OPUS

Town of Victoria Park

Local Area Traffic Management Pilot Study

Lathlain

Final Report

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Date: June 2015
Reference: WP1735.00
Status: Final v3

Contents

Executive Summary

Existing road safety and traffic management issues within Lathlain have been identified based on background data and site investigations as well as community feedback and consultation. Based on the key issues that have been identified, a series of objectives have been identified to assist in the development of a Local Area Traffic Management plan. The primary objectives include improving resident amenity, improving road safety, and promoting pedestrian/cyclist activity.

To address the identified issues, traditional and innovative traffic calming measures have been reviewed against the objectives for the Pilot Study. As part of this, research into various traffic calming trial projects/guidelines which aim to change the behaviour of drivers through psychological means rather than solely relying on physical traffic calming measures has been undertaken.

Based on community feedback that primarily sought to provide a fairer distribution of traffic on the local road network within Lathlain as well as making Rutland Street a more desirable north-south route through the suburb in the longer term, a traffic management philosophy has been adopted that seeks to ensure individual streets are not overly penalised in terms of traffic distribution within the suburb. As part of this, and as a result of the community consultation, no particular preferred route (other than Rutland Avenue in the longer term) has been identified or catered for whilst acknowledging that Goddard Street will still carry traffic along its length given it provides direct access to/from Orrong Road.

As part of the equitable approach to sharing out traffic volumes entering Lathlain from Roberts Road, with the exception of Bishopsgate Street and Rutland Avenue which form a preferred north-south route in the longer term, similar types and amounts of traffic calming will need to be installed (or maintained) on McCartney Crescent, Howick Street, Enfield Street and Custance Street in order to prevent one particular street receiving an unfair amount of traffic. This approach has also been adopted on other east-west routes to the west of Goddard Street as well as along Goddard Street and Gallipoli Street.

In the longer term, subject to the construction of a Principal Shared Path (PSP) alongside Rutland Avenue, this particular route can potentially have traffic calming treatments removed and traffic be more encouraged to use this road compared to others in the suburb. In the short term however, funding for a PSP has not been approved by the DoT and the route should not be promoted as a preferred route until appropriate cycle facilities are put in place.

The above physical treatments should be in addition to the parking and cycle route studies identified as part of this plan as well as any black spot investigation (and subsequent treatment) for the Roberts Road/Bishopsgate Street roundabout. Constant monitoring of northbound traffic using the southbound traffic lane of Goddard Street on the approach to Streatley Avenue should also occur following the installation of a roundabout at this intersection. Should such movements continue to occur in the future, consultation with local businesses, residents and other key stakeholders should be undertaken with a view to potentially closing the Right of Way between Streatley Road and Orrong Road, or at least trialling an alternative arrangement.

1 Introduction

1.1 Background

The Town of Victoria Park has recently reviewed the suitability and appropriateness of traffic management devices used on its local road network as well as the process used to assess the need to install such measures. As part of this overall work, the Town has undertaken a Local Area Traffic Management (LATM) Pilot Study for the suburb of Lathlain that is being used to develop and implement innovative traffic management treatments with the potential for Town-wide application.

The LATM Pilot Study has been undertaken over a series of stages (with separate reports prepared for each):

- an assessment of the background traffic and transport data, site inspections and a review of previous resident complaints;
- the development of concept traffic calming designs for various road types for use across the Town (not just within Lathlain) and the development of proposals to install traffic calming treatments throughout the suburb to address identified issues; and
- stakeholder and public consultation between 13 November 2014 and 16 December 2014.

This report collates the previous work that has been undertaken and makes a number of recommendations.

1.2 Local Area Traffic Management

Austroads Guide to Traffic Management Part 8: Local Area Traffic Management (2008) defines LATM as being 'concerned with the planning and management of the usage of road space within a local traffic area, often to modify streets and local networks which were originally designed in ways that are now no longer considered appropriate to the needs of residents and users of the local area.' As such, LATM may include traffic calming using a number of techniques such as physical and psychological measures and regulations to influence road user operation.

Typically, a local traffic area only contains local streets and collector roads rather than major arterial roads – which (along with other physical barriers) usually form the boundary of the area under consideration. This is due to the different intended functions and roles for each type of road.

As such, LATM typically aims to address issues with respect to:

- Reducing traffic related problems – improved safety through speed moderation, driver behaviour and enhanced street space;
- Traffic management and planning – for instance problems relating to traffic growth, rat-running and/or the use of various roads by inappropriate vehicles;
- Providing for (and encouraging) walking, cycling and public transport; and
- Improving environmental, economic and social outcomes.

2 Site Context

2.1 Town of Victoria Park

The Town of Victoria Park is located approximately five kilometres to the south-east of the Perth central business district with a population in the order of 32,000 with over 15,000 dwellings. It is bordered by the Swan River to the north along with three other local authorities, namely the cities of Belmont to the east, Canning to the south and South Perth to the west. The population forecast for the Town is 48,100 people by 2031 with an estimated 21,850 dwellings[1].

2.2 Suburb of Lathlain

The suburb of Lathlain is located in the north-eastern corner of the Town and is bordered by the Armadale/Thornlie railway line to the west, Great Eastern Highway to the north, Graham Farmer Freeway/Orrong Road to the east and Miller Street/Roberts Road to the south. An outline of Lathlain relative to the Town with the associated road network is shown in Appendix A.

Over 3,000 people were reported as living in Lathlain in the 2011 census, with the land use typically being residential in nature with associated amenities such as shops, parks and reserves, and a primary school. Eight percent of occupied private dwellings had no registered motor vehicles, while 35.1%, 36.5% and 17.4% had one, two, and three or more registered motor vehicles respectively (the remaining percentage consisted of households which did not provide information). Proportionately, Lathlain has a slightly higher percentage of households having less than or equal to one motor vehicle registered compared to the whole of Western Australia - which had 6.1% private dwellings with no registered vehicles, and 32.6% of private dwellings with one registered motor vehicle.

2.2.1 Road Hierarchy and Speed Limits

The Main Roads WA road hierarchy has five different road classifications which are applicable for the Town of Victoria Park:

- **Primary Distributor roads**: these roads are managed and controlled by Main Roads WA and cater for the movement of inter-regional and/or cross town traffic.
- **District Distributor A roads**: these roads are managed by the Town and provide for high capacity traffic movements between industrial, commercial and residential areas. Traffic volumes over 8,000 vehicles per day (vpd) can be expected for these roads.
- **District Distributor B roads**: these roads are managed by the Town and provide for reduced capacity but high traffic volumes travelling between industrial, commercial and residential areas. Traffic volumes over 6,000 vpd can be expected for these roads.
- **Local Distributor roads**: these roads are managed by the Town and provide for movements within local areas and connect access roads to higher order Distributor roads. The maximum desirable traffic volume for these roads is 6,000 vpd.
- **Access roads**: these roads are managed by the Town and provide access to abutting properties with amenity, safety and aesthetic aspects having priority over the vehicle movement function. The maximum desirable traffic volume for these roads is 3,000 vpd.

[1] Sourced from the Town of Victoria Park's 'Integrated Movement Network Strategy' (June 2013).

Given the residential nature of the suburb, the majority of roads in Lathlain are classified as Access roads with a speed limit of 50km/h with the exception of Orrong Road (70km/h) and Great Eastern Highway (60km/h) which are both Primary Distributor Roads, and Roberts Road (50km/h) which is classed as a District Distributor B road.

Correspondence with the Town has revealed that Rutland Avenue was previously classified as a Local Distributor road but is currently classed as an Access road.

The Main Roads WA road hierarchy for the suburb of Lathlain as well as existing speed limits are contained in Appendix B.

2.2.2 Previous Complaints and Town Investigations

Between October 2012 and July 2014 when the first stage of the project commenced, the Town had received and responded to 14 complaints from local residents concerning traffic issues within the suburb of Lathlain. The complaints were centred on nine different streets, with the most complaints received in 2014 (eight complaints in the first half of the year) followed by 2013 (five complaints) and a single complaint in 2012 in the month of October.

Goddard Street and/or Streatley Road were the focus of a total of seven complaints, three of which identified the intersection of Goddard Street/Streatley Road as a perceived road safety concern. Howick Street and Rutland Avenue also received three complaints each. Overall, concerns relating to vehicle speeds (including 'hooning') and requests for traffic calming were the primary issues raised with more minor concerns relating to traffic volumes/movements and road safety in general.

It is noted and acknowledged that since July 2014, the Town has received a number of additional relevant complaints as well as feedback via the community consultation exercise associated with this Study. In particular, recent concerns have been raised with respect to northbound vehicles on Goddard Street using the wrong side of the road in the vicinity of Streatley Road to overtake waiting vehicles queuing back from the Goddard Street/Orrong Road intersection and using a right of way located off Streatley Road to access Orrong Road.

3 Local Strategy and Policy Document Review

3.1 Integrated Movement Network Strategy (2013)

The Integrated Movement Network Strategy (IMNS) that was developed in 2013 provides the Town with a high level framework to guide the development of detailed future actions plans (up to 2031) for delivering an efficient, safe, well-connected and sustainable transport system. The IMNS contains six strategies for improving the Town's transport network:

- Roads – Providing limited improvements focussed on balancing the needs of local and regional traffic for all road users, as well as the management of existing road infrastructure.
- Public Transport – Using resources and revenue to greatly improve public transport services and infrastructure. Land-use/planning requirements will be linked to public transport objectives, for example protecting railway reserves.
- Parking – Building on the existing Parking Management Plan (See Section 3.2) and supporting the active management of parking supply as well as monitoring/adjusting for future demand. This includes reducing the impact of commuter parking for instance by providing on-street parking management as appropriate.
- Walking and Cycling – Maximising priority for pedestrians and cyclists particularly around activity centres, and improving the provision of facilities and infrastructure in accordance with the Town Planning Scheme (See Section 3.3) to meet the estimated demand of pedestrian and cycling activities.
- Travel Demand Management – Adopting a proactive approach including the provision of financial incentives and setting mandatory requirements in the Town Planning Scheme (such as the completion of travel plans for major developments at the development application stage and/or the provision of 'End of Trip' facilities).
- Monitoring and Feedback – Monitoring all transport activities and providing feedback to further improve the transport network.

The following elements are of particular relevance to transport planning and infrastructure provision in Lathlain:

- The development of a town wide Traffic Management Plan will provide an opportunity to address local traffic issues (for instance in Lathlain) while ensuring that any LATM treatments support the creation of pedestrian and cycle friendly streets, for instance by reducing speeds and or traffic volumes.
- Residents living in the eastern half of Lathlain generally have to travel a distance of more than 800m to access train stations. As part of this, it is noted that residents in eastern Lathlain do have access to public transport with bus stops on Great Eastern Highway as well as the number 39 bus service which runs through Lathlain (see Section 4.5).
- There is a need to work with the Public Transport Authority (PTA) and the Department of Transport (DoT) to review the existing public transport routes through and around the suburb.
- The Great Eastern Highway and Orrong Road have insufficient capacity to meet the estimated vehicle travel demand between 2021 and 2031.

- Specifically, the IMNS supports:
  - Signalisation of the existing priority controlled intersection (seagull arrangement) of Roberts Road/Orrong Road.
  - Reclassification of Bishopsgate Street between Roberts Road and Oats Street (outside the suburb of Lathlain) into a Local Distributor.
  - Implementation of additional traffic management devices on Howick Street or monitoring the road for potential reclassification in the Town's functional road hierarchy.
  - Provision of on-road cycle lanes on Bishopsgate Street between Roberts Road and Rutland Avenue.

3.2 Parking Management Plan (2012)

The Parking Management Plan (PMP) has been developed to provide a framework for guiding parking management activities in the future and implementing changes to address parking demand/supply issues. The PMP has identified seven parking management hotspots within the Town and has developed draft plans for these locations.

Whilst none of the identified parking management hotspots are located within Lathlain, the PMP states that roads in the suburb of Lathlain in the vicinity of Victoria Park Station should be considered for parking restrictions due to the potential for a spill-over of parking resulting from parking management changes in Hotspot Area 6 – located in the suburb of Victoria Park west of Victoria Park Station. However, no specific parking management changes for Hotspot Area 6 are proposed in the PMP with the PMP stating that 'Hotspot 6 has already experienced a number of parking management changes'. Furthermore, the PMP highlights a potential residential amenity issue that 'streets adjacent to the Victoria Park Station in Lathlain be considered for parking restrictions' in order to 'manage spill over from other parking changes and ensure traffic and pedestrian safety.'

In addition, parking Hotspot Area 4 (in the suburb of Burswood) is noted as being adjacent to the area under consideration, albeit separated by the railway line that divides the two suburbs (with a pedestrian/cycle over-bridge linking the two areas).

3.3 Town Planning Scheme No. 1 (Plan 7)

The Town Planning Scheme Precinct No. 1 (Plan 7) indicates that the suburb of Lathlain is classified predominantly as a 'Residential' zone under the Town's Planning Scheme with the exception of:

- Lathlain Park – which is classified as 'Parks and Reserves' with 'Restricted Public Access' under the Metropolitan Region Scheme Reserves.
- Lee Reserve and Rayment Park – which are classified as 'Parks and Recreation' under the Town's Scheme Reserves.
- Lathlain Primary School – which is classified for 'Public Purposes' under the Town's Scheme Reserves.
- Limited areas of land on Lathlain Place and Francisco Place – which are classified as Local Centres under the Town's Planning Scheme.
- Land adjacent to Great Eastern Highway between Cornwall Street and Maple Street which is classified as Commercial under the Town's Planning Scheme.

The Town's Planning Scheme has the intention of maintaining and further developing the Lathlain Precinct as a predominantly low-medium density residential area. The scheme states that existing commercial areas along Great Eastern Highway will be controlled to ensure that there are no adverse impacts on the adjacent residential areas, with land-uses considered incompatible with residential users being encouraged to relocate. The Scheme also aims to provide a safe and accessible environment for public transport and vulnerable roads users.

3.4 Lathlain Precinct Structure Plan (2000)

The Lathlain Precinct Structure Plan was finalised in November 2000 following a high level planning study and extensive consultation to identify traffic/planning issues within the suburb. The Structure Plan provided a series of recommendations for addressing the identified traffic/planning issues for the purposes of allocating budgetary funds.

Most of the recommendations for addressing identified traffic issues as outlined in the Structure Plan appear to have been implemented with the exception of the following:

- Rutland Avenue – upgrade of the railway reserve with landscaping.
- Rutland Avenue – installation of mid-block landscaped 'nibs' (kerb build-outs) to create two lane slow points near Howick Street and Enfield Street.
- Gallipoli Street – installation of mid-block landscaped kerb build-outs to create two lane slow points between Saleham Street and Howick Street, Egham Road and Enfield Street, and Midgley Street and Streatley Road.
- Goddard Street – installation of mid-block landscaped kerb build-outs to create two lane slow points between Enfield Street and Cookham Road, and Cookham Road and Midgley Street.
- Goddard Street – restrict south bound traffic on Goddard Street from turning right onto Streatley Road.
- Enfield Street – construct paved entry statement at the north-western approach at the intersection of Roberts Road/Enfield Street.
- Bishopsgate Street – install advanced destination signage at the intersection of Rutland Avenue/Bishopsgate Street pointing towards Roberts Road with an arrow pointing to "Roberts Road and Graham Farmer Freeway".
- Francisco Place – reconnect Streatley Road with Francisco Place to provide a signalised access point into/out of Lathlain.

3.5 Traffic Management Intervention Warrant System

The Town's Traffic Management Intervention Warrant System relates specifically to Local Distributor and Local Access roads and sets out an investigation procedure for residents' complaints and a warrant scoring system. The warrant scoring system is based on a number of parameters, with points given for each element:

- Traffic speed – measured 85th percentile operating speeds being above the speed limit.
- Traffic volume – Annual Weekday Traffic (AWT) volumes.
- Crash history – split by fatal, injury and property damage only.

- Topography – split by horizontal and vertical curves with both restricted and unrestricted sight distance.
- Road user type ('vulnerable road users') – major bicycle/pedestrian crossing points and bicycle routes.
- Activity generators – including 'college', 'school' and 'retail'.
- Commercial traffic ('amenity factors') – percentage of trucks with an Austroads Classification of 6 or greater as well as 'rat-running through traffic' which is determined as a percentage of peak hour traffic volumes to AWT volumes.

The total number of points scored indicates the relative importance of a resident's complaint compared to other traffic issues that the Town needs to address and subsequently fund.

4 Existing Network Data

4.1 Traffic Volumes

Average Weekday Traffic (AWT) volumes for a number of roads within the study area between September 2012 and June 2014 have been supplied by the Town. Details of these traffic volumes (along with the measured 85th percentile speeds) are contained in Appendix C and summarised below.

Roberts Road (District Distributor B road) is the only road classified higher than a Local Access road in the suburb that is controlled and managed by the Town. The AWT volume varies from approximately 9,900 vehicles per day (south western end – near Bishopsgate Street) to 7,700 vehicles per day (north eastern end – near Orrong Road).

Goddard Street (north of Bishopsgate Street) carries approximately 2,500 vehicles per day (AWT) with the section near Streatley Road having slightly in excess of 3,000 vehicles per day. It is noted that Howick Street (east of Getting Street), Gallipoli Street (between Streatley Road and Cornwall Street) and Cornwall Street (west of Gallipoli Street) also carry in excess of 2,000 vehicles per day. Rutland Avenue, Castle Way, sections of Enfield Street, as well as other sections of Howick Street, Gallipoli Street and Cornwall Street have AWT volumes in the order of 1,500 to 2,000 vehicles per day.

Of the remaining Local Access roads, the majority have AWT volumes below 1,000 vehicles per day whilst those between 1,000 and 1,500 vehicles per day (AWT) tend to be acting as a feeder to the above favoured routes through the suburb.

Further to this, peak hour traffic volumes were also reviewed to identify any roads that may potentially be used as 'rat-run' routes. Peak hour traffic volumes greater than 14% of the AWT volume on urban residential streets generally indicate that 'rat-run' through movements may be occurring[2]. Rutland Avenue and Howick Street (between Goddard Street and Roberts Road) have recorded peak hour traffic volumes in excess of 14% of their respective AWT volumes, although it should be noted that Howick Street serves the local Primary School and will be affected by associated traffic. All other roads had recorded peak hour traffic volumes less than 14% of their respective AWT volumes.

4.2 Vehicle Speeds

As indicated in Section 2.2.1, the speed limit within Lathlain is typically 50km/h albeit with Great Eastern Highway and Graham Farmer Freeway/Orrong Road being 60 km/h and 70 km/h respectively (see Appendix B). In addition, school zones (reduced speed limits of 40 km/h during school peak periods) exist within the suburb on sections of Howick Street, Keyes Street, Waller Street and Petherbridge Street.

A review of the measured operational 85th percentile speeds[3] supplied by the Town (see Appendix C) indicates that local Access roads such as Rutland Avenue, Enfield Street (between Goddard Street and Roberts Road), Goddard Street and Streatley Road have 85th percentile speeds well above the speed limit (i.e. over 10 km/h) whilst Gallipoli Street has an 85th percentile speed of 59 km/h (9km/h

[2] Ogden and Taylor. Traffic Engineering and Management. Institute of Transport Studies. Monash University. 1999
[3] The 85th percentile speed is the speed at/below which 85 percent of the vehicles travel at.

over the speed limit). Other roads with 85th percentile speeds between 55 km/h and 59 km/h include Cornwall Street, Enfield Street (between Gallipoli Street and Goddard Street) and Cookham Road.

Roberts Road, the only District Distributor in Lathlain had 85th percentile recorded speeds of up to 60 km/h (10 km/h over the posted speed limit).

4.3 Crash Data

Crash data for the five year period between 2009 and 2013 has been collated from the Main Roads WA Crash Analysis Reporting System (CARS) and assessed for the suburb. This crash data has been analysed and mapped – see Figures 4.1 and 4.2.

4.3.1 Local Road Network

As indicated in Figures 4.1 and 4.2, crash locations are focussed along the major arterial roads around the precinct. However, there are four hazardous intersections that exist on the local road network (managed and controlled by the Town) with respect to meeting the National Black Spot Crash Criteria: at least two casualty (fatal, hospital or medical) crashes over a five year period (see Table 4.1). It is noted that all four of these intersections also meet the State Black Spot Crash Criteria of five crashes (casualty and non-injury) over a five year period.

Table 4.1 – Intersections within Lathlain which meet Black Sport Crash Criteria

Intersection	Crash Summary	Main Roads WA Crash Ranking[4]
Roberts Road/Bishopsgate Street	6 medical, 15 property damage	1794
Roberts Road/Howick Street	2 medical, 13 property damage	2346
Goddard Street/Streatley Road	2 medical, 5 property damage	3227
Goddard Street/Enfield Street	1 hospital, 1 medical, 3 property damage	6313

The predominant crash type for the Roberts Road/Bishopsgate Street, Goddard Street/Streatley Road and Goddard Street/Enfield Street intersections are right angled crashes with generally at least 80% of all crashes being attributed to this crash type. The Roberts Road/Howick Street intersection had a 2:1 split between right angled and rear end type crashes respectively. It is noted that over 50% of the crashes at the intersection of Roberts Road/Bishopsgate Street occurred during night-time/low light conditions. Additional details relating to these hazardous locations are given in Section 9.

In total, there were 12 crashes involving cyclists on the local road network including one hospital crash, five medical crashes, five property damage crashes and one crash with unknown crash severity. The majority of these crashes (eight) occurred along Roberts Road, including six crashes at the intersection of Bishopsgate Street/Roberts Road. The remaining crashes occurred on Cornwall Street, and at the intersection of Goddard Street/Enfield Street. It is noted that none of the recorded crashes within the local road network involved any pedestrians.

4 The Main Roads WA State Intersection Crash list ranked by social cost. It should be noted that there appear to be some discrepancies in the number of crashes between the detailed crash reports obtained from CARS and the Crash Ranking Reports.

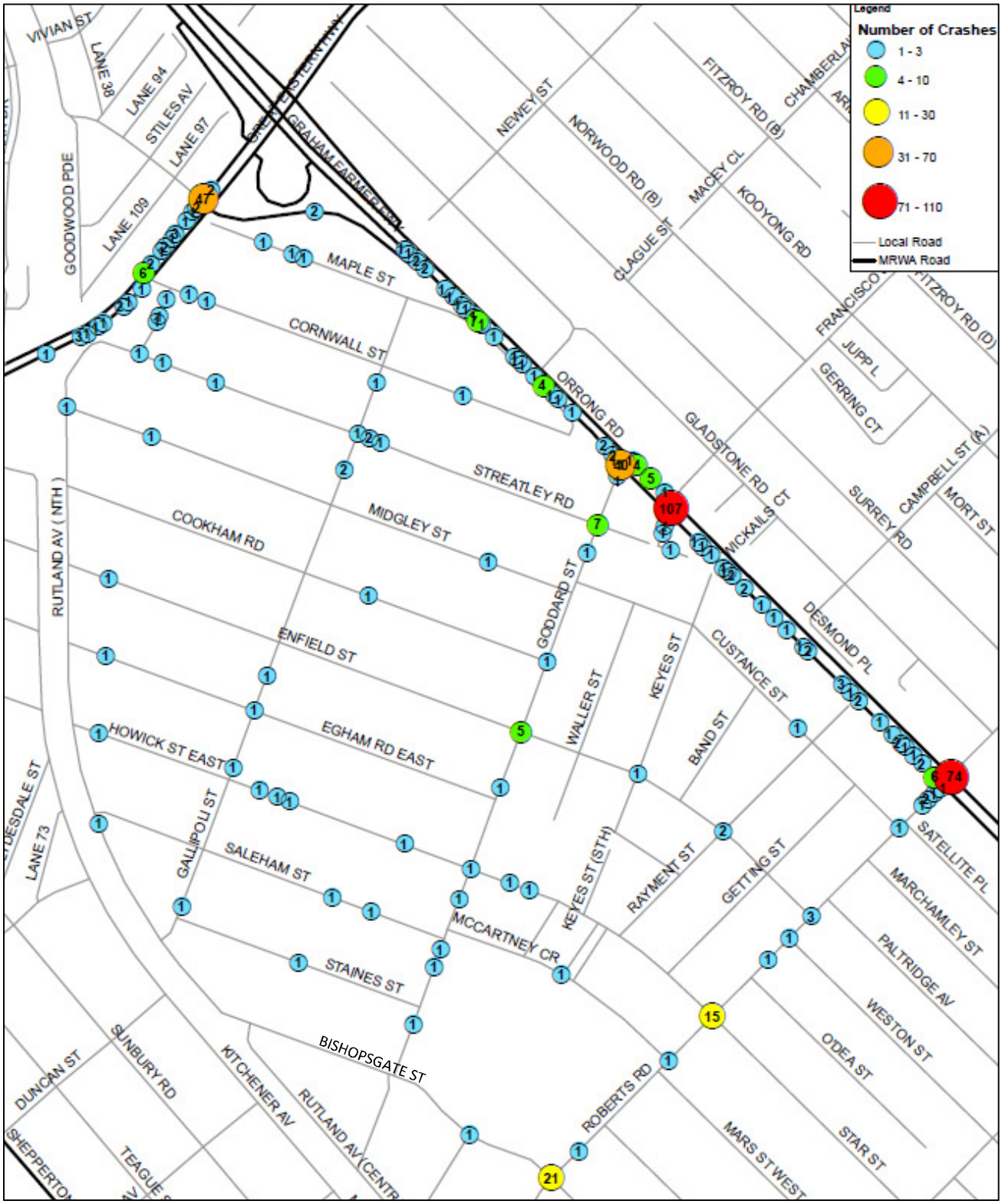

Figure 4.1 – Map of all recorded crashes between 2009 and 2013

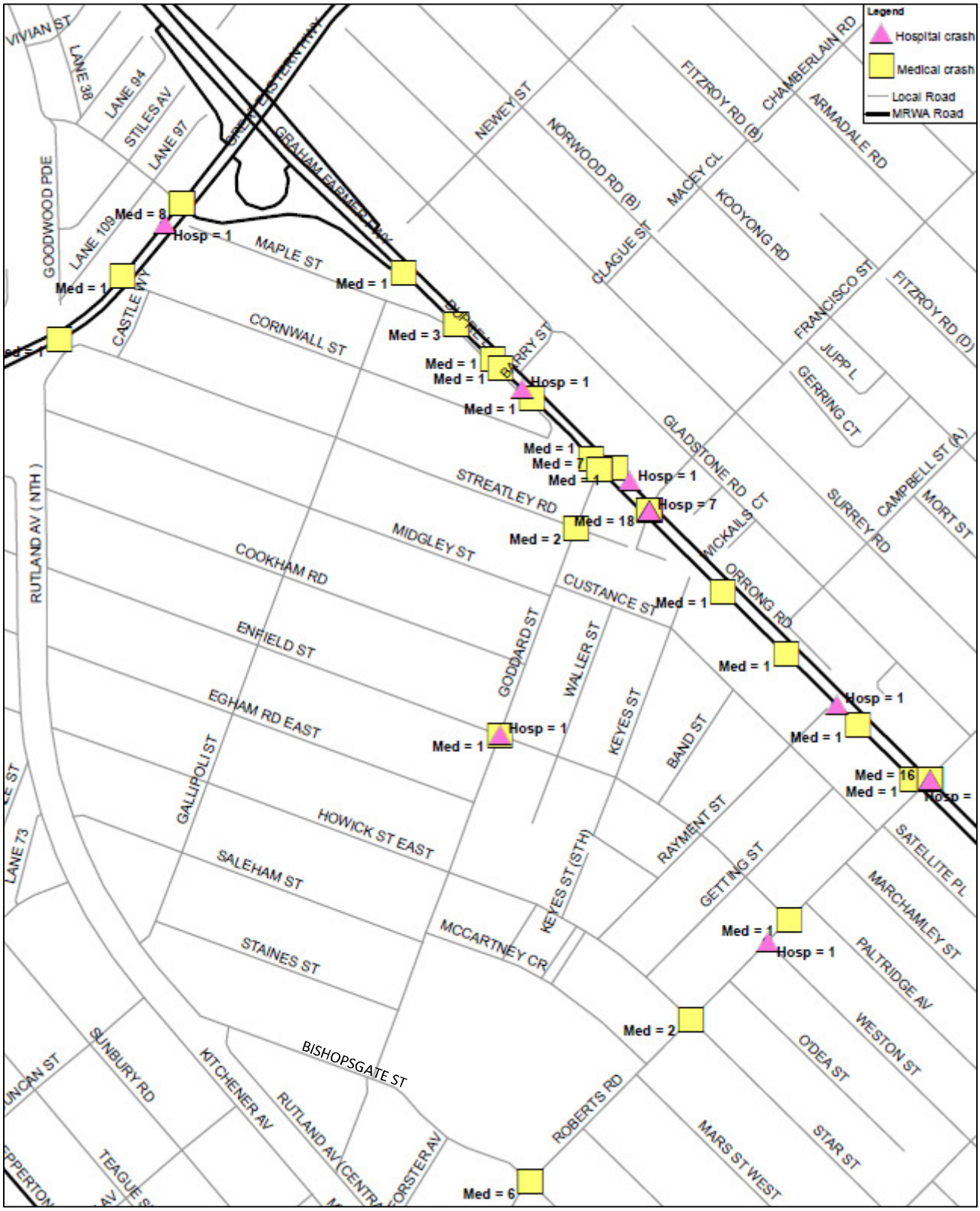

Figure 4.2 – Map of all recorded casualty crashes between 2009 and 2013

4.3.2 State/Local Road Network

In addition to the local road network, a number of casualty crashes also occurred where the local roads connect with the Primary Distributor roads (see Table 4.2).

Table 4.2 – Intersections with Casualty Crashes where Local Roads connect with Primary Distributor Roads

Intersection	Crash Summary	Main Roads WA Crash Ranking[5]
Francisco Place/Orrong Road/Francisco Street	7 hospital, 18 medical, 82 property damage crashes	160
Roberts Road/Orrong Road	3 hospital, 16 medical, 55 property damage	347
Goddard Street/Orrong Road	7 medical crashes, 33 property damage crashes	828
Cornwall Street/Great Eastern Highway	1 Medical, 5 property damage crashes	2632

Although there were a total of 107 crashes at the intersection of Francisco Place/Orrong Road/Francisco Street, only seven of the crashes involved vehicles from the Francisco Place approach. All seven of these crashes were right angled crashes and included three casualty crashes. Right angled and rear end crash types constituted 90% of all crash types at the Roberts Road/Orrong Road intersection. At the intersection of Goddard Street and Orrong Road (which has a left-in/left-out arrangement), 34 of the 40 crashes were caused by northwest bound traffic on Orrong Road rear ending vehicles turning left into Goddard Street. It is also noted that four of the six crashes at the intersection of Cornwall Street/Great Eastern Highway involved vehicles turning into/out of Cornwall Street, including the single recorded medical crash.

In total, there were 10 crashes involving pedestrians and/or cyclists on the Main Roads WA road network including four hospital crashes, three medical crashes and three property damage crashes. Four of these crashes occurred along Great Eastern Highway with the remaining six crashes occurring on Orrong Road including two crashes at the intersection of Roberts Road/Orrong Road.

4.4 Walking and Cycling

A review of the Department of Transport's Local TravelSmart map for Victoria Park (see Figure 4.3) indicates that a number of formally recognised cycle routes pass through and around Lathlain. Shared paths for pedestrians and cyclists are shown as existing along Miller Street and Roberts Road (South of Bishopsgate Street), Orrong Road, Great Eastern Highway and near Maple Street - although it is suggested that some of the routes no longer have shared facility markings and/or are badly faded.

Furthermore, (un-signed) on-road cycle lanes are shown on Bishopsgate Street and Roberts Road. Rutland Avenue, Streatley Road, Gallipoli Street and Howick Street are also identified as local bicycle friendly streets (including Bishopsgate Street and Roberts Road). However, it should be noted that Roberts Road and Gallipoli Street had 85th percentile speeds in excess of 55 km/h while Rutland

[5] The Main Roads WA State Intersection Crash list ranked by social cost.

Avenue and Streatley Road had 85th percentile speeds in excess of 60 km/h. These higher traffic speeds are not desirable for local bicycle friendly streets.

Parking facilities for cyclists are shown as being provided throughout Lathlain including at locations near the Victoria Park Train Station, Lathlain Primary School, parks and reserves, and near key entry points into Lathlain such as the intersections of Roberts Road/Orrong Road, Goddard Street/Orrong Road and Cornwall Street/Great Eastern Highway.

There are two pedestrian (cycle) over-bridges across the railway line connecting with Rutland Avenue: the bridge located north of Midgley Street provides connectivity to the shared path on Great Eastern Highway, while the bridge located south of Howick Street provides connectivity into the suburb of Burswood. In both instances, the overbridges allow pedestrian (and cycle) connectivity to the nearby railway stations.

Figure 4.3 – Cycle Routes and Facilities

4.5 Public Transport

As indicated in Figure 4.4, the number 39 bus service travels through Lathlain along the local road network utilising part of Howick Street, Goddard Street, Streatley Road, Gallipoli Street and Cornwall Street. In addition, the PTA have noted that a Train Replacement Service (No. 907) also operates along Cornwall Street, Castle Way, Rutland Avenue and Bishopsgate Street.

Further public transport facilities include the Burswood Train station, located approximately 300m north of the Streatley Road/Rutland Avenue intersection while the Victoria Park Train Station (which has pedestrian access from Rutland Avenue) is located on the western boundary of the suburb.

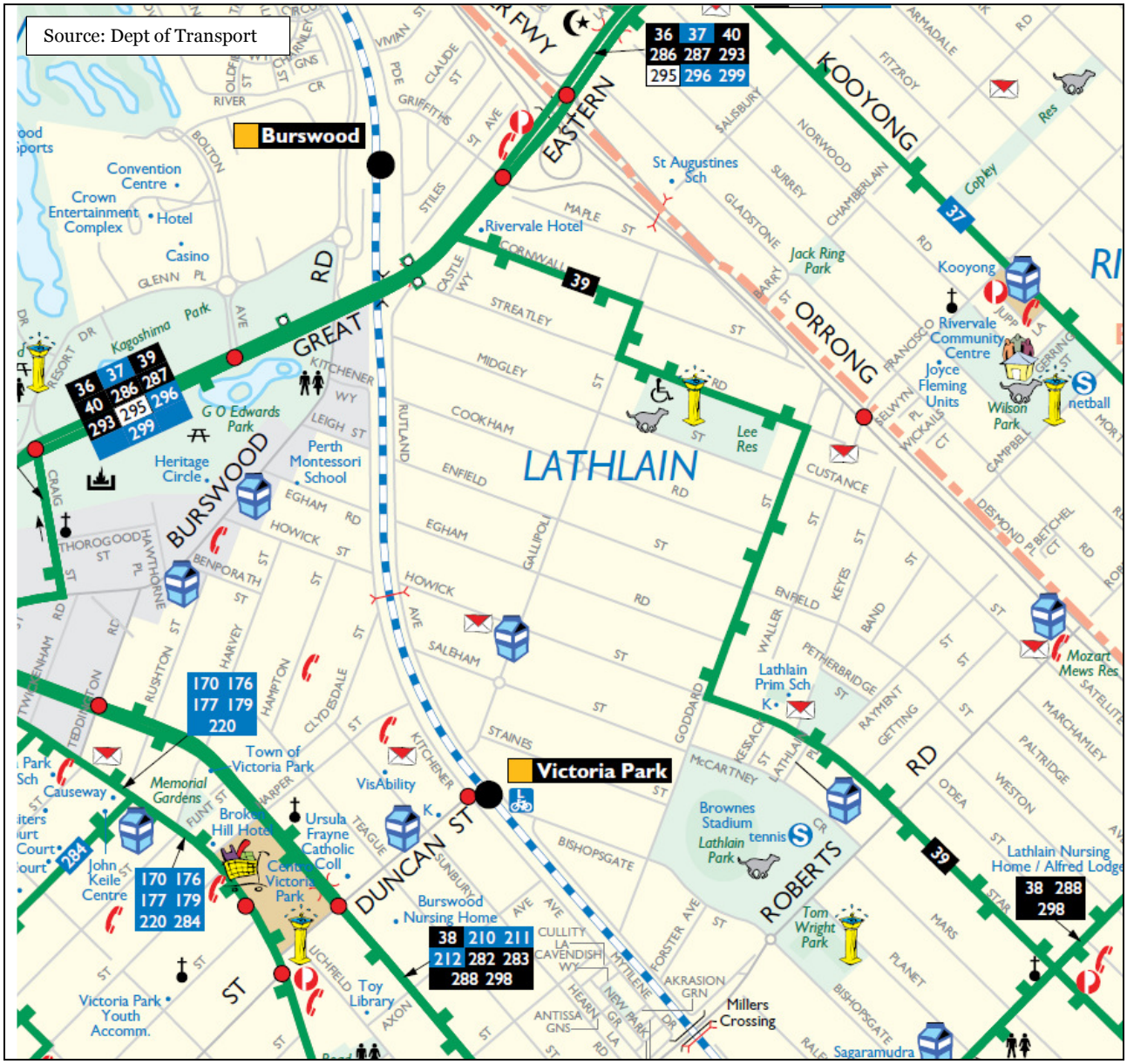

Figure 4.4 – Public Transport Routes and Facilities

4.6 Traffic Management

A review of existing traffic management and traffic calming devices around/within the suburb has indicated that a number of measures have already been installed whilst other measures are also currently planned for 2014/15 – see Figure 4.5.

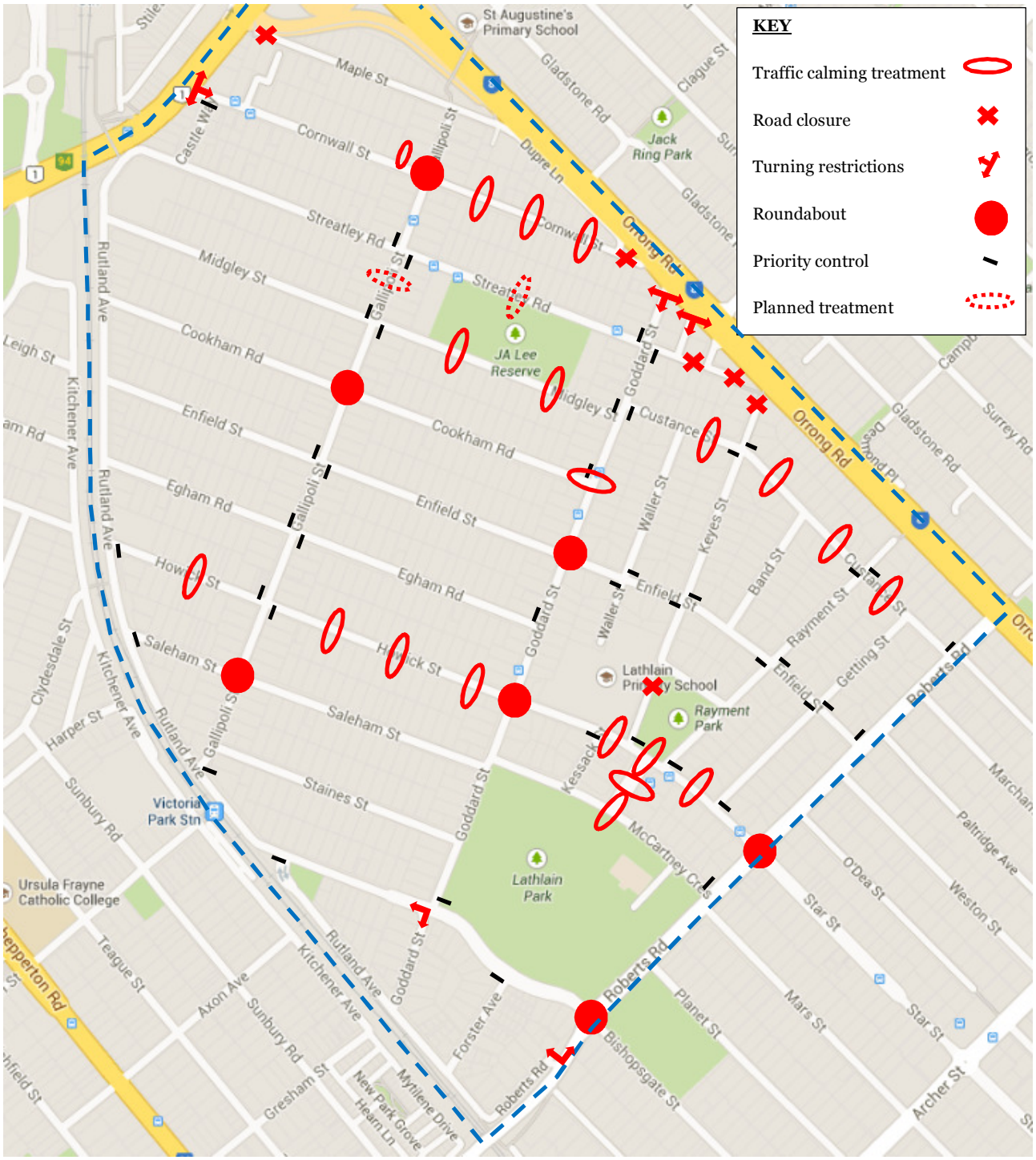

Figure 4.5 – Study Area and Existing Traffic Management

A series of roundabout treatments have been installed on three relatively long straight roads in the north-east/south-west direction: Gallipoli Street, Goddard Street and Roberts Road. Other traffic calming treatments intended to address vehicle speeds such as speed cushions, speed humps and one-way slow points have been installed on various roads in the north-west/south-east direction including Cornwall Street, Midgley Street, Custance Street and Howick Street.

As part of the one-way slow points, it is noted that the priority of vehicles is currently unsigned/ unmarked. While this ambiguous nature may potentially be beneficial from a traffic calming perspective (i.e. vehicles slowing down even further to assess the priority situation at these treatments prior to proceeding), there is a risk that this lack of clarity may lead to issues in terms of insurance and/or legal claims if a conflict were to occur.

It is also noted that there are a number of treatments that provide horizontal deflection/width restrictions (e.g. chicanes, kerb build-outs and traffic islands) on Goddard Street. However, during the site inspection, vehicles including buses and trucks were observed to typically drive through these sections of Goddard Street with the measures having minimal impact on speed (and are subsequently not shown in Figure 4.5).

The carriageway width for Streatley Road and Howick Street is approximately 10m, which is generally wider than most north-west/south-east oriented roads (approximately 7m - 8m carriageway width) within the suburb. It is noted that whilst Howick Street has a number of traffic calming treatments along its length between Rutland Avenue and Roberts Road, currently none exist on Streatley Road (see below). As such, there is a potential risk that the driving environment on Streatley Road (i.e. wide road without any traffic calming treatments) will encourage motorists to speed – which is reflected in the speed data.

As noted previous and indicated in Figure 4.5, in addition to the existing treatments in the suburb, traffic calming in the form of a blister island on Streatley Road between Goddard Street and Gallipoli Street and a double lane angled slow point on Gallipoli Street between Midgley Street and Streatley Road is planned for construction in 2015.

4.7 Site Inspection Findings

All roads within the precinct have been reviewed and inspected as part of the Study, with specific locations investigated further on foot. As part of the formal site inspection that was undertaken during the day time on 02 July 2014, the principles associated with a network road safety audit have been applied with respect to:

- Sightlines and vegetation;
- Topography;
- The provisions for vulnerable road users such as cyclists and pedestrians; and
- Roadside hazards.

Notwithstanding the above, the site inspection was not, nor was it intended to be, a formal road safety audit of the existing road and path network. As such, it is noted that a night time inspection has not carried out.

In addition to the above however, it should be noted that a number of other informal site visits (during the day and night) have been undertaken since the initial inspection.

4.7.1 Visibility

The topography around the suburb of Lathlain is such that the landform rises from Gallipoli Street to a ridge half way between Gallipoli Street and Rutland Avenue/Great Eastern Highway. This rise in landform creates vertical crests along Maple Street, Cornwall Street, Streatley Road, Midgley Street, Cookham Street, Enfield Street, Egham Road, Rutland Avenue and Howick Street which reduce the forward visibility on these roads (see Figure 4.6).

Figure 4.6 – Vertical Crest limiting Forward Visibility

During the site inspection, vehicles were observed to be parked on-street along many of the above mentioned roads (except for Cookham Road which has a 'No Parking' restriction denoted by yellow lines) in the vicinity of crests, despite such behaviour being prohibited in the WA Road Traffic Code 2000. The limited forward visibility and possibility of on-street parking could lead to potential conflict with on-coming vehicles when overtaking parked vehicles.

The separation between the Great Eastern Highway/Cornwall Street and Cornwall Street/Castle Way intersections is approximately 35m. Due to the close proximity of the intersection of Great Eastern Highway/Cornwall Street, right turning vehicles out of Castle Way have limited visibility to the northwest of vehicles that are turning left into Cornwall Street from Great Eastern Highway. Furthermore, the curve radius on the northern corner of the Great Eastern Highway/Cornwall Street intersection appears to be quite large, which may encourage vehicles to turn left into Cornwall Street from Great Eastern Highway at a higher speed. This potentially higher operating speed of this manoeuvre would normally increase the sight distance required for vehicles turning right out of Castle Way (as sight distance requirements are based on operating speeds of opposing vehicles). Furthermore, there is a risk that vehicles turning into Cornwall Street from Great Eastern Highway may potentially collide with the rear end of any vehicles queueing to turn right into Castle Way.

4.7.2 Road Safety Barriers

A road safety barrier has been installed along sections of the western side of Rutland Avenue, for instance between Midgley Street and Castle Way. The provision of the road safety barrier effectively reduces the usable footpath width to approximately 1.2m. In addition, the steel posts that form part of the barrier structure are exposed to pedestrians (and cyclists which were observed to use this path) i.e. hand/rub rails have not been provided on the road safety barrier. As such, there is a risk that pedestrians and cyclists may 'snag' on these exposed steel posts. It is also noted that the barrier is installed on top and set back from the kerb line as opposed to in between the kerb line and the road which is generally the preferred method of installation.

Figure 4.7 – Road Safety Barrier with Exposed Steel Posts

The road safety barriers also appear to have non-standard terminal treatments, for instance in the form of a 'fish-tail' design. Such barrier terminals are hazards and could 'spear' any errant vehicles that may collide with them.

4.7.3 Vegetation

During the July 2014 site inspection, vegetation and trees were noted to block and/or reduce the forward visibility to intersection controls at the following locations:

- Streatley Road/Gallipoli Street (south eastern approach);
- Midgley Street/Gallipoli Street (north western approach);
- Enfield Street/Gallipoli Street (south eastern approach);
- Egham Road/Gallipoli Street (north western approach); and
- Goddard Street/Streatley Road (north western approach).

5 Proposed Redevelopments/Projects

5.1 Lathlain Precinct Redevelopment Project/Lathlain Place Concept plan

Lathlain Place is a dual carriageway road (approximately 100m in length) between Howick Street and McCartney Crescent. The site previously had a combination of 90 degree parking and parallel parking on either side of each carriageway with a total of 63 car parking spaces. The land use adjacent to Lathlain Place primarily consists of shops/cafes on the north western side, with a small park and public community buildings (proposed to be redeveloped) on the south eastern side of Lathlain Park. The Town had previously identified concerns over the existing configuration of Lathlain Place with respect to drainage, street lighting and the safety of pedestrians crossing the road.

Accordingly, the Town is in the process of upgrading Lathlain Place to improve the public amenity and ensure a pedestrian friendly environment. The Lathlain Place Concept Plan developed by the Town includes:

- Raised intersections on either side of Lathlain Place to provide traffic calming on Howick Street and McCartney Crescent on the approach to Lathlain Place.
- Thirty two car parking spaces (90 degree) within Lathlain Place and over 30 car park spaces on McCartney Crescent. The aim of this car parking arrangement is to decrease the number of through vehicles on Lathlain place while trying to maintaining the existing car parking provision immediately surrounding the Lathlain Place precinct.
- Widening the existing median strip along Lathlain Place to connect with Rayment Park, an existing public open space adjacent to Rayment Street (north of Lathlain Place). The raised median is proposed to have a dedicated pedestrian walkway, play areas, seating and other streetscaping improvements.
- Other improvements such as drainage and street lighting upgrades, the provision of cycle parking and rubbish bins.

It is noted that as part of this redevelopment project, Rayment Park is also proposed to be upgraded to improve public amenity to a level that is consistent with Lathlain Place.

5.2 Lathlain Park Redevelopment

Lathlain Park is zoned under the Metropolitan Region Scheme as a 'Reserve for Recreation'. The site is bound by McCartney Crescent, Roberts Road, Bishopsgate Street and Goddard Street. Currently, Lathlain Park has a single oval which is used by the Perth Football Club (PFC). The site also has other supplementary uses and developments included car parking and tennis courts.

In 2013, the Town and the West Coast Eagles (WCE) entered into discussions regarding the potential relocation of the West Coast Eagles' training and administration centre into Lathlain Park. Accordingly, the Town is to redevelop Lathlain Park with the following amenities:

- PFC to remain on-site in their present location with an estimated 10 home games a year.
- WCE to lease the site for an initial term of 50 years with a possibility for extending the lease.
- Provision of two AFL standard ovals with a synthetic running track around one oval.

- Provision of parking around the site (approximately 260 car park spaces).
- Substantial training and administration buildings on the southern side of Lathlain Park.
- Upgrade of community recreational areas including playground areas, picnic/barbeque areas and multi-purpose courts.

The Town has undertaken an indicative parking study of the proposed parking provision as part of the above mentioned improvements which concluded that sufficient parking should be available throughout and around the site. Notwithstanding the additional parking proposed for McCartney Crescent, it is important to note that at present, there is restricted parking available on Bishopsgate Street, Goddard Street and Roberts Road adjacent to Lathlain Park.

5.3 Red Castle Motel Redevelopment

The site on the corner of Rutland Avenue and Midgley Street was formerly occupied by the Red Castle Tavern and Motel which closed in 2012. This site is proposed to be redeveloped to provide 141 apartments with 185 car parking spaces. A Traffic and Parking Assessment undertaken in October 2013 by Riley Consulting determined that approximately 640 vehicles per day will be generated as a result of the proposed development. The assessment concluded that the impact of this development traffic is not significant given the relatively low volumes of traffic in the identified surrounding road network of Rutland Avenue, Castle Way, Cornwall Street, Streatley Road and Midgley Street which have less than 2,000 vehicles per day. The assessment also concluded that sufficient on-site parking will be provided as part of the proposed development given the close proximity to the Burswood and Victoria Park Train Stations (within 300m and 800m respectively).

The development provides for two access points: one on Streatley Road (approximately 25m East of Castle Way), and the other on Rutland Avenue (immediately south of the horizontal curve which is located West of Castle Way). The assessment concluded that the access to the site at both locations can "be achieved in accordance with current standards" in terms of AS2890.1 Parking Facilities - Part 1: Off-street Car Parking, whilst noting that the access on Rutland Avenue does not achieve the Safe Intersection Sight Distance to the north when compared to the requirements in the Austroads Guidelines for a 50 km/h operating speed. As such, the Traffic and Parking Assessment report acknowledges and accepts an expected condition to install speed humps on both Rutland Avenue and Streatley Road as well as a raised plateau for pedestrians near the overpass footbridge entry point to help mitigate any potential road safety impact, but comments on the limited need for a speed hump on Streatley Road.

5.4 Rutland Avenue/Bishopsgate Street Proposed PSP

In 2014, the Town sought funding from the Department of Transport's Perth Bicycle Network Local Government Grants Program to design and construct a Principle Shared Path (PSP) along the western side of Rutland Avenue (between Castle Way and Roberts Road Service Lane) in accordance with the route outlined in the WA Bicycle Network (WABN) Plan. The PSP is intended to provide connectivity between the existing shared path on Roberts Road and the over-bridge located north of Midgley Street while also connecting with the over-bridge south of Howick Street. Accordingly, it would help provide part of the Burswood to William Street PSP that has been identified as a high priority PSP project in the WABN.

In April 2015 however, the Town was informed that its application for funding in 2015-2016/2016-2017 for the PSP along Rutland Street was unsuccessful.

6 Problem Definition and Objectives

6.1 Key Issues

Based on the background data as well as the community consultation feedback (see Section 11), the following broad existing issues have been identified:

- Whilst Average Weekday Traffic volumes within the suburb are typically below the expected maximum design traffic flows for Local Distributor and Local Access roads, Goddard Street (near the Streatley Road intersection) slightly exceeded the expected daily traffic volume. It is also noted that at some locations along its length towards the southern end, Roberts Road had traffic volumes in excess of 9,000 vehicles per day – above the typical maximum expected volume for a District Distributor B road. Notwithstanding this, operating speeds on Roberts Road are such as to suggest traffic generally flows freely through the day. Furthermore, a review of the peak hour traffic volumes indicate that Rutland Avenue in particular (and Howick Street between Roberts Road and Goddard Street) may potentially be used as a 'rat-run' with peak hour traffic volumes in excess of 14% of the Average Weekday Traffic volumes.
- There is a strong perception that Goddard Street is used as a rat-run by non-local traffic to avoid the Orrong Road/Roberts Road intersection along with other roads within the suburb in order to avoid congestion and delays on Orrong Road. As part of this, there is a strong desire to install traffic signals at the Orrong Road/Roberts Road intersection to improve access to/from Orrong Road and reduce the desire/demand to use Goddard Street.
- Notwithstanding the absolute recorded daily traffic volumes using roads within the suburb, relatively high percentage increases in traffic volumes over short time periods has an impact on local amenity.
- Rutland Avenue, Enfield Street, Goddard Street and Streatley Road experience 85th percentile speeds in excess of 10km/h over the speed limit. A number of other local roads also recorded 85th percentile speeds between 5 to 9 km/h over the speed limit.
- Four hazardous locations (intersections) in terms of meeting both the State and National Black Spot Crash Criteria exist on the local road network:
  - Roberts Road/Bishopsgate Street (including a high number of cycle crashes);
  - Roberts Road/Howick Street;
  - Goddard Street/Streatley Road (also see below); and
  - Goddard Street/Enfield Street (albeit with one injury crash involving a passenger falling in/from a bus).
- In addition to the above locations with a poor crash record, the following road safety concerns have been identified on local roads as potentially requiring site specific treatments based on discussions with the City, residents' complaints and site inspection findings:
  - Goddard Street/Streatley Road Intersection - Northbound vehicles on Goddard Street wishing to access Orrong Road have been observed to use the opposing southbound lane to turn right into Streatley Road (east) in order to access Orrong Road via the adjacent laneway. There is a risk that these vehicles may conflict with other southbound vehicles on Goddard Street/turning out of Streatley Road. There have been a number of resident complaints at this location including recent photographs of crashes.

  - Cornwall Street/Castle Way Intersection - Due to the close proximity of the intersection of Great Eastern Highway/Cornwall Street (approximately 35m), there is a risk that vehicles turning into Cornwall Street from Great Eastern Highway may potentially collide with the rear end of any vehicles queuing to turn right into Castle Way. There is also limited inter-visibility between vehicles turning into Cornwall Street (from Great Eastern Highway north) and vehicles turning right out of Castle Way at the intersection with Cornwall Street (although this movement is not expected to have high turning volumes as eastbound vehicles on Streatley Road are likely to continue along the same road).

- When considering the full road network surrounding Lathlain, a number of casualty crashes were recorded at all major intersections where local roads connect with Main Roads WA controlled roads. For the purposes of this report however, such locations are considered beyond the direct scope of this LATM Study.
- A lack of cycle infrastructure, in particular the missing section of the Principal Shared Path (PSP) alongside the railway line adjacent to Rutland Avenue.
- Issues with existing traffic management:
  - An ad-hoc approach to traffic management with traffic calming treatments installed on isolated streets resulting in an unfair distribution of traffic on roads throughout the suburb, with traffic calming spacing in excess of 150m in some instances reducing its overall effectiveness (it is noted that good practice recommends a spacing of 80m-120m for traffic calming treatments in order to be effective).
  - Resident complaints with respect to excessive noise resulting from the implementation of vertical traffic calming treatments such as road humps and speed cushions.
  - Concerns over the lack of clarity (in terms of priority) at the one way slow points which have minimal signage/line marking.
  - A lack of off-street car parking on the eastern side of Victoria Park Railway Station resulting in commuter on-street parking around the station throughout the day impacting on local residents.
  - There are a number of existing treatments that provide horizontal deflection/width restrictions (e.g. chicanes, kerb build-outs and traffic islands) that appeared have minimal impact on speed during the site inspection.

6.2 Project Objectives

Based on the above concerns and the original scope of work, a number of primary and subsequent related specific objectives (in no particular order) have been identified to assist in the development of the traffic management philosophy for this Study as shown in Table 6.1.

It is noted that in this instance, the primary objectives are complementary with each other, with one of the specific objectives ('reduce vehicular traffic speeds') being valid for all three primary objectives.

As part of the above, feedback received from the community consultation also highlighted a desire for an equitable distribution of traffic on local roads within the suburb if external vehicles do need to travel through it.

Table 6.1 Primary and Specific Objectives

Primary objective	Specific objective
Improve Resident Amenity	Displacing through traffic movements to preferred routes with a fair distribution of traffic on Local Access roads in the suburb through the use of appropriate traffic calming treatments.
	Reducing vehicular traffic speeds through the use of appropriate traffic calming treatments.
	Incorporating streetscaping/visual amenity as part of the design of flexible traffic calming improvements/treatments.
	Ensuring sufficient parking/appropriate parking management around Victoria Park station and the redeveloped Lathlain Park.
Improve Road Safety	Resolving vehicle-vehicle conflict points/crash hazards and black spots.
	Reducing vehicular traffic speeds through the use of appropriate traffic calming treatments.
Promote Pedestrian/ Cyclist Activity	Improving pedestrian and cyclist safety through enhanced access and connectivity and reduced vehicle speeds.

Notwithstanding these objectives, it should be noted that the Pilot Study should also meet certain secondary objectives to meet a wide range of community expectations in terms of the quality of life, practicality of treatments and policy objectives that the Town and the community hold. It is noted that these secondary objectives are outside the strategic decision making process but are nonetheless important and can exert a separate influence on the development of the traffic management philosophy and agreed treatments. These secondary objectives include:

- Minimising the noise effects of traffic calming treatments where possible;
- Minimising any potential loss of on-street parking;
- Meeting public transport requirements in terms of disruption/impact/comfort;
- Limiting emergency vehicle access;
- Being cost effective including taking maintenance cost implications into account; and
- Requiring Main Roads WA approval of traffic signs and pavement markings.

7 Traffic Calming Measures

7.1 Innovative Traffic Calming Research

Notwithstanding the benefits of traditional physical traffic calming measures, they potentially result in a number of unintended consequences:

- They may lead to a driving style that involves a high degree of braking and accelerating which may potentially result in increased noise and air (vehicle emissions) pollution.
- Vehicles traversing vertical deflections can generate increased noise and vibration – an issue already highlighted in complaints to the Town.
- If crossed at inappropriate speeds, traffic calming devices with vertical deflection can damage vehicles or cause discomfort for occupants.
- Excessive pavement markings and signage can be unappealing from a visual perspective.

Conversely, most innovative traffic calming measures seek to reduce vehicle speeds by means of providing more complex environments (through a greater cognitive load to the driver) for instance by reducing forward visibility/linearity, creating uncertainty and/or increasing roadside activity. Innovative traffic calming treatments aim to change the behaviour of drivers by psychological means rather than solely relying on physical traffic calming measures. As such, research into various innovative traffic calming trial projects/guidelines has been undertaken (see Appendix D).

For completeness, existing traditional traffic calming treatments have also been outlined (see Appendix E) in terms of benefits and dis-benefits to provide a comparison between the more innovative traffic calming techniques.

7.2 Short-Listing of Traffic Calming Treatments

The traffic calming treatments detailed in Appendices D and E have been reviewed against the specific and secondary objectives. Subsequently, the following traffic calming treatments have primarily been short-listed for further consideration in the overall LATM scheme:

- Kerb build-outs (incorporating trees/planter boxes) – potentially formalising alternate inset parking bays;
- Skinny and self-explaining local roads treatment;
- Centre blister islands; and/or
- Informal one way slow points and/or two way chicanes.

These treatments are considered to have the ability to potentially address the primary and specific objectives set out in Section 6. Traditional traffic calming measures which provide vertical deflection have generally not been considered further in the development of the generic traffic calming treatments. However, it is acknowledged and noted that in some instances within Lathlain, there has been the need to use traditional techniques such as raised intersections on certain roads, or in areas of higher than normal potential conflict and/or locations where existing facilities on parallel streets result in the need to provide a similar approach to ensure a fair distribution of traffic.

7.3 Treatment Options

The sections below outline the basis of the proposed generic traffic calming treatments including the benefits and dis-benefits of all concept options developed for each road type. All Concept Design Drawings can also be found in Appendix F.

It should be noted that in some instances, for example where non-standard designs have been developed and proposed, the concept design drawings will be subject to the approval of Main Roads WA with respect to traffic signs (except parking signs) and pavement markings given that the Commissioner of Main Roads has sole power to install such traffic control devices (Clause 297(1) of the Road Traffic Code 2000). Such approvals would also be required for the use of any non-standard sign or pavement marking.

Furthermore, it should be noted that the Town will seek to implement and install traffic calming treatments based on the current/future intended road function rather than simply relying on the current road classification (which may not be the same in all instances).

It is also recommended that consideration be given to undertaking a road safety audit at an appropriate stage of the design and/or construction process to better understand and appreciate any potential risks associated with the concept designs when applied to specific locations.

7.3.1 Local Access Roads Options

Local Access roads in Lathlain generally have approximate carriageway widths in the order of 7m. The exceptions to this are Cornwall Street, Staines Street, McCartney Place and Gallipoli Street as well the mid-block section of Howick Street between Gallipoli Street and Roberts Road which all having carriageway widths of approximately 10m. In addition, Lathlain Place and Francisco Place have 90 degree parking provided and are typically unique in their design/arrangement in the suburb. Accordingly, the concept designs (with the exception of Option 1) have generally been designed for a 7m wide carriageway, with specific notes on the modifications required for implementing the designs on a 10m wide carriageway contained where appropriate below and/or in the concept design drawings in Appendix F.

7.3.1.1 Option One

This option (see Figure 7.1) has been developed from the principles of self-explaining roads in that a chicane effect has been created through the installation of alternating kerbside and central traffic islands. In this instance, on-street angled parking is also provided within the central traffic island.

It is noted that an absolute minimum carriageway width of 10.1m will be required for this option (based on AS2890.5 with respect to the parking dimensions) with 3.1m traffic lanes to ensure vehicles can turn into/reverse out of the parking bays (reducing to 2.5 – 2.75m lane widths at locations where flat top speed tables are installed/away from the angled parking) and 4.5m lateral parking bay depths with wheel stops. However, it is noted that a carriageway width of approximately 11.0m may potentially improve the level of service of emergency vehicles/buses and/or increase the separation between parked cars and opposing vehicles in the other direction. The exact dimensions and arrangement would need to be considered on a case by case basis – however, given the limited number of wide Local Access roads within Lathlain, its potential use is noted as being limited. As such, the option may be more suited to site specific roads such as Howick Street, McCartney Crescent, and potentially Goddard Street or Gallipoli Street where activity generators such as the Train Station or businesses exists, and where parking demand is subsequently higher.

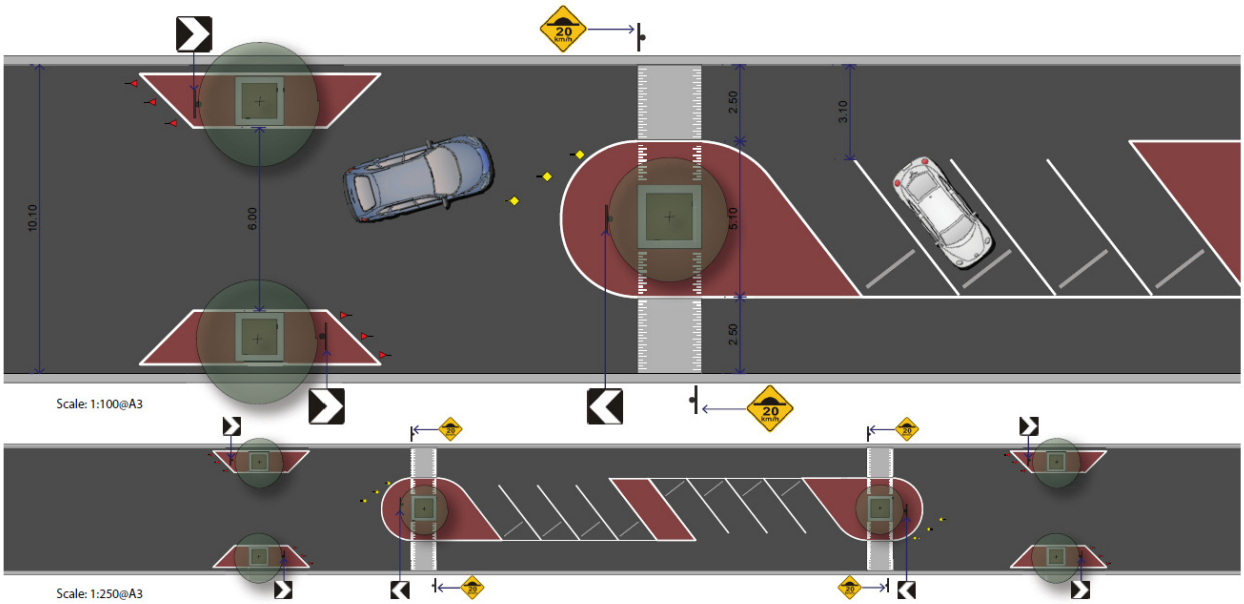

Figure 7.1 – Local Access Roads – Option One

Benefits

- Reduce vehicle speeds due to the provision of vertical deflection and the chicane effect of the alternating kerbside islands and central traffic island (with angled parking).
- Allows the use of street trees to improve the visual amenity of the area.
- Formalises on-street parking (angled parking bays).

Dis-benefits

- On-street central parking results in increased pedestrian crossing movements/potential conflicts with vehicles compared to kerbside on-street parking.
- Vertical deflection can lead to noise and vibration which is noted to have been raised as an issue from a number of residents, and can be a discomfort for cyclists and passengers (including public transport and emergency response vehicles). As part of this, one alternative is to remove the speed tables or reduce the number for instance by connecting the two speed tables to essentially form a continuous raised plateau.
- A risk of potential conflict exists between vehicles reversing out of the angled parking bays and oncoming vehicles in the adjacent traffic lane.
- Some properties may have turning restrictions imposed as a result of the central angle parking (although vehicles can potentially undertake U-turn movements on either end of the parking area around the semi-circular traffic islands as required).
- A potentially expensive treatment depending on the extent of raised traffic islands and/or use of white lines and coloured surfacing.
- The use of a planter box (rather than a central kerbed island) with edge lines may result in the planter box becoming a hazard (as opposed to frangible tree planting at road level).
- The concept design shown in Figure 7.1 may need additional pavement marking to obtain Main Roads WA approval with respect to delineation on the approach to the central angled parking area rather than simply the use of Raised Reflective Pavement Markers (RRPMs) potentially resulting in a large amount of pavement marking on a low speed Local Access Road .

- The lateral shift distance between the kerb build-out and central median area would need careful consideration to ensure sufficiently slow speeds are achieved through the area.

Cost
A rough order cost for this Option is estimated at $24,000.

7.3.1.2 Option Two

This option has been developed from the principles of Skinny Roads in which vehicles have to give way to opposing/oncoming vehicles between parked cars, or in this instance formalised marked/ denoted parking bays. As indicated in Figure 7.2, pavement marking and planter boxes are proposed to help delineate the parking bays – although these planter boxes could be replaced with frangible trees once parking lengths/areas have been agreed upon.

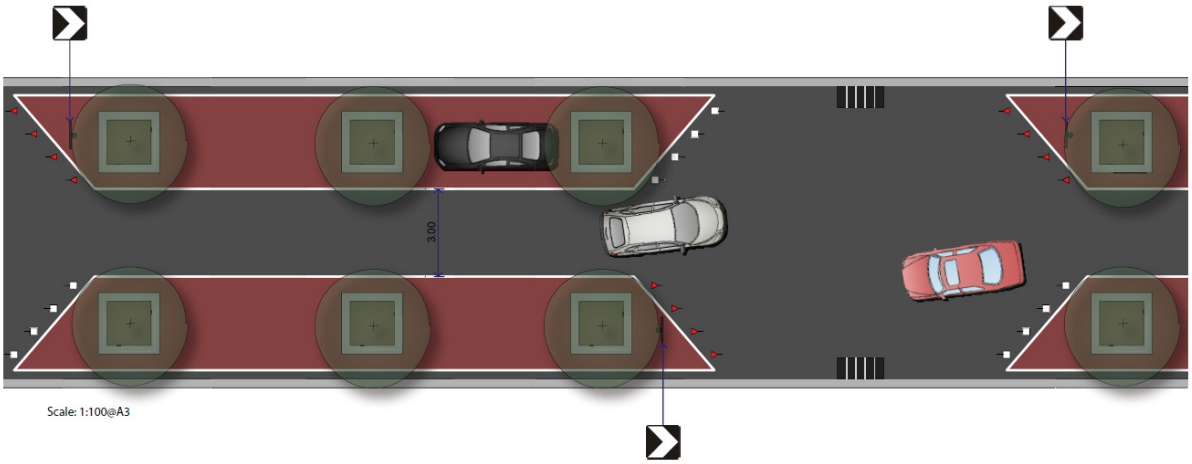

Figure 7.2 – Local Access Roads – Option Two

This option is essentially an elongated one-way slow-point and works on the basis of limited guidance with respect to which vehicle has priority – as would occur on any narrow road with on-street parking on both sides of the road permitted. It is acknowledged that existing one-way slow points typically have Give Way controls provided to ensure priority is understood and that the proposed arrangement removes this formal control, relying on driver uncertainty and good will as to who has priority.

The maximum length of the single traffic lane would need to be determined based on expected traffic numbers and subsequent probability testing to ensure sufficient space exists where the full width of the road is provided to accommodate waiting vehicles.

Benefits

- Reduce vehicle speeds due to the narrow primary through lane as well as vehicles having to give way to opposing traffic/driver uncertainty as to who has priority.
- Formalises on-street parking.
- When used with white lining to denote the parking area/single lane length of road, it is relatively cheap to install, allowing trials to be undertaken as to the length and location of parking areas.
- Once a parking length and associated single lane of traffic has been agreed upon, frangible trees could potentially replace planter boxes to denote the parking areas.
- Can potentially help provide formal crossing points for pedestrians (not shown in Figure 7.2).

- Cyclists can potentially be directed to use any gap between the planter box and kerb as a bypass subject to adequate spacing being provided (albeit with a risk of drivers opening their door and potentially hitting passing cyclists.)

Dis-benefits

- The reduction in vehicle speed is a function of the volume of opposing through traffic. There is also a risk that congestion may occur due to increased traffic volumes. As such, this option will be limited to low volume traffic roads (indicatively up to 1,000 vehicles per day based on Main Roads WA guidance for Driveway Links and Liveable Neighbourhoods Guidelines for narrower access streets with low demand for on-street parking).
- Risk of head-on collisions if opposing vehicles fail to yield appropriately. This could also discourage cyclists from using the road if a bypass isn't provided.
- Lack of clarity in between yield points may lead to issues in terms of insurance and/or legal claims if a conflict were to occur, although this could be addressed with signs and lines.
- May be an expensive treatment if the parking areas are formalised as raised areas with mountable kerbing rather than simply using edge lines and planter boxes/trees.
- The use of planter boxes (rather than frangible trees planted at road level) may result in the planter box becoming a hazard.
- May impact on access and movement from driveways.
- May inconvenience emergency vehicles and can't be used on bus routes – see Section 11.5.

Cost

A rough order cost for this Option is estimated at $12,000.

7.3.1.3 Option Three

As with Option 2, this option has been developed from the principles of Skinny Roads in which moving vehicles have to yield to opposing vehicles between parked cars, or in this instance formalised/marked parking bays. As indicated in Figure 7.3, pavement marking and planter boxes are proposed to help delineate the parking bays – although these planter boxes could be replaced with frangible trees once parking lengths/areas have been agreed upon. Given that parking bays are provided on one side of the road only, this option can be used on any narrower roads (with the design potentially amended to allow a one-way cycle lane adjacent to the kerb within the parking bay area – not shown in Figure 7.3, although such an arrangement has potential safety issues associated with it.)

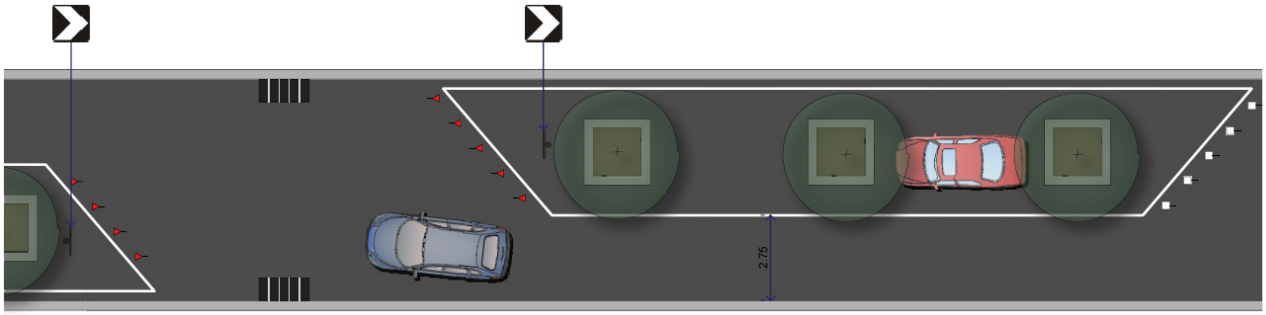

Figure 7.3 – Local Access Roads – Option Three

Similar to Option 2, the concept is essentially that of an elongated one-way slow-point and works on the basis of limited guidance with respect to which vehicle has priority – as would occur on any

narrow road with on-street parking permitted. It is acknowledged that existing one-way slow points typically have Give Way controls provided to ensure priority is understood and that the proposed arrangement removes this formal control, relying on driver uncertainty and good will as to who has priority.

The maximum length of the single traffic lane would need to be determined based on expected traffic numbers and subsequent probability testing to ensure sufficient space exists where the full width of the road is provided to accommodate waiting vehicles. Longer one-way distances will also have an impact on cyclists.

Benefits

- Should reduce vehicle speeds due to the narrow primary through lane as well as vehicles having to give way to opposing traffic/driver uncertainty as to who has priority.
- Formalises on-street parking.
- When used with white lining to denote the parking area/single lane length of road, it is relatively cheap to install, allowing trials to be undertaken as to the length and location of parking areas.
- Once a parking length and associated single lane of traffic has been agreed upon, frangible trees could potentially replace planter boxes to denote the parking areas.
- Can potentially help provide formal crossing points for pedestrians (not shown in Figure 7.3).

Dis-benefits

- The reduction in vehicle speeds is a function of the volume of opposing through traffic. There is also a risk that congestion may occur due to increased traffic volumes. As such, this option will be limited to low volume traffic roads (indicatively up to 1,000 vehicles per day based on Main Roads WA guidance for Driveway Links and Liveable Neighbourhoods Guidelines for narrower access streets with low demand for on-street parking).
- Risk of head-on collisions if opposing vehicles fail to yield appropriately. This could discourage cyclists from using the road.
- Lack of clarity in between yield points may lead to issues in terms of insurance and/or legal claims if a conflict were to occur, although this could be addressed with signs and lines.
- May be an expensive treatment if the parking areas are formalised as raised areas with mountable kerbing rather than simply using edge lines and planter boxes/trees.
- The use of planter boxes (rather than frangible trees planted at road level) may result in the planter box becoming a hazard.
- May impact on access and movement from driveways.
- May inconvenience emergency vehicles and can't be used on bus routes – see Section 11.5.

Cost

A rough order cost for this Option is estimated at $4,000.

7.3.1.4 All Three Options - Miscellaneous

As part of the proposed Options for Local Access roads, it should be noted that narrow traffic lanes down to 2.75m could be considered (for non-bus routes) in conjunction with treatments to help further reduce vehicle speeds given the amount of side friction. However, such traffic lane widths should be considered on a case by case basis with respect to traffic volume and the needs/use of such roads by cyclists who may feel squeezed by such lane widths/following vehicles trying to overtake

them although at lane widths less than 3m, this is unlikely. Nevertheless, where possible, cycle bypasses with protection from parked vehicles at the entry/exits should be provided and maintained to cater for safer cycle movements. At single lane areas, the use of 'sharrows' consisting of cycle lane markings should also be considered following discussion and agreement with Main Roads WA.

7.3.2 Local Distributor Roads/Bus Route Options

As indicated previously, whilst there are no Local Distributor roads within Lathlain, it is acknowledged that Rutland Avenue was previously classed as a Local Distributor road and currently still tends to function in this manner. Notwithstanding this with respect to Lathlain, an overarching requirement of the Study has been the need to develop appropriate concept design options for such roads in general for the Town, as well as to potentially develop treatments for bus routes within Lathlain.

Due to the limitations of suitable traffic calming treatments on relatively narrow roads, it is noted that two concept design options have been developed generally based on a 10m carriageway width with Option 3 developed for narrower roads.

In the case of Rutland Avenue, it is noted that the carriageway width currently varies between 5.5m and 6.5m (although options exist to widen it to 7m as part of a proposed principal shared path alongside it – see Section 10).

7.3.2.1 Option One

This option (see Figure 7.4) is essentially an elongated variation of a double lane angled slow point (Main Roads WA drawing 200331-132-3) and works on the basis of regular lateral shifts with forward visibility restricted by the use of frangible trees planted at road level.

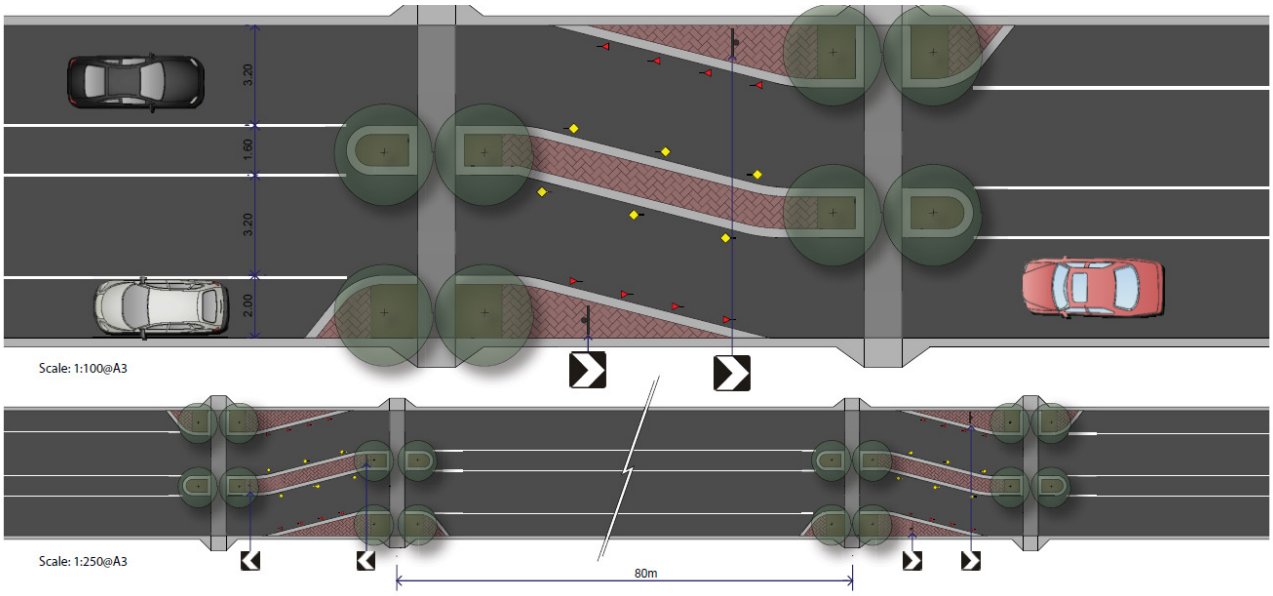

Figure 7.4 – Local Distributor Roads/Preferred Routes – Option One

Where a lateral shift occurs, indented parking on one side of the road is permitted with a central median also provided along the length of the road to help reduce traffic lane widths and provide pedestrian refuges where the lateral shift occurs. The lateral shift is achieved through the use of both kerb-buildouts and a central median. As indicated in Figure 7.4, coloured road surfacing could also

be provided to help denote informal pedestrian crossing points – which being in the vicinity of the lateral shift, should have lower vehicle speeds. As part of this, any tree planting near the informal pedestrian crossing points should be such as to not restrict inter-visibility between oncoming vehicles and pedestrians at the side of the road/in the median. A range of traffic lane and median widths can be provided taking account of the needs of cyclists and standard refuge widths.

Benefits

- Reduces vehicle speeds in the vicinity of the slow point as well as over the entire length of the street when used in a series (when spaced appropriately).
- Formalises on-street parking.
- Based on an existing Main Roads WA standard design which will minimise potential concerns.

Dis-benefits

- May impact on access and movement from driveways.
- May create a squeeze point for cyclists.
- May limit the total amount of permissible parking.
- Not applicable on Rutland Avenue due to the limited carriageway width available.

Cost

A rough order cost for this Option is estimated at $38,000 (assuming complimentary treatments at each end).

7.3.2.2 Option Two

This option (see Figure 7.5) is based on the Main Roads WA drawing 200331-132-3 for a double lane angled slow point. This traditional traffic calming treatment is proposed to be enhanced by additional streetscaping so that forward visibility is reduced.

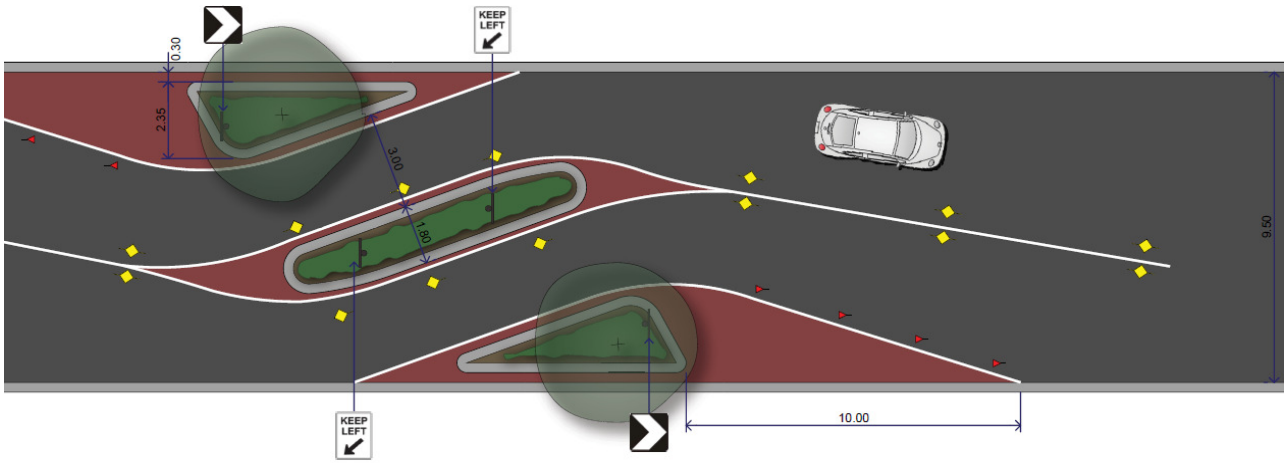

Figure 7.5 – Local Distributor Roads/Preferred Routes – Option Two

Benefits

- Reduces vehicle speeds in the vicinity of the slow point as well as over the entire length of the street when used in a series (when spaced appropriately).

Dis-benefits

- May impact on access and movement from driveways.

- May create a squeeze point for cyclists.
- Requires the removal of on-street parking in the vicinity of the slow point.
- Not applicable on Rutland Avenue due to the limited carriageway width available.

Cost
A rough order cost for this Option is estimated at $11,000.

7.3.2.3 Option Three

This option (see Figure 7.6) is based on the Main Roads WA drawing 200331-13-135-3 for a blister island. This traditional traffic calming treatment is proposed to be enhanced by streetscaping so that forward visibility is reduced.

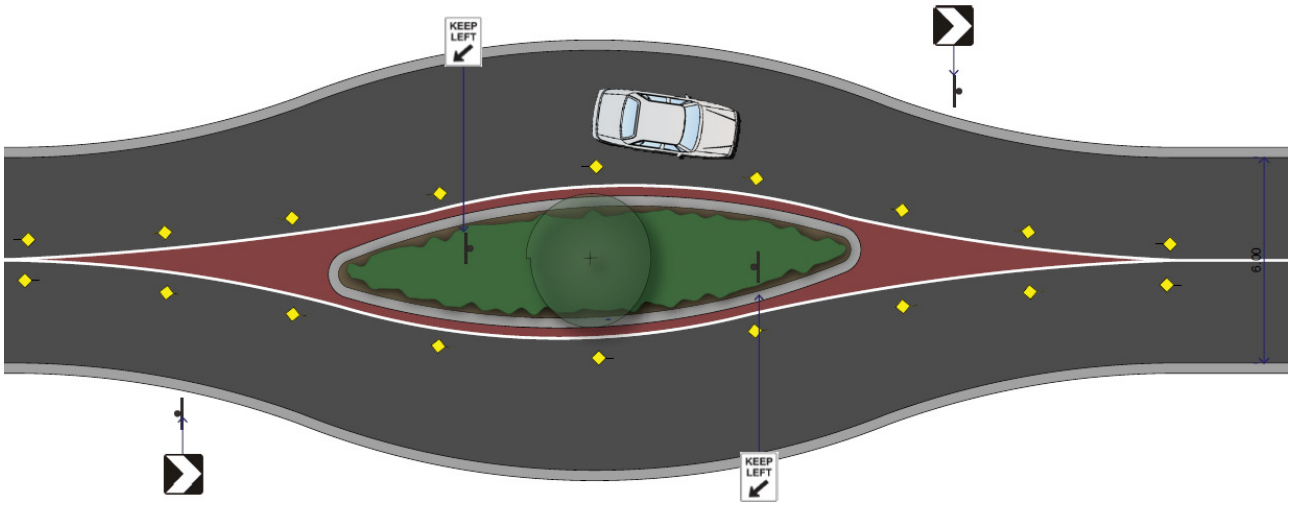

Figure 7.6 – Local Distributor Roads/Preferred Routes – Option Three

Benefits
- Reduces vehicle speeds in the vicinity of the blister island as well as over the entire length of the street when used in a series (when spaced appropriately).
- Could be applicable on Rutland Avenue (if appropriate) through localised road widening.

Dis-benefits
- May impact on access and movement from driveways.
- May create a squeeze point for cyclists.
- Requires the removal of on-street parking in the vicinity of the blister island.

Cost
A rough order cost for this Option is estimated at $16,000.

7.3.2.4 All Three Options - Miscellaneous

As part of the proposed Options for Local Distributor roads/preferred routes, it should be noted that any reduction in road widths may result in pinch points for cyclists. As a result, lane widths between 3.2m and 3.8m should be avoided as motorists are likely to try and overtake a cyclists whilst causing discomfort to cyclists given the proximity of the overtaking vehicle to the cyclist. Where possible, cycle bypasses with protection from parked vehicles at the entry/exits should be provided and maintained to cater for safer cycle movements. At narrow lane width locations, 'sharrows' consisting

of cycle lane markings should also be considered following discussion and agreement with Main Roads WA.

7.3.3 District Distributor Roads Options

7.3.3.1 Option One

This option (see Figure 7.7) is based on the provision of segregated on-street cycle lanes (similar to those outlined in The London Cycling Design Standards Consultation Draft document by Transport for London and elsewhere). In this option, flexible posts have been provided with a 10m spacing to enable cyclist to merge with general traffic lanes in order to make right turn manoeuvres. 1.5m cycle lanes, and a 0.5m buffer area (where posts are proposed to be installed) have been provided in lieu of a central median. Relatively narrow traffic lanes (3.0m) have been provided with the aim of discouraging excessive vehicle speeds. This option may be suitable for roads which have a strong demand for cyclists, minimal demand for on-street parking and a limited number of driveways/ accesses.

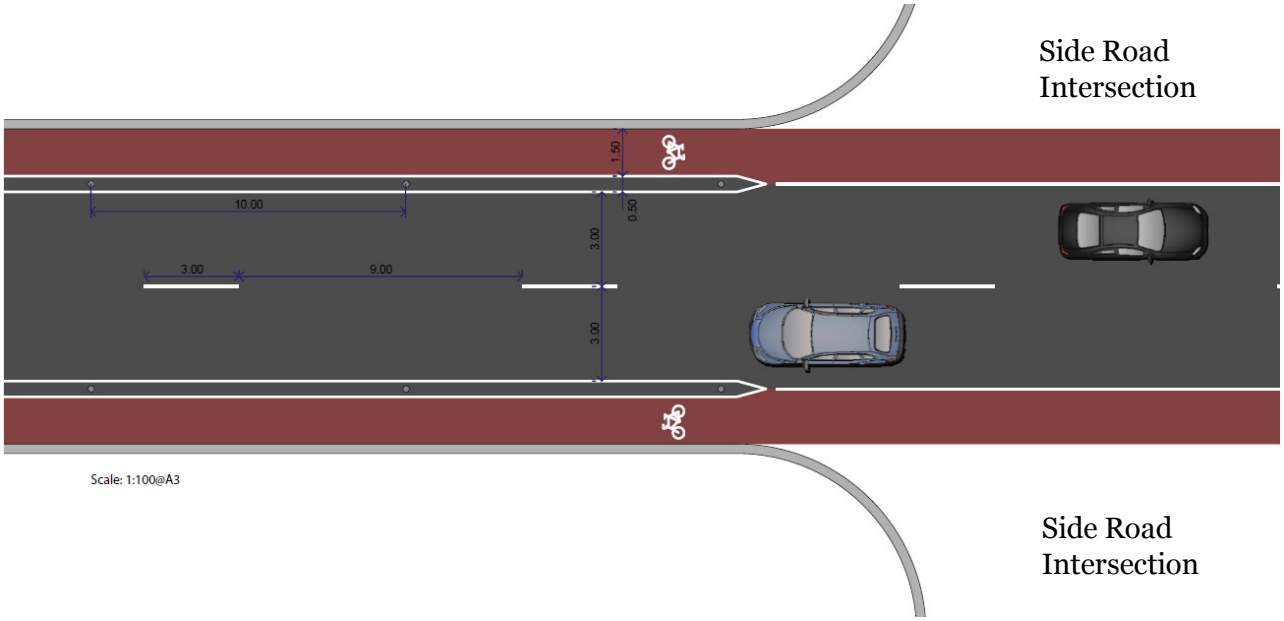

Figure 7.7 – District Distributor Roads – Option One

Benefits

- May reduce vehicle speeds as a result of increased side friction from the posts on either side of the road.
- Increased cyclist separation/protection.

Dis-benefits

- Posts may result in nuisance hits from vehicles (increased maintenance).
- Lack of separation between opposing vehicles.
- Prevents on-street parking.

Cost

A rough order cost for this Option is estimated at $15,000/100m.

7.3.3.2 Option Two

This option (see Figure 7.8) is similar to the existing cross-section on Roberts Road albeit with the additional provision of indented car parking. Due to the nature of the design with parking provided on both sides of the road, it is applicable to very wide roads (16.2m) – or alternatively, depending upon the road width, indented parking could only be provided on one side of the road only (not shown in Figure 7.8) with a resulting road width requirement in the order of 13m. The layout also includes streetscaping so that forward visibility is potentially reduced, with tree planting as part of the kerb buildouts (to break up the parking). The proposed kerb buildouts also improve crossing opportunities for pedestrians by minimising their exposure to risk and providing an enhanced waiting area so that pedestrians don't need to cross in-between/peer around parked vehicles whilst being in the road.

It should be noted that any tree planting in the vicinity of informal pedestrian crossing points should be such as to not restrict inter-visibility between oncoming vehicles and pedestrians at the side of the road/in the median.

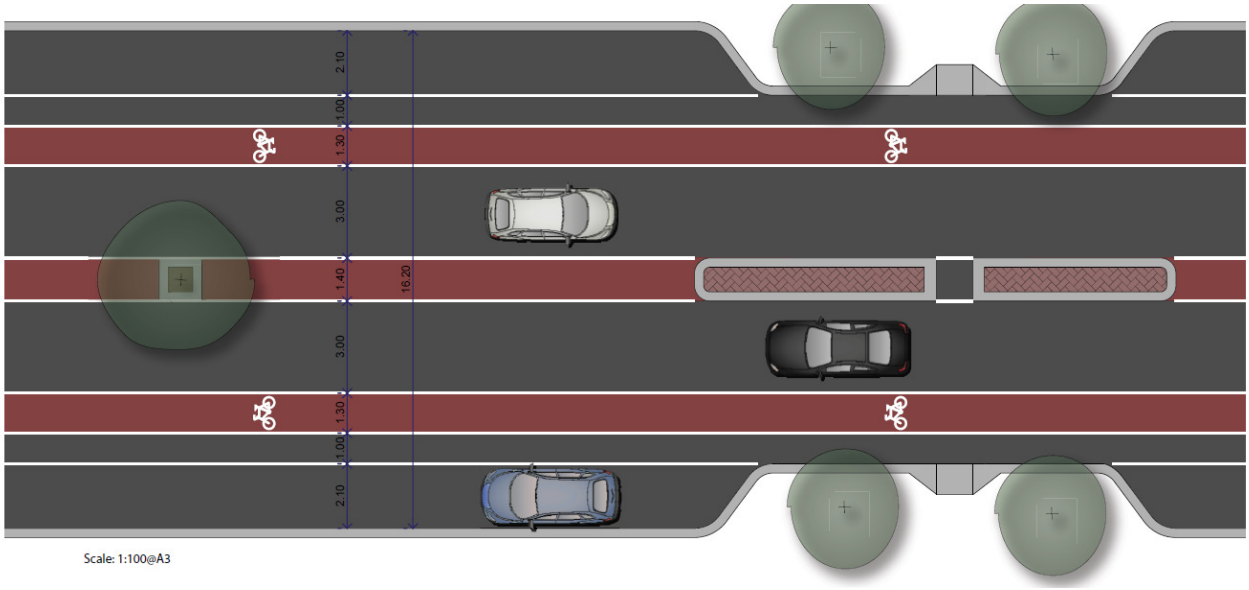

Figure 7.8 – District Distributor Roads – Option Two

Benefits

- Provides on-street cycle lanes with a clear zone from parked vehicles to minimise the impact of car doors being opened (safety strips between 0.4m to 1m are recommended and can be determined on a case by case basis).
- Provides separation between opposing vehicles.
- Allows for reduced crossing widths for pedestrians at kerb build-outs.

Dis-benefits

- May be less effective in reducing vehicle speeds (particularly if no parked vehicles) given the lack of side friction and overall road width.

Cost

A rough order cost for this Option is estimated at $40,000/100m (assuming two to three sets of kerb buildouts and associated pedestrian refuges).

7.3.3.3 Option Three

This option (see Figure 7.9) is based on the typical existing cross-section on Roberts Road albeit enhanced by streetscaping so that forward visibility is reduced.

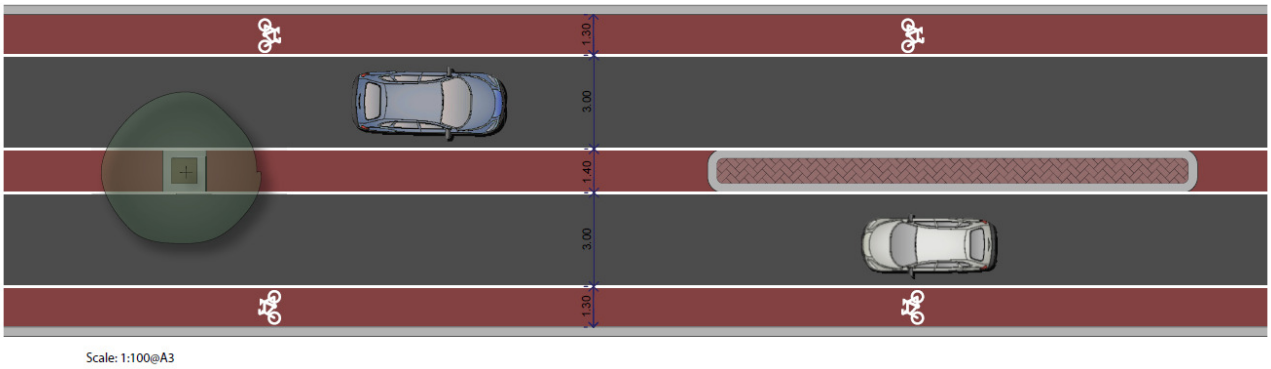

Figure 7.9 – District Distributor Roads – Option Three

Benefits

- Provides on-street cycle lanes although they are 1.3m wide (less than the Austroads desirable minimum width of 1.5m) compared to Option One where they are 1.5m wide. Actual cycle lane widths would be stipulated on a case by case basis subject to the road location/width.
- Provides separation between opposing vehicles.

Dis-benefits

- May not be effective in reducing vehicle speeds on Roberts Road (given that the existing lane widths are 3.0m). However, this option will potentially reduce vehicle speeds on other District Distributor roads in Victoria Park which have existing traffic lane widths in excess of 3.0m.
- Potentially prevents on-street parking given the cycle lane.

Cost

A rough order cost for this Option is estimated at $25,000/100m (assuming two to three sets of median islands).

7.3.4 Other Considerations

7.3.4.1 Gateway Treatments/Speed Limit

Gateway treatments (including the use of speed limit roundels) could potentially be installed at the main access points into the suburb to inform and highlight the changed road environment from surrounding roads. It should be noted however that at this stage, any proposal to reduce the speed limit through the suburb, for instance to 40km/h to help support any traffic calming treatments is unlikely to obtain the support of Main Roads WA. Main Roads WA is the sole authority for the setting of speed limits and the installation of supporting speed limit signs and as such, specific guidance exists with respect to the setting of area speed zones less than 50km/h.

7.3.4.2 Miscellaneous – Discounted Options

It is noted that other potential pavement marking treatments such as the use of 'SLOW' pavement markings in conjunction with warning signs and/or 'Dragon's Teeth' markings, as used in New South Wales at school zones to improve the conspicuity of school speed zone have been considered but

discounted following discussions with the City given the need to obtain Main Roads WA approval to use such markings.

7.3.5 Intersection Treatments

The traffic calming treatments outlined in Sections 3.3.1 to 3.3.3 are typically suitable for mid-block situations. If the Town wishes to implement further traffic calming, the following intersection treatments could be considered:

- Roundabout treatments including mini roundabouts (see Appendix E, Section E1.4 for further details);
- Raised Intersections (see Appendix E, Section E2.4 for further details) – estimated at $32,000 per site;
- Intersection upgrades (see Appendix D, Section D2 for further details);
- 'Give Way' and 'Stop' pavement markings as appropriate on the side road approaches to priority controlled intersections (see Appendix E, Section E3.1 for further details). However, it should be noted that Main Roads WA recommends that the use of pavement messages should be minimised, as these may be hazardous if placed in the path of braking vehicles.

8 Improve Resident Amenity

8.1 Preferred Routes/Traffic Distribution

For the purposes of identifying any preferred routes within/around Lathlain, the following elements have been considered:

- At present, all roads within the suburb of Lathlain are classified as Local Access roads with the exception of Great Eastern Highway and Orrong Road (Primary Distributor roads) along with Roberts Road (District Distributor road B) which all border the suburb.
- Discussions with the Town have indicated that Rutland Avenue (currently a Local Access road) was previously classified as a Local Distributor road and have also advised that there is the potential to re-classify Rutland Avenue as a Local Distributor road in the future. Current traffic flows along Rutland Avenue are generally lower than Gallipoli Street and/or Goddard Street.
- Plans to provide a PSP along Rutland Avenue (along with widening of the road) in the immediate term have not been funded by the DoT.
- There are four primary access points into Lathlain (with a further four accesses off Roberts Road to reach the centre of the suburb):
    - Roberts Road/Orrong Road intersection;
    - Roberts Road/Bishopsgate Street intersection;
    - Goddard Street/Orrong Road intersection; and
    - Cornwall Street/Great Eastern Highway intersection.
- Of the four accesses off Roberts Street to/from Lathlain, extensive traffic calming has been installed on Custance Street and Howick Street with a single raised intersection on McCartney Crescent. No traffic calming currently exists on Enfield Street with high traffic speeds previously recorded.
- The need to have an equitable distribution of traffic on Local Access roads within the suburb notwithstanding that certain roads are attractive to users, for instance roads providing a direct connection to the surrounding higher order roads and/or to traffic generators such as the school. For instance, Goddard Street carries approximately 2,500 vehicles per day (vpd) with the section near Streatley Road having a daily traffic volume of just over 3,000 vpd which is the highest recorded traffic volume compared to all other Local Access roads in the suburb.
- There is a bus route on certain mid-block sections on Howick Street, Goddard Street, Streatley Road, Gallipoli Street and Cornwall Street.

Taking the above into account, the Bishopsgate Street/Rutland Avenue/Castle Way/Cornwall Street route has been identified as a north-south route which should take a greater share of traffic relative to alternative routes through the suburb and on to which traffic should be encouraged to use in the longer term subject to appropriate facilities for cyclists being provided. In the short/immediate term however, until the PSP (or alternative facilities) gets constructed, the road should play a similar role and function to Gallipoli Street and Goddard Street. Given the above, Figure 8.1 shows the various routes and access points within/around the suburb of Lathlain.

Source – NearMaps 2014

Figure 8.1 – Long Term Identified Routes and Access Points

As part of any future preferred route along Rutland Avenue, consideration should be given to providing priority to this route by modifying the movement priority at the following intersections:

- Cornwall Street/Castle Way – western approach and southern approach to have priority.
- Castle Way/Streatley Road – northern approach and western approach (continues onto Rutland Avenue) to have priority.

This change in priority will remove the need for vehicles currently turning right into Castle Way (at the Cornwall Street intersection) to queue/yield to opposing traffic on Cornwall Street – which would address the road safety risk indicated in Section 6.

Given that Bishopsgate Street/Rutland Avenue have been identified as a longer term preferred route, intersections along these roads that provide a direct straight through movement and connection to Roberts Road (Howick Street and Enfield Street) may experience an increase in traffic, subject to treatments elsewhere within the suburb. Such treatments should seek to discourage both traffic volumes and speeds on these internal suburban roads.

Whilst consideration has also been given to making Goddard Street and Howick Street (between Roberts Road and Goddard Street) as preferred routes given that these roads already currently provide connections to Lathlain Primary School and Orrong Road, community consultation (see Section 11) has indicated a general desire to treat roads within the suburb equally and hence provide a fairer share of traffic distribution. Accordingly, with the exception of Bishopsgate Street which is

being promoted as a future route to take a higher share of traffic (subject to appropriate cycle facilities being installed), an equal approach to traffic calming the connecting routes between Roberts Road and Goddard Street is required - i.e. maintaining the existing traffic calming on Custance Street and Howick Street as well as enhancing McCartney Crescent and providing traffic calming on Enfield Street. This approach also requires the two main internal north-south routes (Goddard Street and Gallipoli Street) to be treated equally as well as each individual east-west route.

Furthermore, any potential upgrade to the Orrong Road/Goddard Street intersection or the re-connection of Streatley Road to Francisco Place may simply increase the amount of traffic using Goddard Street, which would be inconsistent with the current road hierarchy and community consultation feedback. Accordingly, such improvements are not considered appropriate.

The redevelopment of Lathlain Park is also likely to generate some additional traffic in the vicinity of the Goddard Street/Bishopsgate Street and Goddard Street/Saleham Street/McCartney Crescent intersections – albeit potentially out of peak morning and evening weekday periods. As such, the existing priority controlled intersections may need to be upgraded to a roundabout in the future to maintain an appropriate level of service. Notwithstanding this potential future need, it is noted that the Goddard Street/Bishopsgate Street intersection has recently (2014) been upgraded to provide a right turn bay from Bishopsgate Street into Goddard Street – and this may well suffice with respect to traffic efficiency and safety. It is also noted that any upgrade of the Goddard Street/Saleham Street/McCartney Crescent intersection would act as an additional form of traffic calming to reduce speeds along Goddard Street.

Whilst community consultation has indicated a strong desire for the Orrong Road/ Roberts Road intersection to be signalised and hence reinforce Roberts Road as a preferred route to access Orrong Road (rather than Goddard Street), the ability to signalise this intersection is outside of the Town's control with responsibility for the installation of traffic signals resting with Main Roads WA. Whilst the installation of traffic signals would improve safety at this location and enhance access to/from Roberts Road, it would also have an impact on the flow of traffic along Orrong Road. Whilst the City has sought to obtain approval to signalise this intersection, such an upgrade does not appear to be currently supported by Main Roads WA (see Sections 9.6 and 11.4).

8.2 Reduce Vehicle Speeds

Traffic calming treatments will need to reduce vehicular traffic speeds while ensuring that traffic is distributed appropriately – primarily on the identified preferred route and District Distributor Road. As such, traffic calming treatments have been developed with approaches unique to each road type as shown in Section 7.3. Specifically with respect to Lathlain:

- Local Access Roads (non-bus routes) – Reduce vehicular traffic speeds (as well as discourage through traffic) by providing informal one way slow points (which also limits forward visibility) and/or substantial perceived narrowing of the road.
- Local Access Roads (bus routes) – Reduce vehicular traffic speeds primarily through the use of horizontal deflection/limiting forward visibility
- Rutland Avenue (as a promoted/preferred route) – Reduce vehicular traffic speeds primarily by providing horizontal deflection/limiting forward visibility as well as the installation of vertical traffic calming in the form of raised intersections as appropriate to help reduce vehicle speeds.

8.3 Visual Amenity

Landscaping in the form of street trees and mass planting is proposed to be incorporated into all traffic calming treatments to improve visual amenity and assist with increasing side-friction. The landscaping will also limit forward visibility which has been identified as having psychological traffic calming effects. Notwithstanding this, in terms of trees/planting, it is noted that consideration needs to be given to:

- The provision of frangible trees (less than 100mm diameter);
- Species selection so that plants are generally below 600mm and trees have clear canopies;
- The use of planter boxes in some instances to allow treatments to be trialled and easily amended as appropriate
- Ensuring that visibility out of property accesses and side roads is sufficient, whilst noting that the lack of visibility increases the cognitive demand on drivers which may potentially further traffic calming;
- Maximising the available planting area (within traffic island) to ensure adequate catchment area for absorbing water and oxygen to tree roots;
- Maintenance activity in the form of hand watering during the preliminary phases of tree/vegetation growth where underground water systems are not in place; and
- Alternative landscape solutions such as signage or artwork structures (with minimal maintenance requirements) in lieu of trees/vegetation.

8.4 Parking Provision/Management

Based on community consultation feedback as well as the Integrated Movement Network Strategy, parking management measures in the form of an on-street parking hierarchy is required adjacent to the Victoria Park Station. It is understood that parking issues are primarily associated with commuter parking around the Victoria Park Station and/or football games at Lathlain Park.

8.4.1 Commuter Parking

It is noted that off-street associated with the Station is provided on the western side of the railway lines with only 'kiss and ride' parking provided on the eastern side of the Station. As a result, drivers travelling to the Station from the east/north-east (e.g. from within Lathlain itself) wishing to park their vehicle need to do so on-street or make an unattractive detour via Roberts Road, Miller Street and Sunbury Road to the western side of the railway line. It is further acknowledged that the full extent and amount of on-street commuter parking on the eastern side of Victoria Park station is unknown at present and/or indeed the uptake of off-street parking on the western side of the railway line. Nevertheless, on-street all day commuter parking can be expected to have an impact on the streets immediately surrounding the Station such as Rutland Avenue between Gallipoli Street and Bishopsgate Street, the southern end of Gallipoli Street and Staines Street.

Whilst the Parking Management Plan didn't specifically address parking in Lathlain (as it wasn't considered a 'hotspot') and hence identify actual proposed treatments, any proposal to manage parking such as time restrictions need to be undertaken with care as a separate exercise to this LATM Pilot study given a lack of existing background data. Accordingly, it will be necessary to better understand commuter parking demand on both sides of the railway station, who is actually

undertaking such parking (i.e. where have they travelled from) as well as to establish the distance from the railway that any parking restrictions would need to extend if it were justified given the costs associated implementing a parking management regime. As part of any future on-street parking hierarchy and the associated management techniques, an amendment to the Town Planning Scheme will be required.

8.4.2 Lathlain Park Parking

It is understood that an indicative study of proposed parking provision has been undertaken as part of the redevelopment of Lathlain Park, with additional parking around the site (such as along the southern side of McCartney Crescent) proposed in order to reduce the amount of on-street parking associated with football related activities.

9 Improve Existing Road Safety Issues

Given that a reduction in traffic speeds is proposed to be addressed as part of the primary objective of improving resident amenity, this section will focus on resolving identified existing and potential hazardous locations.

9.1 Goddard Street/Streatley Road Intersection

Two road safety issues exist at this intersection with respect to existing crash problems as well as dangerous driver behaviour. As highlighted in Section 4.3, the intersection is considered to be a blackspot given the number and/or severity of previous crashes recorded at this location. A common contributory crash factor at the intersection is the number of right angled crashes with vehicles from Streatley Road noted as failing to give way to traffic from Goddard Street on four occasions (albeit split into two crashes each from either approach). All the crashes during day light hours in good weather.

In addition, as indicated in Section 6, northbound vehicles on Goddard Street wishing to access Orrong Road have been observed to use the opposing southbound lane to turn right into Streatley Road (east) before accessing Orrong Road via the adjacent laneway. This action occurs as a result of impatient drivers unwilling to wait in the queue along Goddard Street.

Potential options for discouraging/preventing this illegal unsafe manoeuvre at this intersection as well as addressing the existing crash problem are outlined below.

9.1.1 Option 1: Traffic Island Extension on Goddard Street (south)

A raised traffic island currently exists on Goddard Street (south) at the intersection with Streatley Road with a refuge area for pedestrians. Extending this traffic island may discourage northbound vehicles from undertaking the illegal manoeuvre subject to the length of the median extension. It is noted that a central traffic island (median) with a total length of approximately 20m can be installed without restricting any turning movements out of adjacent properties on Goddard Street.

However, it is noted that such a treatment may not discourage all drivers from undertaking the illegal manoeuvre, especially drivers with a higher tolerance for risk. If the Town wishes to implement this treatment, the length of the traffic island extension will need to be determined by considering the effectiveness of this treatment as well any turning restrictions imposed on adjacent properties (see Section 9.1.2). Notwithstanding this, it is noted that this treatment could be implemented as an interim measure before potentially undertaking further traffic calming modifications to further discourage/prevent the illegal manoeuvre – as discussed below.

9.1.2 Option 2: Raised Median on Goddard Street (north and south)

Providing an extended central raised median along the entire section of Goddard Street between Streatley Road and Custance Street would be likely to prevent drivers form undertaking the illegal manoeuvre given the length of road to be traversed (85m) on the wrong side of the road – albeit imposing turning restrictions into/out of adjacent properties along this section of Goddard Street (as highlighted in Section 5.1.1).

A further element of this option would be to prevent all right turning movements at the Goddard Street/Streatley Road intersection by extending the central raised median through the intersection.

However, in addition to the turning restrictions imposed on adjacent properties, including properties on Streatley Road, the bus route turning right out of Streatley Road (west) would be impacted by this treatment. Although it would be possible to potentially relocate this bus route onto Midgley Street (an adjacent parallel road that would still service any public transport demand generated by Lee Reserve), all associated bus stop facilities on Streatley Road (West) will be required to be relocated onto Midgley Street. Furthermore, if Midgley Street is formalised as part of the bus route in lieu of Streatley Road, the traffic island located between the staggered T-intersection of Midgley Street/Custance Street/Goddard Street may need to be modified/removed to ensure buses can turn right out of Midgley Street. Consultation with the PTA has suggested such a treatment would be strongly opposed.

9.1.3 Option 3: Left-In/Left-Out Restriction on Streatley Road (east)

Restricting Streatley Road (east) to a 'Left-In/Left-Out' arrangement may discourage northbound vehicles from undertaking the illegal manoeuvre outlined above. This treatment could also be combined with the extension of the traffic island on Goddard Street (South) to further discourage the illegal manoeuvre.

However, this treatment may not prevent all drivers from undertaking the illegal manoeuvre with some drivers potentially using the 'Left-Out' lane to illegally turn right into Streatley Road. Furthermore, the properties on Streatley Road (East) will not be able to turn right into Goddard Street (north), thereby restricting direct access to Orrong Road via Goddard Street (and hence being forced to use the laneway). Similarly, road users wishing to access their properties from Goddard Street (south) and/or Streatley Road (west) would be forced to re-route via Orrong Road/Goddard Street (north) or potentially the laneway.

9.1.4 Option 4: Left-In Only Restriction on Streatley Road (east)

Restricting Streatley Road (east) to a 'Left-In' arrangement only from Goddard Street (north) while banning all other turning movements out of this approach (except cyclists) would prevent northbound vehicles form undertaking the illegal manoeuvre outlined above.

However, the turning restrictions imposed at this intersection will require any road users exiting properties from Streatley Road (east) to use the lane-way and turn left into Orrong Road. As with the left in/left out option, road users from Goddard Street (south) and/or Streatley Road (west) will also be forced to re-route to access their properties via Orrong Road/Goddard Street (north) or potentially the laneway. It is noted that if this option is implemented, the laneway should be formalised. Alternatively, the existing road closure between Streatley Road (east) and Francisco Place could be re-opened.

9.1.5 Option 5: Full Road Closure on Streatley Road (east)

Providing a full road closure on Streatley Road (East) will prevent all turning movements into/out of this road (except cyclists) as well as the illegal manoeuvre outlined above. To mitigate/address the impact on the access to/from the properties on this road, the existing road closure between Streatley Road (east) and Francisco Place could be re-opened. This will provide properties in this area access to the signalised intersection of Orrong Road/Francisco Place which in turn allows right turn movements into/out of Orrong Road.

Although this option will improve access into/out of Orrong Road for the properties located on Streatley Road (East), it will require any vehicles from these properties that previously continued

along Streatley Road (west) and Goddard Street (south) to re-route (for instance turning onto Orrong Road and then turning into Goddard Street). It will also affect road users from Goddard Street (south) and/or Streatley Road (west) trying to access the area.

9.1.6 Option 6: Road Closure at Laneway between Streatley Avenue and Orrong Road

A full road closure at the laneway running parallel to Goddard Street and Francisco Place between Streatley Avenue and Orrong Road (for example at the access with Orrong Road) and converting the lane way into a cul-de-sac would prevent vehicles from using the laneway to access Orrong Road (and hence typically stop the identified problem movement from occurring). It would also result in fewer through movements using the laneway – which is not designed to accommodate anything other than minor vehicle movements accessing adjacent properties.

Although this option would address the identified problem, road users legally using the laneway would be impacted upon, with vehicles having to re-route to exit these properties. As part of this, a turnaround area would need to be provided at the end of the blocked-off laneway – which may be difficult to accommodate.

9.1.7 Option 7: Roundabout

In order to address the current crash problem at the intersection, the Town has applied for Black Spot funding to install a roundabout at the intersection. Whilst this may not specifically address the existing problem of northbound vehicles on Goddard Street wishing to access Orrong Road using the opposing southbound lane to turn right into Streatley Road (east), a well-designed roundabout can be expected to address other existing crash problems occurring at this location. This treatment can also be used in conjunction with other options.

9.1.8 Summary of Options

The benefits and dis-benefits for each potential option for discouraging/preventing the illegal and unsafe manoeuvre at the intersection of Goddard Street/Streatley Road have been summarised in Table 9.1.

Table 9.1 Goddard Street/Streatley Road Options

Option	Benefits	Dis-benefits
1. Traffic island extension on Goddard Street (south)	- May discourage illegal manoeuvre	- May not fully prevent illegal manoeuvre - Potential turning restrictions imposed on adjacent properties (depending on length of extension) - Doesn't address crash problem
2. Raised Median on Goddard Street (north and south including through the intersection)	- Prevents illegal manoeuvre - Solves crash problem	- Turning restrictions imposed on adjacent properties - Impact on bus route with likely withdrawal of service if extended through intersection -May not fully prevent illegal manoeuvre
3. Left-In/Left-Out Restriction on Streatley Road (East)	- May discourage illegal manoeuvre - Solves some crash problems	- May not fully prevent illegal manoeuvre - Doesn't fully address crash problems

		- Turning restrictions imposed on properties to/from Streatley Road (east)
4. Left-In Only Restriction to Streatley Road (east)	- Will prevent illegal manoeuvre - Solves some crash problems	- Turning restrictions imposed on properties to/from Streatley Road East - Requires formalisation of laneway and/or connection to Francisco Place - Doesn't fully address crash problems
5. Full Road Closure on Streatley Road (East)	- Prevents illegal manoeuvre - Provides signalised access (full turning movements) into Orrong Road for properties on Streatley Road East - Solves some crash problems	- Turning restrictions imposed on properties to/from Streatley Road East - Doesn't fully address crash problems - Slight increase in traffic at signalised intersection and impact on Main Roads WA
6. Road Closure at Laneway	- Prevents vehicles using the laneway to access Orrong Road.	- Restricts access to vehicles legitimately using the laneway. - Turn around area needed at the end of the blocked off laneway – may be difficult to accommodate. - Doesn't address existing crash problem
7. Roundabout	- May discourage illegal manoeuvre - Will address most existing turning crashes at existing intersection - Maintains full turning movements. - Can be used in conjunction with some of the above options	- May not fully prevent illegal manoeuvre – e.g. drivers continue doing same manoeuvre.

9.2 Cornwall Street/Castle Way Intersection

Due to the close proximity of the intersection of Great Eastern Highway/Cornwall Street (approximately 35m), there is a risk that vehicles turning into Cornwall Street from Great Eastern Highway may potentially collide with the rear end of any vehicles queuing to turn right into Castle Way. There is also limited inter-visibility between vehicles turning into Cornwall Street (from Great Eastern Highway) and vehicles turning right out of Castle Way at the intersection with Cornwall Street. Potential options for addressing the above safety risks are outlined below.

9.2.1 Option 1: Right Turn Ban

Providing a right turn ban into/out of Castle Way may resolve the above mentioned road safety risks (although this will discourage the use of Rutland Avenue which has been identified as a preferred through route). To enforce compliance, the existing traffic island on Cornwall Street (at the intersection with Great Eastern Highway) can be extended beyond Castle Way. The extension of the traffic island will also address the risk of vehicle conflict resulting from the limited inter-visibility between vehicles turning into Cornwall Street (from Great Eastern Highway) and vehicles turning out of Castle Way (at the intersection with Cornwall Street).

This option will require any vehicles that previously turned right into/out of Castle Way at this location to re-route (for instance continuing along Cornwall Street, turning right into Gallipoli Street and then turning right into Streatley Road to access Castle Way, and vice versa). The Town will also

need to consider the impact on any additional generated traffic from the proposed Red Castle Re-development that may also be affected by this treatment. In addition, it is likely that drivers heading towards Castle Way from Great Eastern Highway will simply turn around in the adjacent car park on the northern side of Cornwall Street and subsequently then head back towards Castle Way to turn left into the road – which simply results in additional travel distances and other potential safety issues compared to the existing risks.

9.2.2 Option 2: Modify Priority at the Intersection

As outlined in Section 8.1, given that Rutland Avenue has been identified as a preferred through route to connect with Great Eastern Highway, consideration could be given to amending the priorities of the two intersections of Castle Way/Streatley Road/Rutland Avenue and Castle Way/Cornwall Street. It is noted that this treatment will remove the potential/need for vehicles currently turning right into Castle Way (at the Cornwall Street intersection) to queue/give way to opposing traffic on Cornwall Street. As part of this, a right turn ban out of Castle Way into Cornwall Street could also be implemented to address the risk of vehicle conflict resulting from the limited inter-visibility between vehicles turning into Cornwall Street (from Great Eastern Highway) and vehicles turning out of Castle Way (at the intersection with Cornwall Street).

If the priority at the Castle Way/Cornwall Street intersection is altered to provide through priority for the western and southern approaches, it is noted that appropriate traffic calming measures may need to be implemented on Cornwall Street (eastern approach). It should also be noted that this treatment will result in the bus route on Cornwall Street not having priority through the intersection with Castle Way. As such, consultation with PTA may be required prior to the implementation of this option. It is also noted that the provision of a right turn ban has impacts on vehicles that previously turned right out of Castle Way.

9.2.3 Option 3: Right Turn Lane

The carriageway width on Cornwall Street is approximately 12m. Subject to vehicle tracking of a suitable design (noting that Cornwall Street is a bus route), an additional right turn lane (approximately 20m length) can be installed on Cornwall Street at the intersection with Castle Way. The channelisation proposed will direct eastbound vehicles that turn into Cornwall Street from Great Eastern Highway and continue straight ahead away from any vehicles waiting to turn right into Castle Way minimising the potential for a rear-end collision.

However, it is noted that the bus stop located opposite No. 3D Cornwall Street will most likely need to be relocated further east along Cornwall Street which will require consultation with the Public Transport Authority (PTA). In addition, this option does not address risk of potential vehicle conflict resulting from the limited inter-visibility between vehicles turning into Cornwall Street (from Great Eastern Highway) and vehicles turning out of Castle Way (at the intersection with Cornwall Street).

9.2.4 Option 4: Mini Roundabout

Due to the constrained area, a mini roundabout at the intersection could be installed to allow full turning movements to be maintained whilst also addressing the inter-visibility issue between Castle Way and vehicles turning into Cornwall Street from the Great Eastern Highway as drivers on Castle Way only need to focus their attention on the mini-roundabout.

However, it doesn't particularly address the issue of vehicles turning into Cornwall Street from Great Eastern Highway potentially colliding with the rear end of any vehicles at the roundabout, whilst

queues from the left turn out on to the Great Eastern Highway may also block the roundabout – albeit this is acknowledged to be a potential existing issue. As with the provision of a right turn bay, the eastbound bus stop may also need to be relocated and consultation with the PTA will be required. In addition, as indicated in Appendix B, cyclists, motorcyclists and pedestrian all have potential safety or access issues at mini roundabouts.

9.2.5 Summary of Options

The benefits and dis-benefits for each potential option for addressing the safety issues at the intersection of Cornwall Street/Castle Way have been summarised in Table 9.2.

Table 9.2 Cornwall Street/Castle Way Options

Option	Benefits	Dis-benefits
1. Right Turn Ban	- Addresses queuing issue - Addresses inter-visibility issue	- Will discourage the use of Rutland Avenue as the preferred route - Will require vehicles to reroute (including vehicles from Red Castle redevelopment)
2. Modify Priority	- Continuation of preferred route in the long term (Rutland Avenue) - Addresses queuing issue - Right turn ban out of Castle Way addresses inter-visibility issue	- Bus route will not have priority - May need traffic calming on Cornwall Street to highlight/reinforce the change in priority.
3. Right Turn Bay	- Improves the road safety with regards to the queuing issue	- Bus stop will need to be relocated (PTA consultation required) - Does not address inter-visibility issue
4. Mini Roundabout	- Allows full turning movements to be maintained. - Address intervisibility issue as vehicles turning right out of Castle Way are focussed on the roundabout. - Minimal impact on bus tracking movements.	- Vehicles turning right from Cornwall Street in Castle Way blocking traffic onto the Great Eastern Highway and/or not addressing issue of vehicles turning into Cornwall Street from Great Eastern Highway potentially colliding with the rear end of any vehicles at the roundabout. - Potential cycle/motorcycle safety issues and pedestrian access concerns with this type of treatment. - Bus stop will need to be relocated (PTA consultation required)

9.3 Roberts Road/Bishopsgate Street Intersection

A high number of cyclist crashes (six between 2009 and 2013) have been recorded at the Roberts Road/Bishopsgate Street roundabout. Five of these crashes appear to be a result of vehicles failing to Give Way to cyclists on their right from various approaches. Furthermore, it is noted that there were 17 additional vehicle-vehicle crashes at this intersection with the majority (15) being right angle crashes. These right angle crashes generally appear to be a result of vehicles on the southern approach (Roberts Road – Miller Street end) failing to give way to vehicles from Bishopsgate Street (east) with almost two-thirds of these occurring during hours of darkness. (Only one of the six cycle crashes occurred at night.) Further inspection of the roundabout geometry shows minimal deflection for the northbound through traffic movement with some shadows being cast at night due to the

presence of trees and streetlights. Potential options for improving the safety at this intersection are outlined below.

9.3.1 Option 1: Provide Pre-Deflection at the Roundabout/Improve Northbound Deflection

Providing pre-deflection on all legs of the roundabout (especially the southern approach) will help reduce vehicle speeds at the roundabout. An alternative is to reconstruct the roundabout to increase the deflection for all movements (especially the southern approach) to reduce vehicle speeds through the roundabout. Lower vehicle speeds may help to reduce the probability/severity of any conflicts at this intersection, including collisions with cyclists.

However, it is noted and acknowledged that the provision of pre-deflection/reconstruction of the roundabout may be limited by property boundary/funding constraints.

9.3.2 Option 2: Raised Intersection Treatment

The intersection can be raised (e.g. plateau) as a traffic calming treatment to reduce vehicle speeds at the intersection. An alternative solution is to provide traffic calming treatments on approach to the intersection such as speed cushions. Lower vehicle speeds will help to reduce the probability/severity of any conflicts at this intersection. However, raised intersection treatments can have dis-benefits including noise, vibration and discomfort for cyclists.

9.3.3 Option 3: Provide Off-Street Cycle Path Option on All Approaches to the Intersection

At present, the on-street cycle lanes/shoulders on the Bishopsgate Street approaches of the roundabout terminate on the approach to the roundabout with cyclists having to merge with general vehicular traffic (whilst the Roberts Road/Miller Street roundabout to the and north and south provides an off-street cycle path option on one arm of the intersection). If off-street cycle path areas are provided on the Bishopsgate Street approaches prior to the roundabout, cyclists have the option of dismounting and crossing the intersection using the pedestrian crossing points which have refuge areas.

However, it should be noted that whilst this option may improve the safety of cyclists which transfer onto the off-street cycle path, the safety of any cyclists which continue to use the general traffic lane will not improve. Indeed, most experienced cyclists would prefer to continue on-road and claim the traffic lane on the approach to a roundabout rather than having to use the adjacent shared path. Furthermore, this option does not address the 17 vehicular crashes that have occurred at this intersection.

9.3.4 Option 4: Improved Lighting

In addition and/or as a complementary measure to the above three options, as an absolute minimum, a check on the current lighting provision should be undertaken, particularly with respect to traffic approaching and/or being on the roundabout from Bishopsgate Street south. Subject to the findings of the lighting check, it may be necessary to cut-back existing vegetation that is casting a shadow on the roundabout and its approaches and/or improve the street lighting.

9.3.5 Summary of Options

The benefits and dis-benefits for each potential option for addressing the cyclist safety issues at the intersection of Roberts Road/Bishopsgate Street have been summarised in Table 9.3.

Table 9.3 Roberts Road/Bishopsgate Street Options

Option	Benefits	Dis-benefits
1. Pre-Deflection	- Reduce speeds which may reduce the probability/severity of conflicts	- Land acquisition may be required (cost implications)
2. Raised Intersection	- Reduce speeds which may reduce the probability/severity of conflicts	- Noise and vibration - Discomfort for cyclists
3. Off-Street Cycle Path Option on Approaches	- Provides off-road option for cyclists to minimise vehicle-cyclist conflicts	- Does not address vehicular crashes - Cyclists may continue to use traffic lane which will not address safety issue
4. Improve street lighting	- addresses a major percentage of crashes that are occurring i.e. at night - can be done in conjunction with the above three options	Doesn't specifically address existing cycle crash numbers.

9.4 Roberts Road/Howick Street (East)/Star Street

Of the 15 crashes at this roundabout, specific vehicle movements are only known at 10 of them. Furthermore, of the two injury crashes that occurred, one involved a vehicle with the driver reportedly losing control of their vehicle due to sun-glare (an external environmental factor).

Of the 10 crashes with vehicle movements known, five involved northbound vehicles on Roberts Road failing to give way to vehicles already on the roundabout travelling from Star Street (east) whilst a further two involved southbound vehicles on Roberts Road failing to give way to vehicles from Howick Street (west). Observations indicate the presence of a large tree and adjacent power pole which limit visibility along Star Street from Roberts Road.

Subject to any detailed analysis as part of a black-spot study, potential options include establishing the potential to cut back the vegetation on the southern corner to improve visibility. It is also noted that one of the injury crashes was a result of sun-strike. As such, given the injury crash records at this location, it is suggested that this location has a low priority for improvements other than standard maintenance treatments. Crash numbers however should continue to be monitored.

9.5 Goddard Street/Enfield Street

Whilst this roundabout is noted as meeting both the State and National Black Spot Crash Criteria, a detailed review of the crashes indicate that one of the injury crashes was sustained by a bus passenger either falling within or from a bus – thus in reality making it exempt. Of the remaining four crashes, a mix of right angle type crashes occurred with respect to the approach direction of vehicles failing to give way. Notwithstanding this, two crashes involved cyclists travelling along Enfield Street being hit by vehicles on Goddard Street that failed to give way.

The small number of crashes and lack of commonality has resulted in no further treatments specifically at this intersection being considered. Crash numbers however should continue to be monitored with a view to increasing deflection at the roundabout to discourage any relatively high vehicle entry speeds.

9.6 General Improvements

Additional general road safety improvements based on the site inspections that should be considered include:

- Reviewing the construction of the road safety barriers along Rutland Avenue in terms of their intended function/operation in the event of a collision as well as replacing the terminal treatments.
- Ensuring vegetation throughout the suburb that affects visibility to traffic signs is cut back and maintained on a regular basis.
- Installing no parking markings on crests with limited visibility to reinforce the existing Road Traffic Code requirements.

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10 Promote Pedestrian/Cyclist Activity

Austroads[6] acknowledges that the most important contribution to pedestrian/cyclist safety and amenity in local roads comes from the reduction of vehicular traffic speeds along with traffic volumes. Given that the reduction in vehicular traffic speeds is proposed to be addressed as part of the primary objective of improving resident amenity through the proposed traffic management philosophy, this section will focus on other aspects of promoting pedestrian/cyclist activity.

10.1 Proposed Improvements for Pedestrians/Cyclists

10.1.1 Pedestrians Facilities

It is noted that footpaths have been provided on all roads throughout Lathlain. Furthermore, it is noted that any reduction in vehicular traffic speeds resulting from the traffic calming measures/philosophy (as discussed in Section 7) will improve the safety/amenity of pedestrian crossing movements. As such, additional specific dedicated pedestrian facilities have not been proposed as part of this Pilot Study, although the existing provision of pedestrian facilities will be maintained and an opportunity exists for enhanced pedestrian movements through reduced road crossing widths as identified in some of the Options in Section 7.3.

10.1.2 Cyclist Facilities

As indicated in Section 5.4, the Town had previously sought funding from the Department of Transport to design and construct a Principal Shared Path (PSP) along the western side of Rutland Avenue in 2015-2016/2016-2017. This route forms part of the DoT identified Burswood to William Street Priority PSP program along the Perth-Armadale Railway for implementation between 2014 and 2023. As part of this process, it is noted that Rutland Avenue was to be widened to 7m in parts to improve traffic flow and safety. The proposed PSP for which funding was sought was intended to provide connectivity between the existing shared path on Roberts Road and the pedestrian/cyclist over-bridge located north of Midgley Street while also connecting with the over-bridge located south of Howick Street.

The unsuccessful application for funding to the DoT in the short-term has resulted in the need to investigate alternative options to assist north-south cycle movements through the suburb (preferably alongside Rutland Street) as a separate future study given the longer term intention to potentially encourage more vehicles to use Rutland Avenue.

Suburb-wide, as with pedestrians, it is noted that any reduction in vehicular traffic speeds resulting from the traffic calming philosophy will improve the safety/amenity of on-street cycling/crossing movements. It is noted that the traffic calming treatment options outlined in the concept design options should consider the needs of cyclists to ensure that squeeze points for cyclists are not created. It is also noted that cycle bypasses of traffic calming treatments can be provided for the roads in Lathlain which have a carriageway width of approximately 10m. Similarly, the District Distributor road concept options all try to cater specifically for cyclists given the higher expected traffic volumes. Additional guidance on cycle facilities is provided in Appendix G.

[6] Cycling Aspects of Austroads Guidelines (2014)

11 Public Consultation

11.1 Consultation Methods

Community consultation has been carried out at both the inform and consult levels of the International Association for Public Participation (IAP2) Public Participation Spectrum with the goal of providing residents in the local community with background information about the suburb to assist them in their wider understanding of the problem, opportunities and potential solutions as well as to obtain public feedback on all of the above.

Techniques used as part of the consultation process included:

- A letter from the Executive Manager – Street Life of the Town of Victoria Park dated 11 November 2014 to all residents within Lathlain and adjacent streets in Carlisle advising of the pilot study and the availability of the draft Traffic Management Plan (TMP) as well as details regarding a community forum to discuss any and all aspects of the draft TMP.
- An advert in the 18 November 2014 editions of the Southern Gazette and Examiner advising of the pilot study and the availability of the draft TMP as well as the details of the community forum to discuss the draft TMP.
- Information on the Town of Victoria Park's website with a link to the draft TMP, a link to an online survey (see Appendix H) as well as details regarding the community forum.
- A face-to-face meeting with representatives of Main Roads WA.
- An email to the Public Transport Authority informing them of the pilot Study given the potential impact on bus routes/bus stops.
- A community forum between 6pm and 8pm in the Main Hall at Lathlain Park on 26 November 2014.

As part of the above, feedback on the draft TMP was specifically sought via an online survey accessed via the Town's website (see Appendix H) as well as through an email address: lathlain@opus.com.au or posted responses.

As well as the link on the Town's website to the draft TMP, hard copies were made available at the Council Administration Centre and local library. In addition, the Community Consultation report setting out the findings of the various forms of public consultation was also made available to the public via the Town's website with individual submitters sent an email with a link to the site.

11.2 Online Survey Responses

In total, 52 respondents commenced the survey with 32 completing the entire questionnaire (61% completion rate) and 20 respondents dropping out part way through the questionnaire. Of those 20 incomplete surveys, 10 provided zero or only one response to the survey (such as their living status) whilst the remaining 10 tended to provide information throughout the entire questionnaire. A copy of the questionnaire used as part of the survey is included in Appendix H whilst tabulated results are included in Appendix I.

The results presented below relate to the actual number of responses to each question.

11.2.1 Demographics

Of the 41 respondents supplying their gender, 68% were male and 32% female. With respect to the 42 respondents supplying their age range, 48% were 50-64 years of age and 40% were 30 to 49 years of age. Of the remaining respondents, 7% were 65 years of age and older and 5% aged between 18 and 29 years.

Forty one of the 44 respondents indicating they resided in Lathlain, with 86% of the total 44 responses being owner occupiers of their dwellings. Seven percent of the 44 respondents were tenants and 7% did not live in Lathlain. As part of this, it was noted that a small number (four) of respondents indicated that they were owner occupiers in Lathlain, but gave a Carlisle street address.

Thirty seven respondents provided a residential address. Of these, seven responses came from Goddard Street (three addresses provided two responses each) and Howick Street (one address provided two responses). Three responses were received from Rutland Street and Custance Street. Two responses were also received from each of Enfield Street (same address), Streatley Road and Getting Street (same address).

The above individual and residential responses represent approximately 1-2% of the total population/dwellings in Lathlain.

Of the 40 respondents to the various modes of transport regularly used, 50% claimed to cycle on roads within Lathlain on a regular or semi-regular basis; almost all respondents (98%) claimed to walk around Lathlain on a regular or semi-regular basis; and 80% claimed to use public transport (bus or train) through or to/from Lathlain on a regular or semi-regular basis.

11.2.2 Existing Issues

Vehicle speed/hooning (22%) and traffic volumes (21%) were ranked as the two most important traffic and transport issues on the respondent's streets or Lathlain in general followed by road safety (16%) and intersection congestion (11%). These issues were followed by parking (9%), cycling (7%) and walking (5%) in terms of importance. Three percent of the overall responses indicated no traffic or transport issues in general (although one reply also noted cycling as an issue in addition to 'no issues').

Thirty four comments on a wide range of existing issues were provided. The main issues have been summarised below (in no particular order):

- Goddard Street/Streatley Road – this intersection suffers not only from reported crashes but also unreported crashes. Buses also have some problems making the turning movement resulting in the central median being hit (with resulting noise issues).
- Vehicles tend to exit Orrong Road into Goddard Street at a relatively high speed given the lack of a deceleration lane on Orrong Road – any proposed treatment at the Goddard Street/Streatley Road intersection should be aware of this.
- A lack of cycle infrastructure and facilities exists throughout the suburb with some treatments resulting in unfriendly cycle routes such as along Goddard Street. Elsewhere, parking in cycle lanes occurs whilst other elements such as the bridge at Rutland Avenue/Streatley Road needed improving. The provision of cycle infrastructure will be required along Rutland Street if this is to be a preferred route around the suburb.

- General car parking issues were highlighted with respect to illegal parking on crests and adjacent to local corner shops (thereby reducing visibility at intersections). Commuter parking near the railway station was also noted as a problem for residents and their visitors/others.
- Excessive traffic speeds were perceived as occurring (amongst other locations – see later) along Rutland Avenue (for instance near the railway station with the associated risks for pedestrians), Bishopsgate Street and Enfield Street (school zone requested).
- Non-local traffic was using Lathlain as a 'rat-run' to avoid congestion elsewhere such as along Orrong Road with the various sets of traffic signals - Goddard Street, Streatley Road, Howick Street, Star Street and Enfield Street noted as being impacted by this in terms of traffic volumes/speeds. Improvements along Roberts Road, for instance by signalising the intersection with Orrong Road and/or increasing the speed limit to 60km/h were suggested to encourage vehicles to use main roads rather than local roads. Further suggestions to discourage the use of local roads such as Goddard Street could be achieved through restricting the left turn movement from Goddard Street into Orrong Road. As part of this, the laneway between Streatley Road and Orrong Road to the south of Goddard Street was generally requested to be closed, with a further suggestion being that the link between Streatley Road and Francisco Place be re-opened.
- As a result of traffic calming being installed at some, but not all locations around the suburb, traffic is unfairly being 'encouraged' to use some local roads but not others, for instance Enfield Street. This has resulted in an unfair distribution of traffic with rat-running occurring on some streets.
- Traffic calming on Howick Street between Goddard Street and Roberts Road was reported as being ineffective. A further respondent however noted that they believed the traffic calming along Howick Street in general was excessive and didn't like speed humps; whereas another believed the treatments to be effective and wished to see further traffic calming in the area overall.
- Specific locations with issues were noted at the Roberts Road/Bishopsgate Street roundabout (including visibility concerns) and the Enfield Street/Goddard Street roundabout.
- Crossing opportunities over Roberts Road were noted as an issue along with vehicle speeds, although a suggestion to increase the speed limit to 60km/h was also made.
- Hooning in the vicinity of Goddard Street and its intersections with Streatley Road and Orrong Road as well as along Custance Street was noted, with such drivers attempting to negotiate traffic calming features at speed – traffic calming treatments were perceived to be a 'challenge'.
- Recent upgrades to street lighting and/or the lack of street lighting in the suburb were noted as concerns.

11.2.3 Treatment Types – Locations

Goddard Street/Streatley Road

Seventy three percent of respondents supported modifications at the Goddard Street/Streatley Road intersection with a further 19% having no comment or preference. Option 6 (road closure at the laneway between Streatley Road and Orrong Road) with 25% the responses was the preferred option

provided in the draft Traffic Management Plan report followed by Option 1 (traffic island extension on Goddard Street south) with 19% and Option 7 (roundabout) with 17%. Forty eight responses were received with respect to a preferred option.

Eighteen responses and comments were made with respect to improving the Goddard Street/Streatley Road intersection as summarised below:

- A number of responses specifically sought to prevent the left turn movement from Goddard Street into Orrong Road (or make Goddard Street a cul-de-sac), presumably in order to discourage traffic along Goddard Street. As part of this, suggestions also included reopening access between Streatley Road and Francisco Place or providing traffic lights at the Roberts Road/Orrong Road intersection to discourage traffic from entering Lathlain.
- Existing difficulties for buses turning right from Streatley Road into Goddard Street were noted with respect to buses hitting the median island resulting in noise pollution.
- Comments were made supporting the laneway closure, although it was also noted that this may affect adjacent business owners.
- The turning restrictions as proposed potential options were noted as impacting on the 'legibility' (the ability for road users to work out how to move around the suburb) of Lathlain.

Cornwall Street/Castle Way

Sixty three percent of respondents supported modifications at the Cornwall Street/Castle Way intersection with a further 26% having no comment or preference. Option 3 (right turn bay) and Option 4 (mini-roundabout) each with 27% of the responses were preferred options followed by Option 2 (a modification of the intersection priority) with 23% of the responses. It should be noted that only 22 responses were received with respect to a preferred option.

Fourteen responses and comments were made with respect to improving the Cornwall Street/Castle Way intersection. These have been summarised below:

- Whilst one respondent noted that they did not have problems with the current arrangement, a number of responses indicated their preference for improvements due to westbound traffic queuing back from the Great Eastern Highway blocking access into Castle Way - a Keep Clear marking across the intersection was suggested by one respondent.
- A number of responses indicated that Cornwall Street was sufficiently wide to be reconfigured to provide a right turn lane (or already allowed this to occur in an informal way).
- Comment was made with respect to providing a deceleration lane on Great Eastern Highway for left turning vehicles.
- Two specific comments regarding the mini-roundabout option were mixed in terms of being for and against this option.
- Three comments were made with respect to supporting a change in priority.

Roberts Road/Bishopsgate Street

Fifty six percent of respondents supported modifications at the Roberts Road/Bishopsgate Street roundabout with a further 23% having no comment or preference. Twenty one percent did not support any changes at the roundabout. Option 1 (pre-deflection on the roundabout approaches) was the preferred option with 38% of the responses followed by Option 3 (off-street cycle facilities) with

29% of the responses. It should be noted that only 21 responses were received with respect to a preferred option.

Ten responses and comments were made with respect to improving the Roberts Road/Bishopsgate Street roundabout as summarised below:

- Vehicle approach speeds (particularly from Miller Street) were noted as a concern by a number of respondents, with the subsequent need to reduce speeds at the roundabout.
- Whilst responses identified the need to improve cyclist (and pedestrian) safety at the intersection, for instance by separating out less experienced/confident cyclists from motor vehicle traffic, a comment was also made that most on-road cyclists would not use off-road facilities (for instance as currently provided).

11.2.4 Treatment Types – Road Class

Local Access Roads

Twenty one responses with respect to the preferred traffic calming design options for Local Access Roads (as well as more general feedback on traffic calming) were made. Forty one percent of responses supported Option 1 (angled centre parking arrangement) followed by Option 2 (single central traffic lane) - 36% and Option 3 (off-set single traffic lane) - 23%. Specific comments relating to the Local Access Road designs have been summarised below whilst more general comments have been included within Section 11.2.5 of this report 'Other Issues':

- Comments were made with respect to the impact of such treatments on pedestrians and cyclists.
- Some treatments may not be supported by local residents as they impact on current/future access requirements.
- The watering and maintenance of proposed vegetation needs more detailed consideration.
- Option 1 would be limited to wider roads within the suburb.
- One respondent noted that all the Options were preferable to speed humps whilst one response suggested the need to use speed humps.
- Regardless of the Option, there was a need to take account of local parking requirements.

Local Distributors/Preferred Routes

Of the 32 responses indicating a preferred Option, 47% supported Option 3 (blister island) followed by Option 2 (double lane angled slow point) - 28% and Option 1 (elongated angled slow point) - 25%. Eighteen comments with respect to the proposed traffic calming design options for Local Distributor/ Preferred Routes Roads were made, albeit with a number of these more general in nature and as such, these have been reported/included in Section 2.1.5 of this report 'Other Issues'. Specific comments with respect to the three Options have been summarised below:

- Differences of opinion were noted with respect to the effectiveness of Option 3 (blister island) in terms of changing driver behaviour.
- Two respondents questioned the effectiveness in general of traffic calming treatments with a comment that they simply caused more noise pollution for local residents close to the devices.

This contrasted with a comment requesting speed humps on all roads except District Distributors.

- Concerns were raised about catering for cyclists (and pedestrians) as part of the overall design.
- Issues associated with watering and maintaining vegetation as part of the treatments were raised in addition to those noted for Local Access Roads.

District Distributors

Of the 31 responses indicating a preferred Option, 35% each supported Option 2 (indented car parking) and Option 3 (Roberts Road style arrangement) followed by Option 1 (flexible posts to separate the cycle lane) with 30%. Twelve comments with respect to the proposed traffic calming design options for District Distributor Roads were made. These have been summarised below:

- Many respondents specifically identified each of the options with respect to Roberts Road and how the options would work along this road.
- Concerns were made with respect to cycle lane provision and the potential for the opening of vehicle doors to hit passing cyclists. As such, any design should consider the needs of cyclists, whilst noting a large cross section may be required to allow parking and sufficient cycle lane width.
- The use of flexible posts was noted as potentially having an impact on adjacent properties and may assist with separating different types of movements. One further comment was that only protected cycle lanes will increase the number of cyclists, particularly as some drivers park their vehicle in cycle lanes.

11.2.5 Other Issues

Twenty one general responses with respect to other comments and/or recommendations were made as part of the survey. In addition, a number of more general issues identified in other parts of the questionnaire have been incorporated and included in the reporting as summarised overleaf with respect to key elements of the feedback.

- Consideration should be given to alternatives in case the Principal Shared Path along Rutland Avenue isn't funded given the intention to make Rutland Avenue a preferred route around the suburb (e.g. such a one-way road along Rutland Avenue and a separate two-way cycle path). Traffic calming treatments should be designed to meet the needs of cyclists.
- Preferred routes should be designed accordingly with treatments to encourage constant low speeds (rather than accelerating/decelerating) rather than discouraging a particular route. As part of this, Roberts Road and its access to Orrong Road should be treated as the main arterial road through the suburb with the Orrong Road intersection signalised. As such, other existing rat-runs such as Goddard Street would be addressed. Earlier comments about closing the Goddard Street movement to/from Orrong Road were repeated as well as the need to close off the laneway and potentially reconnect Streatley Road and Francisco Place. Any (non-local) traffic passing through Lathlain should be assigned/distributed evenly and appropriately across the suburb.
- In terms of Local Access Roads and/or preferred routes, the provision of traffic calming treatments that simply redistributes non-local traffic onto other roads (for instance along Goddard Street) results in an unfair distribution of traffic within the suburb.

- A mix of views existed with respect to their being too much traffic calming in the suburb already (never mind the additional amount planned) and the need for additional traffic calming in order to discourage non-local traffic. As part of this, different views on types of traffic calming (e.g. speed humps) exists in terms of the intended outcomes and overall effectiveness. Similarly, different views existed with respect to closing off roads.
- More consideration should be given to pedestrian access/movements at the railway station.

11.3 Email Responses

A total of 16 responses were made via email either directly to the nominated lathlain@opus.com.au email address or via the Town by the closing date for feedback of 16 December 2014. One of these email submissions also included a hand written survey form that was subsequently entered verbatim into the electronic online survey having checked that it had not already been entered to minimise any potential duplication. Of the 16 responses, two were made from the same email address, albeit about different elements of the Study. For each of the email responses to the lathlain@opus.com.au email address, an acknowledgement email was sent to the respondent.

In addition to the above, one further hand written survey form was also supplied to the Town of Victoria Park on or shortly after the closing date. Whilst the information on this survey form has not been included and incorporated into the electronic online survey (as the on-line system had been deactivated), the information contained has been incorporated into the general summary of feedback through the email process as set out below.

- Due to the existing traffic calming on Howick Street, vehicles re-route on to parallel roads such as Saleham Street. Additional traffic calming measures on such roads are required to ensure a fair distribution of traffic on local roads i.e. treat all local roads equally. Respondents also queried the purpose and need for a roundabout at the Goddard Street/Saleham Street/McCartney Crescent intersection.
- The safety of cyclists was noted as highly important including the need to construct the Principal Shared Path alongside Rutland Avenue (or alternative arrangements such as making Rutland Street one-way and implement a separated two-way cycle path).
- The re-prioritisation of the Castle Way/Cornwall Street intersection was supported by a respondent with a number of respondents being against any ban on turning movements at this location.
- Comment was made with respect to proposed treatments identified in the 2000 Structure Plan not being implemented.
- Suggestions included the need to signalise Roberts Road/Orrong Road along with a further proposal to make Goddard Street a cul-de-sac at its northern end with Orrong Road in order to prevent through traffic from using Goddard Road to access Orrong Road - rather than making it a preferred route. In addition, an alternative proposal included connecting Goddard Street south with Francisco Place via Streatley Road east and Goddard Street north to Streatley Road west (with no direct vehicular connection at the existing Goddard Street/Streatley Road intersection). One further suggestion included making the laneway connecting Orrong Road one-way southbound rather than its current northbound arrangement.

- The amount of additional traffic calming was considered excessive with such treatments potentially impacting on businesses located within the suburb. As part of this response, improvements to the Goddard Street/Orrong Street access were requested to assist with turning movements/congestion.
- Inappropriate traffic calming treatments have the potential to encourage some drivers to treat them as a challenge. As part of this, the proposed roundabout at Goddard Street/Saleham Street/McCartney Crescent intersection was not supported given a lack of issues (including speeding) on the southern part of Goddard Street.
- The lack of commuter parking at the railway station resulted in on-road parking by commuters around the area thereby preventing local residents/visitors from using the road to park on. Requests for time restrictions and/or a residents' parking scheme were requested.
- Traffic speeds and volumes in general were noted including hoons on Cookham Road with a request to reduce speeds between Gallipoli Street and Goddard Street as well as to introduce traffic calming on Rutland Avenue.
- An extension of the existing footbridge at the Rutland Avenue/Streatley Road corner to allow pedestrians to access the eastern side of Rutland Street was requested.
- Support for Option 1 for both the Goddard Street/Streatley Road and Cornwall Street/Castle Way intersections was expressed.

In addition to the above, a number of other comments were made with respect to the removal of parking on Star Street (in Carlisle) and its impact on road user behaviour. Other comments included, amongst other requests, the need for improved street lighting, the need for aesthetic traffic calming, improved pedestrian facilities/access, a request for no more speed humps on Howick Street and a mix of views with respect to road safety concerns at the Bishopsgate Street/Roberts Road roundabout.

11.4 Main Roads WA

A meeting with representatives of Main Roads WA was held on 25 November 2014 at the Town of Victoria Park to explain the background to the project and to specifically receive initial feedback on the proposed traffic calming options that had been developed given the Commissioner of Main Roads WA's powers with respect to traffic signs and pavement markings.

It was noted that whilst Main Roads WA has standard designs for certain types of traffic calming treatments, scope exists to reduce the amount of traffic signs and pavement markings in low speed local residential areas. Suggestions made by Main Roads WA included not using raised reflective pavement markings (RRPMs) – except along centre lines of opposing flows of traffic and/or piano bars at road humps at locations where speeds are already sufficiently low and the area is well lit. As part of this, Main Roads WA were open to the ideas behind the proposed traffic calming such as self-explaining roads and/or 'skinny–streets'.

Comment was made that whilst no changes to kerbing was currently being proposed as part of the treatments, once trials of the treatment options had been implemented, the potential existed to replace any edge lines with flat kerbing in the future as appropriate subject to drainage requirements at specific locations. For instance, given the current road levels with a crown in the centre and drains at the edges, the removal of kerbs could result in run-off water from the road flooding adjacent properties/gardens. As part of this, the Town noted the potential for them to pay for the installation

of necessary pavement markings as part of the overall contract rather than requesting Main Roads WA to pay for the markings.

Similarly, whilst planter boxes have been proposed for some treatments, the intention is for them to be trialled in the first instance and potentially subsequently replaced by in-ground non-frangible trees if the treatments is proved successful. This in turn would allow the planter boxes to be re-used elsewhere.

Main Roads WA supported the idea of improved pedestrian amenity in the area, suggesting proposed crossing points included in the concept designs be widened and/or the possibility of raising Rutland Avenue adjacent to the train station to give it a more traffic calmed feel where drivers should expect to see and encounter pedestrians. As part of the process for improving pedestrian amenity, it was suggested that more attention to detail (termed 'nano-design') with regards to pedestrian facilities would improve the streetscape for all road users.

Issues associated with the existing signalisation of Francisco Place/Francisco Street and the Town's submission for signalisation of the Roberts Road intersection along Orrong Road were discussed with the preference to signalise Roberts Road and remove the signals at Francisco Street. However, previous attempts to remove the signals at Francisco Street had met with resistance from Belmont. The signalisation of both sets of intersections may result in traffic efficiency concerns for north-south traffic along Orrong Road, particularly given recent improvements to signal timings.

11.5 Public Transport Authority

An email outlining the Consultation process, information and relevant issues was sent to the Public Transport Authority (PTA) on 13 November 2014 with a follow up telephone call on 12 December 2014. Formal feedback from the PTA was received on 16 December 2014.

The PTA noted that Transperth currently operated two bus routes through the suburb, including a Train Replacement Service (Route 907) when the train service is not operating along Great Eastern Highway, Cornwall Street, Castle Way, Rutland Avenue and Bishopsgate Street. A number of other general and specific location comments were made:

- Transperth buses will not operate on any road with a one-way slow point and will not operate on roads with a single carriageway less than 3.2m or lane width less than 3.5m with angled parking. Should such treatments be installed on bus routes, the bus service would be withdrawn.
- Any speed humps on bus routes should have a Watts-type profile with a maximum 75mmm height, with Transperth having a preference for speed cushions (a profile has been provided and subsequently supplied to the Town).
- Whilst raised intersections along Rutland Avenue are not supported by Transperth given the use of the road by its Train Replacement Service, Transperth has requested being involved in the detailed design work if these treatments are utilised. Indeed, should any treatments be installed along any bus route, Transperth has requested that they be contacted and be involved in the design process.
- Any treatment that prevents the existing bus routes from being operated along are strongly opposed – for instance right turn restrictions at Goddard Street/Streatley Road and from Cornwall Street into Castle Way (for the Train Replacement Service).

- Whilst Transperth has no objection to the use of roundabouts, Transperth has requested that they be contacted and be involved in the design process (see above). Notwithstanding this, the use of pre-deflections are not supported due to passenger discomfort/tracking issues.
- Where treatments are required to slow vehicles down prior to a roundabout, Transperth's preference is for the use of speed cushions.
- Cornwall Street/Castle Way intersection – Option 2 (modify priority) is supported by Transperth and has no objections to the westbound bus service on Cornwall Street having to give way. With regards Option 3 (right turn bay), Transperth has requested that they be contacted and be involved in the design process. Transperth also specifically objects to Option 4 (mini-roundabout) given the potential for vehicles to stack back behind an eastbound waiting bus into the Great Eastern Highway.
- No change is requested at the Great Eastern Highway/Cornwall Street. (Note: none is proposed as part of the Study).
- Transperth has requested that they be contacted should any other changes be made to the LATM Study to identify any potential impact on their services.

11.6 Community Forum

A community forum attended by over 30 members of the public (31 people were signed in) was held between 6pm and 8pm in the Main Hall at Lathlain Park on 26 November 2014. The following issues were raised and discussed throughout the forum.

11.6.1 Traffic Volumes - general

- A general feeling expressed throughout the evening was that non-local vehicles were using roads within Lathlain as a rat-run, primarily as a result of Orrong Road being congested. Any wider solutions therefore needed to improve Orrong Road and/or discourage/prevent non-locals from using the suburb's roads. Treatments need to effectively stop this non-local traffic.
- Absolute numbers of vehicles/traffic volumes in terms of a roads' capacity was not the issue, rather concerns related to relatively large increases in vehicle numbers for instance over a short period of time which has an impact on the local amenity. This issue differs from high speeds/crash numbers and should be recognised.

11.6.2 Cycling and Walking - general

- Debate occurred with respect to the extent cyclists should be catered for – for example making an increase in the number of people walking and cycling as an objective for the study through better/enhanced facilities versus cycling not being a key objective and it being more of a side issue.
- The PSP currently runs to Armadale but it stops through Victoria Park – this needs to be addressed as soon as possible notwithstanding the comment from the Town that funding had been sought.
- Pedestrian movements were noted as being important with safety a potential concern, especially on Rutland Avenue near the railway station where large numbers of people exist. Concerns were also raised about pedestrian/cycle safety near the Red Castle development,

particularly given the potential increase in activity in the area related to both its construction and future operation.

- Whilst the percentage of people cycling to work from the suburb may be low, such figures didn't take into account other people cycling through the suburb from elsewhere.

11.6.3 Preferred Traffic Routes

- The use of Rutland Avenue as a preferred route was generally accepted subject to the construction of the PSP alongside it given cycle safety concerns.
- The use of Howick Street between Goddard Street and Roberts Road as a potential preferred route was queried, although it was noted that this was already a well establish route given existing traffic numbers and the use of the road by parents dropping off/picking up school children (also see comment regarding a fairer distribution of traffic around the suburb).

11.6.4 Traffic Calming - general

- There was a general desire for more/additional traffic calming installation to that currently proposed with specific comments made that traffic calming should also be installed on Staines Street, Saleham Street and Egham Road in order to discourage vehicles re-routing on to these roads from those roads with traffic calming installed (this would also therefore need to be extended to the western end of Cookham Road and Enfield Street).
- As part of the above, given the perceived speeds on McCartney Crescent and potential for traffic to re-route, additional traffic calming beyond that envisaged as part of the Lathlain Place upgrade should be considered.
- It was noted that closing roads off would result in traffic re-routing on to other streets, thereby disadvantaging others in the suburb.
- Comment was made that roundabouts were typically a problem for cyclists in terms of road safety.
- Saleham Street/Goddard Street/McCartney Crescent proposed roundabout – without treatments along Saleham Street, roundabouts at either end may direct more traffic on to Saleham Street. As part of this, it was noted that the proposed roundabout would remove the staggered T-intersection which was potentially more dangerous compared to a roundabout in terms of conflict points. The roundabout would also act as an additional form of traffic calming along Goddard Street.
- Concern was expressed by a local business person with respect to ensuring any treatments still allowed full accessibility for heavy vehicles servicing his business.

11.6.5 Parking

- On-street commuter parking around Victoria Park Station, for instance along Staines Street inconveniences local residents and at times, results in unsafe situations for all road users. As part of this (and/or parking issues associated with Perth Demon's games), queries were raised with respect to residents' parking schemes and/or time restricted parking.
- It was noted that parking was not previously addressed in study.

11.6.6 Goddard St/Streatley Rd/Orrong Rd/Francisco Place

- Discussions centred around the possibility of reconnecting Francisco Place to Streatley Road and the impact that it would have, for instance on Orrong Road and Main Roads WA given their role in charge of traffic signals. It was also noted that whilst re-connecting it up may increase opportunities to leave the suburb, it may attract more vehicles and would not address the illegal movements on the wrong side of the road along Goddard Street.
- It was noted that the proposed options were only intended to address safety issues rather than congestion issues on to Orrong Road – with the installation of a slip lane for vehicles turning left onto Orrong Road proposed.
- No particular option was preferred.

11.6.7 Cornwall Street/Castle Way

- It was noted that some vehicles are currently making an illegal right turn onto Great Eastern Highway from Cornwall Street.
- The logic behind making the turning manoeuvre between Cornwall Street west and Castle Way as a priority movement was acknowledged, particularly with respect to using Rutland Avenue as the preferred route.

11.6.8 Roberts Road/Bishopsgate Street

- High speeds along Roberts Road were noted with the comment that the roundabout was ineffective as a deterrent. As part of this, pre-deflection treatment to reduce speeds could be applied for all road user safety (slowing vehicles down at the roundabout would also assist cyclists). Alternatives such as off road crossings (as currently exist for the Roberts Rd/Miller Street movements) were noted as unlikely to be used by the majority of cyclists.

11.6.9 Traffic Calming Solution Options

- The comment was made that any traffic calming solution adopted needs to take account of the needs of cyclists.
- Any option with vegetation being installed needs to take account of future maintenance requirements and issues.

11.7 Consultation Summary

The community consultation process resulted in a wide range of feedback with respect to the LATM Pilot Study and the reports prepared previously. Key issues which have been fed into the Problem Definition (Section 6) and subsequent recommendations include:

- Improvement options and staging need to be aware of the needs of different types of road users and their requirements. For instance along Rutland Avenue with respect to it being a preferred route as well as any future funding commitment for the PSP; and/or treatments along bus routes needing to ensure Transperth's requirements are met to maintain the bus service.
- The community has generally indicated the need to allow/ensure local access is retained whilst non-local through movements are discouraged. As part of this, there is semi-recognition that factors external to the suburb (and/or out of the control of the Town) will

have an impact on this in terms of improving movements around the suburb, for instance along Roberts Road and/or Orrong Road. To support this 'carrot' of reducing the need to travel through Lathlain, the 'stick' of installing traffic calming within the suburb is also required to discourage such movements – or else as traffic growth potentially continues and the surrounding road network returns to its current status, drivers will automatically re-route through Lathlain.

- Given that external elements are outside of the Town's direct control, such as improvements to Orrong Road or traffic signal installations, should such improvements not occur then the Town needs to take a view on the extent that it is willing to accept that roads within the suburb may need to be considered as part of the wider road network (in light of limitations on the arterial road network) with regards to the function and role that they play. This is a fundamental issue for instance with respect to maintaining existing turning movements/ access between Goddard Street and Orrong Road. Similarly, any proposal to re-connect Streatley Road to Francisco Place is likely to result in additional traffic re-routing to Goddard Street – which was opposed by residents given the need for a fair distribution of traffic through the suburb.
- The need to reconfirm the overall/specific objectives of the Study as set down in the Research and Development of Concept Designs report, including the role/ importance of cycling infrastructure and the encouragement of cycling as part of the overall Study.
- No clear preferred option for the three specific hazardous locations and/or the different types of traffic calming treatment has been obtained through the community consultation process, although a general view is that closing off the lane way would help address safety concerns of vehicles using the wrong side of Goddard Street on the northern approach to Streatley Road intersection.
- A mixed set of views exists with respect to the amount of traffic calming that is required (and the associated costs to rate payers). As part of this however, a general feeling tends to exist with respect to ensuring that treatments should allow an equal distribution of traffic across roads of the same type and class within the suburb, with no single street being disadvantaged. This then comes back to the intended future function of Goddard Street (see earlier).
- The need to include parking concerns near the Station/Lathlain Park into the wider study.

12 Proposed Measures

The philosophy and high level measures advocated in Sections 8, 9 and 10 for each of the identified Objectives, have in turn been influenced by the public consultation feedback and comments set out in Section 11. Accordingly, a series of staged proposed measures have been developed to allow monitoring and evaluation to occur as well as implementation costs to be better met and planned for.

The Implementation Plan has had to be realistic in terms of what the Town has directly under its control and able to fund compared to what it can merely seek to influence.

12.1 Stage 1 Short – Medium Term Implementation

12.1.1 Advocacy and Strategic/Planning Requirements

Given the limited number of options to head south along Orrong Road from within Lathlain and/or to access the suburb from Orrong Road north of Roberts Road, in line with the IMNS, the future signalisation of the Orrong Road/Roberts Road intersection is supported. As part of this, it is noted that such an arrangement may help reduce the number of vehicles using internal Local Access roads within the suburb, for instance from the Graham Farmer Freeway (north) or Great Eastern Highway (east), wishing to travel to Lathlain Park. However, it is noted and acknowledged that the power and responsibility to undertake this rests with Main Roads WA rather than the Town. As such, continued advocacy for this to occur should continue.

In addition, it is proposed that a specific parking study associated with Victoria Park Station be carried out to determine current commuter parking demand and the impact on adjacent streets in Lathlain with a view to establishing the need for additional off-street spaces and/or identifying appropriate parking management techniques around the Station to discourage commuter parking. It should also include confirmation of parking demand and supply associated with the Lathlain Park redevelopment. Such a recommendation is in line with the Integrated Movement Network Strategy.

12.1.2 Cycling Infrastructure

The traffic management philosophy adopted for the suburb encourages existing traffic that wishes to travel north-south through the suburb to use Rutland Avenue in the longer term. In turn, this approach fundamentally requires an appropriate north-south cycling facility (PSP) to be provided between Great Eastern Highway and Roberts Road in order to allow Rutland Avenue to carry out this role effectively and safely given its current road width, current/future volumes and operating speeds. The construction of the PSP would also allow the priority PSP network to be connected.

Timing
Given the unsuccessful application for funding the design and construction of a PSP alongside Rutland Street in 2015-2016/2016-2017, in the immediate term it will be necessary to treat the road in the same equal manner as other Local Access roads in the suburb and be subject to traffic calming in line with other alternative north-south routes. This is particularly true given that it can be expected that local residents will wish to see traffic calming infrastructure installed that isn't dependent upon the Town receiving funding and permission construct the PSP which may now take a number of years.

Without an appropriate cycle facility alongside Rutland Avenue however, the route should not be promoted as a preferred option. As such, alternative options to providing an appropriate cycling facility through the suburb should be explored and investigated in the short term rather than simply relying on traffic calming along Rutland Avenue.

12.1.3 Traffic Calming and Traffic Management

As part of the overall proposed traffic management philosophy of promoting a fair distribution of traffic across the Local Access road network, a number of individual traffic calming treatments have been proposed in the first instance to supplement the existing traffic treatments. These are intended to provide a more comprehensive area wide approach whilst addressing specific issues. The proposed number, location and style of treatments are all inter-related and have been developed based on the rationale set out below.

Rationale

Regardless of the timing issues identified in 12.1.2 with respect to the construction of an appropriate north-south cycle facility through the suburb, there is a need to install some traffic calming on Rutland Avenue (with or without the cycle facility) in order to slow traffic down and deter through traffic from passing through the suburb. The amount of traffic calming and the impact it has in terms of the route's attractiveness however is subject to the timing associated with the longer term future construction of the proposed PSP and any shorter term alternative arrangements for cyclists. The lack of the PSP in the short term (as recently advised by the Department of Transport) however will require additional traffic calming (conversely, the construction of an appropriate cycle facility reduces the need for traffic calming in order to allow the road to play its intended role compared to the remaining Local Access road network). The treatments shown in Figure 12.1 therefore assumes a cycle facility has not been installed alongside Rutland Avenue.

In turn, the installation of traffic calming on Rutland Avenue requires treatments to be installed on the Local Access roads within the suburb to discourage through traffic from being diverted elsewhere within the suburb. Accordingly, as shown in Figure 12.1, given the need to try and ensure traffic is distributed as equally as possible (ignoring key origins and destinations such as the School and access to/from Orrong Road at the northern end of Goddard Street) each relevant street has had at least one traffic calming device installed.

East-west routes have typically assumed Local Access road treatments (Option 2) being installed with the exception of the treatments on the bus route (which out of necessity are Local Distributor/bus route type treatments to ensure the bus service can still operate). The exception to this is Enfield Street between Roberts Road and Goddard Street which typically carries in excess of 1,000 vpd which is the maximum intended design volume for narrowed one-lane road treatments (Local Access road treatments Options 2 and 3). Unfortunately, road widths along this section of Enfield Street are in the order of 7m resulting in Option 1 also being unusable due to a road width of over 10m being required. As such, the potential exists to still use Local Access road Option 2 in order to discourage traffic from using Enfield Street in the same way that occurs on Custance Street (and hence spread the traffic volumes equally), coupled with the existing traditional road humps on Howick Street and McCartney Crescent or apply the same traditional style of traffic calming on Enfield Street as currently installed on Howick Street and McCartney Crescent. Furthermore, given the need for an equitable distribution of traffic on the roads connecting Roberts Road to Goddard Street, additional traffic calming is also warranted on McCartney Crescent to match the other parallel roads.

The need to cater for the bus service along Goddard Street has in turn influenced the types of treatments on the two main north-south routes, with the intention of providing equal arrangements on both Goddard Street and Gallipoli Street in terms of the Local Distributor/Bus Route treatments Options 2 and 3 in Stage 1 despite Gallipoli Street not being a bus route. These treatments in turn also need to take the number and type of treatments along Rutland Avenue in order to ensure an equal distribution and share of traffic given the lack of adjacent cycle facilities in the short term. In the longer term following the construction of the PSP, some of the traffic calming along Rutland Avenue can be removed in order to allow the road to play its part as a preferred route through the suburb.

Figure 12.1 – Existing and Proposed Traffic Calming Treatments (Stage 1) – assumes a Cycle Facility provided along Rutland Avenue

As such, between the Rutland Avenue/Gallipoli Street intersection and the Cornwall Street/Great Eastern Highway intersection, the route via Gallipoli Street and Cornwall Street has eight locations where traffic has to slow down due to a roundabout, standalone traffic calming device or a give way intersection control (e.g. at the Cornwall Street/Castle Way revised intersection control). This is the same number as proposed on Rutland Avenue (assuming changes to the priority at either end of Castle Way) – thereby making the Rutland Avenue an equally unattractive route in the short term without any cycle facilities in the form of a PSP being constructed. In the longer term, when the PSP is constructed, some of these treatments can be removed in order to make Rutland Avenue a preferred route.

The number of treatments along Gallipoli Street also then has an impact on the number of treatments on Goddard Street to ensure both are equally as unattractive as a route. As such, Gallipoli Street (between Rutland Avenue and Streatley Road) has six existing or proposed treatments along its length; the same as Goddard Street between Bishopsgate Street (the equivalent of Rutland Avenue) and Streatley Road.

It should also be noted that Local Access road traffic calming devices have also been proposed on Petherbridge Street as well as Waller Street and Keyes Street. This is to ensure any traffic that tries to use alternative routes between Roberts Road and the Goddard Street/Orrong Road intersection have to encounter at least five traffic calming devices whichever route they take.

In addition, two Local Access road treatments have each been proposed on Enfield Street and Saleham Street between Goddard Street and Gallipoli Street. This is due to the need to discourage the straight through movement along both these roads, particularly given the intention to provide a roundabout at the Goddard Street/McCartney Crescent/Saleham Street intersection. The roundabout at Goddard Street/McCartney Crescent/Saleham Street further acts as a form of traffic calming along Goddard Street.

Treatment Types and Costs

Specific treatments proposed include the following for Stage 1 (as shown in Figure 12.1):

- Cornwall Street – one Bus Route Option Two treatment between Castle Way and Gallipoli Street with a change to the priority at the Castle Street intersection (with supporting infrastructure assumed to be in the order of $15,000). Indicative cost: $26,000.
- Streatley Road – one Local Access road Option Two treatment between Castle Way and Gallipoli Street, a change to the priority at the Castle Street intersection (with supporting infrastructure assumed to be in the order of $15,000) and a roundabout at the Goddard Street intersection (in addition to the already planned Bus Route Option Three treatment between Gallipoli Street and Goddard Street). Indicative cost: $27,000 (excluding the Goddard Street roundabout which is costed elsewhere and already planned treatment.)
- Midgley Street – one Local Access road Option Two treatment between Rutland Avenue and Gallipoli Street. Indicative cost: $12,000.
- Cookham Road – one Local Access road Option Two treatment between Rutland Avenue and Gallipoli Street and one Local Access road Option Two treatment between Gallipoli Street and Goddard Street. Indicative cost: $24,000.
- Enfield Street – three Local Access Road Option Two treatments between Roberts Road and Goddard Street or traditional road humps/raised intersections, two Local Access Road Option Two treatments between Gallipoli Street and Goddard Street plus one Local Access

Road Option Two treatment between Gallipoli Street and Rutland Avenue. Indicative cost: $48,000-$76,000.

- Egham Road – one Local Access road Option Two treatment between Rutland Avenue and Gallipoli Street and one Local Access road Option Two treatment between Gallipoli Street and Goddard Street. Indicative cost: $24,000.
- Saleham Street – one Local Access road Option Two treatment between Rutland Avenue and Gallipoli Street and two Local Access road Option Two treatments between Gallipoli Street and Goddard Street. Indicative cost: $36,000.
- Staines Street – one Local Access road Option Two treatment between Gallipoli Street and Goddard Street. Indicative cost: $12,000.
- McCartney Crescent – two Local Access Road Option Two treatments between Roberts Road and Goddard Street or traditional road humps. Indicative cost: $8,000- $24,000.
- Petherbridge Street – one Local Access road Option Two treatment between Rayment Street and Keyes Street. Indicative cost: $12,000.
- Waller Street – one Local Access road Option Two treatment between Enfield Street and Custance Street. Indicative cost: $12,000.
- Keyes Street – one Local Access road Option Two treatment between Enfield Street and Custance Street. Indicative cost: $12,000.
- Goddard Street – two Bus Route Option Two treatments between Midgley Street and Howick Street plus two roundabouts at its intersection with Streatley Road and McCartney Crescent/Saleham Street (each estimated at $250,000 – with Black Spot funding covering two thirds of the cost for one roundabout). Indicative cost: $522,000 including $167,000 from State Black Spot funding.
- Gallipoli Street – one Local Access road Option One treatment between Howick Street and Egham Road and one planned Bus Route Option Two treatment between Egham Road and Enfield Street (in addition to the already planned Bus Route Option Two treatment between Midgley Street and Streatley Road). Indicative cost: $35,000 (excluding already planned treatment).
- Rutland Avenue – Seven raised intersection treatments at each of the intersections along its length between Bishopsgate Street and Midgley Street (in addition to the two planned traffic calming treatments between Midgley Street and Castle Way. Indicative cost: $224,000. (This could be reduced by installing Bus Route Option Two or Three treatments instead.)
- Roberts Road – lighting check/upgrade to the Bishopsgate Street roundabout and, subject to a blackspot study, consideration of pre-deflection treatments on the Roberts Road (south) approach to the intersection. In addition, continued lobbying of Main Roads WA for traffic signals at the Orrong Road intersection should occur.

The total cost for traffic calming as part of Stage 1 is estimated at $1,034,000 to $1,078,000 (excluding GST) including $167,000 from State Black Spot funding.

It is noted that the two traffic calming treatments shown on Streatley Road (between Goddard Street and Gallipoli Street) and Gallipoli Street (between Streatley Road and Midgley Street), as well as the two treatments shown on either side of the horizontal curvature on the northern end of Rutland

Avenue are either currently being proposed by the Town (taking account of this Pilot Study) or form a requirement of the Red Castle Motel redevelopment.

Notwithstanding the proposed use of informal one-way slow points without any give way controls, it is noted that the existing one-way slow points on Custance Street do not have such controls and are contrary to Main Roads WA typical signing and pavement marking standards. If either the proposed Local Assess road concept designs with informal slow points are deemed to require signing and pavement markings by Main Road WA, it will also be necessary to sign and mark the existing treatments on Custance Street to ensure a consistent approach through the suburb.

Treatment Locations

The locations of these treatments have been determined by identifying existing known locations of speeding related issues as well as considering the area-wide impact of individual traffic calming measures. Accordingly, any potential alternative routes that traffic may diverge onto following the implementation of treatments has been considered. Furthermore, the ultimate location/ installation of treatments more closely follow the recommended spacing of the treatments as per Austroads Guidelines. As part of this overall process and the use of traffic calming treatments set out in Section 7.3, locations and the separation of treatments has taken account of the close proximity and spacing of driveways as well as any intersecting roads. However, specific locations of treatments will need to be finalised at a more detailed level in terms of exact locations of Local Access road treatments.

Timing and Ten Year Implementation Plan

Given the estimated cost to construct the total amount of traffic calming (as well as other treatments) in the suburb exceeding $1million, the Town has identified the need to break the physical construction and implementation work down over a ten year period on the basis that only two to three treatments can be afforded per year due to likely available funding. As such, Table 12.1 sets out the proposed treatments on an annual basis as well as the estimated costs to allow for future planning. Notwithstanding this, the gradual installation of treatments may result in traffic re-routing to alternative routes in the short term within the suburb as drivers seek to avoid the traffic calming measures and use other streets where is hasn't yet been installed. Unfortunately, a consequence of this gradual roll-out of measures is that it has an impact on the concept of equally spreading traffic around the suburb in the short term.

The rationale behind the timing of different treatments is based on the following priority considerations:

- Deterring non-local traffic accessing Lathlain from Roberts Road in the first instance.
- Reducing speeds on Rutland Avenue until an alternative cycle solution is determined.
- Ensuring an equal approach to treatments along Gallipoli Street and Goddard Street.
- Deterring internal rat-runs within the suburb as a result of the initial traffic calming treatments.
- Focussing on locations near the entry/exit points to the suburb to deter non-local traffic being able to pass through the centre of the suburb.
- Treating internal roads with the suburb that provide more direct access through the suburb (i.e. requiring minimal turning movements).

Table 12.1 Ten Year Implementation Plan

Year	Treatment Location	Cost ($'000)	Comment
2014/15	Streatley Rd (between Goddard St and Gallipoli St) and Gallipoli St (between Streatley Rd and Midgley St).	27	Already planned for 2014/15.
2015/16	Streatley Rd/Goddard St roundabout.	250	Blackspot funding received. Town of Victoria Park contribution: $83,000.
2016/17	Enfield St – 3 treatments between Roberts Rd and Goddard St. Trial closure of Right of Way between Streatley Road and Orrong Road or other agreed arrangement.	12-40	Deters access into Lathlain from Roberts Rd. Cost subject to treatment types installed. Subject to success or otherwise of Streatley Rd/Goddard St roundabout as well as local consultation.
2017/18	McCartney Cres – 2 treatments between Roberts Rd and Goddard St. Goddard St/Saleham St roundabout.	258-274	Deters access into Lathlain from Roberts Rd. Cost subject to treatment types installed. Reduce speed along Goddard Street.
2018/19	Rutland Av – 2 treatments at Gallipoli St and Egham Rd intersections.	64	Reduce speed near Station and half way along route.
2019/20	Rutland Av – 2 treatments at Cookham Rd and Saleham St intersections.	64	Reduce speed on northern and southern halves of route.
2020/21	Goddard St (between Midgley St and Cookham Rd). Gallipoli St (between Egham Rd and Enfield St). Keyes St.	34	Discouraging traffic and reducing speeds on main north-south routes through the suburb and discouraging internal rat-runs.
2021/22	Goddard St (between Egham Rd and Howick St). Gallipoli St (between Howick St and Egham Rd). Waller St.	47	Discouraging traffic and reducing speeds on main north-south routes through the suburb and discouraging internal rat-runs.
2022/23	Cornwall St and Streatley Road (between Gallipoli St and Castle Way).	23	Discourages traffic using the Great Eastern Hwy/Cornwall St intersection.
2023/24	Saleham St – 2 treatments between Goddard St and Gallipoli St Staines St - 1 treatment.	36	Discourages internal rat-running.
2024/25	Enfield Street – 2 treatments between Goddard St and Gallipoli St and 1 treatment between Gallipoli St and Rutland Av.	36	Discourages direct (straight through) internal movements through the suburb.

The above physical treatments should be in addition to the parking and cycle route studies as well as any black spot investigation (and subsequent treatment) for the Roberts Road/Bishopsgate Street roundabout. It is also acknowledged that the above ten year plan does not cover all of the treatments shown in Figure 12.1.

As indicated in Table 12.1, the success or otherwise of the Goddard Street/Streatley Road roundabout with respect to stopping vehicles accessing the Right of Way between Orrong Road and Streatley Road by travelling down Goddard Street on the wrong side of the road will be reviewed. Should this dangerous driving persist, it will be necessary to consult with businesses and residents in the immediate vicinity as well as with other stake holders such as Main Roads WA with a view to closing the Right of Way and/or trialling an alternative arrangement.

12.1.4 Road Safety

In addition to the traffic calming treatments, the existing road safety barriers and terminals alongside Rutland Avenue should be reviewed/replaced as appropriate along with no parking markings being installed on those roads with crests leading to/from Rutland Avenue. Vegetation on the approaches to intersections should also be cut-back as part of the routine maintenance activities. As indicated previously, the Roberts Road/Bishopsgate Street roundabout should be subject to a formal blackspot study.

12.2 Stage 2 Long Term Implementation

12.2.1 Traffic Calming Infrastructure

Following the implementation of the Stage 1 treatments, if further traffic calming is required, additional treatments can be installed primarily along east-west routes to allow a consistent number of traffic calming devices to be encountered between Goddard Street and Rutland Avenue as well as along Rutland Avenue should the measured operating speeds still be well in excess of the speed limit. Proposed additional treatments are shown in Figure 12.2.

Specifically, additional treatments proposed include the following for Stage 2:

- Streatley Road – one additional Local Access road Option Two treatment between Castle Way and Gallipoli Street and one Bus Route Option Two treatment between Gallipoli Street and Goddard Street). Indicative cost: $23,000.
- Midgley Street – one additional Local Access road Option Two treatment between Rutland Avenue and Gallipoli Street. Indicative cost: $12,000.
- Cookham Road – one additional Local Access road Option Two treatment between Rutland Avenue and Gallipoli Street and one Local Access road Option Two treatment between Gallipoli Street and Goddard Street. Indicative cost: $24,000.
- Enfield Street – one Local Access road Option Two treatment between Rutland Avenue and Gallipoli Street and one Local Access road Option Two treatment between Gallipoli Street and Goddard Street. Indicative cost: $24,000.
- Egham Road – one Local Access road Option Two treatment between Rutland Avenue and Gallipoli Street and one Local Access road Option Two treatment between Gallipoli Street and Goddard Street. Indicative cost: $24,000.

The total cost for traffic calming as part of Stage 2 is estimated at $107,000 (excluding GST).

Any future treatments however should be installed in line with the overall objectives of this LATM plan and based on traffic data with respect to volumes and speeds.

Figure 12.2 – Existing and Proposed Additional Traffic Calming Treatments (Stage 2)

13 Conclusions

Existing road safety and traffic management issues within Lathlain have been identified based on background data, site investigations and community feedback and consultation. Accordingly, based on the key issues that have been identified, a series of objectives have been identified to assist in the development of the Local Area Traffic Management plan. The primary objectives include improving resident amenity, improving road safety, and promoting pedestrian/cyclist activity.

To address the identified issues, traditional and innovative traffic calming measures have been reviewed against the objectives for the Pilot Study. As part of this, research into various innovative traffic calming trial projects/guidelines which aim to change the behaviour of drivers through psychological means rather than solely relying on physical traffic calming measures has been undertaken.

Based on community feedback that primarily sought to provide a fairer distribution of traffic on the local road network within Lathlain as well as making Rutland Street a more desirable north-south route through the suburb in the longer term, a traffic management philosophy has been adopted that seeks to ensure individual streets were not overly penalised in terms of traffic distribution within the suburb. As part of this, and as a result of the community consultation, no particular preferred route (other than Rutland Avenue in the longer term) has been identified or catered for whilst acknowledging that Goddard Street will still carry traffic along its length given it provides access to Orrong Road.

In the longer term, subject to the construction of the PSP alongside Rutland Avenue, this route can potentially have traffic calming treatments removed and traffic be more encouraged to use this road compared to others in the suburb. In the short term however, funding for a PSP has not been approved by the DoT and the route should not be promoted as a preferred route until appropriate cycle facilities are put in place.

As part of the equitable approach to sharing out traffic volumes entering Lathlain from Roberts Road, with the exception of Bishopsgate Street and Rutland Avenue which forms a preferred north-south route in the longer term, similar types and amounts of traffic calming will need to be installed (or maintained) on McCartney Crescent, Howick Street, Enfield Street and Custance Street in order to prevent one particular street receiving an unfair amount of traffic. This approach has also been adopted on other east-west routes to the west of Goddard Street as well as along Goddard Street and Gallipoli Street.

13.1 Recommendations

A staged approach to the installation of traffic calming devices is recommended in order to establish the effectiveness of such treatments. However, given the need to ensure a fair distribution of traffic within the suburb, this means that all affected road sections need to have a treatment installed, rather than for instance only doing part of the suburb in its entirety (for instance concentrating on installing treatments on roads between Roberts Road and Goddard Street to discourage movements to/from Goddard Street in order to avoid the Orrong Road/Roberts Road intersection; and subsequently installing additional treatments to the west of Goddard Street at a later stage).

The intention to make Rutland Avenue and Bishopsgate Street as a preferred route in the longer term as well as the fair distribution of traffic results in a number of logical steps being recommended in

the approach to installing the traffic calming and other infrastructure treatments in order to address both the residential amenity and pedestrian/cycle objectives:

Step 1	Review and investigate alternative short term north-south cycling options given the unsuccessful application for the PSP.
Step 1a	Prior to a review and subsequent construction of any cycle facility, whilst alternative options are considered and assessed, treat Rutland Avenue the same as Gallipoli Street and Goddard Street given existing speeding issues and the need for an equal distribution of traffic
Step 1b	Following construction of cycle facilities, remove some existing traffic calming treatments along Rutland Avenue that are designed to discourage traffic flow as well as changing intersection priorities at either end of Castle Way.
Step 2	Due to the installation of devices along Rutland Avenue, install appropriate devices along Goddard Street and Gallipoli Street (ensuring an equal number and type of devices which exceed the number on Rutland Avenue route in the longer term) as well as on east-west running streets in accordance with the Stage 1 implementation plan to discourage their use as alternative routes.
Step 3	As appropriate following monitoring and evaluation, install additional treatments in accordance with the Stage 2 implementation plan.

It is anticipated that Step 1 be considered immediately in light of the recent unsuccessful Department of Transport PSP application given that it is a fundamental requirement of making Rutland Avenue a preferred north-south route.

Steps 1a and 2 should be undertaken together with such treatments in Step 2 assisting with improving the visual amenity of the area and ideally, making it a more pleasant place to walk around due to reduced speeds and traffic. In this sense, it may also encourage any existing drivers from within the suburb that drive to the Station (and hence park on-street on the eastern side of the railway line) to walk instead.

As part of the above, it is acknowledged that the most important contribution to pedestrian/cyclist safety and amenity in local roads comes from the reduction of vehicular traffic speeds (and volumes). It is also noted that opportunities in the form of cycle bypasses can potentially be provided through traffic calming treatments subject to the available carriageway width and/or mixed traffic lanes should be suitably designed to consider the needs of cyclists. Alternative cycle routes/facilities in the absence of the PSP should also be considered in order to advance the concept of making Rutland Avenue the preferred north-south route.

Over the timeframe of the project, advocacy and discussions with Main Roads WA on the signalisation of Roberts Road/Orrong Road should continue in order to try and ensure Roberts Road acts as the main access to/from Orrong Road (rather than Goddard Street for external, non-local traffic). The unlikely agreement for this intersection to be signalised however necessitates the need to carry out the traffic calming as indicated to discourage rat-running through the suburb. In addition, a parking study to establish current demand and issues as well as the need for parking management techniques to be applied in line with the Integrated Movement Network Strategy should be undertaken.

With respect to the road safety objective, whilst various options for resolving identified vehicle-vehicle conflict points have also been identified, it is noted that the Goddard Street/Streatley Road, and Cornwall Street/Castle Way intersections are addressed as part of the above traffic calming/

preferred route treatments. A constant review and monitoring of northbound traffic using the southbound traffic lane of Goddard Street on the approach to Streatley Avenue should also occur following the installation of a roundabout at this intersection with a view to closing the Right of Way between Streatley Road and Orrong Road, or at least trialling an alternative arrangment. In addition, the Roberts Road/Bishopsgate Street roundabout should also be subject to a formal blackspot study with an initial step to check lighting levels at night and ways to reduce northbound approach speeds on Roberts (Miller Street).

It is also recommended that consideration be given to undertaking a road safety audit at an appropriate stage of the detail design and/or construction process to better understand and appreciate any potential risks associated with the concept design options relative to their specific installation and location.

Appendix A Locality Map

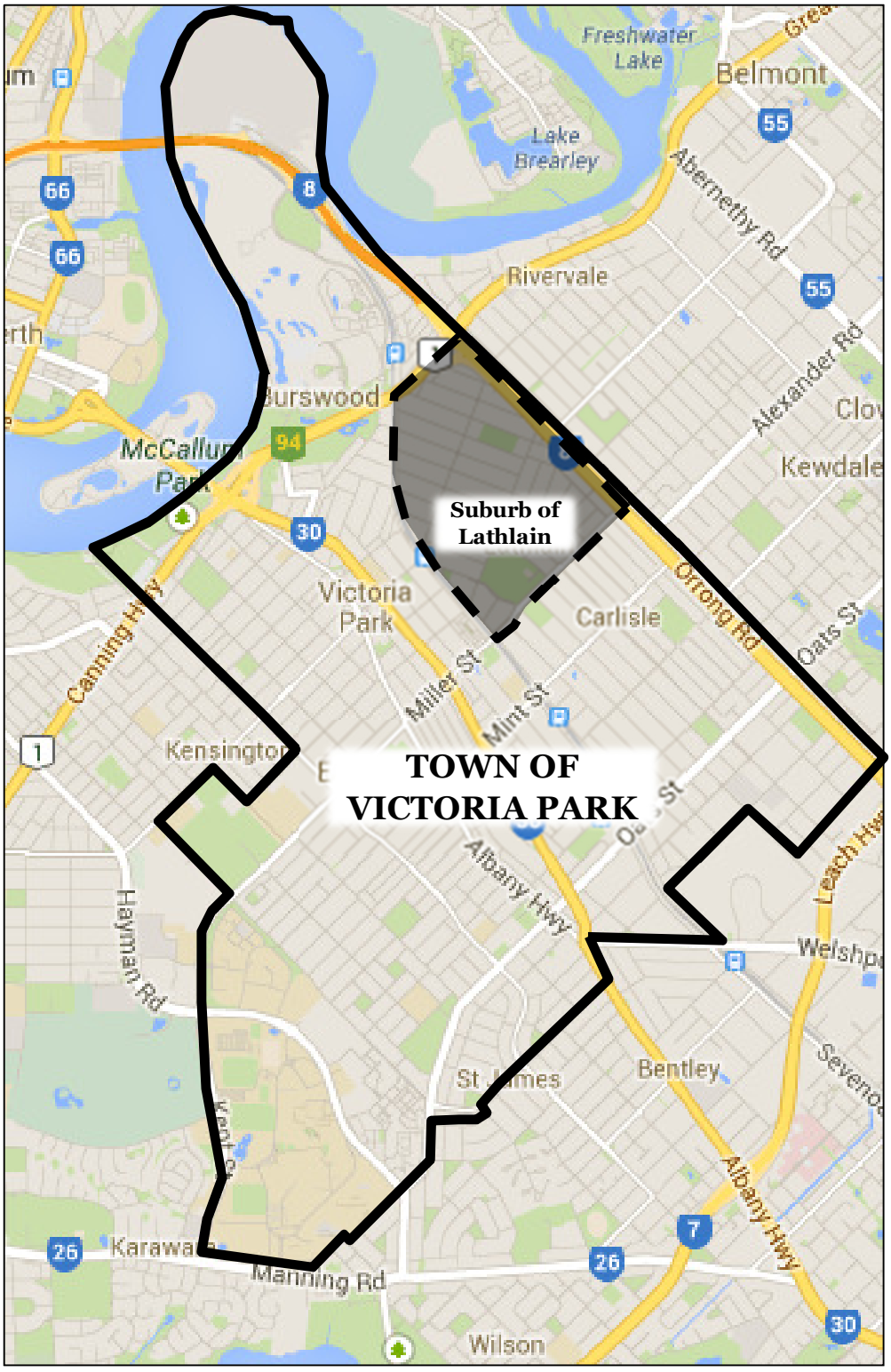

Figure A1 – Town of Victoria Park Boundary and Area of Study (Suburb of Lathlain)

Appendix B Road Hierarchy and Speed Limits

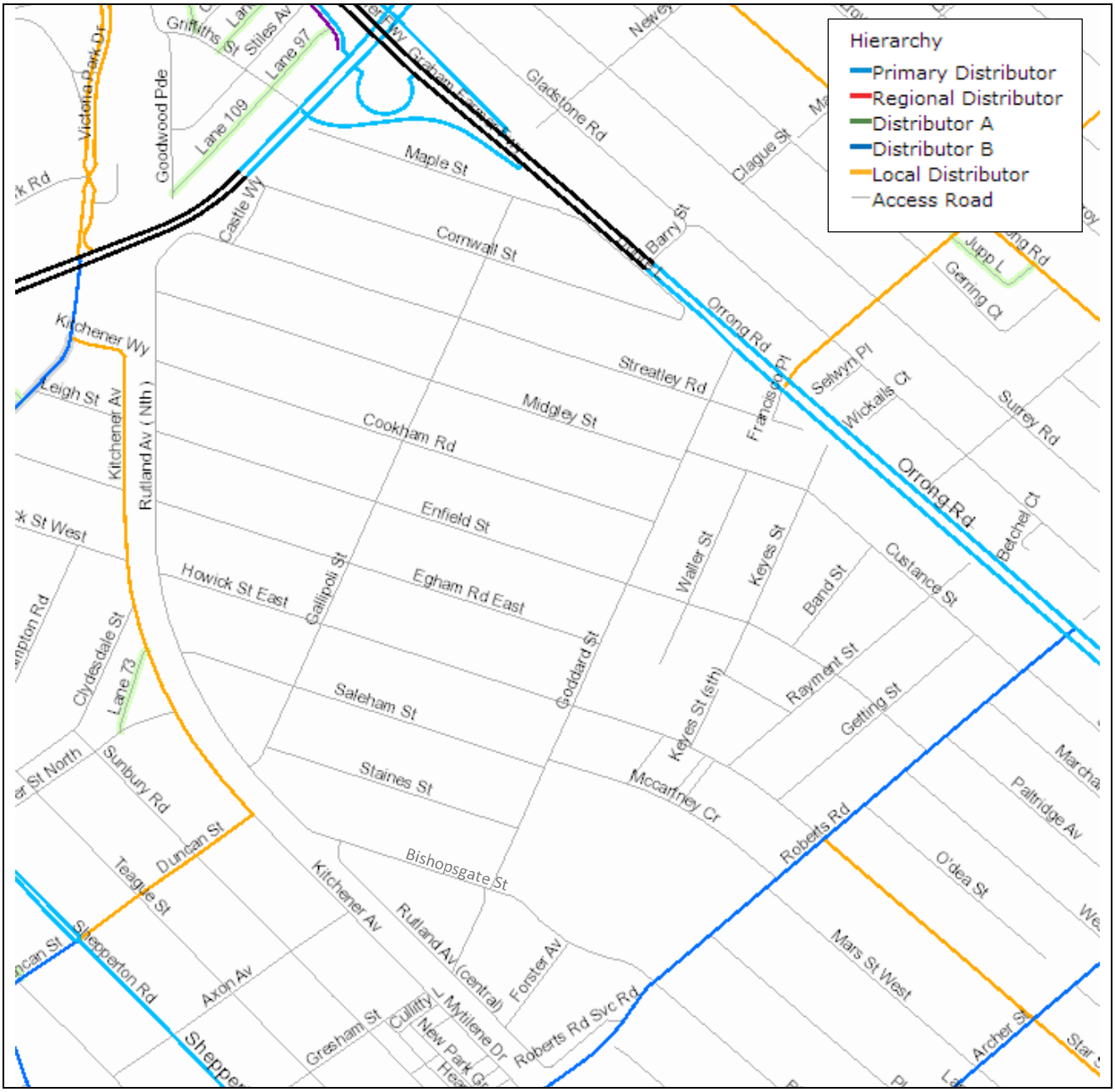

Figure B1 – Main Roads WA Road Hierarchy

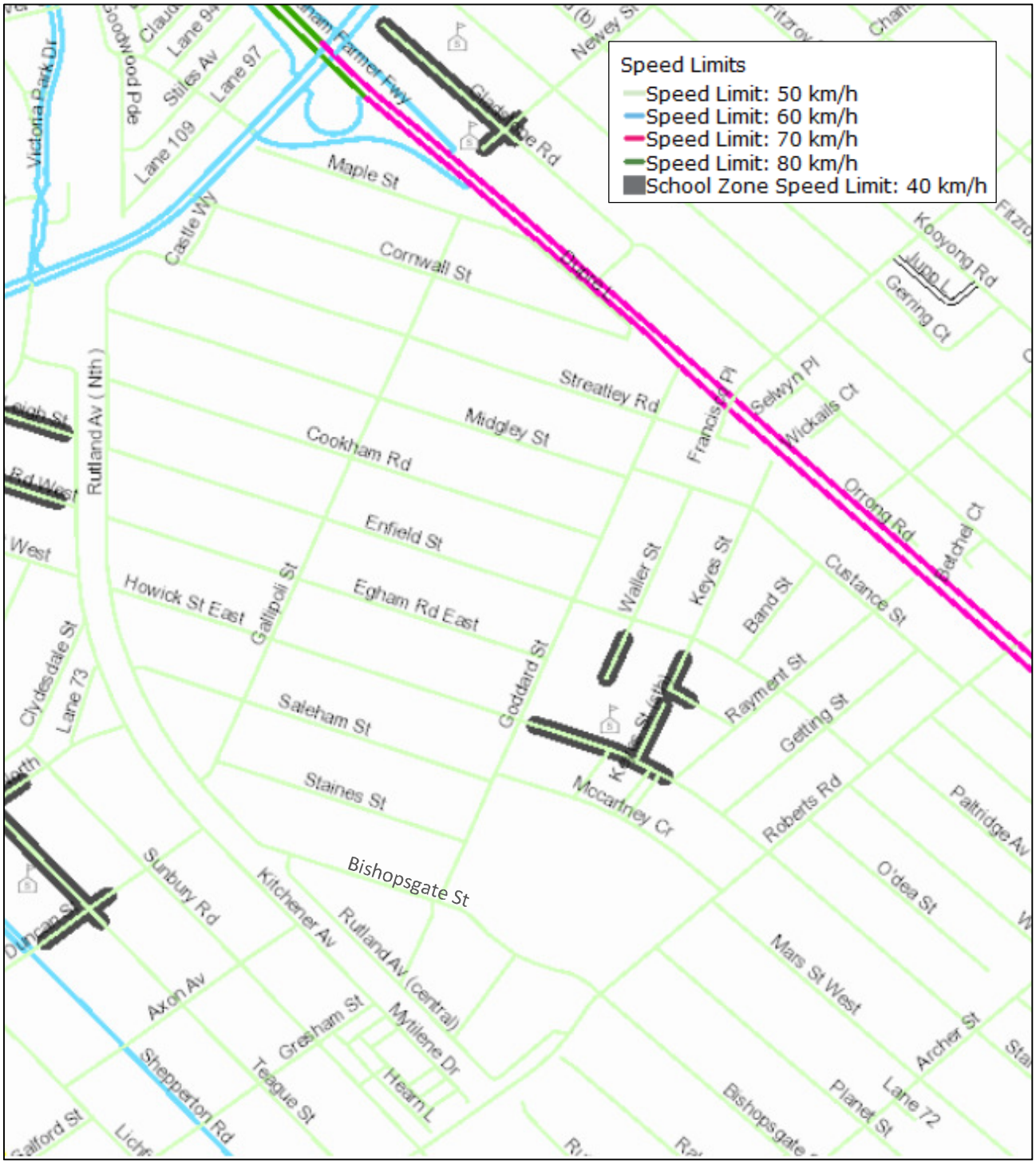

Figure B2 – Main Roads WA Posted Speed Limits

Appendix C Traffic Volumes and Speed

Table C1 – Traffic Volumes in Descending Order

Street	Count Location	Year	Average Weekday Traffic	85th %tile Speed km/h	Speed Limit km/h	Speed Diff km/h
Roberts Road	North of Planet Street	2014	9896	59.8	50	9.8
Roberts Road	South of Planet Street	2013	9568	55.1	50	5.1
Roberts Road	South of Star Street	2013	9210	53.6	50	3.6
Roberts Road	North of O'Dea Street	2014	9091	58.0	50	8.0
Roberts Road	South of Enfield Street	2014	8945	59.4	50	9.4
Roberts Road	South of O'Dea Street	2013	7882	45.7	50	-4.3
Roberts Road	South of Orrong Road	2013	7684	52.2	50	2.2
Goddard Street	South of Streatley Road	2013	3026	60.1	50	10.1
Goddard Street	North of Howick Street	2013	2436	52.9	50	2.9
Goddard Street	South of Orrong Road	2013	2386	49.3	50	-0.7
Goddard Street	South of Enfield Street	2014	2374	46.4	50	-3.6
Howick Street	West of Roberts Road	2012	2358	47.9	50	-2.1
Howick Street	East of Getting Street	2013	2214	47.9	50	-2.1
Gallipoli Street	South of Cornwall Street	2014	2167	52.2	50	2.2
Cornwall Street	East of Great Eastern Highw	2012	2066	56.5	50	6.5
Cornwall Street	West of Gallipoli Street	2014	1932	54.4	50	4.4
Castle Way	North of Streatley Road	2014	1873	42.8	50	-7.2
Enfield Street	West of Roberts Road	2014	1778	47.2	50	-2.8
Gallipoli Street	North of Cookham Road	2013	1764	55.0	50	5.0
Gallipoli Street	North of Midgley Road	2013	1711	59.0	50	9.0
Goddard Street	South of Saleham Street	2013	1653	59.0	50	9.0
Rutland Avenue	South of Gallipoli Street	2014	1643	54.4	50	4.4
Enfield Street	East of Goddard Street	2014	1633	48.2	50	-1.8
Howick Street	East of Goddard Street	2012	1589	52.2	50	2.2
Gallipoli Street	North of Enfield Street	2013	1582	54.0	50	4.0
Enfield Street	West of Getting Street	2012	1561	56.9	50	6.9
Streatley Road	West of Castle Way	2014	1557	34.9	50	-15.1
Rutland Avenue	South of Cookham Road	2014	1503	61.6	50	11.6
Enfield Street	West of Keyes Street	2012	1440	58.3	50	8.3
Rutland Avenue	South of Egham Road	2013	1372	60.8	50	10.8
Rutland Avenue	South of Enfield Street	2014	1337	60.8	50	10.8
Rutland Avenue	South of Saleham Street	2014	1258	63.4	50	13.4
Gallipoli Street	North Howick Street	2013	1178	54.4	50	4.4
Goddard Street	North of Bishopsgate Street	2014	1028	46.8	50	-3.2
Streatley Road	East of Gallipoli Street	2013	910	60.1	50	10.1
Enfield Street	East of Gallipoli Street	2014	851	56.5	50	6.5
Gallipoli Street	North of Staines Street	2014	776	50.0	50	0.0
Custance Street	East of Goddard Street	2014	739	45.7	50	-4.3
Custance Street	West of Roberts Road	2013	680	50.0	50	0.0
Custance Street	East of Rayment Street	2014	667	45.4	50	-4.6
Enfield Street	East of Gallipoli Street	2012	649	55.1	50	5.1
Custance Street	East of Band Street	2014	645	45.7	50	-4.3
Custance Street	East of Keyes Street	2014	637	45.7	50	-4.3
Gallipoli Street	North of Cornwall Street	2014	498	43.9	50	-6.1
Cookham Road	East of Gallipoli Street	2013	487	56.5	50	6.5
Howick Street	East of Gallipoli Street	2013	471	48.2	50	-1.8
Howick Street	East of Gallipoli Street	2012	456	45.7	50	-4.3
Streatley Road	West of Gallipoli Street	2013	437	52.9	50	2.9
Rutland Avenue	South of Forster Avenue	2014	409	46.1	50	-3.9
Saleham Street	West of Goddard Street	2013	374	52.6	50	2.6
Streatley Road	East of Goddard Street	2014	361	44.8	50	-5.2
Saleham Street	West of Goddard Street	2012	347	55.1	50	5.1
Lathlain Place	North of McCartney Crescent	2014	345	23.0	50	-27.0
Egham Road	East of Gallipoli Street	2013	339	52.9	50	2.9
Cornwall Street	East of Gallipoli Street	2014	326	40.0	50	-10.0
Staines Street	East of Gallipoli Street	2013	235	50.4	50	0.4
Howick Street	West of Gallipoli Street	2012	206	40.3	50	-9.7
Cornwall Street	East of Gallipoli Street	2012	193	40.0	50	-10.0
Enfield Street	East of Rutland Avenue	2013	178	48.2	50	-1.8
Enfield Street	West of Rayment Street	2012	158	63.4	50	13.4
Midgley Street	East of Rutland Avenue	2013	155	45.4	50	-4.6
Cookham Road	East of Rutland Avenue	2013	149	51.8	50	1.8
Egham Road	East of Rutland Avenue	2013	135	44.6	50	-5.4
Keyes Street	North of Enfield Street	2014	105	41.8	50	-8.2

Table C2 – Vehicle Speeds Exceeding Speed Limit in Descending Order

Street	Count Location	Year	Average Weekday Traffic	85th %tile Speed km/h	Speed Limit km/h	Speed Diff km/h
Rutland Avenue	South of Saleham Street	2014	1258	63.4	50	13.4
Enfield Street	West of Rayment Street	2012	158	63.4	50	13.4
Rutland Avenue	South of Cookham Road	2014	1503	61.6	50	11.6
Rutland Avenue	South of Egham Road	2013	1372	60.8	50	10.8
Rutland Avenue	South of Enfield Street	2014	1337	60.8	50	10.8
Goddard Street	South of Streatley Road	2013	3026	60.1	50	10.1
Streatley Road	East of Gallipoli Street	2013	910	60.1	50	10.1
Roberts Road	North of Planet Street	2014	9896	59.8	50	9.8
Roberts Road	South of Enfield Street	2014	8945	59.4	50	9.4
Gallipoli Street	North of Midgley Road	2013	1711	59.0	50	9.0
Goddard Street	South of Saleham Street	2013	1653	59.0	50	9.0
Enfield Street	West of Keyes Street	2012	1440	58.3	50	8.3
Roberts Road	North of O'Dea Street	2014	9091	58.0	50	8.0
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Enfield Street	East of Gallipoli Street	2014	851	56.5	50	6.5
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Enfield Street	East of Gallipoli Street	2012	649	55.1	50	5.1
Saleham Street	West of Goddard Street	2012	347	55.1	50	5.1
Gallipoli Street	North of Cookham Road	2013	1764	55.0	50	5.0
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Gallipoli Street	North Howick Street	2013	1178	54.4	50	4.4
Gallipoli Street	North of Enfield Street	2013	1582	54.0	50	4.0
Roberts Road	South of Star Street	2013	9210	53.6	50	3.6
Goddard Street	North of Howick Street	2013	2436	52.9	50	2.9
Streatley Road	West of Gallipoli Street	2013	437	52.9	50	2.9
Egham Road	East of Gallipoli Street	2013	339	52.9	50	2.9
Saleham Street	West of Goddard Street	2013	374	52.6	50	2.6
Roberts Road	South of Orrong Road	2013	7684	52.2	50	2.2
Gallipoli Street	South of Cornwall Street	2014	2167	52.2	50	2.2
Howick Street	East of Goddard Street	2012	1589	52.2	50	2.2
Cookham Road	East of Rutland Avenue	2013	149	51.8	50	1.8
Staines Street	East of Gallipoli Street	2013	235	50.4	50	0.4
Gallipoli Street	North of Staines Street	2014	776	50.0	50	0.0
Custance Street	West of Roberts Road	2013	680	50.0	50	0.0
Goddard Street	South of Orrong Road	2013	2386	49.3	50	-0.7
Enfield Street	East of Goddard Street	2014	1633	48.2	50	-1.8
Howick Street	East of Gallipoli Street	2013	471	48.2	50	-1.8
Enfield Street	East of Rutland Avenue	2013	178	48.2	50	-1.8
Howick Street	West of Roberts Road	2012	2358	47.9	50	-2.1
Howick Street	East of Getting Street	2013	2214	47.9	50	-2.1
Enfield Street	West of Roberts Road	2014	1778	47.2	50	-2.8
Goddard Street	North of Bishopsgate Street	2014	1028	46.8	50	-3.2
Goddard Street	South of Enfield Street	2014	2374	46.4	50	-3.6
Rutland Avenue	South of Forster Avenue	2014	409	46.1	50	-3.9
Roberts Road	South of O'Dea Street	2013	7882	45.7	50	-4.3
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Custance Street	East of Keyes Street	2014	637	45.7	50	-4.3
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Custance Street	East of Rayment Street	2014	667	45.4	50	-4.6
Midgley Street	East of Rutland Avenue	2013	155	45.4	50	-4.6
Streatley Road	East of Goddard Street	2014	361	44.8	50	-5.2
Egham Road	East of Rutland Avenue	2013	135	44.6	50	-5.4
Gallipoli Street	North of Cornwall Street	2014	498	43.9	50	-6.1
Castle Way	North of Streatley Road	2014	1873	42.8	50	-7.2
Keyes Street	North of Enfield Street	2014	105	41.8	50	-8.2
Howick Street	West of Gallipoli Street	2012	206	40.3	50	-9.7
Cornwall Street	East of Gallipoli Street	2014	326	40.0	50	-10.0
Cornwall Street	East of Gallipoli Street	2012	193	40.0	50	-10.0
Streatley Road	West of Castle Way	2014	1557	34.9	50	-15.1
Lathlain Place	North of McCartney Crescent	2014	345	23.0	50	-27.0

Appendix D Innovative Traffic Calming Research

D1 Psychological Traffic Calming – Driving Simulator Study[7]

A research project undertaken by TRL on behalf of the Department for Transport (UK) in 2005 developed and tested various psychological traffic calming measures. Although the study was generally focussed on developing traffic calming measures in a rural context, elements which are potentially applicable in a residential context (for instance Lathlain) are outlined further on. The research project consisted of two stages. Stage one consisted of the preliminary development of psychological measures followed by a verbal questionnaire by voluntary participants. In stage two, the various traffic calming measures which were identified and shortlisted in stage one were further refined and in some instances combined and then tested using a driving simulator.

The main findings from the driving simulator trials are summarised below:

- Continuous or repeated measures were require to sustain speed reductions.
- Coloured surfacing alone showed minimal reductions in vehicle speeds.
- Uncertainty (such as reduced forward visibility resulting from kerb build-outs with trees) appeared to reduce vehicle speeds.
- Faster drivers showed the greater speed reductions when driving through the most effective measures: 'red brick narrowing' and 'tree build-outs'– see Sections A1.1 and A1.2 respectively.

D1.1 Red Brick/Surface Narrowing

This treatment measure consists of providing red edging with the appearance of cobble stones that narrow the road both physically and visually (see Figure A1). Driving simulator results showed that following the treatment, there was an average speed reduction of 6.2 km/h compared to the pre-treatment road mean speed of 66.1 km/h.

Figure A1.1 - Red Brick Narrowing

[7] 'Psychological' traffic calming, TRL Limited/Department for Transport (2005)

Benefits

- Potentially reduces vehicle speeds over the section of the treatment.

Dis-benefits

- The effectiveness of the treatment in terms of traffic calming may decrease over time.
- Difficult/costly to maintain.

D1.2 Tree Build-Outs

This treatment measure incorporates a series of build-outs each featuring a small shrub/tree (which breaks linearity/reduces forward visibility) protected by four wooden bollards. Each bollard was emphasized by a coloured surfacing line on the road surface (see Figure A1.2). The build-outs were spaced at 70m intervals over a distance of 1000m. Driving simulator results showed that following the treatment, there was an average speed reduction of 5.1 km/h compared to the pre-treatment mean speed of 66.1 km/h.

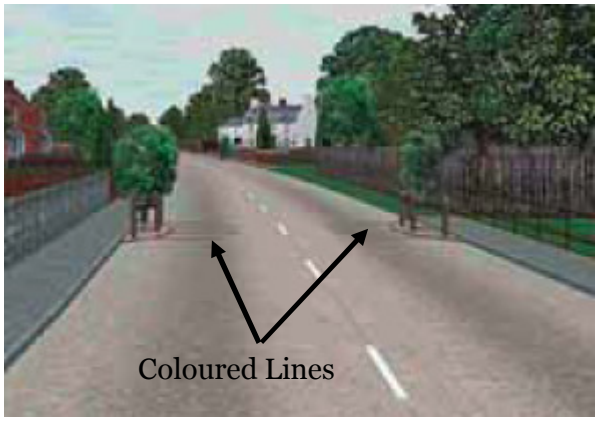

Figure A1.2 - Curved Coloured Patch

Benefits

- Reduces vehicle speeds in the vicinity of the tree build-out as well as over the entire length of the street when used in a series (when spaced appropriately).
- Can potentially be used to formalise on-street parking.
- Potential to be used in combination with other treatments.

Dis-benefits

- May pose a roadside hazard for inattentive drivers.
- Potentially increased maintenance activity resulting from overgrown trees.
- Coloured surfacing lines may require Main Roads WA approval.

D2 Latton Scheme Trial Study[8]

Following the TRL research project mentioned in Section A1, some of the principles from this study were used for developing and implementing traffic calming treatments in the village of Latton in Wiltshire which is located on the C419 road (previously wide and straight and carries low volumes of traffic). The scheme was implemented in 2004 with the primary aim of reducing vehicle speeds through the village. The total cost of the scheme, which included two gateway treatments on either side and four mid-block treatments was approximately $80,000. Following the implementation of the scheme, 85th percentile speeds throughout various locations on C419 were reduced by up to 14 km/h.

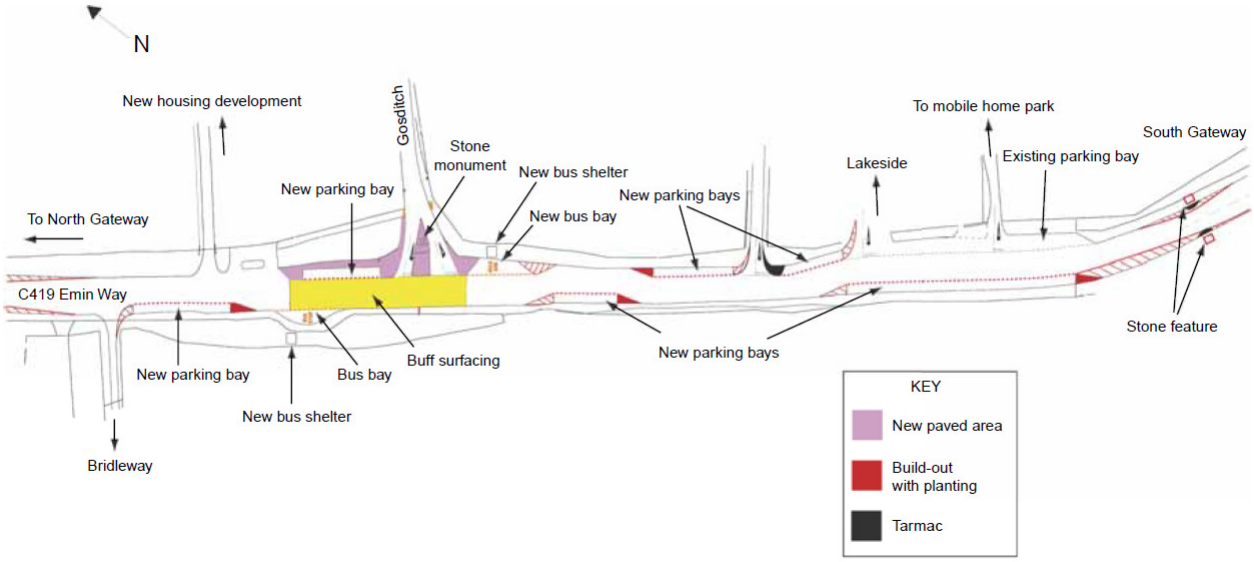

Figure A2 Plan of the Latton Scheme

As shown in the Figure A2, the main traffic calming components of the scheme were:

- Stone gateways on either end of the village where the speed limit was reduced from 40 mph (64 km/h) to 30 mph (48 km/h).
- Removal of the centre lines and build-outs with planting to create new parking bays on alternating sides of the carriageway.
- Enhancement at and around the main junction with paved build-outs, a section of paved footpath as well as paving around a stone monument with high friction surfacing where it is considered most likely to be crossed by pedestrians.

These components are further detailed in the sub-sections which follow.

[8] 'Psychological' traffic calming, TRL Limited/Department for Transport (2005)

D2.1 Gateways

The gateways comprised of a stone feature incorporating signing, a build-out and hatching on either side of the carriageway (see Figure A2.1). The 85th percentile speeds before the treatment was 71 km/h and 65 km/h for the northern and southern entry points. Following the treatment, the 85th percentile speed reduced to 59 km/h (reductions of up to 12 km/h).

Figure A2.1 - Gateway Treatments

Benefits

- The gateway treatments will act as entry statements providing visual cues to drivers in terms of the different road environment (i.e. lower speeds). Along with other traffic calming treatments gateway treatments can reduce vehicle speeds over the entire length of road.
- May visually enhance the street through streetscaping.

Dis-benefits

- May pose to be a roadside hazard for inattentive drivers.

D2.2 Build-outs with Formalised Parking Bays

Kerbed build-outs were installed on alternate sides of the carriageway to create parking bays with the intention of creating the effect of chicanes. Shrubs have been planted on the build-outs with the intention of limiting forward visibility, although at the time of the photograph (see Figure A2.2), the planting has not grown sufficiently to achieve this. Furthermore, the centreline was removed for the entire section of road between the gateways to create driver concern over meeting other vehicles head-on, thus increasing perceived risk, which can reduce speeds. The 85th percentile speed before the treatment was 60 km/h. Following the treatment, the 85th percentile speed reduced to 49 km/h (reductions of 11 km/h).

Figure A2.2 - Build-Outs with Parking Bays

Benefits

- Reduces vehicle speeds in the vicinity of the tree build-out as well as over the entire length of the street when used in a series (when spaced appropriately).
- Will help formalise on-street parking to a certain extent.

Dis-benefits

- Will reduce the amount of kerbside parking (due to the provision of parking bays on alternating sides of the carriageway)
- Ghost markings resulting from simply removing centrelines may not be effective in reducing vehicle speeds as intended by this treatment measure. Conversely, resurfacing roads with the view of removing the centre line is a costly treatment.

D2.3 Intersection Upgrades

As mentioned previously, enhancements at and around the main intersection in the Latton Town centre were undertaken including paved build-outs to tighten the intersection radii, enlargement and streetscaping improvements on the traffic island as well as the provision of a paved footpath (see Figure A2.3). High friction surfacing was also laid for a length of 85m where pedestrians are most likely to cross the road. The 85th percentile speed before the intersection upgrade was 63 km/h. Following the intersection upgrade, the 85th percentile speeds reduced to 49 km/h (reductions of 14 km/h).

Figure A2.3 - Intersection Upgrades

Benefits

- Reduces vehicle speeds in the vicinity of intersection due to the potentially/perceived increased activity in the vicinity of the intersection and tighter intersection radii.
- Improves the pedestrian amenity at the intersection.
- Improved skid resistance which will improve the braking performance of vehicles for an area which is expected to have a higher number of vulnerable road users.
- Warns drivers of areas where pedestrians are likely to cross.
- Improves the conspicuity of the intersection.

Dis-benefits

- Expensive treatment.
- Requires increased activity in the vicinity of the intersection to prove most effective in terms of traffic calming.

D3 Self-Explaining Roads – Point England Study

Self-Explaining Roads (SER) is a concept about making roads safer for all road users by reducing the design speed environment on local roads, and providing higher levels of delineation and amenity on through roads. The basis of this concept is to provide clear distinctions between roads serving different functions, making it easier for pedestrians, cyclists and drivers to better understand the likely behaviour of all other road users[9]. A research study into Self Explaining Roads (SER) was undertaken in New Zealand for implementation of a trial study in Point England, Auckland. Key elements of the SER design are outlined in the sub-sections which follow. It should be noted that further work is currently being undertaken to analyse road-user interaction and monitor any road safety issues.

D3.1 SER Local Roads

The fundamental elements for a SER Local road are:

- A target design speed of 30 km/h.
- Increased landscaping and large traffic islands to limit forward visibility.
- The removal of road markings.

A3.1 - Self Explaining Local Road[10]

Following the implementation of the project, the mean speed has reduced to less than 30 km/h in the six roads which have had the most landscaping (it is noted that vehicle speeds prior to the implementation of the treatments have not been provided in the source document[3]). Furthermore, no serious injuries have occurred in the first two years following the implementation of the project compared to the four serious injury crashes which have occurred in the five years preceding[7].

Benefits

- Reduces vehicle speeds over the length of the route when traffic island treatments are spaced appropriately.
- Distinct features which assist road users to recognise the class of road (compared to SER Local Distributor roads).
- Discourages through traffic.

[9] Trees and Barrier in Test Streets Cut Accident/Injury Rates, New Zealand Herald (2012)
[10] Self-Explaining Roads, Mackie Research and Consulting

Dis-benefits

- Will reduce the amount of kerbside parking.
- Inter-visibility between vehicles and pedestrians maybe reduced (landscaped traffic islands at various locations) which is a road safety issue, especially for younger vulnerable road users.
- May pose to be a roadside hazard for inattentive drivers.
- Lack of clarity/delineation may lead to issues in terms of insurance and/or legal claims if a conflict were to occur.
- Potentially increased maintenance activity resulting from overgrown trees and/or from vehicles damaging trees planted in the middle of the road – as reported by the Police[11].
- May inconvenience emergency vehicles and buses.

D3.2 SER Collector (Local Distributor) Roads

The fundamental elements for a SER Local Distributor road are:

- Increased delineation.
- Addition of cycle lanes.
- Improved amenity for pedestrians.

Figure A3.2 - Self Explaining Local Distributor Road[12]

The Local Distributor roads have reportedly experienced modest speed reductions with mean speeds around 50 km/h (speed limit).

Benefits

- Improved pedestrian and cyclist amenity.
- Will potentially formalise parking.

Dis-benefits

- May not be effective in reducing vehicle speeds.

[11] Trees and Barrier in Test Streets Cut Accident/Injury Rates, New Zealand Herald (2012)
[12] Self-Explaining Roads, Mackie Research and Consulting

D4 Skinny Roads[13]

The concept of Skinny Roads has been adopted in the 'Neighbourhood Street Design' Guidelines for Oregon, U.S.A. As the name suggests, Skinny Roads are narrow streets which aim to reduce vehicle speeds whilst appreciating that the probability of a vulnerable road user surviving a vehicular collision is exponentially higher at lower speeds. Key considerations in the development of these Guidelines included the provision of on-street parking and the impact on emergency vehicles. The Guidelines have identified key factors for determining the suitability of the application of the Skinny Roads concept:

- **Queuing** – designing street so that moving vehicles occasionally need to yield to opposing vehicles between parked cars before proceeding.
- **Connected Street Networks** (as opposed to cul-de-sacs and road closures) – Provide multiple ways for emergency vehicles to access a particular location as well as encourage slow, cautious driving since drivers encounter cross traffic at frequent intervals.
- **Adequate Parking and Enforcement –** It is acknowledged that is if there is insufficient on-street parking, people are more likely to ignore parking restrictions (which are essential to provide yielding areas for vehicles). As such, the guidelines note that if there is ineffective parking enforcement, narrow street standards should not be adopted. Conversely, if there is insufficient demand for on-street parking, the resulting wide carriageway width is likely to encourage increased vehicle speeds.

Accommodating Emergency Vehicles – The guidelines note that the increased flexibility in street design may be possible when sprinklers are provided (so that smaller fire trucks can be used), whilst noting that narrow streets still need to accommodate other large emergency vehicles and rubbish trucks.

[13] Neighbourhood Street Design Guidelines – An Oregon Guide for Reducing Street Widths, Neighbourhood Streets Project Stakeholders (2000)

D5 Liveable Neighbourhoods

Liveable Neighbourhoods has been adopted by the Western Australian Planning Commission (WAPC) as operational policy, and is to be followed in the design and approval of urban developments. This policy is applicable to structure planning and subdivision of Greenfield sites. As such, it should be noted that the concepts and principles within the Policy are generally applicable for traffic management planning in new towns and suburbs, as opposed to modifying existing suburbs such as Lathlain due to cost. However, some elements with regards to traffic management and street design may still be applicable for this Pilot Study, in particular typical street cross-sections provided for various road types.

D5.1 Access Roads[14]

Liveable Neighbourhoods recommends the following carriageway widths for access roads in a typical residential area:

- 5.5m to 6.0m for a short (less than 200m) and/or one-sided streets (e.g. opposite parks or bushland) which have low traffic volumes (less than 1,000 vpd), low parking demand and a target operating speed of 30 km/h. This width is considered sufficient for a vehicle to pass a parked/moving vehicle (see Figure A5.1a). However it is considered too narrow for vehicles to park opposite each other without blocking the street. As such, any on-street parking provisions will need to be staggered. It is noted that the recommended spacing between traffic calming treatments/mid-block sections without through priority is 70-80m.

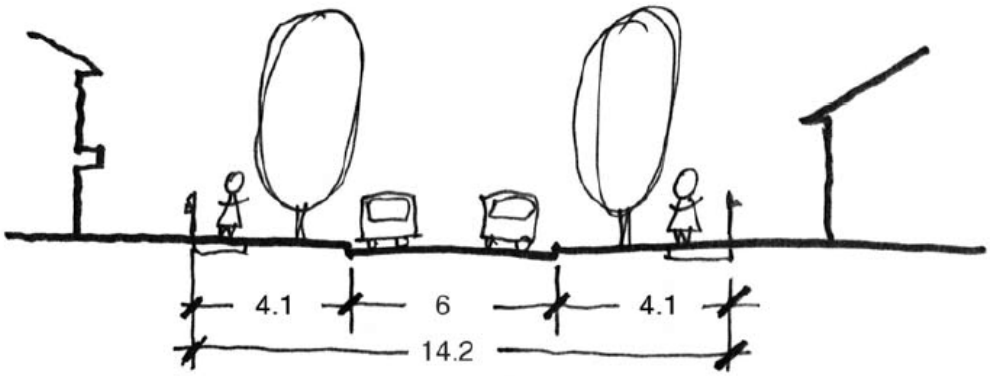

Figure A5.1a – Access Roads (less than 1,000 vpd)

- 7.0m to 7.5m for typical residential streets with traffic volumes up to 3,000 vpd and a target operating speed of 40 km/h. This width is considered sufficient for two vehicles to pass each other while passing a parked vehicle (see Figure A5.1b). It is also wide enough for a moving vehicle to pass between two parked vehicles. It is also noted that the street can be widened up to 9.7m for situations with increased parking and/or traffic demand (2.1m parking lanes and a combined 5.5m width for the two traffic lanes). It is noted that the recommended spacing between traffic calming treatments/mid-block sections without through priority is 100-130m.

[14] Liveable Neighbourhoods – a Western Australian Government Sustainable Cities Initiative, WAPC (2009)

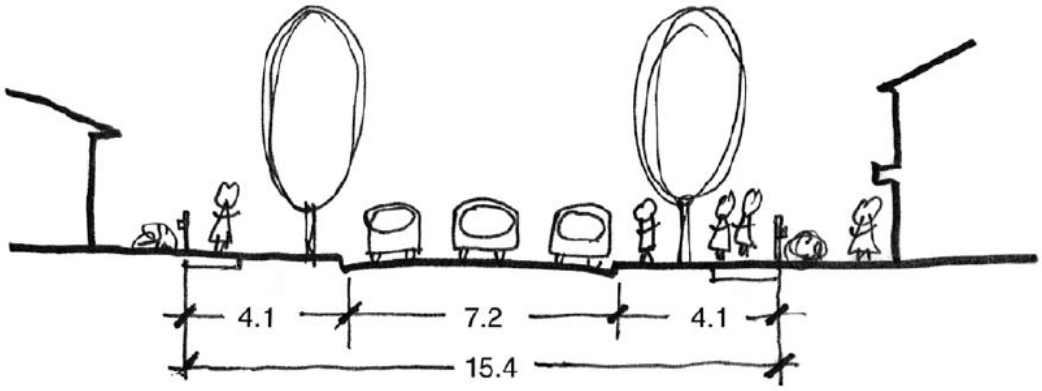

Figure A5.1a – Access Roads (less than 3,000 vpd)

D5.2 Local Distributor Roads[15]

Liveable Neighbourhoods recommends the following carriageway widths for neighbourhood connectors (similar to Local Distributor roads) in a typical residential area:

- 11.2m for a Local Distributor road with up to 3,000 vpd which consist of two 3.5m traffic lanes and two 2.1m parking lanes. The provision of trees at certain locations along the parking lanes as well as painted parking lines are recommended to visually narrow the street. Together with other traffic calming measures, the target operating speed for these roads is less than 50 km/h. This cross-section also proposes a shared path in lieu of on-street cycle lane(s).

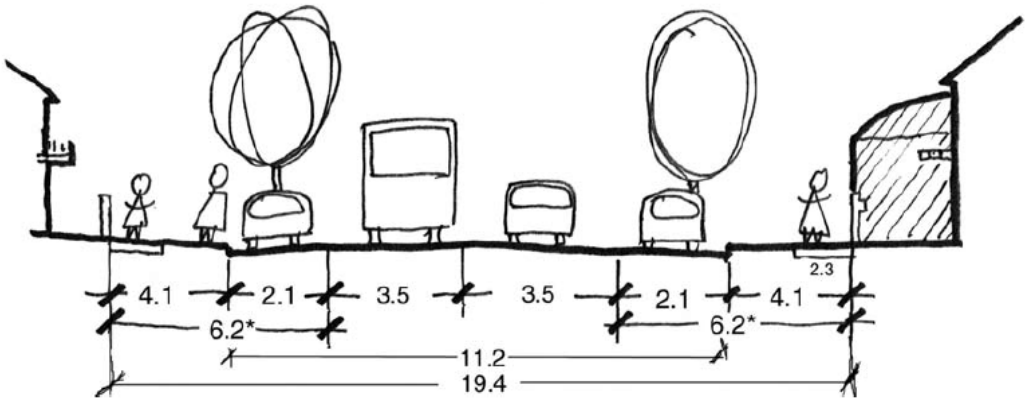

Figure A5.2a – Local Distributor Roads (less than 3,000 vpd)

- For Local Distributors with traffic volumes up to 7,000 vpd, the typical cross-section is as per above with the addition of on-street cycle lanes as well as a raised central median.

[15] Liveable Neighbourhoods – a Western Australian Government Sustainable Cities Initiative, WAPC (2009)

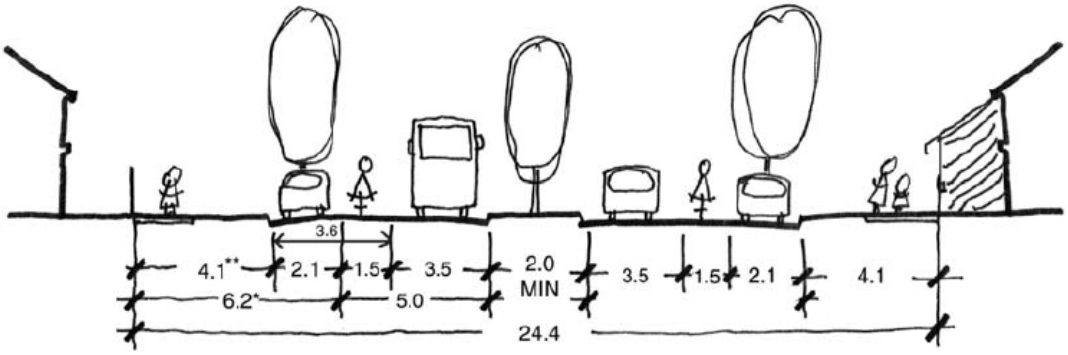

Figure A5.2a – Local Distributor Roads (less than 7,000 vpd)

D5.3 District Distributor Roads

It is noted that the planning characteristics of Liveable Neighbourhoods differs from those for conventional planning approaches in that town centres are formed along transport routes, rather than being bound by arterial roads. As such, The Integrator A and B type roads (similar to District Distributor B type roads) have typical cross-sections which have been determined on the basis of having a variety of adjacent land-uses as a result of being located on town centres. Therefore, these typical cross-sections are unlikely to be suitable for roads such as Roberts Road which have been planned and designed from a conventional approach with adjacent land-use being primarily residential.

D6 Manual for Streets (UK)[16]

The Manual for Streets (UK) provides technical guidance on the planning and designing of new residential streets. It is also applicable to existing residential roads subject to re-design. The document discourages building roads that are primarily designed for motor vehicles and encourages visual amenity, pedestrian/cyclist activity, improved public transport access as well as good design/construction practise. The document provide the following guidance with regards to achieving appropriate vehicle speeds in residential areas:

- Conflict between various user groups can be minimised by reducing the speed/flow of vehicular traffic.
- A maximum design speed of 20 mph (36 km/h) should be used due to the significantly reduced risk of a casualty crash associated with lower vehicular traffic speeds.
- Traffic calming features are required at no more than 70m intervals to achieve average speeds of less than 36 km/h.
- A continuous road can be broken up by introducing the following features to calm traffic:
    - » Physical features (vertical/horizontal devices)
    - » Changes in priority
    - » Lengths of road between intersections/yielding points
    - » Reduced forward visibility (see Figure A5 below)
    - » Psychological measures including edge markings to narrow traffic lanes, on-street parking, increased pedestrian activity, etc.
- If the design speed is less than the posted speed limit, measures will need to be installed to reduce traffic speeds accordingly.

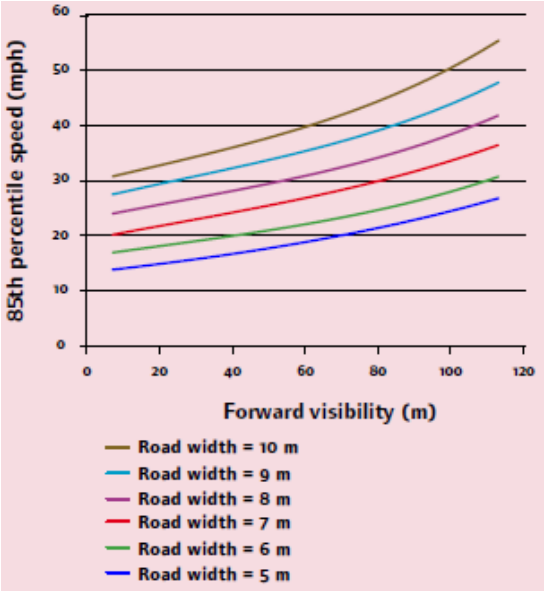

Figure A5 – Impact of Forward Visibility and Carriageway Width on Travel Speeds

[16] Manual for Streets (UK), Department For Transport (2007)

Appendix E Traditional Traffic Calming Measures

B1 Horizontal Deflection Devices

E1.1 Centre Blister Islands

A centre blister island is positioned at the centre line of a road which has a wide oval plan shape that narrows lanes, diverts the angle of traffic flow into and out of the device, and can be used to provide pedestrians with a refuge.

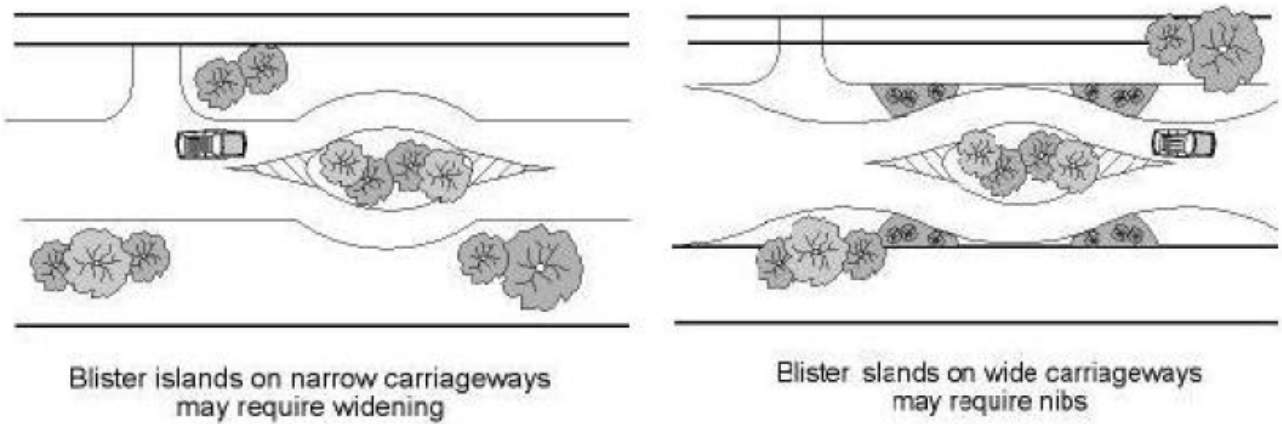

Figure B1.1 - Centre Blister Islands[17]

The following benefits and dis-benefits have been identified for this traffic calming treatment:

Benefits

- Reduces vehicle speeds in the vicinity of the blister island as well as over the entire length of the street when used in a series (when spaced appropriately).
- If constructed in conjunction with a pedestrian crossing, they provide a refuge area for pedestrians.

Dis-benefits

- May prohibit or limit access and movement from driveways.
- Will require the removal of on-street parking in the vicinity of the blister islands.
- May restrict emergency vehicles and buses.

[17] Austroads Guide to Traffic Management Part8: Local Area Traffic Management (2008)

E1.2 Kerb Extensions

Figure B1.2 - Kerb Extension – City of Perth[18]

The following benefits and dis-benefits have been identified for this Traffic calming treatment:

Benefits

- Can be used to tighten intersection kerb radii to reduce turning vehicle speeds.
- They can be used to provide shorter crossing distances for pedestrians and improve inter-visibility between pedestrians and cars.
- They can help to delineate and protect parking spaces.

Dis-benefits

- Drivers may mistake an empty kerbside parking lane for a traffic lane.
- Kerb extensions alone are not as effective at reducing vehicle speeds as other horizontal displacement devices.

[18] Austroads Guide to Traffic Management Part8: Local Area Traffic Management (2008)

E1.3 Slow Points

A slow point is a series of kerb extensions on alternating/opposing sides of a roadway which narrow and/or angle the roadway which are intended to reduce vehicle speeds. Slow points can either have one or two lanes and can be angled.

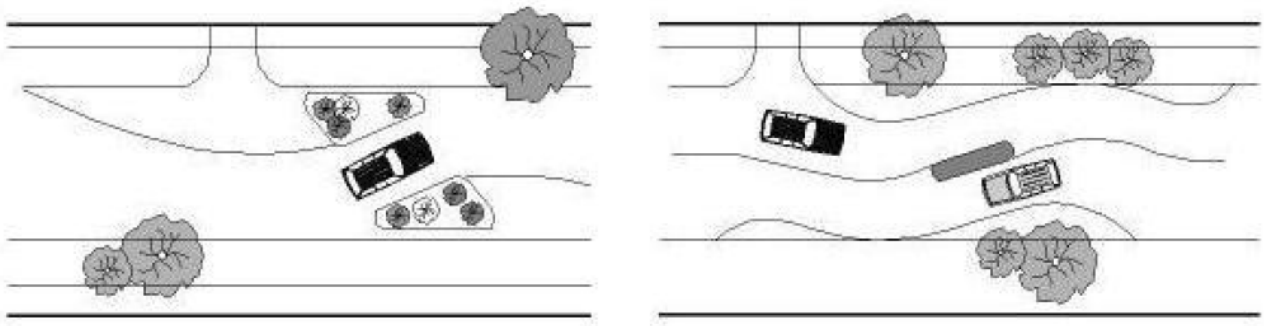

Figure B1.3 - Single Lane and Two lane Angled Slow Point Treatments[19]

The following benefits and dis-benefits have been identified for this Traffic calming treatment:

Benefits

- Reduces vehicle speeds in the vicinity of the slow point as well as over the entire length of the street when used in a series (when spaced appropriately).
- If constructed in conjunction with a pedestrian crossing, they provide a shorter distance for pedestrians to cross the street.
- Discourages through traffic (especially one way slow points).

Dis-benefits

- May impact on access and movement from driveways.
- Inconveniences and potentially restricts emergency vehicles and buses.
- Requires the removal of on-street parking in the vicinity of the slow point.
- With one lane devices, confrontations between opposing drivers may occur when arriving simultaneously and it may be unclear who should give way (although this can be minimised by signing and marking in accordance with Main Roads WA standards).

[19] Austroads Guide to Traffic Management Part8: Local Area Traffic Management (2008)

E1.4 Roundabouts

A roundabout (or mini-roundabout) is a form of channelisation that incorporates a circular central island and are suitable for intersections with a high crash rate – especially right angle or right-turn through type crashes or on local streets in residential areas which have a high volume of unnecessary through traffic.

Figure B1.4 - Roundabout – City of Stirling[20]

Benefits

- Reduces the number of vehicle conflict points at intersection.
- Reduces vehicle speeds on approach to/through the intersection.
- Highlights the presence of an intersection.

Dis-benefits

- Expensive and may require land acquisition.
- Potentially reduces the availability of on-street parking on each approach (depending on the extent of narrowing and/or pre-deflection provided).

E1.4.1 Mini Roundabouts

In addition to normal roundabouts, mini-roundabouts (denoted as small diameter roundabouts in AS1472.13) with fully mountable central islands between 2m and 5m in diameter (note this differs from UK regulations which allows white, reflectorised central circular island of between 1m to 4m) can be used in constrained sites. Mini roundabouts are typically installed[21] to improve the operation of an existing intersection, as a crash reduction measure, as part of a traffic calming

[20] Austroads Guide to Traffic Management Part8: Local Area Traffic Management (2008)
[21] Mini Roundabouts – good practice guide. Department of Transport and Country Surveyors Society (UK)

scheme or to provide access to a new development. It should be noted that they are not widely used in Western Australia.

Benefits

- Relatively cheap intersection treatment solution compared to regular sized roundabouts.
- Reduces the number of vehicle conflict points at intersection.
- If installed correctly, can highlight the presence of an intersection.

Dis-benefits

- Vehicles may proceed through the intersection at speed due to the lack of deflection – depending upon the design. This may lead to an increased risk/severity of crashes. However, vehicle speeds on approach to the intersection can potentially be reduced by raising the intersection, providing speed humps/cushions on approach to the intersection, and/or by providing pre-deflection on all approaches.
- May have safety impacts on cyclists/motorcyclists as well as accessibility/crossing issues for pedestrians.

E1.5 Driveway Links

Driveway links consist of a single lane two way meandering road extending over the length of two or more property frontages. They are an extended form of a slow point which provides a greater traffic calming and visual effect.

Figure B1.5 - Driveway Link – City of Stirling[22]

Benefits

- Reduces vehicle speeds in the vicinity of the driveway link as well as over the entire length of the street when used in a series (when spaced appropriately).
- If constructed in conjunction with a pedestrian crossing, they provide a shorter distance to cross the street.
- Discourages through traffic.
- May visually enhance the street through streetscaping.

Dis-benefits

- May restrict emergency vehicles and buses.
- Requires the removal of on-street parking.
- Any streetscaping will need to be maintained to ensure adequate visibility.
- Expensive treatment.

Confrontations between opposing drivers may occur when arriving simultaneously and it may be unclear who should give way.

[22] Austroads Guide to Traffic Management Part8: Local Area Traffic Management (2008)

E2 Vertical Deflection Devices

E2.1 Road humps/ Raised Plateaus

Traditional road humps/raised plateaus consist of round-topped/square topped vertical deflection devices. These treatments are expected to reduce 85th percentile speeds by 15 to 20 km/h when spaced between 80m and 120m apart (for round-top humps 75-100mm high with ramp gradient 1:10 to 1:15 and flat-top humps 100mm high with ramp gradient 1:8 and 1:10)[23].

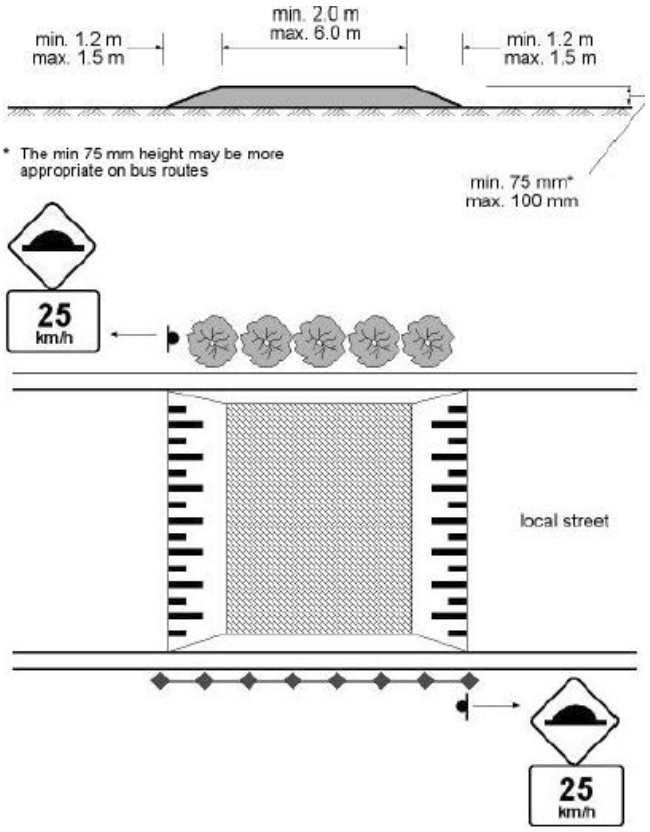

Figure B2.1a - Typical Dimensions of a Flat Top Road Hump[24]

It is noted that there a variations to these traditional designs including sinusoidal road humps (which are more sympathetic towards cyclists) and H-Type or S-Type road humps which provide a shallower gradient of travel for larger vehicles (i.e. buses and trucks) compared to smaller vehicles (i.e. cars). – see Figures 2.1b, 2.1c and 2.1d.

[23] Local Transport Note 007 Traffic Calming, Department for Transport UK (2007)
[24] Austroads Guide to Traffic Management Part8: Local Area Traffic Management (2008)

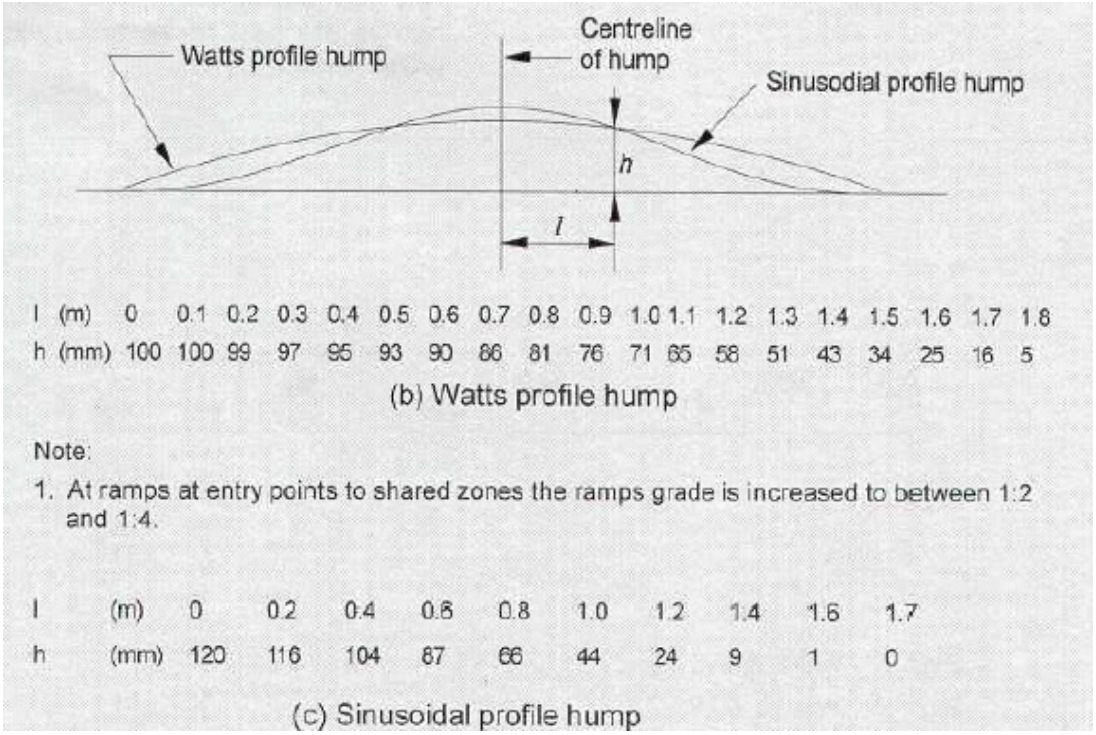

Figure B2.1b - Comparison of Round Topped (Watt's Profile) and Sinusoidal Road Humps[25]

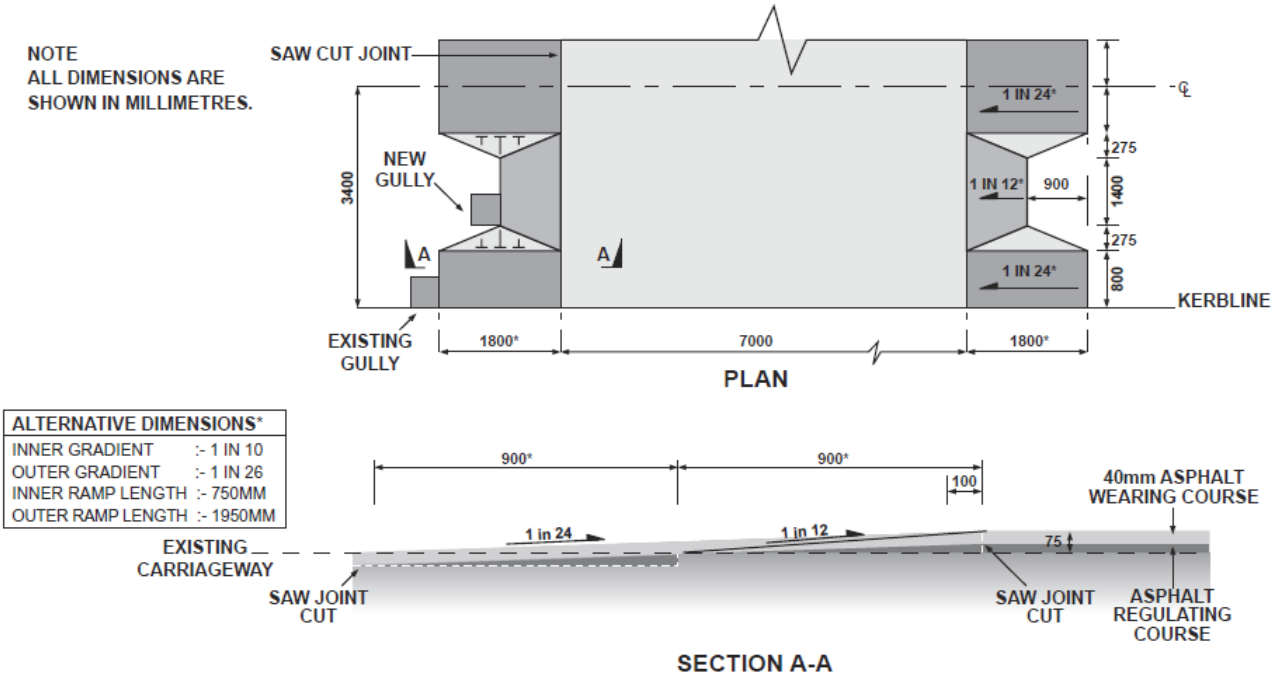

Figure B2.1c - H-Type Road Humps[26]

[25] Austroads Guide to Traffic Management Part8: Local Area Traffic Management (2008)
[26] Innovative Traffic Calming Initial Tool Kit Development, Mott MacDonald Limited/Sheffield City Council (2009)

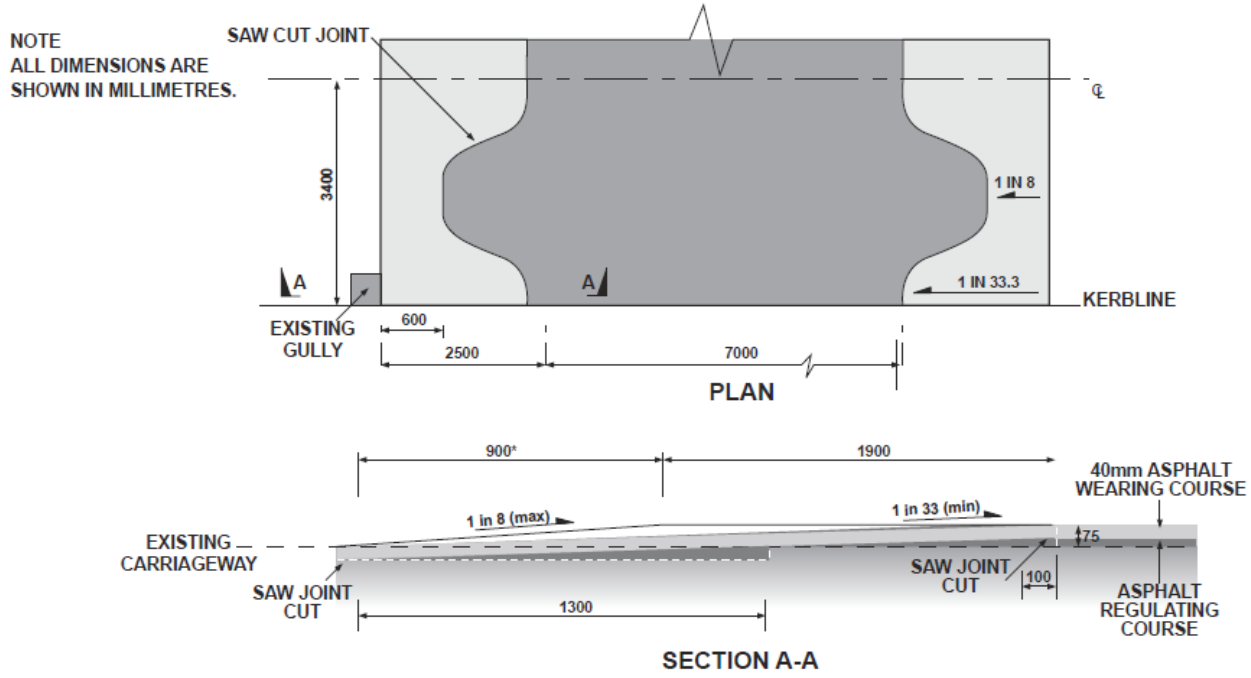

Figure B2.1d - S-Type Road Humps[21]

The following benefits and dis-benefits have been identified for this Traffic calming treatment:

Benefits

- Reduces vehicle speeds in the vicinity of the road hump as well as over the entire length of the street when used in a series (when spaced appropriately).
- Relatively low cost to install and maintain.
- Discourages through traffic including larger vehicles (with the exception of H-Type and S-Type Road Humps which allow large vehicles including trucks to use the road – see Section B2.3 for similar associated benefits and dis-benefits).

Dis-benefits

- Noise and vibration.
- Discomfort for cyclists and passengers (including public transport and emergency response vehicles). Although they can be designed to limit discomfort to cyclists (i.e. sinusoidal road humps), there is a trade-off between cyclist discomfort and effectiveness in reducing vehicle speeds.

E2.2 Vehicle Responsive Speed Humps

In the UK, an active speed hump constructed of rubber and a patented valve system has been developed which allows vehicles approaching the hump at the desired speed (adjustable) to pass through by deflating, whilst speeding vehicles have to pass through the hump – see Figure B2.2. However, it should be noted that there is no supporting information on speed reduction available for this product. Furthermore, officers from Nottinghamshire County Council (in the UK) attended a demonstration of this product in 2004 and expressed concern over noise as well as passenger discomfort.

Figure B2.2 - Vehicle Responsive Speed Hump[27]

The following benefits and dis-benefits have been identified for this Traffic calming treatment:

Benefits

- Reduces vehicle speeds in the vicinity of the road hump as well as over the entire length of the street when used in a series (when spaced appropriately).
- Discourages through traffic.
- Impact on passenger comfort is minimal when traversed at slow speeds.

Dis-benefits

- Not readily available.
- High product, construction and maintenance costs.
- Although it may be expected that the adaptive nature of this product will lead to reduced noise and discomfort, concerns have been raised (see above) over issues with noise and passenger discomfort.

[27] Innovative Traffic Calming Initial Tool Kit Development, Mott MacDonald Limited/Sheffield City Council (2009)

E2.3 Speed Cushions

Figure B2.3 - Speed Cushions – as installed on Cornwall Street, Lathlain

The following benefits and dis-benefits have been identified for this Traffic calming treatment:

Benefits

- Reduces vehicle speeds in the vicinity of the cushion as well as over the entire length of the street when used in a series (when spaced appropriately).
- Relatively low cost to install and maintain.
- Discourages through traffic (excluding trucks – see below).
- Do not discomfort/restrict cyclists and buses.

Dis-benefits

- Noise and vibration.
- They are less effective in slowing down/discouraging motorcyclists and trucks – truck use on residential roads is generally undesirable and a larger road safety risk (compared to a car) if conflict were to occur with a vulnerable road user.
- Drivers can reduce the intended effect of the cushion by traversing the cushions with only two wheels.

E2.4 Raised Intersections

Raised plateaus can be installed at intersection (including at least six metres on each approach to ensure that a vehicle can be fully mounted on the plateau behind the hold line) as a traffic calming treatment.

Figure B2.4 - Raised Intersection – City of Gold Coast [28]

The following benefits and dis-benefits have been identified for this Traffic calming treatment:

Benefits

- Highlights the presence of an intersection.
- Reduces vehicle speeds in the vicinity of the intersection as well as over the entire length of the street when used in conjunction with raised plateaus in a series (when spaced appropriately).
- Discourages through vehicles from using the roads/intersection
- Can act as/part of an 'entry statement', especially into a lower speed zone.

Dis-benefits

- Noise and vibration.
- Discomfort for passengers (including public transport and emergency response vehicles).

[28] Austroads Guide to Traffic Management Part8: Local Area Traffic Management (2008)

E2.5 Rumble Wave Surfacing

Traditionally, rumble devices are used in non-urban situations where noise or vibration is generated to alert drivers in advance of a hazard as well as to provide traffic calming. However, an innovative surfacing product has been developed as a quieter alternative to conventional rumble strips and is considered more suitable for residential areas (see Figure B1.6).

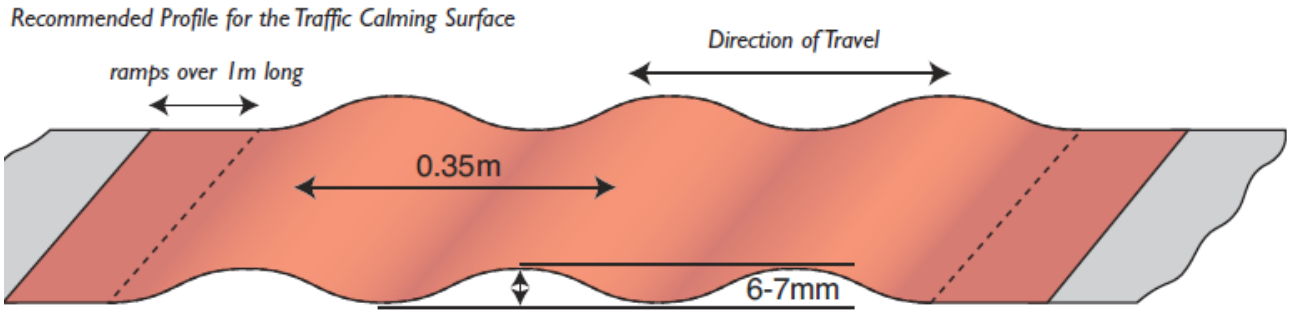

Figure B2.5 - Rumblewave Surfacing[29]

Benefits

- Reduces vehicle speeds in the vicinity of the treatment as well as over the entire length of the street when used in a series (when spaced appropriately).

Dis-benefits

- High construction and maintenance costs.
- Discomfort for cyclists and passengers (including public transport and emergency response vehicles).
- May not be readily available and/or have contractors with suitable experience to construct appropriately.

[29] Traffic Advisory Leaflet – Rumblewave Surfacing, Department for Transport UK (2005)

E3 Traffic Control Devices

E3.1 Pavement 'Give Way'/ 'Stop' Markings

'Give Way triangle'/'STOP' pavement markings are installed at priority controlled intersections outside of Australia, for instance in New Zealand and the UK. In New Zealand, these pavement markings are installed in urban areas (see Figures overleaf) The 'Give Way triangle' and 'STOP' pavement markings are installed up to 20m and 10m from the limit line of the controlled approach respectively. The use of such pavement markings would need the formal approval of Main Roads WA given the non-standard nature of such markings.

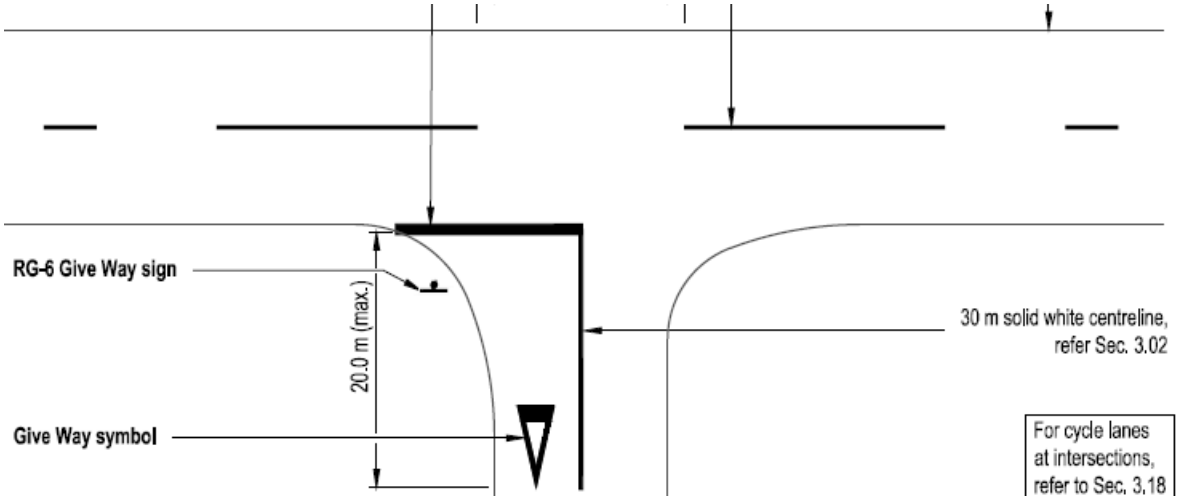

Figure 10– Typical layout of Give Way controlled intersection in New Zealand (Source: Manual of Traffic Signs and Markings, NZTA, March 2011)

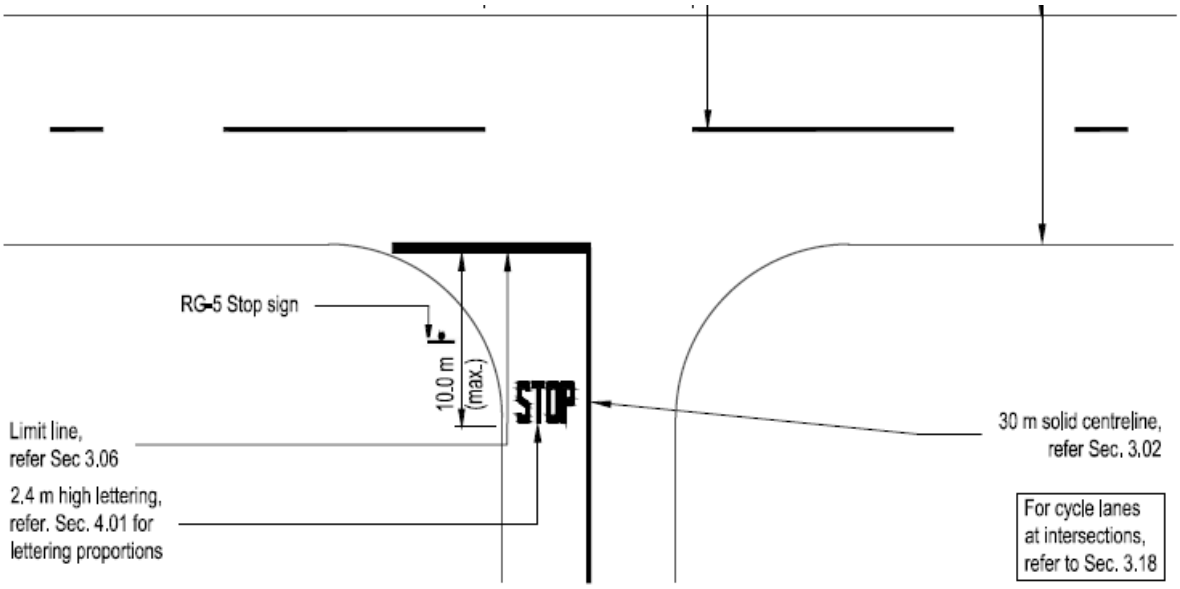

Figure 11 – Typical layout of STOP controlled intersection in New Zealand (Source: Manual of Traffic Signs and Markings, NZTA, March 2011)

Appendix F Concept Design Drawings

Traffic calming concept layout plans are provided in the following A3 pages.

Local Area Traffic Management

Town of Victoria Park

Traffic Calming Concepts

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TOWN OF VICTORIA PARK

Notes:

1. Street lighting should be designed and installed in accordance with AS1158.

2. Dimensions are indicative and yet to be finalised, following vehicle swept path movements.

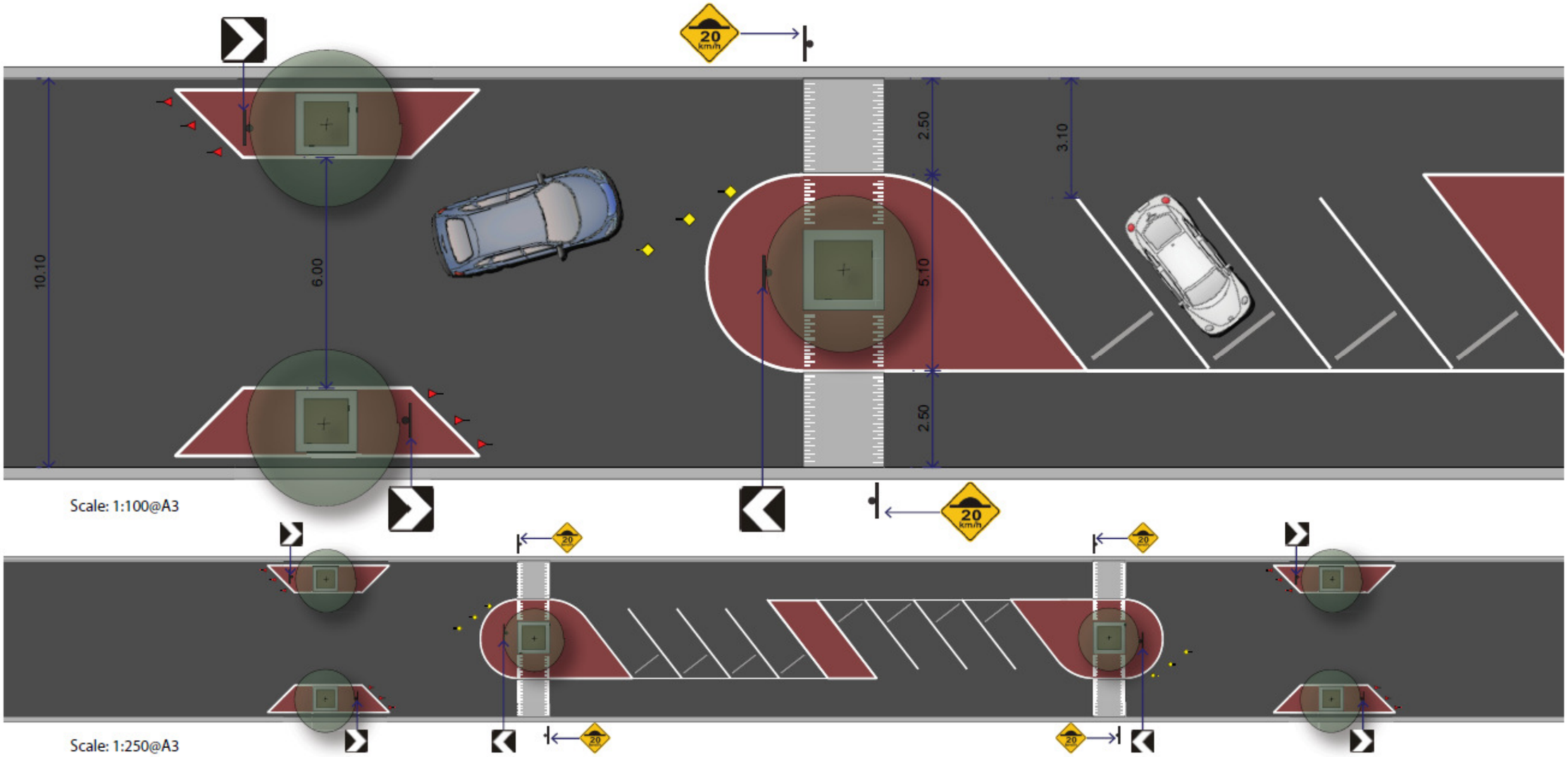
3. Kerb buildouts can be used at either, both or none of the approaches.

4. Option restricted to roads with sufficient width.

5. Subject to Main Raods WA inputs - design may require a centreline / line marking to delineate the start of the central parking area.

Legend

- Black asphalt, existing
- Red asphalt
- Kerb
- Red, uni-directional RRPMs
- Yellow, uni-directional RRPMs
- Tree with clear canopy & 100mm max dia. trunk, in raised planter beds



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Drawing: W-P1735.00 | Sheet: 001 | Revision: B | Date: 05/11/2014

Local Access Roads - Option 1

Town of Victoria Park, Traffic Calming

TOWN OF VICTORIA PARK

Notes:

1. Street lighting should be designed and installed in accordance with AS1158.

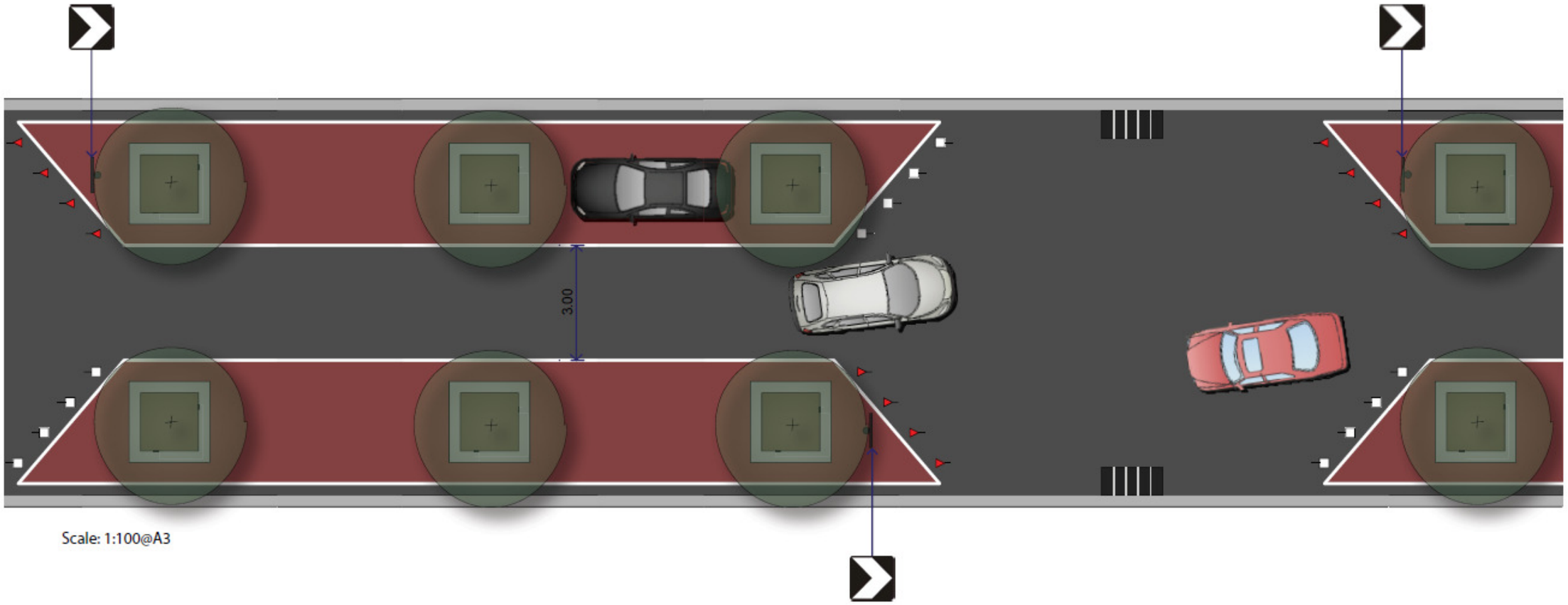
2. Dimensions are indicative and yet to be finalised, following vehicle swept path movements. 1. Different arrangements and numbers of planter boxes are possible, according to parking requirements.

3. Surface of parking area can be coloured as desired.

4. W5-33 Slow Point Warning Sign may be required at the start of street on each approach.

Legend

- Black asphalt, existing
- Red asphalt
- Kerb
- Red, uni-directional RRPMs
- White, uni-directional RRPMs
- Tree with clear canopy & 100mm max dia. trunk, in raised planter box



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Drawing: W-P1735.00 Sheet: 002 Revision: B Date: 05/11/2014

Local Access Roads - Option 2
Town of Victoria Park, Traffic Calming

TOWN OF VICTORIA PARK

Notes:

1. Street lighting should be designed and installed in accordance with AS1158.

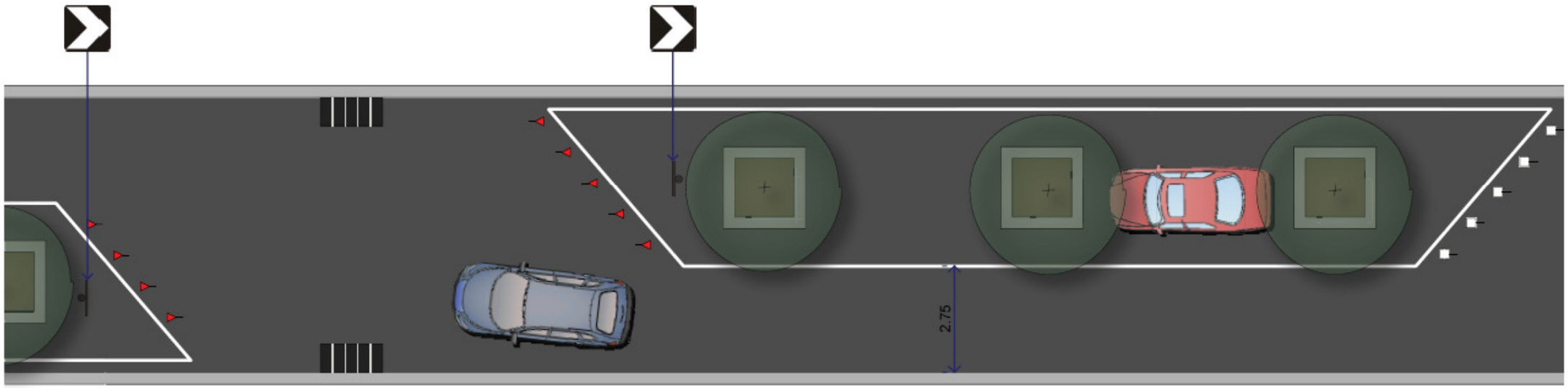
2. Dimensions are indicative and yet to be finalised, following vehicle swept path movements. 1. Different arrangements and numbers of planter boxes are possible, according to parking requirements.

3. Surface of parking area can be coloured as desired.

4. W5-33 Slow Point Warning Sign may be required at the start of street on each approach.

Legend

- Black asphalt, existing
- Red asphalt
- Kerb
- Red, uni-directional RRPMs
- White, uni-directional RRPMs
- Tree with clear canopy & 100mm max dia. trunk, in raised planter box



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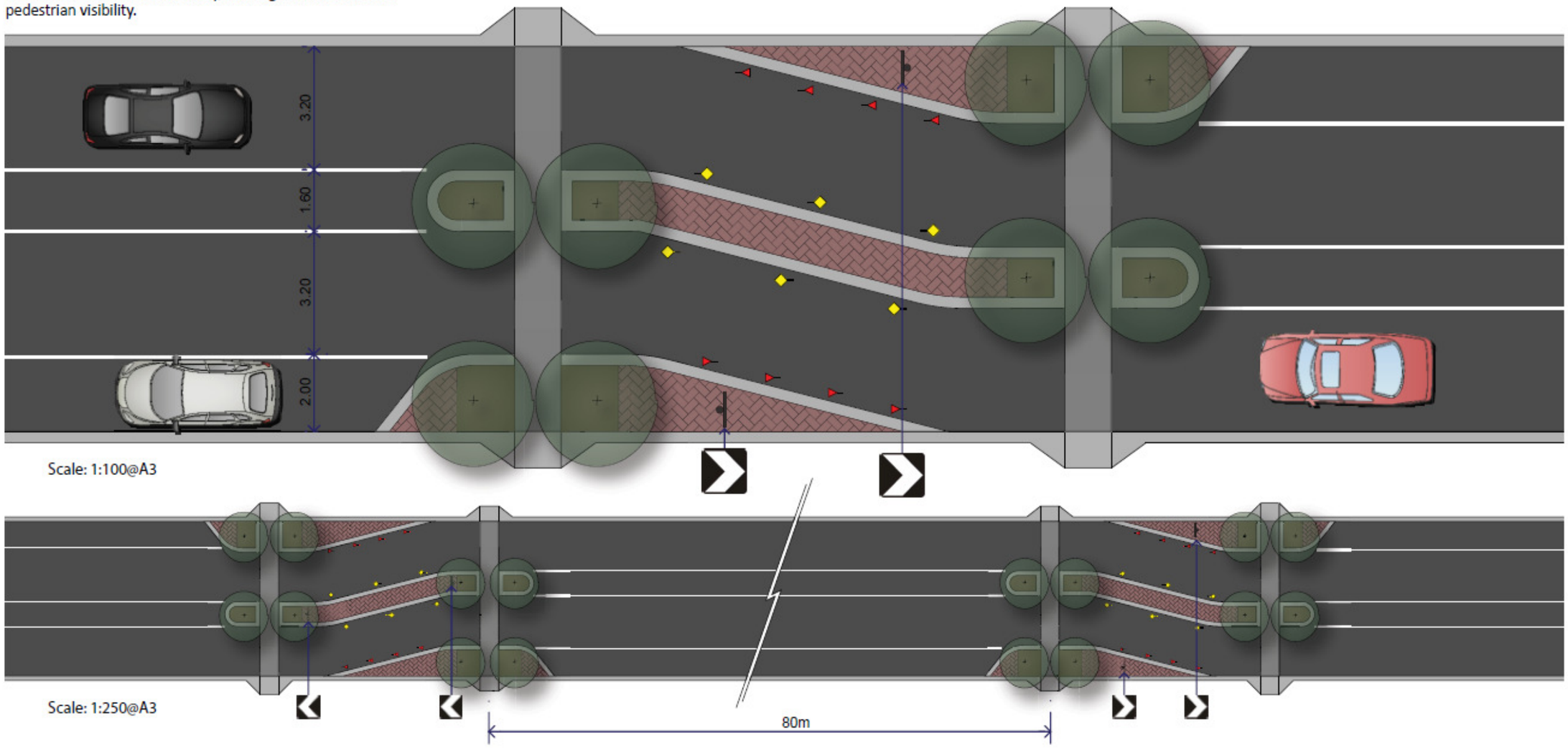
Notes:

1. Street lighting should be designed and installed in accordance with AS1158.
2. Dimensions are indicative and yet to be finalised, following vehicle swept path movements.
3. Kerbing to be semi-mountable, unless stated otherwise.
4. On-street parking is restricted opposite kerbside island (and potentially along narrow traffic lane section).
5. Trees reduce forward visibility, although shall not restrict pedestrian visibility.
6. Not applicable to Rutland Avenue due to limited carriageway width.
7. Keep left required in central median at start of treatment.
8. Central median can have a coloured surface if required.
9. Dropped kerbs/crossing points provided as required.
10. Surface of parking and/or median can be coloured as desired.

Legend

- Black asphalt, existing
- Red asphalt
- Grey asphalt
- Kerb
- Unit paving, trafficable
- Red, uni-directional RRPMs
- Yellow, uni-directional RRPMs
- Tree with clear canopy & 100mm max dia. trunk, planted at road level
- Dropped kerb



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Drawing: W-P1735.00 Sheet: 004 Revision: B Date: 05/11/2014

Local Distributor Roads - Option 1

Town of Victoria Park, Traffic Calming

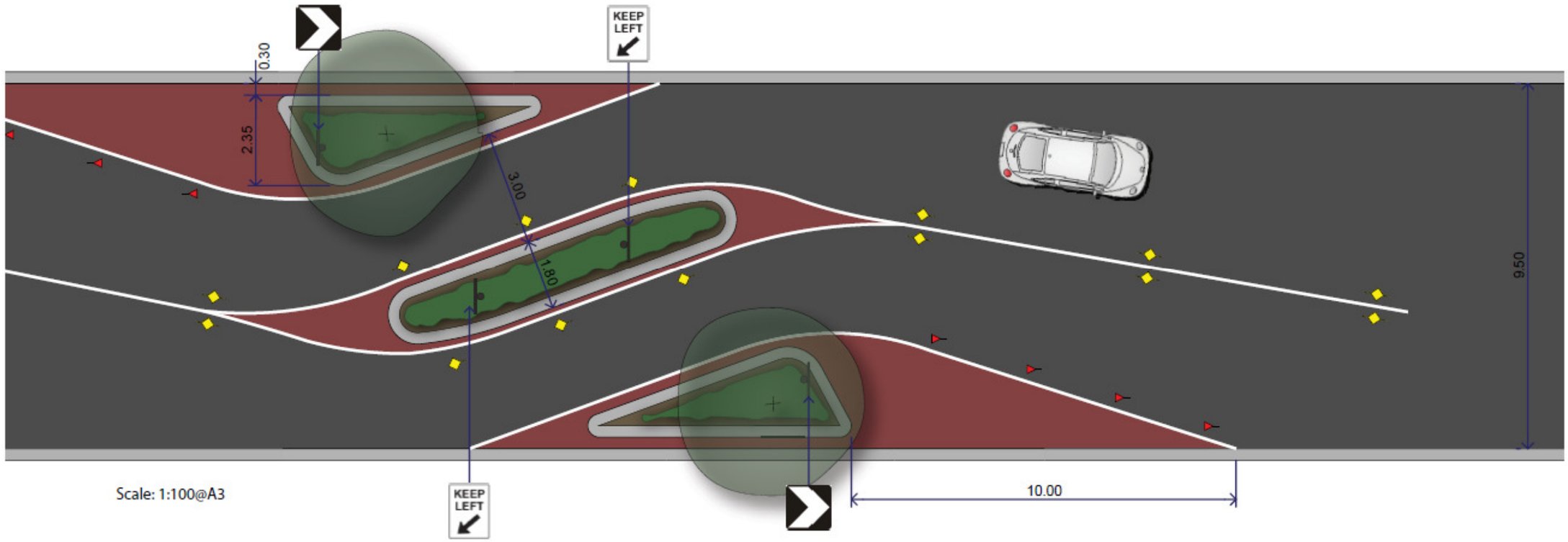
TOWN OF VICTORIA PARK

Notes

1. Street lighting should be designed and installed in accordance with AS1158.
2. Dimensions are indicative and yet to be finalised, following vehicle swept path movements.
3. Kerbing to be semi-mountable, unless stated otherwise.
4. Not applicable to Rutland Avenue due to limited carriageway width.

Legend

- Black asphalt, existing
- Red asphalt
- Kerb
- Red, uni-directional RRPMs
- White, uni-directional RRPMs
- Yellow, uni-directional RRPMs
- Mass planting
- Tree with clear canopy & 100mm max dia. trunk



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Local Distributor Roads - Option 2

Town of Victoria Park, Traffic Calming

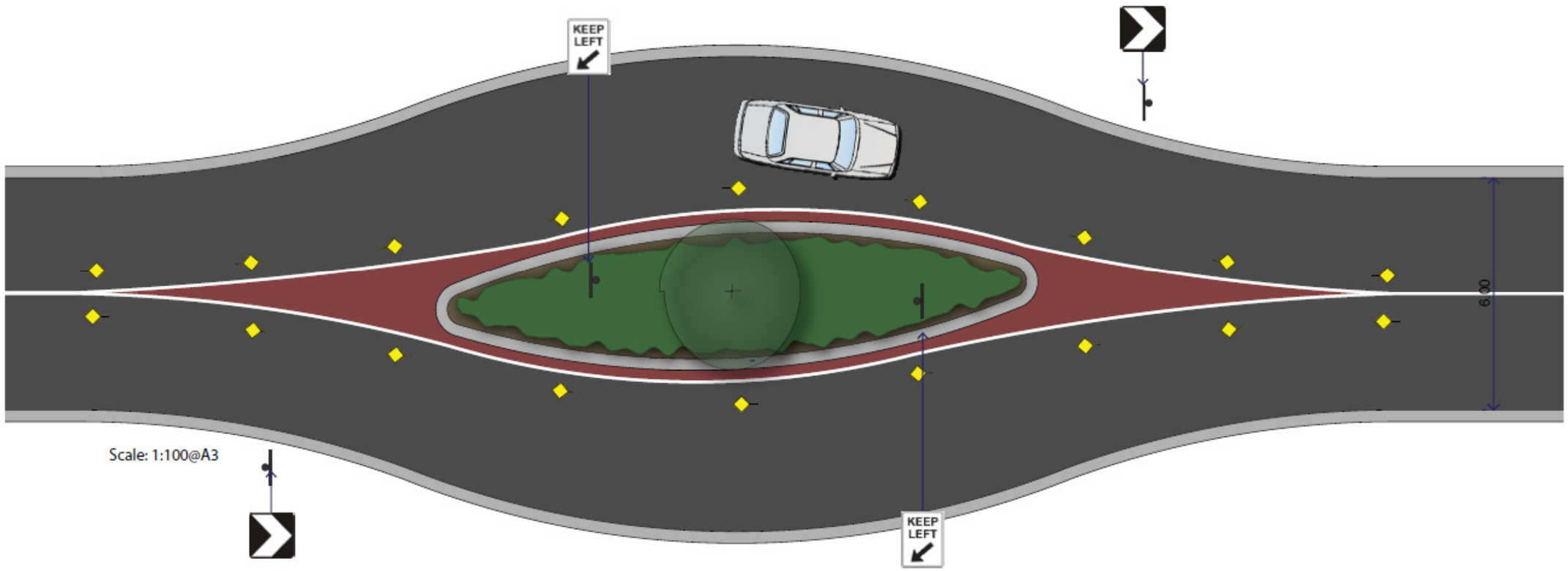
TOWN OF VICTORIA PARK

Notes:

1. Street lighting should be designed and installed in accordance with AS1158.
2. Dimensions are indicative and yet to be finalised, following vehicle swept path movements.
3. Kerbing to be semi-mountable, unless stated otherwise.
4. Option well suited to Rutland Avenue.

Legend

- Black asphalt, existing
- Red asphalt
- Kerb
- Red, uni-directional RRPMs
- White, uni-directional RRPMs
- Yellow, uni-directional RRPMs
- Mass planting
- Tree with clear canopy & 100mm max dia. trunk



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Drawing: W-P1735.00 Sheet: 006 Revision: B Date: 05/11/2014

Local Distributor Roads - Option 3

Town of Victoria Park, Traffic Calming

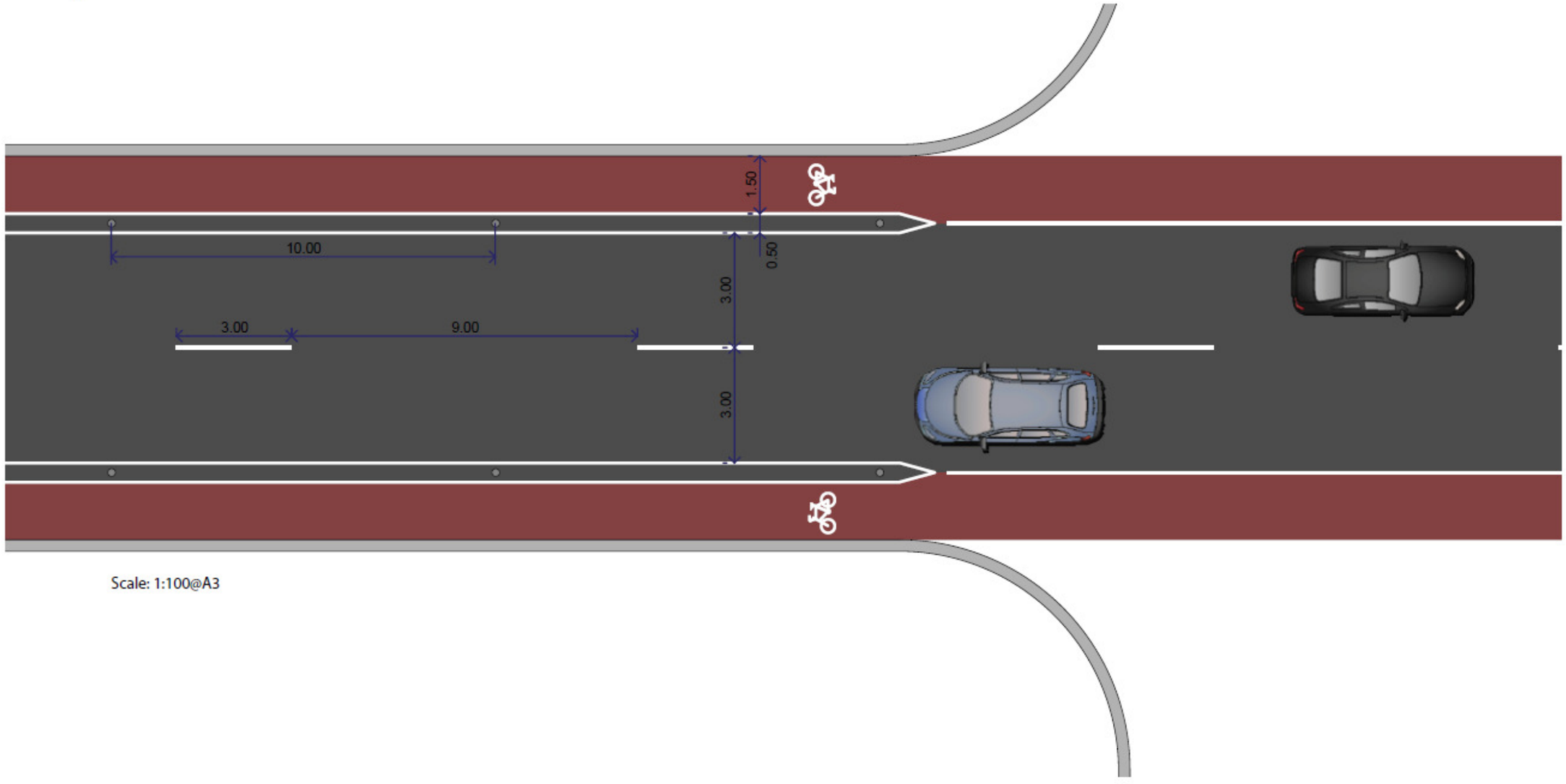
TOWN OF VICTORIA PARK

Notes:

1. Street lighting should be designed and installed in accordance with AS1158.
2. Dimensions are indicative and yet to be finalised, following vehicle swept path movements.
3. Kerbing to be semi-mountable, unless stated otherwise.
4. Flexible posts with reflective bands at 10m spacings between cycle lane and traffic lane.

Legend

- Black asphalt, existing
- Red asphalt
- Kerb
- Flexible post



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Drawing: W-P1735.00 Sheet: 007 Revision: B Date: 05/11/2014

District Distributor Roads - Option 1

Town of Victoria Park, Traffic Calming

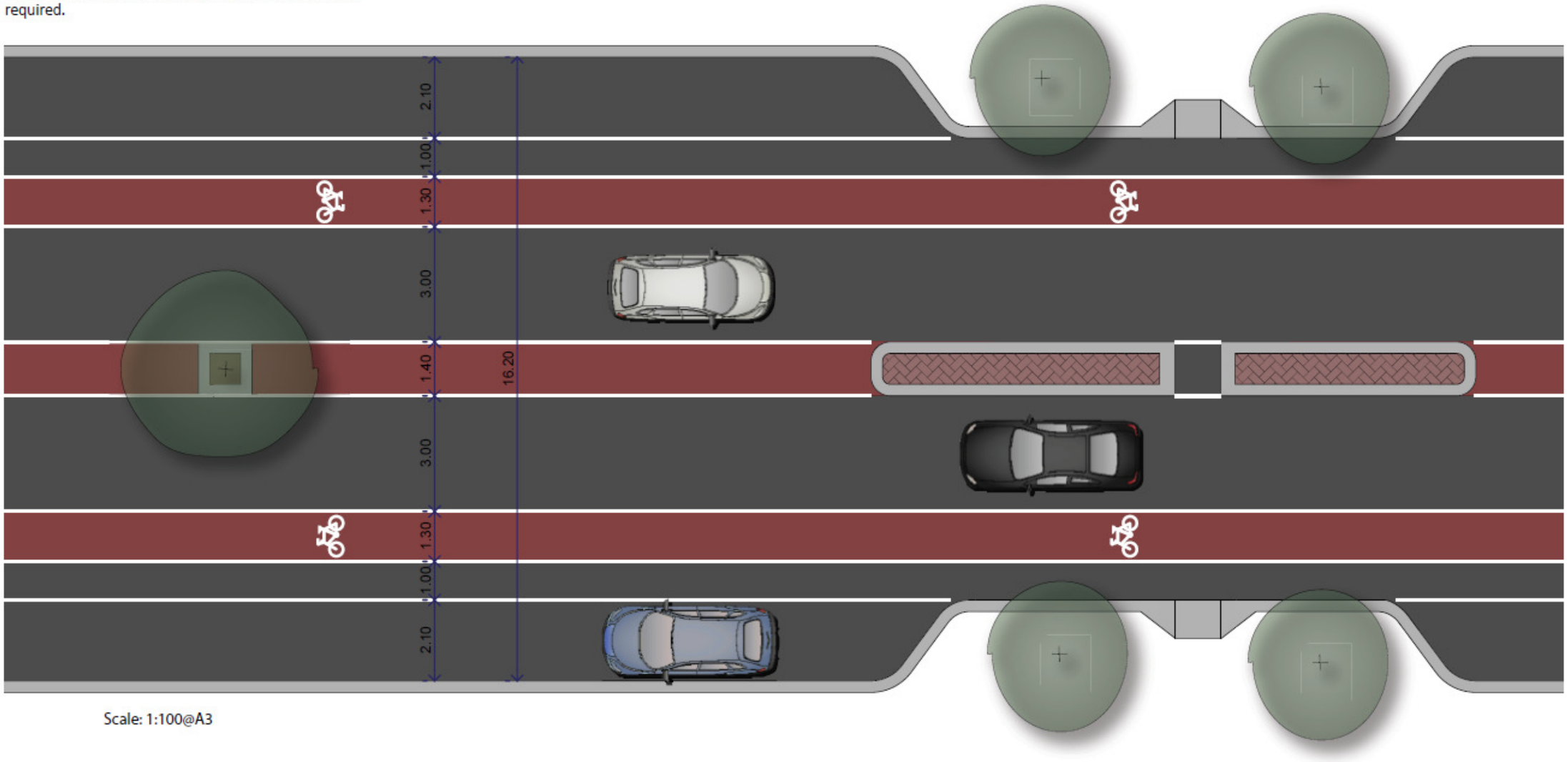
Town of Victoria Park

Notes:

1. Street lighting should be designed and installed in accordance with AS1158.
2. Dimensions are indicative and yet to be finalised, following vehicle swept path movements.
3. Kerbing to be semi-mountable, unless stated otherwise.
4. On-street parking provided.
5. Dropped kerb can be provided at kerb build-outs as required.

Legend

- Black asphalt, existing
- Red asphalt
- Kerb
- Unit paving, trafficable
- Tree with clear canopy & 100mm max dia. trunk, planted at road level
- Dropped kerb



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District Distributor Roads - Option 2

Town of Victoria Park, Traffic Calming

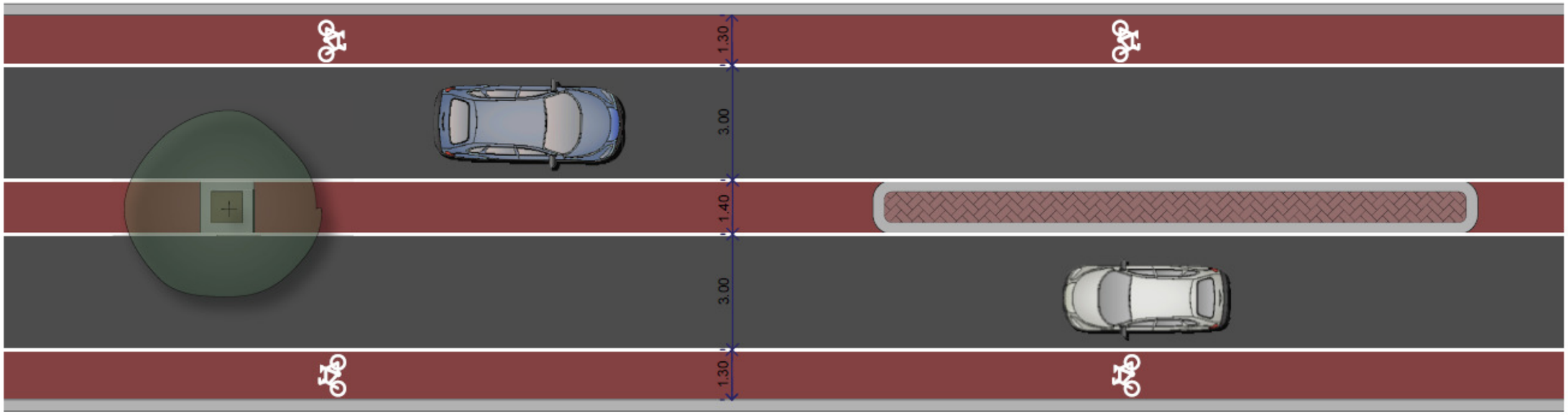
Town of Victoria Park

Notes:

1. Street lighting should be designed and installed in accordance with AS1158.
2. Dimensions are indicative and yet to be finalised, following vehicle swept path movements.
3. Kerbing to be semi-mountable, unless stated otherwise.

Legend

- Black asphalt, existing
- Red asphalt
- Kerb
- Unit paving, trafficable
- Tree with clear canopy & 100mm max dia. trunk, planted at road level



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Appendix G Cycle Facilities

G1 Types of Bicycle Facilities

There are various types of bicycle facilities including separated bicycle paths, shared paths, bicycle lanes, sealed shoulders and mixed traffic lanes (allowing cyclists to mix with vehicular traffic). Austroads[1] states that bicycle lanes are not generally required in local areas where the speed environment is low and the mixture of bicycle and vehicle traffic works well together. Figure D1 shows both traditional and more recent guidance with respect to on-road cycle facilities.

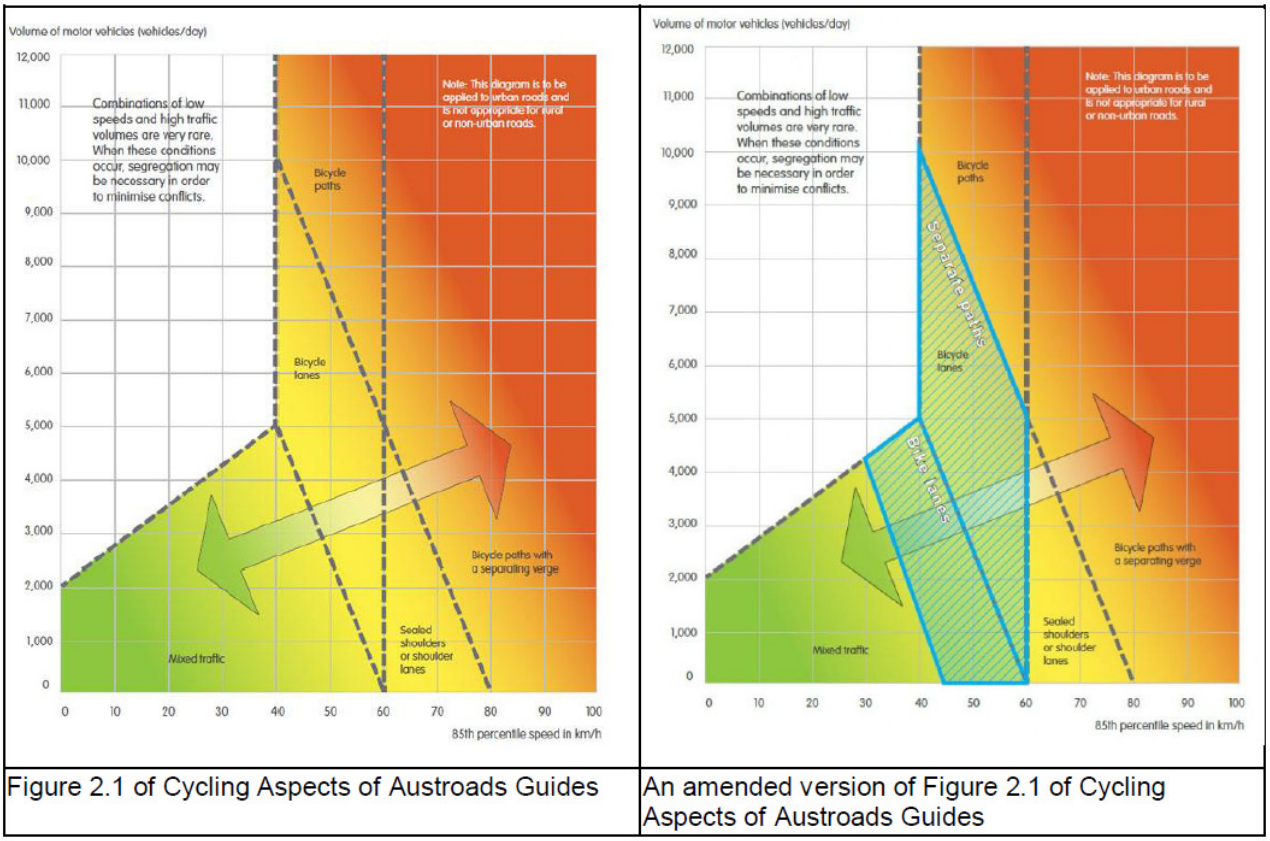


Figure D1 - Separation of Cyclists and Motor Vehicles by Speed and Volume[30]

The Austroads Guidelines also state that on-street lanes are preferred over off-road paths for cyclists (especially children) in local areas when considering potential conflict arising from vehicles turning into/out of direct access to abutting developments. However, if slow vehicular speeds (between 30-40 km/h) can't be achieved, some form of separation for cyclists may be desirable, especially if on the designated bicycle network. It is noted that this indication of low speeds is inconsistent with Figure D1 which suggests that operating speeds of up to 50 km/h maybe suitable for on-street cycling.

Further to the above, segregation from vehicular traffic can be provided for on-street cycle lanes. As part of this, either full segregation (e.g. continuous barrier/kerb) or light segregation (e.g.

[30] DoT WA. Draft Guidelines for Developing a Bicycle Plan. Rev C 26/9/14.

posts/concrete 'lacasitas' spaced appropriately) can be provided. Transport for London recommends a spacing of between 2.5m and 10m for objects used to provide light segregation[31]. This range of spacing is considered an appropriate balance between providing adequate protection for cyclists and minimal constraints for cyclists wishing to enter general traffic lanes (for instance to turn right into a side road) and pedestrians wishing to cross the road.

G2 Footpath/Shared Path and Cycle Lane Widths

Austroads[32] recommend desirable minimum widths as follows:

- Footpaths: low demand scenarios – 1.2m, to enable wheel chair users to pass – 1.5m to 1.8m.
- On-street cycle lanes: 1.5m (for posted speed limit/operating speed of 60 km/h) (excludes width of buffer area/barrier for separated on-street cycle lanes).
- Bicycle paths (exclusive use only): local access path – 2.5m, major path – 3.0m.
- Shared path: shared paths – 2.5m, commuter paths – 3.0m, recreational paths – 3.5m.

For mixed traffic lanes, Austroads[33] also recommends that lane widths should either be wide enough to allow the safe passage of a cyclist and a vehicle side by side (3.7m minimum, 4.2m desirable minimum) or narrow enough to permit the passage of a vehicle or bicycle only (3.0m or less). Widths in between these two extremes have been identified to create squeeze points potentially leading to conflicts.

G3 Other Considerations

With respect to LATM schemes, Austroads[3] recommends the consideration of the following factors for improved cyclist safety and continuity:

- Separation from vehicular traffic is more critical at intersections and at devices that deflect the travel path (e.g. slow points) than at mid-block locations.
- Provide bicycle bypasses through LATM devices where:
  - » Closely spaced devices could detract from the attractiveness of the route for cyclists;
  - » There is significant differential speeds between vehicles and bicycles; and
  - » It is desirable to separate cyclists form other traffic and where cycling needs to be encouraged.
- Ensure surfaces for cyclists are smooth and free of irregularities that would affect the stability of cyclists.
- Provide adequate street lighting.

[31] The London Cycling Design Standards Consultation Draft document, Transport for London (2014)
[32] Austroads Guide to Road Design Part 6A: Pedestrian and Cyclist Paths (2008)
[33] Cycling Aspects of Austroads Guidelines (2014)

- Exempt cyclists from road closures/turning restrictions to enhance the connectivity and permeability through the network as appropriate (need to be considered on a case by case basis).

It should be noted that although traffic calming should help reduce vehicular traffic speeds and hence improve cyclist safety, traffic calming (where dedicated cyclist bypasses/facilities have not been provided) may impact on the level of service provided to cyclists:

- Vertical/horizontal deflection is undesirable from a cyclist comfort/manoeuvrability perspective.

- Reduced cyclist speeds (resulting from traffic calming) is likely to discourage cyclists from using the road.

Appendix H On-Line Survey Questionnaire

Lathlain Local Area Traffic Management Consultation 2014

You are invited to participate in our survey as part of the Lathlain Local Area Traffic Management Study community consultation (2014). It will take approximately 5 to 10 minutes to complete the questionnaire. Your participation in this survey is completely voluntary. If you feel uncomfortable answering any questions, you can withdraw from the survey at any point. Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate.

A draft version of the Traffic Management Plan is available for viewing on the Town's website (www.victoriapark.wa.gov.au) under the "Town Projects" section of the Development tab and hard copies can be viewed at the Council Administration Centre and Council Library. It is encouraged that you view this document prior to completing this survey as it will provide context and background with regards to potential options to address the identified road safety/traffic issues.

Thank you very much for your time and support. Please start with the survey now by clicking on the Continue button below.

Demographics

What is your gender?

- ○ Male
- ○ Female

What is your age?

- ○ 0-17 years old
- ○ 18-29 years old
- ○ 30-49 years old
- ○ 50-64 years old
- ○ 65 years and over

Please provide your e-mail address (non-mandatory). If necessay, this will allow us to clarify any responses to the survey that you may have made.

Are you an owner occupier or a tenant living within Lathlain? *

- ○ Owner Occupier
- ○ Tenant
- ○ I do not live in Lathlain

Demographics

Please provide your home address including house number and street name *

Demographics

Please provide your e-mail address (non-mandatory). This will allow us to clarify any responses to the survey that you may have made if necessary.

Demographics

Are you a regular cyclist on the roads in Lathlain? *

- ○ Yes
- ○ No
- ○ Sometimes

Are you a regular pedestrian on the roads/footpaths in Lathlain? *

- ○ Yes
- ○ No
- ○ Sometimes

Are you a regular public transport user (Train/Bus) through or to/from Lathlain? *

- ○ Yes
- ○ No
- ○ Sometimes

Existing Issues

Do you have any traffic and transport issues on your street or Lathlain in general relating to: (you can tick more than one issue if required) *

- ☐ Speed/Hooning
- ☐ Traffic Volumes
- ☐ Road Safety

- ☐ Intersection Congestion
- ☐ Walking
- ☐ Cycling
- ☐ Parking
- ☐ Street Lighting
- ☐ Other
- ☐ No issues

Existing Issues

If yes, indicate location and describe issue as required.

Treatments and Types of Measures

Do you support any modifications at the Goddard Street/Streatley Road intersection? *

- ○ Yes
- ○ No
- ○ No Comment

Treatments and Types of Measures

Do you support any of the options described in the attached draft TMP (Research and Development of Concept Designs) for the Goddard Street/Streatley Road intersection? (you can tick more than one option if required)

- ☐ Option 1 - Traffic Island Extension on Goddard Street (south)
- ☐ Option 2 - Raised Median on Goddard Street (north and south)
- ☐ Option 3 - Left-In/Left-Out Restriction on Streatley Road (east)
- ☐ Option 4 - Left-In Only Restriction on Streatley Road (east)
- ☐ Option 5 - Full Road Closure on Streatley Road (east)
- ☐ Option 6 - Road Closure at Laneway between Streatley Avenue and Orrong Road
- ☐ Option 7 - Roundabout

☐ None of the above

Can you please explain why you support/do not support any of the proposed treatments at the Goddard Street/Streatley Road intersection?

Treatments and Types of Measures

Do you support any modifications at the Cornwall Street/Castle Way intersection? *

- ○ Yes
- ○ No
- ○ No Comment

Treatments and Types of Measures

Do you support any of the options described in the attached draft TMP (Research and Development of Concept Designs) for the Cornwall Street/Castle Way? (you can tick more than one option if required)

- ☐ Option 1 - Right Turn Ban
- ☐ Option 2 - Modify Priority at the Intersection
- ☐ Option 3 - Right Turn Bay
- ☐ Option 4 - Mini Roundabout
- ☐ None of the above

Can you please explain why you support/do not support any of the proposed treatments at the Cornwall Street/Castle Way intersection?

Treatments and Types of Measures

Do you support any modifications at the Roberts Road/Bishopsgate Street intersection? *

- ○ Yes
- ○ No
- ○ No Comment

Treatments and Types of Measures

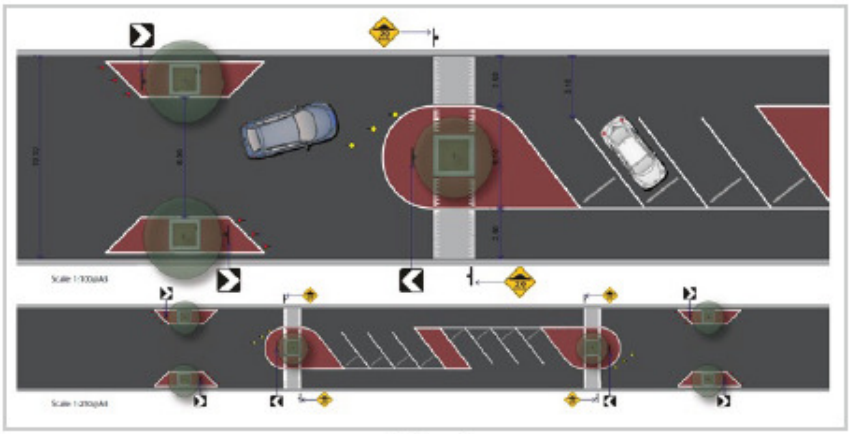
Do you support any of the options described in the attached draft TMP (Research and Development of Concept Designs) for the Roberts Road/Bishopsgate Street? (you can tick more than one option if required)

- ☐ Option 1 - Provide Pre-Deflection at the Roundabout/Improve Northbound Deflection
- ☐ Option 2 - Raised Intersection Treatment
- ☐ Option 3 - Provide Off-Street Cycle Path option on Approach to Intersection
- ☐ None of the above

Can you please explain why you support/do not support any of the proposed treatments at the Roberts Road/Bishopsgate Street intersection?

Treatments and Types of Measures

Do you support any of the proposed traffic calming concept design options for Local Access roads (e.g. Streatley Road and Enfield Street, etc.)? (you can tick more than one option if required, or none at all)



Option 1

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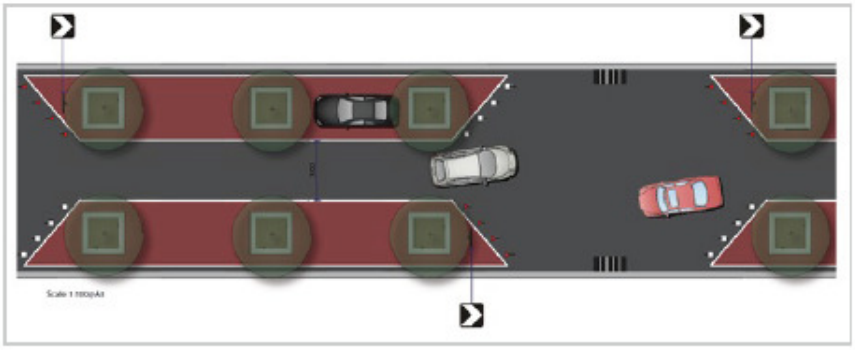

Option 2

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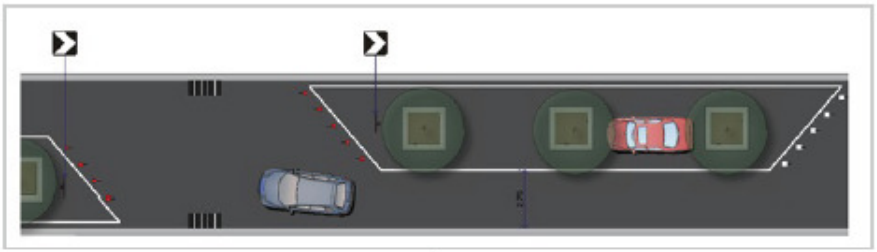


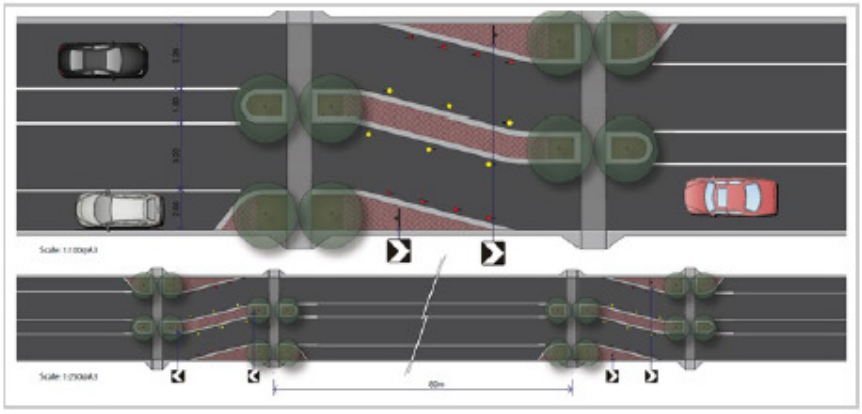
Option 3

☐

Do you have any comments with respect to any of the proposed traffic calming concept design options for Local Access Roads? Or do you have any other recommendations/options?

Treatments and Types of Measures

Do you support any of the proposed traffic calming concept design options for Local Distributor roads/Preferred Routes (e.g. Goddard Street and Rutland Avenue, etc)? (you can tick more than one option if required, or none at all)



Option 1

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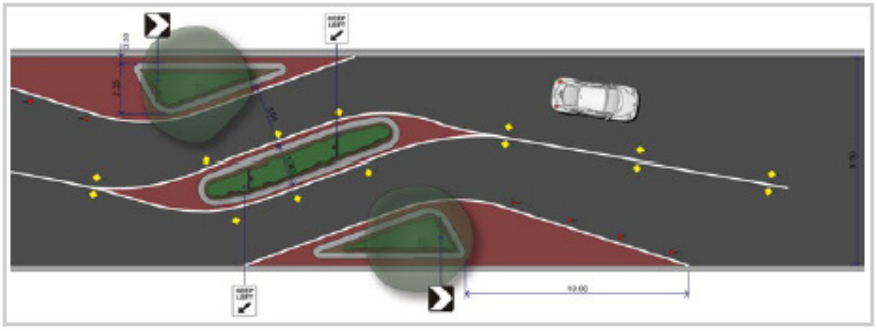

Option 2

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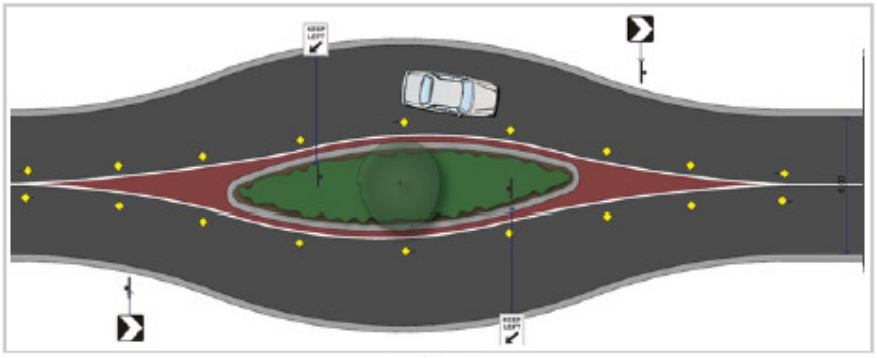


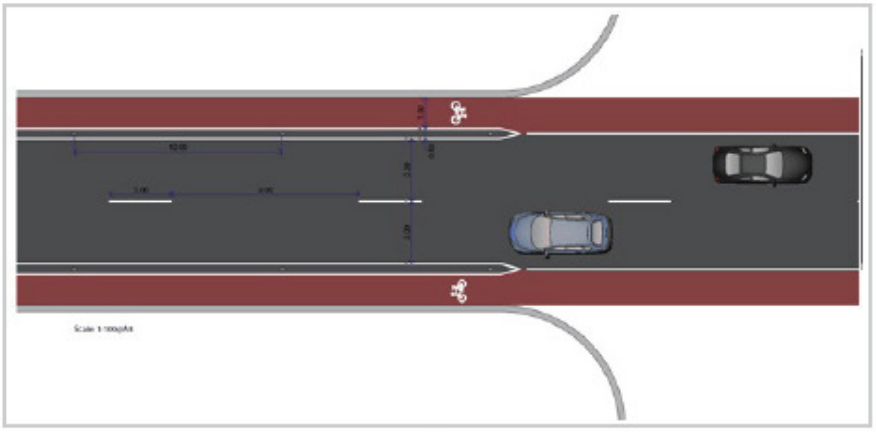
Option 3

☐

Do you have any comments with respect to any of the proposed traffic calming concept design options for Local Distributor Roads? Or do you have any other recommendations/options?

Treatments and Types of Measures

Do you support any of the proposed traffic calming concept design options for District Distributor roads (e.g. Roberts Road)? (you can tick more than one option if required, or none at all)



Option 1

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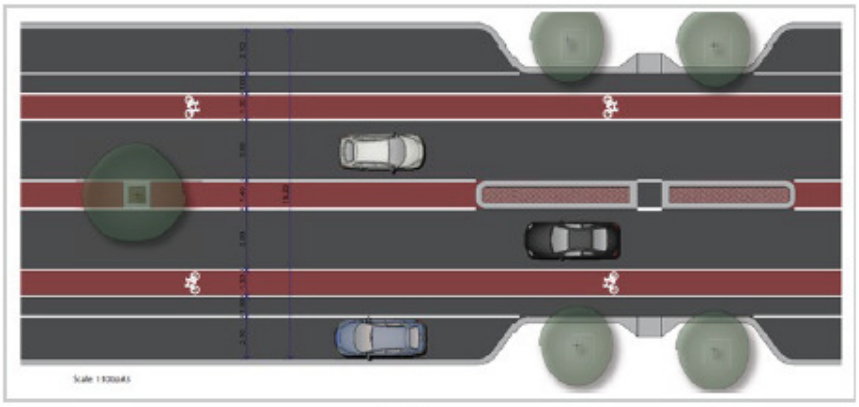

Option 2

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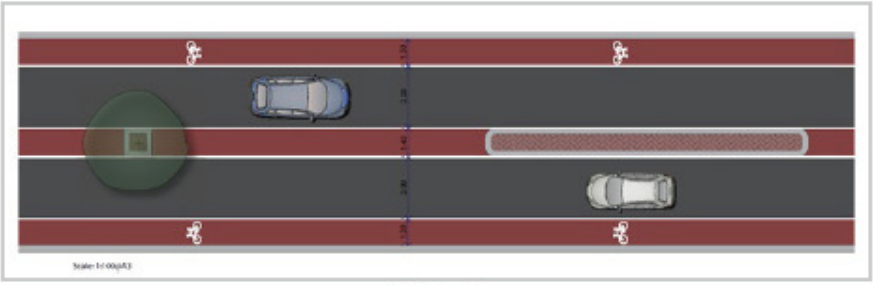


Option 3

☐

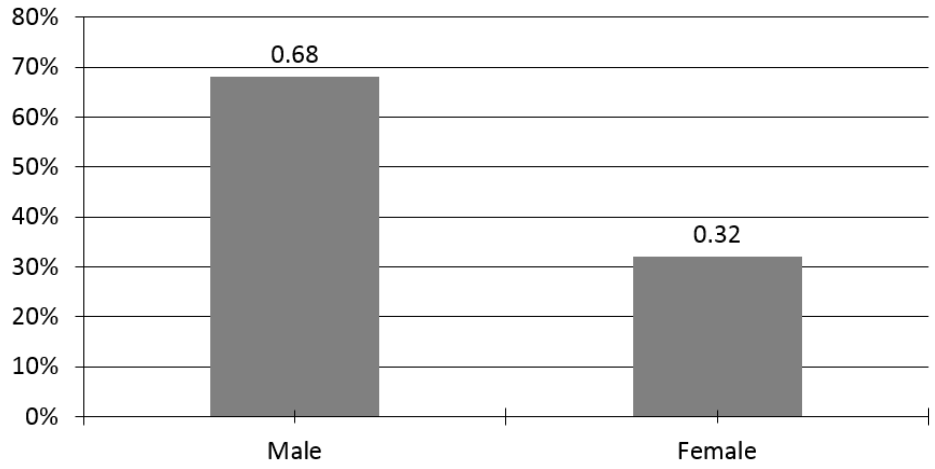
Do you have any comments with respect to any of the proposed traffic calming concept design options for District Distributor Roads? Or do you have any other recommendations/options?

Other Comments

Do you have any other comments/recommendations in general?

Appendix I On-Line Survey Graphical Results

What is your gender?



QuestionPro
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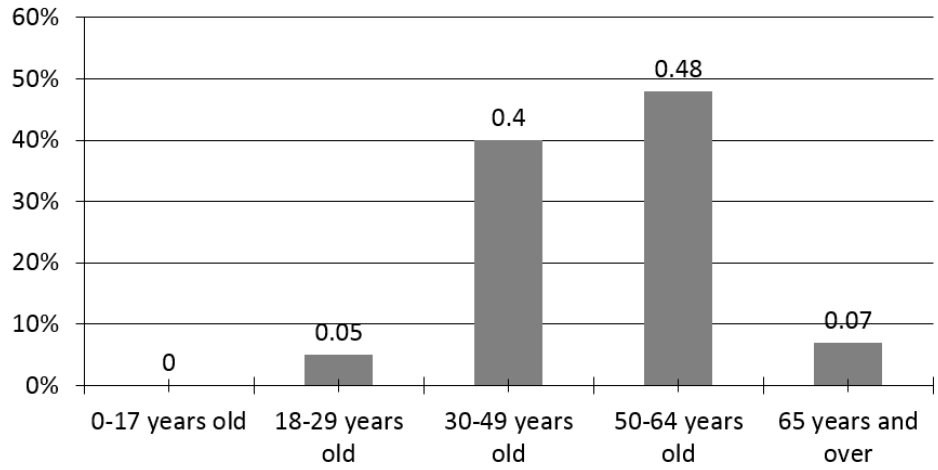
What is your age?



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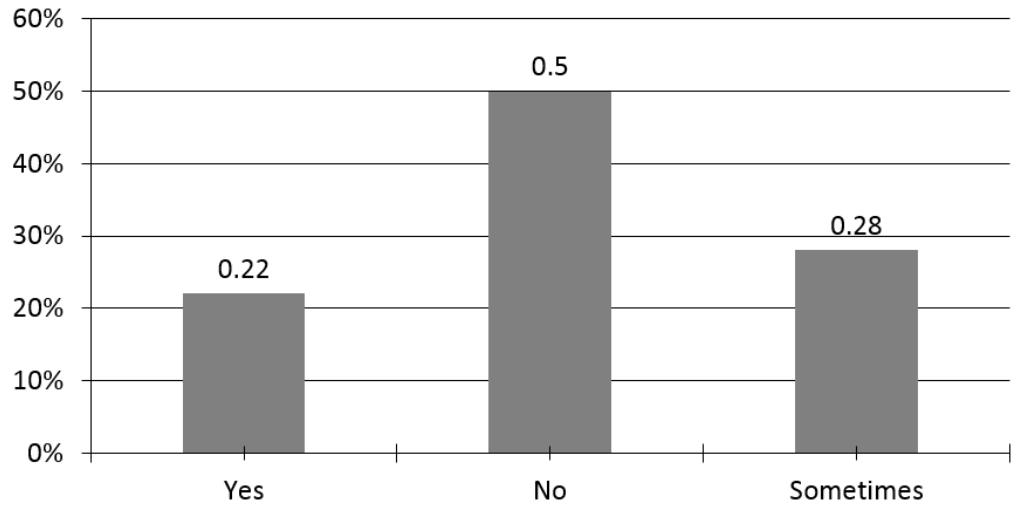
Are you a regular cyclist on the roads in Lathlain?



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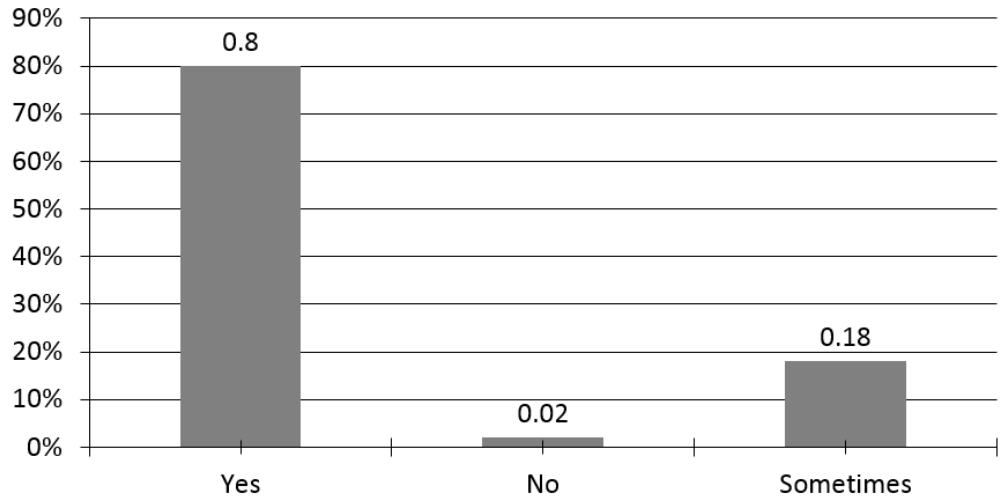
Are you a regular pedestrian on the roads/footpaths in Lathlain?



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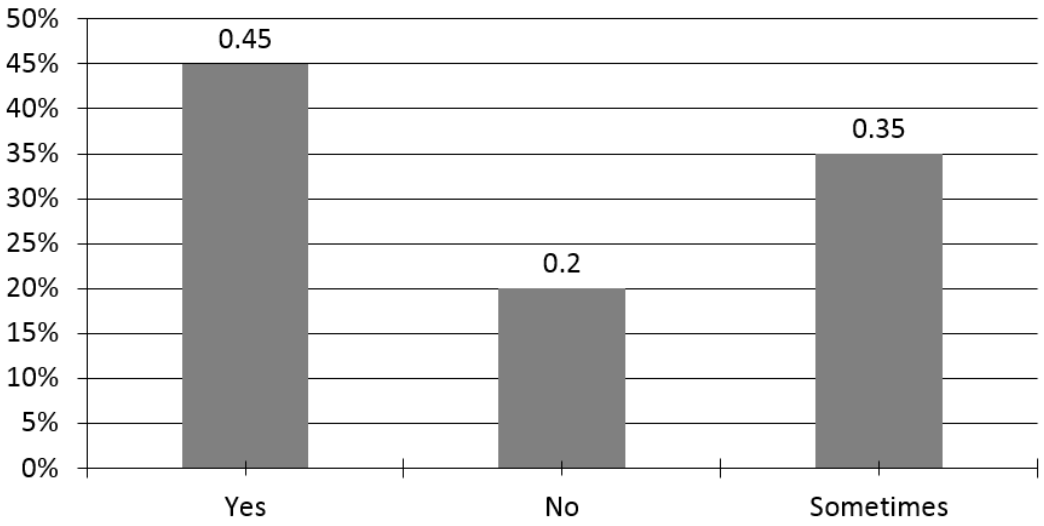
Are you a regular public transport user (Train/Bus) through or to/from Lathlain



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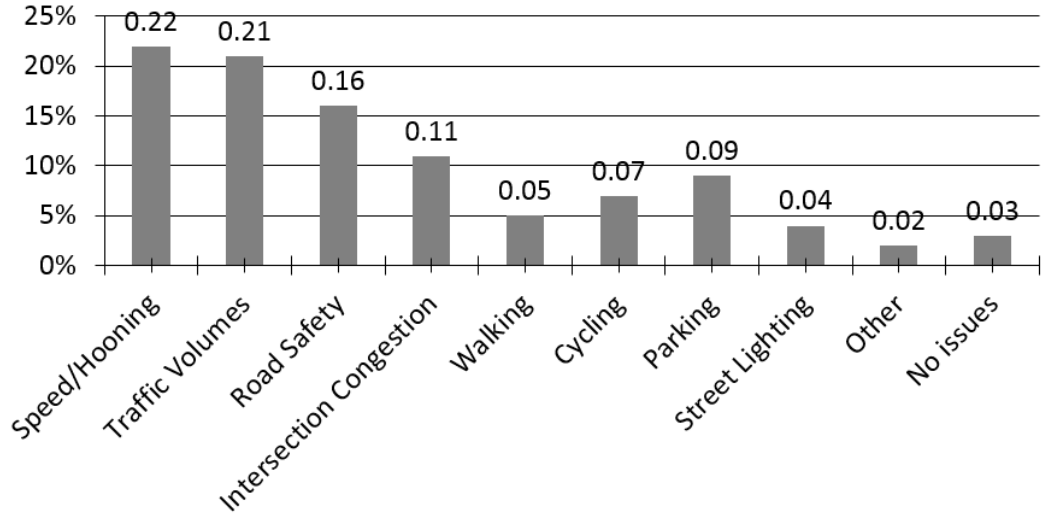
Do you have any traffic and transport issues on your street or Lathlain?



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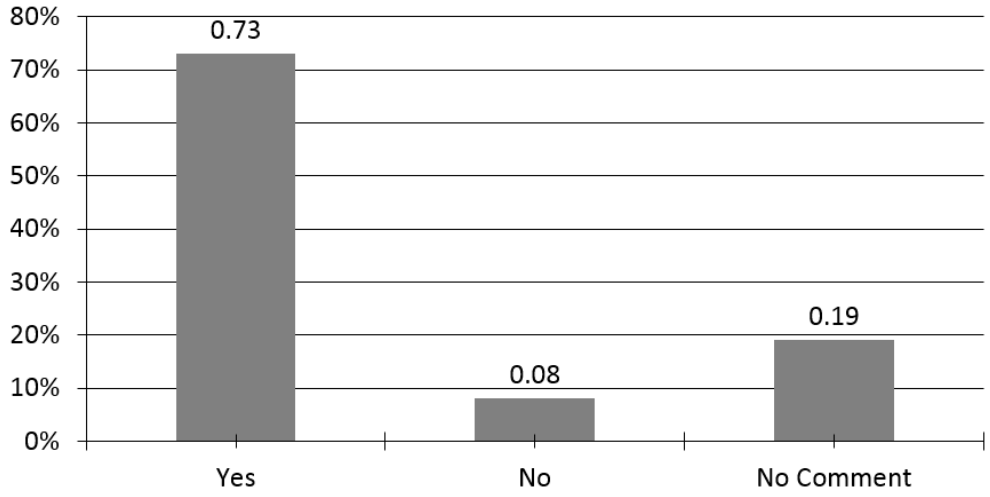
Do you support any modifications at the Goddard Street/Streatley Road Intersection



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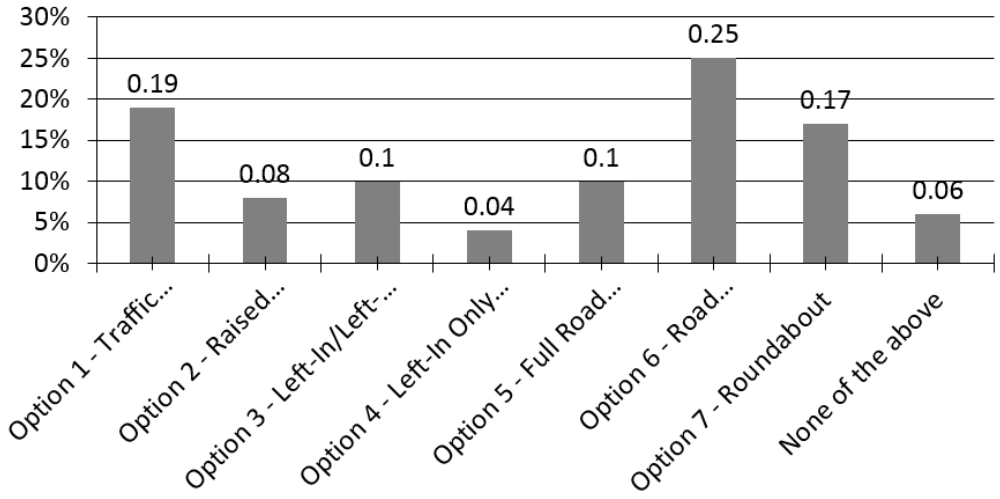
Do you support any of the options described in the attached draft TMP?



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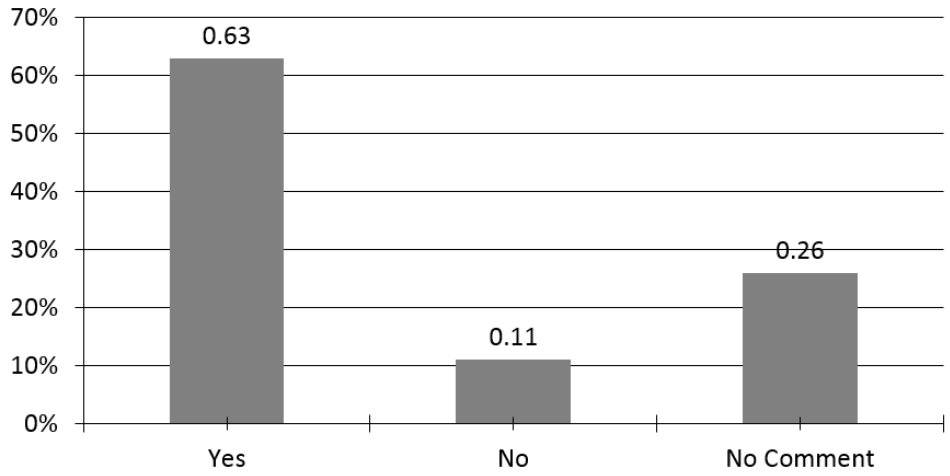
Do you support any modifications at the Cornwall Street/Castle Way Intersection



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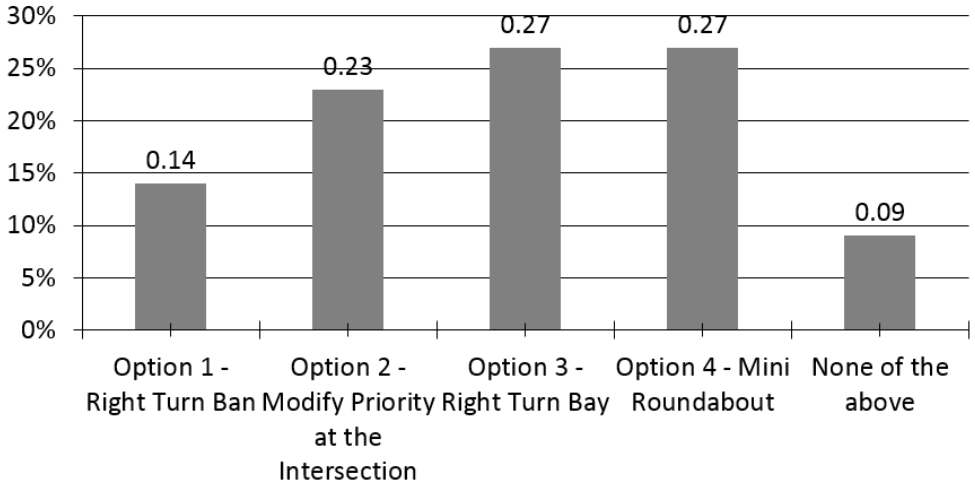
Do you support any of the options described in the attached draft TMP



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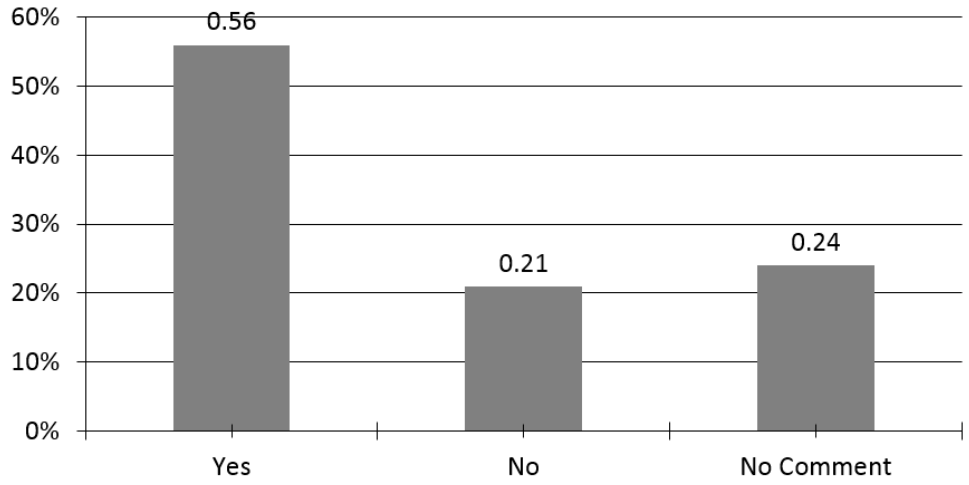
Do you support any modifications at the Roberts Road/Bishopsgate Street Intersection



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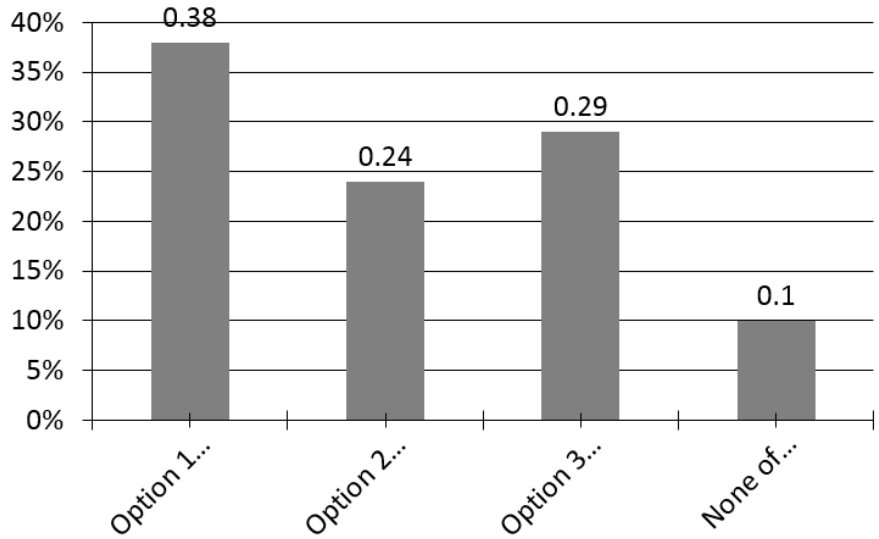
Do you support any of the options described in the attached draft TMP



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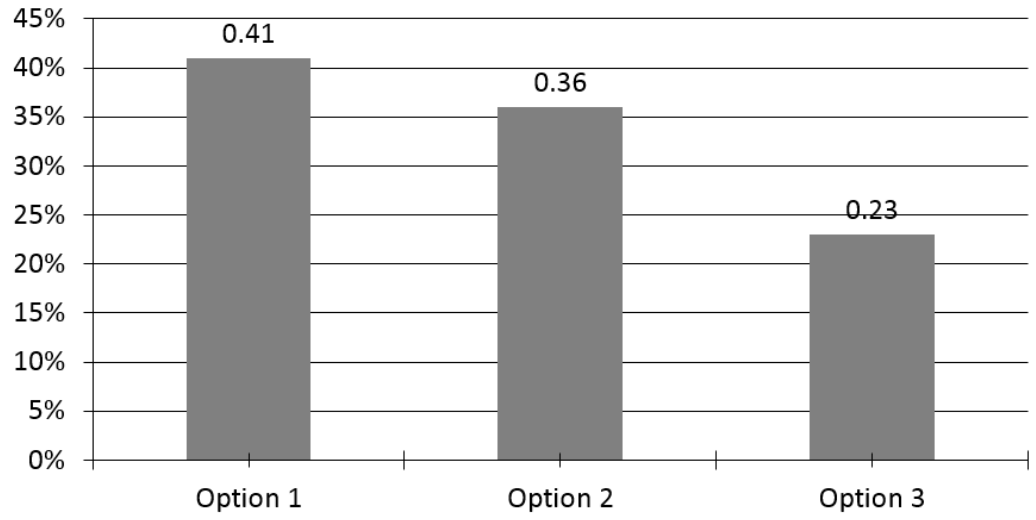
Do you support any of the proposed traffic calming concept design options for Local Access Roads



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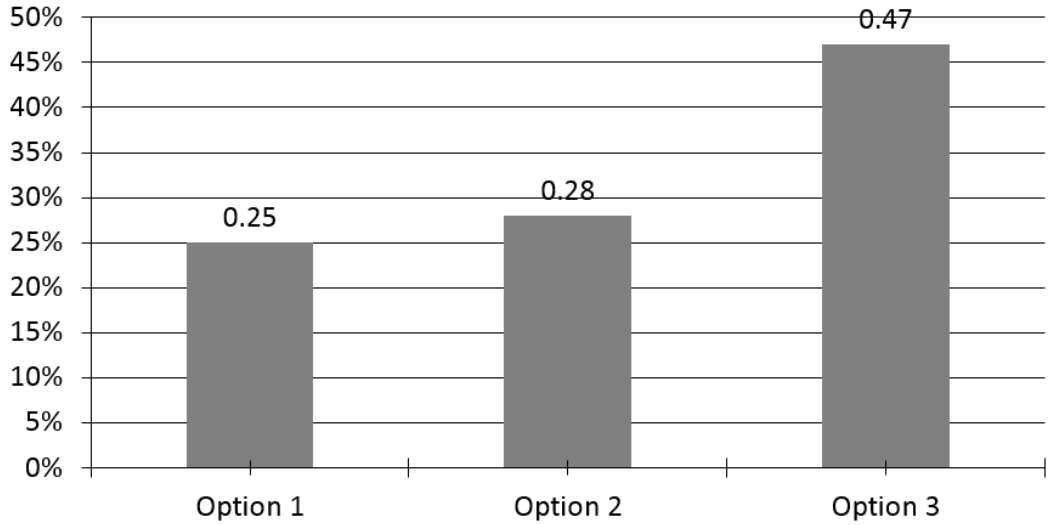
Do you support any of the proposed traffic calming concept design options for Local Distributor Roads/Preferred Routes



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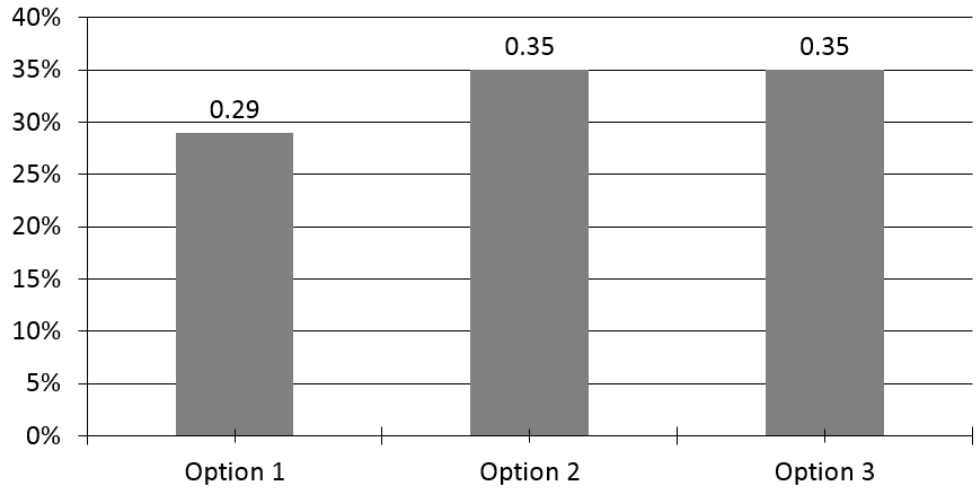
Do you support any of the proposed traffic calming concept design options for District Distributor Roads



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