

COMPLETE



D3 Iron Cove to Anzac Bridge Rozelle Regional Cycleway Design

Feasibility Report - Supplementary Routes

Complete Urban Pty Ltd
Suite 3/10 Regent Street
Chippendale NSW 2008

Version 6: 8 August 2019



CONTENTS

1	Introduction	1
2	Project Objectives and Design Principles	1
2.1	Objectives	1
2.2	Design Principles	1
3	Route Assessment Methodology and Considerations	2
3.1	Process	2
3.2	Assumptions	2
3.3	Cycle Facility Considerations	2
3.4	Pedestrian Considerations	2
3.5	Traffic Operation Considerations	3
3.6	Parking Considerations	3
3.7	Public Transport Considerations	3
3.8	Street Trees, Landscape and Public Open Space Considerations	3
3.9	Future Stages	3
4	Proposed Supplementary Route Options	3
4.1	Study Area	3
4.2	Community Feedback	5
4.3	Supplementary Route 1 – Hawthorne Canal to Balmain Road	5
4.3.1	General	5
4.3.2	Treatments Identified	6
4.3.3	Existing Cycle Facilities on Route	7
4.3.4	Existing Connectivity Issues	8
4.3.5	Pedestrian Considerations	8
4.3.6	Traffic Operation Considerations	9
4.3.7	Parking Considerations	9
4.3.8	Public Transport Factors	9
4.3.9	Street Trees, Open Space and Landscape Considerations	9
4.3.10	Drainage and Service Conflicts	9
4.3.11	Advantages and Disadvantages of Route Option	9
4.4	Supplementary Route 2 – Waratah Street to Balmain Road	10
4.4.1	General	10
4.4.2	Treatments Identified	10
4.4.3	Existing Cycle Facilities on Route	12
4.4.4	Existing Connectivity Issues	13
4.4.5	Pedestrian Considerations	13
4.4.6	Traffic Operation Considerations	13
4.4.7	Parking Considerations	13
4.4.8	Public Transport Factors	13
4.4.9	Street Trees, Open space and Landscape Considerations	14
4.4.10	Drainage and Service Conflicts	14
4.4.11	Advantages and Disadvantages of the Supplementary Route	14
4.5	Supplementary Route 3 – Charles Street to Henry Street	15

4.5.1	General	15
4.5.2	Treatments Identified	15
4.5.3	Existing Cycle Facilities on Route	16
4.5.4	Existing Connectivity Issues	16
4.5.5	Pedestrian Considerations	16
4.5.6	Traffic Operation Considerations	17
4.5.7	Parking Considerations	17
4.5.8	Public Transport Factors	17
4.5.9	Street Trees, Open Space and Landscape Considerations	17
4.5.10	Drainage and Service Conflicts	17
4.5.11	Advantages and Disadvantages of the Supplementary Route	17
4.6	Supplementary Route 4 – Maliyawul Street to Balmain Road	18
4.6.1	General	18
4.6.2	Treatments Identified	19
4.6.3	Existing Cycle Facilities on Route	19
4.6.4	Existing Connectivity Issues	19
4.6.5	Pedestrian Considerations	19
4.6.6	Traffic Operation Considerations	19
4.6.7	Parking Considerations	19
4.6.8	Public Transport Factors	20
4.6.9	Street Trees, Open Space and Landscape Considerations	20
4.6.10	Drainage and Service Conflicts	20
4.6.11	Advantages and Disadvantages of the Supplementary Route	20
5	The Next Steps	20
6	Appendix	21

Revision Control

Version	Description	Date	Prepared
1	Feasibility Report	19.07.19	N Parish M Owen
2	Feasibility Report	26.07.19	N Parish M Owen
3	Feasibility Report	31.07.19	N Parish M Owen
4	Feasibility Report	01.08.19	N Parish M Owen
5	Feasibility Report	02.08.19	N Parish M Owen
6	Feasibility Report	08.08.19	N Parish M Owen

COMPLETE URBAN

SYDNEY
P: +61 2 9282 9900
F: +61 2 9282 9277

GOLD COAST
P: +61 7 5553 5555
F: +61 7 5580 8088

LONDON
P: +44 (0)207 430 6985
F: +44 (0)207 421 8199

www.completeurban.com.au
admin@completeurban.com.au

**ARCHITECTURE
LANDSCAPE
ENGINEERING
MANAGEMENT**

COMPLETE

1 INTRODUCTION

COMPLETE Urban Pty. Ltd. (COMPLETE) has been engaged by Inner West Council to undertake a detailed route assessment and feasibility report of the proposed Regional Cycleway Route from Iron Cove to Anzac Bridge, Rozelle along Lilyfield Road. As part of the project, additional supplementary routes are being considered to complement the main Lilyfield Road link due to the grade issues on Lilyfield Road that are identified as a barrier for some cyclists.

Several routes have been assessed, the majority of which were identified by the local Bicycle User Groups (BUGs) as potential options for consideration that provided better conditions for cyclists. Three (3) of the identified routes were included in the original project brief, whilst a fourth was identified at the initial stakeholders' meetings to commence the project.

The project is broken into stages, the first being the assessment of the routes and development of concept design treatment types. Future stages, involving detailed assessment, engineering survey, detailed design and for construction documentation is subject to Council approval and dependent on the findings of the supplementary route selection process and development of a suitable concept design.

2 PROJECT OBJECTIVES AND DESIGN PRINCIPLES

2.1 OBJECTIVES

Inner West Council has the following primary objectives for this section of the project:

- scope existing bicycle infrastructure;
- determine feasibility to improve one of the identified cycle route options;
- provide bicycle infrastructure on the selected route that, as far as practicable, meets user needs by providing a safe, comfortable and convenient route for bike riders and connects to intersecting bicycle routes and local destinations whilst maintaining, and preferably enhancing, the amenity of the study area for users and residents;
- work closely with Council staff, the community and other stakeholders including bicycle user groups to include local knowledge;
- undertake detailed surveys, analysis and investigation of the selected route as required to evaluate design treatments types (Future Stage); and
- prepare detailed design plans, cost estimates and construction set-out for cycling infrastructure along the route (Future Stage).

2.2 DESIGN PRINCIPLES

The following design principles are considered as part of the assessment to ensure that the developed options are appealing to existing cyclists and potential users thinking about cycling as an alternative mode of transport:

- Coherence
 - The network should link to popular destinations and trip generators and also to adjacent cycle routes in the area;
 - The network should be continuous and be clear where the route leads;
 - Intersections should provide a clear path for bicycle riders and other road users; and
 - The quality of the bicycle facilities should be consistent throughout the length of the route regardless of the bicycle facility typology.
- Directness
 - The route should be as direct as safely practicable. Long detours and steep gradients should be avoided if possible;
 - The route should take into account the slow speed of bike riders ascending compared to the high speed of bike riders descending; and
 - Delays due to prolonged crossing times at major barriers or due to site constraints should be avoided and the route should allow for a safe comfortable and consistent operating speed throughout the length of the route.

COMPLETE

- Safety
 - The proposed bicycle route and facilities should be well designed and improve and enhance the road safety of bicycle riders, pedestrians and motorists;
 - Intersections should be designed to explicitly include bicycles as well as other road user types;
 - Bicycle routes past bus stops should be designed for safe accommodation of riders, bus passengers, other pedestrians and vehicles.
- Attractiveness
 - The bicycle route should fit into the surrounding environment so that the enjoyment of all road users is enhanced. Community support for cycling is greater if the activity is enjoyable and an attractive cycle facility aids enjoyment;
 - Clear and well placed signposting should indicate major destinations;
 - The route should feel safe and offer good personal security.
- Comfort
 - The bicycle route has to be easy to use for all types of riders. A smooth and well maintained riding surface is essential for both comfort and safety;
 - Depending on the speed and volume of other traffic (motor vehicles or pedestrians), some level of separation is often needed;
 - Clearly marked bicycle facilities that allocate operating space to bicycle users are the most appropriate types of facilities on all but low volume and low speed roads; and
 - Effective intersection treatments, providing a safe and direct crossing, is important for overall route comfort.

3 ROUTE ASSESSMENT METHODOLOGY AND CONSIDERATIONS

3.1 PROCESS

This report has been prepared in response to Council's request to assess the potential bicycle route options for the Rozelle Regional Cycleway Route D3, connecting Iron Cove and Anzac Bridge. The route assessment has been carried out utilising the following methodology:

- Site inspection of the proposed route, supplementary routes and adjacent areas;
- Site assessment and recording of site features, incorporating:
 - Existing road geometry, including measurement of key site features to assist in the evaluation of route options and bicycle facility typologies;
 - Existing bicycle routes;
 - Existing traffic conditions, including identification of sections of high traffic / pedestrian volumes, high traffic speeds, areas of traffic congestion etc.;
 - Existing kerb side parking provisions, including identification of areas of high parking utilisation, high parking turnover, location of existing bus stops / mail zones etc.;

- Existing pedestrian provisions, including areas of high pedestrian concentration, location of crossings and type of control, any areas of inadequate pedestrian storage space, locations of substandard kerb ramps potentially impacted by a cycle facility etc.;
- Location and frequency of driveways and side roads along the proposed routes. In addition, assessment of the turning movements and usage (volume) associated with any side road and high use driveways;
- Location and condition of any street trees and landscaping potentially impacted by a cycle facility; and
- Location of any street furniture items potentially impacted by a cycle route.
- Preparation of a concept design feasibility report outlining the findings of the assessment process, including a recommended final concept design; and
- Stakeholders including Bicycle User Groups (BUGs) meeting with Council representatives to present and discuss the route assessment findings and preliminary design opportunities.

3.2 ASSUMPTIONS

The following assumptions are relevant to the preparation of this route assessment study:

- The existing geometry and dimensions are based on assessment of the provided GIS and cadastral information, aerial photography and site assessments and measurements undertaken by COMPLETE; and
- Being a supplementary route that compliments the main regional route along Lilyfield Road, it is assumed that the bicycle facilities provided will be largely on road, on quieter streets, and mixed traffic or shoulder lane in typology. It is not expected that the supplementary routes will include significant civil works, major parking loss, street tree impact or service implications required by typologies such as a bi-directional separated cycleway.

3.3 CYCLE FACILITY CONSIDERATIONS

Whilst the overall objective is to provide a safe and well linked cycle facility that is attractive to new and existing cyclists, the cycle route and facility typology must be balanced against the greater needs of the road network, the general public and the residents and businesses that are located along the route. In light of this, the developed treatment types consider the potential implications of differing cycle facility typologies against existing traffic and parking provisions, public transport infrastructure, pedestrian facilities and existing landscaping / street trees.

Attendees at a recent stakeholder engagement meeting commented that cyclists are unaware of the routes they can take from Lilyfield Road. A suggestion was made to implement signposting at the foot of Lilyfield Road from the Bay Run. The signage could indicate the various routes to the city and the difficulty of each route.

3.4 PEDESTRIAN CONSIDERATIONS

The assessment considers and identifies the existing pedestrian facilities and how potential cycle facilities would impact on those facilities.

3.5 TRAFFIC OPERATION CONSIDERATIONS

The assessment also considers the potential impacts of cycleway treatments on the existing traffic operation of the route and intersections along the route. Specific consideration of the number of traffic lanes (including short turning lanes at intersections), lane widths, traffic volumes (assessed as high, medium, low - not measured) and vehicle speeds (assessed – not measured).

Any changes at signalised intersections are likely to require additional assessment to meet the requirements of the RMS.

3.6 PARKING CONSIDERATIONS

The assessment considers the parking implications of the route alignment and the cycle facility typology treatments. Specific reference is made in relation to potential loss of parking.

3.7 PUBLIC TRANSPORT CONSIDERATIONS

Where public transport provisions are located on possible route alignment options, the assessment considers the effects of implementing a cycleway on the traffic lane widths and bus stop facilities. (It is noted that Sydney Buses Infrastructure Guide suggests minimum desirable lane widths for bus routes of 3.2m).

3.8 STREET TREES, LANDSCAPE AND PUBLIC OPEN SPACE CONSIDERATIONS

The assessment also considers the potential impact on existing landscaping and street tree installations and evaluated the potential landscape and open space losses incurred as a result of providing a cycle facility adjacent.

3.9 FUTURE STAGES

Following completion and endorsement of the concept design stage, and subject to Council's direction, COMPLETE will progress the project to the detailed design and for construction documentation stages.

4 PROPOSED SUPPLEMENTARY ROUTE OPTIONS

4.1 STUDY AREA

The Regional Bicycle Route considers the route corridor from Hawthorne Canal to Victoria Road via Lilyfield Road, providing links from The Greenway and The Bay Run to Victoria Road and The Anzac Bridge.

Figure 1 below indicates the main regional cycle route along Lilyfield Road and also other key nodes in the vicinity that connect to the route.

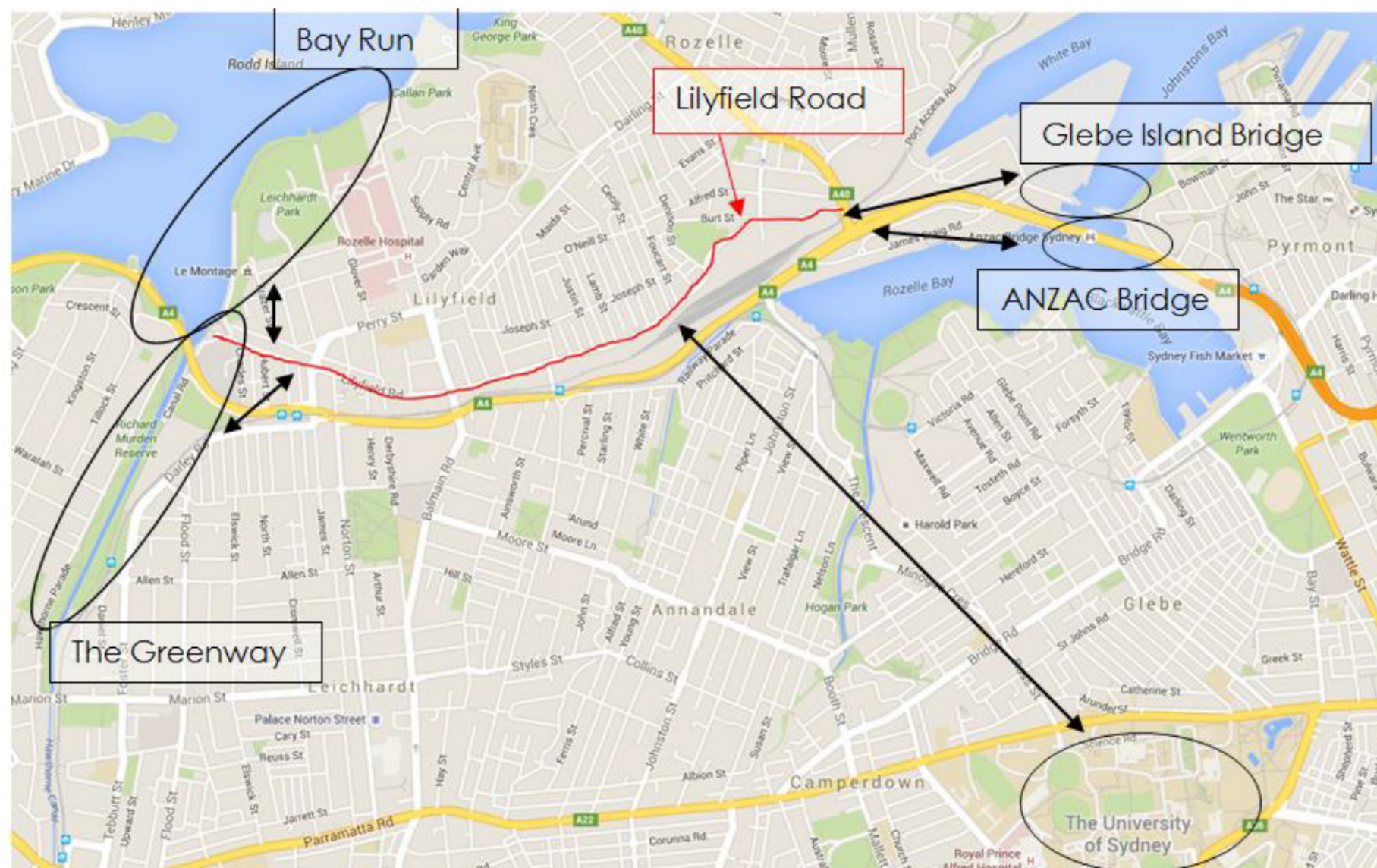


Figure 1 – Identified links to Lilyfield Road

COMPLETE

The four (4) main supplementary routes considered are highlighted in figure 2 below and are described as follows:

- Supplementary Route 1 – Hawthorne Canal to Balmain Road
 - o starts at Canal Road where the Maliyawul Street shared path ends, heads along Charles Street and Darley Road before heading south on Francis Street. The route then travels along Allen Street and north through Derbyshire Road before cutting through to Balmain Road and heading northbound until reaching Lilyfield Road.
- Supplementary Route 2 – Waratah Street to Balmain Road
 - o starts at the Waratah Street/Dobroyd Parade intersection and heads east before cutting through Richard Murden Reserve and Hawthorne Canal reserves. The route then travels east through Lyall Street and Allen Street and north along Derbyshire Road before cutting through to Balmain Road via the Moore Street Cycleway and heading northbound until reaching Lilyfield Road.
- Supplementary Route 3 – Charles Street to Henry Street
 - o begins at the Charles Street/ Lilyfield Road intersection and head south along Charles Street until reaching the dead end. Off-road pathways traverses east between the sound barrier wall and residential property fencing until reaching James Street. The route then travels adjacent City West Link Road before travelling behind the noise barrier wall and traversing north along Henry Street until connecting with Lilyfield Road.
- Supplementary Route 4 – Maliyawul Street to Balmain Road
 - o begins at Maliyawul Street and traverses north along Frazer Street and Mary Street, skirting around Leichhardt Oval before heading south on Glover Street, east along Church Street and south along Wharf Road and Balmain Road before reaching Lilyfield Road.

D3 IRON COVE TO ANZAC BRIDGE, ROZELLE (LILYFIELD ROAD) CYCLEWAY CONCEPT ROUTES

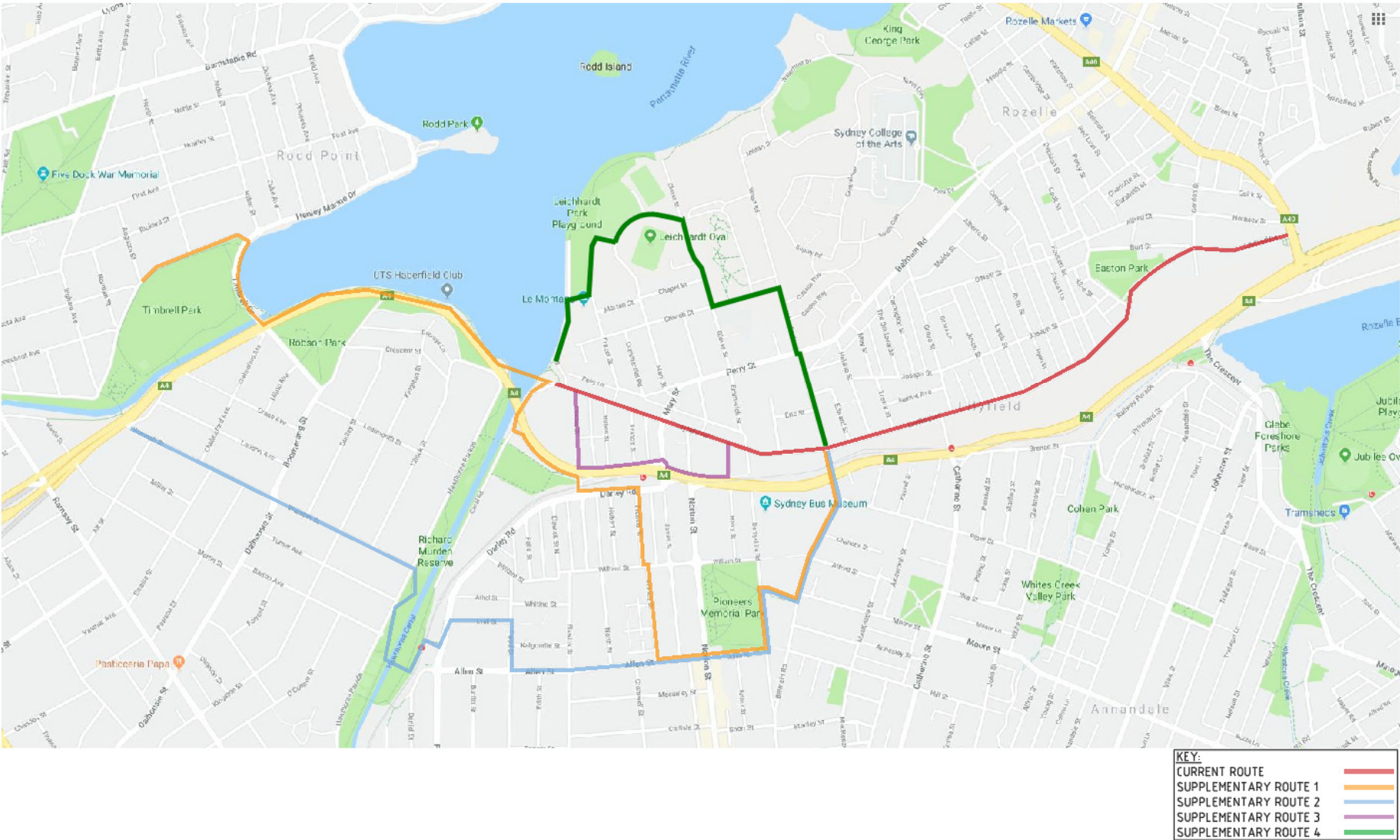


Figure 2 – Supplementary Route Options

4.2 COMMUNITY FEEDBACK

Previous community engagement for the Lilyfield Road cycleway occurred between May 2016 and February 2018. After each phase, the feedback provided was taken into consideration for the next design stage.

Of the feedback received, it was heavily suggested that alternative routes to the main route on Lilyfield Road also be considered. Concerns raised on the main proposed route included the multiple intersections and steep sections along Lilyfield Road which were considered unsafe by residents.

Local bicycle user groups, in consultation with other stakeholders, developed the supplementary routes considered in this report.

4.3 SUPPLEMENTARY ROUTE 1 – HAWTHORNE CANAL TO BALMAIN ROAD

4.3.1 GENERAL

Supplementary Route 1 starts at Canal Road, traverses relatively quiet residential streets with the exception of Darley Road and ends at the Lilyfield Road/ Balmain Road intersection as shown in figure 3.

The alternative route is 2.2km long, which bypasses 870m of Lilyfield Road, resulting in an increased travel distance of approximately 1.3km for Supplementary Route 1.

The route connects to the Bay Run in the west as well as Maliyawul Street bi-directional shared path in the north.

The route is relatively flat, with the exception of:

- 85m uphill gradient at Darley Street between Hubert Street and Francis Street, eastbound;
- 500m slight uphill gradient on Francis Street southbound;
- 290m slight uphill gradient, Allen Street eastbound; and
- 175m uphill gradient on Allen Street (east of Norton Street) eastbound.

Note the road widths stated below are approximate values based on onsite measurements.

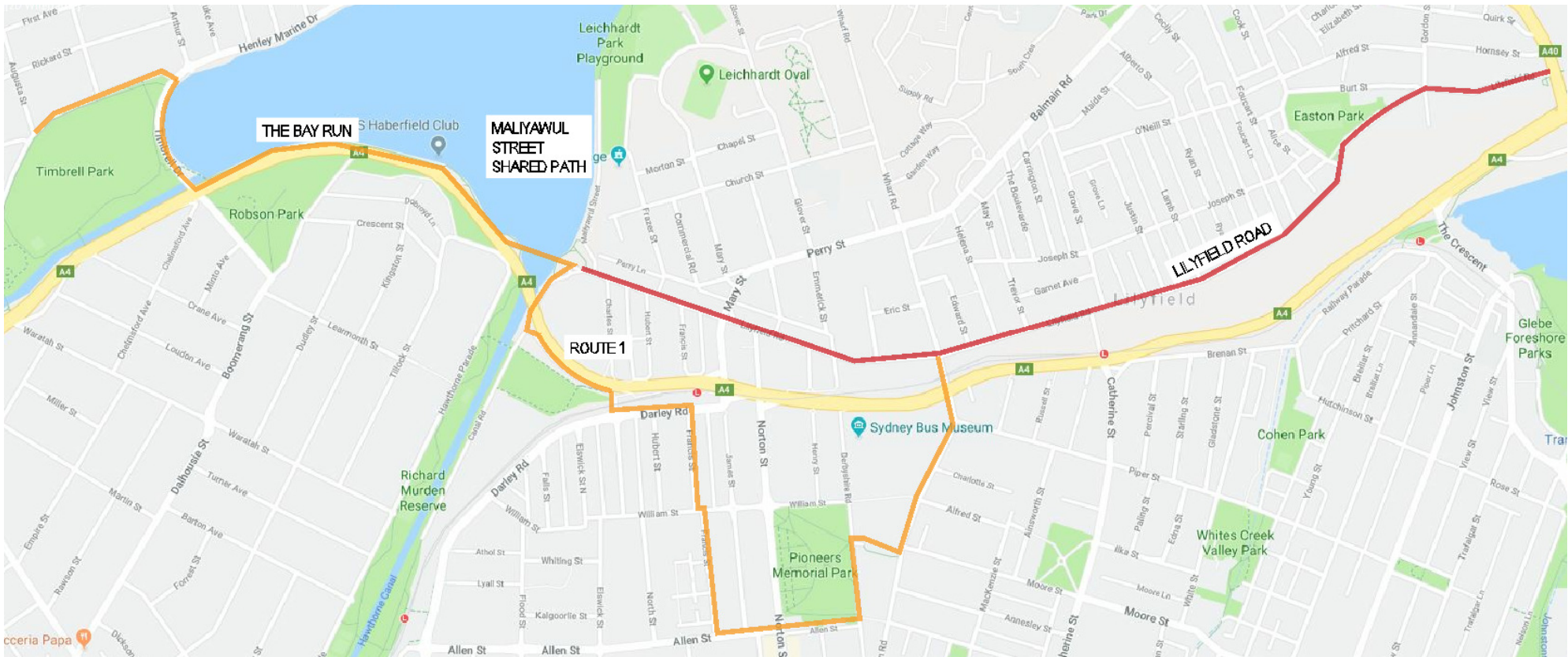


Figure 3 - Supplementary Route Option 1

4.3.2 TREATMENTS IDENTIFIED

Canal Road – 9m wide

Preferred Treatment

- Mixed traffic on Canal Road due to low traffic volumes, low vehicle speeds and short distance between the bi-directional shared path along Maliyawul Street and the bi-directional shared path under City-West Link Road bridge; and
- Install on road cycle symbols.

Charles Street – 5.5-6m wide

Preferred Treatment

- Mixed traffic and on road cycle symbols.

Other Treatments Considered

- Shared path on northern side of Charles Street – issues with sign structures, services and tree loss on verge; and
- Cyclists could access the shared path alongside the adjacent Blackmore Oval which connects to Charles Street. This would require an access ramp from the shared path to Charles Street at an appropriate location.

Note:

- Large vehicles use Charles Street to access nearby film studio warehouses. The volume of such vehicles is unknown.

Darley Road – 12-14m wide (10m wide at signalised crossing with kerb buildouts)

Preferred Treatment

- Eastbound cycle lane along Darley Road (uphill) and mixed traffic westbound (downhill). There is sufficient width for 2 parking lanes, 2 traffic lanes and a shoulder cycle lane. A narrow median (similar to existing) could be installed to restrict turning movements, however the existing median would be demolished from its current location in order to accommodate eastbound cycle lane; and
- Additional directional/wayfinding signage installed at Darley Road/ Francis Street intersection.

Other Treatments Considered

- Shared path on north side of Darley Road with cycle lane provisions at signalised crossing opposite Dan Murphy's. This treatment would result in some tree loss and pole relocation, and it is noted that a shared path across a high volume driveway is undesirable and
- Extend kerb buildouts from signalised crossing on south side to Francis Street to build a cycleway path with ramp on Francis Street. This treatment has potential for tree and parking loss.

Francis Street – 12.3-12.5m wide

Preferred Treatment

- Southbound cycle lane and mixed on road northbound lane. Use line marking to define and delineate parking lanes.

Other Treatment Considered

- On road cycle lanes and marked parking lanes (between on road trees) – may not be feasible as the minimum road width required for 2 shoulder cycle lanes, 2 parking lanes and 2 traffic lanes are 12.6m;
- Bi-directional shared path – involves removal of multiple mature trees;
- Bi-directional on-road cycleway on one side of road – eliminating half the parking available on Francis Street;
- Mixed traffic and on road cycle symbols in both directions; and
- Widening of gap between garden beds at Francis Street (south). Existing gap is approximately 1.5m.

Francis Street/ William Street intersection

Preferred Treatment

- Direction signage and additional line marking to clarify route; and
- Kerb blisters/extensions to reduce road width and reduce vehicle speeds.

William Street

Preferred Treatment

- Lane and centre line marking;

Allen Street – 12.6-13.3m wide

Preferred Treatment

- Retain existing cycle lanes adjacent parking lane. Add linemarking as necessary to clarify lanes and where possible increase cycle lane width from existing the 1.2m to 1.5m and/or mark a buffer zone between cycle lane and parking lane;
- Bus stops need to be taken into account during cycle lane development and marking; and
- Install appropriate signage.

Allen Street (east of Norton Street) – 6.5m wide

Preferred Treatment

- Existing on road cycle symbols remain; and
- Install appropriate signage.

COMPLETE

Derbyshire Road – 6.4m wide

Preferred Treatment

- Existing two on road cycle symbols remain – add several more along length of road;
- Parking restrictions on street near raised threshold to improve visibility for cyclists travelling out of the Moore Street Cycleway shared path and to increase space for vehicles turning around on the street due at the dead end; and
- Install appropriate signage.

Other Treatments Considered

- Extend path on park side to create bi-directional shared path, requires relocation of existing power poles.

Balmain Road – 9.5-9.9m wide

Preferred Treatment

- Retain on road cycle symbols;
- Convert existing path to shared path with additional signage between Moore Street Cycleway and City West Link Road;
- Additional signage at City West Link intersection to improve existing discontinuity on cycleway;
- Convert the three existing pedestrian crossings into shared crossings at Balmain Road/ City West Link Road intersection;
- Convert existing path on the east side of Balmain Road bridge to shared path. Width is 2.2-3.3m wide with shared path 'end' signs at the corner of Lilyfield Road and Balmain Road. There is currently a short section of barrier protection at the south east corner of the bridge which may be moved or expanded; and
- Install off ramp at the corner of Lilyfield Road and Balmain Road for cyclists to access Lilyfield Road.

Other Treatments Considered

- Widen bridge to accommodate shared path on west side of bridge and relocate existing power poles and traffic light poles. Cost prohibitive.
- On road cycle symbols for the full length mixed traffic. This could be considered in conjunction with the preferred treatment type for more confident cyclists.

4.3.3 EXISTING CYCLE FACILITIES ON ROUTE

Location	Existing cycle facilities
Canal Road (north of City-West Link Road overpass)	On-road cycle symbols (faded). North of this section links to existing 2.2m wide concrete bi-directional shared path along Maliyawul Street and into Leichhardt Park.

Location	Existing cycle facilities
Shared path connecting Canal Road (north and south sections) under City-West Link Rd overpass	AC 2.5m wide bi-directional shared path. South of the overpass, the path splits allowing users to enter Charles St (on road via ramp) or continue south along Canal Road (using bi-directional shared path and then on road until Hawthorne Canal Reserve).
Charles Street	Shared zone (10km/hr) with cycle symbols on road until speed hump. 40km/hr area for remainder of road. Shared path from Blackmore Oval meanders until adjacent Charles Street with ramp onto road before light rail bridge.
Charles Street	Connection to pedestrian overpass (supplementary route 3) ramp.
Darley Road	On-road cycle symbols around roundabout. 1.5m wide pedestrian concrete footpath adjacent Darley Road with 3.82-4.2 m wide verge. Signalised 4.67m wide crossing with kerb blisters in front of Dan Murphy's. Wide parking lane to accommodate cyclists travelling westbound along Darley Road.
William Street	On-road cycle symbols. Francis and William Street intersections do not align.
Allen Street	On-road shoulder cycleway in both directions with green coating at intersections. Cycle lanes end just south of Allen Street/ Norton Street intersection. Adjacent 2.54m wide parking lane.
Allen Street (south) /Norton Street intersection	On-road cycle symbols on approach to intersection. Green coated cycle lane on Norton Street on approach to intersection to allow for right hand turn cycle movements onto Allen Street.
Allen Street (north of Norton Street intersection)	Short section of cycle only road with kerb build outs for pedestrians travelling along eastern side of Norton Street. Narrow road with on-road cycle symbols. Parking allowed on both sides of Allen Street.
Derbyshire Road	On-road cycle symbols.

COMPLETE

Location	Existing cycle facilities
	Road is narrow road with parking allowed on eastern side only.
Moore Street West	Raised section on Derbyshire Road leading onto 4.6m wide bi-directional shared path Existing wayfinding signage on Derbyshire Road directing cyclists onto path.
Moore Street West Cycleway	5-6m wide bi-directional shared path (note: lots of school kids crossing the path to get from school to oval located opposite). Shared path signage.
Balmain Road	Wide footpath with a designated cycle ramp at signalised Balmain Road/Moore Street intersection. Wayfinding signage for cyclists at intersection. On road cycle symbols. Extra wide parking lane to accommodate cyclists using the road shoulder at Balmain Road southbound opposite the school sports oval.
Balmain Road/Bus depot	Specific cycle traffic light at major bus depot intersection Cycle 'cross with care' signs at secondary bus depot intersection.
Balmain Road.	Shoulder lane on east side of Balmain Road (in sections). On road cycle symbols on western side of Balmain Road No cycle facilities on Balmain Road between City West Link Road and Lilyfield Road. Way finding signage provided at Lilyfield Road intersection. North of Lilyfield Road intersection there are on-road cycle symbols. Further north there is a shoulder cycle lane on both directions with adjacent parking lane.
City-West Link Road	Shoulder cycle lane westbound from Beames Street.
Various	Wayfinding signage at some parts of route

4.3.4 EXISTING CONNECTIVITY ISSUES

Currently, cyclists are not aware of this potential route due to lack of directional or wayfinding signage. The installation of signage is recommended at the following locations:

- Darley Road directing riders towards Francis Street;
- Francis Street; and
- William Street / Francis Street intersection.

There is an existing permanent roadblock located at Francis Street (south of William Street) with a 1.48m wide gap between two raised garden beds. The width is sufficient to allow a cyclist to pass.

The Balmain Road/City-West Link intersection southbound has no pedestrian traffic signals meaning three stages of signalised crossings are required to cross City-West Link Road if one wishes to use the existing east side path.

Balmain Road bridge between A4/City-West Link and Lilyfield Road is a very busy section of road with two lanes in each direction with no additional shoulder width permissible. The north bound path ranges from 1.65-3.5m in width and the southbound path ranges from 2.24-3.35m wide. The traffic light pole and power pole located at south west corner of Balmain Road/Lilyfield Road creates a pinch point.

4.3.5 PEDESTRIAN CONSIDERATIONS

Existing pedestrian infrastructure along route:

- Shared path around Blackmore Oval, adjacent Charles Street;
- Footpath under light rail bridge on Charles Street on both sides;
- Footpath on both sides of Darley Road;
- Footpath on both sides of Francis Street;
- Footpath on both sides of Allen Street;
- Footpath on west side of Derbyshire Road;
- Shared path on Moore Street Cycleway; and
- Footpath on both sides of Balmain Road.

4.3.5.1 Pedestrian Areas

A signalised pedestrian crossing with sufficient pedestrian storage including 4.67m wide pram ramps and kerb buildouts is located on Darley Street in front of Dan Murphy's. The crossing connects to a path which leads to Leichhardt North light rail station.

There is a high volume of school kids which cross Moore Street Cycleway to get from the school to the sports oval located opposite. High volumes of pedestrians and school kids also occur at the bus stop on Balmain Road in front of the school sports oval during AM/PM peak school times and during special events.

Moderate and continuous volumes of pedestrians are present on Norton Street due to proximity to medical centre, bus stops, public park, shops and cafes.

Potential cycle facilities will have minimal impact to the existing pedestrian facilities. There may be an increase in bicycle volumes which would impact pedestrians using the Moore Street Cycleway shared path as well as those using the footpath along the eastern side of Norton Street crossing Allen Street.

4.3.6 TRAFFIC OPERATION CONSIDERATIONS

Darley Road connects to a signalised intersection with access to A4/City-West Link Road and has a moderate volume of continuous traffic.

Turning right to enter Francis Street from Darley Road may be an issue for cyclists particularly as there is an incline and moderate volume of westbound vehicles exiting the City-West Link Road.

Francis Street and William Street intersection have small volumes of low-speed traffic as these are residential streets.

Care must be taken when travelling along Allen Street and crossing Norton Street due to the high volume of turning movements at the intersection, multiple bus stops, pedestrian activity, a pedestrian crossing and roadside parking within the vicinity.

Vehicle maneuverability on Allen Street (east of Norton Street) can be difficult as parking is permitted on both sides of the narrow road.

Derbyshire Road is quiet during the day but may have high traffic volumes around AM/PM peak school times. A number of school children ride bikes to school as evidenced by the bike racks located on campus which were full.

The Leichhardt bus depot has a high volume of vehicles entering and exiting the facility via three intersections located on Balmain Road. One is a signalised crossing and the secondary access points have multiple warning signs for cyclists using the adjacent shared path.

High volumes of traffic along Balmain Road due to the connectivity with City-West Link Road and Lilyfield Road. Both intersections are signalised. City West Link Road has a sign posted speed of 70km/hr whilst Lilyfield Road has a sign posted speed of 50km/hr.

4.3.7 PARKING CONSIDERATIONS

Existing parking availability on route:

- Parallel and 90-degree parking on Canal Road;
- No parking permitted on Charles Street;
- Parallel parking on both sides of Darley Street;
- Parallel parking on both sides of Francis Street;
- Parallel parking on both sides of Allen Street;
- Parking permitted on eastern side of Derbyshire Road only; and
- Parking permitted on eastern side of Balmain Road only until City-West Link Road intersection.

There is high parking utilisation on Derbyshire Road although turnover is low as it is most likely used by teachers from the adjacent high school during the weekdays.

4.3.8 PUBLIC TRANSPORT FACTORS

An overhead footbridge bridge links Charles Street to Leichhardt North light rail station over City-West Link Road, allowing for a north-south pedestrian link over the City West Link Road.

Bus stops are located on Allen Street outside of a medical centre and in front of the sports oval on Balmain Road. It is assumed that there will be a high volume of school children during AM and PM peak times at the bus stop on Balmain Road due to the close proximity with the local high school.

4.3.9 STREET TREES, OPEN SPACE AND LANDSCAPE CONSIDERATIONS

There are various trees planted along the route which requires attention when considering route options. Medium sized gum trees are located along the verges in Charles Street. Located in the road and verge along Francis Street are mature paper bark trees. Young and mature trees are also planted in the verges of Allen Street.

The proposed route is located adjacent the following open spaces:

- Blackmore Oval;
- Pioneers Memorial Oval; and
- Sydney Secondary College sports oval.

Minimal potential landscape and open space losses will be incurred as a result of providing a cycle facility adjacent.

4.3.10 DRAINAGE AND SERVICE CONFLICTS

Location	Drainage/ service conflict type
Darley Road at signalised intersection	Traffic signals box located on footpath

4.3.11 ADVANTAGES AND DISADVANTAGES OF ROUTE OPTION

4.3.11.1 Advantages

The route has one the shortest distance of uphill gradients for cyclists travelling eastwards from the options considered. Most of the streets used as part of the route are relatively quiet and some have existing cycle infrastructure.

The route has a smaller detour than options 2 and 4 and connects points of interest including Leichhardt North light rail station, the businesses and services located on Norton Street, Pioneers Memorial Park, Sydney Secondary College Leichhardt Campus and bus depot.

4.3.11.2 Disadvantages

Cyclists are required to make several right hand turns when wishing to travel eastwards at busy intersections including Darley Street and Francis Street, and Allen Street and Norton Street as well as navigating the major intersection at City West Link Road and Balmain Road.

COMPLETE

4.4 SUPPLEMENTARY ROUTE 2 – WARATAH STREET TO BALMAIN ROAD

4.4.1 GENERAL

Supplementary Route 2 starts at the intersection of Waratah Street and Dobroyd Parade, traverses quiet residential streets and a section of the Greenway and ends at the Lilyfield Road/ Balmain Road intersection as shown in figure 4.

Supplementary Route 2 is 6km long, which bypasses 870m of Lilyfield Road and 3.4km of the Bay Run / Henley Marine Drive section, resulting in an increased travel distance of 1.7km for Supplementary Route 2.

The route has varying grades including:

- 460m uphill gradient, Waratah Street eastbound;
- 150m uphill gradient, Waratah Street westbound;
- 250m uphill gradient, Waratah Street westbound;
- 135m uphill gradient, Lyall Street eastbound;
- 145m uphill gradient, Flood Street southbound;
- 120m uphill, Allen Street westbound;
- 290m slight uphill gradient, Allen Street eastbound; and
- 175m uphill gradient on Allen Street (east of Norton Street) eastbound.

4.4.2 TREATMENTS IDENTIFIED

Dobroyd Parade/Waratah Street

- Shared path at the end of Dobroyd Street which extends to Waratah Street with off-ramps on both streets.

Waratah Street – 12.5m wide

Preferred Treatment

- Eastbound cycle lane (uphill) from Dobroyd Parade to Dalhousie Street roundabout with mixed traffic westbound; and
- Westbound cycle lane (uphill) from Dalhousie Street roundabout to Hawthorne Parade with mixed traffic eastbound.

Other Treatments Considered

- On road cycle lanes and adjacent marked parking lane with provisions at narrowed sections on the carriageway (to join existing cycle lane sections) – may not be feasible as the absolute minimum road width required for 2 shoulder cycle lanes, 2 parking lanes and 2 traffic lanes are 12.6m.

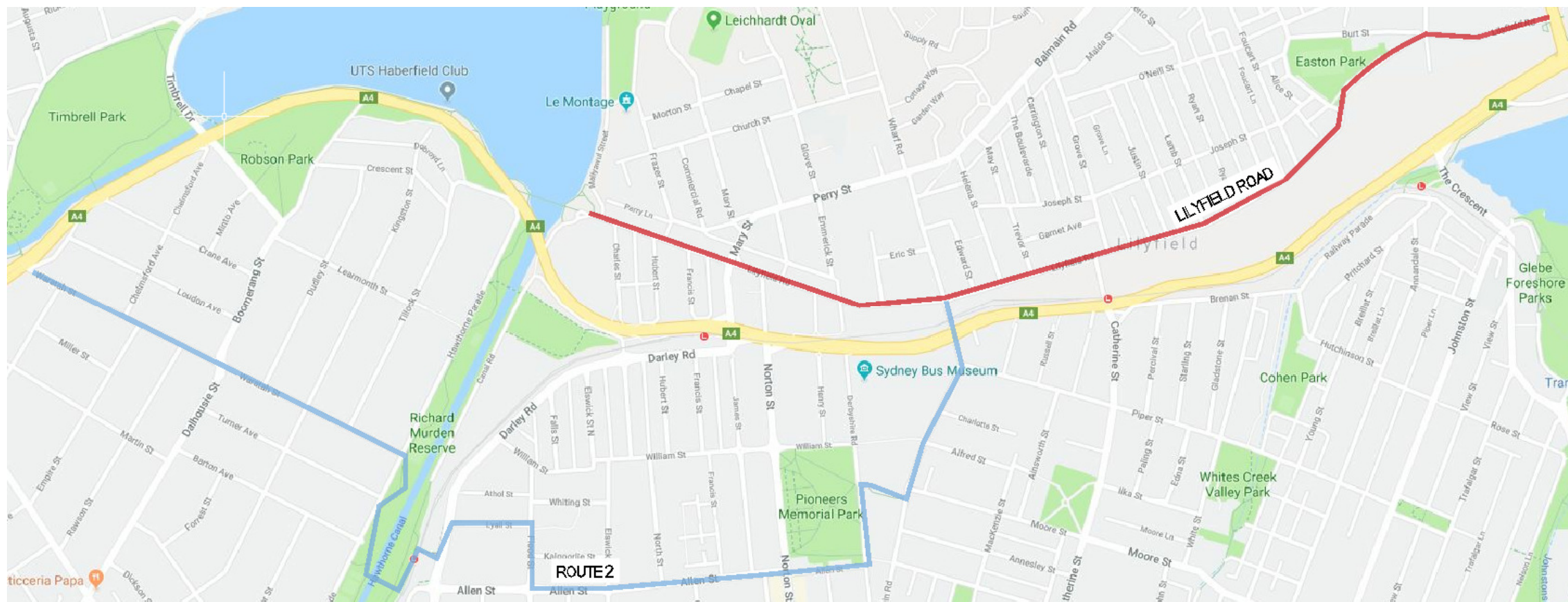


Figure 4 - Supplementary Route Option 2

COMPLETE

Hawthorne Parade – 8.5m wide between kerb ramps

- Upgrade refuge on north side of Waratah Street/ Hawthorne Parade roundabout intersection.

Richard Murden Reserve

- 2-2.4m wide shared path remains.

Hawthorne Canal Reserve

Suggested Treatment

- Widen/ improve existing 1.8m wide shared path near pedestrian tunnel.

Darley Road – 12.2-12.5m wide

Preferred Treatment

- Retain 90 degree car parking and add 'rear to kerb' signage;
- Retain existing on road cycle symbols; and
- Increase size of pedestrian refuge opposite Lyall Street and align with gap in end treatment. Refuge is currently 2m wide.

Lyall Street – 12m wide

Preferred Treatment

- Covert 90 degree parking to kerb side parking and install eastbound cycle lane (going uphill) and mixed traffic westbound (downhill).

Other Treatments Considered

- Lyall Street/ Flood Street intersection - remove kerb side median island.

Flood Street – 12.9m wide

Preferred Treatment

- Directional signage to direct cyclists onto Lyall Street;
- Install cycle signage to increase awareness for motorists; and
- Increase width of cycle lanes to 1.5m where possible.

Other Treatments Considered

- At roundabout, install shared path on verge corners to avoid cyclists in the roundabout. Most likely insufficient room and a somewhat undesirable treatment type; and
- At roundabout, extend on road cycle lane on approaches up to the intersection. This is likely to result in some parking loss and there are advantages of cyclists being in lane at roundabouts to ensure that vehicles observe them and don't reduce cyclist space with traversing the roundabout.

Allen Street – 12.6-13.3m wide

Preferred Treatment

- Retain existing cycle lanes adjacent parking lane. Add linemarking as necessary to clarify lanes and where possible increase cycle lane width from existing the 1.2m to 1.5m and/or mark a buffer zone between cycle lane and parking lane;
- Bus stops need to be taken into account during cycle lane development and marking; and
- Install appropriate signage.

Allen Street (east of Norton Street) – 6.5m wide

Preferred Treatment

- Existing on road cycle symbols remain; and
- Install appropriate signage.

Derbyshire Road – 6.4m wide

Preferred Treatment

- Existing two on road cycle symbols remain – add several more along length of road;
- Parking restrictions on street near raised threshold to improve visibility of cyclists travelling out of the Moore Street cycleway path and to increase space for vehicles turning around on the street due at the dead end; and
- Install appropriate signage.

Other Treatments Considered

- Extend path on park side to create bi-directional shared path – requires relocation of existing power poles.

Balmain Road – 9.5-9.9m wide

Preferred Treatment

- Retain on road cycle symbols;
- Convert existing path to shared path with additional signage between Moore Street shared path and City West Link Road;
- Additional signage at City-West Link intersection to improve existing discontinuity on cycleway;
- Convert the three existing pedestrian crossings into shared crossings at Balmain Road/ City West Link Road intersection;
- Convert existing path on the east side of Balmain Road bridge to shared path. Width is 2.2-3.3m wide with shared path 'end' signs at the corner of Lilyfield Road and Balmain Road. There is currently a short section of barrier protection at the south east corner of the bridge which may be moved or expanded; and
- Install off ramp at the corner of Lilyfield Road and Balmain Road for cyclists to access Lilyfield Road.

Other Treatments Considered

- Widen bridge to accommodate shared path on west side of bridge and relocate existing power poles and traffic light poles. Likely cost prohibitive; and
- On road cycle symbols. This could be considered in conjunction with the preferred treatment type for more confident cyclists.

4.4.3 EXISTING CYCLE FACILITIES ON ROUTE

Location	Existing cycle facilities
Waratah Street	On road cycle symbols
Waratah Street/ Boomerang Street	Wide landing area at median island for crossing. Multiple on road cycle symbols
HN 49 Waratah Street	Road narrows due to kerb buildouts with adjacent green coated shoulder 1m wide cycle lanes
Richard Murden Reserve	2m wide AC shared path
Hawthorne Canal	4.18m wide pedestrian bridge with lighting
Hawthorne Canal Reserve	1.8-2.1m wide AC shared path with underpass crossing light rail tracks.
Darley Road	2.5m wide AC shared path until the reserve meets the road. On road cycle symbols and way finding signage.
Darley Road	3m wide bi-directional shared path. Additional shared path leads to Hawthorne light rail station. Small median island to facilitate crossing Darley Road.
Flood Street	On-road shoulder cycleway in both directions with green coating at intersections. Cycle lane ends on approach to roundabout. Cyclists directed onto traffic lane with on road symbols.
Allen Street	On road cycle symbols at Flood Street/Allen Street roundabout with wayfinding signage. On-road shoulder cycleway in both directions with green coating at intersections. Cycle lanes end just south of Allen Street/ Norton Street intersection. Adjacent 2.54m wide parking lane.
Allen Street (south) /Norton Street intersection	On-road cycle symbols on approach to intersection.

Location	Existing cycle facilities
	Green coated cycle lane on Norton Street on approach to intersection to allow for right hand turn cycle movements onto Allen Street.
Allen Street (north of Norton Street intersection)	Short section of cycle only road with kerb build outs for pedestrians travelling along eastern side of Norton Street. Narrow road with on-road cycle symbols. Parking allowed on both sides of Allen Street.
Derbyshire Road	On-road cycle symbols. Road is narrow road with parking allowed on eastern side only.
Moore West Street	Raised section on Derbyshire Road leading onto 4.6m wide bi-directional shared path Existing wayfinding signage on Derbyshire Road directing cyclists onto path.
Moore Street Cycleway	5-6m wide bi-directional shared path (note lots of school kids crossing the path to get from school to oval located opposite). Shared path signage.
Balmain Road	Wide footpath with a designated cycle ramp at signalised Balmain Road/Moore Street intersection. Wayfinding signage for cyclists at intersection. On road cycle symbols. Extra wide parking lane to accommodate cyclists using the road shoulder.
Balmain Road/Bus depot	Specific cycle traffic light at major bus depot intersection Cycle 'cross with care' signs at secondary bus depot intersection.
Balmain Road.	Shoulder lane on east side of Balmain road (in sections). On road cycle symbols on western side of Balmain Road No cycle facilities on Balmain Road between City West Link Road and Lilyfield Road. Way finding signage provided at Lilyfield Road intersection. North of Lilyfield Road intersection there are on-road cycle symbols. Further north there is a shoulder cycle lane on both directions with adjacent parking lane.
City-West Link Road	Shoulder cycle lane westbound from Beames Street.
Various	Wayfinding signage at some parts of route

COMPLETE

4.4.4 EXISTING CONNECTIVITY ISSUES

There is limited capacity at the refuge islands located at the Dalhousie-Boomerang/Waratah Street roundabout intersection. The most suitable refuge island is located at the Boomerang Street/Waratah Street due to the larger size and installation of holding rails.

The end of Dobroyd Parade is blocked off for vehicular access, with a 1.95m concrete footpath path connecting to Waratah Street. Currently, there is no ramp for cyclists to exit onto road to Waratah Street.

A small pedestrian refuge is located between north and southbound lanes at Darley Road to access Lyall Street. Cyclists may be uncomfortable stopping at this refuge as the width is a maximum of 2m.

A dead end located at the western end of Lyall Street due to a raised garden bed. Spaces of 3.47m and 3.42m between edge of garden bed and property boundaries to allow for pedestrian and cycle movements.

4.4.5 PEDESTRIAN CONSIDERATIONS

Existing pedestrian infrastructure along route:

- Footpath on both sides of Waratah Street.
- Pedestrian crossing located in front of Dobroyd Point Primary School.
- Shared path along Richard Murden Reserve/Hawthorne Parade.
- Shared path along Hawthorne Canal Reserve.
- Bi-separational shared path at Darley Road which begins near the roundabout intersection with Allen Street.
- Footpath on both sides of Lyall Street.
- Footpath on both sides of Flood Street.
- Footpath on both sides of Allen Street.
- Footpath on west side of Derbyshire Road
- Shared path on Moore Street Cycleway
- Footpath on both sides of Balmain Road

4.4.5.1 Pedestrian Areas

There is a high volume of pedestrians between Boomerang Street and Dudley Street because of shops and a popular café in the vicinity.

There is a high volume of school kids which cross Moore Street Cycleway to get from school to the sports oval located opposite. High volumes of pedestrians and school kids also occur at the bus stop on Balmain Road in front of the school sports oval during AM/PM peak school times and during special events.

Moderate and continuous volumes of pedestrians are present on Norton Street due to proximity to medical centre, bus stops, public park, shops and cafes.

Potential cycle facilities will have minimal impact to the existing pedestrian facilities. There may be an increase in bicycle volumes which would impact pedestrians using the shared path on Richard Murden Reserve/Hawthorne Canal reserve, the Moore Street Cycleway shared path as well as those using the footpath along the eastern side of Norton Street crossing Allen Street.

4.4.6 TRAFFIC OPERATION CONSIDERATIONS

Darley Road has a moderate and continuous volume as it connects to a signalised intersection with access to A4/City-West Link Road.

Care must be taken when travelling along Allen Street and crossing Norton Street due to a high volume of turning movements at the intersection, multiple bus stops, pedestrian activity, a pedestrian crossing and roadside parking within the vicinity.

Vehicular maneuverability on Allen Street (north of Norton Street) may be difficult as parking was permitted on both sides despite the narrow road.

Derbyshire Road is quiet during the day but may have high traffic volumes around AM/PM peak school times. A number of school children ride bikes to school as evidenced by the bike racks located on campus which were full.

The Leichhardt bus depot has a high volume of vehicles entering and exiting the facility via three intersections located on Balmain Road. One is a signalised crossing and the secondary access points have multiple warning signs for cyclists using the adjacent shared path.

High volumes of traffic along Balmain Road due to connectivity with City-West Link Road and Lilyfield Road. Both intersections are signalised. City-West Link Road has a sign posted speed of 70km/hr whilst Lilyfield Road has a sign posted speed of 70km/hr.

The Balmain Road bridge between A4/City-West Link and Lilyfield Road is a very busy section of road with two lanes in each direction and no additional shoulder width permissible.

4.4.7 PARKING CONSIDERATIONS

Existing parking availability on route:

- Kerb side parking along Waratah Street.
- Kerb side parking and marked parking spaces at Hawthorne Parade.
- Darley Road has 90 degree parking and kerb side parking.
- Lyall Street has kerb side and angled parking.
- Kerb side parking in parking lane along Flood Street.
- Kerb side parking in parking lane along Allen Street.
- Parallel parking on both sides of Allen Street east of Norton Street.
- Parking permitted on eastern side of Derbyshire Road only.
- Parking permitted on eastern side of Balmain Road only until City-West Link Road intersection.

There is high parking utilisation on Derbyshire Road although turnover is low as it is most likely used by teachers from the adjacent high school. A high turnover of parked vehicles would occur at the vicinity of Dobroyd Point Public School during Am/PM peak drop off times. High parking turnover also occurs on Waratah Street between Boomerang Street and Dudley Street due to cafes and shops.

4.4.8 PUBLIC TRANSPORT FACTORS

Bus stops are located at Leichhardt Congregational Church, Allen Street, the corner of Allen Street and North Street, on Allen Street outside of medical centre and in front of the sports oval on Balmain Road.

There are also two light rail stops in the vicinity; Hawthorne at the centre of Hawthorne Canal Reserve, with a direct path to Darley Road and Marion located at the southern end of the reserve.

4.4.9 STREET TREES, OPEN SPACE AND LANDSCAPE CONSIDERATIONS

Young and mature trees are planted in the verges of Waratah Street, Lyall Street, Flood Street and Allen Street.

Trees are sparsely located in Richard Murden Reserve and the existing shared path in Hawthorne Canal Reserve is heavily treed with a high volume of leaf fall covering the path.

Route located adjacent open space reserves including:

- Richard Murden Reserve (The Greenway)
- Hawthorne Canal Reserve (The Greenway)
- Pioneers Memorial Oval
- Sydney Secondary College sports oval

Minimal potential landscape and open space losses will be incurred as a result of providing a cycle facility adjacent.

4.4.10 DRAINAGE AND SERVICE CONFLICTS

Location	Drainage/ service conflict type
Corner of Waratah Street and Alt Street	Electrical Box
HN 67 Rawson Street	Electrical Box
Corner of Waratah Street and Hawthorne Parade	Electrical Box
Lyall Street dead end	Drainage pits located at dead end due to low point.
Corner of Allen Street and Flood Street	Above ground Telecom pillar

4.4.11 ADVANTAGES AND DISADVANTAGES OF THE SUPPLEMENTARY ROUTE

4.4.11.1 Advantages

The route travels through part of the Greenway reserve and connects points of interest including Leichhardt North light rail station, the businesses and services located on Norton Street, Pioneers Memorial Park, Sydney Secondary College Leichhardt Campus and bus depot.

4.4.11.2 Disadvantages

The longest route of the options considered which also does not link to the Bay Run. The existing Henley Marine Drive pedestrian bridge is an inadequate linkage to Timbrell Park/ the Bay Run for cyclists due to the narrow width of the crossing.

Multiple raised crossings and road narrowing sections along Waratah street. Only a couple have cycleway provisions.

The route also consists of multiple right hand turns and has various uphill gradients which are not ideal for cycleway provisions, especially when the purpose of the supplementary route is to avoid the uphill gradient on Lilyfield Road.

COMPLETE

4.5 SUPPLEMENTARY ROUTE 3 – CHARLES STREET TO HENRY STREET

4.5.1 GENERAL

Supplementary Route 3 starts at the intersection of Lilyfield Road and Charles Street, traverses quiet residential streets and the existing thoroughfares adjacent the sound barrier wall before ending at the Lilyfield Road/ Henry Street intersection as shown in figure 5.

Supplementary Route 3 is 0.81km long, which bypasses 500m of Lilyfield Road, resulting in an increased travel distance of approximately 300m for Supplementary Route 3.

The route connects to the Bay Run in the west as well as Maliyawul Street bi-directional shared path in the north.

The route has varying grades including:

- 130m uphill gradient, Charles Street southbound;
- 80m uphill gradient, Charles Street northbound; and
- 80m uphill gradient on Henry Street northbound.

4.5.2 TREATMENTS IDENTIFIED

Charles Street – 12m wide

Preferred Treatment

- Southbound shoulder cycle lane and mixed traffic westbound with an off road connection to the path at the south end of Charles Street.

Other Treatments Considered

- Separated bi-directional cycleway;
- Convert to shared path from Fairlight Street intersection on raised footpath;
- Widen and convert existing footpath adjacent HN 85 Charles Street to shared path; and
- On road cycle lanes and adjacent marked parking lane– may not be feasible as the minimum road width required for 2 shoulder cycle lanes, 2 parking lanes and 2 traffic lanes are 12.6m.

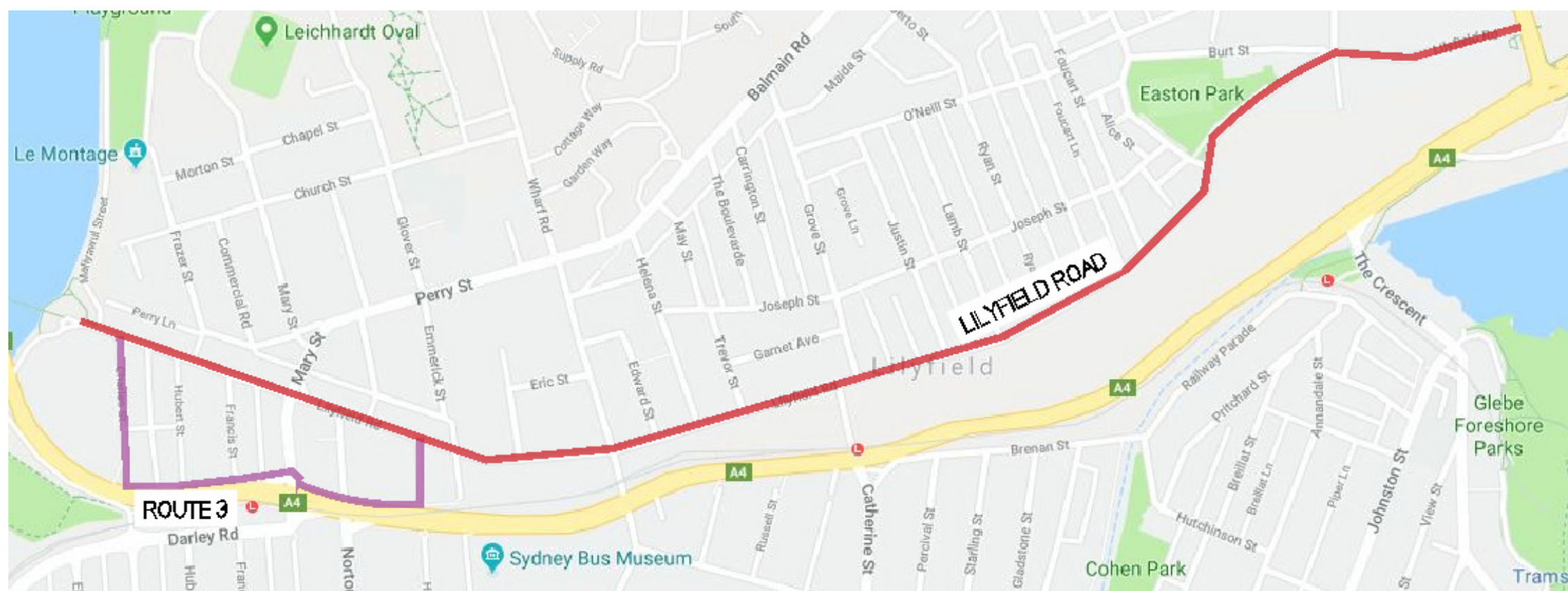


Figure 5 - Supplementary Route Option 3

COMPLETE

Hubert Street – 4.1m wide

Preferred Treatment

- Widen and convert existing footpath between Hubert Street and Francis Street to shared path.

Other Treatments Considered

- Kerb ramp to transition from path to road and remove tree roots; and
- Mixed on road traffic with on road cycle symbols, although connection to and from existing shared paths at each end is more complicated.

Wragge/Francis Street – 5.3m wide

Preferred Treatment

- Mixed on road traffic with on road cycle symbols; and
- Kerb ramp to transition from path to road. Remove garden bed and tree. Assess of the street light can remain in existing position.

Other Treatments Considered

- Remove/reposition sound walls for a more direct route – cost prohibitive.

City West-Link Road

Preferred Treatment

- Increase size of traffic island at City West Link and James Street intersection and install cycle and pedestrian crossing lanterns and cycle lanes adjacent pedestrian crossing (7m crossing distance); and
- Widen and convert existing footpath between Norton Street and Henry Street to shared path.

Other Treatments Considered

- Relocate light pole on the corner of City-West Link Road and Norton Street; and
- Remove/reposition sound walls for a more direct route – cost prohibitive.

Henry Street – 12.1-12.6m wide

Preferred Treatment

- Convert 90 degree parking to parallel parking with an on road cycle lane uphill (towards Lilyfield Road); and
- Widen existing bridge over drainage channel.

Other Treatments Considered

- Widen existing bridge over drainage channel; and
- Mixed on road traffic with on road cycle symbols.

4.5.3 EXISTING CYCLE FACILITIES ON ROUTE

Location	Existing cycle facilities
Lilyfield Road/Charles Street intersection	Shoulder cycle lane along Lilyfield Road eastbound (uphill). On road cycle symbols for westbound direction
Charles Street-Hubert Street path	Narrowest reserve width at 2.9m. 1.33m wide footpath
Hubert Street-Francis Street path	Reserve and existing footpath is a minimum 2.55m
Wragge Street-James Street path	Pedestrians directed onto James Street/City West Link intersection via pedestrian crossing. Small island with traffic lights
City Link West Road path. Between James Street and Norton Street	3.1m wide path with occasional light pole which narrows path down to 2.25m
City Link West Road path. Between Norton Street and Henry Street.	3.3m wide concrete path with narrows to 1.94m. Two right angled corners due to brick and steel structure. Maneuverability may be difficult if multiple users are at the same location.
Henry Street	Two paths connecting City West Link path to Henry Street. The eastern path is 1.6m wide and located adjacent a fence and drainage channel. The western path is 1.77m wide and
Henry Street	Access to paths via adjacent concrete driveways

4.5.4 EXISTING CONNECTIVITY ISSUES

At the end of Charles Street, maneuverability is tight at the connection between the elevated path ramp and perpendicular footpath.

The path between Wragge Street and James Street has two right angled corners in the footpath due to the brick barrier walls. This is also the case adjacent City-West Link Road when accessing the Henry Street/ Derbyshire Road footpath.

4.5.5 PEDESTRIAN CONSIDERATIONS

Existing pedestrian infrastructure along route:

- Footpath on east side of Charles Street. Footpath on west side of Charles Street from HN 90.
- Elevated 3m wide footpath section on Charles Street south of Fairlight Street intersection.
- 1.3m wide footpath along the side of HN 85 Charles Street.
- 1.2m wide footpath on south side of Hubert Street.
- 1.2m wide footpath between Hubert and Francis Street.

COMPLETE

- No footpath on Wragge Street.
- Footpath between Wragge and James Street.
- Footpath along City-West Link Road, narrowest section at 1.94m wide.
- Footpath behind barrier wall between City West Link Road and Henry Street.

The Balmain Road/City-West Link intersection southbound has no pedestrian traffic signals meaning three stages of signalised crossings are required to cross City-West Link Road.

Potential cycle facilities will have some impact to the existing pedestrian facilities. There may be an increase in bicycle volumes which would impact pedestrians using the existing footpaths which are proposed to be converted to shared paths.

4.5.6 TRAFFIC OPERATION CONSIDERATIONS

At Charles Street, an industrial driveway is present with heavy vehicles utilising this access point. A crest of a hill is located at the Charles Street/Fairlight Street intersection causing a potential visibility issue.

A section of the route is adjacent City-West Link Road between James Street and Henry Street. The road is a major thoroughfare with a sign posted speed limit of 70km/hr.

A number of signalised crossings are located on the route including the James Street/City-West Link Road intersection at the median island and Norton Street/ City-West Link intersection. A zebra crossing is located at James Street/ City-West Link on the slip lane.

4.5.7 PARKING CONSIDERATIONS

Existing parking availability on route:

- Charles Street is a wide road with parking on both sides.
- No parking available at Hubert Street.
- No parking available at Wragge Street.
- No parking available along City-West Link Road.
- Parking at 90 degrees along east side and parallel parking along west side of Henry Street.

4.5.8 PUBLIC TRANSPORT FACTORS

There are no bus stops along this route.

An overhead footbridge bridge links Charles Street to Leichhardt North light rail station over City-West Link Road providing a north-south connection over the City West Link Road.

4.5.9 STREET TREES, OPEN SPACE AND LANDSCAPE CONSIDERATIONS

Mature gum trees are located along the eastern side of Charles Street and in Henry Street parking lanes and along the verge.

Buttress tree roots are present alongside of No. 85 Charles Street and Hubert Street-Francis Street path. The tree roots are causing existing footpath uplift at the City Link West Road-Henry Street path.

An informal reserve is located adjacent Henry Street.

Small landscape and open space losses will be incurred as a result of providing a cycle facility particularly at Hubert Street and around the barrier walls at Wragge Street/ James Street and City-West Link Road towards Henry Street.

4.5.10 DRAINAGE AND SERVICE CONFLICTS

Location	Drainage/ service conflict type
HN 84 Charles Street	Small electrical box
Corner of HN 85 Charles Street	Small electrical box
Charles Street-Hubert Street path	Large electrical box
Hubert Street behind HN 85 Charles Street	Potential drainage issue. Low point on corner with water collected from both directions of Hubert Street and alleyway.
Corner of HN 73 Hubert Street	Small electrical box
Corner of HN 133 Francis Street	Small electrical box
Corner of James Street	RMS small traffic signal box
Henry Street (south end)	Large electrical box
Henry Street (south end)	Drainage inlet pit. Low point on road. Would most likely connect to underlying drainage channel.
Henry Street/Lilyfield Road intersection	Large electrical box
Henry Street	Large electrical unit adjacent 1.9m wide footpath.

4.5.11 ADVANTAGES AND DISADVANTAGES OF THE SUPPLEMENTARY ROUTE

4.5.11.1 Advantages

Route 3 is the shortest route of the options considered with the majority of the length off road and the remainder using quiet roads with low traffic volumes and vehicle parking turnover.

COMPLETE

4.5.11.2 Disadvantages

Should the route be selected, the installation of lighting would be required. There may also be community concerns for safety as the potential for passive surveillance is limited and conflicts with the principles of CPTED (Crime Prevention Through Environmental Design).

The position of some power poles may cause constraints along sections of the route as well as the potential removal of the existing 90 degree brick barrier walls to allow for smoother movements for cyclists. These changes to the existing infrastructure are costly and may prove difficult to implement. The alteration to the existing barrier walls may impact the noise acoustics for the properties surrounding the areas affected and would require assessment.

4.6 SUPPLEMENTARY ROUTE 4 – MALIYAWUL STREET TO BALMAIN ROAD

4.6.1 GENERAL

Supplementary Route 4 starts at Maliyawul Street, travels along streets adjacent recreational and parkland facilities before ending at the Lilyfield Road/ Balmain Road intersection as shown in figure 6.

Supplementary Route 4 is 2.9km long, which bypasses 870m of Lilyfield Road, resulting in an increased travel distance of approximately 2km for Supplementary Route 4.

There are varying grades on the route:

- 410m uphill gradient, Frazer Street northbound;
- 215m uphill gradient, Mary Street southbound;
- 150m uphill gradient, Glover Street southbound;
- 150m uphill gradient, Church Street eastbound;
- 230m uphill gradient, Wharf Road southbound; and
- 165m uphill gradient, Balmain Road northbound.

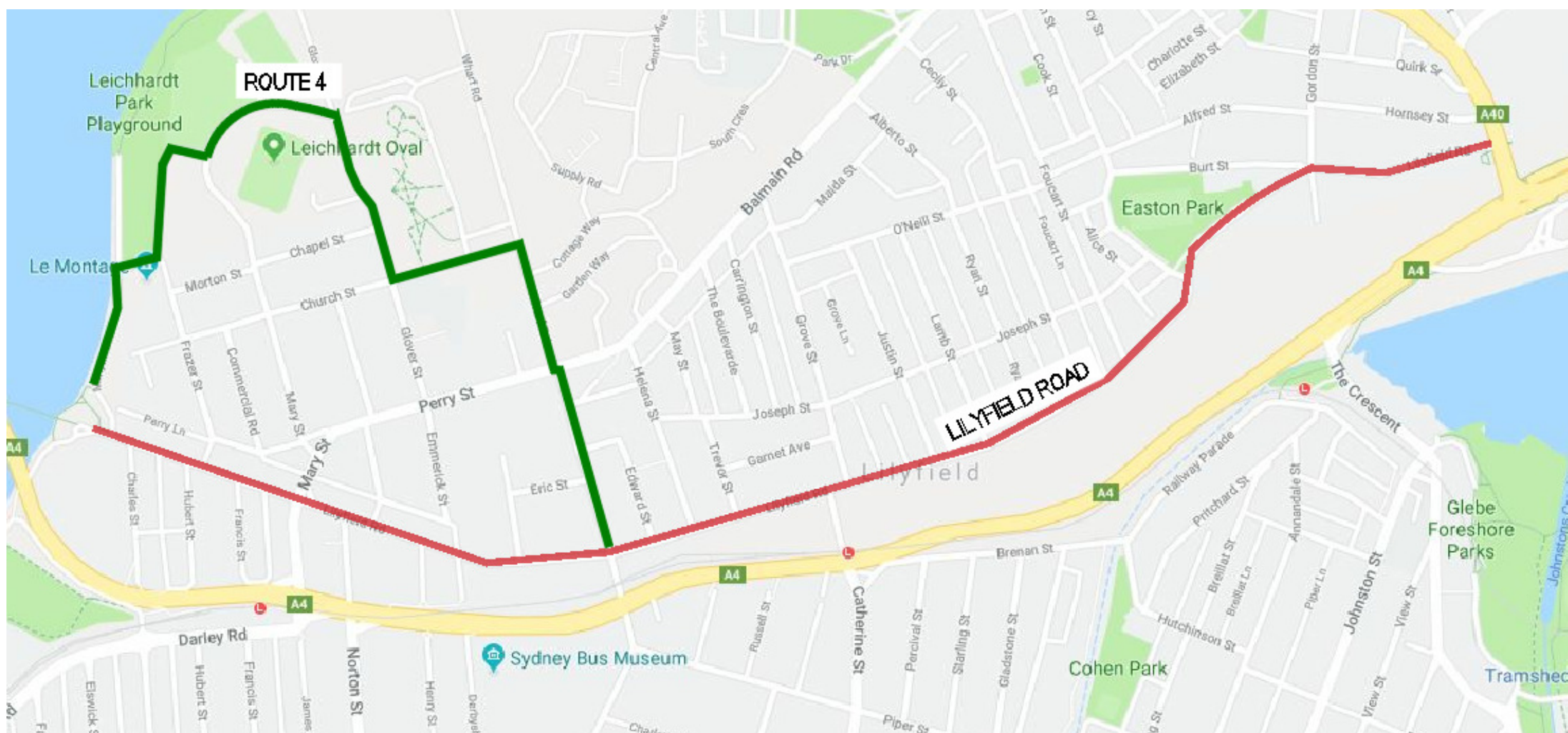


Figure 6 - Supplementary Route Option 4

4.6.2 TREATMENTS IDENTIFIED

Frazer Street/ Le Montage carpark

- Mixed traffic with on road cycle symbols; and
- Installation of rear to kerb parking signs for the existing 90 degree car parking. This reduces the likelihood of vehicles exiting a car park in a reversing direction and in turn reduces potential conflicts with cyclists.

Frazer Street

Preferred Treatment

- Mixed traffic with on road cycle symbols;
- Centreline marking to delineate traffic lanes and where vehicles should be positioned.

Other Treatments Considered

- Cycle lane uphill with mixed traffic downhill (likely parking loss).

Mary Street

Preferred Treatment

- Mixed traffic with on road cycle symbols;
- Centreline marking to delineate traffic lanes and where vehicles should be positioned.

Other Treatments Considered

- Widening of existing footpath to become bi-directional shared path.

Glover Street

- Widening of existing footpath to become bi-directional shared path.

Church Street

- Mixed traffic with on road cycle symbols due to narrow one-way street and minimal verge width.

Wharf Street

- Mixed traffic with on road cycle symbols due to narrow street and minimal verge width.

Balmain Road

- Southbound lane may have sufficient width for a cycle lane adjacent parking lane

Install wayfinding and directional signage at intersections along the route.

4.6.3 EXISTING CYCLE FACILITIES ON ROUTE

Location	Existing cycle facilities
Maliyawul Street	Bi-directional shared path with designated cycle ramp for on road access
Mary Street	On road cycle symbols
Glover Street	On road cycle symbols
Balmain Road	On road cycle symbols Northbound and southbound cycle lanes with green coating at intersections between HN 278 Balmain Road and Edward Road

4.6.4 EXISTING CONNECTIVITY ISSUES

The majority of the route involves mixed traffic including some sections uphill. Cyclists would be required to navigate the busy Wharf Road/ Balmain Road intersection without dedicated provisions for crossing.

If starting at Maliyawul Street, the route involves predominantly left hand turns. The two right hand turns required are on low speed streets which are relatively quiet unless a sporting event is held in the vicinity.

4.6.5 PEDESTRIAN CONSIDERATIONS

Existing pedestrian infrastructure along route includes:

- Bi-directional shared path on Maliyawul Street connecting to the Bay Run;
- 1.5m wide footpath on Mary Street; and
- 1.5-2.5m wide footpath on Glover Street.

Potential cycle facilities will have minimal impact to the existing pedestrian facilities as the majority of the route is on road. There may be an increased volume of bicycles using the existing shared path along Maliyawul Street.

4.6.6 TRAFFIC OPERATION CONSIDERATIONS

There are two one way streets for vehicles along the route. Frazer Street is one way for vehicles travelling northbound and Church Street is one way only for vehicles travelling westbound, meaning contra flow cyclists will be required.

4.6.7 PARKING CONSIDERATIONS

Existing parking availability on route:

- 90 degree parking on Maliyawul Street;
- Road side parking on Frazer Street;
- Nine 90 degrees signposted front to kerb parking on Frazer Street;
- 90 degree signposted rear to kerb parking on Mary Street at Aquatic Centre;
- Off road 90 degree parking bay Mary Street;

- Kerb side parking along Glover Street;
- Kerb side parking on south side of Church Street;
- Kerb side parking on east side of Wharf Road;
- Indented kerb side parking bay on the east side of Balmain Road; and
- Kerb side parking on Balmain Road on west side until approach to intersection.

4.6.8 PUBLIC TRANSPORT FACTORS

There are no public transport bus stops along route. However, there may be community busses to gain access to health service providers on Glover Street, Church Street and Wharf Street.

4.6.9 STREET TREES, OPEN SPACE AND LANDSCAPE CONSIDERATIONS

The route is located adjacent various open space and recreational areas including:

- Hippo Park
- Leichhardt Aquatic Park
- Leichhardt Oval #2

Minimal potential landscape and open space losses will be incurred as a result of providing a cycle facility adjacent.

4.6.10 DRAINAGE AND SERVICE CONFLICTS

Several services are located on the road verges and is expected to have minimal impact on the identified cycle way provision treatment types.

4.6.11 ADVANTAGES AND DISADVANTAGES OF THE SUPPLEMENTARY ROUTE

4.6.11.1 Advantages

The streets on the route are relatively quiet when no sporting activities are occurring. Another advantage is the existing cycle shoulder lanes located on Balmain Road.

The route connects to the Sydney branch of the University of Tasmania which is located on Church Street and Wharf Road.

4.6.11.2 Disadvantages

Disadvantages include the multiple speed cushions along the route at Mary Street and Glover Street, and the potential conflicts where 90 degree parking is provided adjacent sections of mixed traffic on the route.

Whilst not observed, weekend sporting activities is likely to increase traffic and parking demand in the area which may adversely impact cyclist safety, particularly in and around high turnover parking locations.

5 THE NEXT STEPS

The next stage will involve community consultation and further stakeholder involvement. The feedback will be considered when providing a recommendation of the preferred option and will be presented at Council's Local Traffic Committee (LTC). The recommendation of the LTC will then be considered by Council. Following Council's decision, Phase two will commence with further community engagement.

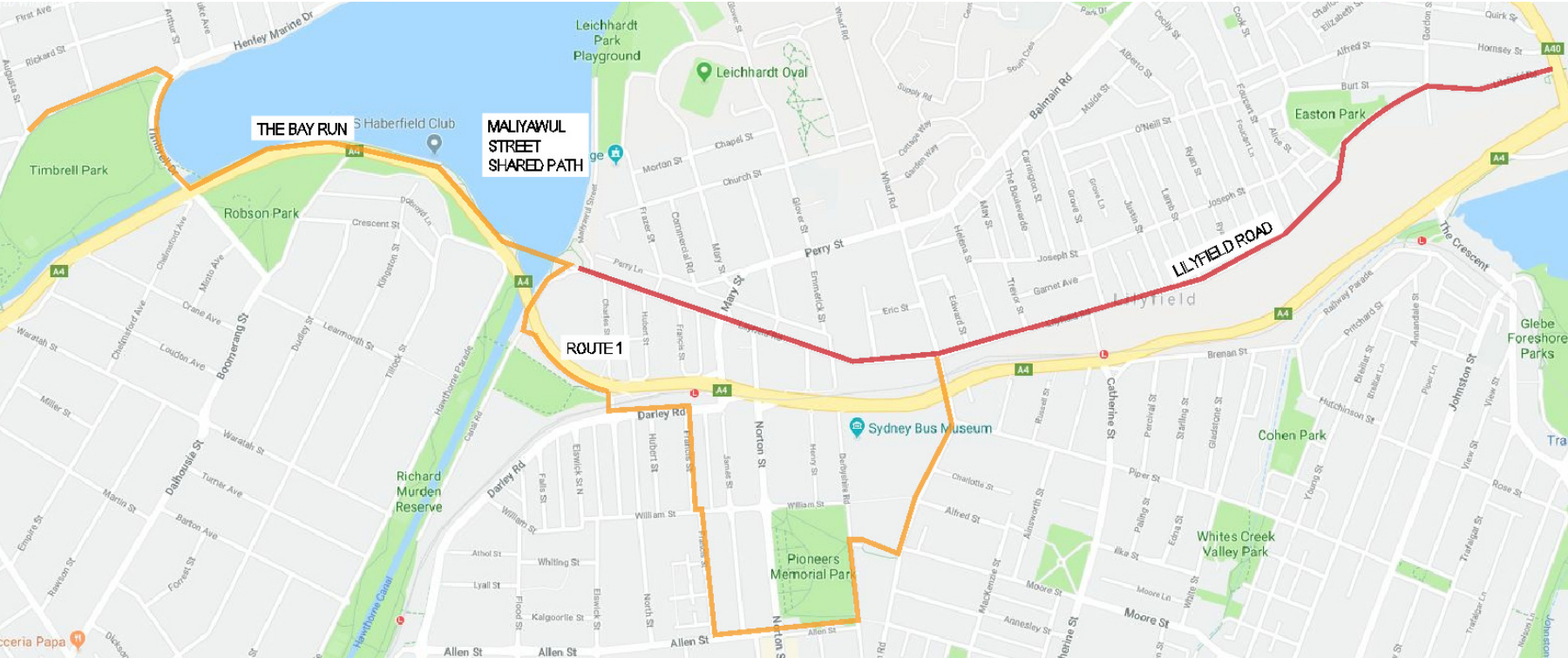
Council has put together a three phase process to develop the new design. The community will be invited to input feedback at each phase:

1. Option investigation/development in a Feasibility Study report - **Now**
2. Concept development - **Late 2019**
3. Detailed design - **Mid 2020**

6 APPENDIX

Please see the Supplementary Route summaries below.

SUPPLEMENTARY ROUTE 1



- HAWTHORNE CANAL TO BALMAIN ROAD**
Route (heading east)
 - Canal Road where the shared path at Maliyawul Street ends
 - Charles Street
 - Darley Road
 - Francis Street
 - Allen Street
 - Derbyshire Road
 - Moore Street Cycleway
 - Balmain Road
 - Balmain Road/Lilyfield Road intersection

General Description

Supplementary Route 1 starts at Canal Road and ends at the Lilyfield Road/ Balmain Road intersection.

The route is 2.2km long, which bypasses 870m of Lilyfield Road, resulting in an increased travel distance of approximately 1.3km for Supplementary Route 1. The route connects to the Bay Run in the west and Maliyawul Street bi-directional shared path in the north.

Features

Public Transport links include Leichhardt North light rail station and bus stops at Allen Street and Balmain Road.

Areas of open spaces adjacent the route include Blackmore Oval, Pioneers Memorial Oval and Sydney Secondary College sports oval.

Points of interest along the route comprise of Leichhardt North light rail station, overhead footbridge at Charles Street, businesses and services located on Norton Street, Pioneers Memorial Park, Sydney Secondary College Leichhardt Campus and Transit Systems Leichhardt bus depot.

Major Existing Cycle Facilities On Route

- Bi-directional shared path under City West Link Bridge
- On-road shoulder cycle lanes in both directions at Allen Street
- Moore Street West Cycleway
- Shared path on west side of Balmain Road
- Occasional on road cycle symbols and wayfinding signage

Advantages and Disadvantages of Route

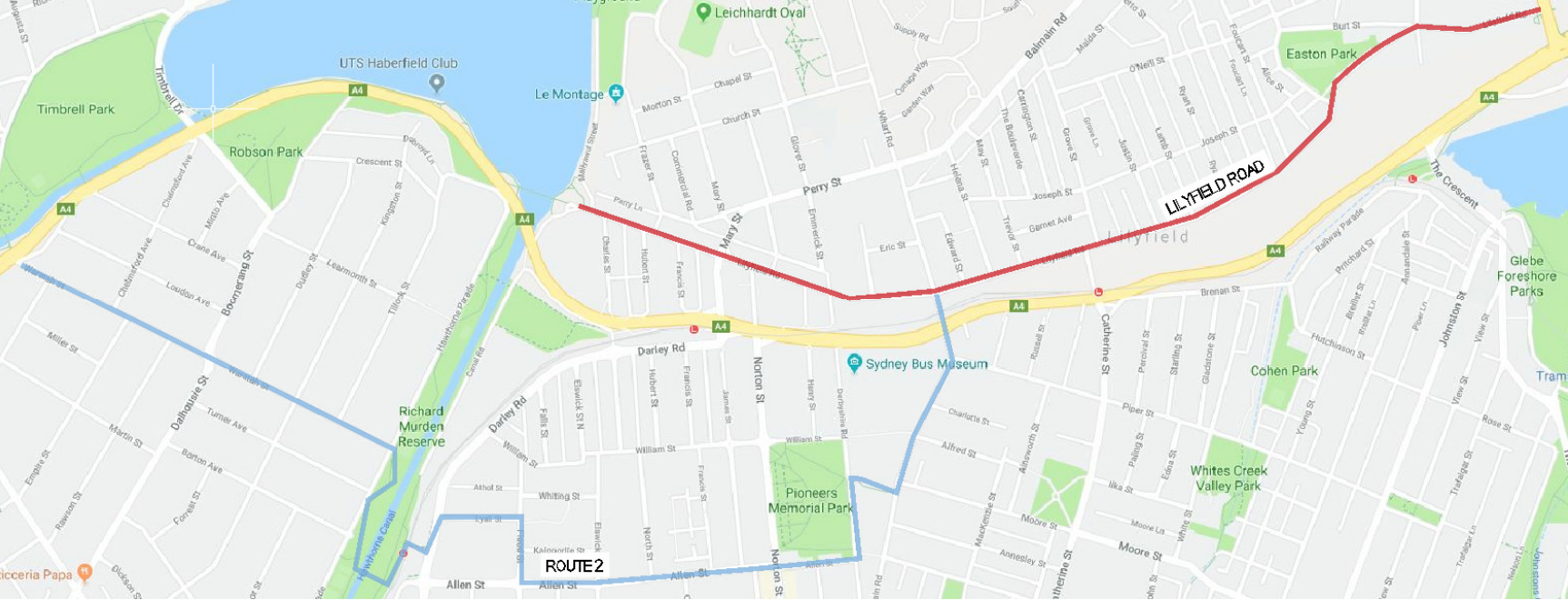
Advantages

- The route is relatively flat and traverses quiet residential streets;
- Of all options considered, the route has one the shortest distance of uphill gradients for cyclists travelling eastwards and has a shorter detour than options 2 and 4;
- Connects to the existing facilities at the Bay Run and Maliyawul shared path;
- Some sections of the proposed route have existing cycle infrastructure; and,
- Minimal potential landscape and open space losses incurred if cycle facilities are provided.

Disadvantages

- Cyclists are required to make several right hand turns when travelling eastwards at Darley Street, Francis Street and Allen Street;
- The route includes the major intersection at City West Link Road and Balmain Road;
- Treatment types are limited when addressing Balmain Road bridge;
- Trees are planted along the verges and in the road way in several streets may limit the treatment types;
- Care must be taken when travelling along Allen Street and crossing Norton Street due to the high volume of turning movements at the intersection, multiple bus stops, pedestrian activity, a pedestrian crossing and roadside parking within the vicinity;
- Two sections of road which require attention are Darley Road which has an incline and high traffic volumes, and Balmain Road due to the very high traffic volumes and constraints at the bridge leading to the intersection of Balmain Road and Lilyfield Road; and,
- The existing permanent roadblock located at Francis Street with a 1.48m wide gap between two raised garden beds.

SUPPLEMENTARY ROUTE 2



General Description

Supplementary Route 2 starts at the intersection of Waratah Street and Dobroyd Parade and ends at the Lilyfield Road/ Balmain Road intersection.

The route is 6km long, which bypasses 870m of Lilyfield Road and 3.4km of the Bay Run / Henley Marine Drive section, resulting in an increased travel distance of 1.7km for Supplementary Route 2. The route connects to the Henley Maine Drive footbridge across Dobroyd Parade to Timbrell Park reserve in the west.

Features

On the route, bus stops are located at the corner of Flood Street and Allen Street, Leichhardt Congregational Church, on Allen Street outside a medical centre and on Balmain Road in front of the sports oval.

Two light rail stops are in the vicinity; Hawthorne at the centre of Hawthorne Canal Reserve, with a direct path to Darley Road and Marion located at the southern end of Richard Murden Reserve.

Areas of open spaces along the route such as Richard Murden Reserve and Hawthorne Canal Reserve (both are part of The Greenway), Pioneers Memorial Park and Sydney Secondary College sports oval.

The route connects to points of interest including Hawthorne light rail station, businesses and services located on Norton Street, Pioneers Memorial Park, Sydney Secondary College Leichhardt Campus and Transit Systems Leichhardt bus depot.

Major Existing Cycle Facilities on Route

- Short sections of cycle lanes on Waratah Street in both directions
- Shared path at Richard Murden Reserve and Hawthorne Canal Reserve
- Darley Road shared path
- On-road shoulder cycle lanes in both directions at Flood Street and Allen Street
- Moore Street West Cycleway
- Shared path on west side of Balmain Road
- Occasional on road cycle symbols and wayfinding signage

WARATAH STREET TO BALMAIN ROAD

Route (heading east)

- Waratah Road
- Richard Murden Reserve
- Hawthorne Canal Reserve
- Darley Road
- Lyall Street
- Flood Street
- Allen Street
- Derbyshire Road
- Moore Street Cycleway
- Balmain Road
- Balmain Road/Lilyfield Road intersection

Advantages and Disadvantages of Route

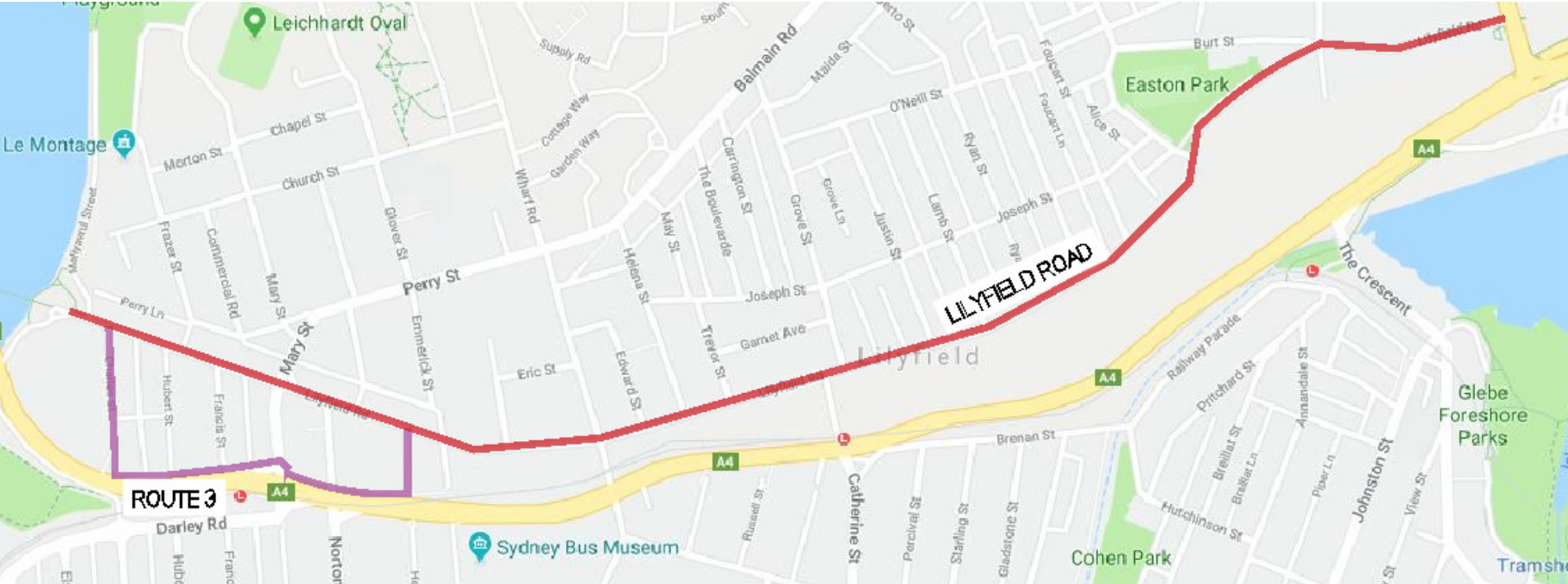
Advantages

- Some sections have existing cycle infrastructure;
- The route travels through part of The Greenway reserve and connects to points of interest; and,
- Minimal potential landscape and open space losses will be incurred as a result of providing a cycle facility adjacent.

Disadvantages

- The longest route of the options considered and does not formally link to the Bay Run. The existing Henley Marine Drive pedestrian bridge is an inadequate linkage to Timbrell Park/ the Bay Run for cyclists due to the narrow width of the crossing;
- The route consists of multiple right hand turns and has various uphill gradients which are not ideal for cycleway provisions. The long uphill section of Waratah Road is not significantly dissimilar to Lilyfield Road to warrant the additional distance that the route would require to avoid the main route;
- Cyclists are required to cross the Dalhousie Street /Waratah Street roundabout intersection;
- Cyclists have to cross Darley Road to access Lyall Street. A small refuge is located on Darley Road which may be uncomfortable for cyclists waiting to cross;
- Care must be taken when travelling along Allen Street and crossing Norton Street due to a high volume of turning movements at the intersection, multiple bus stops, pedestrian activity, a pedestrian crossing and roadside parking within the vicinity; and,
- The Balmain Road bridge has no additional shoulder width permissible and high volumes of traffic.

SUPPLEMENTARY ROUTE 3



- CHARLES STREET TO HENRY STREET
- Route (heading east)
- Charles Street
 - Hubert Street
 - Francis Street/ Wragge Street
 - City West Link Road
 - Henry Street

General Description

Supplementary Route 3 starts at the intersection of Lilyfield Road and Charles Street before ending at the Lilyfield Road/ Henry Street intersection.

The route is 0.81km long, which bypasses 500m of Lilyfield Road, resulting in an increased travel distance of approximately 300m for Supplementary Route 3.

The route connects to the Bay Run in the west as well as Maliyawul Street bi-directional shared path in the north.

Features

An overhead footbridge bridge links Charles Street to Leichhardt North light rail station providing a north-south connection over the City West Link Road.

There is an informal reserve is located adjacent Henry Street.

Major Existing Cycle Facilities on Route

Currently, there are no existing cycle specific facilities on this route. There is potential for the existing pedestrian footpaths to be widened to form shared paths between Charles Street and Hubert Street, Wragge Street and James Street as well as City West Link Road to Henry Street.

Advantages and Disadvantages of Route

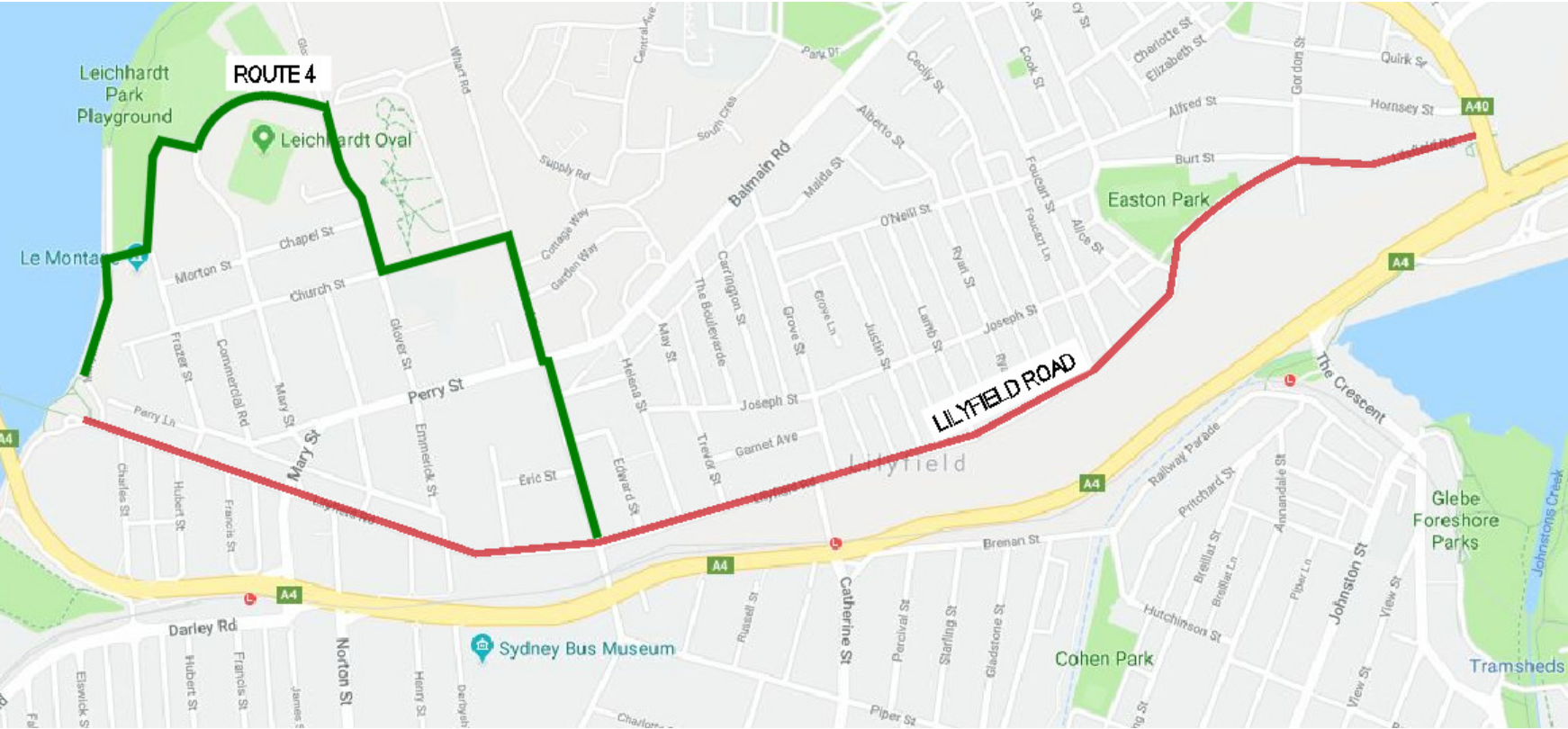
Advantages

- The majority of the route is off-road;
- Route 3 is the shortest route of the options considered; and,
- Consists of quiet residential streets with low traffic volumes and vehicle parking turnover.

Disadvantages

- Two sections of the route have right angled turns due to the brick barrier walls which may be difficult to navigate for cyclists;
- If the pedestrian paths were converted to shared paths, the increased bicycle volumes may impact pedestrians using these paths;
- A crest is located at the Charles Street/Fairlight Street intersection potentially causing visibility issues;
- A section of the route is adjacent City-West Link Road between James Street and Henry Street. The road is a major thoroughfare with a sign posted speed limit of 70km/hr;
- Multiple signalised crossings are located on the route including the James Street/City-West Link Road intersection at the median island and Norton Street/ City-West Link intersection. A zebra crossing is located at James Street/ City-West Link on the slip lane. These crossings will require upgrading;
- Mature gum trees are located in parking lanes and along the verge at Henry Street, reducing road width and limiting treatment types;
- Buttress tree roots have caused sections of the existing footpath to uplift;
- Limited space for treatments between sound barrier wall, property boundaries and adjacent utilities including power poles; and,
- The installation of lighting would be required. There may also be community concerns for safety as the potential for passive surveillance is limited and conflicts with the principles of CPTED.

SUPPLEMENTARY ROUTE 4



- MALIYAWUL STREET TO BALMAIN ROAD
- Route (heading east)
- Maliyawul Street
 - Frazer Street
 - Mary Street
 - Glover Street
 - Church Street
 - Wharf Road
 - Balmain Road

General Description

Supplementary Route 4 starts at Maliyawul Street, travels along streets adjacent recreational facilities and parklands before ending at the Lilyfield Road/ Balmain Road intersection.

The route is 2.9km long, which bypasses 870m of Lilyfield Road, resulting in an increased travel distance of approximately 2km for Supplementary Route 4.

This route was suggested by local BUGs (Bicycle User Groups) during a recent stakeholder meeting.

Features

There are two one way streets for vehicles along the route. Frazer Street is one way for vehicles travelling northbound and Church Street is one way only for vehicles travelling westbound, meaning eastbound cyclists will be required to travel contra flow.

Whilst there are no public transport bus stops along the route, there are several bus stops for community busses to gain access to health service providers on Glover Street, Church Street and Wharf Street.

The route is located adjacent various open space and recreational areas including Hippo Park, Leichhardt Aquatic Park and Leichhardt Oval #2 as well as the Sydney branch of the University of Tasmania.

Major Existing Cycle Facilities on Route

- A bi-directional shared path with cycle-only off ramp at Maliyawul Street
- On-road shoulder cycle lanes in both directions on Balmain Road

Advantages and Disadvantages of Route

Advantages

- The streets on the route are relatively quiet when no sporting activities are occurring;
- Minimal potential landscape and open space losses will be incurred if providing cycle facility adjacent;
- If starting at Maliyawul Street, the route involves predominantly left hand turns. The two right hand turns on the route are on quiet and low speed streets;
- Potential cycle facilities will have minimal impact to the existing pedestrian facilities as most of the proposed route is on road;
- Part of the route uses an existing bi-directional shared path which connects to the Bay Run; and,
- Existing cycle shoulder lanes are located on Balmain Road.

Disadvantages

- Multiple speed cushions are present along the route at Mary Street and Glover Street;
- Potential conflicts where 90 degree vehicle parking (some of which is signposted front to kerb) is provided adjacent sections of mixed traffic on the route;
- Weekend sporting activities are likely to increase traffic and parking demand in the area which may adversely impact cyclist safety, particularly around high turnover parking locations;
- The majority of the route proposed involves mixed traffic including sections uphill, some which are quite prolonged; and,
- Cyclists would be required to navigate the busy Wharf Road/ Balmain Road intersection without dedicated provisions for crossing.