

A blue-tinted photograph of a park path. The path is paved and curves to the right. On the left side of the path, there are several large, mature trees with thick trunks and dense foliage. On the right side, there is a dark metal fence. A tall, black lamppost stands near the path. The ground is covered with fallen leaves and some small plants. The overall scene is serene and natural.

**GREENWAY MASTERPLAN**  
**APPENDIX C**  
ROUTE OPTIONS ASSESSMENT

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# INTRODUCTION

This route options assessment has been prepared as part of the GreenWay Master Plan development process.

The route options assessed here are focused on the main cycling route between the Cooks River and Iron Cove.

Note that the GreenWay:

- Includes the concept of a “trellis”; however, this document is focused on the main “spine” in the trellis; some of the supplementary routes to the main preferred ‘spine’ are listed
- In particular sections may include multiple routes suited to different users – therefore in some sections, multiple routes are recommended
- Will be implemented in stages and will continue to evolve, and therefore some route options have been identified as short-term or long-term options

Route options have been developed based on McGregor Coxall’s site assessment, discussions with Council, and input from the traffic engineering consultant.

Route options have been assessed against a number of qualitative criteria. These criteria were developed based on the agreed functions of the GreenWay (see right) and the draft set of principles also shown on the right.

An important consideration in assessing route options is that each section of the route needs to be connected, and therefore the option/s selected for one section impact on the options in adjacent sections. At the end of this document is a summary of the preferred options over the entire route, showing how they fit together.

# ROUTE OPTIONS ASSESSMENT FRAMEWORK

The route options assessment framework has been developed to incorporate six evaluation criteria, as shown below. These criteria were based on the principles and objectives for the GreenWay as a whole. The criteria are that the route should be:

Route Options Assessment Criteria	Explanation
Walkable and rideable by all	The ambition for the GreenWay is that it should cater to a wide range of walkers and riders, including old and young, and riders on different styles of bikes. In order to achieve this, the route needs to be safe, with smooth transitions and gentle grades. The route should facilitate a design which minimises conflict between different users. Ideally it is relatively direct with minimal stopping and starting, offering visual interest and places to pause.
Connected	The GreenWay should be connected to places that people want to go – both for recreation and using active transport. Given the GreenWay’s regional significance, regional connections are important here as well as local.
Ecologically friendly	The GreenWay is a significant ecological corridor. There is the potential for future works to both impact on existing ecological values, and create opportunities to improve the ecological corridor. A key idea is to move towards a concept of integrating ecology and biodiversity into all places along the GreenWay corridor (not only at Bushcare sites).
An experience in urban nature	During consultation, many people have already noted the importance of the GreenWay as a place to escape from the city into nature. There is significant potential to improve this opportunity with more of the route off-road.
Place friendly	The GreenWay is regionally significant, but it traverses a series of local places, each with their own character and values. The GreenWay should not only minimise its impacts on existing places, but should complement and contribute to placemaking.
Resident friendly	In some places the GreenWay route will go along residential streets and in others it will come close to residences backing onto the light rail corridor. Some of the key concerns of residents include privacy, amenity, tranquillity and safety.

ABOVE. Criteria list for route options assessment

These criteria are further articulated in the assessment framework shown below. For each criteria, a few points are provided on what would constitute a high quality outcome or a poor quality outcome for the GreenWay.

Each route option has been evaluated against these criteria using a colour-coded scale, where green shows the best fit with the criteria and red shows the poorest fit.

	Fits criteria in almost every respect	Most criteria could be met if designed well	Some criteria not likely to be met	Poor fit with most criteria
Criteria	High Quality options		Low Quality options	
Walkable and rideable by all	Smooth transitions, gentle grades		Tight corners, steep grades	
	Direct route with minimal stopping and starting		Awkward intersections, circuitous route	
	Visual interest and places to pause		Lacking visual interest or places to pause	
	Low potential for conflict between people		High potential for conflict between people	
	On roads: low traffic volumes and slow speeds		Busy roads, vehicle conflict	
Connected	Connected to places of interest		Disconnected from places of interest	
	Connected to east-west routes		Disconnected from east-west routes	
Ecologically friendly	Minimal impact on existing bushcare or other habitat		High impact on existing bushcare or other habitat	
	Low potential for impact on threatened species		High potential for impact on threatened species	
	High potential to create or restore habitat		Low potential to create or restore habitat	
An experience in urban nature	Green, shady and quiet atmosphere		Highly urban atmosphere	
	An escape from the city		Exposed to traffic, heat, noise	
	Immersion in urban nature		Disconnected from nature	
Place friendly	Complements the existing character		Detracts from the character	
	Contributes to placemaking		Impacts on valued features	
	Complements existing activities		Conflicts with other activities	
Resident friendly	Respects residents' privacy, amenity, tranquillity, safety		Impacts on residents	

ABOVE. Criteria-grading table for route options assessment

## NAVIGATING THIS DOCUMENT

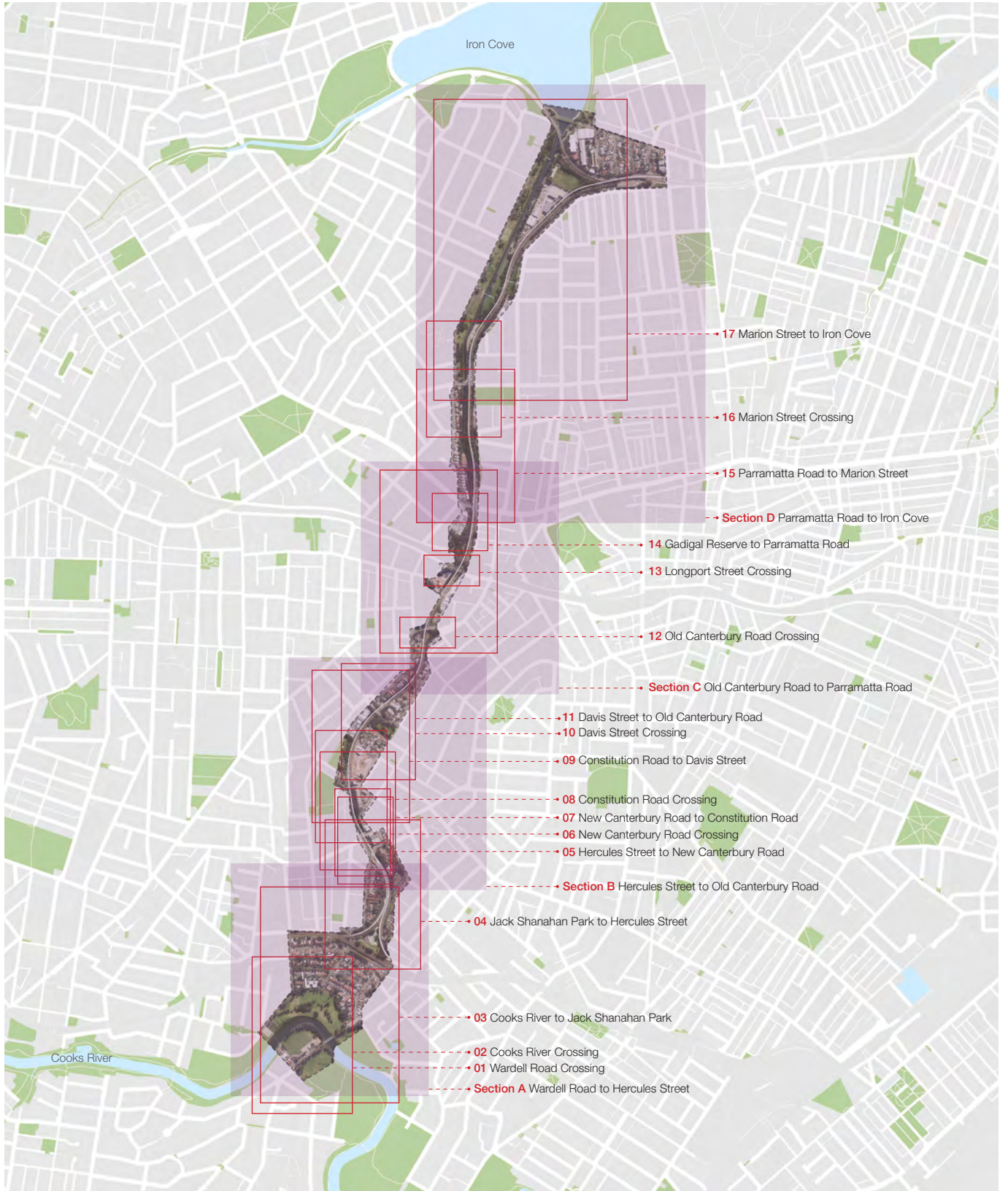
This document has been organised into four sections, as shown in the key map opposite. These are:

- A. Cooks River at Wardell Road to Hercules Street, where there are multiple route options, important issues to discuss with other stakeholders, and decisions still to be made
- B. Hercules Street to Old Canterbury Road, where there are opportunities on either side of the light rail corridor and some decisions to be made about the main route
- C. Old Canterbury Road to Parramatta Road, which are the “Central Missing Links” identified as the highest priority in the 2015 Missing Links Report. This section also presents significant challenges navigating busy road crossings, major existing infrastructure, heritage items, new development at Lewisham West and a significant area of native vegetation in Gadigal Reserve, including an important microbat roosting site.
- D. Parramatta Road to Iron Cove, where there is an existing shared path, but a need to look at secondary routes beyond this existing path

When considering route options, particularly from a connectivity point of view, it is important to see them in context. Therefore each of the four sections starts with an overview of the context at this scale. Following this, each road crossing and each section between roads has been considered individually. At the end of each of the four sections, the recommended options are brought together and presented at the larger scale, so they can be seen in context.

Costing has been done on a minimum basis, providing the minimum cost needed to implement the transport elements of the GreenWay. Embellishment of the GreenWay and adjacent open spaces, as well as additional measures such as pavement changes, in-road planting and road closures to create a distinct GreenWay identity have not been included in the costing.







# Section A: Cooks River to Hercules Street

In this section of the GreenWay, the key regional connections are to the existing Cooks River path (south-east and south-west), and to the proposed “GreenWay South West”, following the route of the proposed Sydenham to Bankstown Metro line. It is understood that the intention for the GreenWay South West is that it would be located on the southern side of the railway line in this area, and is intended to come down to cross Terrace Road at grade.

Important existing infrastructure in this section includes:

- The Cooks River shared path
- Two existing bridges across the Cooks River:
  - The Lang Road footbridge, which is due for an upgrade. Canterbury-Bankstown Council is currently working on a detailed design and has funding for construction
  - Wardell Road, which is mainly a vehicle bridge, with narrow footpaths on either side. It is not well connected to the Cooks River shared path
- An unused bridge across Terrace Road at the south-western end of the “disused fork”
- Paths within Jack Shanahan Park

Key considerations in this section include:

- How to make effective links with the Cooks River shared path (the options assessment has been extended down to the existing Wardell Road crossing in order to consider all relevant options to link with this existing path)
- Where to cross the Cooks River (and working with Canterbury-Bankstown Council on this)
- Getting across the golf course while minimising impacts
- Creating effective links along local streets between the Cooks River and Jack Shanahan Park
- Crossing Ewart Street

Note that between Jack Shanahan Park and Hercules Street, there is a clear preferred route along the western side of the light rail corridor. South of Jack Shanahan Park, the options are more open.

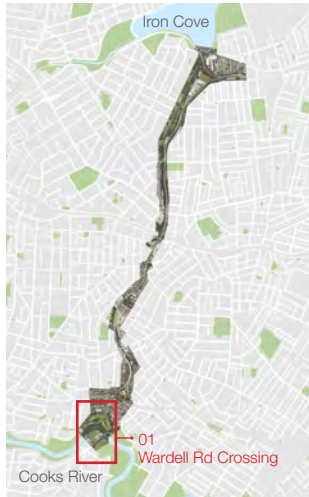
This section has been broken down into the following elements:

1. Wardell Road crossing
2. Cooks River crossing
3. Cooks River to Jack Shanahan Park
4. Jack Shanahan Park to Hercules Street



- - - GreenWay   
 - - - Future shared path by others   
 0 10 20 30 40 50 M

# 01 Wardell Road crossing



ABOVE. Location map showing GreenWay boundary, and site location (red)

## ● OPTION 1

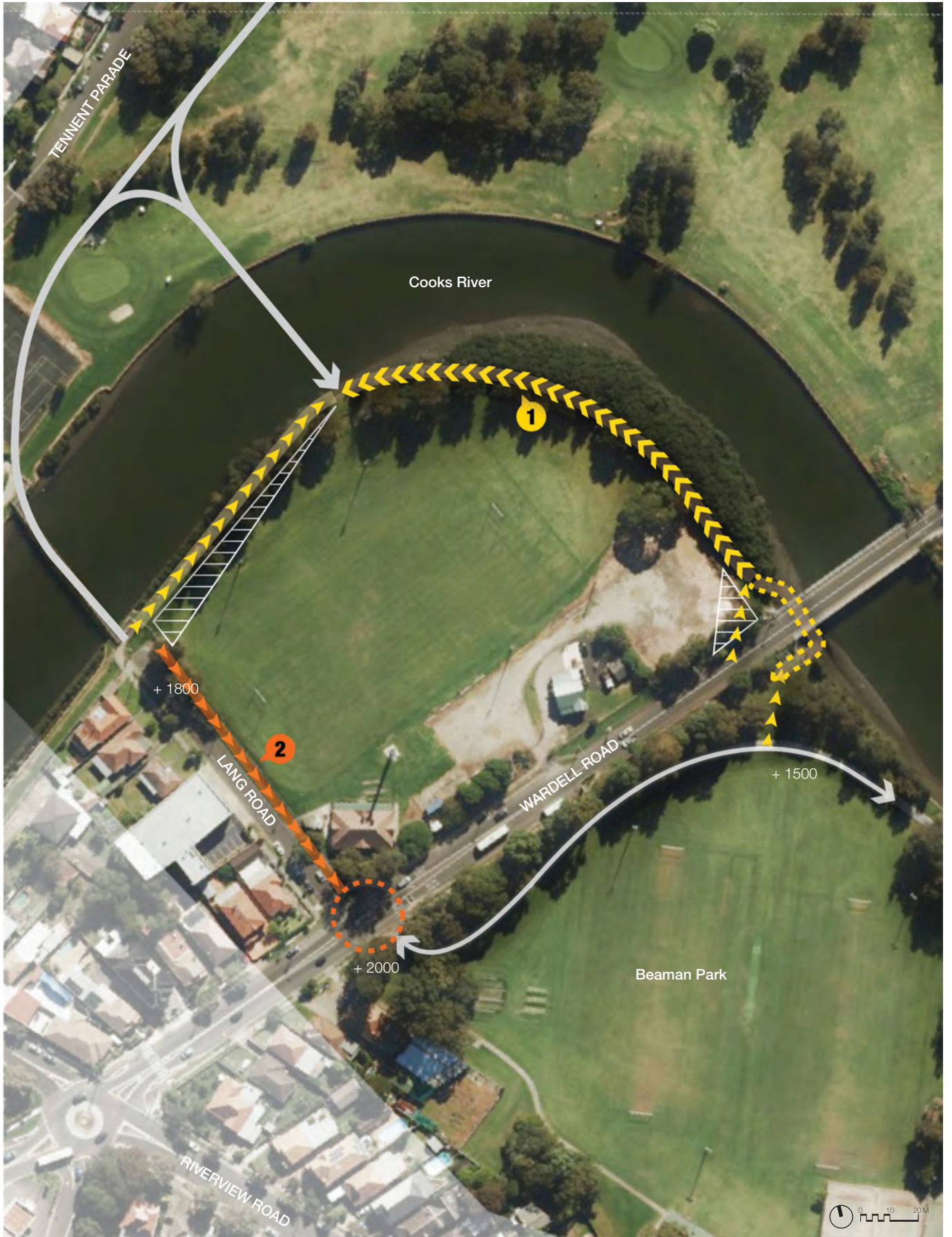
This option involves an underpass under Wardell Road, and a path around the river's edge between Wills Ground and the River. The underpass would need to be designed to avoid tidal impacts, and would probably require purchase of a small portion of property from the sports club at Wills Ground. The path along the river's edge can use an existing easement between the sports field and the River, most of which is about 6 to 7 m wide. Along most of its length, there is space for a path between existing trees and mangroves. Option 1 has the potential to be green and shady, offer natural interest, views over the river, and nice places to pause.

A potential downside with Option 1 is that it may make it more difficult in the future to naturalise the bank of the Cooks River in this section. This should be considered during the design stage and potentially bank restoration works could be undertaken in conjunction with path works. Allowance has been made for this in cost estimate.

## ● OPTION 2

This is an existing section of the Cooks River cycleway, linking Beaman Park towards Ewen Park across Wardell Road. There is an off-road cycleway through Beaman Park, then riders need to cross Wardell Road at grade. There is a zebra crossing here, but during community consultation, several people noted that they dislike this crossing because it's a busy road, cars don't always stop, and the crossing involves several tight turns. It can't be negotiated on all bikes. After crossing Wardell Road, the route continues along Lang Road which is quiet, but has low amenity for cyclists and pedestrians. It has few trees, no shade and little visual interest.





- Option 1
- Option 2
- Options ruled out from further analysis
- ▨ Acquisition area
- ▬ On road - shared
- ▬ On road - separated
- ▬ Off road - elevated
- ▬ Off road - at grade
- ⊞ Upgrade crossing
- ⊞ Underpass

## COST ESTIMATE

### Option 1: New link under Wardell Road and around foreshore

<b>Wardell Road underpass</b>	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	34	\$34,000		
Bridge underpass 3.5m wide inc. civils and lighting	each	\$500,000	1	\$500,000		
Property partial acquisition open space*	sqm	\$2,500	100	\$250,000		
				\$784,000	\$862,400	\$1,122,000
<b>Foreshore link - eastern section</b>						
Cycleway off road 3.5m elevated <0.4m steel, FRP deck inc. lighting	m	\$3,500	146	\$511,000		
Allowance for bank naturalisation	m	\$3,000	100	\$300,000		
				\$811,000	\$892,100	\$1,160,000
<b>Foreshore link - western section</b>						
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	133	\$133,000	\$146,300	\$191,000
<b>TOTAL OPTION 1</b>				<b>\$1,728,000</b>	<b>\$1,900,800</b>	<b>\$2,472,000</b>

\*property purchase has a big impact on cost - sensitive to area

### Option 2: Upgrade existing at-grade crossing over Wardell Road, and link along Lang Road

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway on-road mixed traffic	m	\$534	100	\$53,400		
Upgrade Wardell Road crossing to raised pedestrian	No	\$150,000	1	\$150,000		
<b>TOTAL OPTION 2</b>				<b>\$203,400</b>	<b>\$223,740</b>	<b>\$291,000</b>

## ASSESSMENT

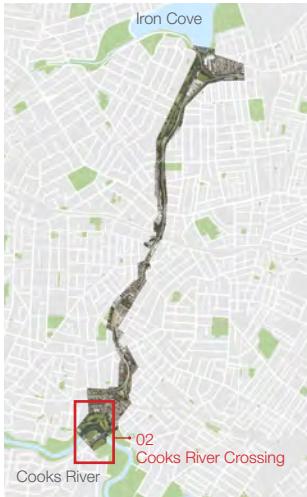
	● <b>OPTION 1</b>	● <b>OPTION 2</b>
<b>Walkable and rideable by all</b>		Busy road
<b>Ecologically friendly</b>	Potential impact on mangroves along Cooks River	Potential impact on street trees on Lang Rd
<b>An experience in urban nature</b>		On-road
<b>Connected</b>		
<b>Place-friendly</b>	Would require purchase of property from Wills Ground	
<b>Resident-friendly</b>		Proximity to Lang Rd residences
<b>Indicative cost</b>	\$ 2.47 Mil	\$ 0.29 Mil
<b>Length</b>	330 m	280 m

## RECOMMENDATIONS

- Option 1 is the preferred option, as it meets most of the criteria and rates significantly better than Option 1
- A key issue to resolve for Option 1 is the feasibility of purchasing a small parcel of land from the sports club, to create enough space for a link up to Wardell Road
- If Option 2 remains in place for any substantial length of time, it is recommended that the Wardell Road pedestrian crossing should be improved to remove tight corners and encourage cars to slow down before they reach the crossing
- The options for Wardell Road need to be considered together with the options for the Cooks River crossing (p.14). These options will need to be implemented on the same timeline



## 02 Cooks River crossing



ABOVE. Location map showing GreenWay boundary, and site location (red)

### ● OPTION 1

Option 1 is located to provide a more direct route between the Cooks River cycleway and the GreenWay, for people moving in all directions. It could serve as part of the Cooks River cycleway (replacing the Lang Road bridge) as well as the GreenWay. It avoids many of the issues associated with Options 2 and 3, and opens up the possibility to create a gateway park at the southern end of the GreenWay, in the western corner of the golf course. The key issues to be managed are the impact on the golf course and the impact on Canterbury-Bankstown Council, who are currently planning to upgrade the Lang Road bridge. Discussions are underway with Canterbury-Bankstown Council. For the golf course, it is recommended that options be explored to rearrange the holes in the vicinity to consolidate them into a smaller space.

### ● OPTION 3

This option involves upgrading the existing Lang Road footbridge (as per Canterbury-Bankstown Council's design currently underway). A few issues with this are that it involves removal of several trees on Lang Road, and it involves a challenging intersection on the northern side of the river, with a tight corner and potential conflict between cyclists and users of a proposed community building on the site of the former bowling club. Option 3 is also a relatively indirect route for people moving between the eastern part of the Cooks River cycleway and the GreenWay.

### ● OPTION 2

Option 2 involves providing a new crossing at (or near) Wardell Road. The existing Wardell Road bridge has basic footpaths on either side, but provides poor pedestrian amenity or safety. The bridge is unfriendly and unsafe for cyclists. During community consultation, several people noted it as a problem. The existing bridge is constrained:

- The road width cannot be narrowed as it is a bus route and the lanes are already only 3.25 m wide
- A previous structural assessment has recommended that it is not possible to extend the width of the footpath on either side of the bridge

Therefore Option 2 involves installation of a new dedicated pedestrian and cycle bridge across the river adjacent to Wardell Road. It would also need to include a link between the cycle path and the bridge on the southern side of the river, and a wider path on the northern side of the river. Note also that Option 2 requires a Wardell Road crossing, but it could use either the existing at-grade crossing on the north side of the river (with no priority for cyclists/pedestrians) or a underpass under Wardell Road on the southern side of the river. Underpass costs would be additional. This option would also have impacts on the golf course and existing trees



● Option 1 - new bridge    ● Option 2 - new separated bridge    ● Option 3 - upgrade to existing bridge



## COST ESTIMATE

### Option 1: Bridge located between Lang Road and Wardell Road

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Bridge (50m long, 3.5m wide, steel, timber piles, FRP deck inc. approaches and lighting)	each	\$950,000	1	\$950,000		
<b>TOTAL OPTION 1</b>				<b>\$950,000</b>	<b>\$1,045,000</b>	<b>\$1,359,000</b>

### Option 2: Bridge located near Wardell Road

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Bridge (50m long, 3.5m wide, steel, timber piles, FRP deck inc. approaches and lighting)	each	\$950,000	1	\$950,000		
<b>TOTAL OPTION 2</b>				<b>\$950,000</b>	<b>\$1,045,000</b>	<b>\$1,359,000</b>

### Option 3: Lang Road bridge replacement

Existing Canterbury-Bankstown Council project expected to cost \$1.4 million

## ASSESSMENT

	● <b>OPTION 1</b>	● <b>OPTION 2</b>	● <b>OPTION 3</b>
<b>Walkable and rideable by all</b>		Bridge unfriendly & unsafe for cyclists	Bridge unfriendly & unsafe for cyclists
<b>Connected</b>		Diversion from Green-Way route	Diversion from Green-Way route
<b>Ecologically friendly</b>	Bridge impacts on river and bank	Bridge impacts on river and bank	Involves removal of trees from Lang Rd
<b>An experience in urban nature</b>		Busy road	Use of busy road
<b>Place-friendly</b>	Conflicts with existing golf course		Conflicts with proposed community building
<b>Resident-friendly</b>			Proximity to Lang Rd residences
<b>Indicative cost</b>	<b>\$ 1.4 Mil</b>	<b>\$ 1.4 Mil</b>	<b>\$ 1.4 Mil</b>
<b>Length</b>	<b>65 m</b>	<b>65 m</b>	<b>65 m</b>

## RECOMMENDATIONS

- Option 1 is the preferred option, as it scores well on most criteria
- A key issue to progress Option 1 is to discuss the alignment with the golf course and explore the potential to create a gateway park
- Canterbury-Bankstown Council prefer an upgrade of the Lang Road footbridge, leading to the possibility of a consolidated masterplan for Cooks River links south of the Ewart Street intersection comprising the golf course and Ewen Park and the possibility of pooled funding for one or two new bridges
- Even though Option 2 scores poorly, it is recommended that a basic upgrade to the Wardell Road bridge should include fencing between the footpaths and traffic lanes

# 03 Cooks River to Jack Shanahan Park



ABOVE. Location Map showing GreenWay boundary, and site location (red)

● **OPTION 1**

This option uses Ness Avenue to link the lower part of Garnet Street to an existing crossing point over Ewart Street. An advantage of this option is that it avoids the steeper and busier part of Garnet Street. It is expected that traffic volumes on Ness Avenue will be able to be managed such that a rider-friendly environment can be designed without significant changes to the road geometry, so this option is rated as resident-friendly. A key disadvantage is that it involves crossing Ewart Street at grade.

The traffic assessment report recommends that Ewart Street could potentially be upgraded to a signalised intersection to accommodate both GreenWay and Sydenham to Bankstown (GreenWay South West) pedestrian and bike traffic with improved safety, and a cost for this upgrade has been included in Option 1. Note that signalisation is dependent on RMS approval, including an exemption from the usual warrants. A fall back option would be to upgrade the existing crossing to increase storage area in the pedestrian refuge. There may also be loss of 12 parking spaces along the Garnet Street portion common to Options 1A and B, however this could be offset in Tennent Pde. **Option 1A** occurs if the existing bridge at Lang Road is used to cross the Cooks River, while **Option 1B** occurs if a new Cooks River bridge is built in line with Garnet Street.

● **SUPPLEMENTARY OPTION 2**

This option uses Garnet Street and The Parade, and connects to Jack Shanahan Park via an existing former railway bridge across Terrace Road. A key advantage of this option is that cyclists would have right of way crossing Ewart Street, as well as a grade-separated crossing over Terrace Road. Key disadvantages are the grade on Garnet Street and relatively high traffic volumes in comparison to the alternatives. This option is proposed as a basic safety upgrade where cyclists remain on road.

● **OPTION 3**

This option links Wardell Road to Ness Ave via Riverside Crescent and Tennyson (or Balfour) Street. It is more suited to a Wardell Road Cooks River crossing and for those crossing the Cooks River at Wardell Road.

● **SUPPLEMENTARY OPTION 4**

This option adds a few potential links through the golf course, to minimise the time spent on road. Note that the link to the corner of Tennyson and Ness Streets would require a property purchase. A link into the centre of Tennyson Street could go through the pocket park at 16 Tennyson Street. A key consideration with this option is the impact on the golf course.

● **SUPPLEMENTARY OPTION 5**

This option involves a new at-grade crossing of Ewart Street, meeting the future Sydenham to Bankstown shared path on the northern side. An advantage of this option is that it could take the pressure off the roundabout at Ewart Street/Terrace Road, which is currently difficult to cross by bike or on foot. However, in this location, it is possible that the Ewart Street crossing may need to be limited to a pedestrian refuge, with no priority for GreenWay users.





- Option 1   ● Option 3   ● Option 5   - - - On road - shared   - - - Reuse existing rail structure   🚶 Upgrade crossing   🌀 intersection re-design to prevent left turn into Tennison St
- Option 2   ● Option 4   - - - On road - separated   ▶▶▶ Off road - at grade   🏗 Widening existing underpass   🏗 Acquisition area



## COST ESTIMATE

### Riverside Crescent Road closure

Part road closure to prevent entry from Wardell Road	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Part road closure including signage, landscaping*	each	\$70,000	1	\$70,000		
<b>TOTAL</b>				<b>\$70,000</b>	<b>\$77,000</b>	<b>\$101,000</b>

\*Recommended to support Options 1, 3, 4 or 5 to reduce traffic on Riverside Crescent, Tennyson Street, and Ness Avenue

### Option 1: from Cooks River to Ewart Street via Tennent, Garnet and Ness

Cooks River to Garnet Street via Tennent Parade	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	285	\$285,000		
<b>TOTAL</b>				<b>\$285,000</b>	<b>\$313,500</b>	<b>\$408,000</b>

Cooks River to Garnet Street via Golf Course	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	160	\$160,000		
<b>TOTAL</b>				<b>\$160,000</b>	<b>\$176,000</b>	<b>\$229,000</b>

Garnet Street to Ewart Street via Ness Avenue	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway on-road bidirectional inc. intersection treatments (Garnet St. lower end)	m	\$3,000	86	\$258,000		
Cycleway on-road mixed traffic (Ness Ave)	m	\$534	311	\$166,074		
<b>TOTAL</b>				<b>\$424,074</b>	<b>\$466,481</b>	<b>\$607,000</b>

Ewart Street signalised intersection	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Signalised road crossing inc. signals, civils and lighting	each	\$175,000	1	\$175,000		
<b>TOTAL</b>				<b>\$250,000</b>	<b>\$275,000</b>	<b>\$358,000</b>

Widened shared path under rail bridges	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Excavation and spoil disposal	m	\$400	40	\$16,000		
Retaining wall	m	\$600	40	\$24,000		
<b>Cycleway off road 3.5m on-grade inc. lighting</b>	<b>m</b>	<b>\$1,000</b>	<b>40</b>	<b>\$40,000</b>		
<b>TOTAL</b>				<b>\$80,000</b>	<b>\$88,000</b>	<b>\$115,000</b>

Shared path along Hercules St between Terrace Rd and park access point	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m on-grade inc. lighting (to gate on Hercules St)	m	\$1,000	130	\$130,000		
<b>TOTAL</b>				<b>\$130,000</b>	<b>\$143,000</b>	<b>\$186,000</b>

<b>TOTAL OPTION 1A</b>				<b>\$1,169,074</b>	<b>\$1,285,981</b>	<b>\$1,672,000</b>
<b>TOTAL OPTION 1B</b>				<b>\$1,044,074</b>	<b>\$1,148,481</b>	<b>\$1,494,000</b>

### Option 2: Alternative on-road link along Garnet Street and The Parade

On-road link along Garnet Street and The Parade	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway on-road mixed traffic (basic safety upgrade)	m	\$100	446	\$44,600		
Intersection treatments (basic safety upgrade)	No	\$25,000	2	\$50,000		
<b>TOTAL</b>				<b>\$94,600</b>	<b>\$104,060</b>	<b>\$136,000</b>

Link along disused fork	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	178	\$178,000		
<b>TOTAL</b>				<b>\$178,000</b>	<b>\$195,800</b>	<b>\$255,000</b>

<b>TOTAL OPTION 2</b>				<b>\$272,600</b>	<b>\$299,860</b>	<b>\$390,000</b>
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**Option 3: Link along Wardell Road, Riverside Crescent and Tennyson Street to Ness Avenue**

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Separated cycleway along Wardell Road						
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	89	\$89,000		
Cycleway on-road bidirectional inc. intersection treatments	m	\$3,000	45	\$135,000		
<b>TOTAL</b>				<b>\$224,000</b>	<b>\$246,400</b>	<b>\$321,000</b>

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
On-road cycleway along Riverside Cres and Tennyson St						
Cycleway on-road mixed traffic	m	\$534	335	\$178,890		
<b>TOTAL</b>				<b>\$178,890</b>	<b>\$196,779</b>	<b>\$256,000</b>

<b>TOTAL OPTION 3</b>				<b>\$402,890</b>	<b>\$443,179</b>	<b>\$487,497</b>
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**Option 4: Links through golf course**

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Links through golf course to Tennent Pde, Wardell Rd and Tennyson Street						
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	457	\$457,000		
Property full acquisition residential (at market rate)	each	\$1,600,000	1	\$1,600,000		
Relocate playground	sqm	\$2,000	240	\$480,000		
<b>OPTION 4A (through private property)</b>				<b>2,057,000</b>	<b>\$2,262,700</b>	<b>\$2,942,000</b>
<b>OPTION 4B (through playground)</b>				<b>\$937,000</b>	<b>\$1,030,700</b>	<b>\$1,340,000</b>

**Option 5: Link along Riverside Crescent**

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Link along Riverside Crescent and Ewart Street, towards Dulwich Hill Station						
Cycleway on-road mixed traffic	m	\$534	141	\$75,294		
Cycleway on-road bidirectional inc. intersection treatments	m	\$3,000	66	\$198,000		
Ped refuge	each	\$30,000	1	\$30,000		
<b>TOTAL OPTION 5</b>				<b>\$303,294</b>	<b>\$333,623</b>	<b>\$434,000</b>

ASSESSMENT

	● <b>OPTION 1</b>	● <b>OPTION 2</b>	● <b>OPTION 3</b>	● <b>OPTION 4</b>	● <b>OPTION 5</b>
<b>Walkable and rideable by all</b>		High traffic options and uphill	Busy road		Ewart St crossing involves pedestrian refuge
<b>Connected</b>					
<b>Ecologically friendly</b>				Impacts on golf course	
<b>An experience in urban nature</b>	On-road but mostly quiet street	On-road including busier roads	On-road but mostly quiet street		On-road but mostly quiet street
<b>Place-friendly</b>				Impacts on golf course	
<b>Resident-friendly</b>	Route goes through residential area	Separated cycleway impacts on parking	Route goes through residential area	May require property purchase at 28 Tennyson St	Route goes through residential area
<b>Indicative cost</b>	1.62/1.49 Mil	0.39 Mil	0.49 Mil	2.94/1.34Mil	0.43 Mil
<b>Length</b>	850/725 m	625 m	470 m	695 m	205 m

RECOMMENDATIONS

Assuming that the Cooks River crossing is located north-east of the existing bridge (as recommended) then the recommendations for this link are as follows:

- Option 1 is the best option overall and should be the first priority. This should be considered as part of the Golf Course Master Plan.
- Option 2 should be implemented as an additional “commuter” route - medium priority
- A low-cost version of Option 3 is recommended to improve walking and riding conditions for anybody who does use Wardell Road. *[Note that if no new bridge is renewed in its existing location, more people (those heading to or coming from the east) will be tempted to use Wardell Road to shorten their travel distance, and so this option will have a greater priority.]*
- Option 4 should be considered as part of the Golf Course Master Plan as a number of potential future links
- Option 5 is not recommended unless there are other reasons driving a need for a new connection into Jack Shanahan Park; for example, if no new bridge is renewed in its existing location

# 04 Jack Shanahan Park to Hercules Street



ABOVE. Location map showing GreenWay boundary, and site location (red)

## ● OPTION 1

There is only one option proposed between Jack Shanahan Park and Hercules Street, as in this section there is significant space available within the light rail corridor on the western side of the tracks and there is no room for a shared path.

This option does include a few alternative connections:

- To the old railway bridge over Terrace Street
- To the lower part of Hercules Street
- To Blackwood Avenue (over the light rail line)
- To the upper part of Hercules Street

## NON FEASIBLE OPTIONS

The eastern side of the rail corridor was ruled out due to:

- Very narrow sections, particularly alongside Dulwich Hill Public School, which would not be sufficient for a 3.5 m shared path
- A crossing over the light rail tracks can only go ahead with Sydney Trains' approval, and if it can proceed at all, it is likely to be a pedestrian crossing where cyclists would have to dismount
- A preference to connect to links on the western side of the corridor, to both north and south

Hercules Street was also ruled out due to:

- Traffic volumes: Hercules Street is a local collector road with annual average daily traffic (AADT) over 1,000 vehicles per day
- A separated cycleway along the road would avoid the traffic, but would be expensive to construct, result in loss of 40+ parking spaces, and would conflict with driveways

## COST ESTIMATE

### Option 1: Shared path between Jack Shanahan Reserve and Hercules Street

Shared path	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	437	\$437,000		
Cycleway off road 3.5m elevated <1m steel, FRP deck inc. lighting	m	\$3,500	75	\$262,500		
<b>TOTAL</b>				<b>\$699,500</b>	<b>\$769,450</b>	<b>\$1,001,000</b>

Underground HV power lines	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Underground HV power lines (to make space for path)	No	\$400,000	1	\$400,000		
<b>TOTAL</b>				<b>\$400,000</b>	<b>\$440,000</b>	<b>\$572,000</b>

<b>TOTAL OPTION 1</b>				<b>1,099,500</b>	<b>\$1,209,450</b>	<b>\$1,573,000</b>
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	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Pedestrian crossing over light rail	each	\$300,000	1	\$300,000		
<b>TOTAL</b>				<b>\$300,000</b>	<b>\$330,000</b>	<b>\$429,000</b>





● Option 1    ●●●● Options ruled out from further analysis    >>>> Off road - elevated    >>> Off road - at grade



## Section B: Hercules Street to Old Canterbury Road

In this section of the GreenWay, the key connections to consider are to north and south:

- At the northern end
- At the southern end (the preferred option is on the western side of the light rail corridor) south of Hercules Street

Important existing infrastructure in this section includes:

- An existing path through Johnson Park, 3.6 m wide (not currently signposted as a shared path, but noted as an off-road bicycle route on maps)

Key considerations in this section include:

- Crossings of Hercules Street, New Canterbury Road, Constitution Road and Davis Street – all of which have at-grade and grade-separated options
- Whether to put the main route east or west of the light rail corridor, particularly between Constitution Road and Davis Street, where there are important impacts to consider on either side

Note that between Davis Street and Old Canterbury Road, there is a clear preferred route along Weston Street. South of Davis Street, there are options on either side of the light rail corridor.

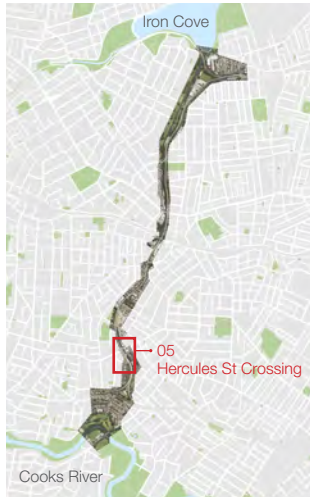
This section has been broken down into the following elements:

5. Hercules Street crossing
6. Hercules Street to New Canterbury Road
7. New Canterbury Road to Constitution Road
8. Constitution Road crossing
9. Constitution Road to Davis Street
10. Davis Street crossing
11. Davis Street to Old Canterbury Road (Weston Street)



Greenway 0 10 20 30 40 50 M

# 05 Hercules Street crossing



ABOVE. Location map showing GreenWay boundary, and site location (red)

● **OPTION 1**

Option 1 is a tunnel under Hercules Street on the western side. This would require part acquisition of 43 Hercules Street

● **OPTION 2**

Options 2 and 3 both involve using the existing pedestrian crossing. The traffic assessment report has recommended that it is not possible to move this crossing, due to limited sightlines, nor is it possible to widen this crossing (e.g. to provide dedicated space for bikes), due to the location of driveways. Therefore it would need to remain as a pedestrian crossing and bike riders would be required to dismount to cross.

This option involves providing a relatively direct connection to the existing pedestrian crossing. It would involve using the existing pedestrian crossing and a proposed link through Nos 43 and 45 Hercules Street (which have been earmarked for a future public park). The street elevation will require ramping up from the southern side.

● **OPTION 3**

This option is a link to an existing at-grade crossing, avoiding all but a small corner of the property at 43 Hercules Street. The cost estimate allows for a ramp up to street level and some modifications to the footpaths on either side of the pedestrian crossing, to provide more space and mark these as slow speed shared zones for pedestrians and bikes.

**NON FEASIBLE OPTIONS**

A grade-separated crossing on the eastern side of the rail corridor was ruled out due to:

- Lack of space
- A preference to connect to links on the western side of the corridor, to both north and south

An at-grade crossing on the eastern side of the rail corridor was also ruled out due to:

- No feasible location for a new pedestrian crossing (due to sight lines)
- Accessing the existing pedestrian crossing would require a significant detour (at least 250 m)
- Along this route is a key school drop off and pick up zone





- Option 1
- Option 2
- Option 3
- Options ruled out from further analysis
- >>> Off road - elevated
- >>> Off road - at grade
- ⊕ Upgrade crossing
- ▨ Acquisition area
- ▨ Tunnel

## COST ESTIMATE

### Option 1: Tunnel under Hercules Street (western side)

Tunnel	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Tunnel inc. GSW disposal	m	\$53,000	26	\$1,378,000		
Property partial acquisition residential	sqm	\$3,500	25	\$87,500		
<b>TOTAL OPTION 1</b>				<b>1,465,500</b>	<b>\$1,612,050</b>	<b>\$2,096,000</b>

### Option 2: At-grade crossing with direct link through property

Option only suitable if private property is converted to open space as part of future development	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	53	\$53,000		
At-grade crossing upgrade	No	\$150,000	1	\$150,000		
Property purchase is excluded - assumes this is a dedication as part of future development						
<b>TOTAL OPTION 2</b>				<b>\$203,000</b>	<b>\$223,300</b>	<b>\$291,000</b>

### Option 3: At-grade crossing with link around private property

On-grade link around property	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m elevated >1m steel, FRP deck inc. lighting (ramp up to road level)	m	\$5,500	60	\$330,000		
At-grade crossing upgrade	No	\$150,000	1	\$150,000		
Property partial acquisition residential (part of property required to make room for path)	sqm	\$3,500	25	\$87,500		
<b>TOTAL OPTION 3</b>				<b>\$567,500</b>	<b>\$624,250</b>	<b>\$812,000</b>

## ASSESSMENT

	● <b>OPTION 1</b>	● <b>OPTION 2</b>	● <b>OPTION 3</b>
<b><i>Walkable and rideable by all</i></b>		Requires ramping up	Stony route requiring good shoes
<b><i>Connected</i></b>		Involves detour to Consett and Hercules St corners	Windy route
<b><i>Ecologically friendly</i></b>			
<b><i>An experience in urban nature</i></b>		Detour to Consett St roundabout	Detour to Consett St roundabout
<b><i>Place-friendly</i></b>			
<b><i>Resident-friendly</i></b>			
<b>Indicative cost</b>	\$ 2.10 Mil	\$ 0.29 Mil	\$ 0.81 Mil
<b>Length</b>	100 m	140 m	200 m

## RECOMMENDATIONS

- Option 1 is preferred, subject to funding
- Option 2 is the next best option, subject to availability of private property
- Option 3 is a fallback option

# 06 Hercules Street to New Canterbury Road



ABOVE. Location Map shows Greenway boundary, and site location (red)

● **OPTION 1**

This option provides an elevated structure at mid-level on the steep embankment between the existing street-level path and the light rail tracks, linking a new tunnel under Hercules street and a new underpass under New Canterbury Road.

● **OPTION 2A**

This option is the existing street-level path. The cost estimate allows for this path to be expanded to 3.5m. This option utilises existing signals over New Canterbury Road. The traffic assessment report recommends that the New Canterbury Road signals could be improved with a minor upgrade to convert existing 3.5 m wide footpaths to shared paths on either side of the crossing.

● **OPTION 2B**

This option is a also allows for the existing path to be expanded to 3.5m, as well as a relocated signalised crossing over New Canterbury Road.

This would put the signalised crossing in line with a GreenWay path on the western side of the light rail line, but would be a poor location for pedestrians crossing the road to access the light rail stop.

**NON FEASIBLE OPTIONS**

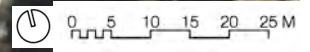
The eastern side of the light rail corridor has been ruled out due to:

- No space available for an underpass under New Canterbury Road, due to the existing light rail access lift
- A preference to connect to links on the western side of the corridor, particularly to the south but also to the north where a steep batter slope affects the eastern option





- Option 1
- Option 2
- Option 3
- Options ruled out from further analysis
- - - On road - shared
- ◆◆◆ Off road - elevated
- ■ ■ ■ Underpass
- ▶▶▶ Off road - at grade



## COST ESTIMATE

### Option 1: Western side, mid level between existing path and light rail

Link from Hercules Street to New Canterbury Road	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m elevated >1m steel, FRP deck inc. lighting (link between Hercules St and New Canterbury Rd)	m	\$5,500	90	\$495,000		
<b>TOTAL</b>				<b>\$495,000</b>	<b>\$544,500</b>	<b>\$708,000</b>

New Canterbury Road underpass	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Elevated boardwalk	m	\$5,500	23	\$126,500		
Allowance for steps connecting to New Canterbury Road	each	\$10,000	1	\$10,000		
<b>TOTAL</b>				<b>\$136,500</b>	<b>\$150,150</b>	<b>\$196,000</b>

<b>TOTAL OPTION 1</b>				<b>\$631,500</b>	<b>\$694,650</b>	<b>\$904,000</b>
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### Option 2A: Street-level link and minor upgrade to existing signalised crossing

At-grade path and minor upgrade to crossing	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	90	\$90,000		
Shared paths either side of existing crossing	each	\$10,000	1	\$10,000		
<b>TOTAL OPTION 2</b>				<b>\$100,000</b>	<b>\$110,000</b>	<b>\$143,000</b>

### Option 2B: Street-level link and relocated signalised crossing

At-grade path and crossing upgrade	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	90	\$90,000		
Signalised road crossing inc. signals, civils and lighting	each	\$250,000	1	\$250,000		
<b>TOTAL OPTION 3</b>				<b>\$340,000</b>	<b>\$374,000</b>	<b>\$487,000</b>

## ASSESSMENT

	● <b>OPTION 1</b>	● <b>OPTION 2A</b>	● <b>OPTION 2B</b>
<b>Walkable and rideable by all</b>		Slight detour required	
<b>Connected</b>		Requires climb to cross New Canterbury Rd	Requires climb to cross New Canterbury Rd
<b>Ecologically friendly</b>			
<b>An experience in urban nature</b>		Crossing New Canterbury Rd at street level	Crossing New Canterbury Rd at street level
<b>Place-friendly</b>		Requires roundabout route	
<b>Resident-friendly</b>			
<b>Indicative cost</b>	\$904,000	\$143,000	\$487,000
<b>Length</b>	115 m	170 m	115 m

## RECOMMENDATIONS

- Option 1 is preferred, subject to funding
- Option 2A is a fallback option, using an existing safe crossing
- Option 2B is not preferred as it would mean that the signals would be poorly located for pedestrian access to the light rail stop.

# 07 New Canterbury Road to Constitution Road



ABOVE. Location map showing GreenWay boundary, and site location (red)

## ● OPTION 1

This option provides a link on the western side of the light rail line, linking a new underpass under New Canterbury Road. The route would need to be an elevated structure at the top of a steep embankment in order to link to the underpass, and could link either to a tunnel under or at-grade crossing of Constitution Road.

The elevated high voltage power line on this side of the light rail corridor is a key constraint for this option. This cable would need to be relocated underground, which increases the cost of this option. Alternatively, one or two poles could be relocated.

There is also a patch of remnant vegetation that has been identified on this side of the light rail corridor, which should be considered in this option.

## ● OPTION 2

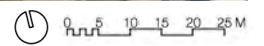
This option is a link on the eastern side of the light rail line, linking with the existing at-grade crossing over New Canterbury Road. The route could link to a tunnel under Constitution Road (at-grade not possible). The route would need to be an elevated structure at the top of a steep embankment.

It is possible that this route could link onto Denison Road through public property. There may also be a need for property acquisition between Denison Road and New Canterbury Road which may add significantly to the costs listed.





● Option 1   ● Option 2   - - - - Off road - elevated





## COST ESTIMATE

### Option 1: Western side of light rail

Elevated path	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m elevated >1m steel, FRP deck inc. lighting rate for >1 m due to steep grade	m	\$5,500	235	\$1,292,500		
<b>TOTAL</b>				<b>\$1,292,500</b>	<b>\$1,421,750</b>	<b>\$1,849,000</b>

Elevated path	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Underground HV power lines (to make space for path)	No	\$400,000	1	\$400,000		
<b>TOTAL</b>				<b>\$400,000</b>	<b>\$440,000</b>	<b>\$572,000</b>

<b>TOTAL OPTION 1</b>				<b>\$1,692,500</b>	<b>\$1,861,750</b>	<b>\$2,421,000</b>
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### Option 2: Eastern side of light rail

Elevated path	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m elevated >1m steel, FRP deck inc. lighting	m	\$5,500	230	\$1,265,000		
<b>TOTAL OPTION 2 (excludes potential acquisition)</b>				<b>\$1,265,000</b>	<b>\$1,391,500</b>	<b>\$1,809,000</b>

## ASSESSMENT

	● <b>OPTION 1</b>	● <b>OPTION 2</b>
<b>Walkable and rideable by all</b>		
<b>Connected</b>		Requires returning to western side of light rail
<b>Ecologically friendly</b>	Remnant vegetation present in this location	Remnant vegetation present in this location
<b>An experience in urban nature</b>		
<b>Place-friendly</b>		
<b>Resident-friendly</b>		
<b>Indicative cost</b>	\$ 2.42	\$ 1.81
<b>Length</b>	235 m	230 m

# 08 Constitution Road crossing



ABOVE. Location map showing GreenWay boundary, and site location (red)

● **OPTION 1**

This option is a tunnel under Constitution Road, on the western side of the light rail line. this option is only suitable if links to the north and south are also on the western side.

● **OPTION 2**

This option involves improving the at-grade crossing, which will be upgraded in 2018/19 to include a pedestrian and cyclist refuge, allowing cyclists and pedestrians to cross Constitution Road before the roundabout with Williams Parade.

Option 2 involves upgrading the refuge to a raised pedestrian crossing with better links on either side.

This is the best option for an at-grade crossing in proximity to the light rail corridor.

● **OPTION 3**

This option is a tunnel under Constitution Road, on the eastern side of the light rail line. This option is only suitable if links to the north and south are also on the eastern side.

**NON FEASIBLE OPTIONS**

An at-grade crossing on the eastern side of the light rail corridor would have to be located a significant distance away, where there is a safe location for a pedestrian crossing. However this option has been ruled out due to:

- The requirement for a significant detour (at least 200 m)
- The need to cross Grove Street as well as Constitution Road
- Significant impacts on existing parking (at least 15 spaces), with no opportunity to offset losses
- A preference to connect to links on the western side of the corridor, particularly to the south



- Option 1
- Option 2
- Option 3
- Options ruled out from further analysis
- ▶▶▶▶ Off road - elevated
- ▶▶▶▶ Off road - at grade
- - - - On road - shared
- ■ ■ ■ Underpass

## COST ESTIMATE

### Option 1: Tunnel on Western side

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Tunnel inc. GSW disposal	m	\$53,000	24	\$1,272,000		
Cycleway off road 3.5m on-grade inc. lighting (link to existing path)	m	\$1,000	51	\$51,000		
<b>TOTAL OPTION 1</b>				<b>\$1,323,000</b>	<b>\$1,455,300</b>	<b>\$1,892,000</b>

### Option 2: At-grade crossing

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway on-road bidirectional inc. intersection treatments	m	\$3,000	52	\$156,000		
Raised ped crossing inc. civils and lighting	each	\$150,000	1	\$150,000		
Cycleway off road 3.5m on-grade inc. lighting (link to existing path)	m	\$1,000	30	\$30,000		
<b>TOTAL OPTION 2</b>				<b>\$336,000</b>	<b>\$369,600</b>	<b>\$481,000</b>

### Option 3: Tunnel on Eastern side

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Tunnel inc. GSW disposal	m	\$53,000	24	\$1,272,000		
Cycleway off road 3.5m on-grade inc. lighting (link to existing path)	m	\$1,000	42	\$42,000		
<b>TOTAL OPTION 3</b>				<b>1,314,000</b>	<b>\$1,445,400</b>	<b>\$1,880,000</b>

## ASSESSMENT

	● <b>OPTION 1</b>	● <b>OPTION 2</b>	● <b>OPTION 3</b>
<b><i>Walkable and rideable by all</i></b>		May require crossing through pedestrian refuge island	
<b><i>Connected</i></b>		Detour towards roundabout	
<b><i>Ecologically friendly</i></b>			
<b><i>An experience in urban nature</i></b>		On-road detour towards roundabout	
<b><i>Place-friendly</i></b>			
<b><i>Resident-friendly</i></b>			
<b>Indicative cost</b>	\$ 1.89 Mil	\$0.48 Mil	\$ 1.88Mil
<b>Length</b>	80 m	120 m	60 m

## RECOMMENDATIONS

A tunnel option, either option 1 or 3, is a preferred option here, and depends on the route selection for the Constitution Road to Davis Street link.



# 09 Constitution Road to Davis Street



ABOVE. Location map showing GreenWay boundary, and site location (red)

● **OPTION 1**

This option is on the western side of the light rail line, and utilises the existing shared path through Johnson Park. The existing steps that connect to the street may have to be modified, and potential conflicts at the interface with the playground would need to be addressed. The shared path structure could be elevated through the bushcare area but such an approach would need to consider the proximity to residences in 10-14 Terry Road, where the elevation of the route may pose a privacy concern.

Two options are shown for the proposed route: 1A located as close to the building as possible (within private property) and 1B located as close to the light rail tracks as possible. 1A would minimise impact on the Bushcare site, but relies on approval to go through private property. 1B is located in public land. Both options would need to avoid one large tree.

The easement through 10-14 Terry Road (within the carpark and driveway) can be used to come back up to street level at Davis Street opposite the existing path. Alternatively, the route could link to a tunnel under Davis Street.

● **OPTION 2**

Option 2 is on the eastern side of the light rail line. This route would be awkward connecting to an at-grade crossing of Constitution Road, but would link well with a tunnel under the eastern side. This increases the priority of grade separation now, rather than at a later date.

The section of path beside the Arlington Grove development is located on private property. Due to their existing development approval, a path through this development would be constrained, particularly at the south-west corner where there will be conflict with light rail pedestrian traffic and a proposed café on this corner of the new building. This tight spot cannot reasonably be avoided. This route would also have significant privacy impacts on residents as the path is located very close to and at a similar level as apartments

The fence line of 1A Hill Street appears to be built in the light rail easement and may need to be relocated to avoid conflict with the proposed shared path route.

There are two options for the route at Hoskins Park:

● **OPTION 2A**

Option 2A is an elevated ramp up to Davis Street, along the southern side of Hoskins Park. The ramp would need to be around 100m long to comply with industry standards (allowing for a preferred grade of 1:20 or minimum grade of 1:14 with landings). This would extend to Hill Street posing privacy concerns to 2 Hill Street. While the elevated ramp might protect some animals and vegetation on the one hand, vegetation between 2 Pigott Street and the railway line would be removed, impacting on the Pigott Street Bushcare site. Big machinery used during construction could also impact on Bushcare and/or mature trees. There is also a disconnection from Hoskins Park.

● **OPTION 2B**

Option 2B is at grade up Pigott Street and through Hoskins Park onto Davis Street. The key considerations for this option are the impacts on the park, the need to extend the shared path along Davis Street to meet the crossing, and it doesn't leave the option open for future grade separation at Davis Street.

This would also require loss of 10+ parking spaces in Pigott Street and add an extra 200m+ to the route.

**NON FEASIBLE OPTIONS**

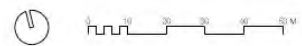
Windsor Road has been ruled out due to:

- Traffic volumes: Windsor Road is a local collector road with annual average daily traffic (AADT) over 1,000 vehicles per day
- A separated cycleway along the road would avoid the traffic, however due to Windsor Road's relatively narrow width, it would involve a loss of 20+ parking spaces on both sides of Windsor Road south of Hampstead Road, and would also conflict with several driveways
- The existing pedestrian path linking Johnson Park to Windsor Road is only 2 m wide, with no potential to widen this connection without full acquisition of a residential property





- Option 1    ● Option 2
- — — On road - shared    >>> Off road - elevated
- — — On road - separated    >>> Off road - at grade



## COST ESTIMATE

### Option 1A/1B: Shared path from Davis Street to Constitution Road via Johnson Park

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Path upgrade through Johnson Park						
Update existing to shared off road 3.5m on-grade inc. lighting	m	\$500	235	\$117,500		
Johnson Park playground modifications to reduce conflict with shared path	No	\$150,000	1	\$150,000		
<b>TOTAL</b>				<b>\$267,500</b>	<b>\$294,250</b>	<b>\$383,000</b>
Link 1A through private property	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m on-grade inc. lighting (excludes property acquisition)	m	\$1,000	104	\$104,000		
Cycleway off road 3.5m elevated <1m steel, FRP deck inc. lighting (elevated to minimise impact on bushcare site)	m	\$3,500	138	\$483,000		
<b>TOTAL</b>				<b>\$587,000</b>	<b>\$645,700</b>	<b>\$840,000</b>
Link 1B through rail corridor	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m elevated <1m steel, FRP deck inc. lighting	m	\$3,500	189	\$661,500		
<b>TOTAL</b>				<b>\$661,500</b>	<b>\$727,650</b>	<b>\$946,000</b>
<b>TOTAL OPTION 1A</b>				<b>\$854,500</b>	<b>\$939,950</b>	<b>\$1,222,000</b>
<b>TOTAL OPTION 1B</b>				<b>\$929,000</b>	<b>\$1,021,900</b>	<b>\$1,329,000</b>

### Option 2A/2B: Shared path from Davis Street to Constitution Road via Hoskins Park

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Section that developer will build		\$250,000	1	\$250,000		
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	150	\$150,000		
<b>TOTAL</b>				<b>\$400,000</b>	<b>\$440,000</b>	<b>\$572,000</b>
2A: Hill Street to Davis Street via ramp	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m elevated >1m steel, FRP deck inc. lighting	m	\$5,500	125	\$687,500		
Cycleway on-road bidirectional inc. intersection treatments (link to existing pedestrian crossing)	m	\$3,000	65	\$195,000		
<b>TOTAL</b>				<b>\$882,500</b>	<b>\$970,750</b>	<b>\$1,262,000</b>
2B: Hill St to Davis Str via at-grade link through Hoskins Park	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m on-grade inc. lighting (Hill St to Pigott St)	m	\$1,000	50	\$50,000		
Cycleway on-road mixed traffic (Pigott St)	m	\$534	109	\$58,206		
Cycleway off road 3.5m on-grade inc. lighting (Hoskins Park)	m	\$1,000	79	\$79,000		
Cycleway on-road bidirectional inc. intersection treatments (Link to existing pedestrian crossing)	m	\$3,000	108	\$324,000		
<b>TOTAL</b>				<b>\$511,206</b>	<b>\$562,327</b>	<b>\$732,000</b>
<b>TOTAL OPTION 2A</b>				<b>\$1,282,500</b>	<b>\$1,410,750</b>	<b>\$1,834,000</b>
<b>TOTAL OPTION 2B</b>				<b>\$911,206</b>	<b>\$1,002,327</b>	<b>\$1,304,000</b>



## ASSESSMENT

● **OPTION 1A** ● **OPTION 1B** ● **OPTION 2A** ● **OPTION 2B**

	● <b>OPTION 1A</b>	● <b>OPTION 1B</b>	● <b>OPTION 2A</b>	● <b>OPTION 2B</b>
<b><i>Walkable and rideable by all</i></b>	Driveway option is too steep	Driveway option is too steep	Ramp will be a challenging climb	Some tight turns hard to avoid
<b><i>Connected</i></b>	Keeps grade separated options open to the north and south Johnson Park is a hub in the area		Disconnection from Hoskins Park	Circuitous route
<b><i>Ecologically friendly</i></b>	Impact on Johnson Park and Waratah Mills Bushcare sites		Impact on Pigott Street bushcare site	
<b><i>An experience in urban nature</i></b>	Park and bush site		Section along building edge will be quite urban	
<b><i>Place-friendly</i></b>	Johnson Park is already busy and can tolerate more traffic		Hoskins Park has a quiet nature and heritage character, inconsistent with the GreenWay	
<b><i>Resident-friendly</i></b>	Part of link on private property (under awning)	Close proximity to Waratah Mills apartments	Close proximity to Arlington Grove apartments	
<b>Indicative cost</b>	<b>\$ 1,222,000</b>	<b>\$ 1,329,000</b>	<b>\$ 1,834,000</b>	<b>\$1,304,000</b>
<b>Length</b>	<b>390 m</b>	<b>390 m</b>	<b>350 m</b>	<b>590m</b>

## RECOMMENDATIONS

Option 1 is the recommended option. This option provides the ability to stage construction works, and does not preclude at-grade or separated crossings. The impacts on Johnson Park are more easily managed than the impacts on Hoskins Park, and can be managed through design. Connecting through Johnson Park is a better outcome for GreenWay users, as Johnson Park is a local hub and key destination.

# 10 Davis Street crossing



ABOVE. Location map showing GreenWay boundary, and site location (red)

● **OPTION 1**

This option involves a tunnel under Davis Street on the western side of the light rail alignment. This crossing would require moving the signal box near the light rail station, likely to incur a relatively significant cost. Linking this option to the cul-de-sac at the end of Weston Street is possible, though conflicts with the station entrance would need to be managed.

● **OPTION 2**

This option uses the easement through 10-14 Terry Road (through the carpark and up the driveway) to come back up to street level at Davis Street opposite the existing path. There is an existing pedestrian crossing approximately 10 m to the east along Davis Street; however, cyclists may be tempted to cross the street directly. It is unlikely that the crossing could be moved as it would conflict with the driveway, although it could be redesigned to make it safer for GreenWay traffic. The 2.5m wide laneway adjacent to 55 Windsor Road would be expanded through purchase of a portion of the eastern side of the property, providing a connection onto Weston Street.

The key limitation for this option is the use of the easement in the driveway of 10-14 Terry Road. Although this easement was put in place with the future GreenWay in mind, it has several limitations:

- The driveway is steep
- The driveway has a tight bend and sightlines around the corner are poor
- The defined easement is relatively narrow and hugs inside of the bend, where the corner is tightest and sightlines are worst
- The driveway is shared with vehicle traffic and there is not enough space to separate different users (there is an existing pedestrian route adjacent to the driveway, but it includes a set of steps)

Despite these limitations, the traffic engineering study recommends the use of the easement would be a feasible option with a few modifications to improve safety.

● **OPTION 3**

This east side option for this location is a link through Hoskins Park from Pigott Street. A tunnel is not feasible on the eastern side of the light rail as there is nothing to link to on the north side. This option utilises the existing pedestrian crossing over Davis Street and would involve constructing a cycle path along Davis Street to safely access this crossing.

**NON FEASIBLE OPTIONS**

A crossing on the eastern side of the light rail corridor (either at-grade or grade-separated) has been ruled out due to:

- A relatively long detour to the existing pedestrian crossing (at least 200 m)
- A tunnel has nothing to connect to on the northern side of Davis Street. The light rail crossing at Waratah Mills station is not appropriate on the main GreenWay route, as it requires cyclists to dismount
- A tunnel would also have a major impact on the Davis Street bush care site and the Pigott Street bushcare site





- Option 1
- Option 2
- Option 3
- ▶▶▶ Off road - elevated
- - - On road - shared
- ▤ Acquisition area
- ▶▶▶ Off road - at grade
- ||||| Tunnel



## COST ESTIMATE

### Option 1: Tunnel under Davis Street

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m elevated <1m steel, FRP deck inc. lighting (southern side of tunnel)	m	\$3,500	28	\$98,000		
Tunnel inc. GSW disposal	m	\$53,000	26	\$1,378,000		
Cycleway off road 3.5m elevated <1m steel, FRP deck inc. lighting (northern side of tunnel)	m	\$3,500	26	\$91,000		
Relocate light rail signal box	each	\$150,000	1	\$150,000		
Cycleway on-road mixed traffic (up to Weston St intersection)	m	\$534	30	\$16,020		
<b>TOTAL OPTION 1</b>				<b>\$1,733,020</b>	<b>\$1,906,322</b>	<b>\$2,479,000</b>

### Option 2: At-grade crossing with link to western route

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Utilise easement in driveway (painting and linemarking)	m	\$200	60	\$12,000		
Modify existing pedestrian crossing to add space for bikes	each	\$75,000	1	\$75,000		
Property partial acquisition residential (to expand laneway)	sqm	\$3,500	39	\$136,500		
Cycleway off road 3.5m on-grade inc. lighting (rebuild path through laneway)	m	\$1,000	23	\$23,000		
<b>TOTAL OPTION 2</b>				<b>\$246,500</b>	<b>\$271,150</b>	<b>\$353,000</b>

### Option 3: At-grade crossing with link to eastern route

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Modify existing pedestrian crossing to add space for bikes	each	\$75,000	1	\$75,000		
Property partial acquisition residential (to expand laneway)	sqm	\$3,500	39	\$136,500		
Cycleway off road 3.5m on-grade inc. lighting (rebuild path through laneway)	m	\$1,000	23	\$23,000		
<b>TOTAL OPTION 3</b>				<b>\$234,500</b>	<b>\$257,950</b>	<b>\$336,000</b>

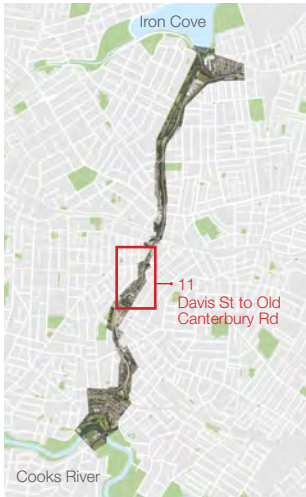
## ASSESSMENT

	● <b>OPTION 1</b>	● <b>OPTION 2</b>	● <b>OPTION 3</b>
<b>Walkable and rideable by all</b>		Steep driveway	
<b>Connected</b>		Requires diversion along Davis St	Requires diversion along Davis St
<b>Ecologically friendly</b>	Tunnel to have impact on Waratah Mills Bush-care site		
<b>An experience in urban nature</b>		Requires diversion along Davis St	Use of Davis St
<b>Place-friendly</b>			
<b>Resident-friendly</b>	Construction stage impacts on residents	Uses residents' driveway	
<b>Indicative cost</b>	<b>\$ 2,479,000</b>	<b>\$ 353,000</b>	<b>\$ 336,000</b>
<b>Length</b>	<b>105 m</b>	<b>120 m</b>	<b>120 m</b>

## RECOMMENDATIONS

If the GreenWay is constructed on the western side of the light rail corridor to the south of Davis Street, then the preferred option here is a tunnel under Davis Street. Given the limitations associated with the at-grade crossing (steep driveway, potential conflict with cars, awkward alignment with pedestrian crossing), a tunnel is likely to be a relatively high priority here. Thus, option 1 is the higher priority option for this location.

# 11 Davis Street to Old Canterbury Road



ABOVE. Location map showing GreenWay boundary, and site location (red)

The options are limited for this section, as there is limited space in the light rail corridor on either the eastern or the western side adjacent to the tracks.

On-road options were considered here and Weston Street clearly emerges as the quietest street in the precinct, which is also a relatively direct link to the GreenWay to the north and south.

● **OPTION 1**

This option is an on-road link along Weston Street. At the southern end, the route would link to either an at-grade or tunnel crossing of Davis Street. At the northern end, the route would link to either a tunnel under Old Canterbury Road, or a set of traffic signals which are being installed in 2018 at the Old Canterbury Road/Weston Street intersection. The intention for Weston Street is that traffic volumes and speeds should be managed so that most GreenWay riders can use the road itself, without the need for a separated path.

Traffic signals proposed at the northern end of Weston Street will likely increase traffic on Weston Street, therefore the preferred option for Weston Street is to close the street at Old Canterbury Road. This option has been investigated in the Traffic Assessment Report. This road closure will keep Weston Street quiet and Weston Street can be designed to accommodate bike riders in a mixed traffic environment.

The cost estimate allows for resurfacing Weston Street with coloured asphalt and line marking.

Closure of Weston Street at Old Canterbury Road requires approval by Council's traffic committee. If Weston Street cannot be closed, alternative options will need to be considered, including a potential separated cycleway on Weston Street.

## NON-FEASIBLE OPTIONS

The option of putting a path into the light rail corridor has previously been investigated and was again ruled out for the following reasons:

- Both sides of the rail corridor have a few pinch points, where there is very little space between the rail tracks and private property boundaries
- Along most of the western side, there is also an open concrete stormwater channel in the narrow space between the houses and the light rail.
- While a shared path could hypothetically fit down the western side, it would be very expensive (some sections would need to be cantilevered over the stormwater channel) and its construction would require shut down of the light rail for approximately 3 months, which is not likely to be acceptable
- Due to the proximity to both the rail tracks and private properties, a pathway in the light rail corridor would also need to be fenced on both sides, to restrict access to the light rail and protect the privacy of residents. This would, however, raise a safety concern for GreenWay users, who would find themselves in a long stretch of path with the only egress to the north and south.

Windsor Road was ruled out due to:

- Traffic volumes: Windsor Road is a local collector road with annual average daily traffic (AADT) over 1,000 vehicles per day
- A separated cycleway along the road would avoid the traffic, but would be expensive to construct and would conflict with driveways

Victoria Street was ruled out, because this is a significant detour of 500m, with more intersections. In addition, from Old Canterbury Road northwards, the GreenWay route has already been determined on the western side of the light rail corridor, and it would be difficult to construct a workable link from Victoria Street back to the western side in the vicinity of Old Canterbury Road.







## COST ESTIMATE

### Option 1: Link along Weston Street

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Weston Street redesign as a bike boulevard						
Cycleway on-road mixed traffic	m	\$534	370	\$197,580		
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	66	\$66,000		
<b>TOTAL</b>				<b>\$263,580</b>	<b>\$289,938</b>	<b>\$377,000</b>
	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Weston Street road closure and threshold treatments (estimate)		\$250,000	1	\$250,000		
<b>TOTAL</b>				<b>\$250,000</b>	<b>\$275,000</b>	<b>\$358,000</b>
<b>TOTAL OPTION 1</b>				<b>\$513,580</b>	<b>\$564,938</b>	<b>\$735,000</b>

## RECOMMENDATIONS

Option 1 is the preferred option.

# Section C: Old Canterbury Road to Parramatta Road

This section of the GreenWay features several busy road crossings – Old Canterbury Road, Longport Street and Parramatta Road. Between Old Canterbury Road and Longport Street, the route is characterised by new development either side of the light rail corridor, and between Longport Street and Parramatta Road is Gadigal Reserve.

There are two key east-west routes which traverse this section:

- An existing regional route (proposed to be upgraded) along Longport Street, which follows the Main Western Railway line on parallel streets
- A route that has been proposed in broad terms along the Parramatta Road urban renewal corridor. The preferred alignment of this route is as yet unknown

Important existing infrastructure in this section includes:

- A section of the route that has already been constructed by the developer of #2 Malthouse Way (a short section of shared path and the shared zone along Malthouse Way)
- An existing shared path through Gadigal Reserve, which currently links Grosvenor Crescent to Parramatta Road
- Across Parramatta Road, there is an existing pedestrian bridge on the western side of the light rail tracks, only accessible via steps or lifts, as well as a narrow pedestrian path on the eastern side of Brown Street, accessible via steep ramps

Key considerations for the Master Plan in this section include:

- Other infrastructure along the route, including the water mains mentioned above as well as other underground services, the stormwater channel and the main western railway line crossing the route
- Significant vegetation and large trees along the route, including both restored native vegetation and non-native patches with habitat value
- An Eastern Bentwing Bat roost site in Gadigal Reserve. Ringtail possums, Grey-headed flying foxes, and eastern water dragons have also been sighted.
- Heritage-listed assets including the whipple truss bridge, the cast iron sewer aqueduct crossing Gadigal Reserve, and the sandstone arch and balustrade of Battle Bridge.
- Other heritage features including the last remaining siding of the original goods line at Lewisham West
- Potential secondary routes and connections which should be considered in addition to the main route, such as:
  - Link to regional cycleway along Longport Street
  - The existing pedestrian link between Longport Street and Lewisham West light rail station on the eastern side of the light rail corridor



- - - - Connection to existing shared path
- - - - GreenWay
- - - - Future shared path by others

- Grosvenor Crescent access (maintain existing)
- Safe crossing over Old Canterbury Road near Hudson Street

Note that between Davis Street and Old Canterbury Road, there is a clear preferred route along Weston Street. North of Parramatta Road there is an existing shared path, recently upgraded, along the eastern side of the Hawthorne Canal channel, at the bottom (western side) of the light rail embankment.

# 12 Old Canterbury Road Crossing



ABOVE. Location map showing GreenWay boundary, and site location (red)

Old Canterbury Road is a busy road which is currently difficult and dangerous for pedestrians and bikes to cross. There is no safe crossing at the north end of Weston Street. The nearest crossing point is a small traffic island at Windsor Road, approximately 90 m away.

However, as part of a separate process, a new set of traffic signals has been proposed for the Weston Street/Old Canterbury Road intersection. As part of the development of the Summer Hill Flour Mills at 2-32 Smith Street, Summer Hill, the RMS has required the developer to install traffic signals at the intersection of Old Canterbury Road and Edward/Weston Street. The installation of these signals will create a safe crossing over Old Canterbury Road, in line with the GreenWay route.

## ● OPTION 1

Option 1 involves tunneling under Old Canterbury Road, on the western side of the light rail corridor. This would provide a safe, grade-separated crossing under Old Canterbury Road.

Option 1 would also include a link between Weston Street and the tunnel, along a service road at Nos. 115-123 Old Canterbury Road. This service road provides access to five dwellings and could be converted to a shared zone.

## ● OPTION 2

Option 2 involves crossing Old Canterbury Road at the new signalised crossing, which will be designed to accommodate both pedestrians and bikes. It would then need a link from the Edward Street/Old Canterbury Road corner into the light rail corridor. There is space for a shared path in the road reserve; it would need to be designed to negotiate a steep embankment and minimise impact on existing trees.

## NON FEASIBLE OPTIONS

A link on the eastern side of the light rail corridor was ruled out due to a lack of space at Old Canterbury Road, and lack of connectivity across Longport Street to the north. A link on the western side of the light rail corridor is preferred.





- Option 1
- Option 2
- Options ruled out from further analysis
- ▶▶▶ Off road - elevated
- - - On road - shared
- ▶▶▶ Off road - at grade
- ||||| Tunnel

ASSESSMENT

	<b>OPTION 1 – TUNNEL UNDER OLD CANTERBURY RD</b>	<b>OPTION 2 – AT GRADE CROSSING OVER OLD CANTERBURY RD</b>
<b><i>Walkable and rideable by all</i></b>		
<b><i>Connected</i></b>		A signalised crossing interrupts the continuity of the Greenway
<b><i>Ecologically friendly</i></b>	Tunnel construction would impact on valuable vegetation adjacent to the road	
<b><i>An experience in urban nature</i></b>		Crossing Old Canterbury Rd detracts from the Greenway experience
<b><i>Place-friendly</i></b>	A tunnel can be experienced as unfriendly environment	
<b><i>Resident-friendly</i></b>	Residents of 115-123 Old Canterbury Rd would be affected by tunnel construction, GreenWay traffic	
<b>Indicative cost</b>	<b>\$ 3,110,000</b>	<b>\$ 336,000</b>
<b>Length</b>	<b>180 m</b>	<b>235 m</b>

COST ESTIMATE

Option 1: Tunnel under Old Canterbury Road

Item	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Tunnel under Old Canterbury Road			As per Central Links detailed design cost estimate – 95%	\$1,995,000		
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	180 m	\$180,000		
<b>TOTAL</b>				<b>\$2,175,000</b>	<b>\$2,392,500</b>	<b>\$3,110,000</b>

Option 2: Including at-grade crossing over Old Canterbury Road at signals

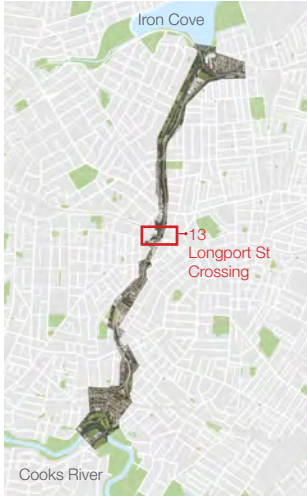
Item	Unit	Rate	Quantity	Total Cost	Inc 10% preliminaries	Inc 30% contingency
Signalised crossing over Old Canterbury Road			No cost – funded by developer	-		
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	235 m	\$235,000		
<b>TOTAL</b>				<b>\$235,000</b>	<b>\$258,500</b>	<b>\$336,000</b>

RECOMMENDATIONS

A grade-separated crossing is the preferred option to cross Old Canterbury Road, but the installation of the signalised crossing has an impact on the priority of grade separation at this location. If there is insufficient funding to install all of the preferred grade-separated crossings along the route with current funding, then those which lack a safe existing crossing should be prioritised.



# 13 Longport Street Crossing



ABOVE. Location map showing GreenWay boundary, and site location (red)

## ● OPTION 1 (INCLUDING 1A/1B)

Option 1 follows an alignment to the east of the building at #2 Malthouse Way, and stays on the eastern side of the Hawthorne Canal stormwater channel.

Between Malthouse Way and Longport Street, Option 1A would use the north-eastern part of Malthouse Way, which functions as the driveway of #2 Malthouse Way. While the western part of Malthouse Way has been designed and constructed as a shared zone, the north-eastern part has not. It is still a low traffic, low speed environment, with good sight lines.

Option 1B would use the light rail corridor alongside Malthouse Way. The light rail corridor is relatively flat in this section, and around 12-13 m wide for most of its length (9 m wide at its narrowest point). There is ample space for a 3.5 m shared path.

Beyond this point, Option 1 also includes:

- A tunnel under Longport Street
- A ramp down into Gadigal Reserve, under the whipple truss bridge and under the main western railway line

A critical issue with Option 1A is that it would require the approval of the landowner to use the north-eastern part of Malthouse Way. While there is a public access easement in place over Malthouse Way, minor works would need to be undertaken to change the signage and linemarking, to remove a section of the fence and make a connection between the road and the continuing shared path. These works would require landowner approval.

Other issues to consider are:

- Option 1B provides a fallback option if the GreenWay can't proceed along Malthouse Way, however it would limit other options for the use of this space
- The Option 1 tunnel alignment under Longport Street is much closer to the Longport Street light rail overbridge, compared to Option 2. A previous condition assessment of this structure (GHD 2012) identified cracking in the western abutment. Vibration associated with tunnel jacking could be an issue for the stability of this structure. Temporary support could be required to stabilise the overbridge during tunnel installation. This has been considered in the cost estimate, although the potential scope of remedial works is highly uncertain.

- Under the main western railway line, there is a tight spot, approximately 5m wide, between the rail bridge pier and the Hawthorne Canal stormwater channel. Structural design will need to accommodate these constraints. This has been considered in the cost estimate.

## ● OPTION 2

Option 2 follows an alignment west of the Hawthorne Canal stormwater channel, and includes:

- An existing shared zone around #2 Malthouse Way (the western portion of the driveway has been designed and constructed as a shared zone)
- An elevated path from the Malthouse Way/Smith Street junction to Longport Street
- A tunnel under Longport Street
- A ramp down into Gadigal Reserve, under the whipple truss bridge and under the main western railway line

A major issue with Option 2 is that it would require relocation of a major water main, at an estimated cost of over \$1 million. This is a 500 mm water main and it would need to be re-routed for approximately 135 m.

Other issues with Option 2 are:

- Between Malthouse Way and Longport Street, the elevated path would be constructed on a steep embankment. This would mean losing all of the existing vegetation on this embankment, including trees and well-established understorey vegetation with moderate habitat value.
- Constructability on the steep embankment and associated cost
- Privacy is a potential issue for residents at #2 Malthouse Way. The western side of the building is currently quite private, but west-facing balconies and windows would be visible from the GreenWay path. The loss of vegetation would also mean the western side of the building is more exposed to the road.
- On the northern side of Longport Street, the route passes in close proximity to the Eastern Bentwing Bat roosting site. It is proposed to time construction in summer when most of the bats are roosting elsewhere.



● **OPTION 3**

Option 3 involves an at-grade crossing over Longport Street, ideally also including signalisation of the Longport Street intersection. Option 3 includes:

- Using the existing shared zone along the western part of the driveway of #2 Malthouse Way, to Smith Street
- Widening the footpath along Smith Street to create a shared path
- Signalising the Longport Street intersection, to create a safe pedestrian and bike crossing
- Widening the footpath along Grosvenor Street to create a shared path
- Upgrading the existing shared path from Grosvenor Street into Gadigal Reserve. This would involve tree removal and retaining wall works, to widen the existing path.

A key consideration with Option 3 is the Longport Street crossing. The existing crossing is a pedestrian island over the light rail bridge, where there is reasonable visibility in either direction, but heavy traffic can make it difficult to cross the street, particularly at peak times. Signalisation of the Longport Street intersection would be required to improve the safety and amenity of the crossing. Traffic volumes are likely to meet the warrants for signalising the intersection, but traffic modelling may be required to assess the impacts on traffic flow in the vicinity and determine the best configuration for the signalised intersection.

Apart from this, the remainder of Option 3 is technically straightforward, but there are the following issues to consider:

- It is further to travel than Options 1 or 2
- It involves a larger climb up over Longport Street and down again, including some sections with grades >6%. There are also tight corners to negotiate going into Gadigal Reserve
- Longport Street is a busy road and this could feel like a short departure from the actual GreenWay
- Option 3 bypasses the area under the whipple truss bridge and main western railway line, which is a lost opportunity for placemaking

**NON-FEASIBLE OPTIONS**

An alignment on the eastern side of the light rail tracks was ruled out. While this alignment could work through Lewisham West, it is not workable north of Old Canterbury Road or north of Longport Street. It would be better to stay on the western side of the light rail.



- Option 1
- Option 2
- Option 3
- Options ruled out from further analysis
- ▶▶▶▶ Off road - elevated
- ▶▶▶▶ Off road - at grade
- - - - On road - shared
- ||||| Tunnel



## COST ESTIMATE

### Option 1A/1B: Eastern alignment

<b>1A: path from Malthouse Way to Longport Street (using driveway)</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Allowance for signage and pavement marking along the driveway	No	\$5,000	1	\$5,000		
Modify kerb and fence where path connects to driveway, incl. bollards or similar	No	\$15,000	1	\$15,000		
Remove existing trees	No	\$1,000	6	\$6,000		
Construct elevated cycleway	m	\$3,152	15	\$47,282		
Construct at-grade cycleway	m	\$151	9	\$1,359		
Allowance for lighting	m	\$590	24	\$14,160		
<b>TOTAL</b>				<b>\$88,801</b>	<b>\$97,681</b>	<b>\$127,000</b>

<b>1B: path from Malthouse Way to Longport Street (in rail corridor)</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Remove existing trees	No	\$1,000	6	\$6,000		
Construct at-grade cycleway	m	\$151	110	\$16,610		
Modify kerb and fence where path connects to driveway, incl. bollards or similar	No	\$15,000	1	\$15,000		
Allowance for lighting	m	\$590	110	\$64,900		
<b>TOTAL</b>				<b>\$102,510</b>	<b>\$112,761</b>	<b>\$147,000</b>

<b>Longport Street Tunnel</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Longport Street Box Culvert Jacking - Single 3m wide x 2.4m high culvert without canopy tube bores	No	\$1,904,807	1	1,904,807		
Temporary Support on North Side of Longport Street	No	\$21,020	1	\$21,020		
Concrete infill to precast culvert and existing brick retaining wall	No	\$2,380	1	\$2,380		
Builders work	No	\$175,875	1	\$175,875		
Retaining walls	m	\$675	12	\$8,100		
Allowance for lighting	m	\$590	27	\$15,930		
<b>TOTAL</b>				<b>\$2,128,112</b>	<b>\$2,340,923</b>	<b>\$3,043,000</b>

<b>Longport Street Northern Ramp</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Vegetation removal - lantana thicket and eight trees	No	\$1,000	12	\$12,000		
Truss bridge	m	\$3,389	14	\$47,450		
Elevated path	m	\$3,152	66	\$208,042		
Allowance for fewer larger piers and cantilevered support under MWR bridge	m	\$2,000	25	\$50,000		
Allowance for split path around significant tree	m	\$1,576	9	\$14,185		
Allowance for lighting	m	\$590	80	\$47,200		
<b>TOTAL</b>				<b>\$378,877</b>	<b>\$416,764</b>	<b>\$542,000</b>

<b>Sydney Water asset adjustments - Longport St area</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Concrete encase sewer	As per WSC estimate 27-06-19			\$10,000		
<b>TOTAL</b>				<b>\$10,000</b>	<b>\$11,000</b>	<b>\$14,000</b>

<b>TOTAL OPTION 1A</b>				<b>2,605,790</b>	<b>\$2,866,369</b>	<b>\$3,726,000</b>
<b>TOTAL OPTION 1B</b>				<b>\$2,619,499</b>	<b>\$2,881,449</b>	<b>\$3,746,000</b>



Option 2: Western alignment

<b>Path from Malthouse Way to Longport Street (elevated path)</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Remove existing trees	No	\$1,000	50	\$50,000		
Construct elevated cycleway	m	\$3,152	62	\$195,434		
Allowance for lighting	m	\$590	62	\$36,580		
<b>TOTAL</b>				<b>\$282,014</b>	<b>\$310,215</b>	<b>\$403,000</b>

<b>Longport Street Tunnel</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Longport Street Box Culvert Jacking - Single 3m wide x 2.4m high culvert without canopy tube bores	No	\$1,904,807	1	\$1,904,807		
Temporary Support on North Side of Longport Street	No	\$21,020	1	\$21,020		
Concrete infill to precast culvert and existing brick retaining wall	No	\$2,380	1	\$2,380		
Builders work	No	\$175,875	1	\$175,875		
Retaining walls	m	\$675	7	\$4,725		
Allowance for lighting	m	\$590	36	\$21,240		
<b>TOTAL</b>				<b>\$2,130,047</b>	<b>\$2,343,052</b>	<b>\$3,046,000</b>

<b>Longport Street Northern Ramp</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Truss bridge	m	\$3,389	14	\$47,450		
Elevated path	m	\$3,152	26	\$81,956		
Allowance for lighting	m	\$590	40	\$23,600		
<b>TOTAL</b>				<b>\$153,006</b>	<b>\$168,306</b>	<b>\$219,000</b>

<b>At-grade path through Gadigal Reserve - section from Longport ramp to junction with existing path</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Concrete path	sqm	\$151	175	\$26,425		
Balustrade along eastern path edge	m	\$90	50	\$4,500		
Allowance for lighting	m	\$590	50	\$29,500		
Provide temporary connection to bridge over Hawthorne Canal, matching design shared path levels	sqm	\$120	19	\$2,280		
<b>TOTAL</b>				<b>\$62,705</b>	<b>\$68,976</b>	<b>\$90,000</b>

<b>Sydney Water asset adjustments - Longport St area</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Water main realignment	As per WSC estimate 27-06-19			\$1,092,000		
Concrete encase sewers	As per WSC estimate 27-06-19			\$32,000		
<b>TOTAL</b>				<b>1,124,000</b>	<b>\$1,236,400</b>	<b>\$1,607,000</b>

<b>TOTAL OPTION 2</b>				<b>\$3,751,771</b>	<b>\$4,126,949</b>	<b>\$5,365,000</b>
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Option 3: Over Longport Street

<b>From Malthouse Way to Gadigal Reserve Channel Crossing</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Smith Street footpath works - as per current design	As per QS estimate	\$143,149		\$143,149		
Signalisation at Smith/Carlton/Grosvenor/Longport intersection	No	\$500,000	1	\$500,000		
Grosvenor Cres footpath works incl. widening, signage, linemarking	m	\$1,789	120	\$214,724		
Demolish existing asphalt path and retaining wall	sqm	\$150	170	\$25,500		
Allow for tree removal	No	\$1,000	3	\$3,000		
Path upgrade in Gadigal Reserve - from carpark to stormwater channel crossing	m	\$151	297.5	\$44,923		
Rebuild retaining wall (new alignment)	m	\$675	30	\$20,250		
Allowance for lighting	m	\$590	85	\$50,150		
<b>TOTAL</b>				<b>\$1,001,695</b>	<b>\$1,101,865</b>	<b>\$1,432,000</b>

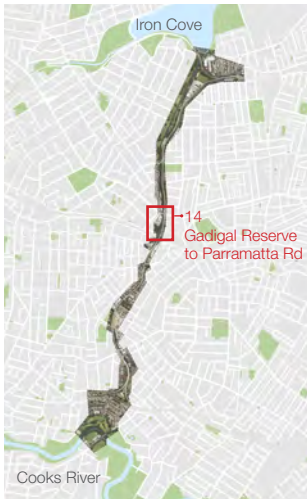
ASSESSMENT

	● <b>OPTION 1A – MALTHOUSE DRIVEWAY</b>	● <b>OPTION 1B – LIGHT RAIL CORRIDOR</b>	● <b>OPTION 2 – WESTERN ALIGNMENT</b>	● <b>OPTION 3 – OVER LONGPORT ST</b>
<b><i>Walkable and rideable by all</i></b>	Mixed traffic environment – shared zone with parking			Substantial climb over Longport Street
<b><i>Connected</i></b>				
<b><i>Ecologically friendly</i></b>	Vegetation removal either side of Longport tunnel	Vegetation removal either side of Longport tunnel	Vegetation removal south of Longport St; proximity to microbat roost	
<b><i>An experience in urban nature</i></b>				Deviation across a busy road
<b><i>Place-friendly</i></b>		Limits opportunities for other uses of rail corridor space		Misses opportunity at whipple truss bridge
<b><i>Resident-friendly</i></b>	Proximity to eastern side of #2 Malthouse Way (a more public frontage)		Visibility to western side of #2 Malthouse Way	
<b>Indicative cost</b>	<b>\$ 3,726,000</b>	<b>\$ 3,746,000</b>	<b>\$ 5,365,000</b>	<b>\$ 1,432,000</b>
<b>Length</b>	<b>219 m</b>	<b>217 m</b>	<b>264 m</b>	<b>305m</b>

RECOMMENDATION

Option 1A is the preferred option. Option 1B provides a fallback option if the GreenWay can't proceed along Malthouse Way, however it would limit other options for the use of this space.

# 14 Gadigal Reserve to Parramatta Road



ABOVE. Location map showing GreenWay boundary, and site location (red)

## ● OPTION 1

Option 1 follows an alignment to the east of the stormwater channel through Gadigal Reserve, and then an underpass under Parramatta Road. It would include:

- An at-grade path on eastern side of Gadigal Reserve, passing through the current dog-off-leash area. The path would need to cross two minor drainage lines and could be designed to avoid large trees.
- At the northern end of Gadigal Reserve, where the grade becomes steep, the path would need to be built either as a raised structure above the surface, or cut into the slope with retaining walls to support it.
- An approach would need to be designed to join in to the proposed underpass under Parramatta Road.

Option 1 passes through the dog-off-leash area, and would necessitate relocation of dog-off-leash facilities to a different location. However this idea has been raised separately anyway, as the current dog-off-leash area is in difficult to maintain, and the current location can feel isolated and unsafe.

A key technical issue with Option 1 is the stability of the slope at the northern end of Gadigal Reserve. This slope is part of the embankment that was constructed for the former goods line. Slope stability issues were identified when the light rail was constructed, but it appears that any stabilisation works undertaken at that time may have been focused on the light rail, and did not necessarily do anything to stabilise the lower part of the embankment. The design will need to consider this and construction in this environment will be challenging. This has been considered in the cost estimate for Option 1, although the potential scope of slope stabilisation works is highly uncertain.

Other issues with Option 1 are:

- Impacts on vegetation on the embankment at the northern end of Gadigal Reserve – while most of this vegetation is exotic, it is a patch of good quality habitat
- There is a tight spot between the Hawthorne Canal drainage channel and the light rail steps on the southern side of Parramatta Road (approx. 6.0 m)
- It would require relocation of a section of 500 mm water main which crosses the stormwater channel just south of Parramatta Road.

## ● OPTION 2

This option is defined by an alignment west of the Hawthorne Canal stormwater channel, and includes:

- An upgraded path through Gadigal Reserve, following the same alignment as the existing path, widened to 3.5 m
- An underpass under Parramatta Road

A major issue with Option 2 is that to widen the path within Gadigal Reserve, within a tight space on a steep embankment, the proposed design includes retaining walls running along the length of the path, so it becomes a substantial structure. Under the path, and between the path and the stormwater channel, there are two 500 mm water mains. One of these would need to be moved before building the retaining walls and path over it. This adds over \$1.6 million to the construction cost.

As per Option 1 there is also a shorter section of 500 mm water main which crosses the stormwater channel just south of Parramatta Road, which would also need to be relocated, to fit the proposed underpass under Parramatta Road.

One other notable issue with Option 2 is the impact on trees on the western side of Gadigal Reserve – the western side of the reserve is well vegetated along its whole length.

## ● OPTION 3

Option 3 would use an existing pedestrian overpass over Parramatta Road. This was built for the light rail, and during the light rail design process it was considered that the GreenWay may use this link. The existing pedestrian bridge is approximately 4 m wide.

Option 3 would also need to include ramps on either side of Parramatta Road, to connect with this overpass.

A key issue with Option 3 is the extent of these ramps. To achieve a 5% grade and allowing for landings, ramps would need to be approximately 190 m long on the southern side of Parramatta Road, and 230 m long on the northern side. Steeper ramps (e.g. 6% or 7% only provide a modest reduction in the length, and present accessibility issues due to the length over which this grade needs to be sustained.

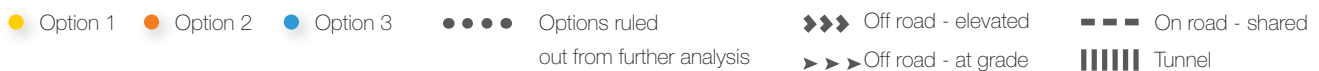


Other issues to consider with Option 3 are:

- Building on unstable slopes – as per Option 1
- Building over and in close proximity to light rail structures – this would need to be negotiated with the asset owners and operators and could add to the cost
- Impact on trees – particularly on the northern side of Parramatta Road, where the ramp would conflict with several large fig trees that give the GreenWay its character between Parramatta Road and Marion Street.

**NON-FEASIBLE OPTIONS**

A western alignment was ruled out for the underpass under Parramatta Road, as there is a major water main in the bridge abutment, which would make it difficult to support a structure on this side of the bridge.



## COST ESTIMATE

### Option 1: Eastern alignment

<b>Connection across stormwater channel, to link east and west Gadigal, and allow construction and maintenance access</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Concrete path	sqm	\$151	77	\$11,627		
Bridge (9 m span)	No	\$63,000	1	\$63,000		
Allowance for lighting	m	\$590	31	\$18,290		
<b>TOTAL</b>				<b>\$92,917</b>	<b>\$102,209</b>	<b>\$133,000</b>

<b>At-grade path through Gadigal Reserve - through dog-off-leash area</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Earthworks to create level path	cum	\$55	180	\$9,900		
Retaining walls at southern end	m	\$400	49	\$19,600		
Concrete path	sqm	\$151	420	\$63,420		
Include two small bridges over drainage lines	No	\$28,000	2	\$56,000		
Allowance for lighting	m	\$590	120	\$70,800		
<b>TOTAL</b>				<b>\$219,720</b>	<b>\$241,692</b>	<b>\$314,000</b>

<b>At-grade path through Gadigal Reserve - from dog-off-leash area to Parramatta Road</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Temporary slope stabilisation (for safe work environment)	No	\$300,000	1	\$300,000		
Remove existing trees	No	\$1,000	45	\$45,000		
Elevated path - simply supported	m	\$3,152	50	\$157,608		
Allow extra for piles to bedrock and for the design load to accommodate a piling rig	m	\$1,576	50	\$78,804		
Elevated path - cantilvered construction	m	\$10,500	45	\$472,500		
Allowance for lighting	m	\$590	95	\$56,050		
<b>TOTAL</b>				<b>\$1,109,962</b>	<b>\$1,220,958</b>	<b>\$1,587,000</b>

<b>Parramatta Road underpass</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Remove existing trees	No	\$1,000	21	\$21,000		
Truss bridge	m	\$3,389	110	\$372,819		
Elevated path	m	\$3,152	7	\$22,065		
Retaining wall	m	\$675	2	\$1,350		
Allowance for lighting	m	\$590	121	\$71,390		
<b>TOTAL</b>				<b>\$488,624</b>	<b>\$537,487</b>	<b>\$699,000</b>

<b>Sydney Water asset adjustments - Parramatta Road area</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Water main realignment	As per WSC estimate 27-06-19			\$328,000		
<b>TOTAL</b>				<b>\$328,000</b>	<b>\$360,800</b>	<b>\$469,000</b>

<b>TOTAL OPTION 1</b>				<b>2,239,223</b>	<b>\$2,463,145</b>	<b>\$3,202,000</b>
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Option 2: Western alignment

<b>At-grade path through Gadigal Reserve - from dog-off-leash area to Parramatta Road</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Demolition	As per QS estimate			\$61,711		
Remove existing trees	No	\$1,000	36	\$36,000		
Retaining walls under path	m	\$675	120	\$81,000		
Concrete path	sqm	\$151	686	\$103,586		
Balustrade along eastern path edge	m	\$550	196	\$107,800		
Allowance for lighting	m	\$590	196	\$115,640		
Locally reconstruct asphalt path	sqm	\$237	13	\$3,081		
Concrete driveway at Haig Ave	sqm	\$150	26	\$3,900		
Kerb and gutter at Haig Ave	m	\$130	12	\$1,560		
Stormwater drainage works at Haig Ave	As per QS estimate			\$18,300		
Retractable bollards at Haig Ave	No	\$950	4	\$3,800		
<b>TOTAL</b>				<b>\$536,378</b>	<b>\$590,016</b>	<b>\$767,000</b>
<b>Parramatta Road underpass</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Remove existing trees	No	\$1,000	21	\$21,000		
Truss bridge	m	\$3,389	110	\$372,819		
Elevated path	m	\$3,152	7	\$22,065		
Retaining wall	m	\$675	2	\$1,350		
Allowance for lighting	m	\$590	121	\$71,390		
<b>TOTAL</b>				<b>\$488,624</b>	<b>\$537,487</b>	<b>\$699,000</b>
<b>Sydney Water asset adjustments - Parramatta Road area</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Water main realignment	As per WSC estimate 27-06-19			\$1,948,000		
Concrete encase sewers	As per WSC estimate 27-06-19			\$20,000		
<b>TOTAL</b>				<b>\$1,968,000</b>	<b>\$2,164,800</b>	<b>\$2,814,000</b>
<b>TOTAL OPTION 2</b>				<b>\$2,993,002</b>	<b>\$3,292,303</b>	<b>\$4,280,000</b>

Option 3: Over Parramatta Road

<b>Connection across stormwater channel, to link east and west Gadigal, and allow construction and maintenance access</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Concrete path	sqm	\$151	77	\$11,627		
Bridge (9 m span)	No	\$63,000	1	\$63,000		
Allowance for lighting	m	\$590	31	\$18,290		
<b>TOTAL</b>				<b>\$92,917</b>	<b>\$102,209</b>	<b>\$133,000</b>
<b>From Gadigal Reserve across Parramatta Road</b>	Unit	Rate	Quantity	Base Cost	Inc 10% preliminaries	Inc 30% contingency
Earthworks to create level path	cum	\$55	39	\$2,145		
Retaining walls at southern end	m	\$400	49	\$19,600		
Concrete path	sqm	\$151	91	\$13,741		
Remove existing trees	No	\$1,000	75	\$75,000		
Temporary slope stabilisation (for safe work environment)	No	\$600,000	1	\$600,000		
Elevated path - simply supported	m	\$3,152	425	\$1,339,600		
Allow extra for piles to bedrock and for the design load to accommodate a piling rig	m	\$1,576	425	\$669,800		
Allowance for modifications at existing pedestrian bridge (signage, linemarking, remove balustrade at either end and tie in)	No	\$30,000	1	\$30,000		
Allowance for modifications to northern stairs (relocate light poles)	No	\$20,000	1	\$20,000		
Allowance for lighting	m	\$590	451	\$266,090		
<b>TOTAL</b>				<b>\$3,035,976</b>	<b>\$3,339,574</b>	<b>\$4,341,000</b>
<b>TOTAL OPTION 3</b>				<b>\$3,128,893</b>	<b>\$3,441,782</b>	<b>\$4,474,000</b>



ASSESSMENT

	<b>● OPTION 1 – EASTERN ALIGNMENT</b>	<b>● OPTION 2 – WESTERN ALIGNMENT</b>	<b>● OPTION 3 – OVER PARRAMATTA RD</b>
<b><i>Walkable and rideable by all</i></b>	Short steep sections either side of Parramatta Road	Short steep sections either side of Parramatta Road	Major climb over Parramatta Road
<b><i>Connected</i></b>			Disconnected from Gadigal Reserve
<b><i>Ecologically friendly</i></b>	Impact on vegetation south of Parramatta Road		Impact on trees both sides of Parramatta Road, including iconic fig trees
<b><i>An experience in urban nature</i></b>			Elevated ramps will be more exposed and separate from nature
<b><i>Place-friendly</i></b>	Impact on dog-off-leash area		Impact on dog-off-leash area plus avenue of figs
<b><i>Resident-friendly</i></b>			
<b>Indicative cost</b>	<b>\$ 3,202,000</b>	<b>\$ 4,280,000</b>	<b>\$ 4,474,000</b>
<b>Length</b>	<b>337 m</b>	<b>317 m</b>	<b>496 m</b>

RECOMMENDATION

Option 1 is the preferred option. Further investigation of the slope stability issue and testing of design options is recommended.

## Section D: Parramatta Road to Iron Cove

This section of the GreenWay features existing shared paths:

- A recently upgraded path between Parramatta Road and Marion Street, which is well used
- A path through Richard Murden Reserve between Marion Street and Iron Cove, which is narrow and winding, but could be upgraded

The key road crossing to consider is Marion Street, which has an existing signalised crossing.

Between Parramatta Road and Marion Street, the route is established by the existing path and there are few options to change it; however between Marion Street and Iron Cove, there are multiple options through the park itself as well as along the roads on either side. Therefore this area needs more detailed consideration.

Important regional connections are:

- To the existing Bay Run shared path around Iron Cove
- To the proposed Lilyfield Road cycleway towards the city
- To a potential future “City West Link” path following the route of the light rail towards the Bays Precinct and the city

Key considerations for the Master Plan in this section include:

- An existing shared path through Cadigal Reserve

This section has been broken down into the following elements:

13. Parramatta Road to Marion Street
14. Marion Street crossing
15. Marion Street to Iron Cove



- - - - - Connection to existing shared path
- - - - - GreenWay shared path
- - - - - Future shared path by others

# 15 Parramatta Road to Marion Street



ABOVE. Location map showing GreenWay boundary, and site location (red)

## ● OPTION 1

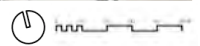
The path was upgraded recently and working well - not only are alternative options not required, they are fairly limited. The path has to fit between the canal to the west and the light rail on the east.

On the eastern side, a secondary pedestrian link is recommended at least between Hathern Street and Lords Road, potentially extending all the way to Marion Street. This will improve access to green space for residents in the area between the GreenWay and Tebbutt Street





● Option 1 - retained existing    ▶▶▶ Off road - at grade





# 16 Marion Street crossing



ABOVE. Location map showing GreenWay boundary, and site location (red)

● **OPTION 1**

This option involves improving the at-grade crossing to provide a more direct line, more space and priority for both cyclists and pedestrians, and to reduce the temptation to short-cut across the street. Options to re-configure the signals are presented in the Traffic Assessment Report.

● **OPTION 2**

This option utilises the existing signalised crossing without modification. The existing signal-controlled at-grade crossing is safe but impractical. Cyclists are currently asked to dismount; should a cyclist remain on their bicycle; the signal button is awkward to reach from a bike. The wait time is long, and many people short-cut across the street when there are gaps in traffic.

**NON-FEASIBLE OPTIONS**

An underpass was considered beneath Marion Street but ruled out for the following reasons:

- To cross under Marion Street, the path would need to be at such a low level that it would frequently flood and would be difficult to drain
- In order to link up with the existing and proposed route through Richard Murden Reserve to the north, the path would also need to cross over Hawthorne Canal, which is likely to cause flood impacts
- This would require purchase of a property at 2A Marion Street, which is currently a Scout Hall. The property purchase and provision of an alternative facility for the Scout Hall would both contribute to a significant cost for this option

An overpass was also considered over Marion Street. While an overpass at the location is technically feasible, it was ruled out for the following reasons:

- It would require a large structure including minimum 90m long ramps on both approaches and long spans to bridge the Hawthorne Canal and Marion Street
- This structure would need to be integrated into a complex, constrained environment and would impact on the large fig trees south of Marion Street and impose on the amenity of the southern end of Richard Murden Reserve.
- The long ramps would be undesirable from an accessibility perspective.
- It would be a very expensive option, in the order of \$3 to 5 million.

## COST ESTIMATE

### Option 1: Relocated signalised crossing

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Signalised road crossing inc. signals, civils and lighting	each	\$250,000	1	\$250,000		
<b>TOTAL OPTION 1</b>				<b>\$250,000</b>	<b>\$275,000</b>	<b>\$358,000</b>

### Option 2: Utilise existing crossing

No costs.

## RECOMMENDATIONS

Option 1 is preferred, subject to RMS approval.



- Option 1
- Option 2
- Option 3
- - - On road - shared
- >>> Off road - elevated
- ||||| Tunnel
- On road - separated
- >>> Off road - at grade



# 17 Marion Street to Iron Cove



ABOVE. Location map showing GreenWay boundary, and site location (red)

● **OPTION 1**

This option upgrades the existing path to 3.5m wide and making it smoother, generally following the same alignment with minor changes such as those required to minimise playground conflicts. Existing bends will be retained to minimise speeds.

There would be impacts on parking, but much of the parking along Darley Road is already taken up by trailers, boats and mobile advertising.

This option makes more sense in the future if the City West cycle link goes ahead.

● **OPTION 2**

Option 2 is a more direct cycle link using a modified Canal Road. Canal Road is in need of redesign, presenting an opportunity to accommodate cars, bikes, pedestrians, and dog-walkers. Access to Canal Road Film Centre will need to be retained.

There would also be the option to construct a link through the council depot site, connecting to Marion St, if this site's use changes in the future.

There may also be options to link into Blackmore Oval.

This option allows the northern end of Richard Murden Reserve to remain quieter.

While Option 2 has been aligned to avoid impacts on the most active part of the dog off-leash area, which is why the proposed bridge is located where it is, there are already four bridges over Hawthorne Canal downstream of Marion Street (five including the City West Link Road), and this would add another crossing.

● **OPTION 3**

Option 3 maintains Hawthorne Parade as a commuter route, with improvements to safety particularly at the roundabouts and slow points. Recommendations are included in the Traffic Assessment Report.

This option does not readily provide a route to the eastern side: city-bound riders could cross Hawthorne Canal at the Lilyfield Road bridge and continue up Lilyfield Road.

● **OPTION 4A & 4B**

These are future options to connect with the City West cycle link. An existing tunnel under the light rail. The route runs along a quiet section of Darley Road south of the light rail station, then onto a separated cycleway along Darley Road north of Allen St. It would connect to the southern section of Richard Murden Reserve via an upgraded bridge crossing over Hawthorne Canal.







## COST ESTIMATE

### Option 1: Upgrade existing path through Richard Murden Reserve

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Upgrade path through Richard Murden Reserve, with some changes to alignment						
Cycleway off road 3.5m on-grade inc. lighting	m	\$700	1500	\$1,050,000		
Utilise existing bridge over Hawthorne Canal	each	\$-	1	\$-		
Utilise existing underpass under City West Link Road	each	\$-	1	\$-		
<b>TOTAL</b>				<b>\$1,050,000</b>	<b>\$1,155,000</b>	<b>\$1,502,000</b>
Canal Road bike friendly upgrade	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway on-road mixed traffic	m	\$534	227	\$121,218		
<b>TOTAL</b>				<b>\$121,218</b>	<b>\$133,340</b>	<b>\$174,000</b>
<b>TOTAL OPTION 1</b>				<b>1,171,218</b>	<b>\$1,288,340</b>	<b>\$1,675,000</b>

### Option 2: Alternative link via new waterway crossing and Canal Road

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway off road 3.5m on-grade inc. lighting	m	\$1,000	65	\$65,000		
New bridge over Hawthorne Canal	each	\$500,000	1	\$500,000		
Cycleway on-road mixed traffic	m	\$534	470	\$250,980		
<b>TOTAL OPTION 2</b>				<b>\$815,980</b>	<b>\$897,578</b>	<b>\$1,167,000</b>

### Option 3: Hawthorne Parade cycle friendly upgrade

	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway marking	m	\$100	1411	\$141,100		
Modify each intersection	each	\$100,000	5	\$500,000		
<b>TOTAL OPTION 3</b>				<b>\$641,100</b>	<b>\$705,210</b>	<b>\$917,000</b>



Option 4: City West Cycle link connections

Link from Richard Murden Reserve to Darley Road	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Replace existing bridge over Hawthorne Canal	m	\$50,000	1	\$50,000		
Utilise existing underpass	each	\$-	1	\$-		
On road cycle route between Foster St and Loftus St (redo linemarking) - along Darley Rd south of Allen St.	m	\$50	130	\$6,500		
<b>TOTAL</b>				<b>\$56,500</b>	<b>\$62,150</b>	<b>\$81,000</b>
Link along Darley Road	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Cycleway on-road bidirectional inc. intersection treatments	m	\$3,000	800	\$2,400,000		
<b>TOTAL</b>				<b>\$2,400,000</b>	<b>\$2,640,000</b>	<b>\$3,432,000</b>
Link through Blackmore Oval	Unit	Rate	Quantity	Base cost	Inc 10% preliminaries	Inc 30% contingency
Upgrade existing cycleway		\$175,000	1	\$175,000		
<b>TOTAL</b>				<b>\$175,000</b>	<b>\$192,500</b>	<b>\$251,000</b>
<b>TOTAL OPTION 4A</b>				<b>2,456,500</b>	<b>\$2,702,150</b>	<b>\$3,513,000</b>
<b>TOTAL OPTION 4B</b>				<b>\$175,000</b>	<b>\$192,500</b>	<b>\$251,000</b>

ASSESSMENT

	● OPTION 1	● OPTION 2	● OPTION 3	● OPTION 4A
<b>Walkable and rideable by all</b>			On-road route will only suit confident riders	
<b>Connected</b>				
<b>Ecologically friendly</b>				
<b>An experience in urban nature</b>			On-road	On-road but has bush on one edge
<b>Place-friendly</b>	Lots of bike traffic through the park might be problematic	Canal Rd congested with cars, walkers, dogs, studio access		
<b>Resident-friendly</b>				
<b>Indicative cost</b>	\$ 1,675,000	\$ 1,167,000	\$ 917,000	\$3,513,000
<b>Length</b>	1725 m	535 m	1415 m	1335 m

RECOMMENDATIONS

Option 1 is the preferred option. The meandering path through Richard Murden Reserve should be kept, but does need to be upgraded to make it wider and route adjusted at certain sections.

Hawthorne Parade and Darley Road are more suited as “commuter” routes for faster paced cyclists, best kept out of the park.

Option 2 is not recommended.

# SUMMARY

The following sections present recommendations on the preferred GreenWay route in each of the four sections presented in this document, divided into high and additional recommendations.

## A. Cooks River to Hercules

**Preferred options:**

- A. Underpass under Wardell Road
- B. Link along river foreshore from Wardell Road towards Lang Road
- C. New bridge alignment between Lang Road and Wardell Road
- D. Path through the western corner of the current golf course – the golf course boundary would be adjusted and the westernmost holes rearranged, so that it would be contained to the eastern side of the GreenWay. The western side would become an expanded park
- E. Ness Avenue on-road route to Ewart St roundabout
- F. Traffic management at Riverside Crescent to prevent vehicle left turns in ('rat runs') from Wardell Road
- G. Signalisation at Ewart Street crossing (existing roundabout)
- H. Connection into light rail corridor via Hercules Street
- I. Path through western side of light rail corridor

**Additional recommendations:**

- J. An alternative route via the edge of the golf course and through a private property (to be purchased) to link with Tennyson Street – lower priority – future funding
- K. An alternative route via Garnet Street and The Parade, utilising old rail bridge over Terrace Road, more suitable to commuters and faster paced cyclists – lower priority
- L. A potential link across the light rail to Blackwood Avenue

### Total cost of preferred items

No	Description	Cost estimate
A	Underpass under Wardell Rd	\$1,122,000
B	Link along river foreshore from Wardell Rd towards Lang Rd	\$1,160,000
C	New bridge alignment between Lang Rd and Wardell Rd	\$1,359,000
D	Path through the western corner of the current golf course (as per option 1B)	\$229,000
E	Ness Avenue on-road route to Ewart St roundabout	\$607,000
F	Traffic management at Riverside Crescent to prevent turn in from Wardell Rd	\$101,000
G	Signalisation of Ewart Street crossing (existing roundabout)	\$358,000
H	Connection into light rail corridor via Hercules St	\$301,000
I	Path through western side of light rail corridor (includes undergrounding HV)	\$1,573,000
		<b>\$6,810,000</b>



----- alternative walking route

### Additional recommendations

No	Description	Cost estimate
J	Alternative route via the edge of the golf course (option 4A (through property rather than playground))	\$2,942,000
K	Alternative route via Garnet St and The Parade, then along disused fork	\$390,000
L	Potential link across the light rail to Blackwood Ave	\$429,000
		<b>\$3,761,000</b>

## B. Hercules to Old Canterbury Road

In this section, options have been investigated on either side of the light rail corridor. The preferred option involves a western alignment all the way through this section, which keeps the options open at each road crossing, to utilise at-grade crossings in the short-term, and upgrade to grade-separated crossings when funding becomes available. Note that when any link shifts to the eastern side, it locks in two at-grade crossings for the long term. A western alignment avoids this limitation.

**Preferred options:**

- A. A tunnel at Hercules Street. The existing at-grade pedestrian crossing on the western side of the light rail corridor at Hercules Street is currently awkward to access. However if Nos 43 and 45 Hercules Street are converted to a park (as has been suggested previously), then access to the existing crossing could be improved.
- B. Hercules Street to New Canterbury Road link (western alignment) and an underpass under New Canterbury Road, which would be significantly cheaper than tunnels at other roads, as there is an existing void under the road over the light rail embankments. At New Canterbury Road, the existing signals on the eastern side of the light rail corridor are awkward to access for GreenWay traffic on the western side of the rail corridor.
- C. New Canterbury Road to Constitution Road link elevated through light rail corridor
- D. A tunnel at Constitution Road, where currently the only feasible option to cross the road is at the existing roundabout, which is awkward and potentially unsafe.
- E. Constitution Road to Davis Street link. A western alignment between Constitution Road and Davis Street, although impacting on existing Bushcare sites, is otherwise preferred because of its connectivity, better GreenWay experience and minimal impacts on local places, traversing Johnson Park (on the western side) rather than Hoskins Park (on the eastern side).
- F. A tunnel at Davis Street - to connect the Weston Street cul-de-sac with an easement at the Waratah Mills property. Otherwise, crossing Davis Street at grade would be steep, awkward, and potentially unsafe.
- G. Davis Street to Old Canterbury Road link on road along Weston St.

**Additional recommendations:**

- H. Pedestrian link between Arlington light rail station and Hoskins Park, on the eastern side of the light rail
- I. Potential link across the light rail line between Johnson Park and Hoskins Park



----- alternative walking route

### Total cost of preferred items

No	Description	Cost estimate
A	Tunnel at Hercules St	\$2,096,000
B	Hercules St to New Canterbury Rd link	\$904,000
C	New Canterbury Rd to Constitution Rd link (includes undergrounding HV)	\$2,421,000
D	Tunnel at Constitution Rd	\$1,892,000
E	Constitution Rd to Davis St link (option 1B)	\$1,329,000
F	Tunnel at Davis St	\$2,479,000
G	Davis St to Old Canterbury Rd link (Weston Street)	\$735,000
		<b>\$11,856,000</b>

### Total cost of additional items

No	Description	Cost estimate
H	Pedestrian link between Hill Street and Hoskins Park, on the eastern side of the light rail (Arlington Light Rail to Hill St links will be built as part of proposed development)	\$43,000
I	Potential link across the light rail line between Johnson Park and Hoskins Park (aligned with Terry Rd and Hill St)	\$429,000
		<b>\$472,000</b>



### C. Old Canterbury Road to Parramatta Road

In this section, options have been investigated passing either under or over both Longport Street and Parramatta Road, and for the tunnel/underpass options, alignments on either side of the Hawthorne Canal stormwater channel.

The preferred option is an alignment east of the stormwater channel (and west of the light rail), including a tunnel under Longport Street and underpass under Parramatta Road.

This alignment avoids most of the major water main relocation costs associated with the alignment west of the stormwater channel.

The preferred options in each part of this route are:

**Preferred options:**

- A: a tunnel under Old Canterbury Road
- B: a shared path on the western side of the light rail corridor from Old Canterbury Road to Lewisham West
- C: a shared zone along the north-eastern portion of the private road known as Malthouse Way (subject to landowner approval).
- D: a tunnel under Longport Street and ramp down into Gadigal Reserve. An alignment east of the stormwater channel would not require any major service relocation works, making it significantly cheaper than an alignment west of the stormwater channel.
- E: a new connection across the stormwater channel in Gadigal Reserve
- F: an at-grade path through the current dog-off-leash area within Gadigal Reserve. This would require relocation of the dog-off-leash facility.
- G: a path built along the steep embankment at the northern end of Gadigal Reserve – either as an elevated structure over the embankment (supported on piers) or cut into the embankment and supported with retaining walls.
- H: an underpass under Parramatta Road on the eastern side

**Additional recommendations:**

- I: a link between Malthouse Way and Longport Street, which will link the GreenWay with Regional Route 7.
- J: Maintain or improve existing pedestrian link between Longport Street and Lewisham West light rail station on the eastern side of the light rail corridor
- K: Grosvenor Crescent access (maintain existing)



----- alternative walking route

#### Total cost of items currently being implemented

No	Description	Cost estimate
A	Tunnel under Old Canterbury Road	\$2,853,000
B	Shared path in light rail corridor	\$257,000
C	Shared zone along Malthouse Way	\$127,000
D	Tunnel under Longport Street and ramp down into Gadigal Reserve	\$3,599,000
E	New connection across stormwater channel	\$133,000
F	At-grade path through dog-off-leash area	\$314,000
G	Path across steep embankment, north end of Gadigal Reserve	\$1,587,000
H	Parramatta Road underpass	\$1,168,000
<b>TOTAL</b>		<b>\$10,038,000</b>

#### Total cost of additional items

No	Description	Cost estimate
I	Link between Malthouse Way and Longport Street - connection to Regional Route 7	\$205,000
<b>TOTAL</b>		<b>\$205,000</b>



### D. Parramatta Road to Iron Cove

Between Parramatta Road and Marion Street, there is an existing path which has recently been upgraded and remains the preferred route for the GreenWay. The prioritised route below refer to the section north of Marion Street.

- Preferred options:
  - A. Re-align Marion Street signalised crossing as per Option 3
  - B. Quiet, meandering path through Richard Murden Reserve (yellow) (similar to existing path alignment, but upgraded to improve surface and increase width)
  - C. "Commuter" route (blue) along Hawthorne Parade (upgraded to improve safety)
- Additional recommendations:
  - D. "Commuter" route (green) along Darley Road (also upgraded, potentially as a separated cycleway)

#### Total cost of preferred items

No	Description	Cost estimate
A	Upgraded path through Richard Murden Reserve (including Canal Rd link)	\$1,675,000
B	Hawthorne Pde safety upgrade	\$917,000
C	Re-align Marion St crossing	\$358,000
		\$2,950,000

#### Additional recommendations

Items	Description	Total
D	Darley Road separated cycleway and Blackmore Oval links	\$3,764,000



### GreenWay: Overall summary

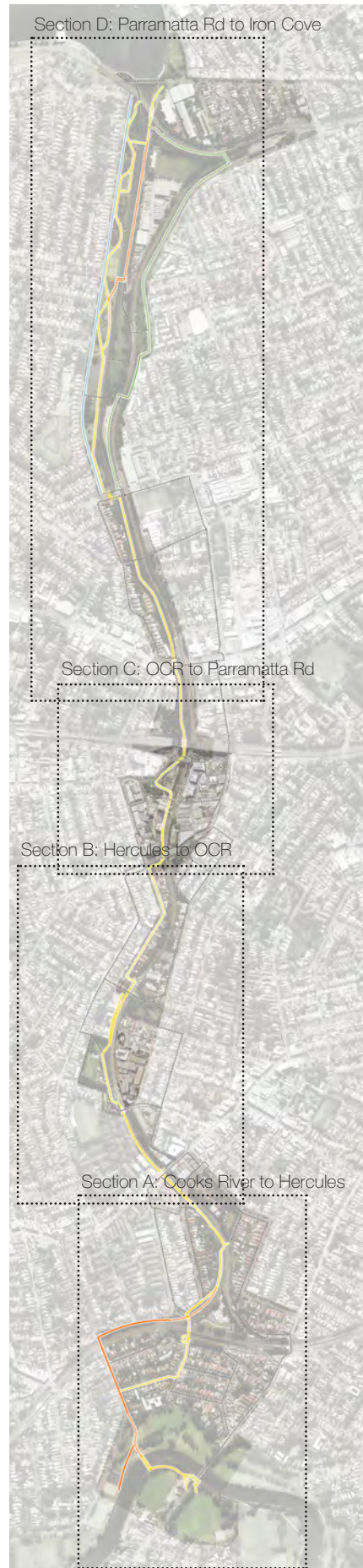
The below costs provide for the minimum needed to establish the GreenWay and implement transport elements. Embellishment of the GreenWay and adjacent open spaces, as well as additional measures such as pavement changes, in-road planting and road closures to create a distinct GreenWay identity have not been included in the costs.

#### Total cost of preferred items

Sections	Description	Total
A	Cooks River to Hercules	\$6,810,000
B	Hercules to Old Canterbury Rd	\$11,856,000
C	Old Canterbury Rd to Parramatta Rd	\$10,038,000
D	Parramatta Rd to Iron Cove	\$2,950,000
		<b>\$31,654,000</b>

#### Total cost of additional items

Sections	Description	Total
A	Cooks River to Hercules	\$3,761,000
B	Hercules to Old Canterbury Rd	\$472,000
C	Old Canterbury Rd to Parramatta Rd	\$205,000
D	Parramatta Rd to Iron Cove	\$3,764,000
E	Link between Malthouse Way and Longport Street - connection to Regional Route 7	\$205,000
		<b>\$8,407,000</b>





### Note re path types and cost estimates

The cost estimates in this report are based on the following typical path types along the main GreenWay route:

- Off-road 3.5 m concrete path including lighting
- On-road mixed traffic
- On-road bidirectional separated cycleway
- Off-road 3.5 m elevated <1m FRP deck inc. lighting
- Off-road 3.5 m elevated >1m FRP deck inc. lighting



Off-road concrete path (Prince Alfred Park - note that this path is 5 m wide)



Off-road - elevated >1m (Parramatta River cycleway)



On-road mixed traffic (Bunda Street, ACT)



Off-road - elevated <1m (Narrabeen lagoon)



On-road bidirectional separated cycleway (typical City of Sydney separated cycleway)



