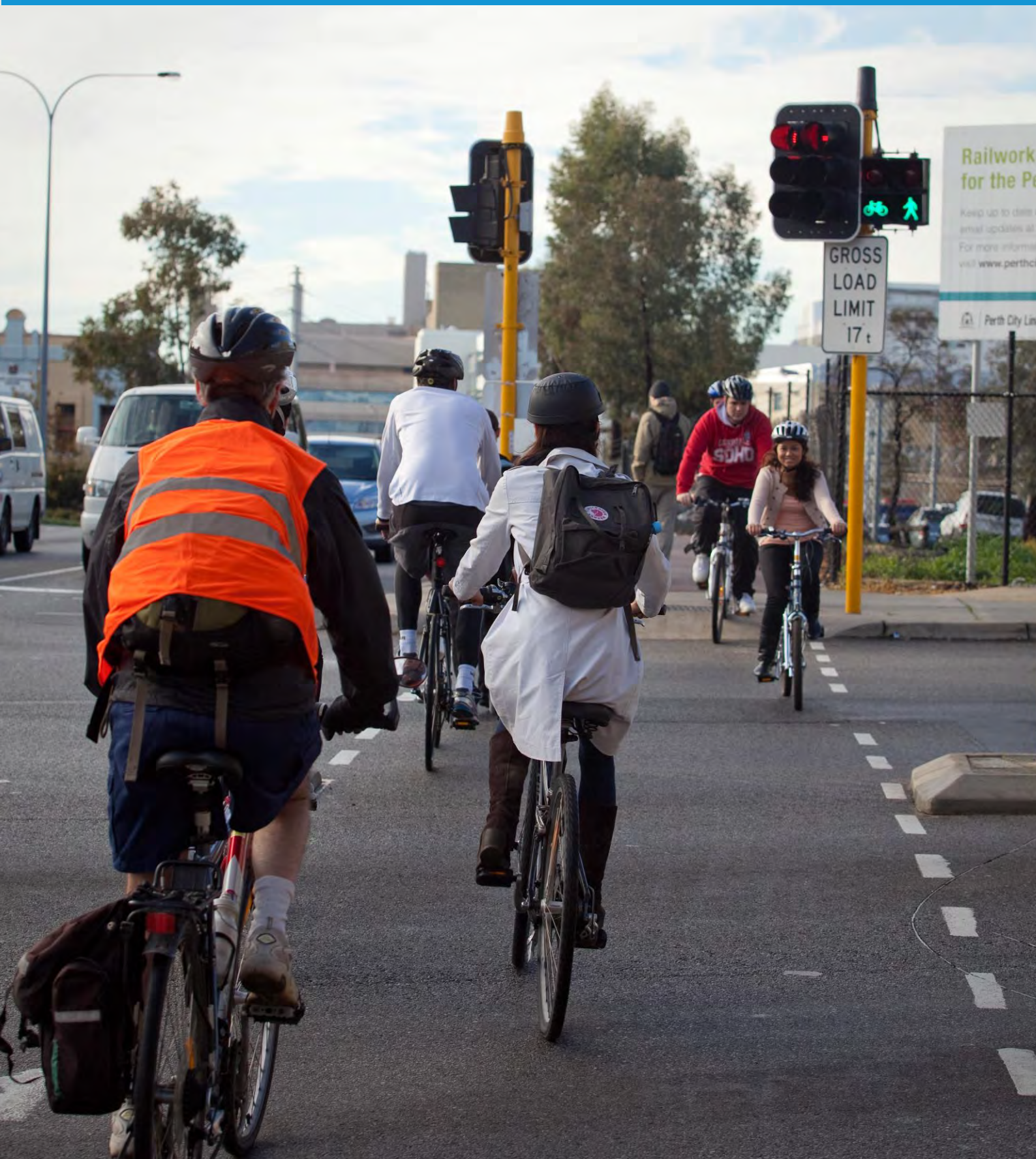
Department of Transport

# 2015 Cycling Imagineering Workshop Report



# Detailed Cycling Imagineering Workshop Report

Prepared for Department of Transport

Prepared by Craig Wooldridge, Director Network Planning Moving People

Date May 2015

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## Version control

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## Amendment record

This guidelines document is reviewed to ensure its continuing relevance to the systems and process that it describes. A record of contextual revisions is listed in the following table.

| Page No. | Context | Revision | Date |
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# Introduction

From 15 to 18 March 2015, the Department of Transport and the RAC hosted a visit by two expert Dutch Cycle Planners/Designers for the purpose of exploring innovative cycling solutions for Perth and Regional Cities/Town. The visit emanated from a cycling study tour of the Netherlands in 2014 in which the Department of Transport participated.

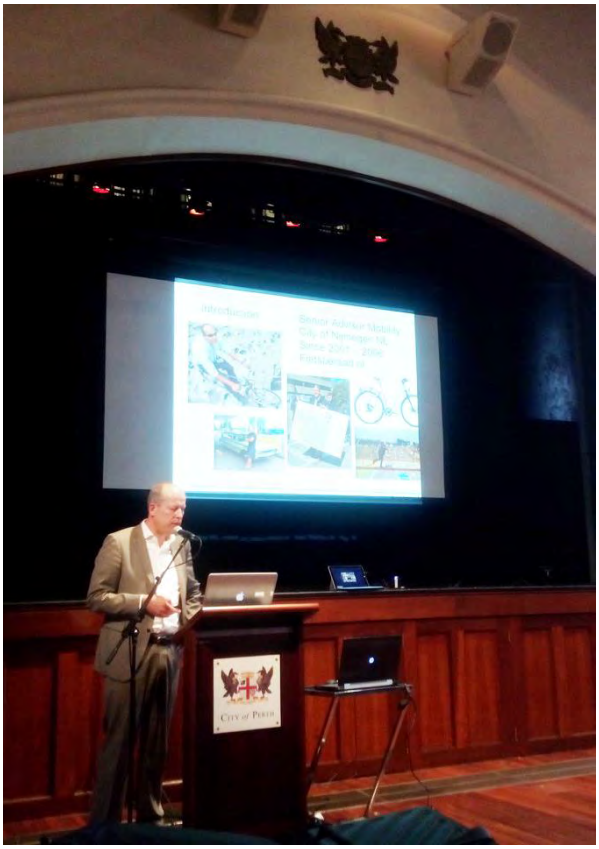
The two Dutch experts were:

- Martijn J. te Lintelo (City of Nijmegen-Local Government)
- Arie Vijfhuizen (Royal Haskoning DHV-Private Sector)

Martijn and Arie have extensive experience in planning and designing for bicycles, traffic engineering, road safety, traffic management and integrated spatial planning.

The visit consisted of three planning days and a full day Imagineering Workshop. The planning days provided the Dutch experts with an overview of the Perth context and an opportunity to experience Perth as a cyclist as well as site visits to a number of example roads. This element was critical to ensuring that Arie and Martijn built a good background on the key issues and challenges.

Prior to the workshop, a presentation session was arranged for the participants to provide a background to the Dutch approach for cycle planning and design. A copy of the presentations can be obtained at http://www.transport.wa.gov.au/imagineering



The workshop was an invitation-only event to ensure that a broad range of people involved in cycling were represented. Indicating the level of importance of the workshop, the opening included the Minister for Transport and the Dutch Consul General. The Minister's opening remarks highlighted the range of cyclists that needed to be catered for including: commuters, recreational riders and high-speed training cyclists.

The Dutch Consul General provided an overview of the Dutch cycling history and the passion that Dutch professionals have for sharing cycling knowledge. An emphasis was placed on making the most of the 40 years of learnings that the Dutch have obtained since re-embracing cycling as a true transport mode.

The opening concluded with a challenge to the participants to put existing policies and standards to one side and take an open eyes and ears approach to the day. In this way, we could imagine what might be possible by focusing on creating a safe and connected network, while also considering the needs of the other transport modes.

A total of 140 people attended the workshop from state/local government, private sector transport planners/traffic engineers/urban planners, academics, advocacy groups and individual advocates.

The workshop had a focus on five key areas to assist with the ongoing development of a number of key initiatives within the Western Australian Bicycle Network Plan:

- Local Roads
- Arterial Roads
- Connections to Schools
- Connection to rail stations and hospitals
- Roundabouts.

Each focus group had a range of real example roads with a full background package for each and was allocated 90 minutes to work up options for their allocated example.

The selection of the example projects was based on the need to asses a range of diverse examples, the opportunity that the projects offered for future demonstration projects and the value of influencing future projects in a similar environment.

The key outcomes for each focus area are detailed below.

# Workshop Themes

## Local Roads

The Western Australian Bicycle Network Plan (WABN) has a key item that involves the review of local bike routes, and the local roads component of the workshop tied in very well with this initiative. Close to half of the cycling crashes that involve a serious or fatal injury occur on 50km/h local roads and there is significant scope to address this situation.

The main findings and options put forward for local roads include:

- Long local roads could be disconnected with midblock or tail end closures to move motorised traffic to the higher order roads sooner. This would result in lower volumes on local roads and a safer environment for cyclists and also pedestrians. In this environment inappropriate roundabouts could be removed to reduce crashes involving cars and cyclists;
- Bike boulevards should be planned and implemented as demonstration projects with before and after studies;
- Where separation is not an option, operating speeds should be reduced to 30km/h through reengineering the street environment;
- There needs to be a clear difference between the lowest order, preferably 30km/h roads, and the 50km/h roads. This needs to be achieved via road design options and a logical road hierarchy (self explaining roads principles);
- There needs to be a network approach taken when planning local road networks for developments within established areas (brownfield sites) and new suburbs on the metropolitan fringe (greenfield sites). This needs to take in the requirements of all modes, while having a strong focus on road safety. Too often we look at an isolated intersection or road links and end up retro fitting inappropriate options that do not always end up achieving the intended aims. The case in point is the over use of roundabouts, when other network wide options are available.
- Community engagement is critical to ensure that two way information is exchanged, examined and understood, rather than putting ideas down without knowledge;
- Cycle routes must have priority for bikes and this may require re-orientation of stop/giveway signs and the addition of disconnects in the link to reduce motorised traffic;
- On-street parking needs to be taken into account when developing options. There needs to be a review of the need for existing parking and a review of the risks of cars parking over cycling facilities in higher density areas; and
- High speed training circuits need to be identified, mapped and considered when local area traffic management is being planned.

## Arterial Roads

Arterial Roads were next on the agenda, and this is one of the most challenging areas for cycling.

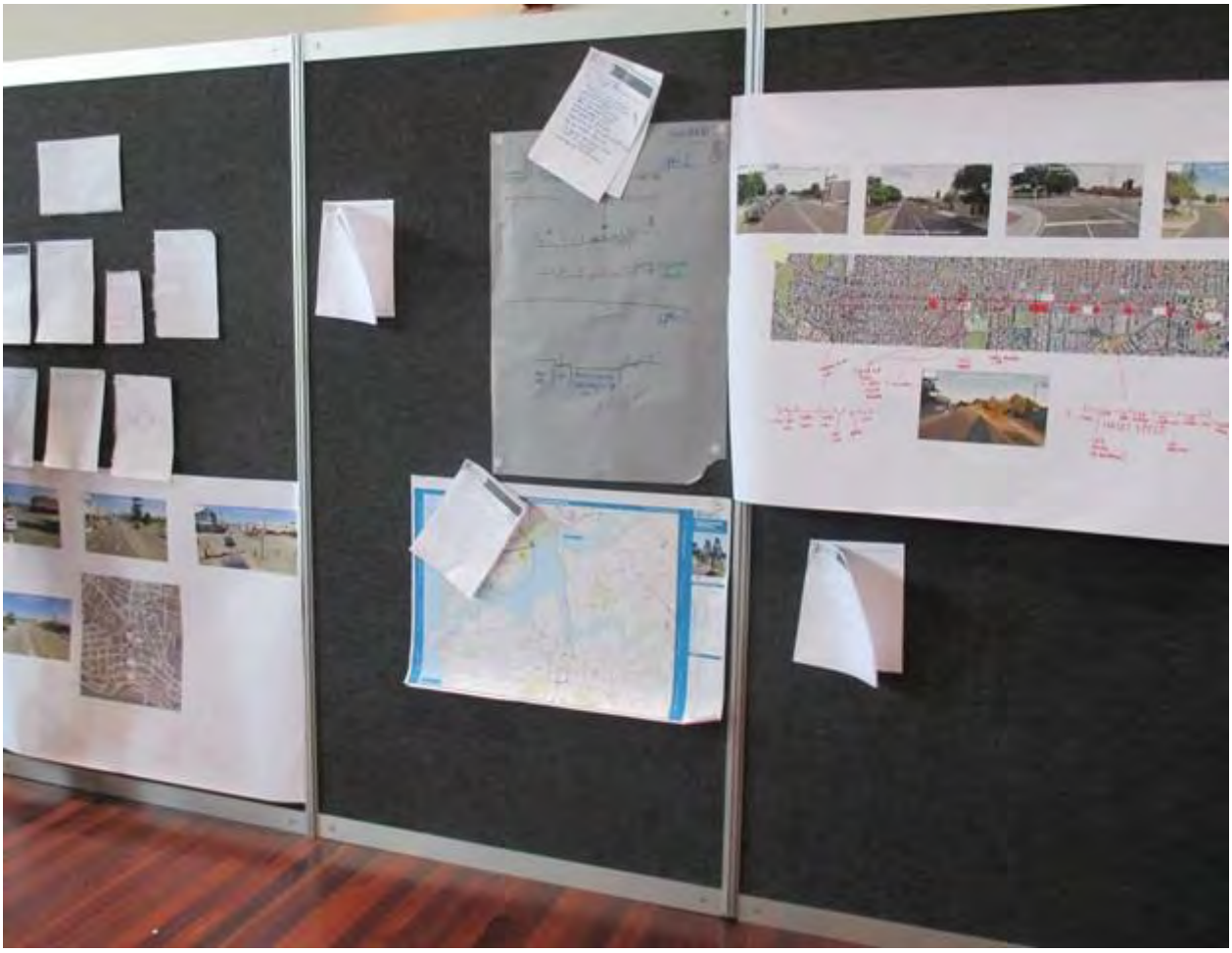
In Perth, we have generally catered for cyclists on arterial roads with a sealed shoulder for commuting and high speed training and a shared path for recreational cycling. This approach has been utilised for about 15 years and has largely resulted in facilities that have very little use.

The level of protection in the sealed shoulder is fairly low with a painted edge line and there are also high conflict areas at intersections, particularly with vehicles crossing into left turn lanes. Road debris is also frequently swept into the shoulders of arterial roads, thereby creating a hazard for cyclists. On older roads with no cycling facilities, it is often an environment that provides a very low level of safety. As

such, most arterial roads are generally travelled by males and even then, mostly dedicated cyclists (such as competitive cyclists and MAMLS).

The main ideas put forward for arterial roads were as follows:

- The first priority should be to find an alternative route on the local road network one block back and the local network could be redesigned to create a bike boulevard. This approach provides a far safer outcome in a more pleasant environment;
- If an alternative route is not available a fully separated facility needs to be provided. This does provide challenges as priority through intersections is problematic, but options could be developed; and
- Consider the origins and destinations to determine if there is a cycling demand along the arterial road route.



## Connections to Schools

The connections to schools area has been a focus for the Perth Bicycle Network Grants for the past two years and is an area where innovation and options need to be developed to build upon low cycling numbers. The main ideas put forward were as follows:

- The options developed for the local roads theme are highly applicable to connections to schools;
- 40km/h school zones can be ineffective if speed compliance is reliant on enforcement, the roads surrounding the school need to be redesigned to encourage slower speeds and safety for children at all times;

- Develop fine grain connection to school routes that cater for cycling within a 1.5km radius of the schools;
- Provide a focus on safe intersection crossings;
- Survey students and parents to determine what the barriers are;
- Bike education in schools is a good initiative to get kids cycling safely with broader road safety learnings being a bonus;
- Educate the parents;
- Provide secure end of trip facilities;
- Discourage car use and improve mode separation in close proximity to the school;
- Change the regulations to allow people of all ages to cycle on footpaths (parents and grandparents); and
- Make cycle routes to school fun with on-path signage and good way finding.

## Connections to Stations

The connections to rail stations is a key initiative of the WABN and aims to improve cycling within a 3km radius of the station along with secure end of trip facilities. The main ideas put forward were as follows:

- The options developed for the local roads theme are highly applicable to connections to stations;
- A fine grain network feeding into stations is needed;
- Connectivity within the station precinct is just as important as the lead ins;
- Any cycling facilities provided must be continuous;
- Develop colour coded routes;
- High standard lighting is needed; and
- Consider links between stations and high schools.

## Connections to Hospitals

Connections to hospitals is a new topic and is clearly needed due to a strong focus on the expansion of existing hospitals and construction of new hospitals in Perth in recent years. Two hospital examples were selected: the recently opened Fiona Stanley in Murdoch and the QEII precinct in Nedlands that is being expanded at present. The following ideas were developed:

- The options developed for the local roads theme are highly applicable to connections to hospitals;
- A focus is required on linking with other origins and destinations via common routes to maximise the cycling opportunities and minimise duplication of infrastructure;
- Options within the hospital boundaries need to be considered to provide door to door options;
- Consideration of separation of cyclists and pedestrians within the precinct needs to be part of the planning;
- Links to the higher order shared paths are important;
- Some of the car parking may need to be modified to provide a more direct and safer route for cyclists, particularly connecting end of trip facilities;
- End of trip facilities need to be planned and integrated into the hospital;
- Grade separations are likely to be required for crossing high volume arterial roads that surround the hospital sites;
- On road parallel parking could be removed to provide a separated cycling facility in close proximity to the hospitals;
- Cycling must be considered in the early planning for hospital sites;
- There are good options to link surrounding activities such as universities including bike share schemes; and

- Way finding is required.

## Roundabouts

The last topic covered was roundabouts, which have been reviewed many times over the past two decades to find solutions to safely accommodate cyclists. Single lane roundabouts have been covered to some degree in the local roads area, but there are still situations where a single roundabout is appropriate and cycling requirements need to be taken into account. Dual lane roundabouts present the biggest challenge in terms of safety for cyclists.

The following options were developed:

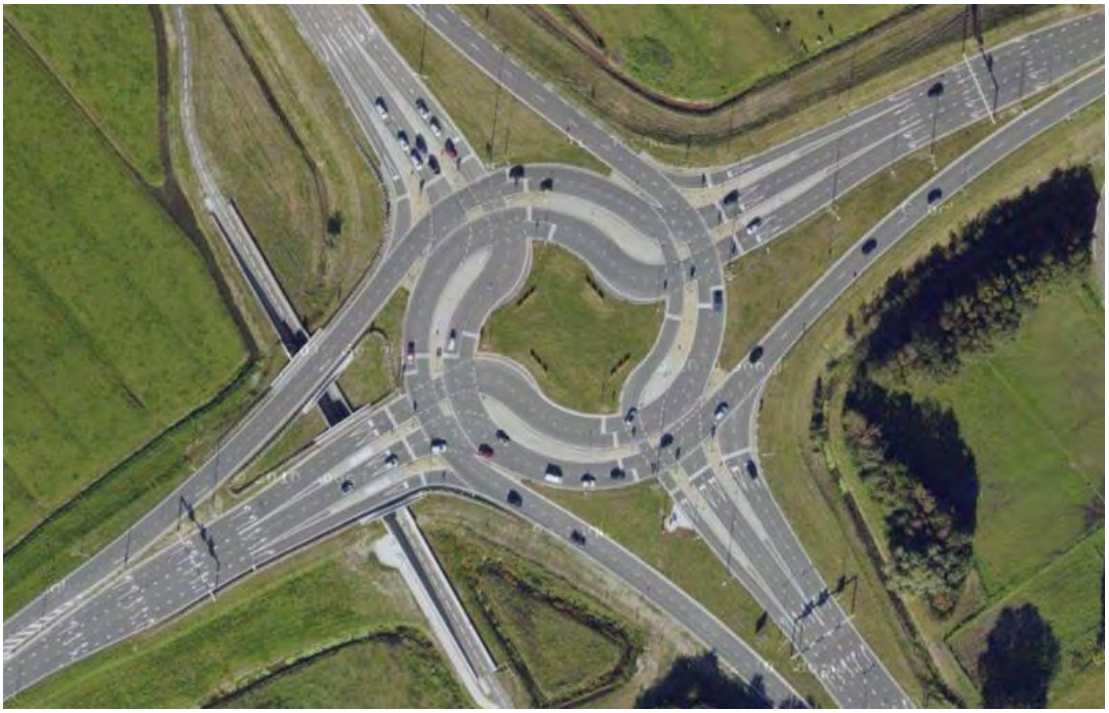
- Question if other treatments such as priority control or traffic signals are more appropriate; and
- For high volume dual lane roundabouts the only safe option for cyclists and pedestrians is grade separation of the crossings.
- For single lane roundabouts, the approach speed needs to be reduced with devices such as a raised plateau for both motorised traffic and cyclists;
- Roundabouts at a tee junction with cycle lanes on approach and departure to the non-conflict legs can have a free flow cycle lane but protection needs to be provided via kerbing to prevent motorised traffic cutting into the cycle lane;
- For dual lane roundabouts the only safe option is to create an off road cycle bypass. The appropriateness of the route also needs to be questioned and consideration given to whether a parallel alternative route is available;
- Consider the option of providing priority for cyclists at the roundabout crossing with a similar approach to the Dutch with giveway treatments for motorised traffic, as per the below picture:

*Dutch Roundabout with priority for cyclists*

*Source: https://bicycledutch.wordpress.com/2013/05/09/a-modern-amsterdam-roundabout/*

- Modify dual lane roundabouts to keep motorised traffic in their lanes with physical separation;
- For large, high speed roundabouts, trial a turbo roundabout with a grade separated cyclist bypass, which will reduce the number conflict points as opposed to a concentric roundabout, as it is impossible to change direction once the driver is inside the roundabout. See below:

*Dual Lane Turbo Roundabout*



*Source: https://bicycledutch.wordpress.com/2013/05/09/a-modern-amsterdam-roundabout/*

# Progressing the Workshop Outcomes

A significant amount of ideas were put forward throughout the workshop and an outcomes and action plan has been developed as per the table below. As the actions progress, input and feedback will be sought from the Western Australian Bicycle Network Plan Implementation Reference Group.

| Action Item | Lead Agency | Partner Agencies / Bodies | Timeframes |
|---|---|---|---|
| Develop and implement demonstration low speed bike boulevards, low speed precincts, connections to stations/schools and hospitals | DoT | Main Roads, PTA, WALGA, LGA's, Department of Education, Health Department, WABN IRG-Sub Group | Commence planning immediately and run for a three year period before converting to an ongoing grants program with dollar for dollar contributions |
| Review of Main Roads and Public Transport Authority (PTA) Cycling Policies | Main Roads, PTA | DoT, WALGA | Commence in mid 2015 with drafts being available for consultation by the end of 2015. |
| Review of cycling requirements for major road extension projects and road improvement projects | Main Roads | DoT, PTA, WALGA | Commence in mid 2015 with drafts being available for consultation by the end of 2015. Final versions to be available by June 2016. |
| Review of cyclist/pedestrian conflicts on the PSP network within a 5km radius of the Perth CBD and at high patronage train stations that interface with the PSP network. | DoT | Main Roads, PTA, Inner City LGA's | Start in early 2016 with a discussion paper being available for consultation in early 2017 |
| Review the width requirements for the planning of new PSP's and maintenance of existing PSP's | DoT | Main Roads | Start in mid 2015 with a discussion paper being available for consultation in mid 2016 |
| Consider allowing cycling two abreast on shared paths if sufficient width is available and removing the age restriction for cycling on footpaths | ORS | Main Roads, PTA, WALGA, Police | Start review in mid 2015 with regulations being modified by mid 2016 if agreed. |

| Action Item | Lead Agency | Partner Agencies / Bodies | Timeframes |
|---|---|---|---|
| Review of standards and guidelines, including but not limited to:<br>• Roundabouts<br>• Lane widths on local roads<br>• Signage/way finding | Main Roads | DoT, PTA, WALGA | Start in mid 2016 and conclude in mid 2017 |
| Develop a high level cycling network for Perth at a population of 3.5m | DoT | Main Roads, PTA, WALGA | Start in mid 2015 with a draft due in mid 2016 |
| Identify and map high usage/high speed cycle training circuits and communicate with local government to influence local area traffic management planning | WestCycle | DoT, Main Roads, WALGA | Initial report due in mid 2015 with options development to follow with progressive development until mid 2017 |
| Develop benchmarking options against others states and overseas cities for cycle surveys | RAC | DoT, Main Roads, PTA, WALGA | Options due for consideration by mid 2016 |
| Consider whether cycling education in schools should be made available and how | ORS | Police, DoT, Main Roads, PTA, DoE, WALGA, Advocacy Groups | Discussion paper to be completed for consultation by mid 2016 |
| Consider whether cycling education for adults should be made available and how | ORS | Police, DoT, Main Roads, PTA, WALGA, Advocacy Groups | Discussion paper to be completed for consultation by mid 2016 |
| In tandem with the review of all action items, review the areas of need for potential promotion, education and enforcement options | DoT | DoT, Main Roads, PTA, WALGA, Police, Advocacy Groups | High level review to start in mid 2015 and be completed by late 2016. Ongoing beyond that point. |
| Develop an option to run a planning and design Masterclass during Bikeweek 2016 | DoT | Main Roads, PTA, WALGA, Advocacy Groups | Complete by October 2015 |

# Appendix A-Attendee Organisations

- Department of Transport
- Main Roads
- Public Transport Authority
- Department of Planning
- WA Police
- Health Department
- Auditor General's Office
- Local Government-Traffic and Transport Officers, Travel Smart Officers, Urban Planners and Elected Members
- Western Australian Local Government Association
- Universities
- RAC
- Private Sector Transport Planning, Traffic Engineering and Civil Engineering Consultants
- Private Sector Urban Planners
- Heart Foundation
- Cycling Advocacy Organisations
- Individual Advocates
- Community Based Advocacy Groups

# Appendix B-Ideas Developed for Each Example Project

The workshop included twenty-seven examples of roads/precincts across the five focus areas. A summary of the outcomes for each example is contained below. Each outcome will be subject to additional exploration of ideas and engagement with the relevant authorities.

## Local Roads

**Bayswater Bike Boulevard (Swan River RSP to Morley Strategic Activity Centre)**

- Slow motorised traffic down with bike friendly traffic calming;
- Restrict motorised traffic movements at key intersections to reduce traffic volumes;
- Add 2m wide refuge islands at busy road crossings;
- Lawrence Street is proposed (north of Railway Parade), but May Street or The Strand should also be explored;
- Provide plateaus at intersections;
- Provide cyclists with priority at most intersections;
- Review the option to ban on-street parking as wide verges are available. Formalised indented parking in the verge may be possible in the medium term;
- A signalised crossing will be provided on Guildford Road near Leake Street in 2015/16.
- Need to consult with residents;
- Aim for a 30km/h speed limit;
- May require some mid-block cul-de-sacs to reduce motorised traffic;
- Advisory 1.5m bike lanes in each direction, with on-street parking banned and verge parking allowed. In the longer term build indented parking bays; and
- Review the option to ban cars in close proximity to schools with pop up bollards during school drop off and pick up times.

**Macrae Road, Applecross**

- Remove some local road intersections via cul-de-sacs or reduce to three way intersections (instead of four way) to reduce the flows onto Macrae Street and improve the sight lines at remaining intersections;
- Review the option to cul-de-sac each end of Macrae Road or mid block at Ardross Street to reduce motorised traffic;
- Remove the roundabouts and provide priority to Macrae Road;
- Reduce the speed limit to 30km/h;
- Traffic calm approach roads to be more cyclist friendly; and
- Move motorised traffic onto Canning Highway earlier to reduce rat running.

**Rutland Avenue-Welshpool Road to Great Eastern Highway, Lathlain and Carlisle**

- Create an alternative on road option until the PSP is constructed;
- Some sections are wide enough to mark a bike lane, while maintaining two way access for motorised traffic;
- For the narrow sections consider changing the road to a bi-direction bike facility and one way for motorised traffic;
- Consider mid block closures at some locations to reduce motorised traffic;
- Possible stage 1-use red/green treatments to create bike lanes, with improved crossing facilities at intersections;
- Possible stage 2-bike boulevard with street parking removed and moved to the verge, bi-directional bike lanes on the rail side of the reserve, grade separation of Oats Street and Archer Street and improve the Goodwood Parade connection from Great Eastern Highway to the Graham Farmer Freeway PSP; and
- Possible stage 3-PSP.

**Princess Road, Nedlands**

- Consider abandoning as a designated bike route this is only suitable for experienced riders. However, Princess Road is a popular route for cyclists and still requires improvement;
- The 1m wide bike lane is too narrow; consider installing a 2m lane up hill;
- Develop alternative routes such as Melvista Avenue, Elizabeth Street and Edward Street, where motorised traffic volumes are lower and lower speed limits are more achievable;
- Improve intersection treatments; and
- Develop connections to schools routes with low speed limits.

**York Street, Albany**

- Provide a one way cycle path on each side of a 2m protection zone, 2.3m for car parking, one 3.2m lane for motorised traffic on each direction and a 2m central median;
- Review the option to remove the roundabout at Peels Place;
- Reduce the number of intersections;
- Lower the speed limit;
- Take options out to public consultation with good information on the objectives for the main street; and
- The needs for an aging population, e-bikes and gophers need to be considered.

**Scarborough Beach Road-Oxford Street to Loftus Street, Mt Hawthorn**

- The road can be reduced to one lane each way for motorised traffic;
- Three options are viable-bi-directional cycle path, separated verge cycle paths or on street cycle lanes; and
- There are opportunities at intersections to create safer crossing facilities.

**Glyde Street, Mosman Park**

- Provide a bike lantern to the traffic signals at Stirling Highway to allow cyclists to cycle across.
- Add bike ramp to the stairs to the train station;
- Reduce the speed limit on Glyde Street by modifying the road environment to achieve lower operating speeds;
- Add raised plateaus at the intersections with Harvey Street, Palmerston Street and Hope Street; and
- Review the roundabouts - need for and design.

**Salvado Road, Floreat and Subiaco**

- Provide a direct cycle route along Salvado Road by creating either:
  - a 3.5m wide bi-direction bike facility with a 1m buffer zone to the car parking; or
  - Creating a 30km/h environment by reducing the traffic lane widths and utilizing the following cross section: verge, 1.8m cycle lane, narrow traffic lane, wider median (with crossing opportunities at intersections), narrow traffic lane, 1.8m cycle lane, car parking, verge.
- Other improvements include:
  - Create a safe crossing at the Selby Street intersection;
  - Redirect motorised traffic to Underwood Avenue/Hay Street and Cambridge Street; and
  - Extend the red phases at the Selby Street signalised intersections with Cambridge Street and Hay Street to create gaps for cyclists to cross at the Salvado Road intersection.

**Cathedral Avenue, Geraldton**

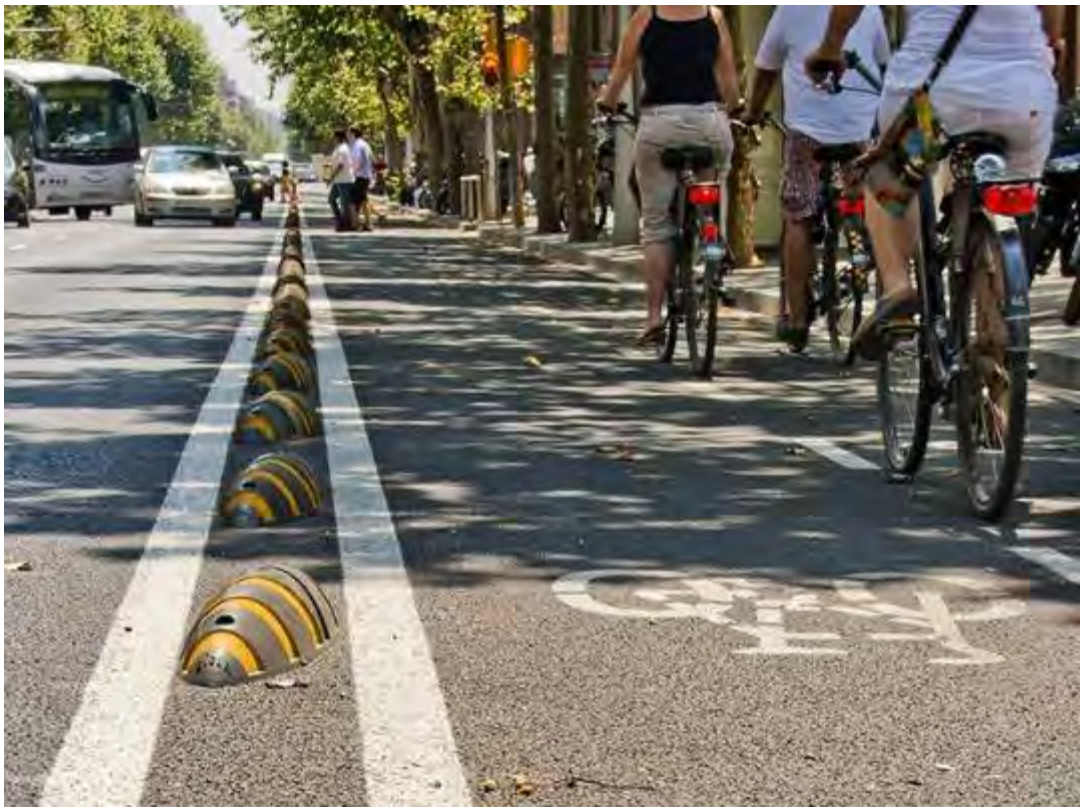
- Propose to remove on street parking to provide space for cycling facilities. This will require consultation;
- A preferred outcome is to achieve protected bike lanes in each direction;
- Lower speed limits;
- Discourage or ban through traffic from Marine Terrace to the Foreshore to enable a shared zone to be established. This may need traffic calming to achieve the outcome; and
- Review end of trip requirements for new developments.

## Arterial Roads

**Great Eastern Hwy, Kooyong Road to Tonkin Highway**

- The existing design is a missed opportunity, but could be improved with protection such as armadillos (as per photo below) or elevating the cycling space above road level;
- The RSP along the river could be upgraded to a higher standard as an alternative to using Great Eastern Highway. Connectivity to the local street network needs to be reviewed with local bike routes developed;
- Review the need and practicality of providing head start facilities at the signalised intersections;
- Review if permanent speed/red light cameras are needed to keep operating speeds close to the posted speed limit of 60km/h;
- Review the option for a bike boulevard parallel to Great Eastern Highway, including a review of the local bike routes for connectivity;
- The learnings from this section of Great Eastern Highway need to be taken into account when planning for the upgrade of the section between Tonkin Highway and Great Eastern Highway; and
- Bridges over the river should be considered in the longer term to provide greater connectivity.

*Armadillo Lane Divider*



*Source: http://inhabitat.com/armadillo-cool-recycled-plastic-bike-lane-dividers-keep-cyclists-safe-on-roads/the-armadillo-barcelona-spain-jpg/*

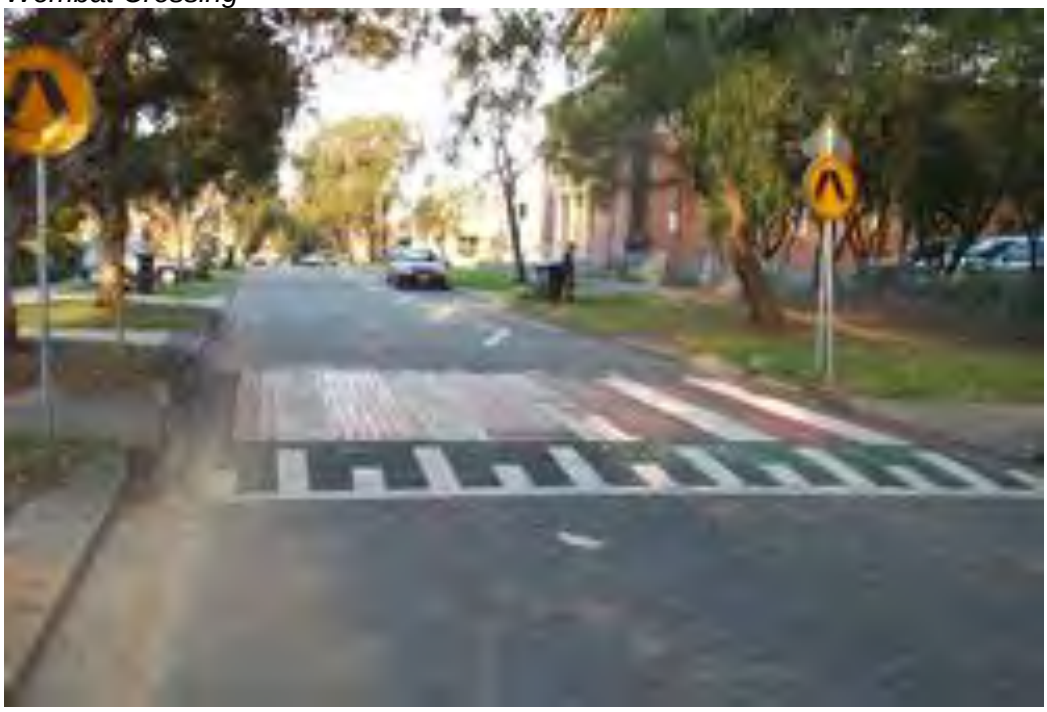
**Armadale Rd, Kwinana Freeway to Tonkin Highway**

- Construct a PSP on the south side of Armadale Road to link in with the existing shared path;
- Upgrade the existing shared path to PSP standards;
- Provide connectivity to the residential areas on the north side of Armadale Road;
- Consider priority across side roads; and
- Improve the permeability from the existing shared path through and within Atwell.

**Ranford Rd (Canning Vale)**

- A 3.5 to 4.5m wide PSP should be provided on the southern side;
- Provide a lower standard 2m footpath on the northern side;
- Introduce crossings across side roads to provide priority to cyclists and pedestrians that are placed on a raised section of road accompanied by a regulatory sign showing a speed limit of 40km/h (Wombat Crossing);
- Consider mid-block crossings for connectivity; and
- Explore options for low speed local bike routes that tie in with Ranford Road and other destinations.

*Wombat Crossing*



**West Coast Dr-Karrinyup Road to Hepburn Avenue**

- Discourage through commuting traffic;
- Reduce the speed limit to 40km/h and possibly 30km/h at activity nodes;
- Consider the following pavement modification options:
  - Narrow the vehicle lanes down to 3.1m in each direction to free up space for a 3m wide bi-directional bike path. The existing shared path would be retailed to provide for slower cyclists and pedestrians;
  - Narrow the vehicles lanes down to 3.0m in each direction to free up space for a cycle lane in each direction with a 0.5m wide protection (such as kerbing) from motorised traffic; and
  - Narrowing the vehicle lanes down 3.2m to provide more parallel parking at a width of 2.2m with a 0.9m buffer zone.
- Install visual traffic calming measures along the median;
- Consider cul de sacing North Beach Road just before West Coast Drive to reduce traffic volumes;
- Consider removing parallel parking in some areas;
- Remove section of road between North Beach Road and Sorrento Street and connect West Coast Drive to North Beach road. Convert this section of West Coast Drive into a cycling boardwalk with flat curbing;
- Flatten curbs and raise road to level of curb; and
- Change colour of the road surface in high traffic volume areas.

**Marmion Avenue-Alkimos**

- Cyclist underpass required when Marmion Avenue is duplicated;
- As an interim measure, signalisation of the Shorehaven Boulevard intersection should be considered to provide a safe crossing for cyclists and pedestrians. Alternatively, a roundabout could be considered, but would be challenging to provide safe crossing opportunities for cyclists and pedestrians;
- Develop a segregated 3-4m wide bi-directional cycleway on one side of Marmion Avenue with separation from motorised traffic and a 2.5m wide shared path on the other side;
- End of trip facilities could be provided at the bus stops until the train line is extended; and
- On Shorehaven Boulevard provide a footpath on one side and a shared path on the other.

**Causeway-Perth**

- Provide a new 6-8m wide separate bridge to the south of the Causeway for cyclists and pedestrians (with bikes and pedestrians separated) in the medium to long term;
- Add a new cyclist path bridge next to existing bridge;
- In the short term review the option to remove one traffic lane to provide a wider shared path; and
- This may be achieved by using contra flow to mitigate against the loss of a lane.

**Thomas Road-Connection from Kwinana Freeway PSP to Casuarina Prison**

- Improve the crossing facilities across the freeway on and off ramps;
- Construct a 3m wide shared path on the southern side of Thomas Road;
- Construct a shared path on Mari Park Drive from Thomas Road to Mari Park Drive to link in with an existing path; and
- Construct a shared path along Park Way and Orton Road, a refuge island on Orton Road at the prison entrance and a link into the prison facilities.

**Queen Victoria Street-Stirling Highway to Canning Highway, Fremantle**

- Cantilever a new path on the side of the bridge;
- Review the option to remove one or two traffic lanes to create space for a wider cycling path;
- Create a link from the future PSP on the rail line (north of Tydeman Road) and the Fremantle City Centre;
- Convert current Queen Victoria Street bridge to a cyclist and pedestrian boardwalk;
- Potential for high quality signal system with count down and two way cycle path through the intersection of Tydeman Road;
- Modify road into a one-way street travelling south between Stirling Highway and Tydeman Road;
- Extend boardwalk on the western side between Stirling Highway and Tydeman Road;
- Remove Parallel parking on western side of the road between Stirling Hwy and Tydeman road. Save this space for bicycle parking, pedestrian space and alfresco dining space for hospitality businesses;
- Potential to tunnel cycle path beneath Tydeman Road intersection and re-connect with western side of the road;
- Shift road into bike lane on the eastern side. Create two-way bike lane on one side of the road between Parry street and the Queen Victoria Street bridge;

- Resurface and extend shared path on western side between Beach Street and Queen Victoria Street bridge; and
- Under pass on the southern end of the bridge re-connecting to the eastern side of the road running south.

## Connections to Stations/Hospitals

### Murdoch (includes connections to Fiona Stanley/St John of God Hospitals, local and arterial road examples)

- Provide coherent and legible way finding signage for cyclists at appropriate locations within the Murdoch Precinct;
- Invest in safe and secure bicycle parking at key destinations within the precinct;
- Identify bicycle routes to/from the Murdoch train/bus station;
- Travel behaviour change programs could be implemented to utilise existing infrastructure and increase the workplace and school sustainable transport mode share;
- Examine and identify the preferred cyclist crossing points across Murdoch Drive;
- Reduce roads speeds along cycle routes;
- Set aside undeveloped land for cycling infrastructure;
- Develop a public bike-sharing scheme;
- Create an east – west-cycling boulevard through the precinct;
- Promote good urban design outcomes;
- Grade separated treatment south of Murdoch train station (over the Kwinana Freeway), connecting Leeming with Murdoch and providing a link to the station;
- Create a cycle superhighway along South Street with seamless connection across intersections; and
- Design separated on street bicycle lanes on Murdoch Drive north of South Street to Parry Avenue.

### Shenton Park (includes connections to the QEII Medical Precinct, local and arterial roads)

- Determine origins and destinations;
- Identify and define a cycling network utilising TransPriority principles;
- Develop cycle routes on low volumes, low speed roads;
- Improve crossings at intersections;
- Thomas Road/Winthrop Avenue should be developed as on off-road shared path;
- Aberdare Road should be modified to include a raised cycle lane in each direction to replace the existing on road sealed shoulder;
- Provide secure and connected End of Trip Facilities at key locations;
- Remove kerbside parking on one side of road to provide cycling facilities;
- Develop way finding and navigation options;
- Provide End of Trip facilities on both sides of Shenton Station;
- Continue PSP towards Fremantle;
- Widen path on Onslow Road;
- Review traffic calming to be more inclusive of cyclists, while still reducing speeds;
- Increase lighting;
- Provide cycle paths through cul-de-sacs;
- Provide good end of trip facilities at the schools;
- Provide cycling and pedestrian priority at required locations;
- Grade separate the crossing at the Stirling Highway/Broadway/Hampden Road intersection; and

- Provide head start facilities at signalised intersections for cyclists.

### Claremont Station

- Need to identify and promote primary routes to/from the station that connect with destinations;
- Identify secondary routes;
- Develop colour coded routes with maps available at the station;
- Grade separations required at Stirling Highway to provide a connection with the river;
- Construct bike paths through parks;
- Create separated bike paths;
- Engage a mediator to work with the four local authorities to develop a plan;
- Provide bike facilities at Claremont Quarter; and
- Ride potential routes with a range of potential riders before finalising plans.

### Greenwood Station

- Make the local road more friendly via reduced speeds and tree plantings into the verge to create an enclosed effect;
- Clearly define cycle routes;
- Create new paths to link the local road network to the station;
- Improve PSP lighting; and
- Plan cycling links from the station to the high schools.

## Connecting Schools

### Mt Hawthorn Primary School

- Survey students and parents to determine what the barriers are;
- Review the design and operation of the bridge;
- Develop treatments to reduce car volumes on local roads;
- Identify cycle to school streets and redesign them for cycling with a focus on crossing points; and
- Provide end of trip facilities to meet with demand.

### Phoenix Primary School

- Make it easier for cyclists and pedestrians to cross Rockingham Road and Phoenix Road;
- Increase accessibility to the Cockburn Civic Centre and Phoenix Shopping Centre;
- Widening the pedestrian crossing on Rockingham Road outside Phoenix Shopping Centre;
- On-road bicycle lane on both sides of Sussex Street;
- Modify Rockingham Road to two lanes from four, add median strip and bicycle lane on both sides and widen footpaths leading to the Phoenix/Rockingham intersections on both sides of Rockingham Road;
- Limit the size of vehicles using Rockingham Road and move freight usage to Stock Road;
- Modify Phoenix Road from four lanes to two. Widen paths on each side and include on road cycling lane on each side. Space from footpaths should be taken for bus stops in order not to hinder cyclists in bicycle lane;
- Widen paths along Carrington Street and implement shared paths along the verge;
- Add an on road bicycle lane along Kent Street; and
- Add a pedestrian crossing on Rockingham Road at Kent Street.

### Bibra Lake Primary School

- Create a friendlier environment for cyclists by developing a connected network;
- Determine where the missing links are and rectify;
- Create a bike boulevard on Annois Road;
- Change vehicle access to the school away from Annois Road;
- Make the cycle lanes on Parkway Road safer with treatments such as armadillos;
- Offset paths from the edge of the kerb;
- Provide connections from the future Roe Highway PSP to the cul-de-sacs;
- Provide a crossing on Bibra Drive;
- Provide cycling and pedestrian education;
- Discourage car use in close proximity to the school;
- Improve signage and way finding;
- Change the regulations to allow people of all ages to ride on footpaths;
- Undertake public consultation for any proposed improvements;
- Provide riding training for students and parents; and
- Improve end of trip facilities.

### Perth Waldorf School

- Provide connections to the future Roe Highway PSP;
- Provide protected bike lanes on Forrest Road; and
- Provide connections to the Bibra Lake RSP.

## Roundabouts

### Hackett Drive/Australia II Drive, Nedlands

- Add a raised plateau on approach for cyclists and motorised traffic;
- Reduce the speed limit;
- Provide off road facilities for less experienced cyclists;
- Before the roundabout provide a gap in the median for cyclists to enter UWA;
- Provide protection for the southbound movement with options such as armadillos and widen the cycle lane;
- Improve sight lines;
- Implement raised platforms at crossing points to emphasis priority and move crossing points to be 6m back (one car length) from holding line;
- Try shark teeth markings to provide priority for cyclists at crossings;
- Apply a green treatment in the cycle lane on approach, through and on departure to highlight the cycling facility;
- Provide a cycling only tunnel;
- Change the intersection treatment to priority control or traffic signals; and
- Monitor after any changes.

### Hester Avenue/Marmion Avenue, Quinns Rock

- Change the black asphalt cycle lane to red;
- Consider removing kerb nib either side of the bus stop/shop;
- Add flashing lights on approach that are triggered by cyclists;
- Create a cyclist bypass;
- Separate cyclists and pedestrians completely from the roundabout via an underpass or overpass, possibly through the centre of the roundabout;
- Modify the roundabout to keep vehicles lane correct;
- Reduce the through speed for vehicles;
- Add pre deflection for motorised traffic;
- Consider a turbo roundabout; and
- Undertake community consultation for any proposed improvements.

# Appendix C - Acronyms

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|---|---|
| **AITPM** | Australian Institute of Traffic Planning and Management |
| **DoE** | Department of Education |
| **DoH** | Department of Health |
| **DoP** | Department of Planning |
| **DoT** | Department of Transport |
| **LGA's** | Local Government Authorities |
| **PTA** | Public Transport Authority |
| **PSP** | Principal Shared Path |
| **RSP** | Recreational Shared Path |
| **UWA** | University of Western Australia |
| **WABN IRG** | Western Australian Bicycle Network Plan Implementation Reference Group |
| **WALGA** | WA Local Government Association |