforth Ave	Garden Ave	9.70	40	BCPL (west)	n/a	6.80	$280	Road width may include median. Faded edge line exists adjacent car parking, but no logos or signage.
low	Glynburn Rd East	Seaforth Ave	Garden Ave	9.70	40	n/a	BCPL (east)	6.80	$280	As above, other side of the road.
low	Glynburn Rd West	Garden Ave	Dryden Ave	6.10	120	EBL (peak)	n/a	4.50	$840	Road width may include median. Sign parking to create EBL (peak). Continue EBL over Garden Ave, Dryden Ave. Other treatments may be possible with confirmed width, but gradient to road needs to be considered.
low	Glynburn Rd East	Garden Ave	Dryden Ave	6.10	130	n/a	EBL (peak)	4.50	$910	As above, other side of the road.
low		Dryden Ave	Katoomba Rd	12.80	280	EBL (peak)	EBL (peak)	8.40	$3,920	Consider developing 1.0m painted median at McAllen
low					*OR*	*AT+E*	*AT+E*	12.60		Road width may include median; minimum AT+E may not be appropriate given road gradient.
low		*and* Katoomba Rd	Bus Terminus	12.80	50	EBL (peak)	EBL (peak)	8.40	$350	EBL over bus terminus.
low					*OR*	*AT+E*	*AT+E*	12.60		
low		Bus Terminus	Warburton Crt	11.55	60	EBL (peak)	EBL (peak)	8.40	$420	
low		*and* Warburton Crt	Dashwood Rd	11.50	320	EBL (peak)	EBL (peak)	8.40	$2,240	
medium	Highfield Ave	Gulfview Rd	Devereux Rd	8.45	90.00	AT+LM	AT+LM	7.40	$1,260	Parking is not line marked.
medium				to	*OR*	*EBL (peak)*	*EBL (peak)*	8.40		
medium		*and* Portrush Rd	Gulfview Rd	8.50	580	AT+LM	AT+LM	7.40	$8,120	(To provide continuous treatment along the street.)

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PRIORITY	STREET	FROM	TO	WIDTH	LENGTH	SIDE 1	SIDE 2	REQ'D WIDTH	EST. COST	COMMENTS
medium	Linden Ave	Devereux Rd	Lerwick Ave	11.80	340	EBL (peak)	EBL (peak)	8.40	$4,760	Width not accurate; wide median. Parking demand is not high out of peak; EBL would continue to provide some protection to cyclists out of peak, especially over side streets. Essentially sign existing marked parking. Taper to Devereux Rd, connect to SUPs (proposed).
low		Lerwick Ave	Ray Cooper Gdns (?)	12.00	40	AT+LM	AT+LM	7.40	$560	Transition EBL along Linden Ave to AT+LM through garden area. Verify road width (estimated down to 7.5m). Mark no standing line marking through narrow area.
low		*and* Ray Cooper Gdns	Russell Ave	13.60	170	AT+LM	AT+LM	7.40	$2,380	Assume as above.
		(or Ray Cooper Gardens West	Lancelot Ave	19.00						
		Lancelot Ave	Ray Cooper Gardens East	11.30)						
low		Russell Ave	Seaforth Ave	16.00	110	EBL (peak)	EBL (peak)	8.40	$1,540	Essentially sign existing marked parking.
low		*and* Seaforth Ave	Ruskin Pl	12.20	70	EBL (peak)	EBL (peak)	8.40	$980	
low		*and* Ruskin Pl	Wood Gr	12.00	50	EBL (peak)	EBL (peak)	8.40	$700	
low		Wood Gr	Duell (Lambden) Ln	13.50	50	AT+LM	AT+LM	7.40	$700	Width not accurate. Transition to AT+LM
low		*and* Duell Ln	Cooper Pce	8.50	30	AT+LM	AT+LM	7.40	$420	
medium	Park St	Keyes St	Beatty St	7.30	90	AT+LM (south)	nothing	6.70	$630	Provides route marking for cyclists seeking to access Burnside Village via Park St.
medium		Beatty St	Portrush Rd	7.40	100	AT+LM	AT+LM	7.40	$1,400	
low	Russell Ave	Glynburn Rd	Collingwood Ave	7.30	680	AT+LM (south)	nothing		$4,760	Continues treatment on south side - concealed driveway exist in this direction of travel, Glynburn Rd end.
low		Collingwood Ave	Cooper Pce	7.50	100	AT+LM	AT+LM	7.40	$1,400	
medium	Sturdee St	Portrush Rd	Beatty St	9.00	100	EBL (peak)	EBL (peak)	8.40	$1,400	Essentially sign parking as peak period EBL. Parking demand is not high out of peak; EBL would continue to provide some protection to cyclists out of peak.
medium	(or	Portrush Rd	Beatty St	10.90)	*OR*	*AT+LM*	*AT+LM*	7.40		No impact on amount of parking, but high impact on current edgelining.
medium		Beatty St	Rayne Ave	10.90	410	EBL (peak)	EBL (peak)	8.40	$5,740	
medium		*and* Rayne Ave	Devereux Rd	10.95	220	EBL (peak)	EBL (peak)	8.40	$3,080	
Beaumont/ Glen Osmond										
low	Bagot St	Glyde St	Blyth St	7.50	100	AT+LM	AT+LM	7.40	$700	
low	Blyth St	Pridmore Rd	Bagot St	7.45	50	AT+LM	AT+LM	7.40	$350	
low		*and* Bagot St	Fulton Cres	7.50	160	AT+LM	AT+LM	7.40	$1,120	(To provide continuous treatment along the street.)
low	Craighill Rd	Portrush Rd	Sunnyside Rd	7.65		AT+LM	AT+LM	7.40		Parking is not line marked.
low	Glebe Rd	Portrush Rd	Pridmore Rd	7.55	210	AT+LM	AT+LM	7.40		
high	**Portrush Rd**	**Fowlers Rd**	**South Eastern Freeway**	**19.00**					**State govt**	**Mark WKL conditions where possible.** **Consider indenting kerb east side between trees and stobie poles, where 20m+ lengths of bike lane can be created with this plus carriageway width e.g. over Gilles Rd, Day Rd, Woodley Rd and Glebe Rd intersections.** **Commence bike lane at north side Pridmore Rd, run to footpath on south side. Mark as SUP. Provide kerb ramp to access bike lane at start of bus bay, South Eastern Freeway.**
high		**South Eastern Freeway**							**State govt**	**Extend Crafers Bikeway to Boucat St, by new path to Gill Tce and widen footpath to Boucat St. Provide cyclist cut-through of closure, Boucat St.**
low	Sunnyside Rd	Dashwood Rd	Thirkell Ave	9.30	80	EBL (peak)	EBL (peak)	8.40	$1,120	Parking demand is not high out of peak; EBL would continue to provide some protection to cyclists out of peak, especially over side streets. Essentially sign existing marked parking.
low					OR	AT+LM	AT+LM	7.40		
low		Thirkell Ave	Craighill Rd	9.10	60	AT+LM	AT+LM	7.40	$840	
low					OR	EBL (east)	nothing	7.20		Road width may not include road narrowing, west side. Peak EBL east.
low		Craighill Rd	Anglesey Ave	11.05	115	AT+LM	AT+LM	7.40	$1,610	
low		Anglesey Ave	Old Coach Ln	10.70	320	EBL (peak)	EBL (peak)	8.40	$4,480	Parking demand is not high out of peak; EBL would continue to provide some protection to cyclists out of peak, especially over side streets. Essentially sign existing marked parking. Continue EBL over Old Coach Ln.
low				to 10.95	OR	AT+LM	AT+LM	7.40		
low		Old Coach Ln	Gilles Rd	10.70	60	AT+LM	AT+LM	7.40	$840	Parking is not line marked. Transition to narrower road width at Gilles Rd.

BCPL = bicycle car park lane
EBL = exclusive bike lane

AT+E = advisory treatment with edge line

AT+LH = advisory treatment with logo (high parking demand)
AT+LM = advisory treatment with logo (minimal parking demand)

1.6.3 Table A2 – intersections and crossings

This is not a comprehensive examination of all intersections and crossings in Burnside, although it is extensive. The locations examined instead reflect the aim of providing continuous treatments. The priorities shown include Super Route connections.

Figure A1, overleaf, presents all intersection/ crossing locations for which a recommended treatment has been described in Table A2. These are shown prioritised, in accordance with the previous priorities assigned for DPTI/ DPTI and DPTI/ local roads, and to suit conditions for local/ local roads.

Table A2 is provided following Figure A1.

Treatments are divided into DPTI/ DPTI roads, DPTI/ local roads and local/ local roads. The DPTI/ local roads section is shown shaded, to assist in identifying the sections separately, similarly to the routes in Table A1. Locations that would fall on Super Routes are highlighted in yellow.

Locations are defined by a primary road and secondary road, except for:

- DPTI/DPTI roads do not have a primary and secondary status, so are shown as east-west running first and then north-south running, and in alphabetic order;
- road closure locations, where no secondary road exists (these are identified as “road closure”).

For DPTI/ local roads, the DPTI road is the primary road. Within each category, locations are ordered alphabetically by primary roads and then the location ordered north to south and west to east along the primary road.

The priority is listed and a description of the recommended treatment is next provided.

Costs for intersections and crossings involving DPTI roads are assumed to be funded by DPTI.

An estimated cost has not been assigned to the remaining intersection treatments. As intersection treatments would be implemented as part of route designs, economies are expected in the implementation of works, but the degree of this is difficult to assess. Therefore, an allowance of $5,000 per intersection has been made. This is a low figure for any significant works, but as many as half of the treatments do not propose significant works.

- For the ten high/ highest priority treatments, a total indicative cost of $50,000 has therefore been assumed.
- For the remaining 27 medium/ low priority treatments, a total indicative cost of $135,000 is assumed.

1.6.4 Table A3 – no on-road works proposed

The final table in this Appendix presents streets that are nominated routes but for which no on-road works are proposed - generally due to lack of road space.

Streets that are part of Super Routes have been highlighted in yellow.

As well as being listed for completeness, some routes also have design comments such as regarding locations for “bicycles crossing” signage. This table provides a record of these comments, to be considered in conjunction with implementation of route and crossing/ intersection treatments.

The format for this table is similar to table A1, but without priority, cost, or required width fields.

For these routes, directional route signage and network route signage are still required.

These routes are generally narrow streets for which it can be assumed that traffic speeds are moderate, however these should be monitored and traffic devices implemented to moderate speeds if required. Such devices should, of course, be ‘cycle friendly’ and include a cycle bypass.

TABLE A2: CROSSING/ INTERSECTION DETAILS

DPTI/ DPTI ROADS			
East-west road	**North-southroad**	**Priority**	**Description**
Glen Osmond Rd	**Fullarton Rd**	**highest**	**Examine for opportunities to improve, and/or establish bypass routes. Path into Eastwood.**
Glen Osmond Rd	Portrush Road	medium	Examine for opportunities to improve, and/or establish bypass routes. (Provide bike path, north east corner to link to Crafers path - separate project). Trim median west of Gill Tce to provide better access to R turn lane from Crafers path.
Greenhill Rd	**Fullarton Rd**	**highest**	**Increase path width through islands where possible, including as path split either side of signal posts, and mark for shared use. Relocate holding rail, north-west corner. Widen kerb ramp, south-east corner, widen path and sign for shared use.**
Greenhill Rd	Glen Osmond Rd	low	High with perimeter path development. Widen median, east side, to create improved refuge. Improve east-west connection with perimeter path.
Greenhill Rd	**Portrush Road**	**high**	**Develop and sign L-turn bypasses: Linden Cres;Cator/Sydney; Sturt/Christie; Fisher/Hyde. Consider crossing treatments to assist use as R-turn bypasses also, with path links as req'd. Sign south-east footpath for shared use. Provide southbound bike lane, departure side Portrush Rd. Provide bike lane approach side, westbound, from Linden Cres and mark in green pavement (cars are allowed to drive in a bike lane to turn left). Sign westbound bike, departure side, as full-time to past ped signals (current no standing). Create interpeak bike lane, eastbound approach (with parking). Consider using car park landscaping to widen footpath for bike use, southbound approach. Sign eastbound departure bike lane full-time to past Hyde St, with green over slip lane. Provide northbound bike lane, departure side, at least to Christie Ave.**
Greenhill Rd	**Glynburn Rd**	**highest**	**Provide path bypass. Consider redesigning or upgrading roundabout to signals in the long term.**
Kensington Rd	**Fullarton Rd**	**highest**	**Britannia Roundabout. Consider signalising as a 4-way intersection with exit only to Fullarton Rd.**
Kensington Rd	Glynburn Rd	medium	Priority for this intersection is based on continuity of Glynburn Rd rather than Kensington Rd, which has no ongoing route. The road reserve in Glynburn Rd is wide and bike paths could be provided on the approach and departure to Kensington Rd, but street furniture, trees and side entry pits provide limitations on length of treatment and path design. A treatment that extended to the existing bike lanes is desirable but would require removal of parking in Glynburn Rd (north) - around 3 spaces on either side of the road. The Kensington Rd road reserve is wider on the north western approach to Glynburn Rd. Some of this has been used to provide an extra lane at the intersection and there is vegetation at the eastern end. It should be possible to provide an indented bike lane in this section, or bike path (more potential for conflict with peds but could be aligned aroundvegetation) with bike button at Glynburn Rd. For the indented option, the signal post at Glynburn Rd would have to be moved back, unless the bike bay went around the post to its north; the bike path would be aligned to avoid this. This would affect the waiting area for the bus stop. Alternatively, road widening to form short WKL treatments may be feasible but expensive due to the need to relocate street furniture.
Kensington Rd	Penfold Rd	low	Improve alignment of and widen paths around roundabout for cycle use. Provide chevroned areas at ends of splitter islands to encourage cyclists to occupy the lane and create the perception of narrower traffic lanes within the roundabout.
Kensington Rd	**Portrush Rd**	**high**	**Provide/improve Portrush Rd bike lanes, approach and departure, with green pavement over slip lanes. Provide eastbound bike lane, departure - cut back kerb if required. Extend eastbound approach over slip lane, with green pavement. Extend westbound departure over slip lane, with green pavement. Sign Wellington/Bridge, Hewitt/Moore, Donegal/Cypress (with access through Cypress) as L-**
Magill Rd	**Glynburn Rd**	**high**	**Provide bike lanes, eastbound approach and departure, southbound approach and departure. Consider reducing median width, Portrush southern leg, to accommodate. Change continuous turn lane, north-east corner, to pref. high angle slip lane with bike lane over the mouth. Sign L turn bypass, Orient Rd/Elford St, Water St, Williams Ave/Third Ave, Brookside Ave/Galway Gv**
Magill Rd	New Norton Summit Rd	medium	Provide path bypass for left into New Norton Summit Rd. Provide westbound BCPL.
Magill Rd	Penfold Rd	medium	Provide bike box, east leg. Other legs subject to phasing (not west leg due to through/left traffic and left turn arrow). Consider road widening north east and south west legs, to provide width for bike lane over vehicular merge area. Provide indented bike bay north west footpath, behind street furniture, with bike button. Provide bike phase with ped phase to allow cyclist to move from bay ahead of traffic. Provide narrow bike lane or logo from bay to front of traffic, or widen this lane by narrowing other lanes/ median. Review phasing. Reinstate pavement.
Magill Rd	Portrush Rd	low	Upgrade bike lanes with green pavement over slip lanes and extend on approach and departure as far as practicable.
The Parade	**Portrush Rd**	**high**	**Extend bike lanes over slip lanes, approach and departure, with green pavement. Sign L turn bypass, Bowen St/High St. Provide path over build-out, north-east corner. Remove pavement bars, provide peak hour bike lane, southwest corner (into bus stop). Extend southbound approach bike lane as far as practicable. Extend northbound approach bike lane as far as practicable. Provide north and south bound departure bike lanes as far as practicable.**

DPTI/ LOCAL ROADS			
Primary road	**Secondary road**	**Priority**	**Description**
Fullarton Rd	**Dulwich Ave**	**high**	**No ongoing route, upgrade access along Fullarton Rd access road instead, to make use of Grant Ave crossing point.**
Fullarton Rd	**Grant Ave**	**highest**	**Remove parking eastern departure, test bus turning movements, use to provide crossing at Thomas Pl. Look to reallocate road space to achieve bike lane on approach to Fullarton Ave as first priority, departure as second priority.**
Glen Osmond Rd	**Bower Pl route/ Kenilworth St/ Young St**	**highest**	**Review ped path for use, provide route signage. Sign all crosswalks for shared use and widen, add bike lanterns. Provide post with bike button, Young St. Investigate options to provide short length EBL or advisory treatment, Young St approach and departure. Provide kerb ramp, Glen Osmond Rd/ ped path.**
Glen Osmond Rd	**Main Ave**	**high**	**Provide SUP from Main Ave to ped signals, east side of Glen Osmond Rd.**
Glen Osmond Rd	**Conyngham St/ Bevington Rd**	**high**	**Katherine St: provide line marked island to maintain access to kerb ramp, cut back hazard board from edge of (nominal) path, designage path (bike logos, edge lines), add "bicycles excepted" subplates to "no entry" signs. Add "bicycles excepted" subplate to "no right turn" sign on Glen Osmond Rd. Provide wide kerb ramp adjacent ped crosswalk for cyclists to access Glen Osmond Rd. Provide departure side EBL Conyngham St and Bevington Rd. Check if bike buttons required to actuate signals, provide if required.**
Glen Osmond Rd	Fowlers Rd	medium	Provide bike path over throat of Fisher St, into shared use path on south-west footpath, to pedestrian signals. Provide SUP connection to Fowlers Rd.
Glynburn Rd	**Beulah Rd/ Cuthero Tce**	**highest**	**Provide cyclist refuge across Glynburn Rd (nominally 15.6m wide at this point). Narrow bike lanes across Beulah Rd to create space if required. Provide turning bay on east side using indented parking bay, to assist right turns and highlight route.** **<u>Super Route</u>: provide path, eastern footpath.**
Glynburn Rd	**Park Rd/ Quondong Ave**	**high**	**Create central island between left and through/right lanes, Park Rd and Quondong Ave. Narrow travel and bike lanes in Glynburn Rd on approach and departure to intersection, use width to provide 1.0 metre wide line-marked median (to form cyclist refuge).**
Glynburn Rd	**Statenborough St**	**highest**	**Narrow travel and bike lanes in Glynburn Rd on approach and departure to intersection, use width to provide 1.0 metre wide line-marked median (to form cyclist refuge).**
Greenhill Rd	**Birkin St/ Beaumont Rd**	**highest**	**Cyclist refuge in median; slightly realign slip lanes to suit. Consider widening painted median in Beaumont Rd to create short stand-up lane into refuge crossing. Add "bicycles excepted" subplates to Beaumont Rd "no through road" signage, "no entry" and "one way" signage in median. Consider route signage (with ACC).**
Greenhill Rd	**Cleland Ave**	**high**	**No ongoing route. Line-mark seagull island in median. Consider providing turning bay on south side of Greenhill Rd, opposite ped refuge, to assist cyclists to turn to cross from kerb side. Widen ped**
Greenhill Rd	**Stuart Rd**	**highest**	**Line-mark seagull island in Greenhill Rd median. Trim central median in Stuart Rd to provide short bike stand-up lane.**

TABLE A2: CROSSING/ INTERSECTION DETAILS

Greenhill Rd	**Conyngham St**	**highest**	**Main issue appears to be right turn motorists accepting short gaps in traffic, during green phase with no arrow. Provide "right turn give way to bikes" sign at right turn lane. Examine impact of changing phasing. Carry southern Greenhill Rd bike lane over Conyngham St using green pavement colour. Mark seagull island in Greenhill Rd (for cyclists to store while waiting for a gap). Consider changing northern bike lane to full-time from ped signals to Hillview St.**
Greenhill Rd	**Cudmore Ave**	**high**	**Reduce length of western right turn lane into Kyle St to minimum. Provide turning bay in southern kerb west of this point, to facilitate cyclists turning from kerb side (i.e. behind western turn lane).**
Greenhill Rd	**Sydney St**	**high**	**Consider removing or semi-indenting parking east of Sydney St to improve sight distances. Shorten taper, right turn lane Greenhill Rd to Sydney st, provide refuge in median west of Sydney St to provide U-turn opportunity to access Sturt Rd, with removal of parking and bike bay provided to access refuge. AND/OR Provide indented bike lane in median for cyclists from Sydney St to enter to access right turn lane into Cudmore Ave.**
Greenhill Rd	**Northumberland St/**	**high**	**Super Route: Provide seagull island crossings opposite Northumberland St and Verdale Ave.**
Greenhill Rd	**Devereux Rd**	**high**	**Provide bike box western leg of Devereux Rd intersection, to assist cyclists to enter right turn lane. Consider shortening/ changing taper angle on right turn lane to Northumberland St, Devereux Rd and trimming back-to-back kerb to create chevroned area between right turn lanes that cyclists can enter to enter right turn lanes. Shorten available parking east of Northumberland St by 1 space to provide bike lane reaching to opposite start of Devereux Rd right turn lane. Consider a bike bay and holding rail in kerb opposite this point. Reduce lane width into Devereux Rd, use to provide short bike lane between left and right turn lanes on approach to Greenhill Rd. OR to create kerbside bike lane left of left turn lane, into bike box, with bike button to actuate signals. (Depends on signal phasing and times.) Narrow median on north side by 1.6m, transition travel lanes over 20m, to provide full-time bike lane adjacent parking on north side. Change peak to full-time bike lanes south side. (OR Consider providing bike path in median, Tusmore Ave to Devereux Rd.) Consider SUP on east side of Devereux Rd, to Linden Ave, with seagull island crossing.**
Greenhill Rd	**Howard Tce**	**highest**	**Super Route: Provide path to pedestrian refuge, then to Lancelot Ave.**
Greenhill Rd	Howard Tce	medium	Provide cyclist right turn lane in nose of median to east. Consider also providing turning bay in southern kerb line, to facilitate crossing from kerb side lane.
Greenhill Rd	Lockwood St	medium	Narrow departure lane at Lockwood St, use width to create bike stand up lane between left and through/right out traffic and departure lane EBL for in traffic. Narrow painted median in Lockwood St to provide space, if required. Examine whether 1.0m painted median can be created in Greenhill Rd.
Greenhill Rd	Hallett Rd	low	Consider narrowing traffic lanes in Greenhill Rd to provide wider painted median and stand up lane on west approach. Hallett Rd, narrow departure lane or cut back island to provide short EBL on approach (and preferably departure side) to intersection.

TABLE A2: CROSSING/ INTERSECTION DETAILS

DPTI/ LOCAL ROADS (continued)

Primary road	Secondary road	Priority	Description
Kensington Rd	**Victoria Tce/ Sydenham Rd**	**highest**	**Widen painted median in Kensington Rd to 1.0m wide minimum. Narrow departure lane at Victoria Tce, use width to create bike stand up lane between left and through/right out traffic. Narrow painted median in Victoria Tce to provide space, if required. Consider EBL on departure from Kensington Rd. Match at Sydenham Rd. Mark "keep clear" across Kensington Rd east side of ped signals. OR Consider moving ped signals to signalise Kensington Rd/ Sydenham Rd/ Victoria Tce intersection. OR Consider partial signalisation of the intersection, with ped crosswalks immediately east and west of Sydenham Rd/ Victoria Tce.**
Kensington Rd	**Giles St/ George St**	**high**	**Develop a 1.0m wide painted median in Kensington Rd. Use median width George St to create stand-up lane for cyclists between left and through/right lanes. Create left and through/right lanes in Giles St and repeat treatment, with "bicycles excepted" subplate to peak hour left only sign.**
Kensington Rd	**Dudley Rd/ High St**	**high**	**Consider replacing upright kerb between petrol station entrances with rollover kerb and marking this section as shared use path. To enable cyclists to use footpath as turning bay. Holding rail at property line would assist.**
Kensington Rd	High St/ Tusmore Ave	medium	Widen cut-through path to High St, realign to direct cyclists through car park into Shipsters Rd (or redirect via Dankel Ave). Provide EBL in Shipsters Rd in no parking area (clearway on west side) near Kensington Rd. Provide short section of SUP on northern footpath, to ped signals. Add bike crosswalk, button and lights. Remove car parking bays south side Kensington Rd, provide SUP. Mark stobie poles for visibility (or replace). Treatment would work better if ped crosswalk were moved east by up to 3 metres, using superseded signal points for cycle crossing instead.
OR	Tusmore Ave/ Uxbridge St	medium	Locate short section of SUP on south side Kensington Rd from Tusmore Ave to ped signals, with bike crossing added on eastern side of signals (crosswalk, button, light). Access to Uxbridge St via laneway adjacent ped signals. Provide bike button at western side of laneway so that cyclists do not have to detour or need SUP to use ped signals. Provide break in median opposite Uxbridge St. Investigate option of travel through car park to Dudley St.
Kensington Rd	Hallett Rd	medium	Provide path bypass from Kensington Rd west to east, commencing at Brigalow Ave and joining bike lane to east. Will have squeeze point. Provide cut-throughs of splitter islands and kerb ramps plus links to these from footpaths. Widen footpaths around roundabout. Provide wide kerb ramp to access footpath 5m before end of westbound bike lane, Kensington Rd east.
Magill Rd	**Verdun St to Salop St**	**highest**	**(See Magill Rd.)**
Magill Rd	**Osborn Ave/ Ashbrook Ave**	**high**	**Change bike lanes to full-time, Avonmore Ave to Ashbrook Ave on the north side of Magill Rd (significant off-street parking exists here) and Osborn Ave to Ashbrook Ave on the south side of Magill Rd, plus at least 5 metres west of Osborn Ave and east of Ashbrook Ave (preferably up to 20 metres, but this will remove parking on the south side of Magill Rd). Between Portrush Rd and Glynburn Rd, Magill Rd is nominally 1.0 metre wider than at Glyburn Rd to Gurrs Rd. Use this width to paint a 1.0 metre wide median between Osborn Ave and Ashbrook Ave, and at least 5 metres west of Osborne Ave and east of Ashbrook Ave. Transition either side.** **<u>Super Route</u>: provide pedestrian actuated crossing Brand Street. See Burnside Connector Route notes.**
Magill Rd	Gurrs Rd/ Breaker St	medium	Re-mark bike lane over bus stops, change to full-time between Gurrs Rd and Breaker St. Road reserve is wider between Gurrs Rd and Breaker St than either side, could indent footpath by 0.5 metres either side of Magill Rd and line-mark a 1.0 metre median. Transition kerb-line west of Gurrs Rd, east of Breaker St. This would affect bus stops but as only a minor change, should not be unacceptable.
Magill Rd	**Toowong Ave/ Green St**	**high**	**Relatively wide footpaths in this area, but also commercial development. Consider indented bicycle only path south side, Toowong Ave to pedestrian signals, with bike button to call signals. Add bike lantern. Change peak hour bike lanes to full-time to suit. Repeat in other direction, for Green St.**
Magill Rd	**Rowland Ave/ Lorne Ave**	**high**	**Current design by Campbelltown Council using refuges. A bike path provided in the median would have less anti-directional (particularly uphill) travel and be more convenient for adult and commuter cyclists.**
Penfold Rd	Adelaide St	medium	Full-time EBL from ped signals to Adelaide St (existing no parking area). NB school children <12 can use footpath.
Penfold Rd	**Chapel St**	**high**	**Provide bike refuge, transitioning road widths to north and south. Restrict parking as required.** **<u>Super Route</u>: provide peak hour bike lanes, or kerb protuberance with on-kerb parking (bike path during peak hours) to access ped crossing. Sign footpath for shared use, ped crossing to Ellis St.**
Penfold Rd	The Parade	medium	Roundabout. Provide kerb ramps and cut-throughs of splitter islands, Penfold Rd south and The Parade east. Link to paths as required. Provide EBL on all legs of the roundabout. Provide bypass from Penfold Rd south to The Parade west using reserve. Consider bypass from The Parade west to Penfold Rd north using verge (kerb side of footpath), into new section of full-time EBL. Extend chevron marking into roundabout, over areas without wear marks, to better delineate path of vehicular travel.
Portrush Rd	**Cator St/ Park St**	**high**	**Narrow westbound lane in no parking section of Cator St, use width to provide EBL to Portrush Rd signals. Widen existing cut-through and provide additional cut-through, Park St to signals. Add bike lights, westbound cyclist crosswalk and phase (hold right out of Cator St when called).**
Portrush Rd	**Fowlers Rd**	**high**	**(For one way of travel).Locate bike button at kerb to actuate ped signals over western lane of Portrush Rd. Create entry into median, with "keep clear" marking. Create path in median to new bike crossing area adjacent ped refuge area of ped signals (approx. 20m), add bike light to ped light, add bike button.**
Portrush Rd	**Grant Ave**	**highest**	**Consider marking footpath as SUP south of Grant Ave and north of Stannington Ave, leading to mid-block refuge in Portrush Rd median. Implies use of Stannington Ave instead of Stafford Gr, which would be subject to school traffic. Provide turning bays in Portrush Rd between Grant Ave and Stafford Gr, to help cyclists access right turn lanes.**
Portrush Rd	Highfield Ave		No suggestion.
Portrush Rd	**Queen St**	**highest**	**<u>Super Route</u>: Provide seagull island crossing, Queen St and Highfield Ave. Indent parking to enable full-time BCPL between Queen St and Highfield Ave. OR Assess feasibility of providing path along central median.**
Portrush Rd	**The Parade**	**highest**	**Provide short section of one-way separated path from Portrush Rd on northern footpath, which is wider in this area but with low ped demand. Ramp back to road level past traffic merge point. From road wear marks, vehicles do not track close to the kerb at the north-eastern corner of the intersection. Mark this area with edge-lines and chevrons to discourage vehicles entering it and consider minor kerb re-alignment to suit cyclist kerb ramp. Extend bike lanes over slip lanes, eastern and western approaches.**
Portrush Rd	**Windsor St/ Sturdee St**	**high**	**Prohibit parking on Windsor Rd between driveways and Portrush Rd, to improve sight distance and provide short length of EBL. Provide cut-through of Portrush Rd median.**
Portrush Rd	Woodcroft Ave/ Bevington Rd	medium	Create exclusive bike path in median, with ped fencing.

TABLE A2: CROSSING/ INTERSECTION DETAILS

LOCAL ROAD/ LOCAL ROAD

Primary road	Secondary road	Priority	Description
Albert St	road closure	medium	Relocate hazard board from edge of path, widen path to 2.0m (remove bollard south side and change landscaping to suit), provide bike logos, provide "no entry" with "bicycles excepted" subplate east and west; add "bicycles excepted" subplate to Albert St "no through road" signage.
Birkin St/ Hauteville Tce	**John St**	**highest**	**Provide kerb ramps and widen paths, sign as shared use, through closure. Trim shrubs or change landscaping to improve visibility.**
Boucat St	road closure	medium	Remove fence, provide 2.0m central path, provide small hazard boards east and west, provide bike logos, provide "no entry" with "bicycles excepted" subplate north and south.
Conyngham St	**Cator St**	**highest**	**Remove parking for sufficient distance to develop refuge in Conyngham St. Could consider short length of SUP south side Cator St, to provide better alignment between bike route and refuge, but need to align to minimise ped conflicts with footpaths. SUP on north side would need to allow merge back to traffic. Note side entry pits close to intersection, in Conyngham St, provide a design constraint.**
Conyngham St	**Windsor St**	**high**	**Provide EBL in no parking on approach to roundabout, may need to remove one parking space on north side to provide useful length. Transition to adjacent treatment.**
Cuthero Tce/ Briant Rd	dead end	medium	Negotiate with Kathlyn Private Hospital and Morialta High School for access through the hospital car park to Morialta High School, initially by providing gated access only but with a view to utilising landscaped/ unused areas to provide a path for students. (The northern boundary appears to have over 3 metres between the fenceline and parking area to provide a SUP, but as the hospital is located north of the car park, a route to the south might be more desirable from the viewpoint of the hospital). Encourage a through site link in the future through the Dev Plan.
Dashwood Rd	Sunnyside Rd	medium	Provide improve kerb ramps and SUP connections to cut-through to Inverness Ave. Trim vegetation along cut-through. Widen painted median and provide cyclist right turn lane from Dashwood Rd and refuge to turn into Sunnyside Rd. Provide signage and lighting for path.
Devereux Rd	Williams Cres/ West Tce	low	Realign central islands to suit bike facilities, Devereux Rd.
Eringa Ave/ Taminga Ave	road closure	low	Widen kerb ramp, cut back landscaping, provide 1.2m path east and west, provide cyclist "stop" sign western path, provide "no entry" with "bicycles excepted" subplate north and south.
Fullarton Rd service road	**Dulwich Ave**	**high**	**Consider marking crossing point with "keep clear" or similar, and/or whether lane widths and central island could be reconfigured to provide a 1.0m painted median to aid crossing.**
Fullarton Rd service	**Swaine Ave**	**high**	**See Fullarton Rd service road SUP to Grant Ave.**
Garden Ave	bridge to Waterfall Tce	low	Sign for shared use, seal path Waterfall Tce side, provide "bicycles excepted" subplate to "no through road" signage.
Grant Ave	**Alexandra Ave/ Gurney Rd**	**highest**	**Provide kerb ramps to paths at Rose Park Primary School, widen paths, connect western path to Wittber Ln. Reverse chicane at Grant Ave, provide kerb ramp into north-eastern bike lane. Widen path from Wittber Lane to school.**
Grant Ave	**Giles St**	**high**	**Consider path bypass of roundabout (check sight distance to driveways, use of the area for car parking).**
Glynburn Rd	McAllen Ave	low	McAllen Ave possible alternative access to Waterfall Tce. Develop 1.0m painted median in Glynburn Rd to assist crossing. Consider creating painted island between left out and right out movements from McAllen Ave, for cyclists to store. Could remove parking in Glyburn Rd either side of McAllen Ave to create space for larger median and cyclist refuge.
Glynburn Rd	Cooper Pl	low	Trim kerb protuberances in Glynburn Rd, or provide short section of path over (northern protuberance only), or provide cyclist bypass.
Hallett Rd	Stonyfell Rd	low	Provide EBL over throat of Stonyfell Rd. Mark left and right out lanes, create cyclist storage between, take up to edge of bike lane. Taper median to increase to 1.0m at Stonyfell Rd, extend closer to intersection. Use chevron line marking instead of pavement bars close to intersection.
Hallett Rd	Statenborough St	low	Provide kerb ramp to south-western footpath of Hallett Rd. Set back ped fencing to increase path width, mark as SUP to ped signals.
Howard Tce	Philip Ave		(See Philip Ave.) Provide one-way separated bike path over build-out, to bypass intersection on the east side. Transition to AT+E to east.
Main Ave	**Chessington Ave**	**high**	**Turning bay at Chessington Ave, to reach SUP. May change with Glenside redevelopment.**
Nelson Ct	road closure	low	Provide 2.0m SUP south side, with signage and logos, provide "bicycles excepted" subplate to "no through road" signs.
Queens Ave/ Royal Ave	road closure	low	Widen path to 2.0m, provide logos, provide SUP signage, provide "bicycles excepted" subplates to "not through road" signs.
Shipsters Rd	Bishops Pl	medium	Provide path through reserve to facilitate left turn into Bishops Pl from Shipsters Rd.
Stonyfell Rd	Simpson Rd	low	Provide path bypass of roundabout on south side. Provide painted island in parking to shelter cyclist access to path. Provide kerb indent on departure side, transitioning to existing kerb line, to highlight cyclists rejoining traffic. Could connect to parking as EBL (see Stonyfell Rd).
Sunnyside Rd	Craighill Rd	medium	Remove parking in Sunnyside Rd north and south of Craighill Rd, provide 1.0m painted median, transition traffic lanes and parking.
Sunnyside Rd	Gilles Rd	low	Change bus only lane to allow bikes. Provide path bypass of roundabout on east side.
Swift Ave	road closure	medium	Remove bollard, provide 1.2m path north and south (or central 2m path), relocate "one way" sign, provide bike logos, provide "no entry" with "bicycles excepted" subplate east and west; add "bicycles excepted" subplate to Swift Ave "no through road" signage.
The Parade	**Thornton Ave/ Duke St**	**high**	**Remove parking both sides between Thornton Ave and Duke St (parking limitations already apply) and provide turn lane for cyclists. May need to limit parking on approaches to Thornton Ave and Duke St to achieve adequate travel lane taper, but parking restrictions apply south side east of Thornton Ave and north side west of Duke St, and should be sufficient for 10m taper per 1m lateral shift. The minimum width for a bicycle turning lane is 1.0 metre, but 1.5 metres would be preferable.**
The Parade	**Gurrs Rd/ Shipsters Rd**	**high**	**Create EBL by narrowing departure lane in Shipsters Rd, ending EBL between left only and through/right lanes. Similarly for Gurrs Rd. Trim back kerb protuberance north-east corner, to allow EBL to develop to east. Extend dashed line-marking between central medians; undertake detailed review of intersection for options to increase this to 1.0 metre width if possible. Remove central bollard, shared use path to south-west of intersection.**
The Parade	Hyland Tce/ Barnes Ave	low	Restrict parking on north-east The Parade to 10m from Barnes Ave (as per ARRs), transition BCPL to EBL across Barnes Ave and Hyland Tce. Provide 1.0m painted median.
Thomas Pl	Hewitt Ave	medium	Provide refuge to cross Hewitt Ave.
Thomas Pl	Watson Ave	medium	Provide refuge to cross Watson Ave.
Thomas Pl	Grant Ave	medium	Remove parking west of Thomas Pl to provide road width for refuge to cross Grant Ave.
Tudor Ave	road closure	medium	Relocate hazard board and cut back, cut back island north and south, provide bike logos, provide "no entry" with "bicycles excepted" subplate east and west; add "bicycles excepted" subplate to Tudor St "no through road" signage.
Tusmore Ave	Romney Rd	medium	Provide cyclist refuge across Glynburn Rd (nominally 15.6m wide at this point). Narrow bike lanes across Statenborough St to create space if required. Provide turning bay on east side using indented parking bay, to assist right turns and highlight route. Consider reconfiguring intersection to one lane into Statenborough St, left and right out with central area for cyclists.
Tusmore Ave	Statenborough St	medium	Provide cyclist refuge across Tusmore Ave (nominally 13.3m wide at this point). Narrow bike lanes across Statenborough St to create space if required. Provide turning bay on east side using indented parking bay, to assist right turns and highlight route. Consider reconfiguring intersection to one lane into Statenborough St, left and right out with central area for cyclists.
West Tce	Quandong Ave	low	Provde path over median separator to off-street car park, and to path over reserve.
Williams Ave	road closure	medium	Relocate hazard board and cut back, provide 1.2m path north and south, provide bike logos, provide "no entry" with "bicycles excepted" subplate east and west; add "bicycles excepted" subplate to Williams Ave "no through road" signage. Consider replacing tree with other landscaping and relocating tree.

TABLE 5: ROUTES WITH NO RECOMMENDED TREATMENT

STREET	FROM	TO	WIDTH	LENGTH	COMMENTS
Amber Woods Dr	Private Road	Plane Tree Ave	7.30	80	
Bagot St	Gilles Rd	Day Rd	7.30		
	Day Rd	Glyde St	7.25		
Barnes Ave	Magill Rd	Cuthero Tce	6.05	400	
	Cuthero Tce	The Parade	6.80	240	
Bethune Ave	Glenunga Ave	Trevorten Ave	7.50	90	To match adjacent street sections.
Birkin St	Greenhill Rd	Hauteville Tce	5.95	150	
Blairgowrie Rd	Inverness Ave	Craighill Rd	7.25	200	
	Craighill Rd	Wootoona Terrace	7.30	250	
Blyth St	Fulton Cres	Snow St	7.25		
Bower Pl	Main St	end	3.80		Review use.
Byhurst Ave	Flemington St	Main Ave	6.30	90	
Cator St	L'Estrange St	Kyle St	6.05	260	
Cedar Ave	Leroy St	Queen St	7.00	90	
Chapel St	Pepper St	Penfold Rd	7.20	90	Short section of narrow street, no treatment required.
					Very low kerbs, could consider marking parking onto footpath area (then AT+LM both sides, 7.4m req'd), but little verge. Could consider removing parking one side (narrow street anyway).
Coach Rd	Bishop St	McBeath Dve	9.40	340	The road levels out and parking is marked on the eastern side. Traffic volumes and cyclist numbers are low; no treatment is proposed.
	McBeath Dve	Whitbread Gve	5.75	410	
	Whitbread Gve	End of Coach Rd	4.80	140	A seat is desirable, but could be subject to vandalism. Improved access to the dirt road/ trail should be considered.
Duke St	Glyde St	Douglas Ave	6.70	80	
East Tce	The Parade	Kadonga Ave	10.70	320	(To provide continuous treatment along the street.)
	Kadonga Ave	South Tce	11.10	120	Existing angle parking west, no parking east. Provide kerb ramp to path opp. Kadonga Ave. Add "bikes crossing" signs.
	South Tce	Kensington Rd	7.50	170	(To provide continuous treatment along the street.)
Fowlers Rd	Glen Osmond Rd	Bethune Ave	5.40	120	Connect to DTEI/ local road crossing.
	Bethune Ave	Portrush Rd	5.80	320	Connect to DTEI/ local road crossing.
Glenunga Ave	Bethune Ave	Myola Ave	6.90	30	Provide "bicycles crossing" signage.
Fullarton Rd service rd	Williams Ave	Fullarton Rd at no. 188	8.20	160	
Fullarton Rd service rd	Fullarton Rd at no. :	Tudor St	8.00	60	
Fullarton Rd service rd	Tudor St	Southern end	5.30	40	
Gilles Rd	Portrush Rd	Sunnyside Rd	8.45		Parking demand likely to be high around school at school times. Minimum width facility not desirable given road gradient.
		to	9.10		
Glebe Rd	Pridmore Rd	Everard St	6.75		
Grandview Gve	Warwick Ave	St Albyns Ave	7.20	290	
Grandview Gve	St Ablyns Ave	Cudmore Ave	7.30	90	
Gulfview Ave	Highfield Ave	Gulfview Ave Laneway	7.30	40	High parking demand near school, but also 25km/h school speed limit.
	Gulfview Ave Lanev	Inverness Ave	7.30	160	
Howard Tce	Knightsbridge Rd	Sidney Pl	6.65	270	AT+LM possible one side.
Kadonga Ave	Brigalow Ave	Hyland Tce	6.10	110	
	Glynburn Rd	Myall Ave	7.30	100	
Kensington Rd	Shipsters Rd	Glynburn Rd	11.50	790	As unable to provide continuous facilities and as Britannia Roundabout hazardous, do not encourage cyclist use of Kensington Rd. Focus on crossings.
Leroy St	Allinga Ave	Cedar Ave	7.20	140	
Main St	Glen Osmond Rd	Elizabeth St	7.05	330	85th %ile traffic speed under 35km/h, do nothing.
	Elizabeth St	Fullarton Rd	6.60	240	85th %ile traffic speed 43km/h, consider traffic device to moderate speed, in conjunction with a build-out or similar at Bower Pl to promote visibility of route.
Myola Ave	O'Dea Dr	Glenunga Ave	5.60		
	Trevorten Ave	Fowlers Rd	6.50	210	
Myola Ave	Bevington Rd	Glenunga Ave	5.6	180	
Osborn Ave	Magill Rd	Beulah Rd	6.80	310	
Pridmore Rd	Gilles Rd	Day Rd	6.60		
	Day Rd	Glebe Rd	7.30		
	Glebe Rd	Derrington St	7.00		
	Derrington St	Portrush Rd	7.95		(To provide continuous treatment along the street.)
Quondong Ave	Myall Ave	West Tce	7.20	100	
Thomas Pl	Kensington Rd	Hewitt Avenue	6.20	100	"Cyclists crossing" signage at Hewitt Ave
Thomas Pl	Hewitt Avenue	Watson Avenue	6.30	100	"Cyclists crossing" signage at Watson Ave
Thomas Pl	Watson Avenue	Alexandra Ave	6.20	100	"Cyclists crossing" signage at Alexandra Ave.
Thomas Pl	Alexandra Ave	Grant Ave	6.25	100	"Cyclists crossing" signage at Grant Ave
Toowong Ave	Magill Rd	Lossie St	6.50	210	
Simpson Rd	Stonyfell Rd	Yeltana Ave	7.00	110	
Sunnyside Rd	Gilles Rd	Goldsack St	10.70		(To provide continuous treatment along the street.) Road width appears inaccurate.
	Goldsack St	Wheal Watkins St	7.00		
	Wheal Watkins St	Wheal Gawler St	5.70		
	Wheal Gawler St	Gill Tce	6.30		
Wilga Ave	South Tce	Kensington Rd	6.40	170	
Woodcroft Ave	Portrush Rd	Anglesey Ave	7.30	290	OR AT+LM possible; if implemented, provide for uphill travel.
	Anglesey Ave	Blairgowrie Rd	7.35	260	OR AT+LM possible; if implemented, provide for uphill travel.