



DATE 4 May, 2016
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Proposed Bicycle Route LR18 (part) / RR2 (part) Marrickville Station to Dulwich Hill Station - Study Area 1
Concept Design Report
For Marrickville Council

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APPENDIX A

CONCEPT DESIGN PLANS

APPENDIX B

PRELIMINARY COST ESTIMATE

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Revision	Date	Description	Author	Signature	Verifier	Signature	Approver	Signature
A	15/04/16	DRAFT	AP		AH		AP	
B	27/04/16	FINAL	AP		AH		AP	
C	04/05/16	UPDATED FINAL	AP		AH		AP	

1.0 INTRODUCTION

Lambert & Rehbein has been engaged by Marrickville Council to prepare a concept design of the proposed bicycle route located between Marrickville Rail Station and Dulwich Hill Rail Station.

The proposed route is known as Local Route 18 (LR18) and part of Regional Route 2 (RR02) as highlighted in the Marrickville Bicycle Plan (2007). The proposed route is located to the north of the existing rail corridor and is intended to generally follow path along Arthur Street, Livingstone Road, Hollands Avenue, Pine Street, Wardell Road, Canonbury Grove, Keith Street, Wardell Lane and Bedford Crescent with some options for alternate streets.

This route is approximately 1790m in length and is to be known as Study Area 1 for the purpose of this report. Please refer to Figure 1-1 and Figure 1-2 identifying the extent of Study Area 1.

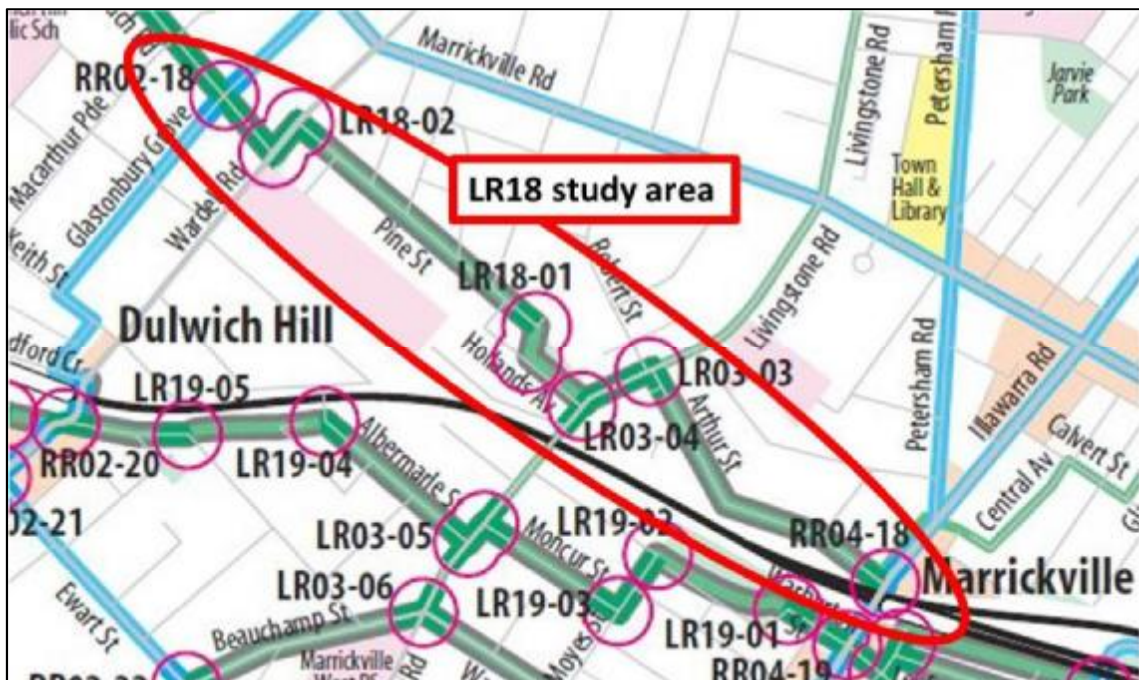


Figure 1-1 Study Area 1

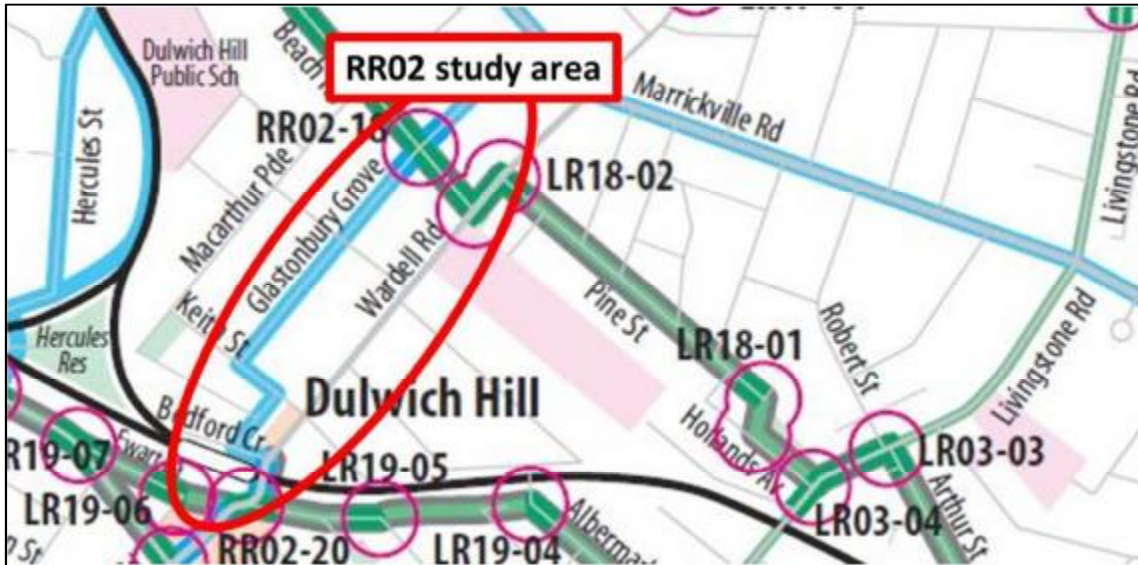


Figure 1-2 Study Area 1

A potential alternative route along the southern side of the rail corridor generally via Warburton Street, Moncur Street / Jersey Street, Albemarle Street and Dudley Street is to also be considered. This alternative route generally follows the alignment of Local Route 19 (LR18) as highlighted in the Marrickville Bicycle Plan (2007) and can be seen in Figure 1-1.

For future reference in this report LR18 will be known as the northern route and LR19 as the southern route.

The preparation of the concept design for Study Area 1 is being undertaken in conjunction with the preparation of two other nearby bicycle route concept designs. A summary of the three study areas is provided below:

- Study Area 1: LR18 (part) / RR2(part) Marrickville Station to Dulwich Station
- Study Area 2: LR3 (part) / RR2(part) Livingstone Road, Marrickville
- Study Area 3: LR16 / Addison Road, Marrickville

In conjunction these routes will connect two important transport hubs – Dulwich Hill Station and Marrickville Station and local trip attractors such as the Addison Road Community Centre and markets, Annette Kellerman Aquatic Centre and Enmore Park, Marrickville Park and Marrickville Metro shopping centre to the surrounding suburbs. Furthermore they will provide improved connection to existing regional and local bicycle routes and facilitate future extension of the networks in accordance with the Marrickville Bicycle Plan.

2.0 KEY OBJECTIVES

The key objectives of this project are to:

- Provide bicycle infrastructure that, as far as practical, meets user needs by providing a safe, comfortable and convenient route for bike riders; connects to intersecting bicycle routes and local destinations; whilst maintaining and preferably enhancing the amenity of the route for local users and residents;
- Work closely with Council staff to include local knowledge; and
- Undertake surveys, analysis and investigation of the proposed route as required for the preparation of concept design plans and itemised costs estimates.

The following tasks are required to be undertaken in order to achieve the objectives for this project:

- Review of existing information;
- Review of the proposed route;
- Consultation with stakeholders relevant to the project;
- Preparation of conceptual design plans for Study Area 1 as described above;
- Preparation of detailed cost estimates for implementation of the works; and
- Preparation of a Concept Design Report to summarise the tasks undertaken in the project including the site analysis and option evaluation, concept design plans and cost estimates for submission to Council's Traffic Committee.

3.0 SITE ANALYSIS & OPTION ASSESSMENT

3.1 REVIEW OF EXISTING INFORMATION

Marrickville Council provided the study team with the following documents and information relevant to the proposed route.

- Marrickville Bicycle Strategy 2007 (Bike Plan);
- Traffic volume and speed data;
- Marrickville Town Centre Parking Study;
- Parking surveys for parts of streets along the route;
- GIS data of existing road infrastructure; and
- Aerial Imagery.

A summary of our review of this information is provided as follows:

Road Infrastructure

The existing roads constituting both the proposed northern and southern routes are generally 'local' classification, asphalt pavement roads in 50km/h residential streets.

Northern Route

Of particular note on the northern route are Hollands Avenue and Arthur Street which are both one way streets with parking located on both sides of the street. The northern route potentially includes sections of Wardell Road and Livingstone Road which are 12.8m wide kerb to kerb and a mixture of concrete and asphalt pavements.

There are two pedestrian crossings located within the extent of the northern route. One midway between Hollands Avenue and Arthur Street on Livingstone Road and one midway Margaret Street and Beach Road on Wardell Road. There are also a series of pedestrian refuge islands located on Livingstone Road and Wardell Road.

Both Livingstone Road and Wardell Road have a 50km/h posted speed limit with a 40km/h School Speed Zone located in the section of the proposed route.

There is an existing signalised pedestrian crossing located on Illawarra Road in the middle of the rail bridge and in front of Marrickville Rail Station.

Southern Route

Of particular note on the southern route is Herb Greedy Lane which is a narrow 6.0m wide lane adjoining McNeilly Park on its northern side and providing rear lane access to residential properties fronting Greenbank Street on its southern side. Herb Greedy Lane includes both a one

way westbound section between Warburton Street and an unnamed lane midway along and a two way section between the unnamed lane and Moyes Street / Jersey Street. Although we note there is some doubt as to the exact demarcation of the one way component.

There are a number pedestrian crossings located within the extent of the southern route. One located across Wardell Road adjoining Dudley Street and Dulwich Hill Rail Station and three in the vicinity of the Marrickville Rail Station crossing Illawarra Road, Schwebel Street and Station Street. There are also a series of pedestrian refuge islands located on Livingstone Road at various side street intersections along the full length of the Study Area.

The southern route includes a small section of Livingstone Road adjoining Albermarle Street and Moncur / Jersey Street. Livingstone Road is a nominated bus route (Route 412) with several bus stops located in both travel directions within the extent of the Study Area. There are existing bus stops also located at Dudley Street adjoining Wardell Road and on Illawarra Road in front of the Marrickville Rail Station.

Traffic Volumes and Speed

The information provided by Council included traffic volume and speed data for various time periods and sections of roads located within the Study Area.

With the exception of Illawarra Road, Livingstone Road and Wardell Road the majority of streets located in the Study Area and included in the data had an AADT of less than 2,000 vehicles and an 85% percentile speed of less than 50 km/h.

Parking Studies

The Marrickville Town Centre Parking Study (MTCPS) completed in 2012/13 included parking information over part of the Study Area. This includes parking inventory and occupancy data for parts of the northern route including Arthur Street and parts of the southern route including Warburton Street, Herb Greedy Lane and Moyes Street.

Further parking inventory and occupancy survey data undertaken in February 2016 was also provided by Council. This covered only a part of the northern route including Wardell Road, Pine Street and Hollands Avenue. Data was obtained over 4 days (Thursday, Saturday, Sunday and Tuesday).

The above information has been utilised to assist in making assessments of the potential impacts of parking modifications and losses proposed as part of the concept design.

Marrickville Bike Plan

A review of Council's Bike Plan was completed to provide background information and input to the project. The Bike Plan indicates an existing cycle route L9 generally following the route of the proposed southern option and also noted in the Bike Plan as proposed local route LR19.

Apart from the proposed local route LR18 subject of this report there are a number of proposed Local and Regional Cycle Routes) identified in the Bike Plan within and directly around the Study Area that should be considered in developing the concept designs. These include:

- RR02 along Wardell Road, Bedford Crescent, Keith Street and Canonbury Avenue;
- RR04 along Illawarra Road;
- LR03 along Livingstone Road; and
- LR05 along Schwebel Street.

GIS Data / Aerial Imagery

The GIS data supplied by Council included locations of existing features such as property boundaries, kerb and channel, signage and line marking. When overlaid with the supplied aerial imagery there was some discrepancies in the location and extent of these features. For the purpose of the concept design we have made our best interpretation of the actual site conditions based on this information and our site observations but note that detail survey will be required as part of the detailed design process to confirm actual extent of property boundaries and the features located within the road reserve.

3.2 REVIEW OF PROPOSED ROUTE

The project team undertook a number of site inspections of the proposed route and existing surrounding network to obtain an understanding the existing route infrastructure, traffic, parking and potential safety issues and to identify any physical or operational constraints along the proposed route.

Bus Stops

There is an existing bus stop located on both the northern and southern side of Dudley Street adjoining Wardell Road and Dulwich Hill Station. Dudley Street is relatively wide at this location and buses do not impede traffic when stopped. There are bus stops located on Livingstone in both travel directions within the extent of both the proposed northern and southern routes. The current configuration of these bus stops sees buses pull out of the traffic lane into the parking lane adjoining the kerb and gutter. At some locations we observed buses pulling over but still slightly impeding traffic due to the bus stop proximity to pedestrian refuge islands. The majority of the bus stops include shelters which will need to be considered in locating potential cycle routes. There is an existing bus stop located on the eastern side of Illawarra Road directly in front of the Marrickville Rail Station. This was observed to be a reasonably busy bus stop with a dedicated space in the parking lane allowing no impediment of traffic.

All existing bus stops locations have been identified and included on the concept plans.

Parking

Our observations of the parking occupancy during the times of our inspections generally indicate there is spare capacity. Occupancy around the two rail stations was higher however not at full capacity. It was observed that where cars were parked on both sides of the two one way streets; Hollands Avenue and the western end of Arthur Street, the remaining traffic lane was quite narrow. One particular area of note was the section of Moyes Street linking Jersey Street and Greenbank Street. This section of Moyes Street is quite narrow with parking currently allowed on the eastern side. During our inspections we witnessed vehicles having to stop to give way to the vehicles travelling in the other direction due to the inability of two cars to pass a parked car. This appeared to be an unsafe situation particularly given the proximity of the bend at the end of Jersey Street where vehicles are unsighted of any oncoming traffic along Moyes Street in the narrow section.

Existing Bicycle Infrastructure

The existing cycle route L9 (proposed LR19) located on the southern side of the rail corridor is currently well delineated with cycle path signage and line marking along the length of the route between Dulwich Hill Rail Station and Marrickville Rail Station. Dudley Street provides on road mixed traffic lanes linking to a bi directional on road cycle path along School Parade. This in turn connects to an off road shared path located beside the rail corridor between School Parade and Kays Avenue East. This section of shared path is a brick paver finish and is approximately 1.8m wide. The actual width between the rail corridor fence to the north of the path and the residential properties to the south of the path is up to 2.3m wide. A 2.4m wide concrete shared path is provided between Kays Avenue East and Albermarle Street. This section of path is meandering in nature incorporating landscaping and water sensitive urban design features. On road mixed traffic lanes are provided along Albermarle Street between the end of the shared path and Livingstone Road. At both the eastbound and westbound approach to the Albermarle Street / Moncur Street / Livingstone Road intersection cyclists are instructed via signage to dismount before crossing Livingstone Road at the existing pedestrian refuge. We note that there are also existing shoulder lane markings along both sides of the section of Livingstone Road between Moncur Street and the rail bridge to the north. Moncur Street is provided with on road mixed traffic lanes between Livingstone Road and Moyes Street. At Moyes Street on road mixed traffic lanes are provided to link to both Greenbank Street and Church Street and out to Illawarra Road.

It was noted that some of the existing on road markings along this route were faded.

There was no signage or line marking delineating RRO4 along Illawarra Road however there is directional signage on Illawarra Road at Schwebel Street and Greenbank Street directing cyclists to existing routes L5 and L9. There is already existing cyclist crossing warning signs on the southern approach to the Illawarra Road/ Warburton Street pedestrian crossing

We did observe cyclists using the southern route along Moncur Street and the off road shared path between Kays Avenue East and Albermarle Street during our inspections.

There is currently existing signage or line marking delineating the proposed northern route LR18 and RR02 along Wardell Road, Keith Street and Canonbury Grove.

Pedestrian Facilities

It was evident during our site inspections that at times there was a high volume of pedestrian traffic at the Marrickville and Dulwich Hill rail stations and the immediate surrounding streets. However, the majority of both the northern and southern routes were relatively low pedestrian activity areas.

Other

McNeilly Park is located along the proposed southern route just to the north of Herb Greedy Lane. The park has playground and BBQ facilities and includes a concrete path linking the end of Jersey Street and Warburton Street. This path is not currently delineated as a shared path.

3.3 COMMUNITY COLLABORATION

There are a number of key stakeholders that may be directly or indirectly be impacted by the potential findings of this project. Detailed following is a summary of discussions held to date.

Bike Marrickville

Council met with Bike Marrickville to obtain their input and comments for the proposed bicycle route for Study Area 1. Comments included:

- Southern option preferred – gentler gradient and more direct;
- Much of the required infrastructure for the southern route is already in place;
- Herb Greedy Lane – locked gates deters bikes/very quiet street;
- McNeilly Park – issue with travelling through park as lots of children; and
- Using Moncur St rather than Jersey St minimises time spent on Livingstone Rd.

These comments were taken into consideration in the development of the concept design.

Community Survey

A workshop with approximately 16 internal Council staff members was undertaken on the 14th March 2016 to present initial option assessments and obtain feedback and input to the proposed concept design for the Study Area. A few of the key points made in the workshop include:

- Southern route preferred;
- Connection to Dulwich Hill Station needs to be improved: and
- Wardell Road has space for a 2 way bike path.

These comments were taken into consideration in the development of the concept design.

Roads & Maritime Services

None of the planned works are located on RMS controlled roads or will affect existing signalised intersections. However, RMS was consulted in regards to the potential for signalising the intersection of Illawarra Road, Schwebel Street and Warburton Street. Mr Ken Hinds of RMS advised that it was unlikely that RMS would support the signalisation of this intersection.

Transport for NSW (Rail) / Sydney Trains

Upgrade works are currently being undertaken at Marrickville Station. Council has attempted to contact Transport for NSW in regards to providing information on the station upgrade and if any specific planning for cyclist is proposed as part of the works. To date these attempt have been unsuccessful.

We have also attempted to contact Sydney Trains in regards to the potential for utilising some of the rail corridor to widen the existing shared path located between School Parade and Kays Avenue East. We have been unable to obtain a response at this time.

State Transit Authority

Relocation and alteration of existing bus stops are proposed as part of the concept designs detailed later in the report. Liaison was undertaken with Mr Peter Whitney of the State Transit Authority in regards to the proposed relocation and alterations of existing bus stops and minimum lane width requirements to accommodate buses. In addition to phone conversations our draft concept plans were forwarded to him to for review and comment. His written feedback included the following relevant points:

- He was generally not supportive of the potential option to provide a new pedestrian crossing across Dudley Street at the intersection with Wardell Road due to potential for bus movements at the intersection to be affected by pedestrians.
- He would prefer the that the proposed relocation of the existing bus stop located on the eastern side of Livingstone Road opposite Randall Street was to the south between Jersey Street and Moncur Street and not to the north of Jersey Street as proposed on the draft concept plans. This was because the location to the north of Jersey Street was further separating the 'sister' bus stops on each side of Livingstone Road and also due to potential grade difference in the footpath at this location that would necessitate retaining walls. In subsequent conversations it was agreed that this relocated bus stop would need to be an in lane bus stop due to the space restrictions.
- Although outside the scope of this study he would like the existing bus stop on the eastern side of Illawarra Road to the north of Schwebel Street (opposite Marrickville Rail Station) extended 6m to the south.

3.4 WORKSHOP

A workshop with approximately 16 internal Council staff members was undertaken on the 14th March 2016 to present initial option assessments and obtain feedback and input to the proposed concept design for the Study Area. A few of the key points made in the workshop include:

- Southern route preferred;
- Potential for shared zone / cycle path along Herb Greedy Way;
- Potential connection to existing cycle paths across rail bridge on Albermarle St;
- Removal of locked gate on western end of Herb Greedy Way for cycle accessibility;

These were taken into consideration in the development of the concept design.

3.5 DESIGN STANDARDS

The principle design standards and guidelines that were considered in preparing the concept designs are:

- Cycling Aspects of Austroads Guides
- RTA NSW Bicycle Guidelines
- City of Sydney - Standard Cycleway Details (2012) - Attachment C

3.6 DISCUSSION OF OPTIONS

Based on our review of the existing information, site observations, community, stakeholder and Council workshop feedback it would seem evident that the southern route is the logical and preferred route.

As a link between Marrickville and Dulwich Hill rail stations the proposed southern route has several advantages over the northern route including:

- Existing cycling infrastructure is in place
- It is a more direct route being shorter by approximately 200m
- More off road paths (safer from a motorist interaction perspective)
- Less potential impacts on parking

The southern route has therefore been selected as the preferred option and concept designs have been prepared on this basis.

4.0 CONCEPT DESIGN

4.1 SOUTHERN ROUTE

Based on the site analysis, option assessment and consultation with Council officers, the following route options and cycleway facilities are proposed for Study Area 1.

- Provide a bidirectional path/off road shared path along the northern side of Dudley Street;
- Maintain existing on road bi directional cycle path in School Parade;
- Maintain Off Road Shared Path between School Parade and Kays Avenue East with some potential for widening and concrete paving;
- Maintain Off Road Shared Path between Kays Avenue East and Albermarle Street;
- Maintain existing mixed traffic lanes on Albermarle Street;
- Provide a bi directional path along Livingstone Road between Albermarle Street and Jersey Street;
- Provide new on road mixed traffic lanes on Jersey Street between Livingstone Road and Herb Greedy Lane;
- Provide new on road mixed traffic lanes on western end of Herb Greedy Lane;
- Provide new on road contraflow cycle lane eastbound and mixed traffic lane westbound on eastern end of Herb Greedy Lane; and
- Provide new on road mixed traffic lanes on Warburton Street;

Further discussion on the design considerations and reasoning for the selected treatment for each segment is detailed in the following sections.

Intersection Treatments

An appropriate intersection treatment that accommodates motorists, cyclists and pedestrians is required at the side streets located along the western side of Livingstone Road. The relatively low traffic volumes of the side streets would typically mean that a treatment where continuity lines are shown across the intersection to delineate the cycle lane would be adequate for a single direction cycle lane. However, in the case of a bi directional cycle path such a treatment may not be an appropriate treatment, given the contraflow arrangements and motorists potential unfamiliarity with cyclists travelling against the flow of traffic.

We understand that Council do not want to provide bi directional cycle paths that require cyclists to give way to vehicles exiting and entering side streets at non signalised intersections. This is based on recent experiences along the Carrington Road, Marrickville cycle path where the requirement for cyclists to give way to vehicles at 5 side street intersections in 500m is resulting in cyclists utilising the on road traffic lane instead of the cycle path.

There are a number of potential options for treatment of these side street intersections that are described and discussed below.

Bend Out (Figure 5.7 NSW Bicycle Guidelines)

A typical bend out type treatment is detailed below in Figure 4-1



Figure 4-1 Bend Out Intersection Treatment

(Source: City of Sydney - Standard Cycleway Details (2012) - Attachment C)

This intersection treatment may be difficult to achieve for the side streets in the Study Area. The parking lane in the example in Figure 4-1 serves to provide a stopping area for vehicles outside of the main through road (Livingstone Road) traffic lane. For the Study Area case there is no parking lane and the bend out will potentially need to push further into the side street to achieve the necessary stopping area and accommodate the other features of the intersection such as pedestrian refuges, bus stops and travel lanes. This may present difficulties in achieving a satisfactory geometry for the cycle path and footpaths without property resumptions.

Cyclist Priority without Bend Out

A typical layout of a side street intersection with cyclist priority for a one way contraflow cycle path is shown below in Figure 4-2.

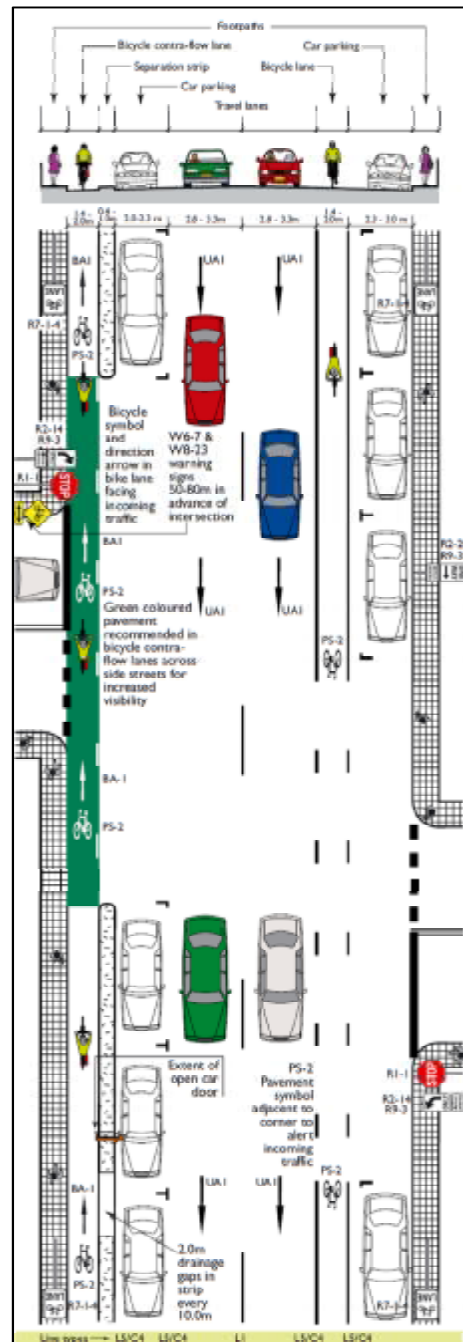


Figure 4-2 Cyclist Priority Intersection Treatment without Bend Out

(Source: Figure 5.7 RTA - NSW Bicycle Guidelines)

This option would be the simplest and most cost effective to implement. However, adopting this treatment for a bi directional cycle path may not be an appropriate treatment, given the motorists potential unfamiliarity with cyclists travelling against the flow of traffic particularly for vehicles entering the side street from Livingstone Road. Green line marking and signage could be provided to warn motorists to be aware of cyclists to potentially reduce the risk

Shared Environment

A typical shared environment intersection treatment is detailed below in Figure 4-3.

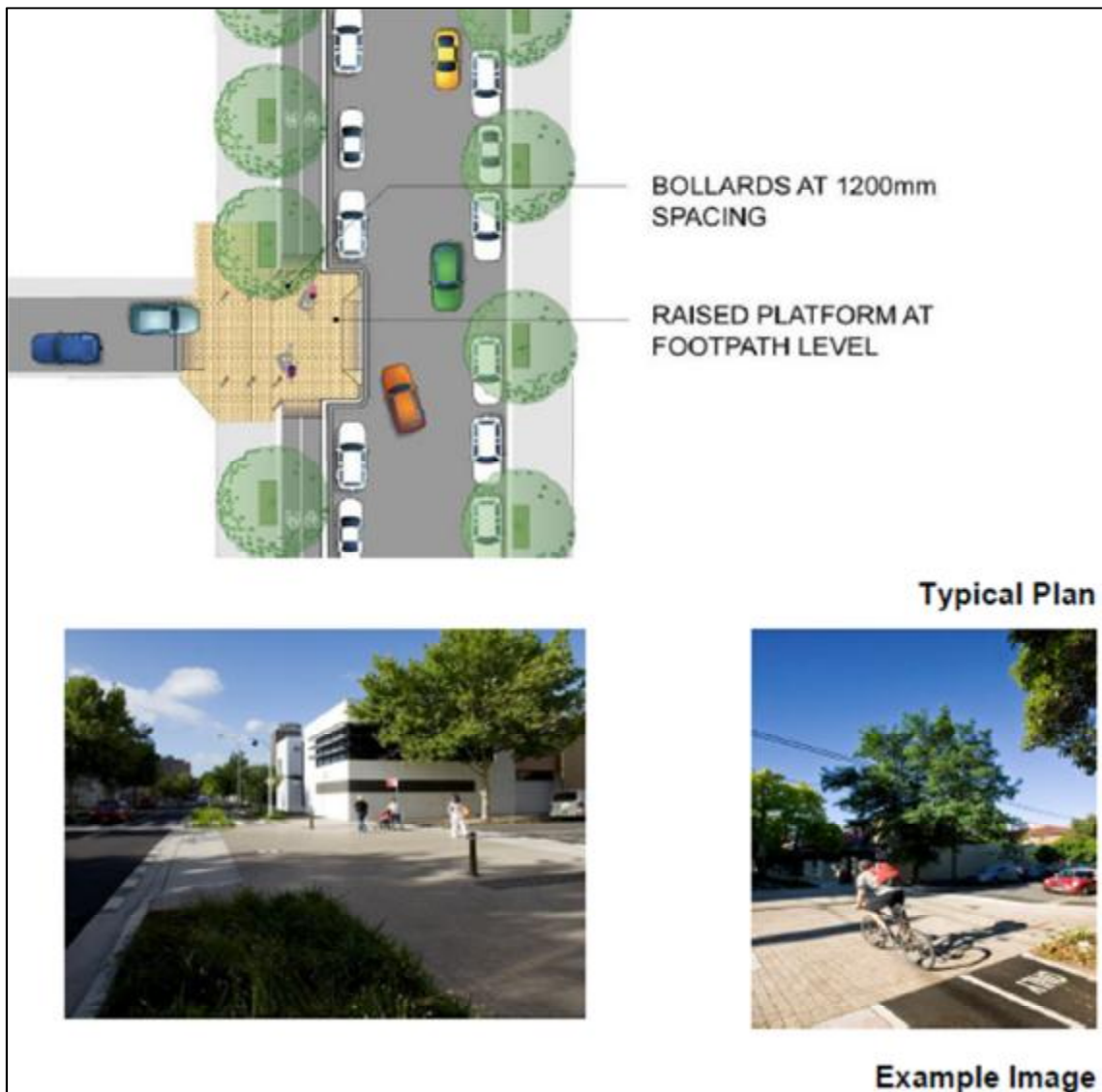


Figure 4-3 Typical Shared Environment Intersection Treatment

(Source: City of Sydney - Standard Cycleway Details (2012) - Attachment C)

This treatment has been developed by the City of Sydney and the RMS as part of the Bourke Street Cycleway. Initially installed as a trial the RMS has recently endorsed its use in appropriate locations where side street traffic is low volume (eg. < 30vph) and further trials for traffic volumes up to 60vph. Based on the traffic data provided by Council the approximate traffic volumes on the relevant side streets located within the Study Area are listed in Table 4-1.

Table 4-1

Street	AADT	Vph (approx.)
Randall Street	132	13

It can be seen that Randall Street is under the < 30vph threshold. Based on this it is likely that this would conceptually be an acceptable treatment of the side street intersections within the Study Area. This treatment would also provide a local traffic calming effect so could be incorporated as part of any future LATM schemes proposed in this area.

It is noted that the example shown in Figure 4-3 incorporates a parking lane which allows for the raised pavement section to be constructed and transitioned to the existing pavement level on the main through road (Livingstone Road). In the applying this treatment within the Study Area there will be no parking lane so the cycle path may need to bend out slightly (600 - 1000mm) to incorporate a transition that does not impact on the through lane nor reduce the width of the cycle path crossing.

Similar to the 'Cyclist Priority without Bend Out' option described above there are potential risks of motorists being unfamiliar with cyclists travelling against the flow of traffic particularly for vehicles entering the side street from Livingstone Road. However the raised treatment is a visual and physical trigger to warn them of this. Appropriate signage could also be provided to warn motorists to be aware of cyclists to potentially reduce the risk further.

No other changes to existing intersection treatments along the route are proposed.

Pedestrian Facilities

As detailed in Section 3.1 there are existing pedestrian crossings located at and around the Dulwich Hill and Marrickville Rail Stations. It is proposed to generally maintain these existing crossings in their current state with some additional signage to be provided to direct cyclist to these crossings.

We understand that the Council are currently considering upgrading the existing crossing at Wardell Road / Dudley Street adjoining the Dulwich Hill Station to a raised crossing. We would comment that this could only enhance cyclist safety if this was to occur.

Modifications are proposed to the existing pedestrian refuges located along Livingstone Road at Albermarle Street and Randall Street.

Parking

The only impact on parking is the proposed removal of parking on the eastern and western side of Livingstone Road between Albermarle Street and just north of Randall Street. Based on our site visits this will result in the loss of approximately 12 parking spaces on the western side and 4 parking spaces on the eastern side. It is expected that this loss of parking could be absorbed into Jersey Street, Moncur Street and Randall Street.

However, there is also potential to offset the loss of parking on Livingstone Road by converting existing parallel parking to 90 degree angle parking in Randall Street. The total number of extra spaces that could be provided in Randall Street is approximately 15. There are also other opportunities in Albermarle, Moncur and Jersey Streets however these are not likely required given the small loss of parking spaces being covered in Randall Street. It would also be preferable to maintain parallel parking in Jersey Street and Albermarle Street given the proposal for on road mixed traffic lanes.

Bus Stops

There is an existing bus stop located on both the northern and southern side of Dudley Street adjoining Wardell Road and Dulwich Hill Station. No changes are proposed to the bus stop on the southern side. The current configuration of the northern side bus stop sees buses pull out of the through traffic lane into the parking lane adjoining the kerb and gutter thus allowing traffic to be able to still pass. The proposal to provide an off road shared path on the northern side will require the existing bus stop to be modified and result in the buses stopping within the eastbound traffic lane. This is required to accommodate the shared path deviating around the rear of the bus stop.

There are also bus stops located on Livingstone just to the north of Albermarle Street on the western side and opposite Randall Street on the eastern side. It is noted that these bus stops include only bus stop timetable signs only and do not have formal bus zone restriction signs. For both these bus stops there is insufficient width to provide for the bus stops, pedestrian refuges, cycle lanes and traffic lanes and they will need to be relocated so appropriate lane widths can be provided.

Specific details of the proposed modifications to the existing bus stops are described in the following sections and shown on the concept design plans.

Dudley Street

Dudley Street currently has on road mixed traffic lanes between Wardell Road and School Parade. In order to provide better connectivity to the Dulwich Hill Rail Station for cyclists it is

proposed extend the existing bi directional cycle path in School Parade along the northern side of Dudley Street. This can be extended as far as the existing bus stop where it is proposed to transition to an off road shared path that will run behind the bus stop and link directly to the existing pedestrian crossing across Wardell Road. The bus stop will need to be relocated into the existing pavement of Dudley Street to facilitate the shared path arrangement. This will result in the buses stopping within the eastbound traffic lane. A minimum traffic lane width of 3.5m is maintained in front of the bus stop. There is also approximately 20m between the end of the bus stop and the intersection with Wardell Road allowing sufficient space for vehicles turning off Wardell Road into Dudley Street to queue if a bus is stopped.

There will be a loss of approximately 3 unrestricted parking spaces along the northern side of Dudley Street due to the proposed cycle path and bus stop reconfiguration. As the existing Dudley Street pavement is so wide some parking towards the School Parade end of the northern side of Dudley Street will be able to be maintained. The existing bus stop located on the southern side of Dudley Street will remained unchanged.

A potential alternative arrangement is to provide a pedestrian crossing across Dudley Street. This would facilitate improved pedestrian and cyclist connectivity to the Dulwich Hill Rail Station from the south. The existing central pedestrian refuge could be partially removed allowing a kerb build out on the northern side to occur without hindering the right turning movement for a bus into Dudley Street from Wardell Road. This alternative arrangement would result in the loss of approximately 2 time restricted parking spaces in front of the existing commercial properties along the southern side of Dudley Street.

There may be some opportunity to provide cycle parking facilities at the northern on the eastern side of Wardell Road at the end of the new shared path on Dudley Street by way of removal of the existing raised planting bed. Opportunities would be increased if the alternative pedestrian crossing arrangement across Dudley Street was adopted as there would be a kerb build out providing more available space.

Livingstone Road

It is proposed to provide a bi directional cycle path along the western side of Livingstone Road between Albermarle Street and Randall Street. This will provide connectivity to a bi directional path located along Livingstone Road to the north of Randall Street being proposed as part of the route LR03 – Livingstone Road (Study Area 2). The bi directional cycle path is to finish slightly short of the Albermarle Street intersection to allow southbound cyclists to transition to the footpath and cross Livingstone Road utilising the pedestrian refuge.

The existing pedestrian refuges at both Randall Street and Albermarle Street are proposed to be relocated to the east to accommodate the cycle path and appropriate lane widths. There is an opportunity to widen the pedestrian refuge to 2.5m to better provide for crossing cyclists. The

existing kerb build out islands on the eastern and western sides of the pedestrian refuge on approach to Albermarle Street will also need to be removed.

A shared environment intersection treatment is proposed at Randall Street. Cyclists will be able cross Livingstone Road between the bi directional cycle path and Jersey Street from this shared area using the pedestrian refuge and the footpath on the eastern side of Livingstone Road. Some localised widening of the existing footpath at the corner of Jersey Street and Livingstone Road and kerb ramp adjustments will be necessary to create a short section of shared path on the eastern side of Livingstone Road.

The existing bus stop located on the western side of Livingstone Road just to the north of Albermarle Street is proposed to be relocated to the southern side of Albermarle Street as it is currently located adjacent the existing pedestrian refuge and Moncur Street and there will be insufficient width to accommodate bus stops, the bi directional cycle path and traffic lanes.

The relocation of the bus stop on the western side of Livingstone Road will result in the loss of 2 parking spaces on the southern side of Albermarle Street.

The existing bus stop located on the eastern side of Livingstone Road just to the south of Jersey Street is proposed to be relocated further south approximately 40m as it is currently located adjacent the existing pedestrian refuge and Randall Street and there will be insufficient width to accommodate bus stops, the bi directional cycle path and traffic lanes. This bus stop will be an in lane bus stop.

The combination of the relocation of the bus stop on the eastern side of Livingstone Road and the pedestrian refuges at Randall Street will result in the loss of 4 parking spaces between Jersey and Moncur Street. The existing bus stop location will be converted to a no stopping zone due to its proximity to the Randall Street intersection and associated pedestrian refuge.

Herb Greedy Lane / McNeilly Park

The existing gate at the western end of Herb Greedy Lane is proposed to be removed and replaced with bollards to allow free movement of cyclists.

Given the low speed and traffic volumes on road mixed lane markings are proposed for the majority of the length of Herb Greedy Lane. However, at the eastern end as the lane bends to connect to Warburton Street and becomes one way, on road contraflow road markings and signage will be provided in the eastbound direction to clearly highlight this to both motorists and cyclists to prevent collisions.

4.2 CONCEPT DESIGN PLANS

Concept designs plans have been prepared for Study Area 1 and are included in **Appendix A**. The concept design plans are scaled drawings and include the following details;

- existing and proposed cycling facilities;
- existing and proposed traffic and parking arrangements;
- all proposed signage and line markings;
- typical cross sections; and
- highlight design issues and constraints and how they are proposed to be treated

It is important to note that the GIS maps and aerial photography provided by Council of the study area have been used as the base for the concept plans. Based on our site inspections there may be some variance to the existing road widths and location of features depicted on this information. Detail feature and level survey will be necessary to complete the detailed design and confirm the proposed concepts are achievable. Where possible we have identified particular areas of concern.

5.0 COST ESTIMATES

A preliminary cost estimate has been prepared for the proposed infrastructure improvements recommended in this concept design report and shown on the concept design plans. The preliminary cost estimate is provided in **Appendix B** and summarised below.

Preliminary Cost Estimate Study Area 3 - \$280,000 (excl GST)

The cost estimate generally includes for the following items.

- Pavement Markings
- Medians
- Signage
- Bus Stops
- Intersection Treatments

The cost estimate makes no allowance for the following items:

- Alternative pedestrian crossing treatments
- 90 degree angle parking
- Relocation or adjustment of existing utilities
- Lighting upgrades
- Signalisation of intersections
- Design and project management costs associated with detailed design and construction of the proposed works

6.0 CONCLUSION

Lambert & Rehbein has been engaged by Marrickville Council to prepare a concept design of the proposed bicycle route located between Marrickville Rail Station and Dulwich Hill Rail Station.

The proposed route is known as Local Route 18 (LR18) and part of Regional Route 2 (RR02) as highlighted in the Marrickville Bicycle Plan (2007).

Based on the site analysis, option assessment and consultation with Council officer an alternate southern route has been recommended. The following route options and cycleway facilities are proposed for Study Area 1.

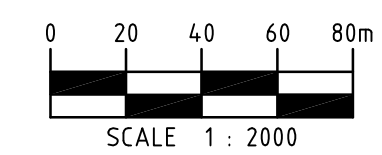
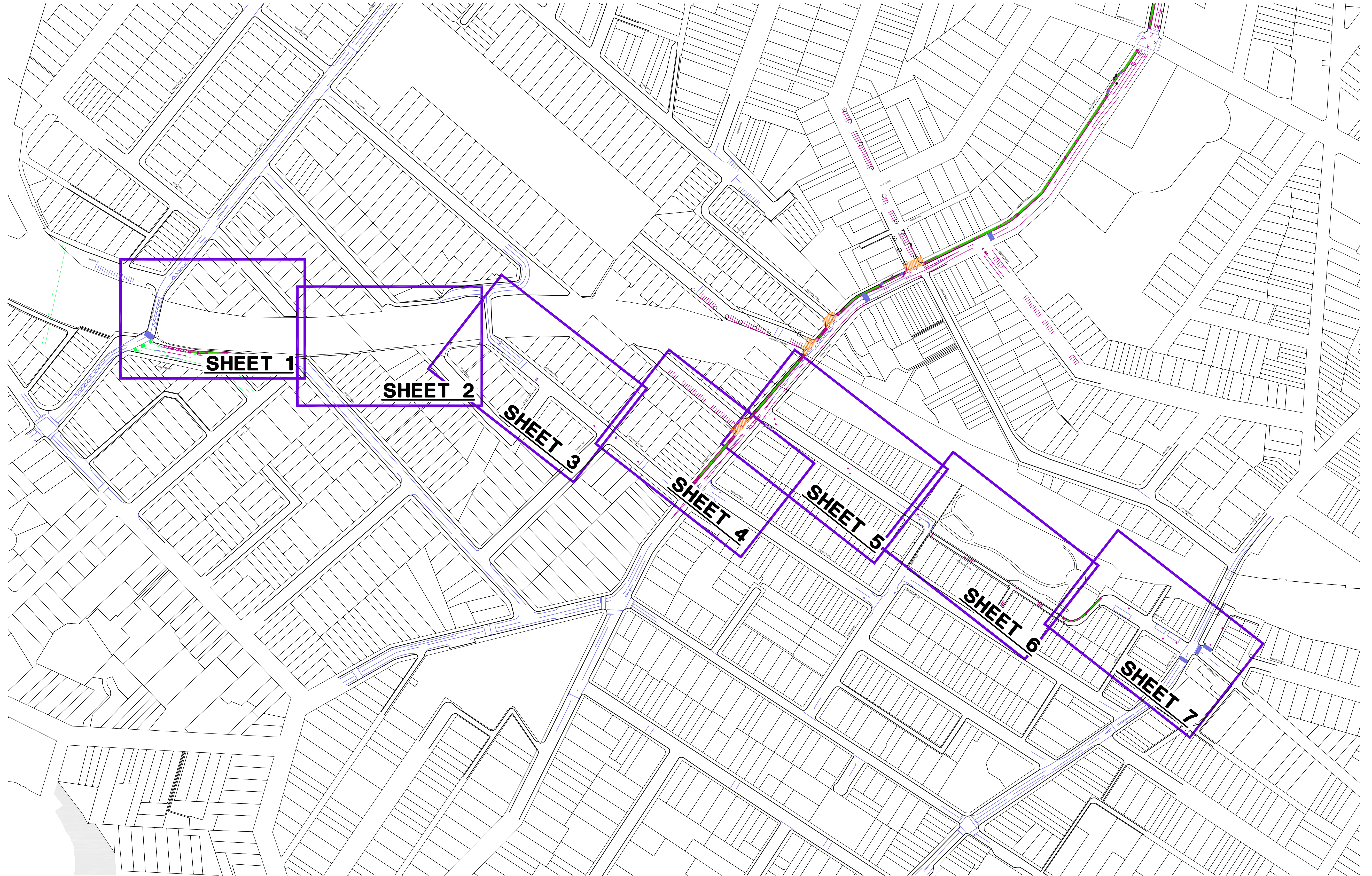
- Provide a bidirectional path/off road shared path along the northern side of Dudley Street;
- Maintain existing on road bi directional cycle path in School Parade;
- Maintain Off Road Shared Path between School Parade and Kays Avenue East with some potential for widening and concrete paving;
- Maintain Off Road Shared Path between Kays Avenue East and Albermarle Street;
- Maintain existing mixed traffic lanes on Albermarle Street;
- Provide a bi directional path along Livingstone Road between Albermarle Street and Jersey Street;
- Provide new on road mixed traffic lanes on Jersey Street between Livingstone Road and Herb Greedy Lane;
- Provide new on road mixed traffic lanes on western end of Herb Greedy Lane;
- Provide new on road contraflow cycle lane eastbound and mixed traffic lane westbound on eastern end of Herb Greedy Lane; and
- Provide new on road mixed traffic lanes on Warburton Street;

Concept design plans for the proposed route options and cycleway facilities have been prepared and are included in **Appendix A**

A preliminary cost estimate of \$280,000 (excl GST) has been calculated for the proposed route options and cycleway facilities based on the proposed concept design plans and is included in **Appendix B**.

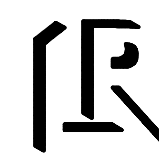
APPENDIX A

CONCEPT DESIGN PLANS



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No.	Date	By	Amendment	Checked
D	03.05.2016	S.G.	SYDNEY BUSES AMENDMENT	
C	27.04.16	S.G.	CONCEPT ISSUE	
B	20.04.16	AST	REVISED DRAFT	
A	11.04.16	S.G.	DRAFT	



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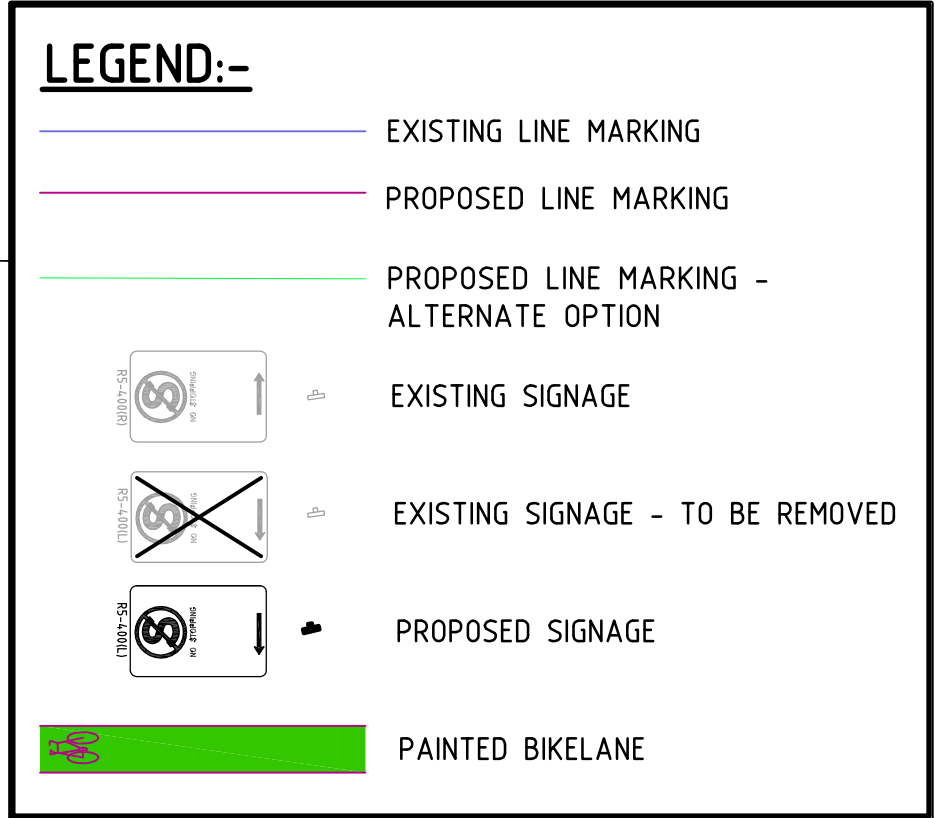
CBD HOUSE
LEVEL 3, 120 WICKHAM STREET
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TELEPHONE (07) 3250 9000
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Project:	PROPOSED BICYCLE ROUTE CONCEPT DESIGN MARRICKVILLE
Title:	STUDY AREA 1 (LR18/RR2) OVERALL KEY PLAN

Client: MARRICKVILLE COUNCIL			
Draftsperson: SG	Checked: DL	Sheet Size A1	Drawing No. B16049-C100
Designer: SG	Approved: RPEQ No: A.PEZZUTTI 6382		
Scale: AS SHOWN	Date: MAR 2016	A	B C D



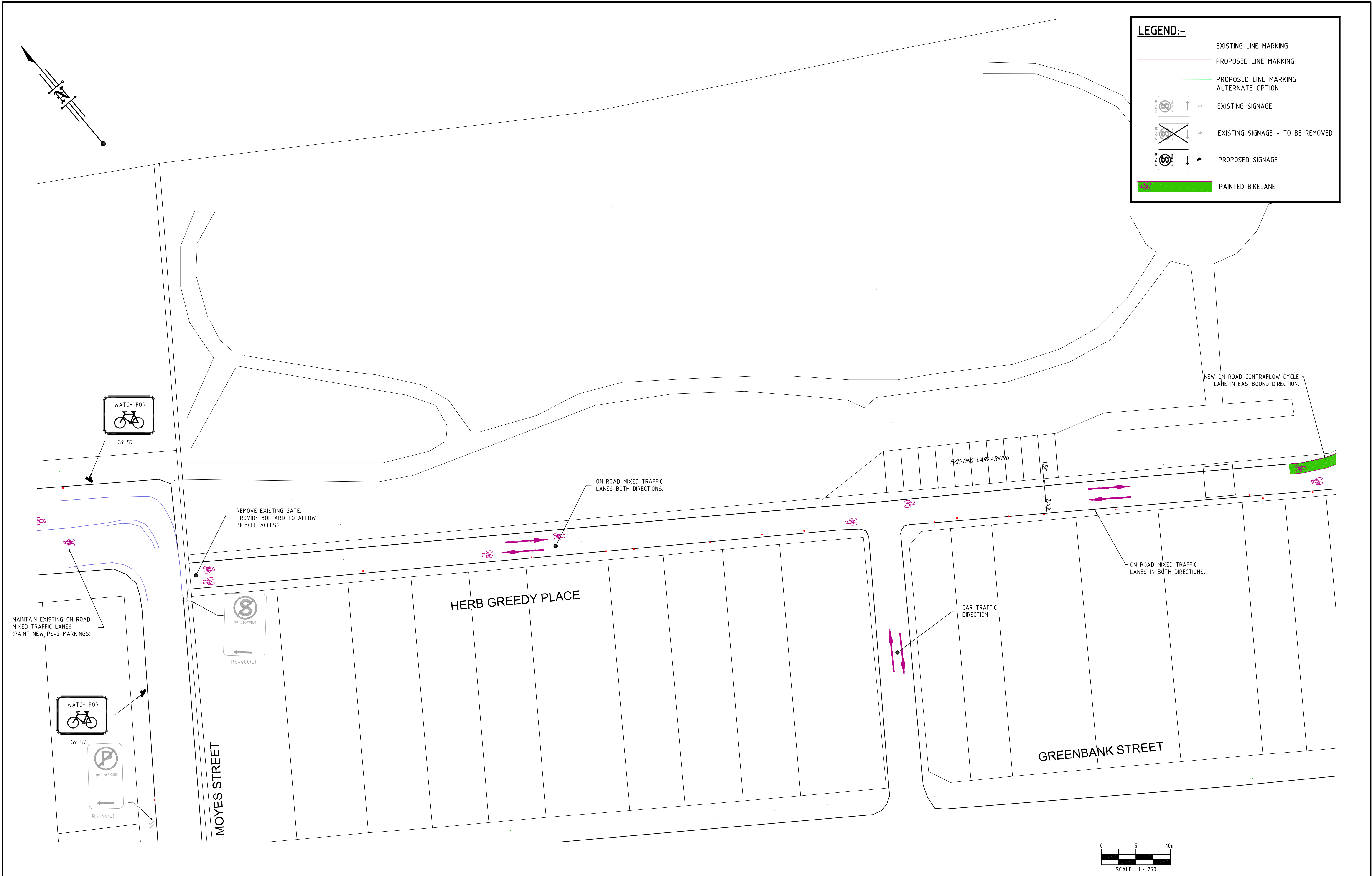
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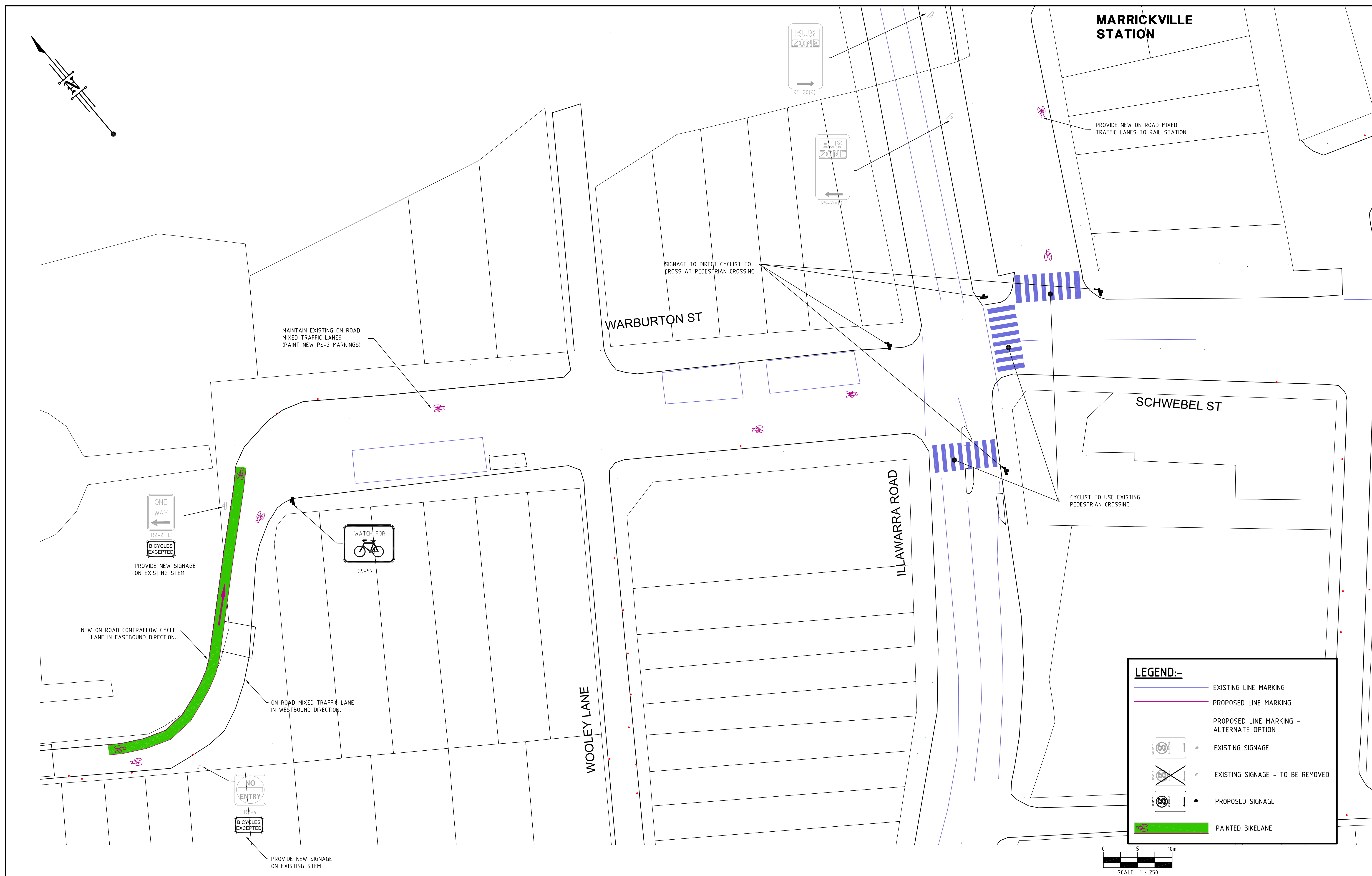
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Client: MARRICKVILLE COUNCIL						
Draftsperson: SG		Checked: DL		Sheet Size	Drawing No.	
Designer: SG		Approved: A,PEZZUTTI RPEQ No: 6362		A1	B16049-C103	
Scale: AS SHOWN		Date: MAR 2016		A	B	C
				D		



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B	20.04.16	AST	REVISED DRAFT	
A	11.04.16	S.G.	DRAFT	
No.	Date	By	Amendment	Checked

Project:	PROPOSED BICYCLE ROUTE CONCEPT DESIGN MARRICKVILLE
Title:	STUDY AREA 1 (LR18-RR2) LAYOUT PLAN SHEET 7 OF 7

APPENDIX B

PRELIMINARY COST ESTIMATE

LAMBERT & REHBEIN

CONSULTING ENGINEERS

PROJECT NO: B16049

27 April 2016

PRELIMINARY COST ESTIMATEPROPOSED BICYCLE PATH
STUDY AREA 1 LR19

DESCRIPTION	UNIT	RATE	QTY	AMOUNT
Site establishment	budget			\$ 20,000
Provision for traffic control	days	\$1,500.00	20	\$ 30,000
Painted bicycle lane 2.4m wide				
Pavement marking (coloured treatment & centre line)	m	\$120.00	125	\$ 15,000
Painted directional arrows	No.	\$250.00	8	\$ 2,000
Painted bicycle symbol	No.	\$250.00	8	\$ 2,000
Raised concrete median	m	\$60.00	125	\$ 7,500
On Road Mixed Lanes				
Painted directional arrows	No.	\$250.00	6	\$ 1,500
Painted bicycle symbol	No.	\$250.00	28	\$ 7,000
Painted bicycle lane 1.5m wide				
Pavement marking (coloured treatment)	m	\$70.00	55	\$ 3,850
Painted directional arrows	No.	\$250.00	1	\$ 250
Painted bicycle symbol	No.	\$250.00	2	\$ 500
Shared environment intersection treatments				
Raised pavements and decorative finishes	m ²	\$250.00	120	\$ 30,000
Allowance for landscaping	No.	\$3,000.00	1	\$ 3,000
Allowance for stormwater drainage	No.	\$5,000.00	1	\$ 5,000
Adjustment of existing traffic islands and raised finishes				
Relocate bus stops including raised concrete and furniture	No.	\$12,000.00	1	\$ 12,000
Additional allowance for relocation of Adshel shelter	No.	\$3,000.00	1	\$ 3,000
Relocate bus stop without pavement works	No.	\$2,000.00	2	\$ 4,000
Remove existing traffic island	No.	\$1,000.00	3	\$ 3,000
New pedestrian crossing including islands and signage	No.	\$10,000.00	1	\$ 10,000
Adjust pedestrian refuges including line marking and signage	No.	\$7,000.00	2	\$ 14,000
New kerb ramps	No.	\$1,500.00	3	\$ 4,500
Traffic signage				
New street sign	No.	\$450.00	32	\$ 14,400
Replace existing street sign	No.	\$350.00	2	\$ 700
Relocate existing sign	No.	\$350.00	9	\$ 3,150
Remove existing sign	No.	\$300.00	3	\$ 900
Adjustment of existing line marking				
New centre lines, lane lines and continuity lines	m	\$4.00	600	\$ 2,400
Remove existing line marking	budget			\$ 5,000
Remove existing gate and replace with bollards	budget			\$ 5,000
Replace existing paved off road 2.5m wide shared path with concrete	m ²	\$120.00	275	\$ 33,000
Widen existing concrete footpath to be 3.0m wide	m ²	\$120.00	50	\$ 6,000
Angle parking in adjacent residential streets	excluded			
Miscellaneous & contingency - 10%				\$ 24,865

SUB-TOTAL (EXCLUDING GST) \$ 273,515

TOTAL PRELIMINARY COST ESTIMATE (EXCLUDING GST) \$ 280,000