Our network priorities

Under a 'four Cs' approach, bicycle routes need to be Comfortable, Connected, Continuous, and Consistent. However, to create cycling networks from individual routes, additional, strategic considerations are required. BISA has adopted the following.

1. Connect catchments to destinations – the ACC area continues to be metro Adelaide's main destination due to the concentration of employment, services, entertainment and retail. However, even locally, the better that routes connect supply (residential catchments) and demand (destinations), the more they will be used and the more that goals around cycling will be achieved.

2. Separated facilities – from both traffic and pedestrians. To attract the most cyclists, cycle routes need to be separated (or mostly separated) from traffic. Off-road paths designated for shared use create their own issues with pedestrians, particularly when volumes of walkers and/or cyclists are high, tidal and/or concurrent; being a second-best result in these conditions.

3. An "8-80" network – this will be achieved in the first instance with a coarser grid of separated routes that can be accessed by low-stress connections, low speed limits (40km/h to 30km/h) in residential streets helping to establish the appropriate local cycling environment, and safe crossings of major roads.

4. Practical wayfinding – several wayfinding signage initiatives have been commissioned, installed, won awards, and failed to help users to find their way easily and intuitively. BISA favours a system based on Dutch best practice (explained later). Councils and DIT also need to commit to ongoing maintenance.

5. Lighting for safety – with lighting being expensive to install, many routes remain dangerously dark. Issues of backlighting and hazard delineation are also rarely considered as part of lighting. Where lighting is not provided on a local route for cost reasons, we advocate for solar-powered LED cateyes. These provide cheap path delineation and enable other users to be perceived, but have low installation and maintenance costs. Solar access to charge such lights is a consideration, but this does not have to be full sunlight all day.

6. Tourism for all – apart from their economic tourism value, longer-distance tourist routes provide for many local trips. Tourist routes can also help in promoting positive attitudes towards cyclists, and form part of a local 'cyclist lifestyle' package that helps challenge car dependency.

Regarding separated facilities, we generally oppose two-way travel being provided on one side of the carriageway. European research has found negative safety outcomes with this design philosophy, as drivers do not adequately yield to cyclists coming from a path on the passenger side (being the opposite direction to vehicular traffic flow for a yielding driver). Nonetheless, this may be appropriate (and supportable) if the facility has no cross-overs or junctions; and/or provides direct linkage to a two-way shared path.

Wayfinding

Wayfinding is a high priority due to the lack of navigational aids, lack of differentiation between decision points and plethora of path choices. After many years in developing and installing wayfinding systems, Dutch authorities now sign three levels of routes/networks:

- Long-distance routes
- Local routes
- Bicycle node network.

The node network system has excellent applicability to longer distance 'spines' such as the River Torrens Linear Path. Instead of signage based on name or branding, this approach numbers junctions (decision points) along a route as 'nodes', with neighbouring nodes indicated by an arrow pointing the direction and number of the neighbour. Some node locations also provide overview maps as an aid to navigation – these could also be available on-line. Once a route is decided upon, a simple list of node numbers can be used for navigation.

The advantages of this system are:

- The node numbers are easy to read and follow at speed. Having highlighted numbers on the main route provides immediately intuitive guidance, as an approach of simply following the highlighted numbers will keep you on the main route. For other routes, a list of numbers (as

shown above) or simple directions ("Stay on the main path, turn right at 60") provide robust and easily remembered navigational cues.

- Painting node numbers is cheap, easy, simple and fast to roll out. The system could be upgraded to signs on posts, again relatively simply and cheaply. Glow-in-the-dark materials, or a solar LED cateye/bollard/etc installed nearby, would make signage readable at night at little additional cost – helped by the very little information required to use the system.
- New nodes can be easily added to the system, supporting incremental roll-out and network growth. As the node signs hold very little information, they are small and inexpensive to produce, install and replace as nodes are added.
- Directions to nodes from adjoining streets would highlight the presence of the facility.
- Council branding is limited to maps and map-based signs, hence doesn't confuse or compromise the navigational value. The utility of the system isn't based on whether someone else has identified a particular destination as being worthy of directional signage.
- Path users can design their own routes and easily follow these. To develop a fun-run circuit or other route using the facility, bodies such as councils, local businesses, schools, clubs, etc don't have to name, brand and separately sign these, but simply produce brochures showing node numbers. Nor do overlapping routes require overlapping signage as all are based on the same node numbers.

Local routes signage should be used as an overlay to indicate nearby services, e.g. shops, bike stores, Council offices. This should be a given set of destinations, as per other wayfinding guidance.

Chief Street

Chief Street has strategic potential as an "8-80" route connecting the Gawler Greenway to the Outer Harbor Greenway (rather than detouring through the Park Lands) and functioning as a collector for the local residential catchment. Given future predicted traffic volumes between Hawker Street and Port Road of some 9,000vpd, a separated facility should be provided between Hawker Street and the Outer Harbor Greenway, with a low-stress profile north-east of Hawker Street.

To the south-west, there is considerable potential to link to Hindmarsh Stadium (a major destination); and through Hindmarsh to the River Torrens Linear Path, albeit that the obvious direct route for the latter via Hindmarsh Place and Chapel Street would require the agreement with Stadium authorities.

In terms of the form of treatment, BISA supports a separated facility between the Outer Harbor Greenway (a major separated facility providing longer distance travel) and Hawker Street. A generalised template for this comprises:

- 20.1m boundary to boundary width
- Footpath – 1.5m (min.) footpath on both sides of the street; desirably 1.8m.
- Tree/verge zone – 1.5m (nom.) for established tree plantings, noting that the majority of tree trunks are located within 1.0m of the existing footpath kerb, which could potentially support reduction of this width by 0.3m if required. A 1.0m minimum width is desirable to support new tree/ verge plantings and provide width for kerb ramps to be installed outside of the footpath width, for pedestrian use. However, a proposed width could also support footpath widening with a minor narrowing at kerb ramp locations.
  For a non-trafficable area (footpath, bike path), the sub-soil does not have to have the same structural characteristics as for a trafficked area and trees could have acceptable health with roots extending beneath the paved surface, as long as adequate air supply and infiltration is supported e.g. using TreeNet inlets. There are also commercial products that can provide for tree root growth while providing structural support for a trafficked surface.
- One-way bike facility on either side of the street, with flush separator to the car parking/traffic side – nom. 1.8m to facilitate overtaking; 1.5m desirable where overtaking is not facilitated; 1.2m (min).
  In all cases, clearance to vertical/upright hazards (e.g. tree trunks, separator posts) is needed. While the desirable clearance to such hazards suggested by Austroads Guidelines is 1.0m, experience on paths around Adelaide is that lower clearances do not pose a major hazard on straight stretches with good visibility and no oncoming bike traffic – as would be the case in Chief Street. We suggest that a 0.5m clearance to tree trunks would be acceptable. This implies maintaining the existing 1.5m tree planting pits where these exist, however the bike facility width requires clearance to upright kerbs of around 0.3m and cutting back the kerb at these locations would enable the kerb clearance to overlap with the vertical hazard clearance. Physical separators used adjacent to bike facilities are flexible, very visible and extend to a lower height, hence clearances to these can be lower. 0.3m is a desirable minimum. Clearances to other types of vertical elements will depend on the characteristics of these elements.
- Flush buffer – 1.0m (min) to accommodate trees/landscaping (if desired and appropriate), placement of bins outside other zones, and clearance to car doors. At tree planting locations, where the bike facility location may need to vary, this can be reduced if parked cars are

physically restricted from locating such that doors can open into the bike facility, or if parking is prohibited using a physical treatment such as landscaping.

- Parallel parking – 2.1m.
- Travel lane – Assuming that this Chief Street is not a bus route, 2.9m adjacent to flush median/parking, 3.0m if it is; 3.1m adjacent to raised median (pedestrian refuge).
- Central median – 1.2m flush with contrasting surface to facilitate pedestrian crossing and car crossing to driveways, 1.8m (min) to support a pedestrian refuge. As little as 0.3m would assist in maintaining a generally consistent streetscape.

Between Hawker Street and Port Road, the nature of Chief Street changes to a more residential character for which a cyclist-friendly road calming treatment would be appropriate. Between Port Road and the Outer Harbor Greenway, a separated facility would be desirable.

Port Road to the Outer Harbor Greenway

Eastern side

A shared use path could be provided on the eastern side of Chief Street as a separated facility, linking to the pedestrian crosswalk of Port Road. This would ideally provide one-way cyclist/two-way pedestrian access. This would not necessarily need to be signed with only one-way cyclist travel, which might be overly restrictive for cyclists using the Port Road footpath in lieu of a separated facility, and usage could be monitored to alter this if required.

- The splay for the single driveway on this side is excessive. Large splays accommodate and hence encourage fast turning speeds. It is recommended that this be narrowed, to suit a passenger car as the design vehicle. Access for larger vehicles could still be facilitated by provided rollover kerb, with the larger vehicle being a ‘check’ vehicle.
- The driveway is constructed in white concrete. Under the Australian Road Rules, footpaths are road related areas where drivers must yield to footpath users, however this is not the impression created when a footpath is visually bisected by a driveway. It is recommended that the driveway be reconstructed in footpath materials.
- The street trees planted create squeeze points but are desirable for amenity reasons. They should be pruned as required and consideration could be given to use of a permeable pavement material in the planting pits, to maintain a level surface (pits are vulnerable to erosion).
- As a short-term option, the driveway could be treated to visually match the footpath or as part of a street art treatment that would also highlight the area as a conflict area (e.g. using StreetPrint). A larger street art treatment might also emphasise the area as being for slow access use rather than fast commuter travel, with particular regard to squeeze points.

Western side

The use of the footpath would be more problematic on this side, given footpath width, local grades and a number of driveways. Arguably, on-street parking on this side is not required to support local land uses, given the availability of off-street parking, the nature of development in this section of Chief Street and the presence of off-street parking on the eastern side of Chief Street (where it is also not required to support the local land use). Removal of on-street parking on the western side (nom. 2.3m wide) would facilitate provision of a one-way bicycle facility on this side (nom. 1.8m wide + separator).

- A number of driveways visually cross the footpath. As for the eastern side, these should be treated to emphasise that vehicles crossing footpaths must yield to footpath users. This would also encourage yielding at the bicycle facility.
- There is opportunity to provide a unified, more intensive and attractive landscaping of verges, particularly if access from parked cars does not have to be provided. This would create a new character for this section of Chief Street, in keeping with its development to the north-east – especially if coupled with a street art treatment on the eastern side + driveways.
- While access for heavy vehicles from Port Road may erode the extent of bicycle facility that can be provided close to the intersection, design around a passenger car would minimise this, with heavy vehicle access provided as a 'check' e.g. via a mountable separator. This arguably also applies at driveways, to some extent.

Outer Harbor Greenway (beneath the bridge)

This underpass section of Chief Street has the potential to be problematic as the grade from the north-east in particular encourages higher traffic speeds, while the footpaths are narrow for conversion to shared use as part of a separated facility.

We have not measured the carriageway and footpath widths at this point. It would appear that both are quite narrow at their minimum widths, i.e. 1.2m footpath + 6m carriageway.

There are three main options.

Shared zone

A shared zone provides conditions under which cars and vulnerable road users can share the carriageway safely. Encouraging appropriate speeds is a key issue, but another issue is that the number of pedestrians and cyclists likely to be using this space is relatively low, given an absence of active land uses in the immediate area. This undermines the messaging for a shared zone and respect for/compliance with the treatment. For this reason, we suggest that a shared zone is not the most desirable treatment for this situation.

Single lane slow point

This type of treatment would both reduce vehicle speed and enable the footpaths to be extended to support shared use. This is our preferred option.

- A threshold treatment in this area would be appropriate and supported by the local urban form.
- It should be integrated with a crossing of Chief Street, immediately south-west of First Street, facilitating access to the Outer Harbor Greenway to/from the eastern side of Chief Street. Ideally, this would be constructed as a wombat crossing.
  As a wombat crossing would impede the drainage path, raised sections may be needed near kerbs to allow water flow beneath. These should have a non-slip surface rather than be provided as checkerplate, e.g. similarly to the cover of a side entry pit. Depending on the grades, it might be possible to cut into the existing road surface beneath these points to increase the flow capacity – noting that the sub-surface structure is designed around holding a vehicle's weight, but the area below a 'bridge' section of a wombat crossing would not be traffic bearing and only has to be waterproof to protect the road from damage.

- The alternative to a wombat crossing is a pedestrian refuge. This would not provide the equivalent priority for pedestrians, nor the same degree of slowing effect on vehicles, hence would be the second-best alternative.
- Shared use paths on both sides of Chief Street would be compatible with one-way bicycle facilities on both sides of the carriageway elsewhere on Chief Street. With facilities on either side of Chief Street, only modest extension of the footpaths would be required to facilitate shared use.
- The low point is important for local drainage. There are temporary footpath products that can sit on a pavement and allow water flow beneath them. These would be appropriate in this location.

Narrow road threshold

This is an alternative to the single lane slow point, should this not be acceptable. Rather than a formal treatment, the concept for this option is to adopt a 5.5m two-way road and apply treatments that encourage adoption of a speed appropriate to the road environment, given that Chief Street already has a 40km/h speed limit.

- Assuming this allows the footpaths to be widened by 0.25m each to 1.45m, the resulting shared use paths would be quite narrow. Hence this option is not the preferred option.
- As with the single lane slow point option, the wombat crossing/refuge should be integrated into the design.
- A contrasting pavement should be used to highlight the narrow, low-speed character of the underpass area as distinct from the character of Chief Street on either side. This could comprise paving or commercial products such as StreetPrint (used to provide a 'street art' cue).

First Street to Fourth Street extension

There are currently no trees on the eastern side of this section of Chief Street. Nor is there an active frontage, with the Brompton Gasworks' historic bluestone façade dominating the eastern side.

BISA proposes removing on-street parking on the eastern side in this section, enabling footpath widening, tree planting and a bike facility that allows for cyclist over-taking; as per the following generalised layout.

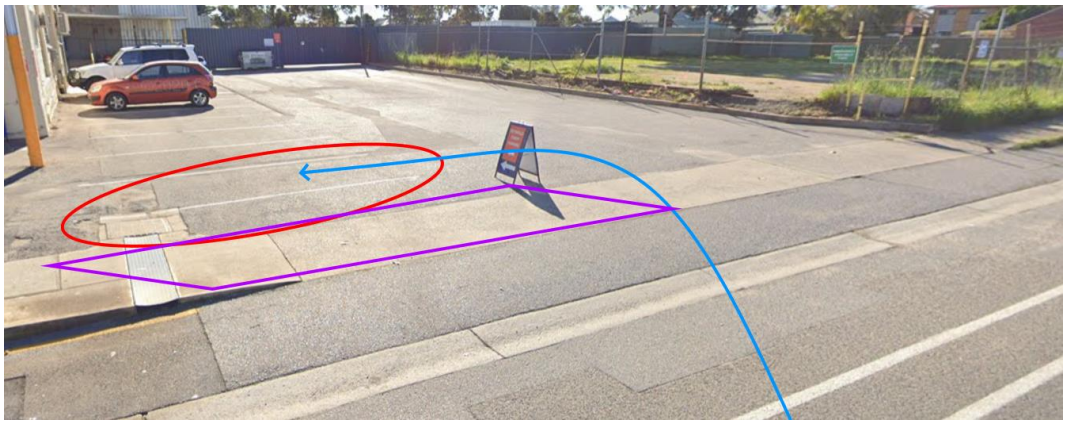
	eastern side						western side						TOTAL
	footpath	tree/verge	bike facility	buffer	traffic lane	median	traffic lane	parking	buffer	bike facility	tree/verge	footpath	
at trees	1.5	1.0	1.8	0.7	3.0	1.2	3.0	2.1	1.0	1.8	1.5	1.5	20.1
elsewhere	1.5	1.0	1.8	0.7	3.0	1.2	3.0	2.1	1.0	1.8	1.5	1.5	20.1

(Tree/verge numbers highlighted indicate existing plantings.)

The 0.7m buffer on the eastern side is adequate for a buffer between a bike facility and traffic lane. It is inadequate to host rubbish bins, on the basis that the lack of land uses on the eastern side is such that this capability is not required. If this *is* required, the tree/verge area between trees on the western side could be provided at 1.2m (resulting in some deviation of the bike facility at tree locations, but noting that there are only 3 street trees currently in this section); and the buffer to parking at tree locations could be reduced to 0.7m, and a vertical element introduced to introduce surety against car door opening.

There are a number of commercial driveways on the western side of the street. Turning into/out of driveways is the largest cause of cyclist crashes in suburban streets, hence access across the separated bicycle facility needs to be well considered to enable drivers to act accordingly.

Firstly, driveways should be reviewed with an eye to reducing crossover widths. For example, the driveway illustrated below gives access to angled parking (as circled in red). The required vehicle turning movement is therefore as shown in blue and the amount of crossover shown in purple could be reinstated to footpath – potentially enabling another on-street car park to be provided. Reducing crossover widths reduces vehicle speeds to/from sites. Whether this is reasonable in the case shown will depend on the Planning Approval regarding vehicular access to the site.



As noted regarding the section of Chief Street between Port Road and the Outer Harbor Greenway, consistency of footpath material is important in regard to visual cues about priority. This is even moreso where a separated bicycle facility is provided, to visually reinforce legal yielding requirements on both sides of the bikeway.

Under our proposed layout, buffers will exist either side of the bicycle facility. These should be treated to emphasise the presence of the bicycle facility and encourage yielding e.g. with a contrasting pavement treatment.

Fourth Street extension to Hawker Street (excluding Ethelbert Square)

Arguably, the comment regarding a lack of active land uses/frontage on the eastern side also applies from Fourth Street extension to Hawker Street. However, for this section, tree plantings exist on both sides of Chief Street. Hence BISA's proposed layout would be:

	eastern side						western side						TOTAL
	footpath	tree/verge	bike facility	buffer	traffic lane	median	traffic lane	parking	buffer	bike facility	tree/verge	footpath	
at trees	1.5	**1.5**	1.5	0.8	3.0	1.2	3.0	2.1	1.0	1.5	**1.5**	1.5	20.1
elsewhere 1	1.5	1.5	1.5	0.8	3.0	1.2	3.0	2.1	1.0	1.5	1.5	1.5	20.1
elsewhere 2	1.5	1.3	1.5	1.0	3.0	1.2	3.0	2.1	1.0	1.5	1.5	1.5	20.1

(Tree/verge numbers highlighted indicate existing plantings.)

Cyclists can no longer overtake within the bike facility. BISA considers this an acceptable trade-off to achieve other desirable elements of the design.

As for the previous layout, this assumes ("elsewhere 1") that the eastern side does not need to be able to host rubbish bins. However, we note that residential properties are present on the western

side for this section of Chief Street. Where hosting of bins is required, the profile "elsewhere 2" can be used. This would introduce a small amount of deviation for cyclists at tree locations and "elsewhere 1" should be provided where possible.

Cessation of on-street parking on the immediate approaches to Second Street facilitates provision of pedestrian refuges. While this is asymmetric (parking is provided on the western side only), the 1.0m buffer between the eastern bike facility and the traffic lane in the "elsewhere 2" option could be reduced to 0.7m to achieve a more symmetrical result, with the remaining 2.1m for parking used for landscaping or other amenity enhancements.

Given that on-street parking servicing residences on the western side of Chief Street is limited by the presence of driveways, these residents may desire on-street parking on the eastern side to also service their properties. As demonstrated below, this would generate a much more significant trade-off for cyclists and pedestrians. BISA would argue against this that the above layouts enable parking to be provided immediately adjacent to trees instead of only between trees, increasing the amount of parking available on the western side of the street.

If active frontages are proposed such that on-street parking is considered desirable, e.g. to support redevelopment of large land holdings on the eastern side, we caution that the Chief Street profile is not particularly generous for achieving all desired outcomes. Options revolve around what is feasible at existing tree locations. Three options are presented below, and two for non-tree locations. These are intended to illustrate the trade-offs between elements rather than provide a preferred proposal.

	Eastern side							western side						TOTAL
	footpath	tree/verge	bike facility	buffer	parking	traffic lane	median	traffic lane	parking	buffer	bike facility	tree/verge	footpath	
at trees (option 1)	1.5	1.5	1.2	0.3	2.1	2.9	1.1	2.9	2.1	0.3	1.2	1.5	1.5	20.1
at trees (option 2)	1.5	1.2	1.5	0.3	2.1	2.9	1.1	2.9	2.1	0.3	1.5	1.2	1.5	20.1
at trees (option 3)	1.5	1.5	1.3	0.5	2.1	2.9	0.5	2.9	2.1	0.5	1.3	1.5	1.5	20.1
elsewhere (option A)	1.5	0.8	1.5	1.0	2.1	2.9	0.5	2.9	2.1	1.0	1.5	0.8	1.5	20.1
elsewhere (option B)	1.5	0.9	1.5	1.0	2.1	2.9	0.3	2.9	2.1	1.0	1.5	0.9	1.5	20.1

(Tree/verge numbers highlighted indicate existing plantings.)

Conceptually, the bicycle facility could be located at a short distance from the existing footpath between trees and be deviated around the existing trees.

- Such deviation is not ideal, but cyclists can cope with a small amount, as long as it is provided over a reasonable distance. (A large, sudden deviation at every tree location would quickly become tiresome.) This may mean limiting parking immediately adjacent to tree locations, e.g. with a length of (say) 2m of landscaping in the buffer (noting that cars can overhang by up to 0.6m). The length of such landscaping effectively controls where car doors can open into the bike facility and hence the length over which the bike facility can deviate. This has the advantage that a vertical element would not need to be introduced into the parking buffer to prevent car door opening – which is the other approach to addressing the car door hazard.
- The larger the tree/verge area between trees (option B vs option A), the less the deviation required at the tree location. The median is the only area that could be traded off to increase this tree/verge area as other elements are already at minimum widths.

- Where the tree/verge can be cut back (option 2), the cyclist deviation is lessened. This is desirable given how close together trees are located and how large the deviation is, however the feasibility/ degree of this would need to be examined on a case-by-case basis.
- A wider buffer at the expense of a narrower bike facility (option 3) provides more space for a vertical element to be included in the buffer, to prevent parked cars opening doors into this space.
- While it is possible to maintain the flush median at close to 1.2m at tree locations (options 1 and 2), the need to provide a 1.0m buffer width to accommodate rubbish bin collection and car door opening means that maintaining a median is not feasible between trees (options A and B). Hence a compatible median width at trees (as per option 3) is the most realistic option.
- While options A and B both have 2.9m travel lanes, 3.0m travel lanes could be provided if no median at all is provided.

The trade-offs are sufficiently significant that the use of this type of profile should be minimised, e.g. to no more than 100m over the length of Chief Street.

Ethelbert Square

Given the lack of an existing tree planting area within the carriageway width, there is considerable scope to redesign Ethelbert Square. Whatever design is proposed should match to the separated bike facility on either side.

It is also desirable for this section of separated bike facility to allow overtaking within the bike facility as this is not generally possible elsewhere along Chief Street.

Hawker Street

We suggest that the treatment recently implemented in Weller Street, Unley, would be a good template. This features a series of speed plateaux with cyclist bypasses at the sides. Existing kerb extension locations would be suitable for locating these treatments (we suggest re-using the plants elsewhere).

Roundabouts present particular safety issues to cyclists and we would propose that the roundabout at Hawker Street/ Fifth Street be redesigned to a radial design compatible with bicycle use.

Link to Torrens Road

We understand that Council is considering linking the Chief Street route to Torrens Road via East Street, given the proposed Torrens Road works. This seems eminently sensible, subject to redesign of the roundabout at Fifth Street.

We note that the bicycle-only path at East Street features bollards and draw your attention to the fact that Austroads *Guide to Road Design Part 6A: Pedestrian and Cyclist Paths* advises not to install bollards unless a demonstrated traffic problem exists, and outlining alternatives to bollards for addressing such traffic management issues. The reason for this advice is the potential for cyclist injury from bollards. BISA has raised concerns with several authorities about cyclist collisions with bollards in Adelaide, including one in Goolwa that resulted in a cyclist's death.

We request that council officers and consultants read the Austroads advice and try not install bollards. We further request that you please consider removing any in your council area located on a cycle route or footpath or pedestrian cut-through, where it is not documented in a risk assessment for the bollard that evidence of a traffic problem existed and was the reason for installing it.