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Marrickville East (Area 10)
LATM Draft Report 2016

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Executive Summary

The Marrickville East LATM study was undertaken by Marrickville Council in order to review the traffic management strategy within the precinct. This report sets out an assessment of the traffic conditions within the Marrickville East study area and includes the following:

- Road Hierarchy
- Traffic survey data (including volumes, speeds and heavy vehicle percentages)
- Crash statistics
- Intersection operation analysis
- Identification of pedestrian and cyclist improvements
- Initial community and stakeholder consultation
- Assessment of the effectiveness of the existing LATM measures
- Pubic exhibition period.
- A review of Council records including complaints and issues which have been raised since 2007.
- Existing and proposed cycle routes.
- Future land use.
- Identification of further opportunities to reduce volumes and speed of traffic on local streets to address public amenity.
- Development of concept LATM proposals.

The recommendations provided in this document aim to align with the parking management principles outlined in the Marrickville Integrated Transport Strategy (2007). The document "provides the rationale and recommended actions for addressing local transport issues and moving Marrickville toward sustainable transport – that is, reducing car use and increasing use of public transport, walking and cycling."

Community opinions were collected by a survey designed to establish what the major issues in the area were. A draft report was prepared for the consideration of Council and will be placed on public exhibition for a minimum of 28 days.

Following feedback from the community at the public exhibition, a final report will be prepared for Council's consideration.

Marrickville East intersection and midblock crash rates for the local and collector roads are lower comparing to the average metropolitan urban local and collector roads crashes. While the potential for crashes to occur in Marrickville East LATM is considered relatively low, there are pockets of areas in the study area that are worthy of further attention. A summary of recommendations to address these issues identified in the report, are outlined in Table A below.

Table A LATM Treatment Recommendations

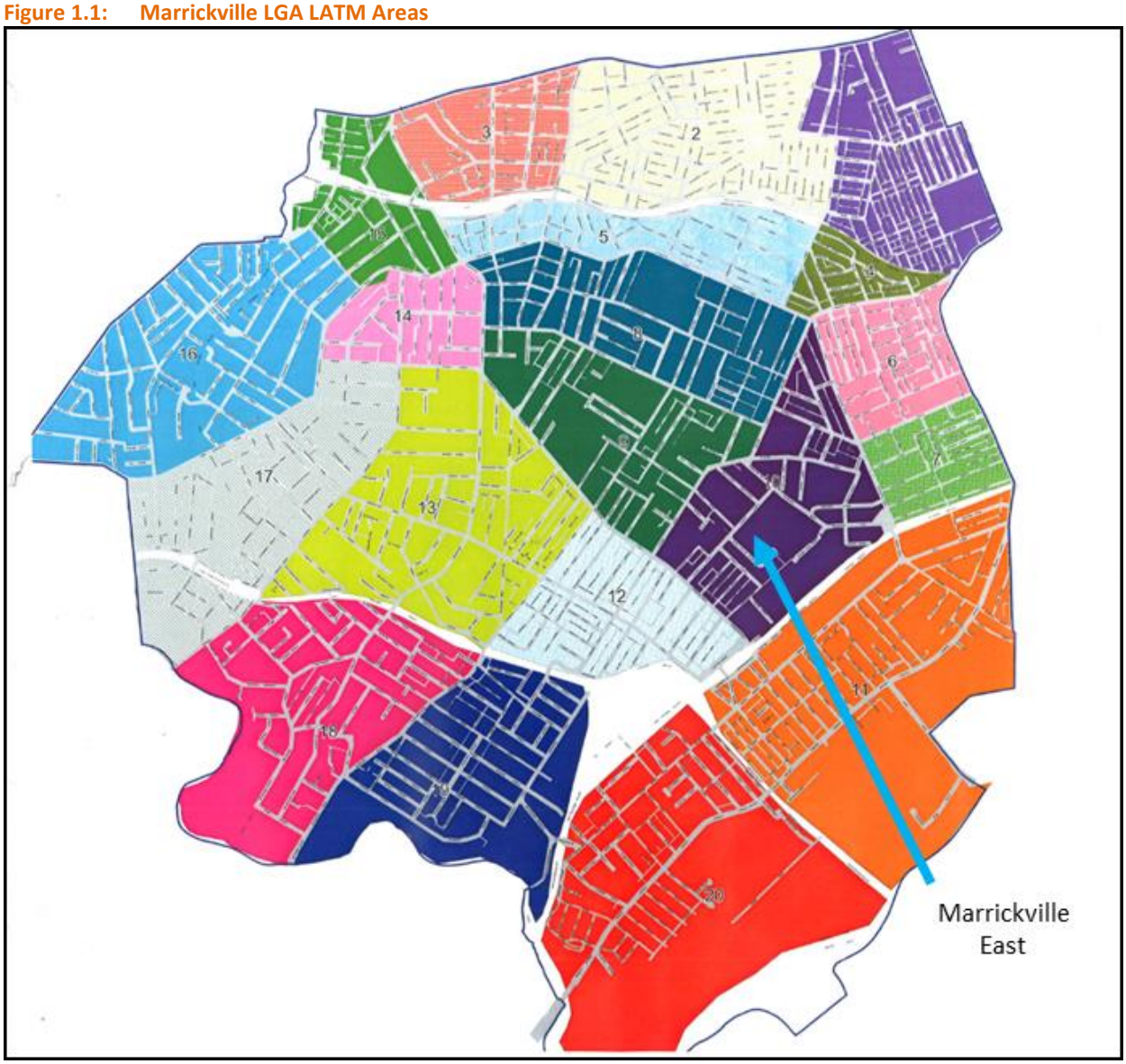
Items	Street	Section	Proposed Treatment
1	Fitzroy Street	Chapel Street to Edinburgh Road	1. Installation of marked edge line (parking lane treatment) 2. Installation of on-street bicycle symbol 3. Installation of 4 kerb blisters 4. Installation of 2 speed humps / cushion 5. Installation of BB Line
2	Fitzroy Street	Sydenham Road to Chapel Street	6. Installation of marked edge line (parking lane treatment) 7. Installation of on-street bicycle symbol 8. Installation of 6 kerb blisters 9. Installation of 3 speed humps / cushion 10. Installation of BB Line 11. Installation of kerb blisters at the corner of Sydenham Rd 12. Set back existing pedestrian crossing at Sydenham Rd 13. Installation of Give-way sign and associated line marking at Fitzroy Street.
3	Edinburgh Road	Fitzroy Street to Murray Street	14. Installation of marked edge line (parking lane treatment) 15. Installation of on-street bicycle symbol 16. Installation of 4 kerb blisters 17. Installation of2 speed humps / cushion 18. Extension of existing BB Line
4	Llewellyn Street	Enmore Road to Edgeware Road	19. Installation of 4 kerb blisters 20. Installation of2 speed humps / cushion 21. Installation of pedestrian refuge
5	Victoria Rd – Bourne St, Black St and Leicester St	Junctions	22. Installation of 4 kerb extensions at Victoria Rd/Black St/Bourne St intersection with access ramps. 23. Installation of 3 kerb extension at Leicester St/Victoria intersection. 24. Installation of Refuge Island on Victoria Rd to the west of Leicester St. 25. Installation of Bicycle Symbols
6	Fitzroy St / Edinburgh Rd	roundabout	26. Installation of cyclist facilities in the roundabout 27. Installation of Bicycle Symbols
7	Francis Street	Lynch Avenue to Enmore Road	28. Installation of street signs to change Francis street from two way to one way Northbound 29. Extension of existing BB line to prevent right turn from Enmore Road to Francis Street
8	Juliett Street	Scouller St to Enmore Rd	30. Re-paint the parking bay delineation
9	Lynch Avenue / Edgeware Road	Junction	31. Installation of Keep Clear sign 32. Installation of “Do not queue across intersection” street sign
10	Shelleys Ln/ Llewellyn St	Junction	33. Installation of pedestrian Threshold 34. Installation of Give way sign 35. Installation of “ Look” signs
11	Black Street	Victoria Rd to Llewellyn St	36. Installation of pedestrian refuges 37. Installation of kerb blisters
12	Juliett St with and including Lynch Ave	Llewellyn St to Lynch Ave	38. Installation of Bicycle symbols
13	Victoria Rd	At Edgeware Rd	39. Installation of kerb extension on Victoria Road 40. Modification of existing centre median
14	Sydenham Rd, Shirlow St, Sydney Steel St, Edinburgh Rd, Smidmore St	various	41. Installation of bicycle symbols 42. Installation of “ shared path” sign 43. Installation of bicycle warning sign

1 Introduction

1.1 Marrickville LATM Background

Marrickville Council has established Local Area Traffic Management (LATM) schemes in 20 local precincts since 1990. The 'Marrickville East' LATM study was originally completed in the 1990s and reviewed in the 2002/2003 financial year. In 2013-14, Council was again reviewing the scheme in the 'Marrickville East' area. The breakdown of the LATM study areas in Marrickville Council, are identified in Figure 1.1: Marrickville LGA LATM Areas below.

Figure 1.1: Marrickville LGA LATM Areas



1.2 Study Background

This report sets out an assessment of the traffic conditions within the Marrickville East study area and includes the following:

- Road Hierarchy
- Traffic survey data (including volumes, speeds and heavy vehicle percentages)

- Crash statistics
- Intersection operation analysis
- Identification of pedestrian and cyclist improvements
- Initial community and stakeholder consultation
- Assessment of the effectiveness of the existing LATM measures
- Public exhibition period.
- A review of Council records including complaints and issues which have been raised since 2007.
- Existing and proposed cycle routes.
- Future land use.
- Identification of further opportunities to reduce volumes and speed of traffic on local streets to address public amenity.
- Development of concept LATM proposals.

1.3 Referenced Documents

In preparing this report, reference has been made to a number of background documents, including:

- Austroads Guide to Traffic Engineering Practice Part 8 - Local Area Traffic Management, 2008
- Manual of Uniform Traffic Control Devices, Part 13: Local Area Traffic Management 2003 Edition. Queensland Government Department of Main Roads
- RTA (Roads and Traffic Authority) Road Design Guide - Note: now RMS
- RTA-Technical Directions (Various) - Note: now RMS
- Marrickville Council Reports including those from the Land Use, Assets and Corporate Committee.
- Marrickville Local Environment Plan 2011
- Marrickville Development Control Plan 2011
- Marrickville Council Development Control Plan
- Marrickville Bicycle strategy August 2007
- Marrickville Pedestrian Access and Mobility Plan (ARUP 2009)
- Marrickville Public Domain Masterplan Design Presentation for Dulwich Hill railway station, Marrickville railway station and Illawarra Road Precincts (EP 2012)
- Marrickville Strategy for a Water Sensitive Community, 2012
- Marrickville Town Centre Parking Strategy (GTA 2013)
- Proposed Expansion of Marrickville Metro Shopping Centre Preferred Project Report on Transport Aspects, Halcrow, November 2010.
- Marrickville Council's Independent Review of the Marrickville Metro TMAP, Transport & Urban Planning (TUP), August 2010.
- Several inspections of the study area and surrounds.
- Proposed Redevelopment of the Marrickville Metro Shopping Centre Review of Traffic Management and & Accessibility Plan, Gennaoui Consulting Pty Ltd, October 2011.
- Review of TMAP and Traffic and Parking Study for Expansion of Marrickville Metro Shopping Centre at 34 Victoria Road Marrickville Transport & Urban Planning (TUP) August 2010.
- Connecting MARRICKVILLE, Connecting streetscape planning and delivery with places and people. Project Overview and Draft Action Plan, June 2013.
- RTA Guide to Traffic Generating Developments, 2002.

A review of the Austroads Guide to Traffic Engineering – Part 8 for Local Area Traffic Management was undertaken. The following information from Austroads describes the purpose of a LATM.

2 Study Background

2.1 What is Local Area Traffic Management (LATM)

Local Area Traffic Management is concerned with the planning and management of the usage of road space within a local traffic area, often to modify streets and street 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. LATM can be seen as a tool of traffic calming at the local level (Brindle 1991; O'Brien and Brindle 1999 p. 259). It involves the use of physical devices, street scaping treatments and other measures (including regulations and other non-physical measures) to influence vehicle operation, in order to create safer and more pleasant streets in local areas.

For the purpose of distinguishing between LATM and other aspects of traffic management, a 'local (traffic) area' is an area containing only local streets and collector roads, and is usually bounded by arterial roads or other roads serving a significant road transportation function, or other physical barriers such as creeks, railways, reserves or impassable terrain.

LATM is essentially system-based and area-wide. It considers neighbourhood traffic-related problems and their proposed solutions in the context of the local area or a group of streets within it, rather than only at isolated locations. In addition, it requires that physical traffic measures be seen as a sequence of interrelated devices rather than individual treatments. Much of the material in the Austroads Guide to Traffic Engineering – Part 8, will assist practitioners in selecting and implementing single countermeasures at isolated sites, where there are localised problems needing spot treatment. Many street closures, channelisation and small roundabouts, for example, are valid stand-alone treatments at problem intersections. However, the installation of such isolated measures is not truly 'local area traffic management', and practitioners will need to be alert to the potential problems of isolated speed management devices.

2.2 Identifying the Cause of Traffic Related Problems

Identifying the root causes of traffic problems in neighbourhoods can often provide pointers to appropriate solutions. In broad terms, problems usually arise because of the quantity of traffic, its speed, or other characteristics of the network that lead directly to higher crash rates and reduced amenity. These in turn are created, at least in part, by the planning and design features of the local network. In summary, inspection of the causes of traffic problems over the past 30 years or so in Australia and New Zealand has led to the following principles for local planning and minor street network management:

To reduce vehicle speeds:

- shorten forward sightlines and enclose the driver's field of vision, by tree planting and other means
- keep street section lengths (i.e. between slow or near-stop conditions) below 200-250m
- reduce the available street width and/or introduce deflections in the vehicle path, while maintaining the margin of safety
- Ensure that there is a traffic route within 400-500m of each local street.

To minimise traffic levels and intruding traffic in a local street:

- Maintain the level of traffic service on adjacent arterials to reduce 'rat-running'
- Increase the lengths (time and distance) of paths through the local street network to reduce their connectivity between points on the arterial road network
- Direct local traffic onto those streets most able to accommodate it. Neighbourhoods with high internal connectivity (that is, grid-based systems showing network redundancy with many alternative and direct paths for trips within the local area) may actually increase the average exposure to traffic for each household
- Provide closer spacing of traffic routes at network planning and subdivision approval stages, including the provision of supplementary traffic routes within large subdivisions. This will avoid the creation of large districts with high levels of internal traffic, and the misuse of local streets as substitutes for missing links in the traffic route network
- Consider traffic impacts at the land use approval stage. Traffic generators should be carefully located so that they do not create additional pressure on the local network.

Changes to the local street system, LATM provisions, and the provision of other modes such as cycling and walking and other travel demand measures might be considered as conditions for planning approval.

To minimise crash risk (in addition to the above):

- Limit the number of local street intersections and junctions. Within reason, fewer intersections mean fewer crashes
- Limit the number of cross-intersections, and include roundabouts or other passive controls where cross-intersections are unavoidable. Note that Stop or Give Way signs may improve cross-intersection safety but still have higher risk
- Limit the number of major-minor road connections
- Minimise the percentage of dwellings with their frontage to connective roads
- Protect or manage parking on distributor roads and other connective streets.

2.3 LATM Scheme in Marrickville

For over 25 years, Council has been 'traffic calming' local roads via Local Area Traffic Management (LATM) schemes. The purpose of traffic calming is to discourage excessive traffic volumes and speeds on local roads, thereby improving residential amenity and safety. Council's existing schemes have played a part in minimising the impact of freight and other traffic on local streets.

In relation to the plan to be developed, analysis should take place on (but is not limited to) the following data:

- Road hierarchy.
- Traffic survey data (including volumes, speeds and heavy vehicle percentages).
- Crash statistics.
- Intersection operation analysis.
- Identification of pedestrian and cyclist improvements.
- Community feedback.
- Future land use.

From the analysis of the data, issues will be identified (but not limited to) the following means:

- Consideration of locations with high numbers of accidents.
- Consideration of residential streets carrying excessive traffic volumes.
- Consideration of residential streets carrying excessive heavy vehicle volumes.
- Consideration of streets where traffic speeds are excessive.
- Consideration of streets where there is a need and opportunity to improve amenity.

Consideration of the impacts of proposed developments and the changes that can be forecast as a result of the new Marrickville LEP-2011 in relation to traffic generation, including quantifying and distributing traffic generation through the road network within the study area using simple modelling methods.

The recommendations provided in this document aim to align with the parking management principles outlined in the Marrickville Integrated Transport Strategy (2007). The document "provides the rationale and recommended actions for addressing local transport issues and moving Marrickville toward sustainable transport – that is, reducing car use and increasing use of public transport, walking and cycling."

In developing recommendations in LATM strategy, consideration must not only be given to minimising vehicle speed, traffic volumes and reducing crash rates, but consideration must also be given to incorporate the following principles of Local Area Traffic Management:

- Reducing car use
- Increasing use of public transport,
- Increasing walking and cycling.
- Improving the streetscape.

2.4 Connecting Marrickville Principles

Connecting Marrickville (CM) is about delivering the Vision outlined in the Marrickville Community Strategic Plan (CSP) – Our Place Our Vision 2023. Key outcomes identified in the CSP that are relevant to the LATM include that:

1. Marrickville's roads are safer and less congested
2. Marrickville's streets, lanes and public spaces are sustainable, welcoming, accessible and clean
3. The community walks, ride bikes and use public transport
4. CM is about designing and delivering a new way of planning for works infrastructure, programs and service and provide for:
    - Streets and lanes are better places to live now and into the future
    - People are connected to place and places with people
    - Infrastructure is integrated across program areas – footpaths, water sensitive urban design, local area traffic management, public art and interpretation, biodiversity, street trees, accessibility, cycle-ways, bus stops, roads, and lanes.

The objectives from CM are to:

- Develop and trial a new way of planning, designing and delivering Council's infrastructure programs, across Council and with the community to deliver place-based plans, infrastructure and services.

- Adopt an action learning / applied research approach and monitor results
- Increase the capacity of staff to connect with local communities and their place
- New way of planning - a collaborative planning process based on local places that leads to the delivery (design and construction) of integrated multifunctional infrastructure and integrated programs and services

Our Place Our Vision

Adopting a locally focused place-based collaborative planning approach means we will:

1. Improve connectedness,
2. Build trust,
3. Make better decisions,
4. Maximise public value,
5. Deliver the full story,
6. Increase effectiveness.

In order to address the above objectives, Council has developed and been trialling a new approach to planning that adopts a local place as the planning unit. The trial is to assess the effectiveness of a place-based approach to planning, design and delivery of capital works, programs and services to achieve multi-functional infrastructure.

Most importantly, the LATM meets the goals of the Connecting Marrickville program, an integrated streetscape and footpath program that take a more holistic approach to infrastructure project planning. The Connecting Marrickville program brings together the Marrickville Community Vision from the Community Strategic Plan, all Council's strategies that impact on streetscapes, plus other studies, plans and masterplans into a new way of planning, designing and delivering infrastructure, services and programs for places. Connecting Marrickville is more about place making than just capital projects. It is about connecting the community, connecting places and connecting various sections of Council. The Marrickville East LATM provides an opportunity to demonstrate an integrated approach to place making.

2.5 Stages of a LATM Study

The general stages of preparing to undertake a LATM study are described below:

Stage 1: Initiating a LATM program

- Decide that action is needed
- Define study area, precincts and functional hierarchy of roads
- Develop study plan, including type treatments and study costs
- Develop engagement strategy
- Council decision.

Stage 2: Data collection and problem identification

- Define and collect required data
- Identify problems
- Identify potential solutions
- Define and confirm objectives.

Stage 3: Development of 'Draft' plans

- Clarify suitable strategies (including confirmation of LATM as an appropriate response)
- Develop outline concept schemes
- Council decision to place on Public Exhibition

Stage 4: Public exhibition

- Consult on draft concept plans
- Assess and refine alternatives
- Select, present to council for adoption.

Stage 5: Scheme design

- Location and design of treatments
- Consult with nearby owners/occupiers
- Select, present to council for adoption.

Stage 6: Implementation

- Confirm timing and staging
- Conduct additional 'before' studies as required
- Community information
- Place on public exhibition, providing a minimum 28 days for submissions
- Construct/install.

Stage 7: Monitoring and review

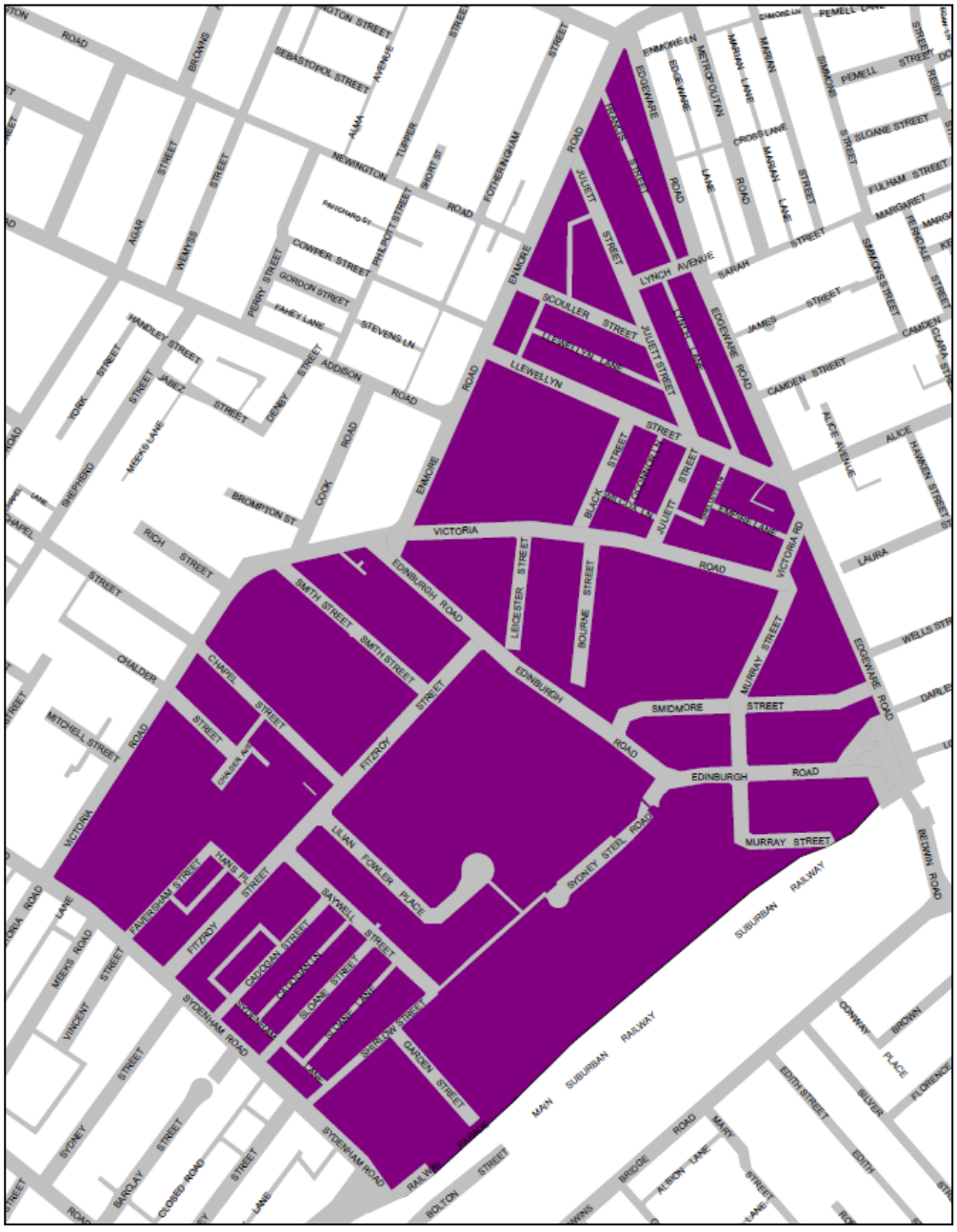
- 'After' data collection, observation and reports
- Identify unanticipated impacts or outcomes
- Review technical and community assessment of scheme
- Revise if needed
- Record and report process and outcomes.

3 Existing Condition Assessment

3.1 Study Area

The Marrickville East study area is bounded by Victoria and Enmore Road to the north-west, Sydenham Road to the south-west, Illawarra railway line to the south-east and Edgeware Road to the east. The study area is located to the eastern area of the Marrickville Local Government Area (LGA) and the Marrickville Town Centre. The location of the study area and the surrounding environs is shown in Figure 3.1.

Figure 3.1: Study Area and its Environs



It is noted that more than 50% of the study area is classified as industrial land use, primarily in the southern area with the area in the north (primarily north of Victoria Road) being residential in use.

3.2 Area Demographics

The 2011 Journey to Work data was examined to identify travel trends within the Marrickville East study area. The results are summarised in **Error! Reference source not found.** and Figure 3.3 below.

Figure 3.2: Journey to Work Data – Destinations to Marrickville East

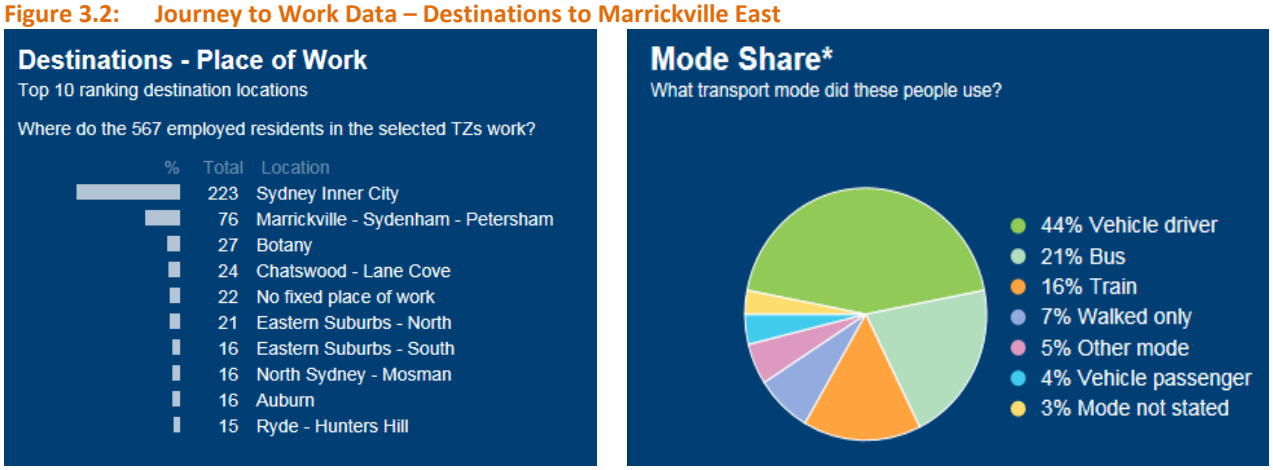
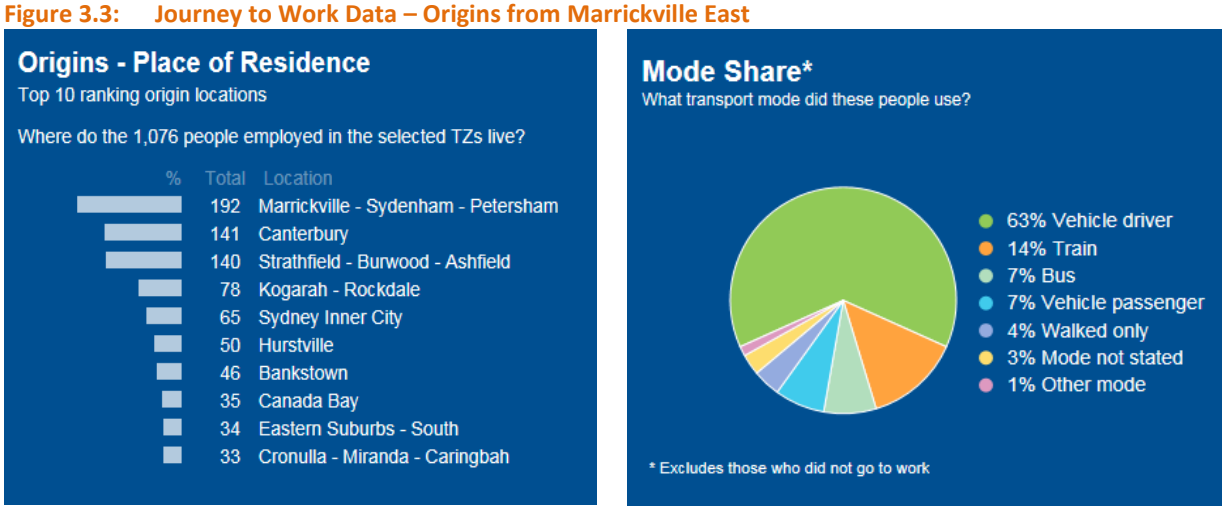


Figure 3.3: Journey to Work Data – Origins from Marrickville East



Source: Bureau of Transport Statistics – Journey to Work Data

The results shows that the majority of the 567 employed residents of the area, travel to Sydney /Inner City (39%) followed by Marrickville/Sydenham/Petersham (13%). Approximately 44% travelled from Marrickville East to work by car, either as the driver or passenger, 21 % of people travelled by bus while 16% travelled by train. The 2011 Journey to Work data shows that 1,067 people travel to the study area for work. The majority of employed people travel from Marrickville/Sydenham/Petersham (18%) followed by Canterbury (13%). Approximately 63% travelled to work by car, either as the driver or passenger, 14 % of people travelled by train while 7% travelled by bus.

The combination of the trend to work outside the study area and the high use of the passenger vehicle means that traffic volumes on the roads in the study area peak in the AM and PM in response to the journey to work activity.

People's willingness to travel by car, especially to work, through the Marrickville East precinct and between adjoining precincts, has the potential to cause friction as the local road network struggles to accommodate user needs without significantly impacting upon the security, road user safety and local area amenity.

3.3 Road Hierarchy

The RTA (Roads and Traffic Authority) Road Design Guide states that the purpose of a functional road hierarchy is to establish a logical integrated network in which roads of similar functional classifications:

- Provided with the same general level of traffic service with regards to trip purpose, traffic composition, capacity and operational speed
- Designed, constructed and maintained to the same general level of structure with regard to alignment, cross section, pavement strength and access control
- Assigned to the appropriate administrative control.

This classification includes arterial, sub-arterial, collector and local roads. Together the roads make up a road network. The functional road classifications in NSW are:

- State/Arterial – Predominantly carry through traffic from one region to another, forming principle avenues of communication for urban traffic movements. These roads are controlled by state government authorities
- Regional/Sub-Arterial – Connects the arterial road to areas of development and carry traffic directly from one part of the region to another. They may also relieve traffic on arterial roads in some circumstances. These roads are often controlled by state government authorities
- Collector – Connects the sub-arterial roads to the local road system in developed area and are generally controlled by local government authorities
- Local – The sub-divisional roads within a particular developed area. These are used solely as local access roads. These roads are generally controlled by local government authorities.

There are 39 streets which were examined as part of the Marrickville East study area. These roads are made up of various road levels including;

The State roads in Marrickville East are:

- Sydenham Road.

The Regional roads in Marrickville East are:

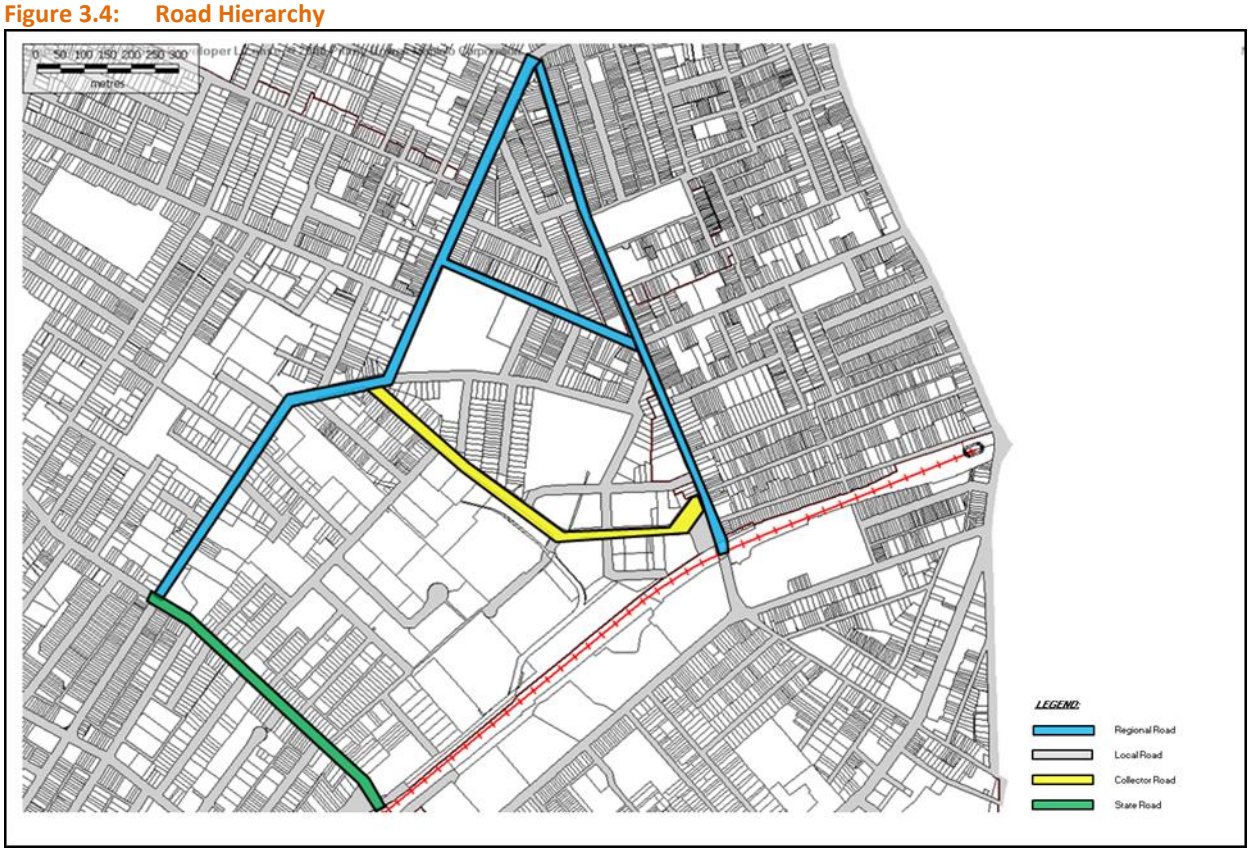
- Victoria Road
- Enmore Road
- Edgeware Road
- Bedwin Road
- Llewellyn Road.

The Collector roads in Marrickville East are:

- Edinburgh Road.

All other roads within the study area are classified as local roads. The responsibility of the road network is illustrated in Figure 3.4 below with regional roads controlled by the state government with the care of the road maintained by Council. The remainder of the local roads are the responsibility of Marrickville Council.

Figure 3.4: Road Hierarchy



3.4 Public Transport Services

3.4.1 Trains

Train services operate along the eastern boundary of the study area and provide services at Sydenham Station which is just outside the south-eastern confines of the study area.

Sydenham station functions as a major transit station, which includes 'park and ride' for commuters, as well as being used as a transport interchange with the connection of the T3 Bankstown line, the T4 Eastern Suburbs line and occasionally theT2 East Hills line. In 2012, Sydenham Station had about 10,500 passengers travel in and out each day which had increased from 9,360 in 2004. About 2/3rds of passengers travel in the AM and PM peaks of 6am-9.30am and 3pm-6.30pm. Sydenham Station was recently converted to a mobility accessible station through a significant upgrade of facilities.

Sydenham railway station provides public transport for the Metro Shopping Centre, the Marrickville industrial area, St Pius Primary School, Camdenville Primary School and TAFE NSW Sydney Institute Design Centre and Annette Kellerman Aquatic Centre. There are recognised pedestrian desire lines between Sydenham railway station and Saint Peters Railway station. The rail network map is shown in Figure 3.5 below.

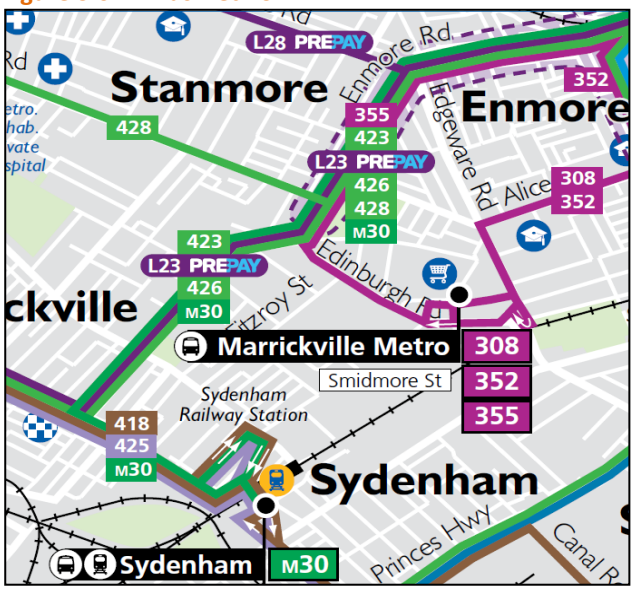
Figure 3.5: Sydney Inner West Rail Network

3.4.2 Buses

Ten main bus services run within the study area, all of which are operated by Sydney Buses. Three of these services enter the study area from the east travelling along Alice Street and Edgeware Road and then into Edinburgh Road and Smidmore Road to access the Marrickville metro shopping centre. The remaining routes predominately travel along Victoria Road and/or Enmore Road.

Details of the bus routes operating within the Marrickville East study area are shown in Figure 3.6.

Figure 3.6: Bus Network



3.5 Bicycles

The Marrickville Bicycle Strategy (2007) details a number of bicycles routes currently in the Marrickville East study area incorporating regional and local routes.

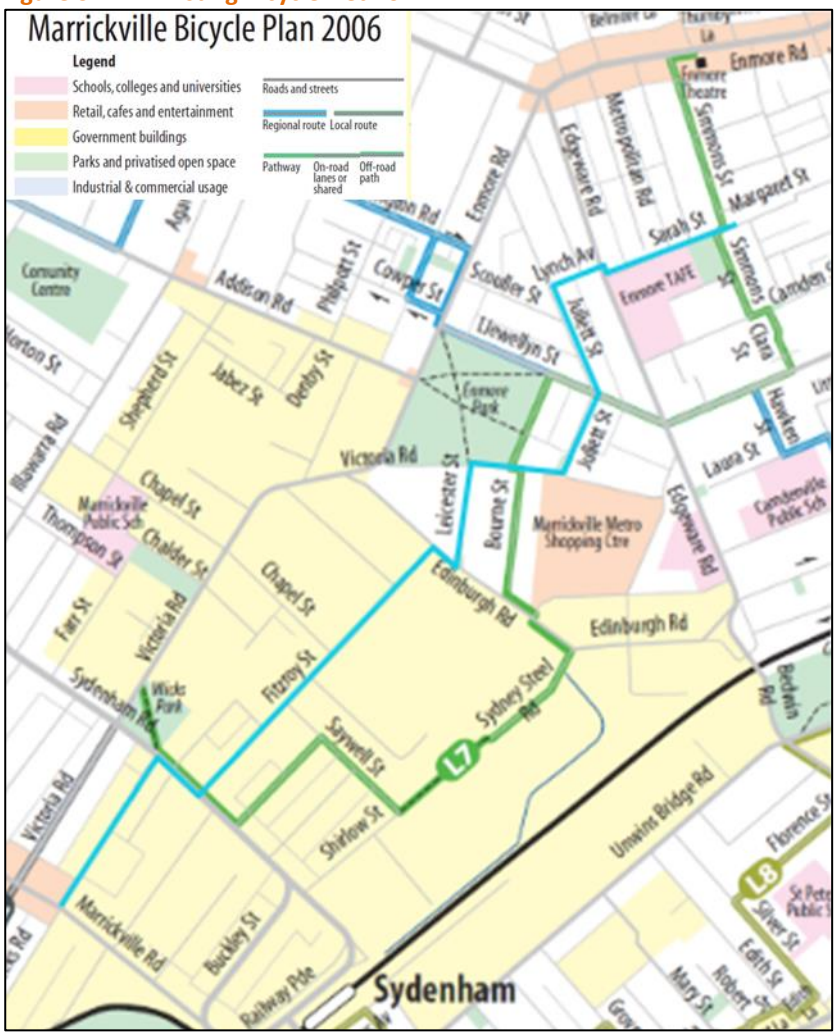
The study area comprises of the following existing cycle routes:

- Albemarle Street
- Black Street
- Bourne Street
- Cadogan Street
- Edinburgh Road
- Fitzroy Street
- Juliett Street
- Leicester Street
- Lynch Road
- Saywell Street
- Sydney Steel Road
- Victoria Road.

Routes through residential areas are primarily on-road and run north-south along local roads, although there are also links to local facilities including Marrickville Metro, Enmore Park and the industrial area of Fitzroy Street.

The existing bicycle facilities in the Marrickville East study area are shown in Figure 3.7. As a general principle, where possible, installation of LATM treatments should not impede the same passage of cyclists in streets designated as existing or proposed bicycle routes.

Figure 3.7: Existing Bicycle Network



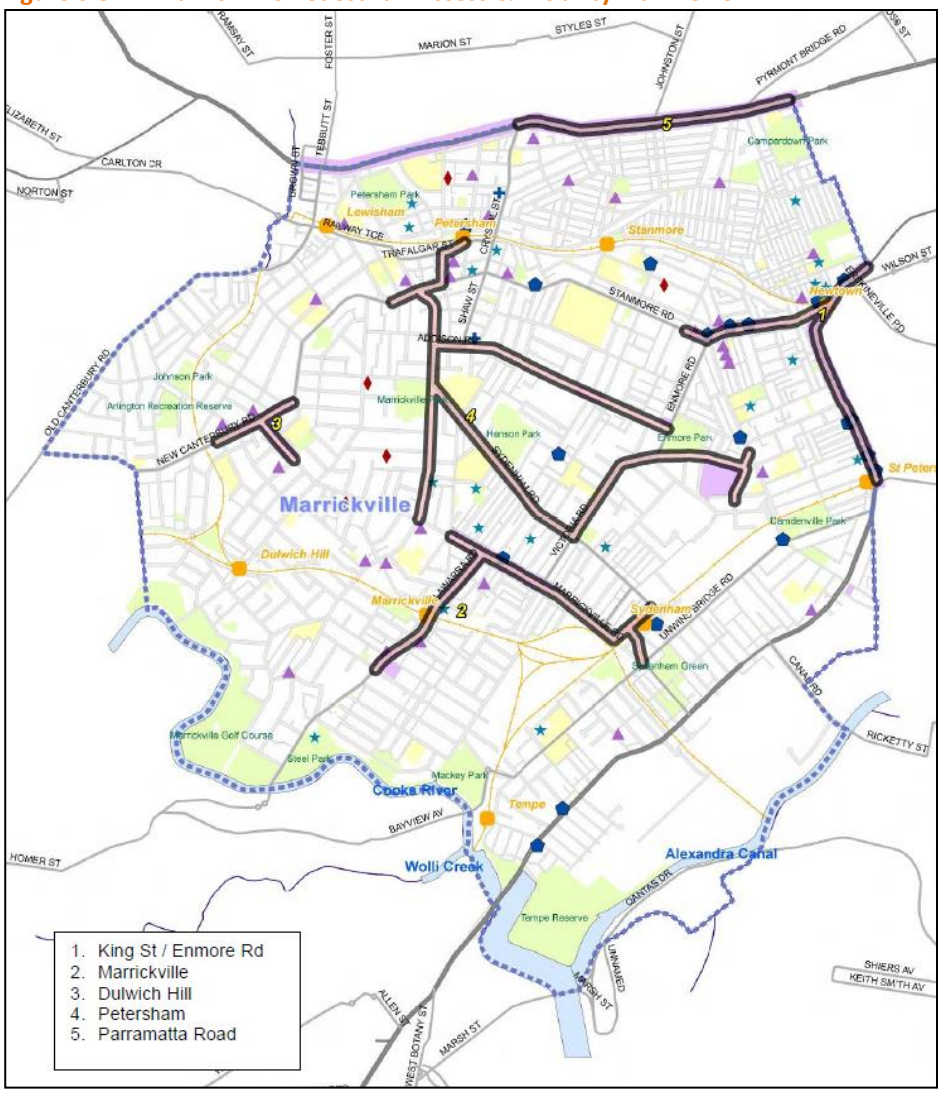
3.6 Pedestrians

3.6.1 Marrickville PAMP

At the end of 2009, Marrickville Council undertook a review of the Pedestrian Access and Mobility Plan. The PAMP focuses on the high pedestrian use areas within the Marrickville Council area.

The PAMP review recommended minor improvement to footpath condition and installation of new kerb ramps along several key corridors including Victoria Road and the roads surrounding Marrickville Metro. The report did not make any recommendations for new formal crossings within the study area. Figure 3.8 illustrates the full details of Council PAMP plan.

Figure 3.8: Marrickville Pedestrian Access & Mobility Plan Review



3.6.2 Ramp Audit

An audit of Council missing ramps and existing ramp conditions has recently been undertaken. The audit identified 14 missing ramps within the Marrickville East LATM area. The missing ramps as well as the upgrade of existing ramps in poor condition are currently being assessed and prioritised for consideration of funding as part of Council's PAMP program.

3.7 Previous LATM Study in Marrickville East

In 2002, a review of the existing Marrickville East LATM Scheme was undertaken and a concept plan prepared.

At its meeting held on 8 November 2002, the Local Traffic Planning and Advisory Committee considered a report on the operations of the existing Marrickville East LATM Scheme and the following was proposed:

"The only additional treatments proposed are for roundabouts to be installed at the following locations:-

- Junction of Edinburgh Road and Smidmore Street; and
- Junction of Edinburgh Road and the connecting link to Bedwin Road."

Following further discussions of the pedestrian safety aspects of the intersection of Edinburgh Road and Smidmore Street, it was determined that the installation of traffic signals was suitable and these were subsequently installed.

Subsequently the roundabout at Edinburgh Road and the connecting link to Bedwin Road was constructed.

3.8 Existing LATM Devices

Marrickville Council staff prepared a detailed inventory of the existing LATM measures within the Marrickville East study area. This enables Council to assess the current conditions and assess the need to provide new LATM measures to address any issues identified during the study.

Of the 39 streets analysed in the Marrickville East LATM, 15 streets have some form of existing LATM treatment. Of the existing devices in place the most common devices used include:

- Kerb Blisters – 21
- Central Medians
- Roundabouts – 8
- Turn Restrictions

The existing LATM measures are detailed in Figure 3.9 and are listed in Appendix D.

Figure 3.9: Existing LATM Devices

3.9 Traffic Component Review

Marrickville Council obtained turning movement data at 14 intersections with the study area, including Stanmore Rd / Enmore Rd, Enmore Rd / Addison Rd, Enmore Rd / Llewellyn St, Edgeware Rd / Alice St / Llewellyn St, Edgeware Rd / Victoria Rd, Edinburgh Rd / Fitzroy St, Fitzroy St / Sydenham Rd, Edinburgh Rd / Smidmore St, Smidmore St / Murray St, Edinburgh Rd / Smidmore St, Smidmore St / Murray St, Edinburgh Rd / Sydney Steel Rd, Edinburgh Rd / Murray St, Edinburgh Rd / Railway Pde, Edinburgh Rd / Bedwin St and Bedwin Rd / Unwins Bridge Rd / Campbell Rd / May St.

24-hour tube counts were undertaken on 28 roads (some streets had more than one tube counter) within the study area to obtain mid-block volume and speed data.

Further, to address the concerns relating to pedestrian safety adjacent to Enmore Park, manual counts including vehicle and pedestrian counts were undertaken for Victoria Road and Llewellyn Street within the vicinity of Enmore Park. Currently, the only pedestrian crossing facilities in the vicinity include two pedestrian refuges located in Llewellyn Street.

3.9.1 Environmental Capacity and Speed Performance Standards

The RTA Guide to Traffic Generating Developments and the RTA NSW Road Classification review Paper assist in allowing engineers to decide what an acceptable environmental limit per road classification is. Based on these guidelines an acceptable guideline for application on Marrickville Council roads is detailed in Table 3.1. It is important to note that these guidelines are based on RMS research relating to safety and amenity and consider ease of crossing the road, noise and delay. This set of criteria has been used as the basis for identifying traffic speed and volume issues within the streets of the Marrickville East study area.

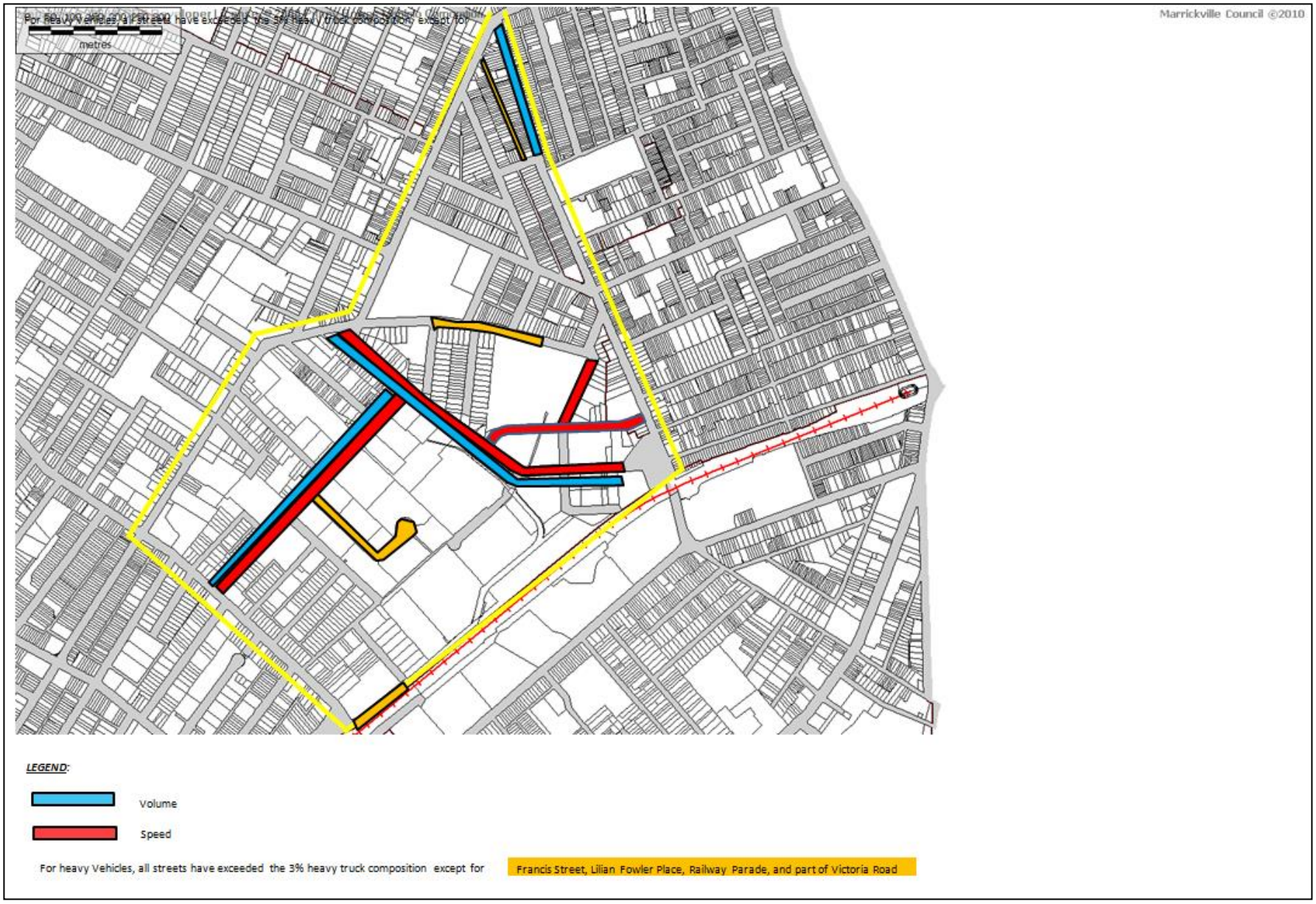
Table 3.1: Environmental Capacity and Speed Performance Guidelines

Road Class	Road Type	Maximum Speed (km/h)	Max Peak volume (ADT)
Local	Access way	50	1,000[1]
	Street	50	2,000 Residential areal 4,000 Other
Collector	Street	50-60	5,000 Residential area 10,000 Other
Regional (Sub-arterial)	Main Road	60-80	15,000-25,000

In addition to the above, as a general guide, all local roads have a 50km/hr speed limit unless signed otherwise. The map in Figure 3.10 details a summary of the locations which exceed the Environmental Capacity and Speed Performance Guidelines.

1 This figure can be used to calculate annual average traffic volumes by assuming a peak to daily ratio of 10%.

Figure 3.10: Roads Exceeding Environmental Capacity in the Marrickville East Study Area



3.9.2 Traffic Survey Results

Marrickville Council staff analysed the traffic survey data to determine the existing volume, heavy vehicle percentages and speed conditions in Marrickville East LATM area. A total of 41 tube counts were undertaken on 28 roads (some streets had more than one tube counter) within the study area to obtain mid-block volume and speed data. The locations of the counts are identified in Figure 3.11 below.

Figure 3.11: Traffic Survey Locations

The assessment of the data available indicated that, on the whole, traffic volumes and speeds were within acceptable environment limits except two(2) streets including Edinburgh Road, Fitzroy Street exceeded both the maximum desirable peak volume and maximum desirable 85th percentile speed for the road classification and road type. Two (2) streets, Murray Street and Smidmore Street, exceeded the maximum desirable peak volume only. In terms of heavy vehicle percentages however, the majority of streets didn't comply with the generally acceptance of 3% heavy vehicle content. The figures highlighted in red in Table 3.2 indicate where the environmental performance standards for traffic volumes, heavy vehicle percentage or vehicle speeds are being exceeded.

Table 3.2: Evaluation of Environmental Capacity & Speed performance

Street Name	Section	Surveyed			Functional Classification	Compliance			Count Collected (Year)
		Volume (ADT)	Speed (85th % km/hr)	Heavy Vehicle (%)		Volume (ADT)	Speed (85th % km/hr)	Heavy Vehicle (%)	
Bedwin Road	Edgware Road – May Street	22038	48.6	6	Regional	Yes	Yes	No	2013
Black Street	Victoria Rd - Llewellyn St	1671	29.2	3.1	LOCAL	Yes	Yes	No	2011
Bourne Street	Victoria Rd - Cu-De-Sac	144	41	3.1	Local	Yes	Yes	No	2012
Cadogan Street	Sydenham Rd - Saywell St	347	37.8	12.2	Local	Yes	Yes	No	2012
Chalder Street	Victoria Rd - Chalder Lane	150	35.6	9.9	Local	Yes	Yes	No	2012
Chapel Street	Victoria Rd - Fitzroy St	1087	46.1	12.8	Local	Yes	Yes	No	2012
Edgeware Road	Wells St - Victoria Rd	16293	50.4	5.3	REGIONAL	Yes	Yes	No	2014
Edgeware Road	Enmore Rd - Lynch Ave	22102	52.2	5.7	REGIONAL	Yes	Yes	No	2014
Edgeware Road	Camden St - Lynch Ave	20652	52.2	4.1	REGIONAL	Yes	Yes	No	2014
Edinburgh Road	Fitzroy St - Smidmore St	13126	52.9	4.8	COLLECTOR	No	No	No	2006
Edinburgh Road	Murray St - Edgeware Rd	9151	45.7	6.6	COLLECTOR	No	Yes	No	2014
Edinburgh Road	Victoria Rd - Fitzroy St	10410	46.1	6	COLLECTOR	No	Yes	No	2014
Enmore Road	Addison Rd - Victoria Rd	14941	50	5.6	REGIONAL	Yes	Yes	No	2006
Enmore Road	Newington Rd - Juliett St	14413	55.4	8.2	REGIONAL	Yes	Yes	No	2014
Faversham Street	Sydenham Rd - Hans Pl	315	30.6	11	Local	Yes	Yes	No	2012
Fitzroy Street	Sydenham Rd - Hans Pl	5340	57.2	11.8	LOCAL	No	No	No	2006
Fitzroy Street	North of Chapel Street	5,517	56.2	11.8	Collector	No	No	No	2012
Fitzroy Street	Chapel St - Smith St	5763	56.2	12	Local	No	No	No	2012
Francis Street	Lynch Ave - Enmore Rd	126	32	3	Local	Yes	Yes	Yes	2012
Garden Street	Shirlow St - End	363	31.7	8.6	Local	Yes	Yes	No	2012
Hans Place	Faversham St - Fitzroy St	536	29.2	16.5	Local	Yes	Yes	No	2012
Juliett Street	Scouller St - Llewellyn St	745	48.2	4.7	Local	Yes	Yes	No	2012
Juliett Street	Enmore Rd - Lynch Ave	513	48.2	5.3	Local	Yes	Yes	No	2012
Leicester Street	Victoria Rd - End	185	36	4.6	Local	Yes	Yes	No	2012
Lilian Fowler Place	Midblock	1,202	43.6	1.5	Local	Yes	Yes	Yes	n/a
Llewellyn Street	Enmore Rd - Black St	6784	50.4	3.1	REGIONAL	Yes	Yes	No	2014
Llewellyn Street	Enmore Rd - Black St	6554	50.8	3.5	REGIONAL	Yes	Yes	No	2011
Lynch Avenue	Francis St - Juliett St	900	36	3	Local	Yes	Yes	Yes	2012
Murray Street	Victoria Rd - Smidmore St	6183	38.9	12.1	Local	No	Yes	No	2012
Saywell Street	Midblock	112	39	8.2	Local	Yes	Yes	No	n/a
Scouller Street	Enmore Rd - Juliett St	457	45.4	4	Local	Yes	Yes	No	2012
Shirlow Street	Sydenham Rd - Garden St	492	33.1	13.8	Local	Yes	Yes	No	2012
Sloane Street	Sydenham Rd - Saywell St	545	40.3	11.7	Local	Yes	Yes	No	2012
Smidmore Street	Edinburgh Rd - Murray St	7796	36	3.9	LOCAL	No	Yes	No	2007
Smith Street	Fitzroy St - Victoria Rd	774	45	11.5	Local	Yes	Yes	No	2012
Sydenham Road	n/a	19,512	n/a	n/a	State	Yes	n/a	n/a	n/a
Sydney Steel Road	Edinburgh Rd - End	1201	36	23.1	Local	Yes	Yes	No	2012
Victoria Road	Black St - Leicester St	1489	38.2	2.1	LOCAL	Yes	Yes	Yes	2011
Victoria Road	Chapel St - Chalder St	16262	59	5.4	REGIONAL	Yes	Yes	No	2005
Victoria Road	W of Murray St	1024	33.8	4	Local	Yes	Yes	No	2012
Victoria Road	E of Bourne St	370	30.6	2	Local	Yes	Yes	Yes	2012
Bedwin Road	Edgware Road – May Street	22038	48.6	6	Regional	Yes	Yes	No	2013
Black Street	Victoria Rd - Llewellyn St	1671	29.2	3.1	LOCAL	Yes	Yes	No	2011
Bourne Street	Victoria Rd - Cu-De-Sac	144	41	3.1	Local	Yes	Yes	No	2012
Cadogan Street	Sydenham Rd - Saywell St	347	37.8	12.2	Local	Yes	Yes	No	2012
Chalder Street	Victoria Rd - Chalder Lane	150	35.6	9.9	Local	Yes	Yes	No	2012
Chapel Street	Victoria Rd - Fitzroy St	1087	46.1	12.8	Local	Yes	Yes	No	2012

From the assessment, four streets exceeded the Environmental Capacity and Speed performance in one shape or form. Mostly the degree to which the capacity was exceeded was small and within acceptable limits for a street environment.

3.9.3 Traffic Volumes

The assessment of the streets in road network identified four streets, which exceeded the Environmental Performance guidelines with respect to desirable peak volume for the road classification and road type (and in brackets is by what degree the traffic volume in ADT was exceeded):

- Smidmore Street (+95%)
- Murray Street (+55%)
- Fitzroy Street (+44%)
- Edinburgh Road (+31%).

Note: It must be noted that these streets are the access mainly to the industrial area rather than residential area. Therefore, the evaluation of the Environmental Capacity is based on the "Other" rates in Table 3.1.

In the Sydney road network, it is often common for the volume to exceed the Environmental Performance Standards. Depending on the situation; this may be acceptable however the warrant for traffic calming might be considered. Traffic calming should be considered where volume combined with other factors, might contributor to an unsafe road environment.

It should be noted that the four streets which exceeded capacity all run adjacent to either Marrickville Metro or the industrial zone, which is likely to be the main contributor to the high volumes.

3.9.4 Traffic Speed

The assessment of the streets in road network road identified that two streets exceeded the Environmental Speed Performance guidelines with respect to maximum desirable speed. The extent that their 85th percentile of vehicle speeds exceeds the advertised speed limit (indication in brackets) in two streets.

- Fitzroy Street (+7.2km/hr)
- Edinburgh Road (+2.9km/hr)

In the Sydney road network, it is common for the 85th percentile vehicle speed to exceed the advertised speed limit by as much as 10km/h. Depending on the situation, this may be acceptable. However, the warrant for traffic calming might be considered. Given the recorded speeds, most of the streets listed above where the 85th percentile speeds exceed the posted speed limit with a small margin (less than 10km/h). Therefore, traffic calming should be considered where speeding issue coinciding with other factors leads to an unsafe road environment.

3.9.5 Heavy Vehicles

The assessment of the streets in road network identified that 25 streets exceeded the Environmental Performance guidelines with respect to heavy vehicle percentage. The streets which exceeded Environmental Performance guideline by the greatest amount is listed below.

- Sydney Steel Road (23.1%)
- Hans Place (16.5%)
- Shirlow Street (13.8%)
- Chapel Street (12.8%)
- Cadogan Street (12.2%)
- Murray Street (12.1%)
- Fitzroy Street (12%)

- Sloane Street (11.7%)
- Smith Street (11.5%)
- Faversham Street (11%)

It is generally considered that heavy vehicle percentage should not exceed 3% of total recorded vehicles for local streets. A higher percentage may be considered acceptable for regional roads such as Enmore Road or Edgeware Road, or roads which are part of an industrial area where heavy vehicles are accessing a particular destination. Most of the residential streets do not exceed the Environmental Performance guideline of 3% with the exception of the following streets:

- Juliett Street (4.7%)
- Leicester Street (4.6%)
- Scouller Street (4%)
- Victoria Road (4%).

A point to note from this assessment is data suggests that most of the local streets are also within their environmental capacity. This is due, in part, to the significant number of existing LATM measures currently in place and the general limitations of available through route options for traffic using this area.

3.10 Intersection Operations

The operation of 14 intersections was examined by Transport & Urban Planning (TUP) at the request of Council in 2010. The intersections were modelled using SIDRA INTERSECTION, a computer based modelling package which calculates intersection performance. The commonly used measure of intersection performance, as defined by the RMS, is vehicle delay. SIDRA INTERSECTION determines the average delay that vehicles encounter and provides a measure of the Level of Service (LOS).

Table 3.3 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service. It is noted that for sign controlled intersections, the LOS is based on the highest (worse movement) delay rather than the average intersection delay.

Table 3.3: Sidra Intersection Level of Service Criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Table 3.4: Existing Intersection Operating Conditions

Intersection	Control	AM Peak		PM Peak		Saturday Peak	
		Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Level of Service (LOS)	Average Delay per vehicle (secs/veh)
Stanmore Rd / Enmore Rd	Signals	E	70.1	F	80.2	B	27.1
Enmore Rd / Addison Rd	Signals	B	20.0	B	25.1	B	22.6
Enmore Rd / Llewellyn St	Signals	n/a	n/a	B	22.0	B	22.6
Edgeware Rd / Alice St/ Llewellyn St	Signals	n/a	n/a	D	51.2	D	50.5
Edgeware Rd / Victoria Rd	Signals	n/a	n/a	C	41.3	C	41.8
Edinburgh Rd / Fitzroy St	ROUNDABOUT	n/a	n/a	B	15.5	A	11.9
Fitzroy St / Sydenham Rd	SIGNS	n/a	n/a	A	11.5	A	12
Edinburgh Rd / Smidmore St	SIGNALS	n/a	n/a	B	26.7	C	29.6
Smidmore St / Murray St	ROUNDABOUT	n/a	n/a	A	8.0	A	8.2
Edinburgh Rd / Sydney Steel Rd	SIGNS	n/a	n/a	A	11.6	A	9.4
Edinburgh Rd / Murray St	ROUNDABOUT	n/a	n/a	A	11.2	A	10.7
Edinburgh Rd / Railway Pde	ROUNDABOUT	n/a	n/a	A	9.8	A	9.6
Edinburgh Rd/ Bedwin St	SIGNS	n/a	n/a	B	24.8	B	24.2
Bedwin Rd / Unwins Bridge Rd / Campbell Rd / May St	SIGNALS	n/a	n/a	F	74.5	C	28.8

Table 3.4 provides a summary of the existing operation of the key intersections within the study area with full results of intersection performance. The results indicate that the majority of intersections operate with spare capacity during most times of the day with the exception being:

- Stanmore Rd / Enmore Rd/ Edgeware Road intersection,
- Edgeware Rd / Alice St/ Llewellyn St intersection,
- Bedwin Rd / Unwins Bridge Rd / Campbell Rd / May St intersection.

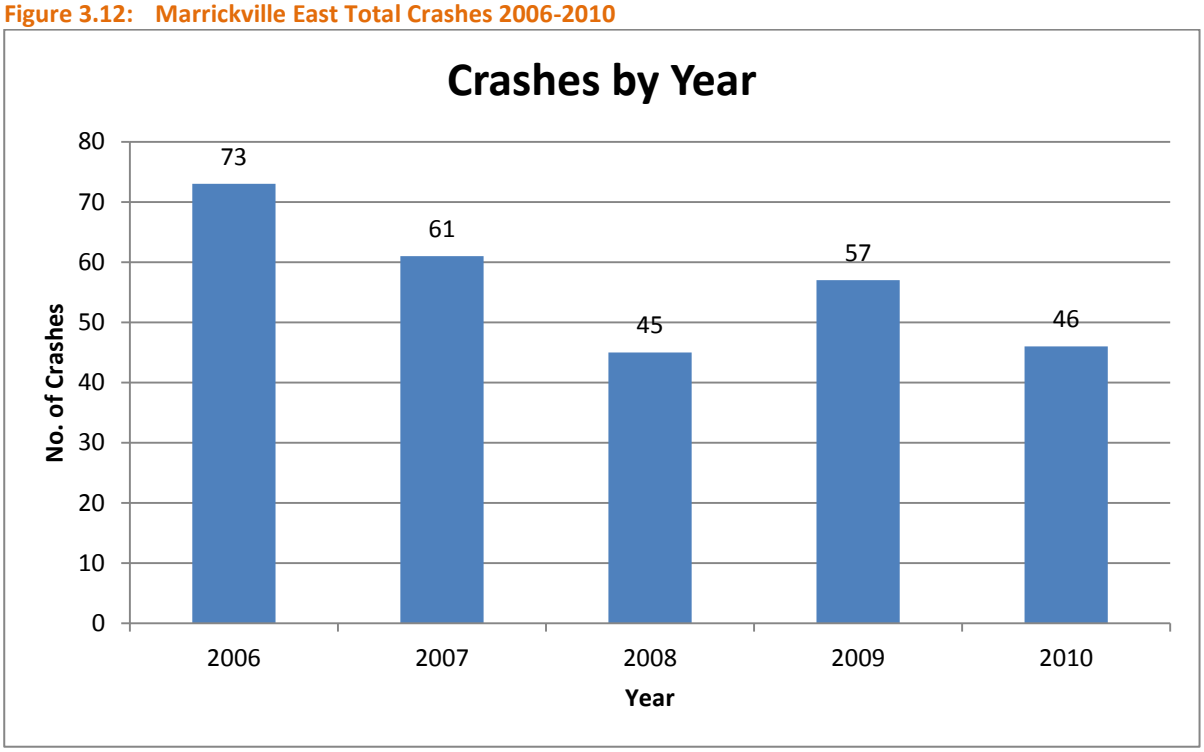
3.11 Crash Statistic Analysis

The RMS keeps detailed crash records. Marrickville Council staff analysed the crash data for the five year period from January 2006 to December 2010 for the study area.

3.11.1 Crash rate by time

A summary of the total crashes by year is provided in Figure 3.12. It is noted that except for 2008, when crash rates were exceptionally low, there has been a steady decline in crashes in the Marrickville East area.

Figure 3.12: Marrickville East Total Crashes 2006-2010



The roads within the study area experienced a total of 282 recorded crashes during the five year period ending December 2010. There has been a gradual decrease in crashes between 2006 and 2010 with the exception of 2008 which was relatively low.

Figure 3.13 shows that there is a general spread of accidents through the day with marginal peaks of accidents occurring during the periods of between 10am and 11am and between 3pm and 4pm.

Figure 3.13: Crashes by time of Day

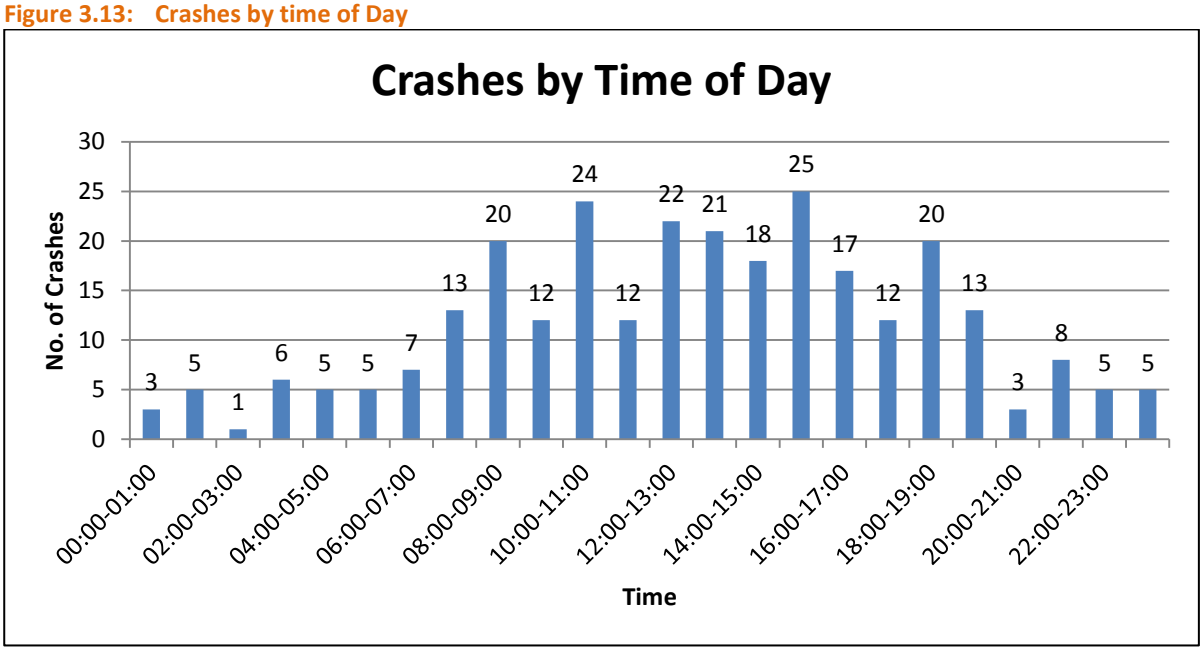
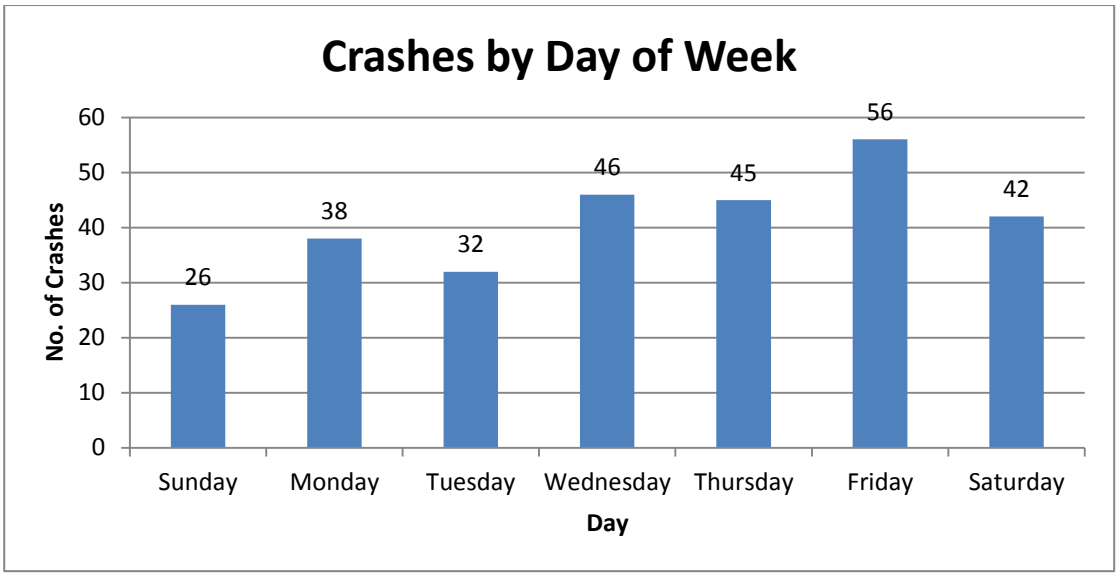


Figure 3.14 shows that more accidents occurred on a Friday than any other day of the week. It should be noted that the number of accidents within the Marrickville East LATM area is lower on a Sunday than any other day.

Figure 3.14: Crashes by Day of Week



3.11.2 Location

From Figure 5.6, it is noted that the majority of crashes occurred on the main arterial road network surrounding the local streets of Marrickville East, including Edgeware Road, Enmore Road and Sydenham Road. Overall, the streets with the highest recorded crashes include:

- Edgeware Road – 63 crashes,
- Enmore Road – 54 crashes,
- Sydenham Road – 52 crashes,
- Victoria Road-46 crashes,
- Bedwin Road – 18 crashes,
- Edinburgh Road – 14 crashes,
- Stanmore Road – 10 crashes,
- Llewellyn Road – 5 crashes,
- Fitzroy Road – 4 crashes.

Approximately 22.3% of all crashes occurred along Edgeware Road, 19.1% along Enmore Road, 18.4% along Sydenham Road and 16.3% along Victoria Road between 2006 and 2010. Thus a total of 88% of crashes were on state and regional roads and only 12% on the local road or collector road network. On the local road network, the highest crash rates were recorded along collector roads such as Edinburgh Road and Fitzroy Street. Llewellyn Street is also worth noting as this street though classified as a regional street, is located among residential environs. It is important to note that of the 227 or 80% of crashes were at intersections along main arterial roads. A further 16 or 5.6% crashes occurred at intersections along local roads. Refer to Figure 3.15 for full details of crash locations.

Figure 3.15: Crashes Locations 2006-2010

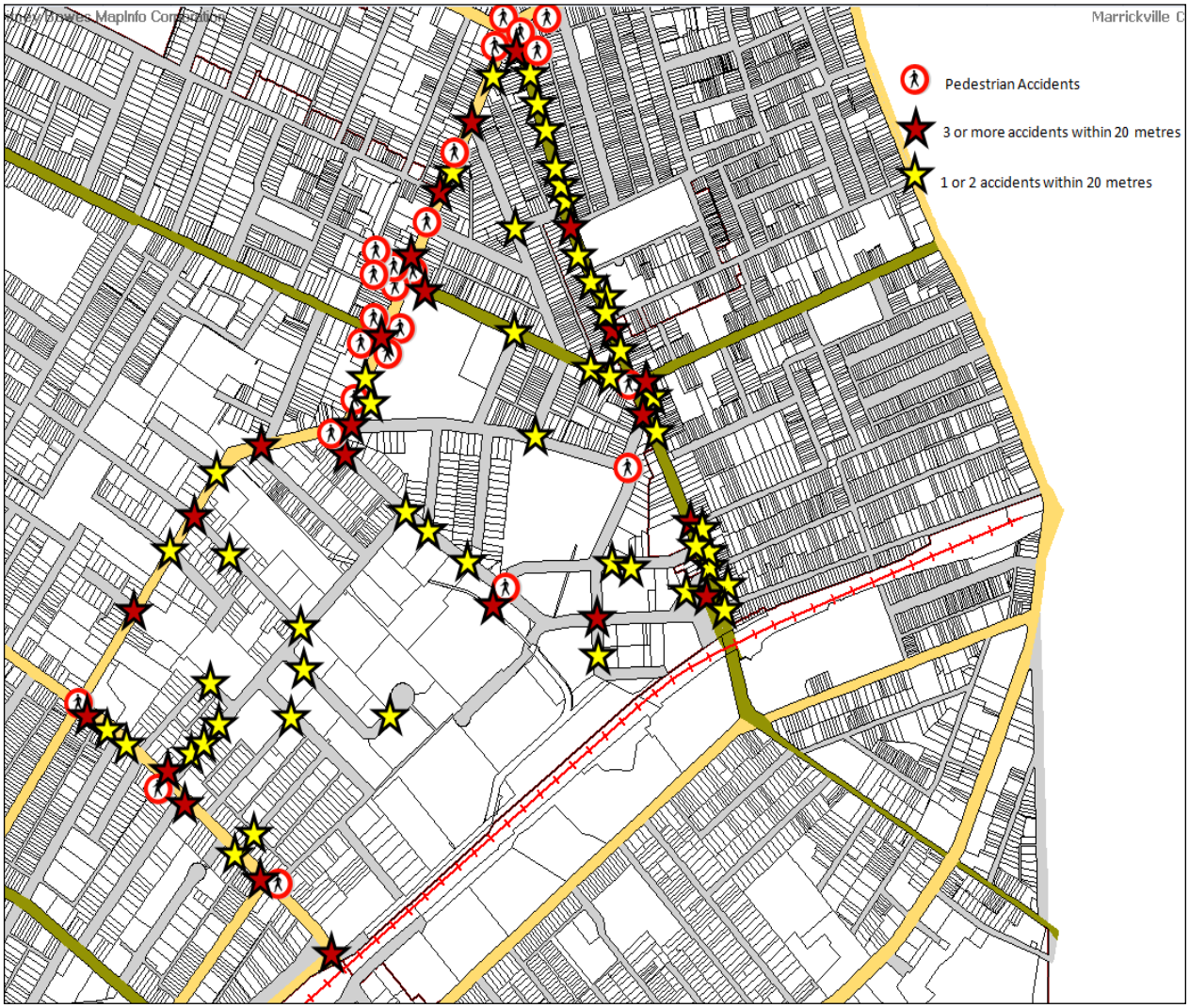
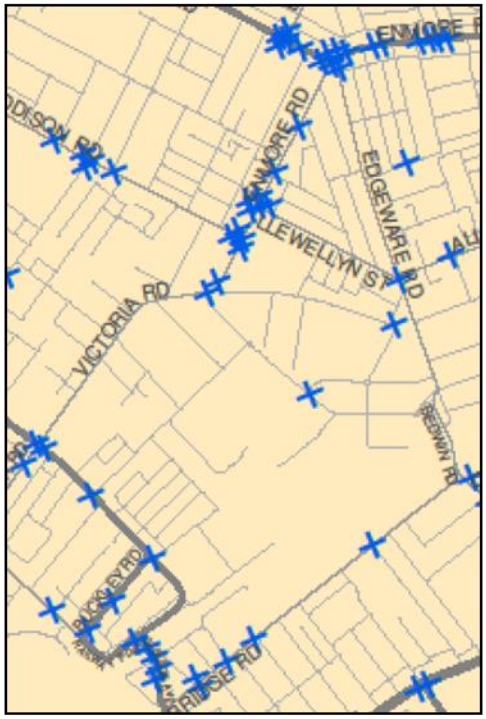
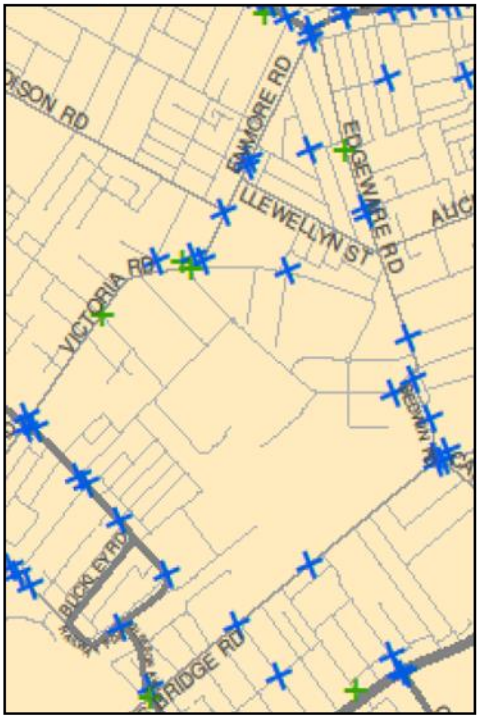


Figure 3.16: Crashes Locations by Type

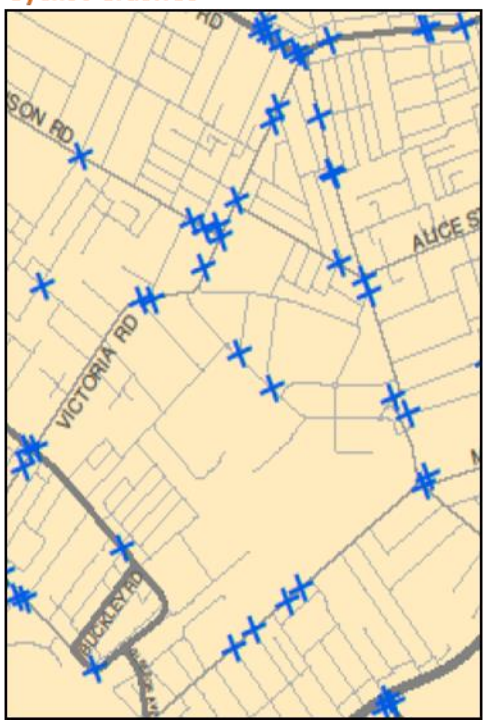
Pedestrian Crashes



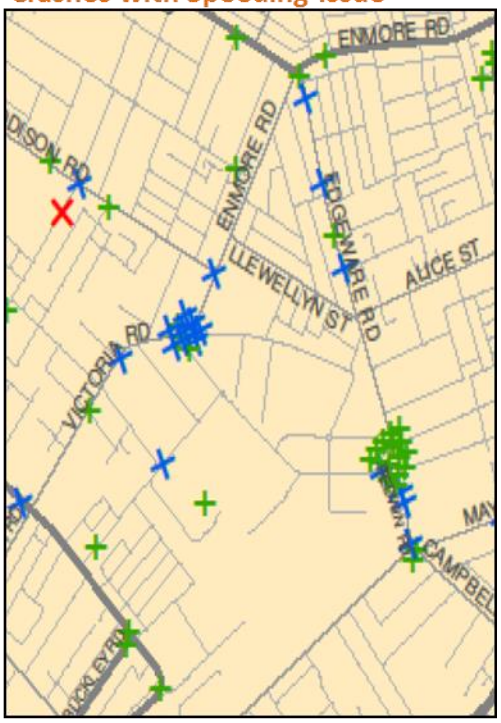
Motorcycle Crashes



Cyclist Crashes



Crashes with Speeding Issue



From Figure 3.16, it is noted that all the pedestrian crashes occurred on the main arterial road network or the collector road network. Details of the location of the crashes by vehicles types involved are detailed in Table 3.5.

3.11.3 Crash Type

In relation to the vehicles types involved in recorded crashes for the period 2006-2010, the crashes occurred as follows:

- Motor vehicle and motor vehicle – 212 crashes (75%),
- Motor vehicle and motorcyclist – 25 crashes (8.9%),
- Motor vehicle and pedestrian– 24 crashes (8.5%),
- Motor vehicle and Cyclist– 21 crashes (7.4%),

Table 3.5: Accident Summary – Marrickville East Area 2006-2010

Street	Vehicle-Cyclist	Vehicle-Motorcyclist	Vehicle-Pedestrian	Vehicle-Vehicle	Total
Edgeware Road	4	4	1	54	63
Enmore Road	6	6	14	28	54
Sydenham Road	1	7	2	42	52
Victoria Road	3	3	2	38	46
Bedwin Road *	1	2	0	15	18
Edinburgh Road	2	0	2	10	14
Stanmore Road	2	1	2	5	10
Llewellyn Street	1	0	1	3	5
Fitzroy Street	0	0	0	4	4
Chapel Street	0	0	0	2	2
Lillian Fowler Place	0	0	0	2	2
Railway Parade	0	0	0	2	2
Smidmore Street	0	0	0	2	2
Bourne Street	0	1	0	0	1
Buckley Street *	0	0	0	1	1
Cardogan Street	0	0	0	1	1
Hans Place	0	0	0	1	1
Julliett Street	0	1	0	0	1
Lord Street *	1	0	0	0	1
Murray Street	0	0	0	1	1
Sloane Street	0	0	0	1	1

Note: * denotes some crashes located just outside boundary of study area

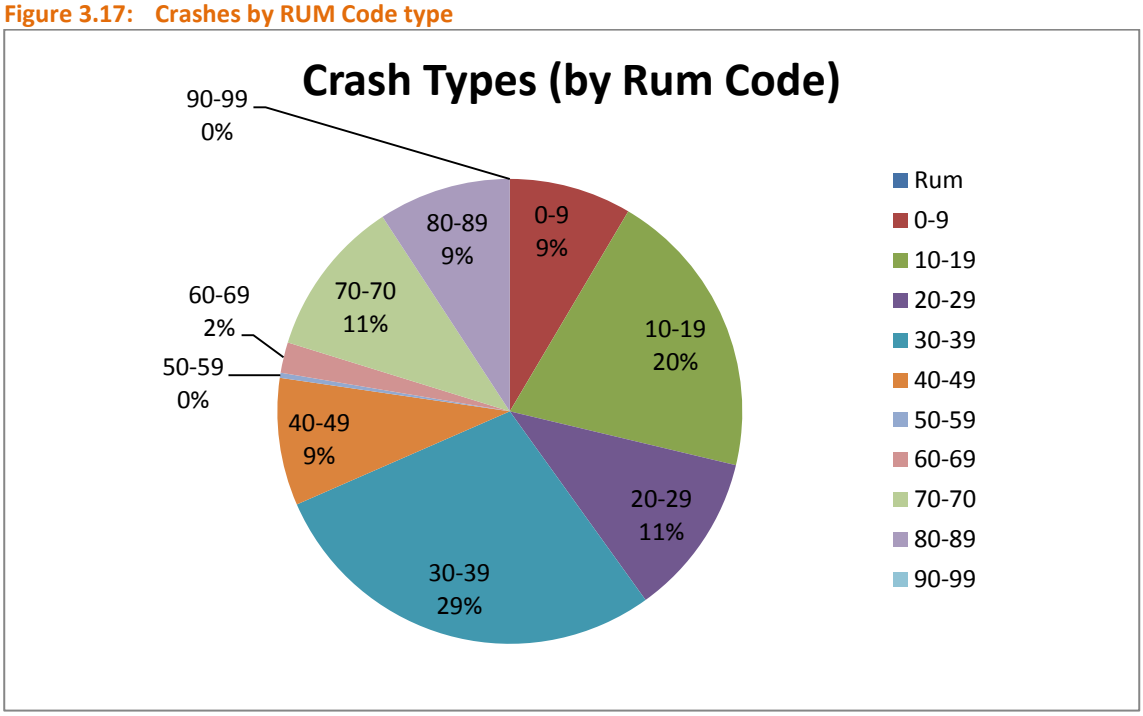
It is noted that the 25 crashes involving motorcyclists caused 25 injuries or 8.9% of total injuries. This is around the NSW state average (2010) of 8% but less than the Sydney Metropolitan average of 10% and less again than the Marrickville LGA average of 18%.

It is noted that the 24 crashes involving pedestrians caused 24 injuries or 8.5% of total injuries. This is less than the NSW state and Sydney Metropolitan average (2010) of 10% and less again than the Marrickville LGA average of 13%.

It is noted that the 21 crashes involving cyclists caused 21 injuries or 7.4% of total injuries. This is higher than the NSW state average (2010) of 4% and the Sydney Metropolitan average of 5% but slightly less than the Marrickville LGA average of 8%.

A RUM CODE is a standard code used to identify the type of Road User Movement (RUM) in accidents. For example, a “right through” type accident (RUM CODE 30) is classified as an accident between two vehicles travelling in the same direction with one vehicle rear ending the other vehicle. Analysis of the RUM codes in the Marrickville East LATM was undertaken. The results are shown in Figure 3.17 below.

Figure 3.17: Crashes by RUM Code type



Note: RUM 0-9:pedestrian related on foot or in toy/pram, RUM 10-19: vehicles from adjacent directions (intersections only, RUM 20-29: vehicles from opposing directions, RUM 30-39: vehicles from same direction, RUM 40-49: u-turns and other, RUM 50-59: overtaking, RUM 60-69: on path, RUM 70-79: off path on straight, RUM 80-89: off path on curve or turning.

The results indicate:

- 29% of crashes within the study area were vehicles travelling in the same direction (RUM CODE 30-39),
- 20% were vehicles from adjacent directions (RUM CODE 10-19) generally at intersections,
- 11% were vehicles from opposing directions (RUM CODE 20-29),
- 11% were vehicles off path on straight (RUM 70-79),
- 9% were U-turns and other (RUM 40-49),
- 9% were vehicles off path on curve or turning (RUM 80-89),
- 9% were pedestrian crashes (RUM 00-9),
- 2% were vehicles on path striking an object (RUM 60-69),
- Less than 1% were vehicles overtaking (RUM 50-59).

Refer to Appendix C for further details of RUM code descriptions.

Finally, it was found that 39 crashes or 13.8% of crashes had vehicle speed as a contributing factor to the crash. This is higher than the Sydney Metropolitan average of 10% (2010) and higher than the Marrickville LGA average of 8%.

3.11.4 Crash rate

Crash rates for the LATM area have been measured for the purpose of comparing the relative occurrence of crashes in the Marrickville East LATM local road network with the incidence of crashes within the metropolitan local and collector road network. Table 3.6 shows a crash rate comparison for the Marrickville East LATM study area with the Sydney Metropolitan area.

Table 3.6: Crash Rate Comparison Marrickville East area v Sydney wide 2006-2010

Area	Intersection Crash Rate (per 1,000,000 vehicle approaches)	Midblock Crash Rate (per 1,000,000 vehicle approaches)
Marrickville East LATM	0.454	1.202
Sydney Metropolitan	0.28	1.151

The Roads and Maritime Services average crash rate for the metropolitan urban local and collector road at intersections is 0.28 million vehicle approaches per year. The measured average crash rate for the Marrickville East local and collector road intersections is 0.454 crashes per 100 million vehicle approaches per year. Likewise the RMS average crash rate for the metropolitan urban local and collector road for midblock sections is 1.51 crashes per million vehicle approaches per year. The measured average crash rate for the Marrickville East local and collector roads is 0.454 crashes per 1 million vehicle approaches per year. Both Marrickville East intersection and midblock crash rates for the local and collector roads are higher when compared to the average metropolitan urban local and collector roads crashes. The potential for crashes to occur in the Marrickville East LATM is considered to be marginally higher than the Sydney Metropolitan area.

Road safety research in the area of the evaluation of crashes indicates there is a trend that annual crash frequencies vary around a mean number. This is because level of traffic, randomness, length of road, road conditions, difference treatment, traffic migration as well as other issues can influence crash frequencies. In the absence of a longer-term crash study and due to the tendency of crashes in the study area to occur on the more heavily trafficked roads, the mean number of crashes is used for impact assessment. Based upon intersection and midblock crashes the mean number of crashes was found to be 56.4 per year as compared to 51.6 per year in the previous 5 year period 2002 to 2006, a 9% increase in the 5 year period.

3.11.5 Conclusions

The crash data provides evidence that the majority of vehicle-vehicle or vehicle-pedestrian crashes are not associated with excessive approach speed or turning speed but is likely to be related to driver error as there is no overall trend or pattern with the crashes. Typically crashes are occurring on the heavier trafficked roads like Edgeware Road, Enmore Road and Sydenham Road where pedestrians and motorists would find it difficult to negotiate a gap in the traffic flow and complete their desired movements, particularly at intersections.

There is also a number of vehicle/object crashes midblock due to vehicles leaving the road carriageway. These include Victoria Road, Edinburgh Road and Llewellyn Road and Fitzroy Road. Again the crash data provides evidence that the majority of crashes are not associated with excessive approach speed but related to driver error. This historical information supports the implementation of traffic calming countermeasures that signal mindful cues to drivers' and which provide separation, driver guidance, improved driver inter visibility and driver awareness are proposed to improve local road user security and safety.

The intersection and midblock crash rates are a measure of road safety. Consequently, crash rates for the LATM area have been measured for the purpose of comparing the relative occurrence of crashes in the Marrickville East local road network with the incidence of crashes within the metropolitan local and collector road network. Both Marrickville East intersection and midblock crash rates for the local and collector roads are higher when compared to the average metropolitan urban local and collector roads

crashes. While the potential for crashes to occur in Marrickville East LATM is considered relatively high, there are pockets of areas in the study area that are worthy of further attention.

3.12 Pedestrian Safety

3.12.1 Pedestrian Counts

Council has received a number of complaints relating to pedestrian safety adjacent to Enmore Park. Currently, the only pedestrian crossing facilities in the vicinity include two pedestrian refuges located in Llewellyn Street. Manual counts including vehicle and pedestrian counts were undertaken for Victoria Road and Llewellyn Street within the vicinity of Enmore Park.

According to the "Interim Guide to Signs and Markings (1986)", the warrant for a pedestrian crossing is as follows:

In each of three separate on hour periods in a typical days, a marked foot crossing is warranted when:

(i) Pedestrian (P) ≥ 30 and,
(ii) Vehicle volume (V) ≥ 500 and,
(iii) The product (PV) is ≥ 60,000

While the (PV) value determines the warrant for a formal pedestrian crossing such as a pedestrian lantern or zebra crossing is met, the provision of other pedestrian devices such as a pedestrian refuge may be considered where the pedestrian (P) value is high yet the vehicle (V) value does not meet the warrant. Table 3.7 below tabulated summary results of the pedestrian / vehicle count.

Table 3.7: Pedestrian / Vehicle Count – Llewellyn Street, Marrickville

Llewellyn St - Black St to Juliet St

Location	Pedestrian (P)	Vehicles (V)	PV Value	Does it meet warrant?
8:45-9:45am	57	469	26,733	No
12:30pm-1.30pm	34	410	13,940	No
4:30pm-5:30pm	54	307	16,578	No

Llewellyn St - west of Black St

Location	Pedestrian (P)	Vehicles (V)	PV Value	Does it meet warrant?
8:45-9:45am	32	469	15,008	No
12:30pm-1.30pm	9	410	3,690	No
4:30pm-5:30pm	32	307	9,824	No

The results from Llewellyn Street show that while there are not the volumes to warrant a formal pedestrian crossing such as a zebra crossing, the volume of pedestrians are quite high for most of the day. The pedestrian refuge near Juliet Street is well utilized which suggests that an upgrade of the existing pedestrian facility might be considered. Similarly, while the pedestrian volumes are not quite as high, the pedestrians crossing at or near the pedestrian refuge west of Black Street are also higher than the pedestrian volumes required for a marked crossing, even though the vehicle (V) and (PV) figures do not meet the requirement for a marked crossing. Again the results show that an upgrade of the existing pedestrian facility might be considered based on the utilization of the crossings.

Table 3.8: Pedestrian / Vehicle Count – Victoria Road

Location	Time	Pedestrian (P)	Vehicles (V)	PV Value	Does it meet warrant?
Victoria Rd at Leicester St	8:15am-9:15am	53	115	6,095	No
	12.00pm-1.00pm	29	107	3,103	No
	3:00pm-4:00pm	41	185	7,585	No
Leicester St at Victoria Rd	8:15am-9:15am	36	38	1,368	No
	12.00pm-1.00pm	52	14	728	No
	3:00pm-4:00pm	63	28	1,764	No
Victoria Rd at Bourne St	8:30am-9:30am		39	1,677	No
	12.00pm-1.00pm	51	60	3,060	No
	3:30pm-4:30pm	124	80	9,920	No
Bourne St at Victoria Rd	8:30am-9:30am	54	19	1,026	No
	12.00pm-1.00pm	79	40	3,160	No
	3:30pm-4:30pm	122	53	6,466	No
Black Street at Victoria Rd	8:30am-9:30am	36	38	1,368	No
	12.00pm-1.00pm	52	14	728	No
	3:30pm-4:30pm	63	28	1,764	No

The results from Victoria Road again show, in Table 3.8, that none of the crossing locations surveyed meets the RMS warrant for a marked pedestrian crossing. It is noted that the pedestrian volumes are quite high at all the crossing points for the times of day surveyed. As there are no existing pedestrian crossing facilities in these locations, some form of pedestrian facilities might be considered.

4 Future Conditions

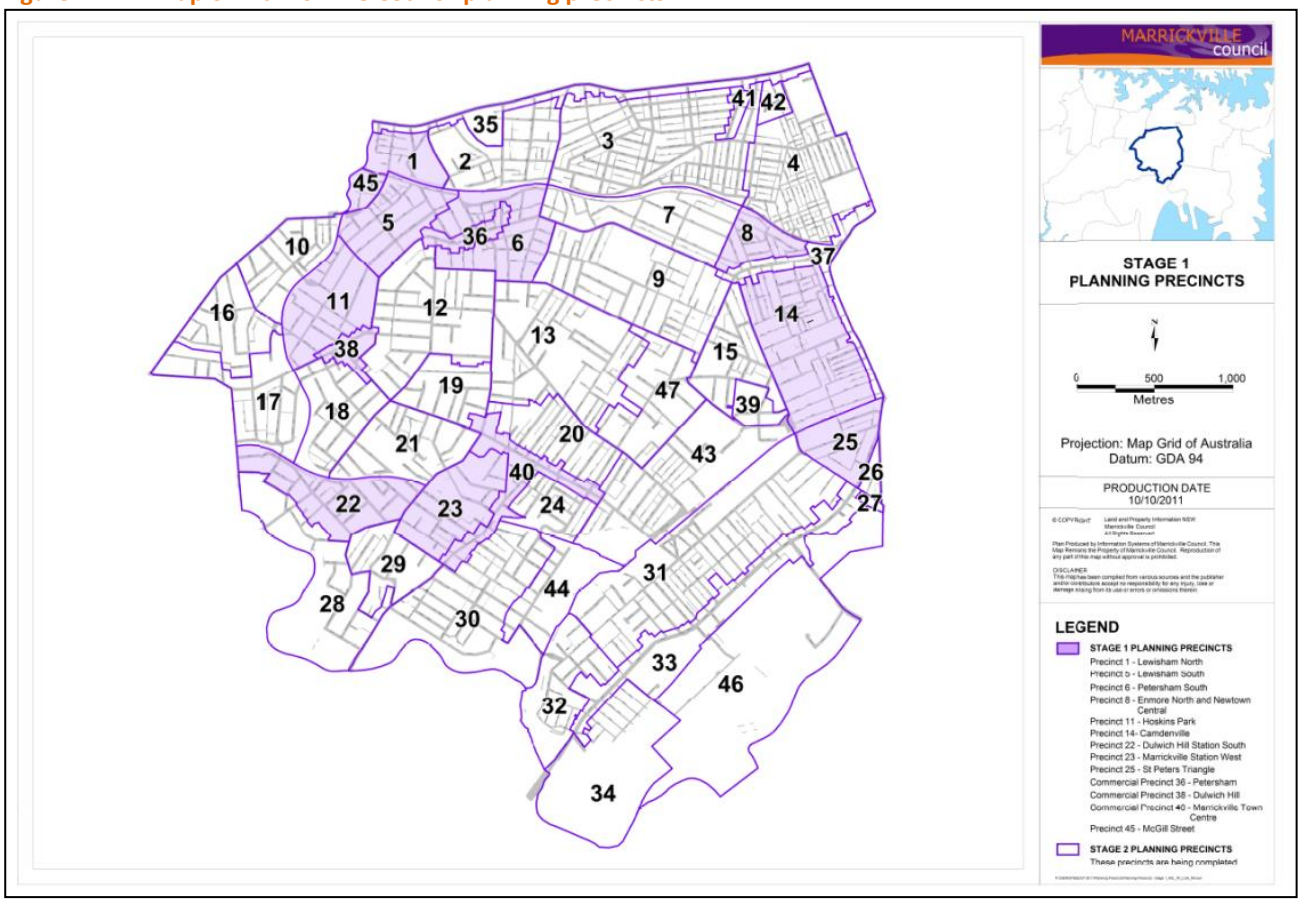
Future traffic conditions were examined as an estimate of increase in traffic volumes. Future traffic volumes are generally a contribution of two main inputs:

- Volumes generated from growth within the defined LATM area due to development,
- Volumes generated from growth from outside the defined LATM area including vehicles passing through the area and a product on the growth in the Sydney basin population.

4.1 Marrickville LEP

Part 9 of the DCP divides the Marrickville Local Government Area (LGA) into 47 planning precincts. The breakdown of the Planning Precincts in Marrickville Council is identified in Figure 4.1 below.

Figure 4.1: Map of Marrickville Council planning precincts



The Marrickville East LATM includes parts of four planning areas including

- Enmore Park (Precinct 15),
- Marrickville Metro (Precinct 39),
- Sydney Steel (Precinct 43),
- Victoria Road (Precinct 47).

Marrickville's LEP provides details on the future planning direction for land use in the Council area. The LGA is divided into various land use zones which allow Council to plan future development. The Marrickville East area is divided into a number of zones including:

- Zone R1 General Residential
- Zone R2 Low Density Residential
- Zone B1 Neighbourhood Centre
- Zone B2 Local Centre
- IN1 General Industrial
- RE1 Public Recreation
- RE2 Private Recreation
- SP1 Special Activities
- SP2 Infrastructure.

It is noted that more than 50% of the study area is classified as industrial land use, primarily in the southern area with the area in the north (primarily north of Victoria Road) being residential in use. See Figure 4.2 and Figure 4.3 below for details of the zoning for the Marrickville East study area.

Figure 4.2: Marrickville Local Environment Plan Zoning Map for Marrickville East

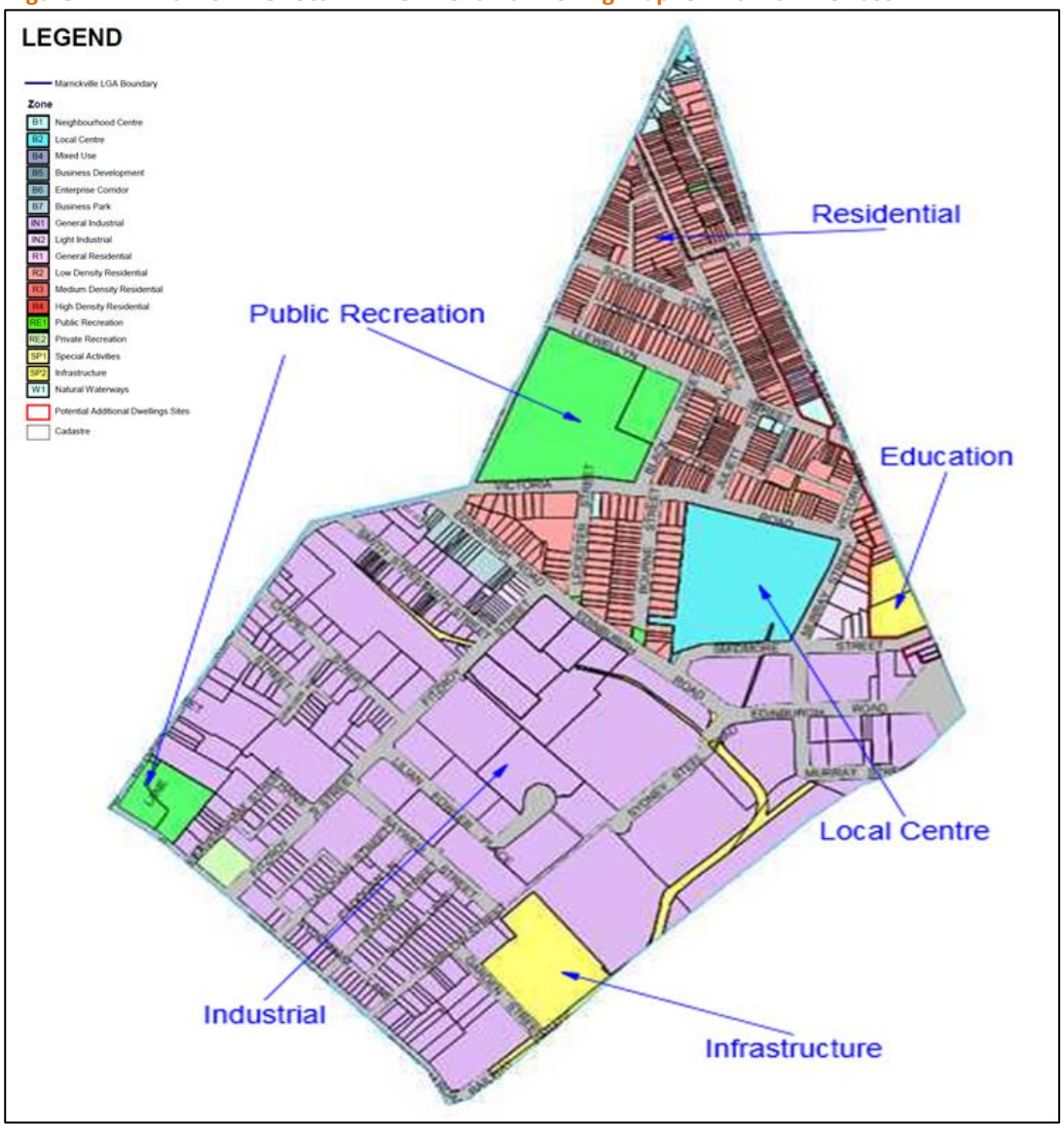
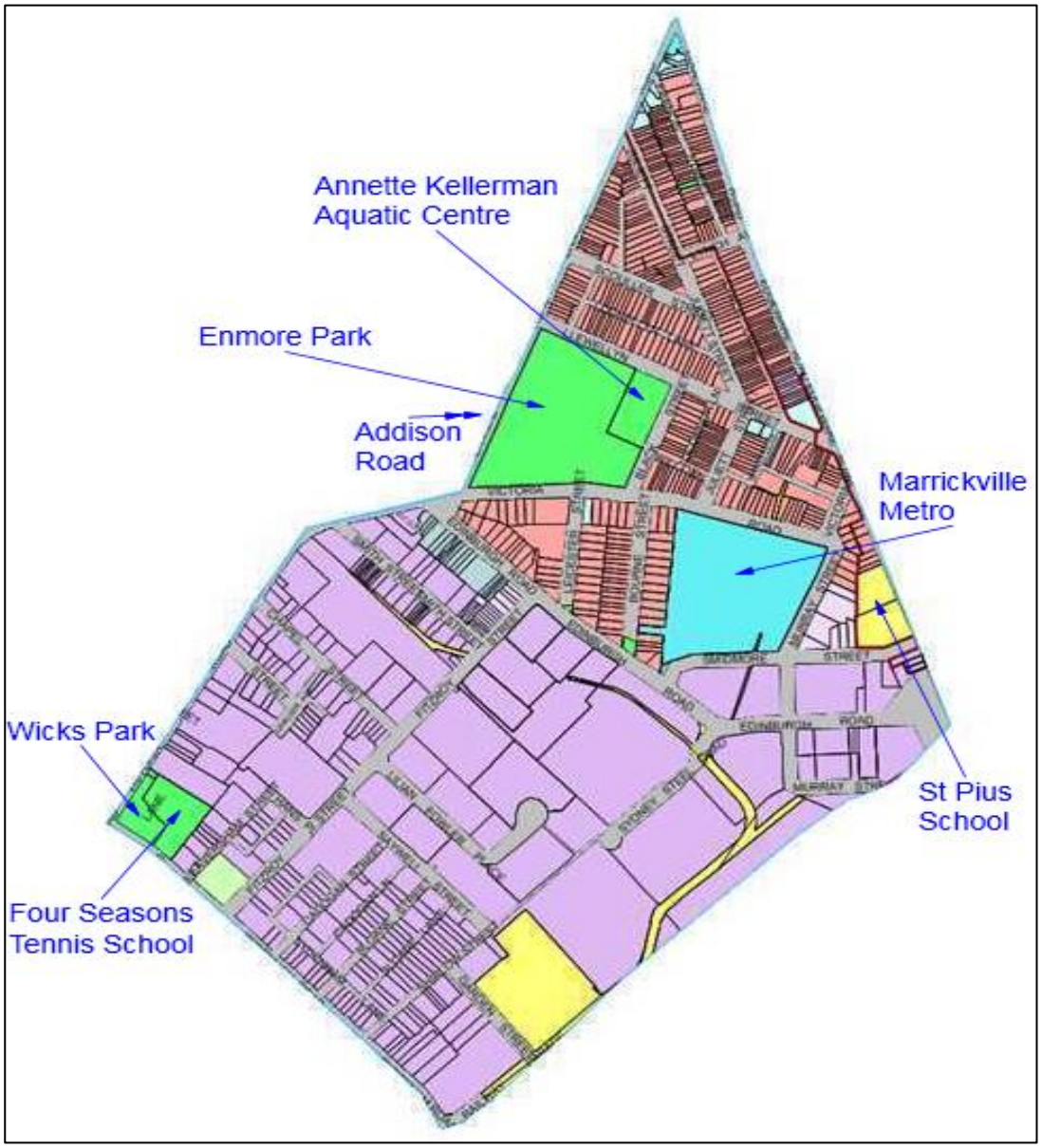


Figure 4.3: Marrickville East Landmarks



A description of the land zones contained within the Marrickville East study area, is provided as follows:

- Zone R1 - R1 General Residential: This zone is to provide for a broad variety of residential densities and housing types, including 'dwelling houses,' 'multi-dwelling housing,' 'residential flat buildings,' 'boarding houses' and 'seniors housing'. The zone also includes additional uses that provide facilities or services to residents, including 'neighbourhood shops,' 'community facilities,' 'child care centres' and 'respite day care centres.' If a particular type and consistent density of residential development is desired it is better to use a more tailored residential zone such as R2, R3 or the R4 zone. There is a small amount of land on Edgeware Road zoned as R1.
- Zone R2 Low Density Residential - This zone is intended to be applied to land where primarily low density housing is to be established or maintained. Typically the zone features detached dwelling houses, but it may be appropriate to include 'dual occupancy' (attached or detached) or some 'multi-dwelling housing.' This is the lowest density urban residential zone and the most restrictive in terms of other permitted uses considered suitable. These are generally restricted to facilities or services that meet the day-to-day needs of residents. This zone is generally not suitable adjacent

to major transport nodes or larger activity centres where residential densities should be higher. This land zoning makes up the second largest area of the Marrickville East LATM study area including most land north of Edinburgh Road.

- Zone B1 Neighbourhood Centre : B1 Neighbourhood Centre: The zone is for neighbourhood centres that include small-scale convenience retail premises ('neighbourhood shops'), 'business premises,' 'medical centres' and community uses that serve the day-to-day needs of residents in easy walking distance. 'Shop top housing 'is permitted in the zone, and other mixed use development may be considered appropriate. This zone should not be used for single 'neighbourhood shops,' as these can generally be permitted within the residential zones. In areas where there is increasing housing density and demand for local retail and business services, a B2 or B4 zone should be considered instead of a B1 zone to cater for expansion. This type of zoning occurs along a small section along the western side of Enmore Road (near Stanmore Road) and in isolated locations along Llewellyn Street.
- Zone B2 Local Centre: This zone is generally intended for centres that provide a range of commercial, civic, cultural and residential uses that typically service a wider catchment than a neighbourhood centre. This zone provides for residential accommodation in the form of 'shop top housing,' and other uses such as 'educational establishments,' 'entertainment facilities,' 'function centres,' 'information and education facilities,' 'office premises,' and 'tourist and visitor accommodation.' Such a mix of uses will increase walking, cycling and public transport options for more people by making more activities available in one location. It is expected that this will be the most appropriate zone for most local and town centres across NSW. This type of land zoning includes the current Marrickville Metro site and the land occupying the furthermost north land adjacent to the Enmore Road /Stanmore Road / Edgeware Road intersection.
- IN1 General Industrial: This zone is generally intended to accommodate a wide range of industrial and warehouse uses and includes 'general industry,' 'high technology industries,' 'industrial training facilities' and 'depots.' This zone would be suitable where a council wishes to have a range of industrial land uses and other compatible land uses generally catered for in an industrial zone. In 2011, a new objective was added to highlight that the purpose of industrial zones is to support and protect industrial land for industrial uses. This land zoning makes up the largest area of the Marrickville East LATM study area including most land south of Edinburgh Road.
- RE1 Public Recreation: This zone is generally intended for a wide range of public recreational areas and activities including local and regional parks and open space. The uses may include 'recreation facilities,' 'community facilities' such as lifesaving clubs, 'environmental facilities,' 'environmental protection works' and other uses compatible with the primary use of the land. There are two large parks (Enmore Park and Wicks Park) that fall into this category along with three pocket parks in Leicester Street, Bourne Street and Francis Street respectively.
- RE2 Private Recreation: This zone is generally intended to cover a wide range of recreation areas and facilities on land that is privately owned or managed. The use of facilities developed on this land may be open to the general public or restricted e.g. to registered members only. Private recreation may include racecourses, golf clubs, bowling clubs, rifle ranges, speedways, tennis complexes and other sporting or recreational facilities which may be on significant parcels of privately owned land, or on land leased from councils or State authorities. This includes Marrickville Bowling club located at the corner of Sydenham Road and Fitzroy Street.
- SP1 Special Activities: This zone is generally intended for land uses or sites with special characteristics that cannot be accommodated in other zones. Some examples of where this zone

may be suitable include land on which there is, or is proposed to be, large complexes such as a major scientific research facility or communications establishment, or an international sporting facility. This zone is not the same as traditional Special Uses zones that appear in a number of non-Standard Instrument LEPs. For example, a school or fire station can generally be accommodated in a Local Centre or Mixed Use Business zone. The permitted use is to be annotated on the map. The use annotated on the map, along with any development that is ordinarily ancillary to that use will be permitted with or without consent. Other development generally permitted in the zone (e.g. roads) would also be permitted. This land use includes a stormwater management system which runs through the industrial area from Smith Street to Garden Street, adjacent to Sydenham Station.

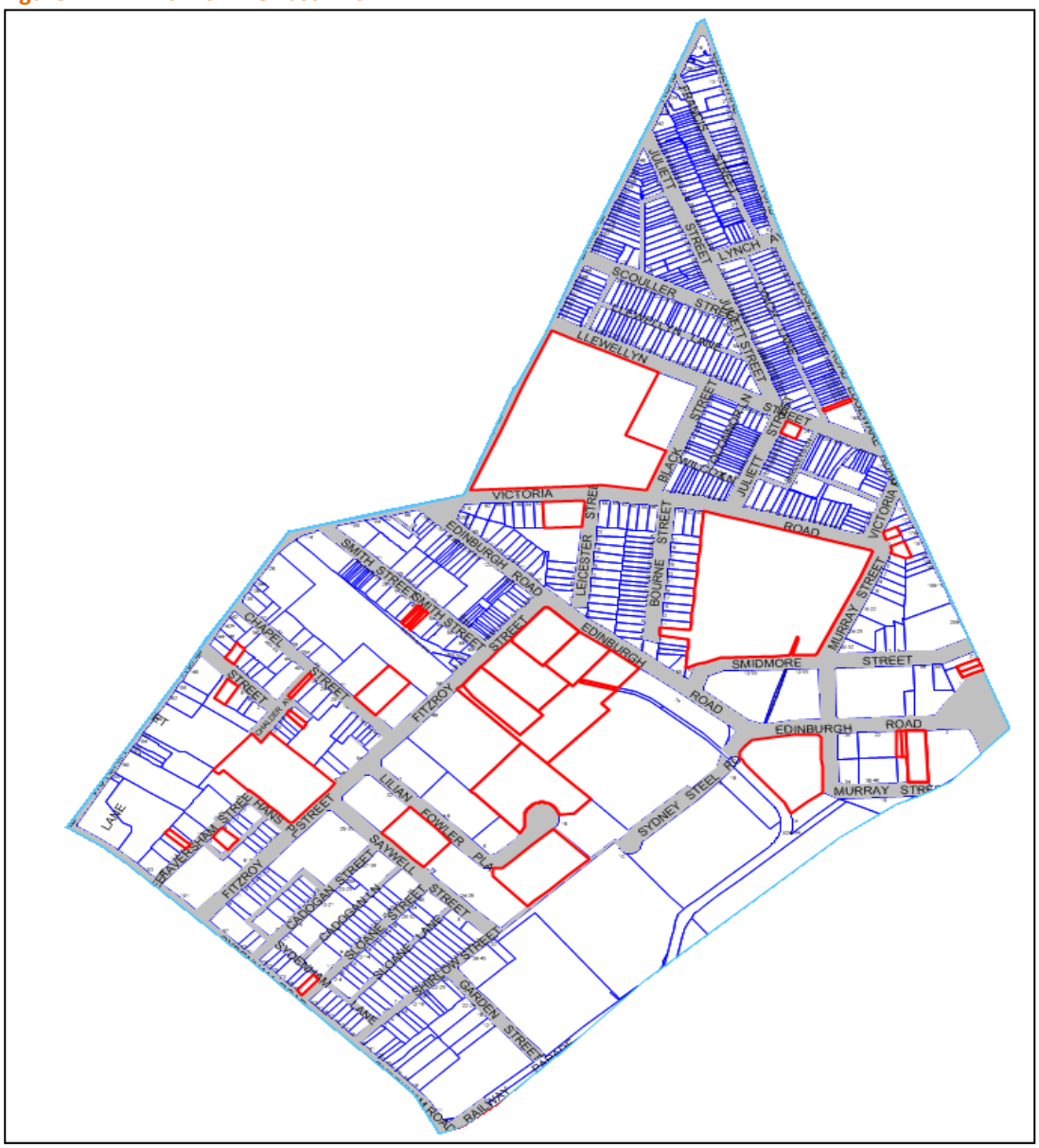
- SP2 Infrastructure: Infrastructure land that is highly unlikely to be used for a different purpose in the future should be zoned SP2, for example 'cemeteries' and major 'sewage treatment plants.'
- It may also be appropriate for major state infrastructure or strategic sites such as major 'hospitals,' large campus universities/TAFEs, major dams, power stations, landfill or waste disposal sites, 'correctional centres,' and 'airports.' Areas of Commonwealth land used for Defence purposes should be zoned SP2 (Defence). A small minority of 'schools' across NSW may also be considered a strategic site. This land use includes St Pius Catholic School on Edgeware Road north of Smidmore Street.

4.2 Redevelopment Proposal

An assessment of the major developments within the study area has been undertaken within the Marrickville East LATM area between 2000 and 2015.

Figure 4.4 below maps the Development Applications (DAs) in Marrickville East LATM area since 2000. More than 25 developments have occurred in the study area since 2000.These development led to additional traffic generation within the study area.

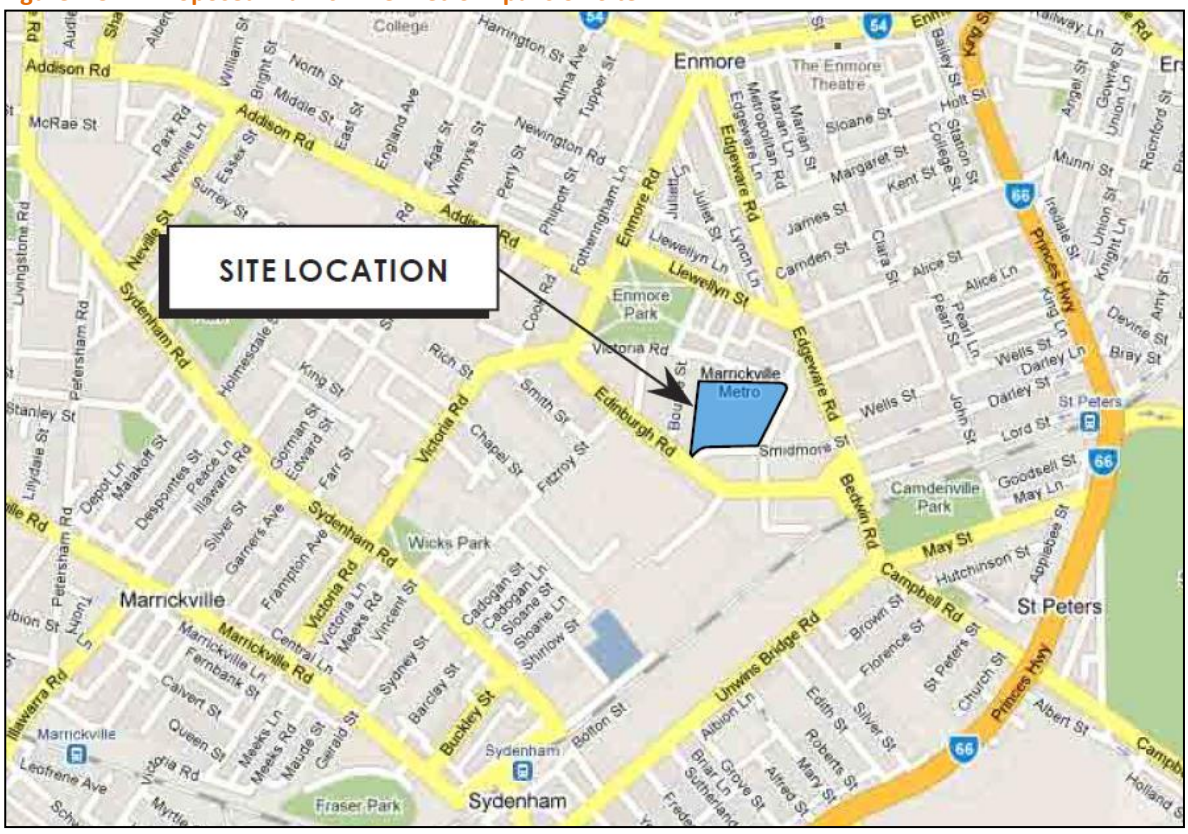
Figure 4.4: Marrickville East DAs



4.2.1 Marrickville Metro Expansion

A major development is planned with the expansion of the Marrickville Metro Shopping Centre. See Figure 4.5 below for details of the proposed Metro expansion site.

Figure 4.5: Proposed Marrickville Metro Expansion Site



Stage 1 will be built on the other side of Smidmore Street, where there is currently an industrial building. This stage will comprise:

- A new two level retail building of approximately 10,000 square metres
- An additional supermarket, mini major, food market and additional specialty retail stores
- Two new levels of car parking above the retail building
- A new loading dock, away from residential areas
- Improved public transport for public buses, community buses and taxis

Stage 2 will be built above the existing centre and will be approximately 6,000 square metres. This stage will:

- Be set well back from residential areas along Victoria Road, Murray Street and Bourne Street and has been designed to minimise overshadowing and protect residents' privacy.
- Include an additional discount department store, additional specialty retail and car parking above the retail building
- Relocate loading docks on Murray Street away from residential areas

Because of the significance of this development several traffic impact assessments were undertake to ascertain and determine appropriate mitigation measures were put in place. Halcrow were engaged by the developer to study the traffic impact assessment. Council engaged consultants Transport and Urban Planning' (TUP) to review the assessment by Halcrow.

Based on the Halcrow assessment, and in accordance with the RTA Guide to Traffic Generating Developments, the proposal is expected to generate a total of 1573 vehicles on a Thursday evening and 2573 vehicles on a Saturday midday period. This will be an increase of 532 vehicles per hour on Thursday

evening and 938 vehicles per hour on Saturday midday. Based on the traffic generation modelling of the development, the following list summaries the civil, traffic and transport works needed to be undertaken to maintain the service ability of the Marrickville East local and regional road network following the impact of the development. The improvement will be undertaken at no cost to Council and to Council's satisfaction.

The proposed transport improvements recommended as part of the TMAP include:

- New bus stops (for 3 buses) and a new bus terminal (shelter etc.) in Edinburgh
- Road to replace the existing facilities in Smidmore Street;
- Improvements to pedestrian routes around the shopping centre including to Sydenham and St Peters rail stations;
- Improvements to local footpaths for pedestrians;
- New dedicated bicycle parking for cyclists and proposed improvements, or connections to, local bike routes;
- A new taxi rank with a shelter and seats to replace the existing one in Smidmore Street;
- Provision of dedicated car share spaces within the new car park to encourage car sharing; and
- A Green Travel Plan.

The proposed road improvements include:

- Edgeware Road, Alice Street and Llewellyn Street intersection – Extend the length of existing parking restrictions on the Edgeware Road southbound approach and the Alice Street approach during peak periods;
- Unwins Bridge Road, Bedwin Road, May Street and Campbell Street intersection – Extend parking restrictions to create a dedicated left slip lane on the Unwins Bridge Road eastbound approach and a dedicated right-turn lane on the May Street westbound approach (with associated right-turn priority signal phase);
- Edinburgh Road, Edgeware Road and Bedwin Road intersection – Directional signage to encourage drivers to avoid the right-turn on to Bedwin Road in favour of using the Railway Parade underpass and left-turn on to Bedwin Road;
- Edinburgh Road and Sydney Steel Road intersection – provide a new roundabout;
- Two thresholds in Victoria Road, at the entry (at the intersection with Murray Street) and in the middle of the block (indicative location west of 37 Victoria Road); and
- Works to prevent vehicles over 8.8 metres in length from accessing Victoria Road via the intersection of Victoria Road and Murray Street and signage to prevent shopping centre delivery vehicle over 6 metres in length from accessing the site via the intersection of Victoria Road and Murray Street.

Since the commencement of this LATM report the development proposal has received development consent. Development consent was issued by the Minister for Planning and Infrastructure on the 19 March 2012.

4.2.2 Other Developments

74 Edinburgh Road Development

The develop has proposed a demolish of existing improvements and Torrens title subdivision of the site into 2 allotments and construct and fit out a 13,350 sqm Masters Home Improvement store including on

Lot 1 and 10 industrial units on Lot 2, with the associated vehicle access, loading, car parking and landscaping.

Determination was made in October 2015 by the Sydney East Joint Regional Planning Panel (JRPP) that accepts the recommendation to approve the development application subject to a series of conditions of consent.

It is proposed that entrance to the site would be via an additional leg being added to the traffic signals at Edinburgh Road and Smidmore Street. Consultants Colston Budd Hunt and Kafes Pty Ltd was engaged to model the impact of the development on the local road network. Colston Budd Hunt and Kafes Pty Ltd estimated that the proposed development might generate an additional 330 vehicles per peak hour on the weekend and 830 vehicles during peak hour on the weekend. Colston Budd Hunt and Kafes Pty Ltd modelled the impact of the additional traffic Included the proposed upgraded signalised intersection at Edinburgh Road / Smidmore Street would operate with average delays of less than 40 seconds per vehicle during peak periods. This represents level of service C with satisfaction

WestConnex

WestConnex is a motorway scheme currently in the detailed design stage. The scheme encompasses widening and extension of the M4 Western Motorway, a new section for the M5 South Western Motorway, and a new bypass of the Sydney CBD connecting the M4 and M5. The scheme is expected to significantly produce high levels of population and employment growth and changing land use driving further forecast growth along the proposed corridor.

A major interchange is proposed at St Peters, to the south of Sydney Park, providing the major access between WestConnex and Sydney Airport and Port Botany, as well as inner west suburbs. The strategic traffic forecasting model developed by RMS indicates a reduction of through traffic from local roads. However concerns are raised by the community that the traffic conditions in the road network within Marrickville LGA will be adversely worsened, due to the congested citybound traffic in peak periods. As lack of full details of environmental impact statements, it is too early to conclude the impacts of the WestConnex scheme on Marrickville local area. Further investigation or actions will be considered and taken, if traffic conditions change.

4.3 Intersection Analysis

The operation of 15 intersections was examined by Transport & Urban Planning (TUP) at the request of Council in 2010. The intersections were modelled using SIDRA INTERSECTION, a computer based modelling package which calculates intersection performance. The intersections were based on projected future growth to 2031 and included estimated traffic generation resulting from the Marrickville Metro expansion. Table 4.1 below presents a summary of the future operation of the key intersection.

Table 4.1: Future Intersection Operating Conditions 2031

Intersection	Control	Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Level of Service (LOS)	Average Delay per vehicle (secs/veh)
		AM Peak		PM Peak		Saturday Peak	
Stanmore Rd / Enmore Rd	Signals	F	>100	F	>100	F	>100
Enmore Rd / Addison Rd	Signals	F	>100	C	35.4	C	35.7
Enmore Rd / Llewellyn St	Signals	n/a	n/a	B	29.2	B	34.0
Victoria Rd / Edinburgh Rd	Signals	n/a	n/a	C	31.4	C	33.9
Edgeware Rd / Alice St/ Llewellyn St	Signals	n/a	n/a	E	61.4	E	58.5
Edgeware Rd / Victoria Rd	Signals	n/a	n/a	D	43.3	D	44.9
Edinburgh Rd / Fitzroy St	ROUNDABOUT	n/a	n/a	C	41.0	B	17.1
Fitzroy St / Sydenham Rd	SIGNS	n/a	n/a	A	12.1	A	12.4
Edinburgh Rd / Smidmore St	SIGNALS	n/a	n/a	B	21.6	D	46.9
Smidmore St / Murray St	ROUNDABOUT	n/a	n/a	A	11.6	A	14.3
Edinburgh Rd / Sydney Steel Rd	ROUNDABOUT	n/a	n/a	A	13.8	A	12.3
Edinburgh Rd / Murray St	ROUNDABOUT	n/a	n/a	A	8.0	A	12.4
Edinburgh Rd / Railway Pde	ROUNDABOUT	n/a	n/a	A	12.0	A	10.2
Edinburgh Rd/ Bedwin St	SIGNS	n/a	n/a	C	35.4	C	36.7
Bedwin Rd / Unwins Bridge Rd / Campbell Rd / May St	SIGNALS	n/a	n/a	C	32.2	C	29.1

# Denotes proposed intersection upgrade design as part of proposed Marrickville Metro works

Table 4.1 indicates that the majority of intersections will operate with spare capacity during most times of the day, even with expected traffic volume increases as of 2031. The exceptions include:

- Edgeware Rd / Alice St/ Llewellyn St intersection.
- Edinburgh Rd / Sydney Steel Rd intersection.
- Bedwin Rd / Unwins Bridge Rd / Campbell Rd / May St intersection.
- Stanmore Rd / Enmore Rd intersection.
- Enmore Rd / Addison Rd intersection.

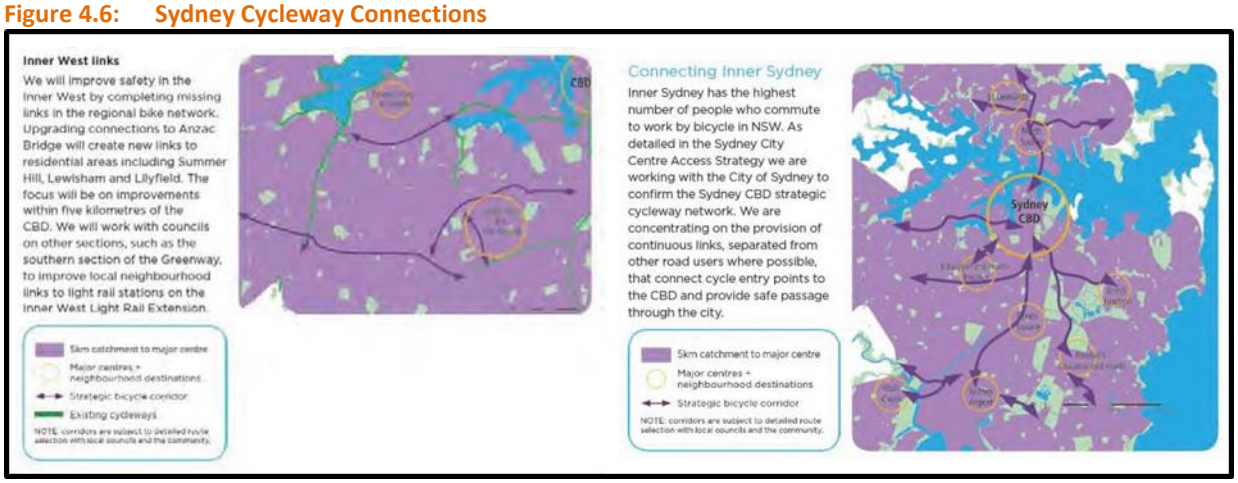
It is noted that Edgeware Rd / Alice St/ Llewellyn St intersection, Edinburgh Rd / Sydney Steel Rd intersection and Bedwin Rd / Unwins Bridge Rd / Campbell Rd / May St intersections are planned to be upgraded as part of the proposed expansion of the Metro due to the increase in traffic generated through the redevelopment.

The intersections of Stanmore Rd / Enmore Rd, and Enmore Rd / Addison Rd are forecast to be at capacity in 2031. The intersections of Edgeware Rd / Victoria Rd and Edinburgh Rd / Smidmore St are proposed to be near capacity at 2031 and further attention may be required.

4.4 Future Bicycle Network

In December 2013, Transport for NSW released the Sydney Cycling Future, a document for the strategic approach for the provision of cycling infrastructure in the city. Sydney's Cycling Future outlines how we will improve the bicycle network and make sure that the needs of bike riders are built into the planning of new transport and infrastructure projects. The state government is planning to invest in state priority corridors to safely link inner Sydney customers to Sydney's CBD from the north, east, south and west. This includes connections to North Sydney, St Leonards and Chatswood; Bondi Junction and Randwick; Green Square and the Airport; and inner west suburbs. The state government is planning to work with councils to connect networks within five kilometre catchments of Sydney's other major centres. Marrickville LGA has been identified as a strategic part of the Sydney bicycle network which links Inner Sydney with the Inner West. Details of the importance of the Marrickville LGA in connecting Sydney as a whole to cycling are detailed in Figure 4.6 below which details plans to connect Marrickville with the Inner Sydney area and Inner west region.

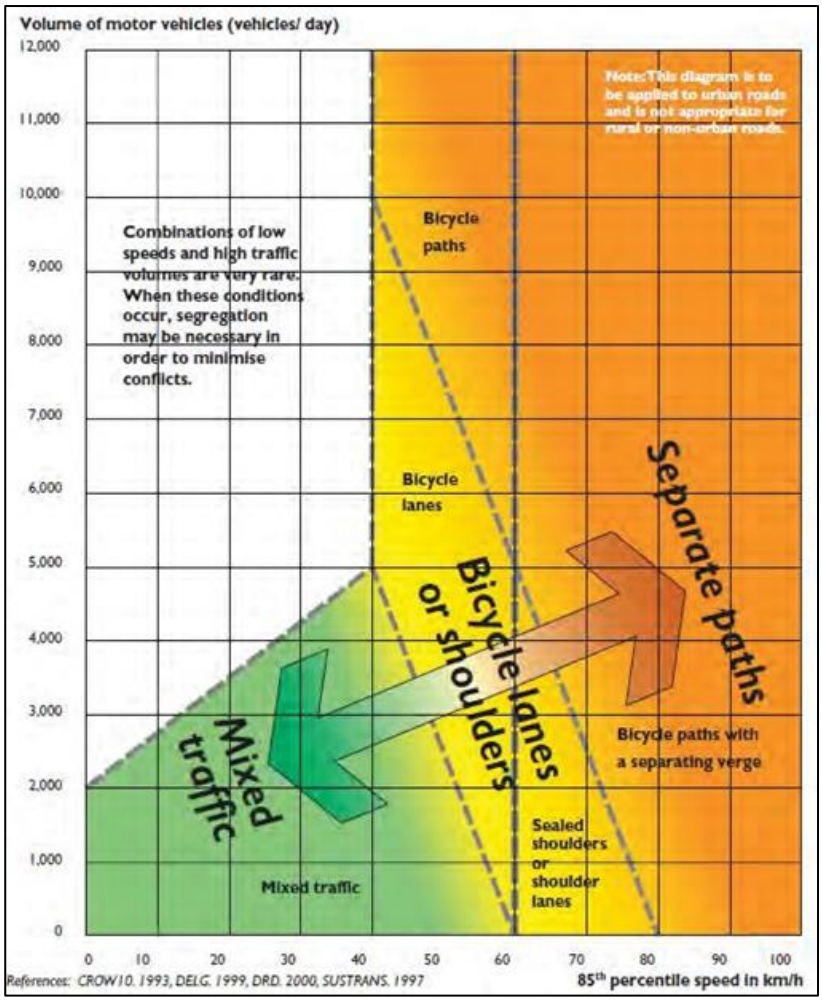
Figure 4.6: Sydney Cycleway Connections



Source: SYDNEY'S CYCLING FUTURE DECEMBER 2013

In addition, Sydney Cycling Future places more emphasis on selection of the correct form of cycleway facility and greater planning before construction. To the present day, the NSW Bicycle Guideline is used to provide an assessment for the selection of appropriate cycleway treatment. Depending on the traffic volumes and speeds, this guideline is used in selecting appropriate treatment whether it will be separated cycle paths, on- road bicycle lanes or mixed traffic. See Figure 4.7 below for details of the assessment methodology.

Figure 4.7: NSW Cycleway Guidelines Selection of Appropriate Facility



Source: NSW Bicycle Guidelines 2005

Most recently, the Sydney Cycling Future document promotes a new way of selecting bicycle facilities with more emphasis placed on customer preferences with particular reference to customers feeling of safety and comfort with the clear implication being that comfort affects usage. Sydney Cycling Future documents a clear preference for greenway cycleway or on road separate cycleway, which is consistent with the recently completed Carrington Road cycleway within Marrickville LGA. See Figure 4.8 below for details of the Infrastructure to match customer needs survey.

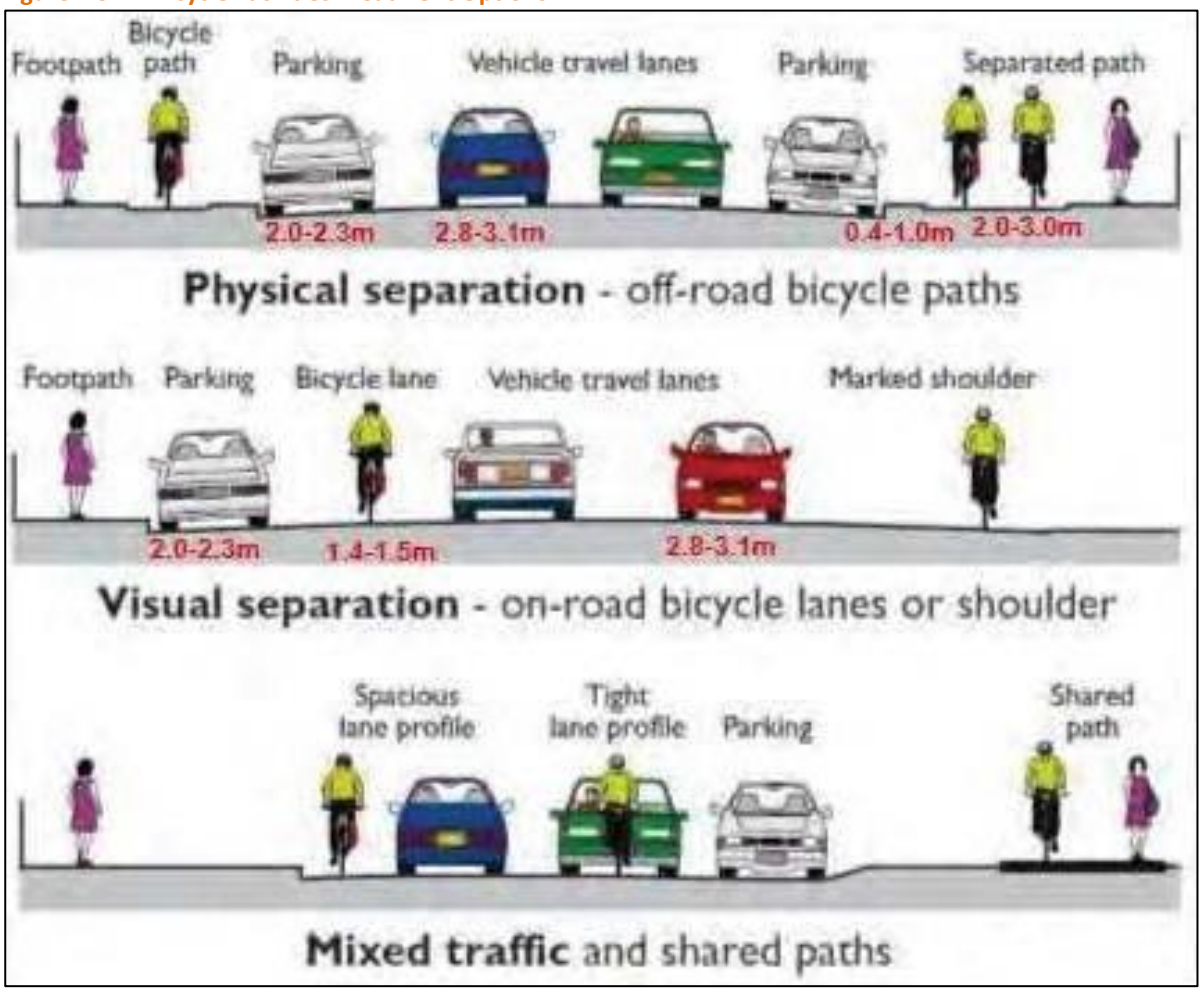
Figure 4.8: Infrastructure to match customer needs – Sydney Cycling Future 2013

Source: SYDNEY'S CYCLING FUTURE DECEMBER 2013

How cycle facilities may be integrated into the Local Area Traffic Environment must be carefully considered. Before deciding what type of bicycle facilities treatment may be applies to a given street cross section, careful consideration should be given to the full range of physical and operational parameters. Because the street environment can change greatly, even within the block, it is important to consider that a single solution may not be appropriate and the final bicycle route design may incorporate many different treatments in response to changing street conditions and opportunities.

Figure 4.9 below considers some treatment options based on the cross section width of a street.

Figure 4.9: Bicycle Facilities Treatment Options



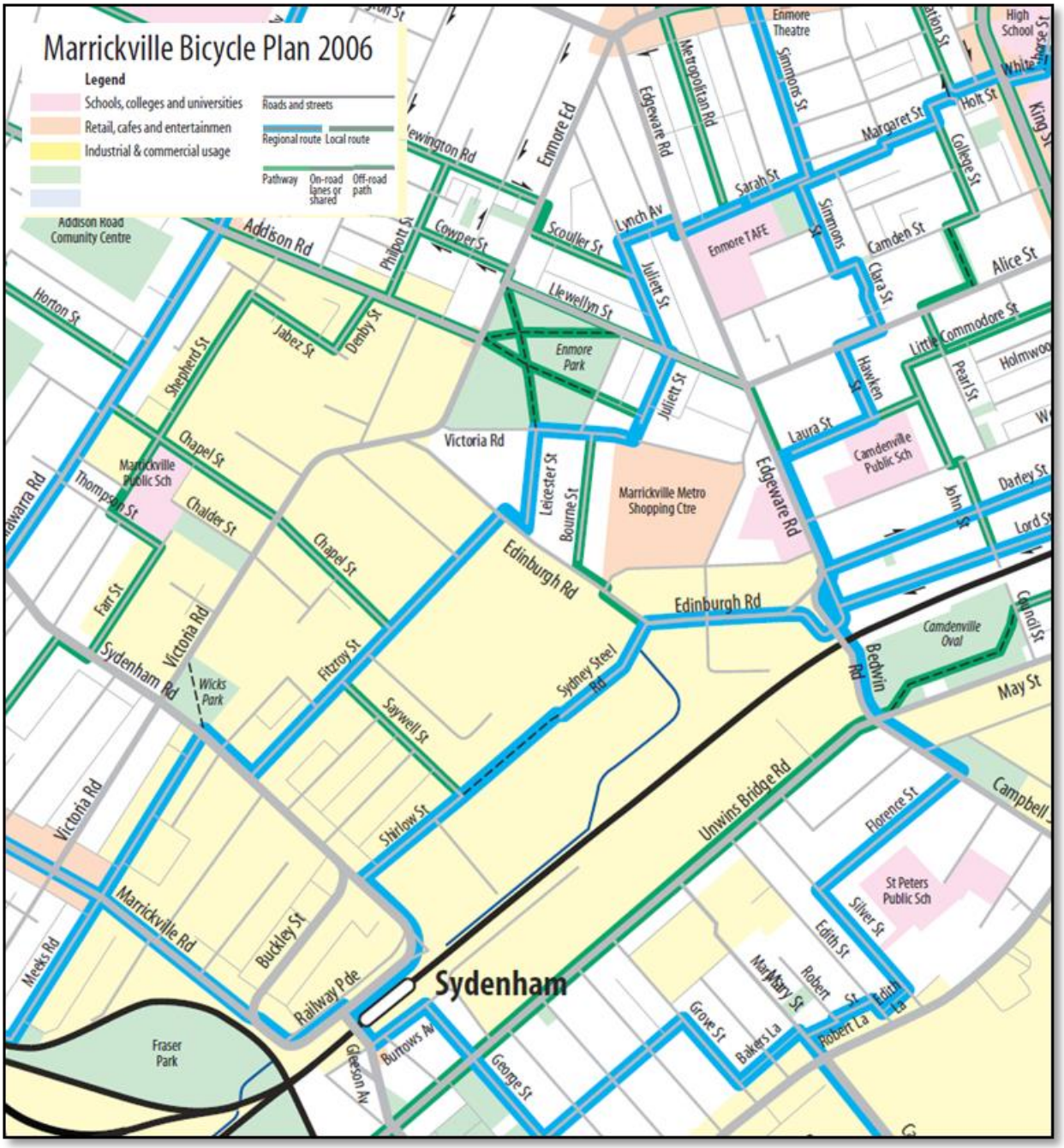
It is important to note that the installation of even separated cycleway facilities on street does not have to come at the expense of on-street parking. It should however be noted that the loss of some parking to accommodate cycle facilities should not be automatically excluded where it can be demonstrated that there are clear safety benefits obtained or where it is demonstrated that the benefits of increased cycling meets Council's Strategic Plan of:

- Marrickville's roads are safer and less congested
- Marrickville's streets, lanes and public spaces are sustainable, welcoming, accessible and clean
- The community walks, ride bikes and use public transport

In addition to funding from the State Government, Marrickville Council supports the introduction of bicycle facilities. These are supported from an annual budget for bicycle facilities, but also from the Connecting Marrickville integrated place planning which includes LATM schemes. It is vital that a LATM scheme be designed to cater for Active Transport needs including cycling and pedestrian facilities and not be excluded by other traffic objectives which limit retrofitting of facilities at a later stage.

The Marrickville Bicycle Strategy (2007) details a number of bicycles routes currently in the Marrickville East study area incorporating regional and local routes which should be considered as part of the recommendations of the Marrickville East LATM and Council's bicycle program. The proposed local bicycle routes (Green Link) and regional route (Blue Link) are shown in Figure 4.10 below.

Figure 4.10: Proposed Local and Regional Bicycle Network



The proposed local cycle routes in the Marrickville East area comprise of the following streets:

- Saywell Street
- Chapel Street
- Edinburgh Road
- Bourne Street
- Llewellyn Street
- Scouller Street

The proposed regional cycle routes in the Marrickville East area comprise of the following streets:

- Lynch Ave
- Juliett Street

- Fitzroy Street
- Leicester Street
- Victoria Road
- Shirlow Street
- Sydney Steel Road

Routes through residential areas are primarily on-road and run north-south along local roads, although there are also links to local facilities including Marrickville Metro, Enmore Park and the industrial area of Fitzroy Street. As a general principle, where possible, installation of LATM treatments should not impede the same passage of cyclists in streets designated as existing or proposed bicycle routes and should help facilitate a lower speed environment which would encourage the use of bicycles.

5 Connecting Marrickville Principles

Connecting Marrickville (CM) aims to lead to a transformation of Council's approach to urban streetscape planning, design, delivery and maintenance so that:

- Streets and lanes are better places to live now and into the future
- People are connected to places and places with people
- Infrastructure is integrated across program areas rather than to consider LATM measures in isolation

With this in mind, a holistic approach to Marrickville East "the place" has been considered when considering treatment options. The need to not examine traffic calming in isolation but in the context of "place planning" is considered in this section such as:

- Water Sensitive Urban Design (WSUD)
- Street trees
- Sustainable streets
- Pedestrian Access and Mobility Plan (PAMP)
- Footpath upgrades
- Road upgrades
- Cycling
- Precinct Parking studies
- Public Domain considerations
- Waste Management

To assist in the process of Council collaboration, Council workshops were held to ensure that all the issues in the study area were considered.

5.1 Internal Council Workshop

An internal Council workshop was held on Wednesday, 24 July 2014. This workshop purpose was to gain insights from across Council with different discipline and area of expertise. During the workshop, a short presentation was given to outline the characteristics of Marrickville East LATM area and the nature of LATM treatment. And at the end of the presentation, feedback from different sections of Council was collected.

The main focus of information requested was:

- Current and on-going study within the study area
- Issues identified
- Solutions or recommendations

The main findings of the workshop were:

- Current and on-going study
    - Eastern Channel North (ECN) around Llewellyn/Victoria/Edinburgh Intersection
    - Eastern Channel East (ECE)Sub-catchment Plan and Flood Study, and drainage works to be developed

- Cycle connection between Sydenham station and Marrickville Metro via Sydney water land
- Marrickville Metro expansion-revitalise shops
- Edinburgh Road-redevelopment opposite Marrickville Metro
- Cycleway Railway Parade to Edinburgh Road
- Enmore Park-future drainage works
- Victoria Road precinct-rezoning to residential / mixed use
- Fitzroy Street – on footpath program 2017 / 18 also main cycle route
- Marrickville East Industrial Area – Employment and Land use study

- Issues in the area
  - Fast and heavy traffic at the intersection of Scouller Street and Juliett Street
  - Parking issue at intersection of Llewellyn Street and Juliett Street
  - Dangerous Intersection at Victoria Road / Enmore Road / Edinburgh Road
  - Unpleasant and inaccessible crossing at Llewellyn Street and Edgeware Road
  - Shirlow Street to Sydney Steel Road – poor linkage between pedestrian and cyclist
  - Poor permeability for cyclist, poor crossing points from industrial areas to metro, parks, pool and ARCC
  - Flooding at Edinburgh Road / Bedwin Road
- Solution and recommendation
  - Improve way finding connection to park and metro
  - Suggest use rain garden to slow traffic in Scouller Street and Juliett Street Intersection
  - Pedestrian Crossing at Edgeware Road near Llewellyn Street
  - Fitzroy Street – separated cycleway
  - Better connection to Enmore Park

5.2 On Road Car Parking

The Marrickville East study area is predominantly made up of industrial areas and some residential dwellings, some providing access to off-street parking, with many not. Observations indicate that there is an existing high day time demand for on-street parking within the study area particularly around Marrickville Metro and also within the industrial area.

5.3 Waste Management

Marrickville Council officers indicated that garbage collection is not generally problematic due to narrow streets or other obstructions in the Marrickville East LATM study area.

5.4 Public Domain Upgrade

The Marrickville Public Domain Concept Designs report (2012) sets out Council's vision to provide a consolidated planning and management direction that enables high priority short term works to be implemented as part of a holistic long term framework in relation to public domain upgrades including street and footway environments. The vision generally aims to apply a consistent pavement and kerbing approach; and simplify choice of material to open visual scale of pedestrian areas.

It should be noted that a number of public domain streetscape improvements masterplans are proposed for areas in the LGA including:

- Marrickville Town Centre
- Petersham Centre
- Dulwich Hill Shops
- Addison Rd Precinct
- Kings St / Enmore Rd

There is no public domain upgrade in the Marrickville East LATM area, however, the public domain upgrade at Addison Road Precinct will include Enmore Road and Victoria Road which is relevant to the Marrickville East LATM area.

This LATM study will take Public Domain Study (PDS) principles and initiatives into consideration in proposing for LATM treatment to align with the targets identified in PDS. It should also be noted that in the context of this report, LATM plays a significant role in the creation of a liveable and thriving public domain area supported by active transportation such as walking and cycling. LATM is particularly important in reducing vehicle volumes and speeds to create a liveable place.

5.5 Water Sensitive Urban Design (WSUD)

WSUD is the integrated design of the urban water cycle, incorporating water supply, wastewater, storm-water and groundwater management, urban design and environmental protection. It represents a fundamental shift in the way water and related environmental resources and water infrastructure are considered in the planning and design of cities and towns, at all scales and densities. WSUD aims to see all streams of water being managed as a resource, as they have quantitative and qualitative impacts on land, water and biodiversity, and the community's aesthetic and recreational enjoyment of waterways. This applies at all levels of urban water governance, i.e. community, institutional and government (Evaluating Options for Water Sensitive Urban Design – A National Guide, 2009).

Marrickville Council's Strategy for a Water Sensitive Community 2012-2021 drives Council's aim for a Water Sensitive Community. The implementation strategies include:

- Reduce potable water use
- Manage the stormwater system and its impacts on the urban environment
- Council to implement sustainable urban water management
- Implementation Plans – Sub-catchment, Assets, POMs, WSAP etc.

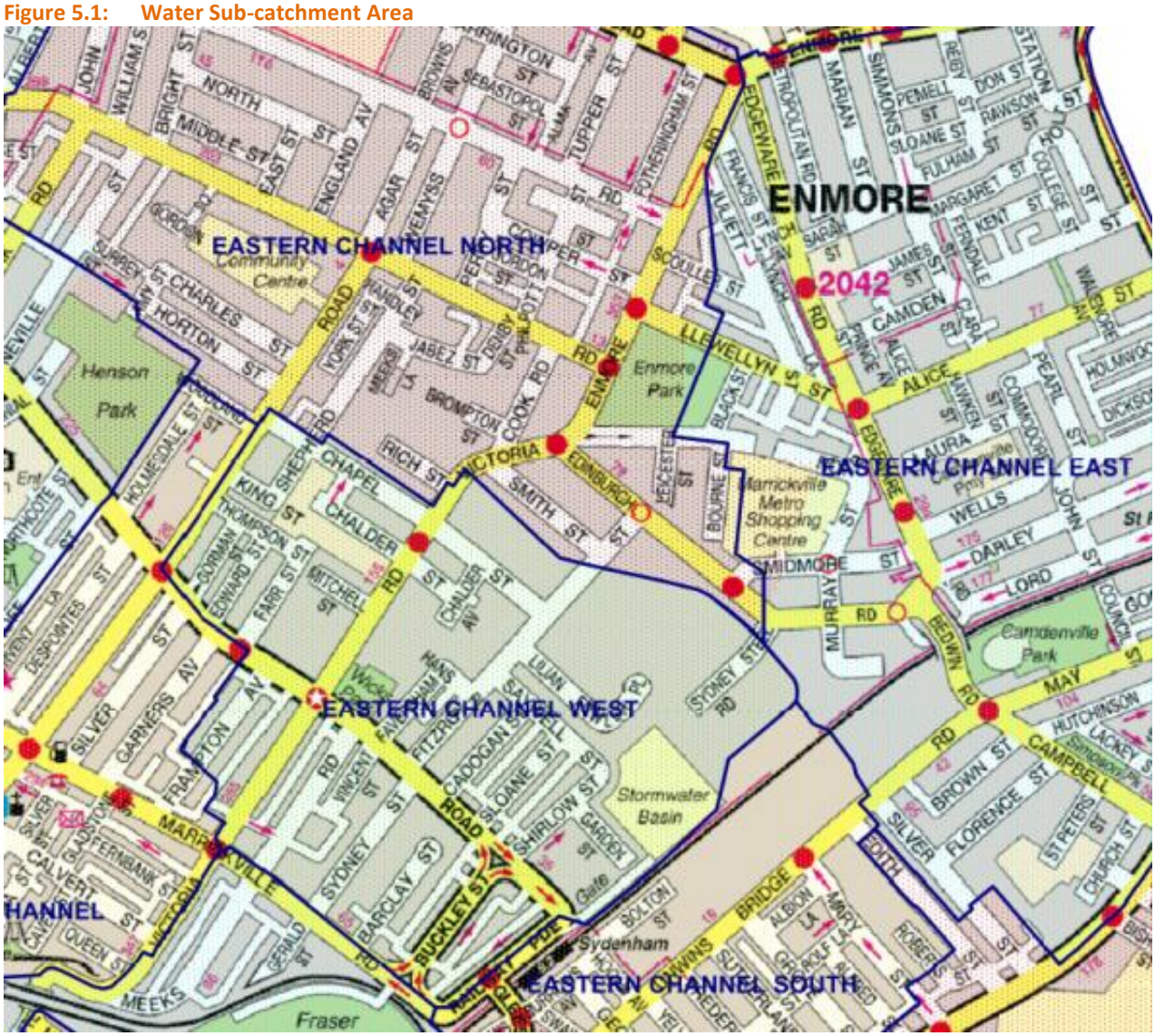
Marrickville LGA has been subdivided into 21 sub-catchments and Marrickville East LATM falls into 4 of them, which include (Figure 5.1:):

- Eastern Channel North
- Eastern Channel East
- Eastern Channel South
- Eastern Channel West

Possible linkage of WSUD and LATM treatments will need to be considered as part of the LATM Study. It should be noted that in the context of this report, LATM plays a significant role in providing opportunities

for WSUD treatment in roads. Kerb blisters, speed humps, intersection treatments, angle parking, road closures and pedestrian crossings provide excellent opportunities for street beautification and reduction of impermeable surface areas.

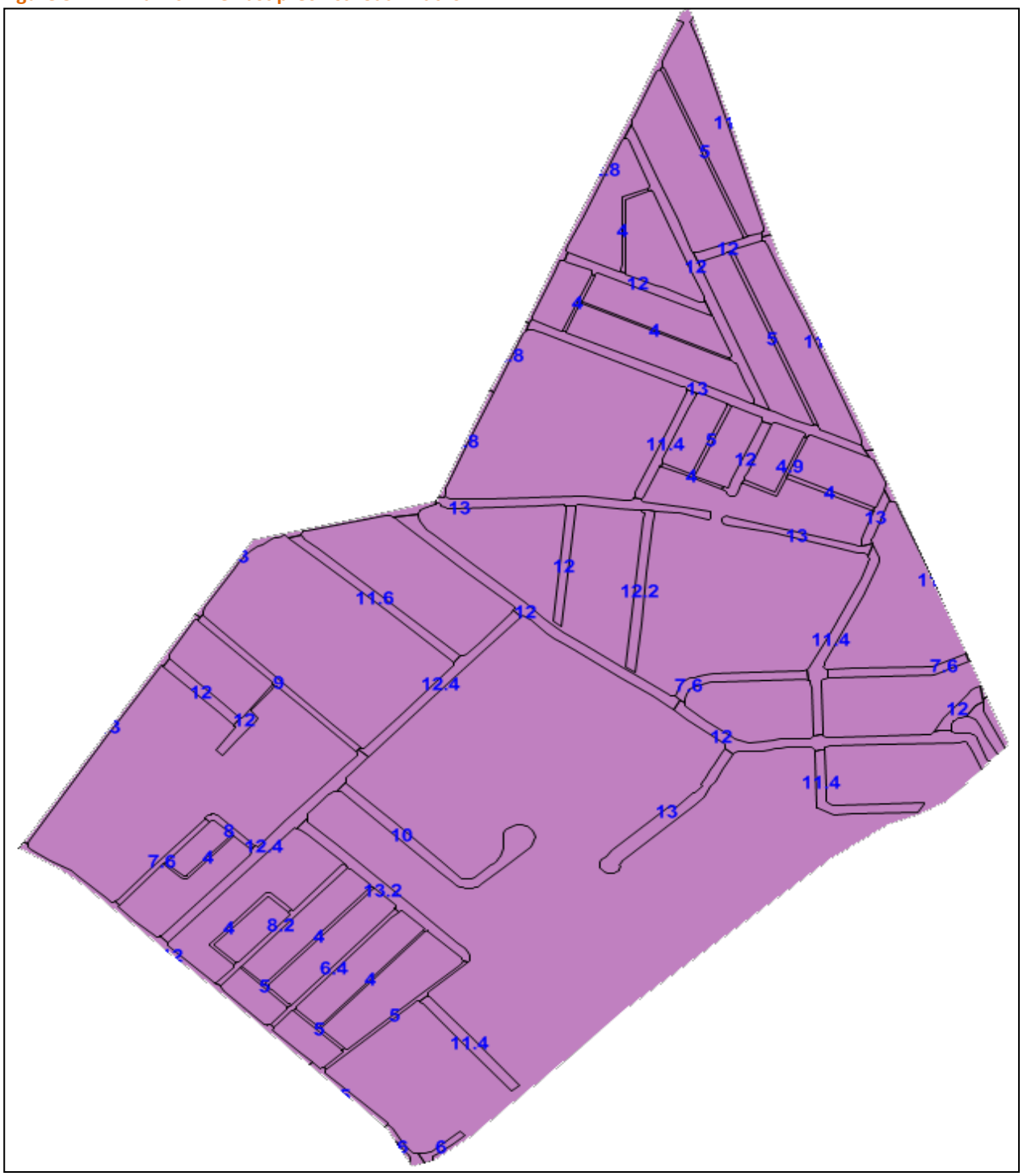
Figure 5.1: Water Sub-catchment Area



5.6 Streetscape Oppotunities

As part of the Connecting Marrickville program, streetscape opportunities which look at the use of space in the road reserve will be considered as part of the study. GIS mapping of averaged road width in the study area is shown in Figure 5.2: below. Possible treatments for wider streets (approximately > 12 m width) in Henson LATM area may include kerb blisters with rain gardens to reduce the impermeable surface, with grassed footpaths and median islands with rain gardens or angled parking.

Figure 5.2: Marrickville East precinct road widths



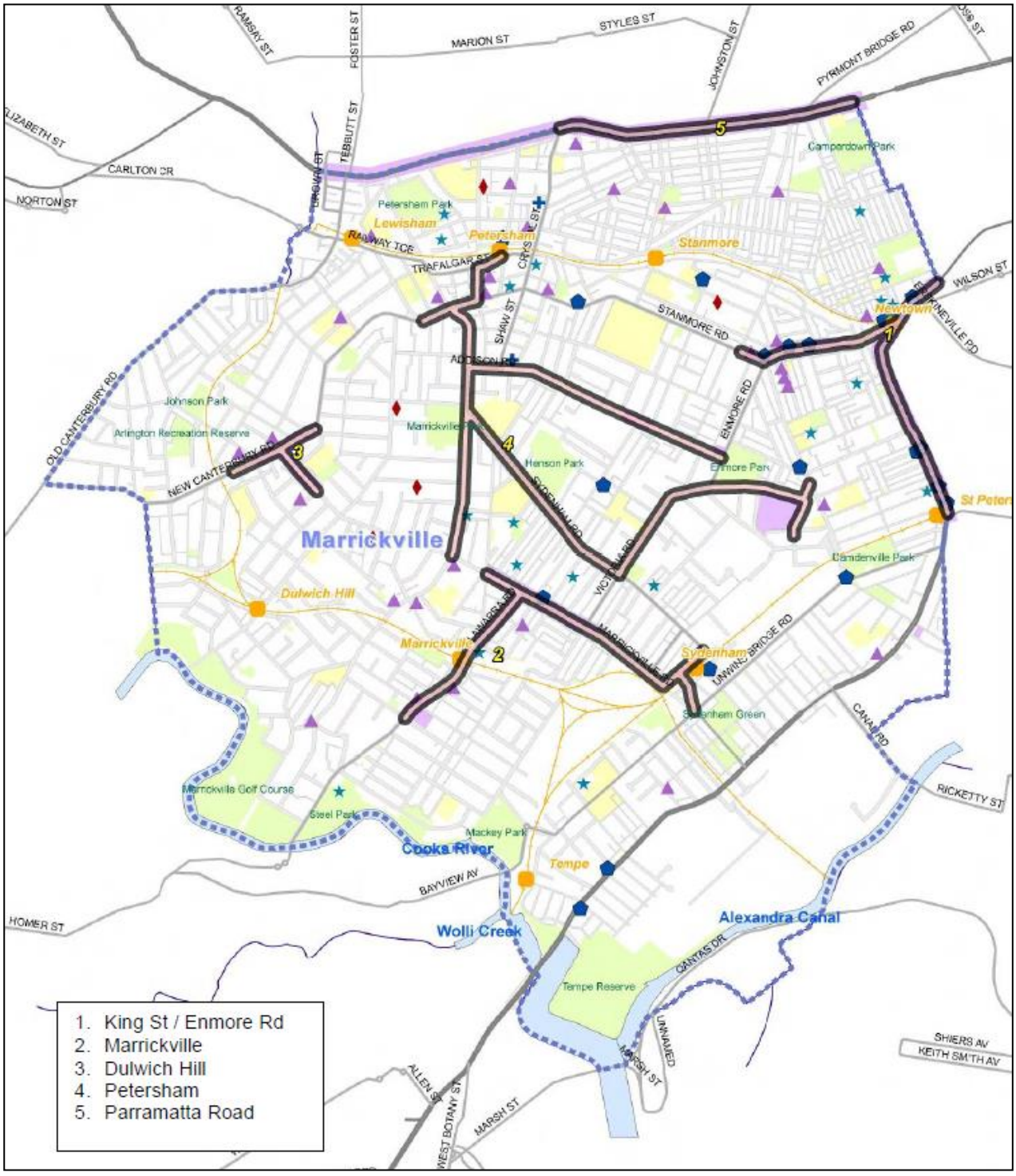
5.7 Pedestrian Accessiblity

5.7.1 Marrickville PAMP

At the end of 2009, Marrickville Council undertook a review of their Pedestrian Access and Mobility Plan. The PAMP focuses on the high pedestrian use areas within the Marrickville Council area. The PAMP recommendations for footpath improvements have been included in Council's four years Capital Works program, funded as budget allowed.

As a general principle, installation of LATM treatments should not impede the passage of pedestrians in streets designated as existing or proposed priority routes. Further, the design of LATM devices should not prohibit future pedestrian works and where possible pedestrian facilities should be incorporated in the LATM scheme design. See Figure 5.3 below for full details of Council PAMP plan.

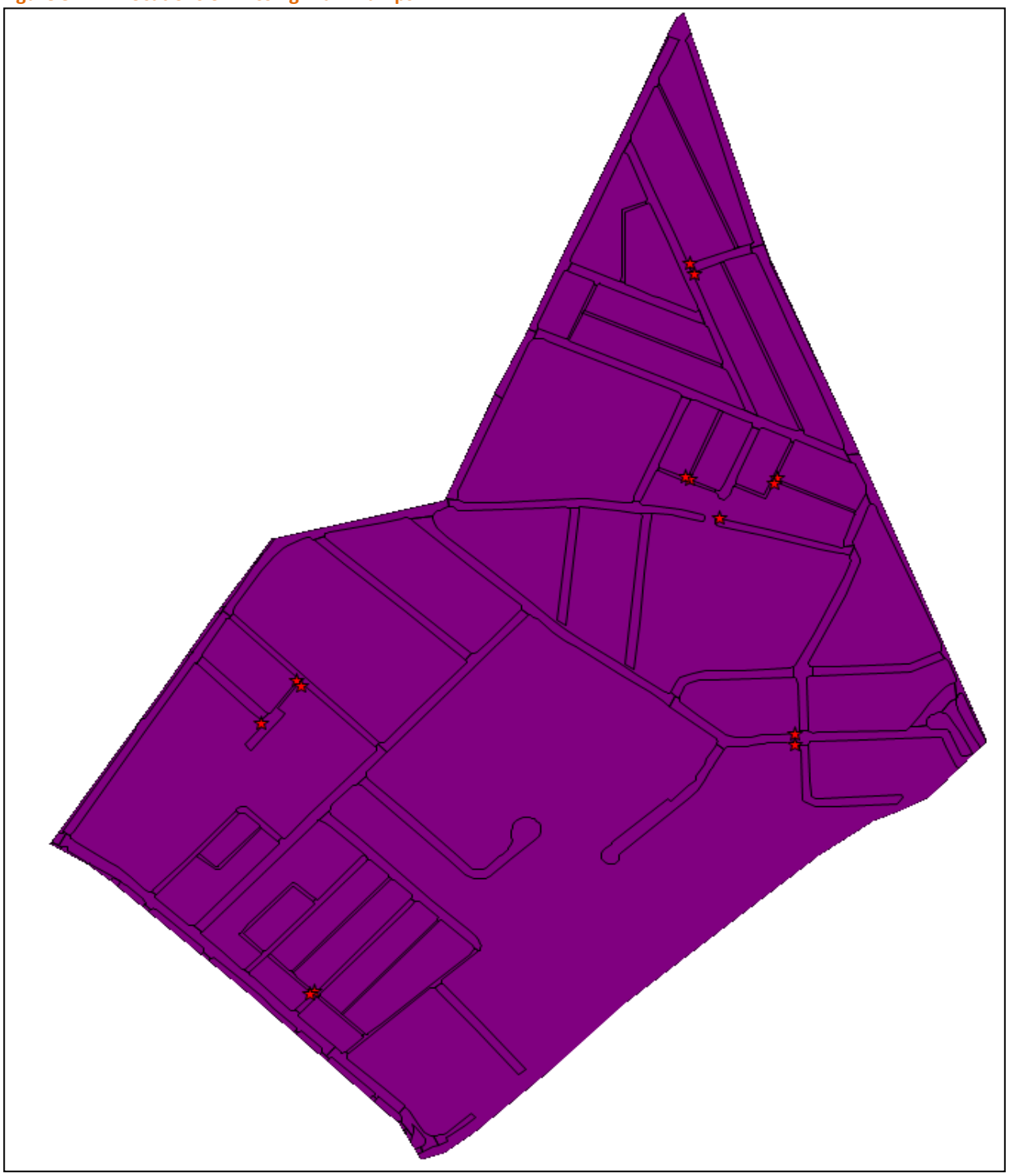
Figure 5.3: Marrickville Pedestrian Access & Mobility Plan Review



5.7.2 Ramp Audit

An audit of Council missing ramps and existing ramp conditions has recently been undertaken. The audit identified 14 missing ramps within the Marrickville East LATM area. The missing ramps as well as the upgrade of existing ramps in poor condition are currently being assessed and prioritised for consideration of funding as part of Council's PAMP program. The location of missing pram ramp in the Marrickville West is shown in Figure 5.4 below.

Figure 5.4: Locations of Missing Pram Ramps



6 Community & Stakeholder Engagement

The Marrickville East LATM strategy involved an extensive community engagement process to understand specific local issues which are currently in place within the study areas. Engagement undertaken during the course of the study included:

- Initial community and stakeholder consultation
- A review of Council records including complaints and issues which have been raised since 2007
- Public exhibition period.

6.1 Initial Stakeholder Consultation

A list of stakeholders has been consulted during the Public Exhibition stage of this LATM project including:

- Roads and Maritime Authority (RMS)
- Transport for NSW (TfNSW)
- NSW Police
- NSW Emergency Service (Fire & Ambulance Services)
- Marrickville West Public School.

6.2 Community Questionnaire

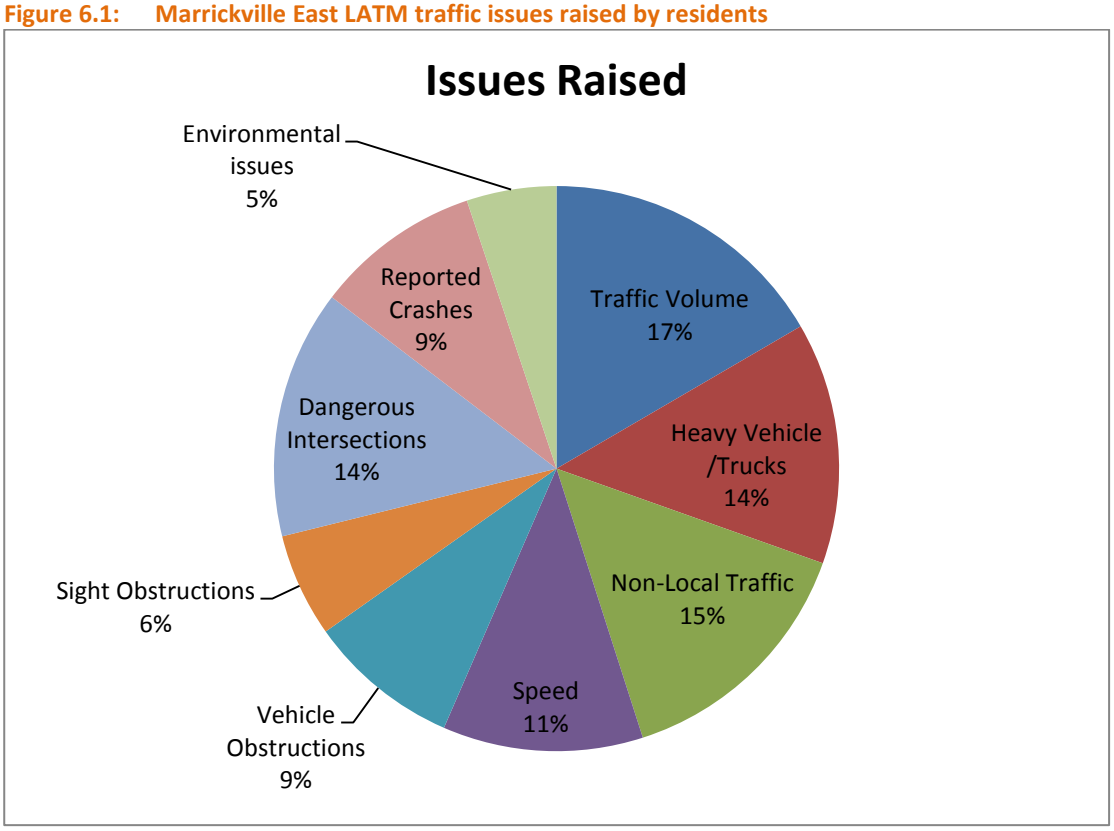
Council prepared and posted a letter on 2 November 2012 to all 1559 residents in the Marrickville East LATM review area informing residents of the LATM study and inviting them to participate in an online questionnaire. This included the option of replying by post.

The survey included 9 (including two open-end) questions to identify the major traffic problems in their street or nearby streets by type of issues, such as traffic volume, speed, heavy vehicles, parking, crashes, unsafe area and environmental issues. Council received 100 responses which equates to a return of 6.4 percent response rate, a reasonable sample size in comparison to other LATM studies .

Altogether, 497 separate issues were raised, with 253 issues related to traffic problems and 244 issues related to the pedestrian or cyclist problems.

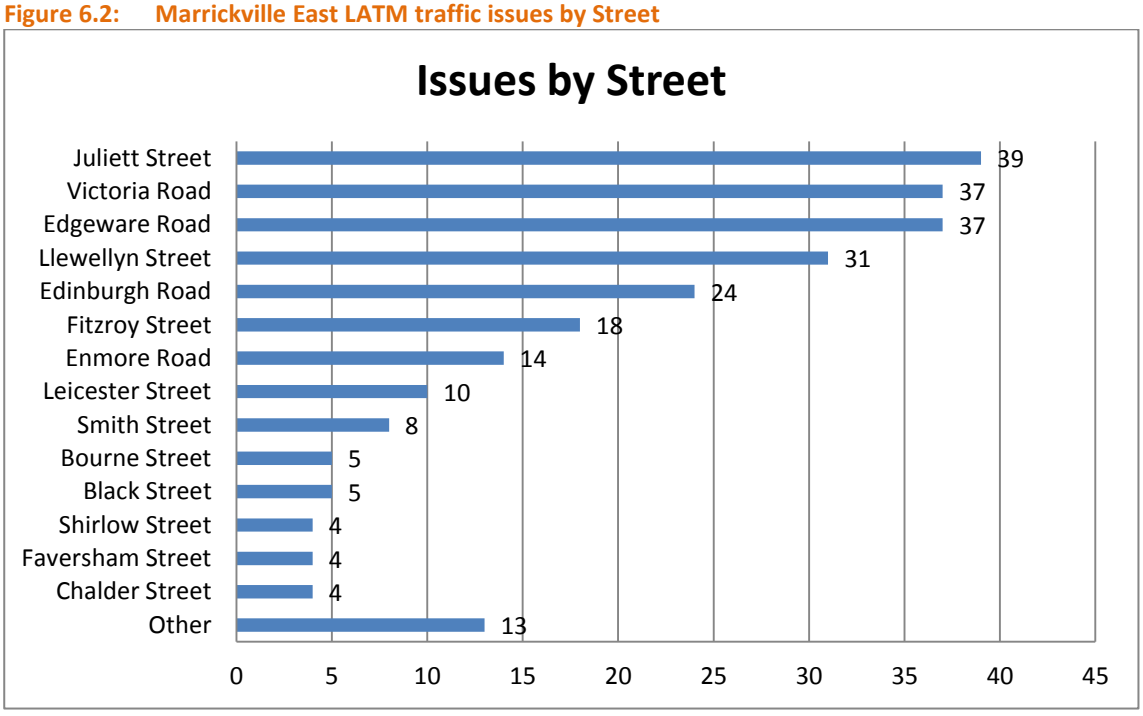
The breakdown of the main traffic issues identified is shown in Figure 6.1.

Figure 6.1: Marrickville East LATM traffic issues raised by residents



The responses indicate that traffic volume, through traffic and heavy vehicles are the main issues raised by residents, with dangerous intersection and vehicle speed, not far behind. Of the 253 issues noted from the survey, the breakdown of the areas mentioned is shown in Figure 6.2 below.

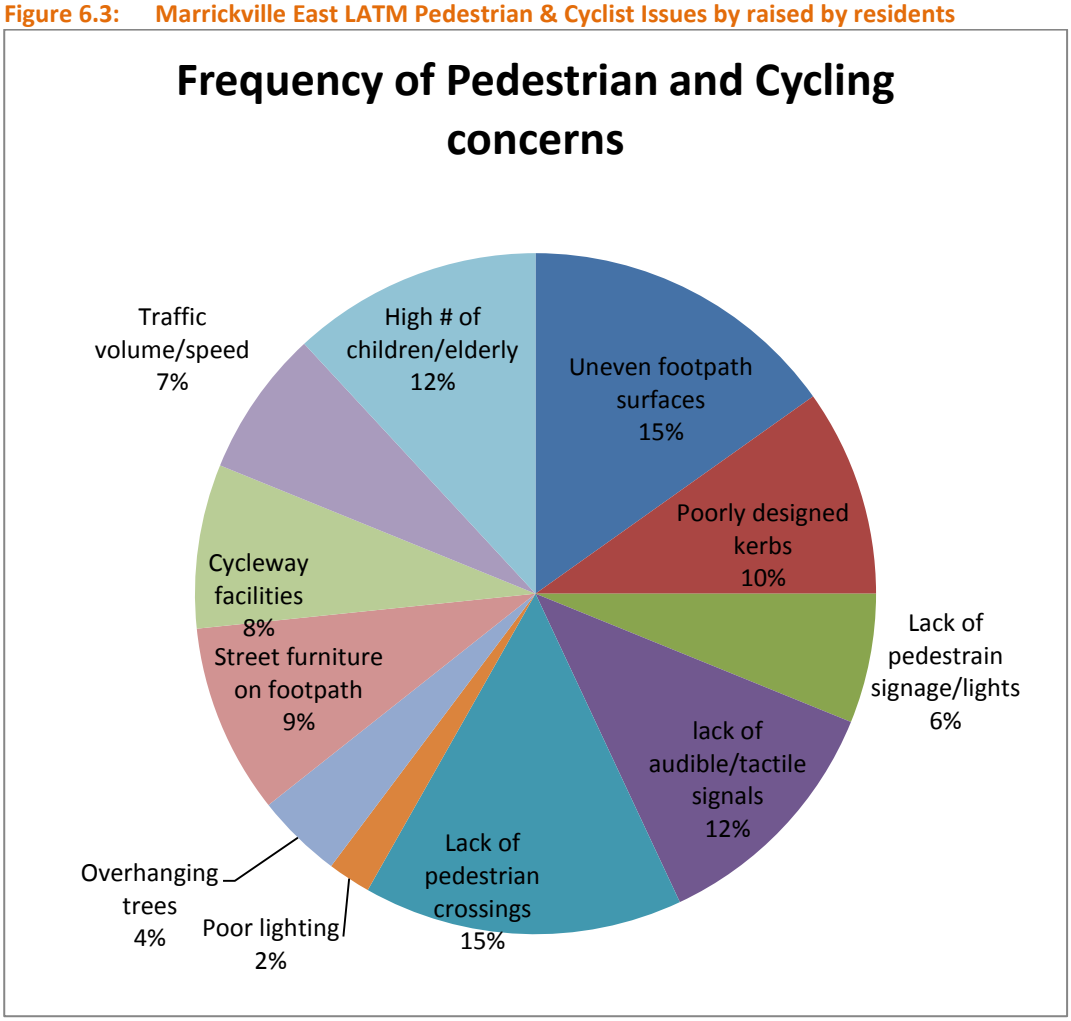
Figure 6.2: Marrickville East LATM traffic issues by Street



The responses indicate that Juliett Street, Victoria Road and Edgeware Road are the streets of most concern to residents, followed by Llewellyn Street, Edinburgh Road and Fitzroy Street. It is not surprisingly the regional and collector roads figure most prominently in the issues raised by the community.

The breakdown of the main pedestrian & cyclist issues identified is shown in Figure 6.3.

Figure 6.3: Marrickville East LATM Pedestrian & Cyclist Issues by raised by residents

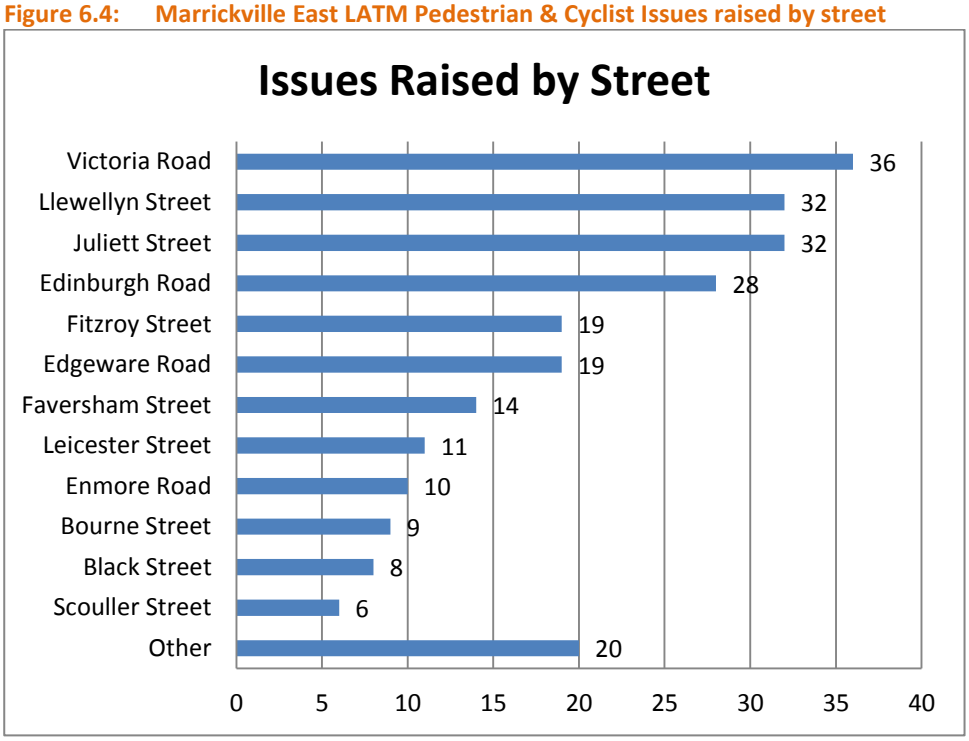


The results of the survey indicate that the most significant issues raised are:

- Lack of pedestrian crossings
- Uneven footpath surfaces
- Lack of audible & tactile signals
- High number of children & elderly
- Poorly designed kerbs

Of the 244 issues noted from the survey, the breakdown of the areas mentioned is shown in Figure 6.4 below.

Figure 6.4: Marrickville East LATM Pedestrian & Cyclist Issues raised by street



The streets which were identified by most people as having problems include (in this order); Victoria Road (36 complaints), Juliett Street (32), Llewellyn Street (32), Edinburgh Road (28), Edgeware Road (19), Fitzroy Street (19), Faversham Street (14), Leicester Street (11) and Enmore Road (10).

The community questionnaire responses are detailed in Appendix A for traffic and Appendix B for pedestrians or cyclists.

6.2.1 Stakeholder Considerations

An analysis was undertaken for the matters considered by the Pedestrian, Cyclist and Traffic calming Advisory Committee (LTPAC) between 2007 and2012. As indicated in Table 6.1 there were 15 matters considered at different locations in the road network. All matters considered resulted in the installation of the proposed traffic calming devices as recommended except the request for a crossing facility in Edgeware Road between Wells Street and Darley Street, Newtown. There is a recognised pedestrian desire between St Peters railway station and the Metro Shopping Centre across Edgeware Road to Smidmore Street. The LTPAC agreed in principle to the provision of a pedestrian refuge on Edgeware Road, immediately south of Smidmore Street and that it be included for consultation and funding consideration as part of the Marrickville East LATM review.

Table 6.1: Pedestrian, Cyclist and Traffic calming Advisory Committee 2007-2012

Street	Issue	LTC Reference
Edgeware Rd	Kerb Blisters and Median island	LTPAC September 2008
Edgeware Rd/Murray Street	Roundabout	LTPAC October 2008
Sydenham Road	Proposed pedestrian crossing upgrade	LTPAC November 2008
Edgeware Rd	Traffic Islands & Bicycle Lanes	LTPAC April 2009
Llewellyn St	Kerb Blisters & Bicycle Markings	LATPC April 2009
Edinburgh Rd at Murray St	Roundabout	LTPAC March 2009
Fitzroy St	Landscaped Kerb Blisters (2)	LTPAC March 2010
Juliett St	Pedestrian Refuge Islands	LATPC October 2009
Black Street	Improvement to pedestrian crossing	LATPC September 2009
Victoria road	Modification of central median	LATPC February2012

Street	Issue	LTC Reference
Lynch Ave & Juliett St	Intersection Safety	LATPC February 2012
Victoria Road	Cycle Path	LATPC march 2012
Fitzroy Road	Cycle Path	LATPC march 2012
Edgeware Rd	Pedestrians/Cyclists shared footway	LTPAC September 2013
Edgeware Rd	Crossing Facility Edgeware at Darley Street.	LTPAC November 2013

6.2.2 Council Recorded Complaints

An analysis of complaints in Councils record system for 2007-2012 (Table 6.2), indicated 23 complaints received relating to roads in the Marrickville East study area, related to LATM related matters. A range of road user concerns were identified including illegal parking, vehicle speed, heavy vehicle movements, traffic noise and pedestrian exposure. Edgeware Road had the most number of complaints in this period with 12 complaints.

Table 6.2: Complaints Received By Council 2007-2012

Street	1. Parking	2. Speed	3. Heavy Vehicles	4. Traffic Volume	5. Traffic Noise	6. Dangerous Intersection	7. Pedestrian Crossing	Total
Bedwin Street	0	0	0	0	0	0	0	0
Black Street	0	0	0	0	0	0	0	0
Cadogan street	0	0	0	0	0	0	0	0
Chalder Ave	0	0	0	0	0	0	0	0
Chapel Street	1	0	0	0	0	0	0	1
Edgeware Road	1	3	1	1	4	1	1	12
Edinburgh Road	0	0	0	0	0	0	0	0
Enmore Road	0	0	0	0	0	0	1	1
Faversham Street	0	0	0	0	0	0	0	0
Fitzroy Street	0	0	0	0	0	0	0	0
Francis Street	1	1	0	1	0	0	0	3
Juliett Street	1	0	0	0	0	0	0	1
Leicester Street	1	0	0	0	0	0	0	1
Lilian Fowler Street	0	0	0	0	0	0	0	0
Llewellyn Street	1	0	0	0	0	0	0	1
Lynch Street	0	0	0	0	0	0	0	0
Murray Street	0	0	0	0	0	0	0	0
Sydenham road	0	0	0	0	0	0	0	0
Victoria Road	0	0	0	1	0	0	1	2
TOTALS	6	4	1	3	4	1	3	23

Specific traffic issue identified included concerns raised about pedestrian safety and crashes associated with the arterial road network. These issues were referred to the RMS for their consideration and action. RMS Network Operations responded positively to a request to relocate the existing pedestrian signals in Victoria Road south of Chapel Street and instead install traffic signals at the intersection of Victoria Road and Chapel Street. This crossing is reportedly used by approximately 20 special needs persons travelling to and from their two sheltered workshops in the area and Marrickville Public School children. The intersection of Victoria Road at Chapel Street, Marrickville, had 12 crashes during the last five years. Therefore, it may be practicable to consider relocating the mid-block signals to this intersection location. Also the adjacent intersection of Victoria Road and Smith Street had seven crashes in the same period, and if the existing signals were relocated to the Chapel Street intersection, this intersection could also be

looked at with the possibility of banning right turns into Smith Street from Victoria Road. Relocating the traffic signals should have no significant impact on Marrickville Public School.

On the local road network, a resident requested traffic calming measures and changing Francis Street from two-way to one- way movement to control the speed and volume of vehicles using Francis Street. At that time the measured speed and traffic volumes in Francis Street were well within acceptable limits for a local road and there are no recorded crashes. The matter was referred to the current LATM review for the consideration.

The other streets within the Marrickville East study area did not have reported traffic related complaints in the 2007-2012 periods.

6.3 Submission Summary

A wide variety of opinions, comments and issues were recorded throughout the study period. Combining the community survey feedback, the most frequent issue raised by location, is summarised as the following:

- Edgeware Road, traffic volume, heavy vehicles, dangerous intersection – 37 complaints
- Edinburgh Road, traffic volume– 24complaints
- Juliett Street, Non-local traffic, vehicle speed– 39 complaints
- Llewellyn Street, traffic volume, Non-local traffic – 31complaints
- Victoria Road, traffic volume, vehicle obstruction – 37complaints
- Edinburgh Road, pedestrian / cyclist safety – 28 complaints
- Juliett Street, pedestrian / cyclist safety – 32 complaints
- Llewellyn Street, pedestrian / cyclist safety – 32 complaints
- Victoria Road, pedestrian / cyclist safety – 36 complaints

6.4 Issues Identified

An analysis of all the information collected was undertaken and a summary of the issues per location is provided in Table 6.3 below.

Table 6.3: Issues by Street

Proposal	Street	Issue
1	Fitzroy Street	1. Volumes 2. Vehicle speed 3. Community concern regarding traffic matters 4. Community concern regarding cycling and pedestrian issues 5. Proposed regional cycle route
2	Edinburgh Road	1. Volumes 2. Vehicle speed 3. Community concern regarding traffic matters 4. Community concern regarding cycling and pedestrian issues 5. Proposed local cycle route
3	Llewellyn Street	1. Community concern regarding traffic matters 2. Community concern regarding cycling and pedestrian issues 3. Proposed local cycle route
4	Murray Street	1. Traffic volumes 2. Development consent concerns due to Marrickville Metro Expansion
5	Edgeware Rd / Alice St /Llewellyn St	1. Development consent due to Marrickville Metro Expansion 2. Proposed cycle route 3. Crashes
6	Bedwin Rd / Unwins Bridge Rd / Campbell Rd / May St	1.Development impact of Marrickville Metro Expansion
7	Victoria Rd / Edgeware Rd	1.Development consent due to Marrickville Metro Expansion 2.Crashes
8	Victoria Rd – Bourne St, Black St and Leicester St	1. Community concern regarding cycling and pedestrian issues 2. Proposed regional and local cycle route
9	Fitzroy St / Edinburgh Rd	1. Community concern regarding cycling and pedestrian issues 2. Development impact of Marrickville Metro Expansion
10	Sydney Steel Road / Edinburgh Rd	1. Development impact of Marrickville Metro Expansion 2. Community concern regarding cycling and pedestrian issues 3. Proposed regional and local cycle route
11	Smidmore St / Edgeware Rd	1. Development impact of Marrickville Metro Expansion 2. Matters considered by Local Traffic Committee
12	Smidmore Street	1. Volume 2. Development consent due to Marrickville Metro Expansion
13	Francis St / Enmore Rd	1. Council recorded complaints 2. Community concern regarding cycling and pedestrian issues
14	Francis Street	1. Council recorded complaints
15	Juliett Street	1. Community concern regarding traffic matters 2. Community concern regarding cycling and pedestrian issues
16	Lynch Avenue / Edgeware Road	1. Community concern regarding traffic matters
17	Shelleys Lane / Llewellyn Street	1. Community concern regarding traffic matters 2. Community concern regarding cycling and pedestrian issues
18	Black Street	1.Community concern regarding cycling and pedestrian issues
19	Juliett Street north Llewellyn Street including Lynch Ave	1. Community concern regarding traffic matters 2. Community concern regarding cycling and pedestrian issues 3. Proposed regional cycle route
20	Victoria Rd / Edgeware Rd	1. Community concern regarding traffic matters 2. Community concern regarding cycling and pedestrian issues
21	Sydenham Rd, Shirlow St, Sydney Steel St, Edinburgh Rd and Smidmore St	1. Community concern regarding cycling and pedestrian issues 2. Proposed regional cycle route
22	Bedwin Rd / Edgeware Rd / Edinburgh Rd	1. Development impact of Marrickville Metro Expansion 2. Crashes

7 Marrickville East LATM Review

7.1 Introduction

Sections of this report have provided a very good understanding of the existing traffic conditions and future traffic projection within the Marrickville East area. The issues identified in these sections form the basis for developing mitigation measures which appropriately address the issues to further improve safety and public amenity throughout this area.

7.2 Key Objectives

The key objectives for the framing of the LATM proposals to address the issues identified within the Marrickville East area were:

1. To ensure that the existing LATM measures were to a standard which ensured that they were clearly visible to the drivers by way of signage and line markings;
2. To ensure that the traffic speeds on the local and collector roads are further contained to comply with the maximum speed limits;
3. To ensure that the traffic volumes on the local and collector roads are further contained to the desired environmental goal;
4. To ensure that the LATM measures along the designated bus and bicycle routes are designed to be bus and cycling friendly and in accordance with the latest design guidelines; and
5. To ensure that the safety on the streets are maintained or improved for all road users.

7.3 Audit of Existing LATM Measures

In order to determine the current condition of the existing LATM devices, Marrickville Council undertook a comprehensive audit of the current LATM devices within the Marrickville East area which resulted in proposals for infrastructure compliance.

These measures are detailed in Table 7.1and have been formulated to provide consistency in the design and the LATM measures and to ensure that the signs and line markings associated with these treatments are clearly visible to drivers to improve their effectiveness and safety.

Table 7.1: Audit of LATM Devices

LATM Device	Location	Issue	Maintenance Treatments	Quantity
Unsignalised intersection	Cadogan St, near Sydenham Rd	Missed priority control	Install Give-way sign and associated line marking	1.
	Fitzroy St, near Sydenham Rd	Missed priority control	Install Give-way sign and associated line marking	1.
	Smith St, near Victoria Road	Missed priority control	Install Give-way sign and associated line marking	1.
Pedestrian Crossing	Edinburgh Rd (left turn slip lane), near Victoria Rd	Missed priority control	Install Give-way line marking	1.
		Missed Pedestrian Crossing sign	Install Pedestrian Crossing sign (R3-1) and signpost	2
Pedestrian Refugee Island	Edinburgh Rd, near Fitzroy St	Incompliant Warning Sign (Missing)	Install Refuge Warning Signs W6-1 and W8-25	2

8 Marrickville East Draft LATM Scheme

8.1 Marrickville East LATM Scheme Key Principles

The ***Austroads Guide to Traffic Management Part 8: Local Area Traffic Management, 2008*** was used for the selection of the appropriate LATM treatments, which address the various issues identified in the study. This guideline provides a clear indication of the types of treatment available, which issues they best address and what the advantages and disadvantages of each treatment are. They have provided a good basis for developing further LATM measures for Marrickville East Area.

8.1.1 Rationale for the Scheme

A suite of recommendations have been developed. The recommendations provided in this document aim to align with the parking management principles outlined in the Marrickville Integrated Transport Strategy (2007). The document "provides the rationale and recommended actions for addressing local transport issues and moving Marrickville toward sustainable transport – that is, reducing car use and increasing use of public transport, walking and cycling."

Most importantly, the LATM meets the goals of the Connecting Marrickville program, an integrated streetscape and footpath program taking a more holistic approach to infrastructure project planning. The Connecting Marrickville program uses the Vision from the Community Strategic Plan reference other key strategies that impact on street infrastructure: Strategy for a Water Sensitive Community (2013), Draft Recreation Strategy (2013), Urban Forest Strategy (2012), Biodiversity Strategy (2011), Transport and Bike Strategies (2007), social justice and access programs, Sustainable Streets program, and more to deliver works that provide much better amenity for the community than simply laying down new or upgraded footpaths. Connecting Marrickville is more about place making than just capital projects. It is about connecting the community, connecting places and connecting various sections of Council. The Marrickville East LATM provides an opportunity to demonstrate an integrated approach to place making.

Analysis of all the inputs to the report has been undertaken and includes:

- Road Hierarchy
- Traffic survey data (including volumes, speeds and heavy vehicle percentages)
- Crash statistics
- Intersection operation analysis
- Identification of pedestrian and cyclist improvements
- Initial community and stakeholder consultation
- Assessment of the effectiveness of the existing LATM measures
- Pubic exhibition period.
- A review of Council records including complaints and issues which have been raised since 2007.
- Existing and proposed cycle routes.
- Future land use.
- Identification of further opportunities to reduce volumes and speed of traffic on local streets to address public amenity.
- Development of concept LATM proposals.

8.1.2 Selection of LATM Treatments

A range of LATM measures can be used for different purposes and situations. Table 8.1 below, from Austroads Guide to Traffic Engineering – Part 8 for Local Area Traffic Management provides a description of accepted LATM measures and outlines their relative effectiveness.

Table 8.1: LATM Treatment Options

MEASURE		Reduce speeds	Reduce Traffic Volumes	Reduce Crash Risk	Increase Pedestrian Safety	Increase Bicycle Safety
Vertical deflection devices	Road Humps	✓	✓	✓	-	-
	Road Cushions	✓	✓	✓	-	✓
	Flat top road humps	✓	✓	✓	-	✓
	Wombat Crossings	✓	✓	✓	✓	✓
	Raised Pavements	✓	✓	✓	-	✓
Horizontal deflection devices	Lane narrowing s/kerb extensions	✓	-	-	✓	-
	Slow points	✓	✓	-	-	-
	Centre blister islands	✓	✓	-	-	-
	Driveway links	✓	✓	-	✓	✓
	Mid-block median treatments	✓	-	✓	✓	✓
	Roundabouts	✓	✓	✓	-	-
Diversion devices	Full road closure	-	✓	✓	✓	✓
	Half road closure	-	✓	✓	✓	✓
	Diagonal road closure	-	✓	✓	✓	✓
	Modified 'T' intersection	✓	✓	✓	✓	✓
	Left-in/left-out islands	-	✓	✓	✓	-
Signs, line markings and other treatments	Speed limit signs	✓	-	✓	✓	✓
	Prohibited traffic movement signs	-	✓	✓	-	✓
	One-way (street) signs	-	✓	✓	✓	
	Give Way signs	✓	✓	✓	✓	✓
	Stop signs	✓	✓	✓	✓	✓
	Marked pedestrian crossings	-	-	✓	✓	✓
	Shared zones	✓	✓	-	✓	✓
	School Zones	✓	-	✓	✓	✓
	Threshold treatments	✓	✓	✓	-	✓
	Tactile surface treatments	✓	-	-	-	-
	Bicycle facilities	-	✓	✓	-	✓
	Bus facilities	-	-	-	-	-
Combination devices	Integrated road treatments	✓	✓	✓	✓	✓

It must be noted that a better mitigation measure is to treat the street section as a whole rather than as a series of isolated devices, and so the outline design of the whole installation is an important part of plan development.

8.2 New LATM Treatment Proposals

The ***Austroads Guide to Traffic Management Part 8: Local Area Traffic Management, 2008*** was used for the selection of the appropriate LATM treatments, which address the various issues identified in the study. This guideline provides a clear indication of the types of treatment available, which issues they best address and what the advantages and disadvantages of each treatment are. They have provided a good basis for developing further LATM measures for Marrickville East Area.

The new LATM proposals for Marrickville East have been categorised as either geometric or regulatory controls.

Total 43 treatments have been recommended. A summary of these LATM treatments are illustrated in **Error! Reference source not found.** and tabulated in Table 8.2 below. The concept designs for the proposal are detailed in Appendix G.

Figure 8.1: Proposed LATM Treatments

Date: 27/04/2016 **Author:** Samanth Jadala **Project:** New Plan

Comments:

Indicating Location Points for Marrickville East LATM Treatments

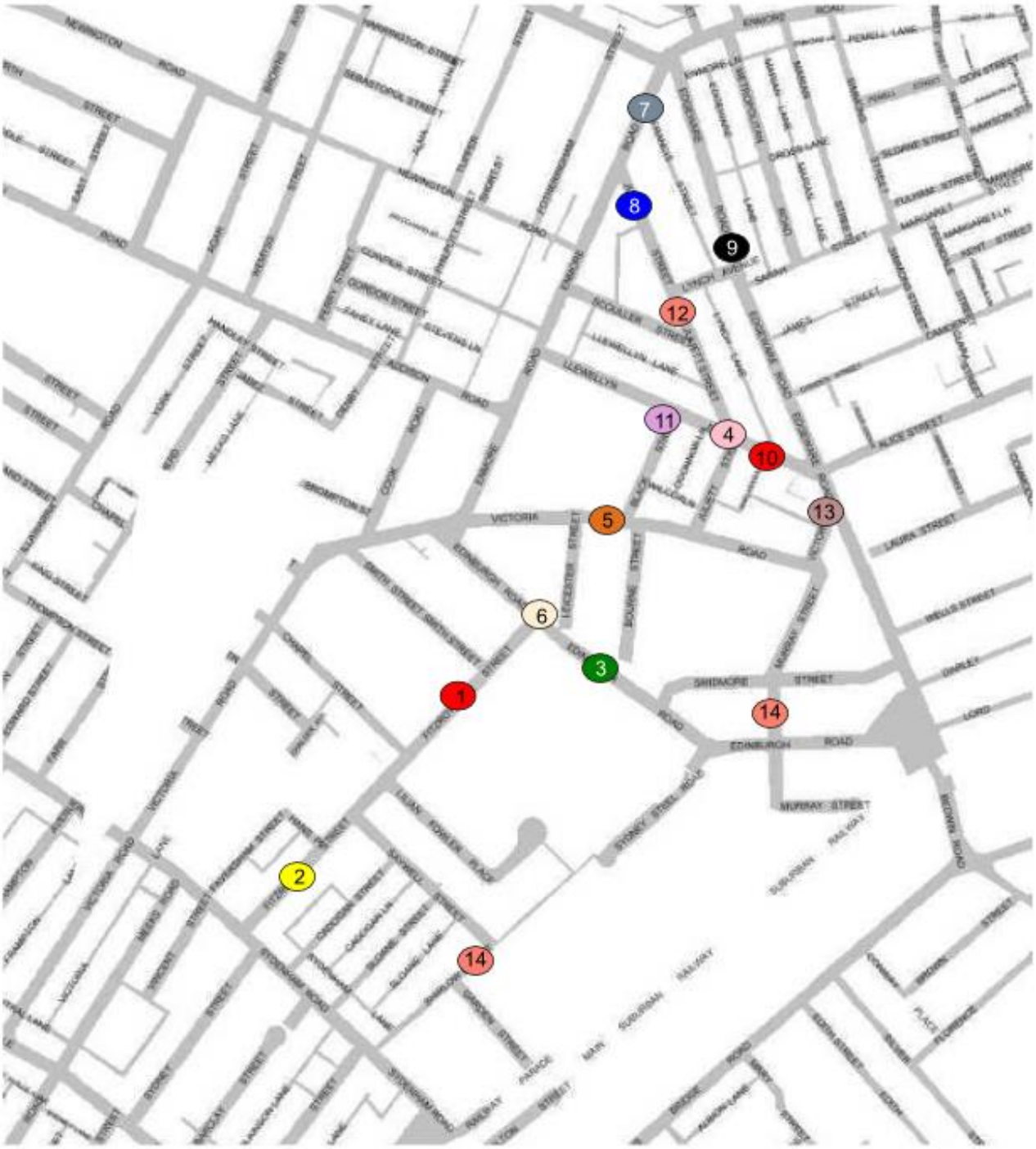


Table 8.2: Draft Treatment Proposals

Items	Street	Section	Proposed Treatment	Rationale	Concerns
1	Fitzroy Street	Chapel Street to Edinburgh Road	1. Installation of marked edge line (parking lane treatment) 2. Installation of on-street bicycle symbol 3. Installation of 4 kerb blisters 4. Installation of 2 speed humps / cushion 5. Installation of BB Line	To reduce traffic speed by vertical deflection devices. Currently there is no mid-block traffic c calming. The 85th percentile exceeds the desirable 50km/hr speed by 6.2km/hr. As the marked edge line and BB line will define the extent of parking and physically or visually narrow the roadway, the scheme without vertical deflection devices may be considered as a trial for short term period. To create mixed traffic condition on Fitzroy St identified as part of Bicycle Strategy Regional Route RR07.	Fitzroy Street mainly provides access to industrial land uses along Fitzroy St and side street. The vertical deflection devices may cause inconvenience to heavy vehicles (12%) Potentially reduce on-street parking spaces due to the occupancy of kerb blisters.
2	Fitzroy Street	Sydenham Road to Chapel Street	6. Installation of marked edge line (parking lane treatment) 7. Installation of on-street bicycle symbol 8. Installation of 6 kerb blisters 9. Installation of 3 speed humps / cushion 10. Installation of BB Line 11. Installation of kerb blisters at the corner of Sydenham Rd 12. Set back existing pedestrian crossing at Sydenham Rd 13. Installation of Give-way sign and associated line marking at Fitzroy Street.	To reduce traffic speed by vertical deflection devices. Currently there is no mid-block traffic c calming. The 85th percentile exceeds the desirable 50km/hr speed by 6.2km/hr. Two out of 4 crashes during the study period are associated with speeding issue. The installation of kerb blisters and pedestrian crossing setback improve safety for the pedestrian crossing. As the marked edge line and BB line will define the extent of parking and physically or visually narrow the roadway, the scheme without vertical deflection devices may be considered as a trial for short term period. To create mixed traffic condition on Fitzroy St identified as part of Bicycle Strategy Regional Route RR07.	Fitzroy Street mainly provides access to industrial land uses along Fitzroy St and side street. The vertical deflection devices may cause inconvenience to heavy vehicles (12%). Potentially reduce on-street parking spaces due to the occupancy of kerb blisters.
3	Edinburgh Road	Fitzroy Street to Murray Street	14. Installation of marked edge line (parking lane treatment) 15. Installation of on-street bicycle symbol 16. Installation of 4 kerb blisters 17. Installation of2 speed humps / cushion 18. Extension of existing BB Line	To visually narrow the roadway by line markings in order to slow down traffic. To reduce traffic speed by vertical deflection devices. To create mixed traffic condition on Edinburgh Rd identified as part of Bicycle Strategy Regional Route RR10.	This treatment may be changed if the proposed roundabout at Edinburgh Rd/Sydney Steel St is implemented due to the Marrickville Metro expansion.
4	Llewellyn Street	Enmore Road to Edgeware Road	19. Installation of 4 kerb blisters 20. Installation of2 speed humps / cushion 21. Installation of pedestrian refuge	To reduce traffic speed by vertical deflection devices. To create safer pedestrian crossing point	Potentially removal of on-street parking spaces due to the occupancy of kerb blisters and squeezes point of pedestrian refuge.
5	Victoria Rd – Bourne St, Black St and Leicester St	Junctions	22. Installation of 4 kerb extensions at Victoria Rd/Black St/Bourne St intersection with access ramps. 23. Installation of 3 kerb extension at Leicester St/Victoria intersection. 24. Installation of Refuge Island on Victoria Rd to the west of Leicester St. 25. Installation of Bicycle Symbols	To narrow road width along the pedestrian desired line to the Enmore Park. To create mixed traffic condition on Victoria St, Leicester St identified as part of Bicycle Strategy Regional Route RR10 and the adjacent Enmore Park and Bounce St cycle links.	Potential removal of on-street parking spaces

Items	Street	Section	Proposed Treatment	Rationale	Concerns
6	Fitzroy St / Edinburgh Rd	roundabout	26. Installation of cyclist facilities in the roundabout 27. Installation of Bicycle Symbols	To improve cycling safety in mixed traffic condition at the intersection identified as part of Bicycle Strategy Regional Route RR10.	
7	Francis Street	Lynch Avenue to Enmore Road	28. Installation of street signs to change Francis street from two way to one way Northbound 29. Extension of existing BB line to prevent right turn from Enmore Road to Francis Street	To eliminate conflict of two way traffic as the narrowness of Francis St, which does not allow 2 vehicles travelling in parallel.	The conversion to one-way street will lead to confusion and inconvenience for accessing residential properties. Short term directional signage will enhance the knowledge of changed traffic condition.
8	Juliett Street	Scouller St to Enmore Rd	30. Re-paint the parking bay delineation	To formalise parking arrangement.	
9	Lynch Avenue / Edgeware Road	Junction	31. Installation of Keep Clear sign 32. Installation of "Do not queue across intersection" street sign	To enhance Keep Clear at intersection regulation.	
10	Shelleys Ln/ Llewellyn St	Junction	33. Installation of pedestrian Threshold 34. Installation of Give way sign 35. Installation of " Look" signs	To enhance safety for pedestrian crossing. Shelley Street joins Llewellyn Street at 90o but the width of the footpath in Shelley Street is very narrow compromising pedestrian exposure /separation east- west. Residents also advise that it difficult to cross Llewellyn Street due to volume & speed of traffic.	
11	Black Street	Victoria Rd to Llewellyn St	36. Installation of pedestrian refuges 37. Installation of kerb blisters	To improve pedestrian crossing safety for the connection to Enmore Park and Annette Kellerman Aquatic Centre	
12	Juliett St with and including Lynch Ave	Llewellyn St to Lynch Ave	38. Installation of Bicycle symbols	To improve cycling safety in mixed traffic condition along Juliett St and Lynch Ave identified as part of Bicycle Strategy Regional Route RR10.	
13	Victoria Rd	At Edgeware Rd	39. Installation of kerb extension on Victoria Road 40. Modification of existing centre median	To improve pedestrian crossing safety at the intersection by narrowing the crossing distance. This treatment may be in conjunction with the No Right Turn restriction as conditions of consent to Marrickville Metro Expansion.	The kerb extension may result in difficulties for turning vehicles, in particular heavy vehicles.
14	Sydenham Rd, Shirlow St, Sydney Steel St, Edinburgh Rd, Smidmore St	various	41. Installation of bicycle symbols 42. Installation of " shared path" sign 43. Installation of bicycle warning sign	To improve safety for pedestrian and cyclist in mixed traffic and shared path conditions along Shirlow St, shared path (between Shirlow St and Sydney Steel St) and Edinburgh Rd, which are identified as part of Bicycle Strategy Regional Route RR10.	

As previously identified, a number of road improvement treatments have been identified as part of the conditions of consent to the Marrickville Metro Expansion project. It is suggested to include these road improvement treatments proposed by the proponent in this report for reference. The summary of these road improvement treatments are tabulated in Table 8.3 below.

Table 8.3: Road Improvements Proposals Associated with DA Conditions

Items	Street	Section	Proposed Treatment	Rationale	Concerns
15	Smidmore Street	Edinburgh Road to Murray Street	44. Proposed concrete median in Smidmore street to prevent right turns into and out of the proposed car park access ramp 45. Installation of traffic signal and crossing on Smidmore street between the pedestrian entrances of the two shopping centre buildings 46. Proposed "shared zone" for the portion of Smidmore street between Murray street and the new relocated carpark ramp	Incorporate measure as conditions of consent to Marrickville Metro Expansion project. To enhance the knowledge of high pedestrian activity area and improve pedestrian safety.	
16	Sydney Steel Road / Edinburgh Rd Junction	Sydney Steel Road / Edinburgh Rd Junction	47. Introduce a new mountable roundabout at the intersection of Edinburgh Road and Sydney Steel Road. 48. Installation of cycleway crossing on Sydney Steel Rd approach. 49. Upgrade of access ramp at the corner of Sydney Steel Rd/Edinburgh Rd 50. Installation of bicycle ramps 51. Installation of bicycle symbols 52. Installation of BB-Line 53. Installation of bicycle path for right turn	Incorporate measure as conditions of consent to Marrickville Metro Expansion project. The proposed roundabout will allow 10.1m long rigid emergency vehicle (and hence 8.8 m typical Council's garbage trucks) to perform a U-turn and allow movement of 14.5m long rigid buses to access the relocated bus terminus to the east.	
17	Bedwin Rd / Edgeware Rd / Edinburgh Rd	Junction	54. Installation of directional signage to encourage drivers to use Railway Parade underpass and left turn onto Bedwin Road	Incorporate measure as conditions of consent to Marrickville Metro Expansion project. To reduce the possibility of traffic conflict at the intersection Edinburgh Rd and Bedwin Rd.	
18	Victoria Rd / Edgeware Rd	Junction	55. Installation of no right turn sign on Victoria Road to Edgeware Road	Incorporate measure as conditions of consent to Marrickville Metro Expansion project. To eliminate the traffic conflict of northbound vehicles on Victoria Rd turning right into Edgeware Road and the traffic along Edgeware Rd.	The No Right Turn restriction will result in access difficulty for residents in Victoria Rd (east of the closure), who wants to travel towards the south of Edgeware Rd.
19	Victoria Rd/Murray St intersection	Junction	56. Installation of kerb blister to prevent vehicles over 8.8 metres from accessing Victoria Road via the intersection of Victoria Road and Murray Street. 57. Installation of signage to prevent delivery vehicles over 6 metres from accessing the site via the intersection of Victoria Road and Murray Street.	Incorporate measure as conditions of consent to Marrickville Metro Expansion project. To prevent heavy vehicle from accessing Victoria Rd	

Items	Street	Section	Proposed Treatment	Rationale	Concerns
20	Edgeware Rd / Alice St / Llewellyn St	Junction	58. Introduce parking restriction for a distance of 100m along northbound approach of Edgeware Road during the afternoon peak period and Saturday morning peak 59. Introduce parking restriction for a distance of 50m along southbound approach of Edgeware Road during the afternoon peak period and Saturday morning peak 60. Extend the existing restriction on the westbound approach of Alice Street of 50 m to cover the afternoon peak period and Saturday morning peak 61. Install of Bicycle Symbols	Incorporate measure as conditions of consent to Marrickville Metro Expansion project. This treatment is to mitigate the intersection performance due to the traffic impact of Marrickville Metro Expansion.	
21	Bedwin Rd / Unwins Bridge Rd / Campbell Rd / May St	Bedwin Rd / Unwins Bridge Rd / Campbell Rd / May St Junction	62. Extend parking restriction to create a dedicated left slip lane and right turn lane on Unwins Bridge Road eastbound approach and a dedicated right-turn lane on May Street westbound approach. 63. Adjust the signal phasing to include a diamond phase for right turn traffic on May Street and Unwins Bridge Road	Incorporate measure as conditions of consent to Marrickville Metro Expansion project. The treatment is to offset the adverse traffic impact of the proposed Marrickville Metro Expansion, to provide better channelization to different traffic movements and to improve intersection operation efficiency.	
22	Vitoria Road	Murray St to Closure	64. Installation of threshold at the Murray St entry. 65. Installation of threshold west of 37 Victoria Rd	Incorporate measure as conditions of consent to Marrickville Metro Expansion project. The treatment is to reduce traffic speed along Victoria Rd and encourage pedestrian activity, thereby minimising additional amenity impacts to residents of Victoria Rd.	

9 Implementation

9.1 Prioritisation of Treatments

Having regard for the suggested LATM measures, the following tables have been prepared. The priority ranking was determine based on a number of factors, including crash history, existing traffic issues, community demand and planning required. The ranking of the proposed treatment is tabulated in Table 9.1. It must be noted that the road improvements associated with DA conditions of consent to proposed development are not considered in Council's implementation plan. Therefore, they are not included in this section.

Table 9.1: Treatment Prioritisation

Items	Street	Section	Proposed Treatment	Ranking
3	Edinburgh Road	Fitzroy Street to Murray Street	Installation of marked edge line (parking lane treatment) Installation of on-street bicycle symbol Installation of 4 kerb blisters Installation of2 speed humps / cushion Extension of existing BB Line	1
1	Fitzroy Street	Chapel Street to Edinburgh Road	Installation of marked edge line (parking lane treatment) Installation of on-street bicycle symbol Installation of 4 kerb blisters Installation of 2 speed humps / cushion Installation of BB Line	2
2	Fitzroy Street	Sydenham Road to Chapel Street	Installation of marked edge line (parking lane treatment) Installation of on-street bicycle symbol Installation of 6 kerb blisters Installation of 3 speed humps / cushion Installation of BB Line Installation of kerb blisters at the corner of Sydenham Rd Set back existing pedestrian crossing at Sydenham Rd Installation of Give-way sign and associated line marking at Fitzroy Street.	2
12	Juliett St with and including Lynch Ave	Llewellyn St to Lynch Ave	Installation of Bicycle symbols	3
14	Sydenham Rd, Shirlow St, Sydney Steel St, Edinburgh Rd, Smidmore St	various	Installation of bicycle symbols Installation of " shared path" sign Installation of bicycle warning sign	4
6	Fitzroy St / Edinburgh Rd	roundabout	Installation of cyclist facilities in the roundabout Installation of Bicycle Symbols	5
4	Llewellyn Street	Enmore Road to Edgeware Road	Installation of 4 kerb blisters Installation of2 speed humps / cushion Installation of pedestrian refuge	6
8	Juliett Street	Scouller St to Enmore Rd	Re-paint the parking bay delineation	6
9	Lynch Avenue / Edgeware Road	Junction	Installation of Keep Clear sign Installation of "Do not queue across intersection" street sign	6
13	Victoria Rd	At Edgeware Rd	Installation of kerb extension on Victoria Road Modification of existing centre median	7
7	Francis Street	Lynch Avenue to Enmore Road	Installation of street signs to change Francis street from two way to one way Northbound Extension of existing BB line to prevent right turn from Enmore Road to Francis Street	8
5	Victoria Rd – Bourne St, Black St and Leicester St	Junctions	Installation of 4 kerb extensions at Victoria Rd/Black St/Bourne St intersection with access ramps. Installation of 3 kerb extension at Leicester St/Victoria intersection. Installation of Refuge Island on Victoria Rd to the west of Leicester St. Installation of Bicycle Symbols	9
11	Black Street	Victoria Rd to Llewellyn St	Installation of pedestrian refuges Installation of kerb blisters	9

Items	Street	Section	Proposed Treatment	Ranking
10	Shelleys Ln/ Llewellyn St	Junction	Installation of pedestrian Threshold Installation of Give way sign Installation of " Look" signs	10

9.2 Strategic Cost Estimates

Strategic cost estimates have been determined from typical rate.

All cost estimates prepared in this report are for broad level or initial feasibility planning only. Detailed cost estimation will be undertaken during detailed design stage.

Table xxx provides a summary of estimated costs of the suggested LATM measure for the study area, noting that these costs do not include allowances for site specific issues such as drainage modification and/or services relocations.

Table 9.2: Strategic Cost Estimation

Items	Street	Section	Proposed Treatment	Ranking	Cost Estimation
3	Edinburgh Road	Fitzroy Street to Murray Street	Installation of marked edge line (parking lane treatment) Installation of on-street bicycle symbol Installation of 4 kerb blisters Installation of2 speed humps / cushion Extension of existing BB Line	1	$33,100
1	Fitzroy Street	Chapel Street to Edinburgh Road	Installation of marked edge line (parking lane treatment) Installation of on-street bicycle symbol Installation of 4 kerb blisters Installation of 2 speed humps / cushion Installation of BB Line	2	$31,900
2	Fitzroy Street	Sydenham Road to Chapel Street	Installation of marked edge line (parking lane treatment) Installation of on-street bicycle symbol Installation of 6 kerb blisters Installation of 3 speed humps / cushion Installation of BB Line Installation of kerb blisters at the corner of Sydenham Rd Set back existing pedestrian crossing at Sydenham Rd Installation of Give-way sign and associated line marking at Fitzroy Street.	2	$88,100
12	Juliett St with and including Lynch Ave	Llewellyn St to Lynch Ave	Installation of Bicycle symbols	3	$600
14	Sydenham Rd, Shirlow St, Sydney Steel St, Edinburgh Rd, Smidmore St	various	Installation of bicycle symbols Installation of " shared path" sign Installation of bicycle warning sign	4	$600
6	Fitzroy St / Edinburgh Rd	roundabout	Installation of cyclist facilities in the roundabout Installation of Bicycle Symbols	5	$700
4	Llewellyn Street	Enmore Road to Edgeware Road	Installation of 4 kerb blisters Installation of2 speed humps / cushion Installation of pedestrian refuge	6	$54,300
8	Juliett Street	Scouller St to Enmore Rd	Re-paint the parking bay delineation	6	$4,700
9	Lynch Avenue / Edgeware Road	Junction	Installation of Keep Clear sign Installation of "Do not queue across intersection" street sign	6	$1,300
13	Victoria Rd	At Edgeware Rd	Installation of kerb extension on Victoria Road Modification of existing centre median	7	$13,000

Items	Street	Section	Proposed Treatment	Ranking	Cost Estimation
7	Francis Street	Lynch Avenue to Enmore Road	Installation of street signs to change Francis street from two way to one way Northbound Extension of existing BB line to prevent right turn from Enmore Road to Francis Street	8	$2,100
5	Victoria Rd – Bourne St, Black St and Leicester St	Junctions	Installation of 4 kerb extensions at Victoria Rd/Black St/Bourne St intersection with access ramps. Installation of 3 kerb extension at Leicester St/Victoria intersection. Installation of Refuge Island on Victoria Rd to the west of Leicester St. Installation of Bicycle Symbols	9	$59,200
11	Black Street	Victoria Rd to Llewellyn St	Installation of pedestrian refuges Installation of kerb blisters	9	$52,000
10	Shelleys Ln/ Llewellyn St	Junction	Installation of pedestrian Threshold Installation of Give way sign Installation of " Look" signs	10	$13,400

Appendices

Appendix A

Community Questionnaire Responses – Traffic Issues

Street Name	Traffic Volume	Heavy Vehicle / Trucks	Non-Local Traffic	Speed	Vehicle Obstructions	Sight Obstructions	Dangerous Intersections	Reported Crashes	Environmental Issues	Σ	Traffic Coments
Black Street				2		2		1		5	Lot of traffic generated from aquatic centre. Request traffic/cycling calming measures
Bourne Street	2						2	1		5	Aquatic centre inducing dangerous behaviour around these intersections with black street
Cadogan Street		1								1	
Chalder Avenue										0	
Chalder Street	1	1	1				1			4	
Chapel Street	1			1						2	
Edgeware Road	8	8	5	3	1		6	3	3	37	Request red traffic camera at intersection with Enmore Rd. Major concerns about bottleneck created by Metro and lack of parking around Sydenham station.
Edinburgh Road	4	4	4	2	2	2	3	2	1	24	Lack of parking spaces and rat-run from Metro
Empire Lane			1			1		1		3	High levels of non-local traffic
Enmore Road	2	3	1	1	1		3	1	2	14	Traffic congestion - dedicated bus lanes?
Faversham Street		2	1				1			4	Request to hot-mix/resurface road - pot hole patrol
Fitzroy Street	4	3		3	2	2	2	1	1	18	
Francis Street				1		1				2	Request to be made 1 way due to narrowness of street
Garden Street										0	
Hans Place										0	
Juliett Street	3	2	10	9	2	2	6	5		39	Rat-runs reported
Leicester Street	2	1	1			1	2	1	2	10	
Lilian Fowler Place		1								1	
Llewellyn Lane										0	
Llewellyn Street	7	3	8	4	3	1	1	3	1	31	Traffic calming measures requested (speed bumps). Dangerous intersection with Edgeware Rd
Lynch Avenue					1		1			2	
Lynch Lane										0	

Street Name	Traffic Volume	Heavy Vehicle / Trucks	Non-Local Traffic	Speed	Vehicle Obstructions	Sight Obstructions	Dangerous Intersections	Reported Crashes	Environmental Issues	Σ	Traffic Coments
Murray Street										0	
Oconnor Lane										0	
Railway Parade										0	Request for increased parking capacity
Saywell Street										0	
Scouller Street				1	1					2	
Shelleys Lane										0	
Shirlow Street		1			1	1		1		4	
Sloane Street										0	
Smidmore Street										0	
Smith Street		2	2	1		1	2			8	
Sydenham Lane										0	
Sydenham Road										0	Reported high levels of heavy traffic
Sydney Steel Road										0	Request for better signage
Victoria Road	8	3	3	1	8	1	6	4	3	37	Various complaints about traffic congestion and associated dangers due to Metro traffic. Consequently, dangerous intersections at Edgeware Rd.

Appendix B

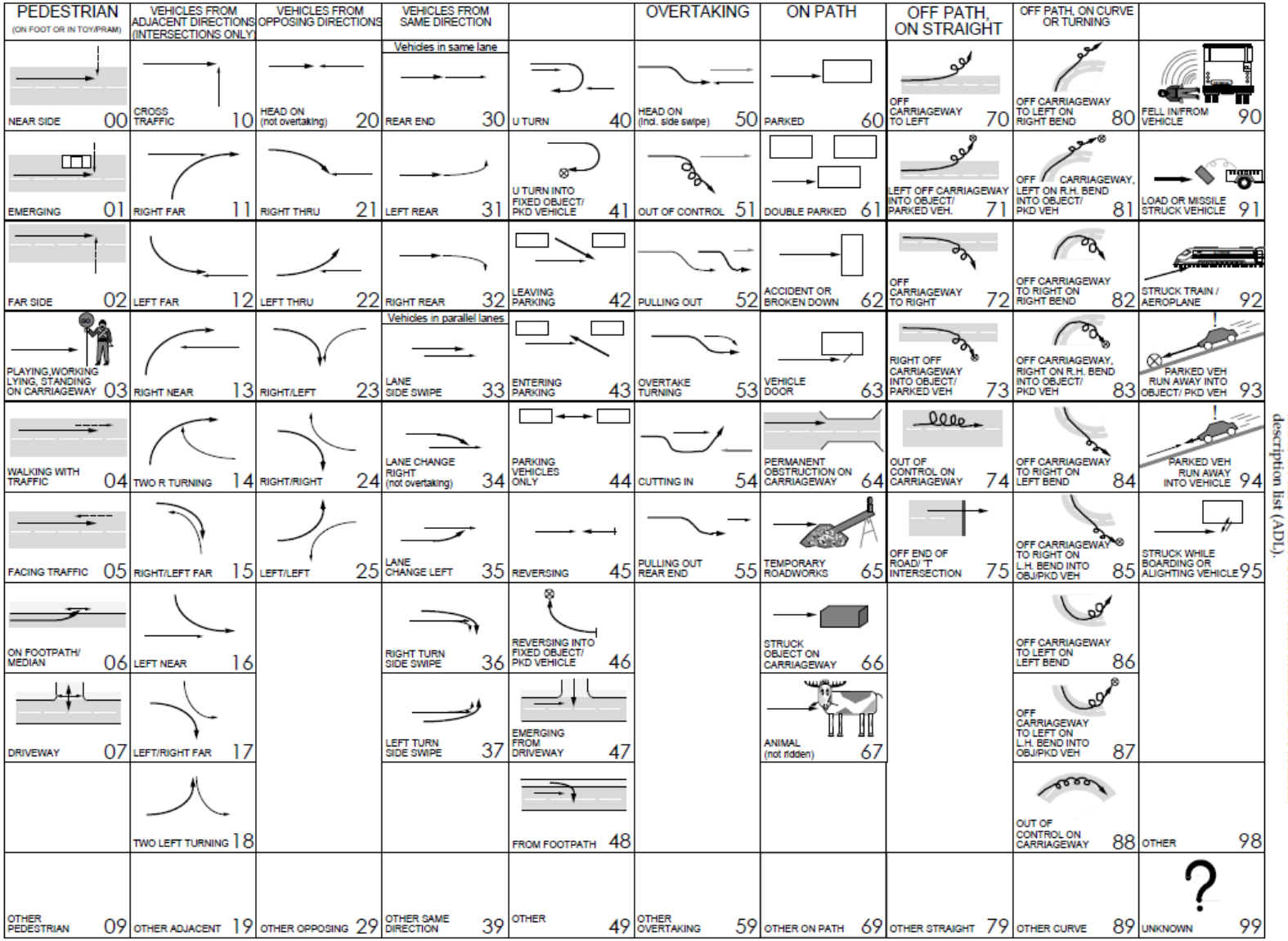
Community Questionnaire Responses – Pedestrian & Cyclist Issues

Street Name	Uneven footpath surfaces	Poorly designed kerbs	Lack of pedestrian signage/lights	lack of audible/tactile signals	Lack of pedestrian crossings	Poor lighting	Overhanging trees	Street furniture on footpath	Cycleway facilities	Traffic volume/speed	High # of children/elderly	Σ	Cycle/Ped Comments
Black Street		1	1	1	2		1		1		1	8	Request to trim plants to increase visibility along cycleway
Bourne Street	2	2		2					1		2	9	
Cadogan Lane												0	
Cadogan Street	1											1	
Chalder Avenue												0	
Chalder Street	1	1	1					1				4	
Chapel Street	1											1	
Edgeware Road	2	2	2		3	1		1	2	6		19	Crossing at corner of Victoria Road is dangerous - turning vehicles ignore pedestrians. Cyclists often ride on footpaths.
Edinburgh Road	4	3	1	2	4	1	2	4	1	4	2	28	Lack of pedestrian crossings
Empire Lane		1	1					1	1			4	
Enmore Road	3			1	4					1	1	10	Install red light cameras. Further requested crossing to enmore park.
Faversham Street	3	3	1		2		2	1	1	1		14	
Fitzroy Street	3	4	2	1	2	1	1	2	1	1	1	19	Requested traffic calming and reduction of heavy traffic. Further, more landscaping required (..trees)
Francis Street	1									1		2	
Garden Street												0	
Hans Place												0	
Juliett Street	5	2		5	5	1		2	5	2	5	32	Cycleway is not marked on maps. More pedestrian crossings
Leicester Street	2			1	3		2	1	1		1	11	Re-surfacing requested to improve cyclist safety
Lilian Fowler Place	1											1	
Llewellyn Lane												0	
Llewellyn Street	1	2	3	6	6		1	6		1	6	32	Cars park on footpath and thus restrict an already narrow walkway. Further, this activity has impeded any effective use of bike racks (reports of damaged bikes)
Lynch Avenue									1			1	

Street Name	Uneven footpath surfaces	Poorly designed kerbs	Lack of pedestrian signage/lights	lack of audible/tactile signals	Lack of pedestrian crossings	Poor lighting	Overhanging trees	Street furniture on footpath	Cycleway facilities	Traffic volume/speed	High # of children/elderly	Σ	Cycle/Ped Comments
Lynch Lane												0	
Murray Street												0	
Oconnor Lane												0	
Railway Parade												0	
Saywell Street												0	Damaged footpath
Scouller Street	2			1	1				1		1	6	
Shelleys Lane												0	
Shirlow Street	1						1					2	Traffic calming measures requested
Sloane Lane												0	
Sloane Street												0	
Smidmore Street												0	
Smith Street	1		1						2			4	
Sydenham Lane												0	
Sydenham Road												0	
Sydney Steel Road												0	Request for cycleway
Victoria Road	3	3	2	9	5	1		3	1		9	36	
Wilcox Lane												0	
												0	
Totals	37	24	15	29	37	5	10	22	19	17	29	244	

Appendix C

Road User Movement (R.U.M) Code Description



ROAD USER MOVEMENT (R.U.M.) CODE

This is recorded for the first impact according to the table below
Note: The 'key' vehicle is represented by the dark arrow:——▶
and is the first vehicle listed for each accident in the accident description list (ADL).

Appendix D

Existing LATM Measures: Street by Street

Street Name	Pedestrian Refuge	Cyclist Refuge	Speed Hump	Rumble Bar treatment	At Grade Pedestrian Crossing	Wombat Crossing	Rounda-bout	Median	Traffic control Signals	Blisters	Flat Top Speed Hump	Left-in/Left-out only	Pedestrain Activated Signals	3-tonnes limit	One-Way Street	Parking Lane Treatment	Total
Black Street	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	3
Bedwin road	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
Bourne Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadogan Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadogan Lane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chalder Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chalder Avenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chapel Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Edgeware Road	1	1	0	0	0	0	0	2	4	14	0	0	2	1	0	1	26
Edinburgh Road	2	0	0	0	0	0	3	0	2	2	0	0	0	0	0	0	9
Empire Lane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enmore Road	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	4
Faversham Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fitzroy Street	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	2
Francis Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Garden Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Juliett Street	1	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	4
Juliett Lane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leicester Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lilian Fowler Place	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Llewellyn Lane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Llewellyn Street	2	1	0	0	0	0	0	1	2	1	0	0	0	1	0	1	9
Lynch Avenue	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Street Name	Pedestrian Refuge	Cyclist Refuge	Speed Hump	Rumble Bar treatment	At Grade Pedestrian Crossing	Wombat Crossing	Rounda-bout	Median	Traffic control Signals	Blisters	Flat Top Speed Hump	Left-in/Left-out only	Pedestrain Activated Signals	3-tonnes limit	One-Way Street	Parking Lane Treatment	Total
Lynch Lane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Murray Street	0	1	0	0	1	0	2	1	0	0	0	0	0	0	0	0	5
O'Connor Lane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Railway Parade	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Saywell Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scouller Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shelley Lane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shirlow Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Sloane Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sloane Lane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smidmore Street	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2
Smith Street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sydenham Lane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sydenham Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Sydney Steel Steel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Victoria Road	0	0	0	0	1	0	0	2	3	0	0	1	1	0	0	0	8
Wilcox Lane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	8	3	0	0	3	1	8	8	15	21	0	1	3	2	2	3	**78**

Appendix E

Internal Council Workshop Feedbacks

Question	Comments
Q. 1 Study?	Significant change probably in next 50 years from Sydenham Road to Murray Street near the railway line Public Domain Strategy near Marrickville Road and Illawarra Road intersection ECN around Llewellyn/Victoria/Edinburgh ECE sub-catchment Plan and Flood Study, and drainage works to be developed Cycle connection between Sydenham station and Marrickville Metro via Sydney water land Marrickville Metro expansion – revitalise shops Smidmore – Flooding drainage works Edinburgh Road – redevelopment opposite Marrickville Metro (eg. Master) – may increase traffic Cycleway Railway Parade to Edinburgh Road Enmore Park – future drainage works Victoria Road precinct – rezoning to residential/ mixed use Fitzroy Street – on footpath program 2017/18 also main cycle route Planning proposal for western side of M. East Industrial area Industrial area – employment Land use study Sydney Steel Road – PDS Master M. East Industrial Area – Employment and Land use study Francis Street – pocket park and community garden Enmore Park – DOLA, POM
Q.2 Issues?	Wardell Road connection to Cooks River traffic is too fast, noisy and dangerous Fast and heavy traffic at the Intersection of Scouller Street and Juliett Street Parking issue at intersection of Llewellyn Street and Juliett Street around the café Poor access to Metro Dangerous Intersection at Victoria Road X Enmore Road X Edinburgh Road Flooding Unpleasant and inaccessible crossing at Llewellyn Street and Edgeware Road Saywell Street – poor pedestrian cycle access Shirlow Street to Sydney Steel Road – poor linkage between pedestrian and cyclist Poor permeability for cyclist, poor crossing points from industrial areas to metro , parks, pool and ARCC Victoria Road and Edinburgh Road – traffic/cycle Enmore Road – danger for pedestrian
Q.3 Suggestions?	Improve way finding connection to park and metro Improving night life / venues in individual area Pedestrian Crossing at Edgeware Road near Llewellyn Street Fitzroy Street – separated cycleway Slow zone for Victoria Road and Enmore Road Better connection to Enmore Park Rain garden at Scouller Street X Juliett Street

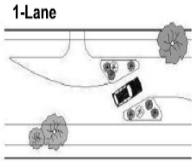
Appendix F

LATM treatments Glossaries

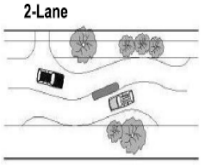
Glossary of LATM Devices

Angled Slow Points

1-Lane



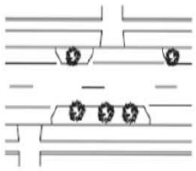
2-Lane



An angled slow point is a series of kerb extensions on opposite sides of the road which narrow and angle the roadway.

How they perform: reduce speed, assist pedestrians crossing, discourage through traffic, minimise inconvenience for local residents, landscaping opportunity.

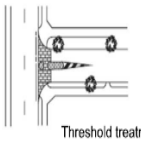
Kerb Blister



A kerb blister is a series of kerb extensions which narrow the roadway.

How they perform: act as a visual narrowing of the roadway, assist pedestrians crossing, improve pedestrian visibility, reduce speeds, delineate and protect parking spaces, landscaping opportutunity, minimise inconvenience for local residents.

Threshold Treatment



Threshold treatments or entry statements are coloured and/or textured road surface treatments that contrast with the adjacent roadway.

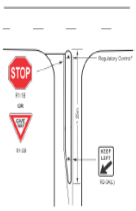
How they perform: alert drivers that they are entering a local traffic environment

Roundabout

A roundabout is a form of channelisation that incorporates a circular central island.

How they perform: regulate traffic at intersections, reduce speed, increase visibility at intersections, clarify the priority of movements, landscaping opportunity.

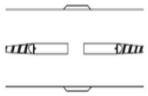
Median Islands



A mid-block median island treatment is a raised or flush island positioned at the centreline of a street.

How they perform: Narrow lanes and can provide pedestrians with a refuge, seperate vehicles reducing risk of collission, prevent overtaking, design can allow bus access to be accomodated, reduce vehicle speed, landscaping opportunity.

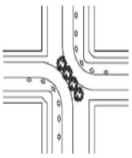
Pedestrian Refuge Islands



A Pedestrian refuge is a concrete safety zone to enable a two stage crossing of a road.

How they perform: provide refuge for pedestrians when crossing, reduce speed, prevent vehicles overtaking, allow buses and commercial traffic to be accomodated.

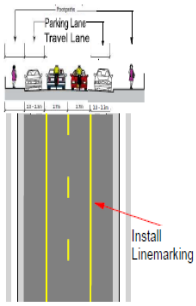
Road Closure



A full road closure is the closure of a street to two-way traffic. The closure can be located at either an intersection or placed mid-block.

How they perform: eliminate through traffic, simplify an intersection layout to reduce the possible number of conflict points and the consequent crash risk, increase pedestrian safety, landscaping opportunity.

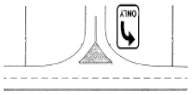
Parking Lane Treatment



Parking lane treatment is the delineation of lanes on the roadway including the parking lane (edge line) and the trafficable lane (separation line).

How they perform: visual narrowing of the roadway, reduce vehicle speeds, relatively simple and quick to install, delineate parking spaces, minimise inconvenience for local residents.

Channelisation (Left In/Out)



A left-in/left-out island is a raised triangular island at an intersection, which aims to obstruct right turns and through movements to and from the intersection, street or driveway. This device is a form of partial road closure similar in its effect to a half road closure.

How they perform: reduce traffic volumes, reduce conflict points, refuge for pedestrians, reinforce the need for vehicles to give way, landscaping opportunity.

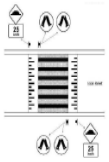
One Way Streets

One-way street signs indicate to drivers that traffic is allowed to travel only in the direction of the arrow in the section of the street applying.

How they perform: are generally accepted by the public, increase the opportunity for on-street parking, increase the opportunities for dedicated facilities for pedestrians, cyclists and public transport, reduce traffic volumes, decrease vehicle conflicts.

Wombat Crossing

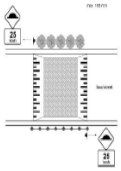
www.invarion.com



Wombat crossings are generally of the form of flat top road humps with a marked pedestrian crossing on the raised flat surface. Although similar to a flat top road hump, wombat crossings give priority to pedestrians while flat top road humps give priority to vehicles.

How they perform: reduce speed, reduce traffic volumes, discourage through traffic, reduce vehicle-pedestrian conflict, provide a designated crossing place for pedestrians.

Flat Top Road Hump



A flat top road hump is a speed reduction device in the form of a raised flat profile extending across the roadway. A flat-top road hump is flat instead of being curved as is the case with a round profile road hump.

How they perform: reduce speed, easy to install, discourage through traffic, work well in a series.

Speed Humps / Cushions

A speed hump or cushion is a speed reduction device in the form of a raised curved profile extending across the roadway. A speed hump is curved instead of being flat. The two main types of road hump are the sinusoidal profile hump and the Watts profile hump. The most common form of road cushions are those made from moulded rubber segments but they can also be constructed from other material such as concrete or asphalt.

How they perform: reduce speed, easy to install, discourage through traffic, work well in a series, less obtrusive for cyclists then other devices.

Appendix G

Concept designs

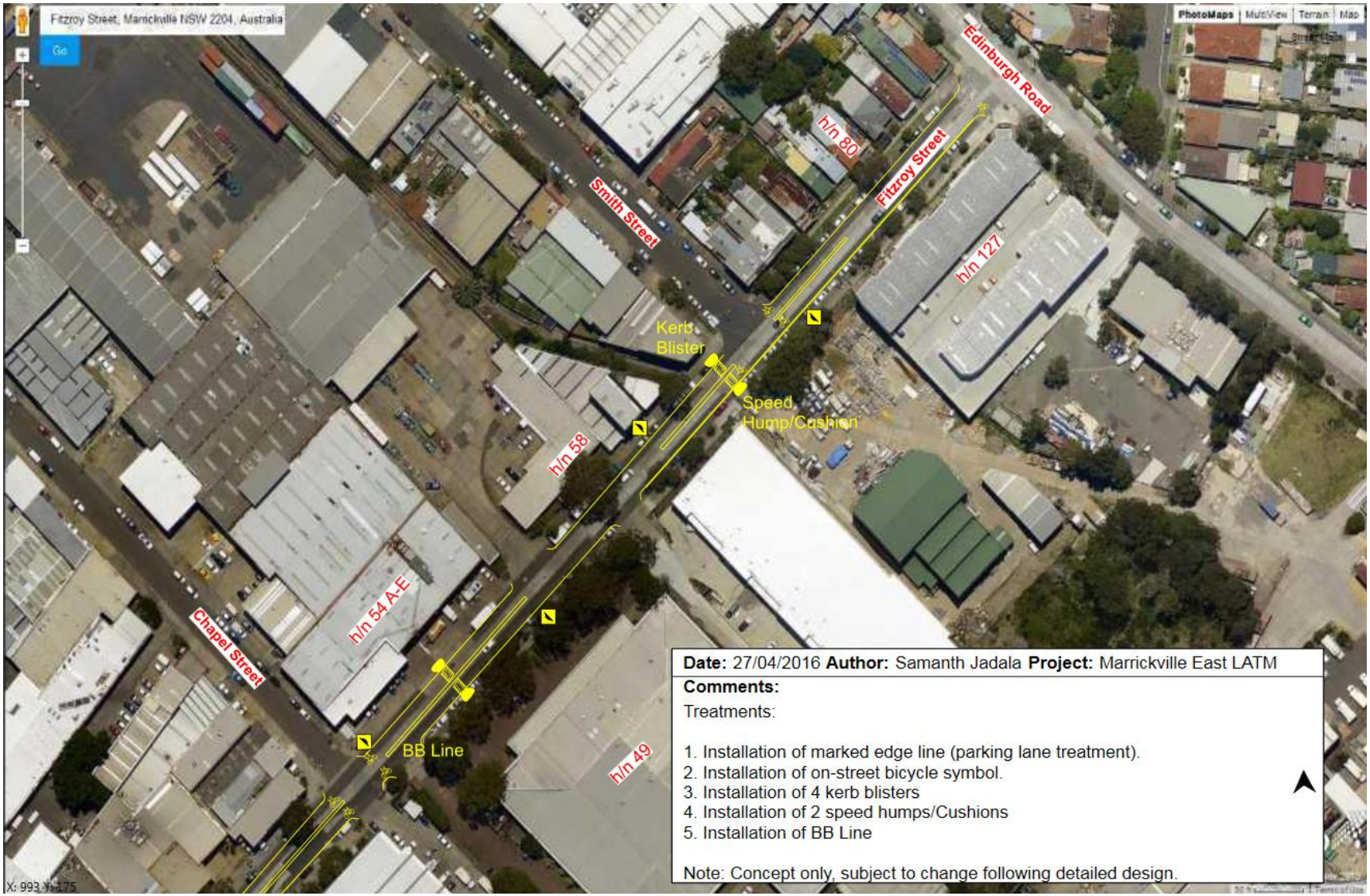


Figure 2: Item 1 - Fitzroy Street from Edinburgh road to Chapel Street

Figure 3: Item 2 - Fitzroy Street from Sydenham Street to Chapel Street

Figure 4: Item 3: Edinburgh Road between Fitzroy Street and Murray Street

Figure 5: Item 4: Llewellyn Street between Enmore Road to Edgeware Rd

Figure 6: Item 5: Victoria Rd – Bourne St, Black St and Leicester St

Figure 7: Item 6: Fitzroy St / Edinburgh Rd Roundabout

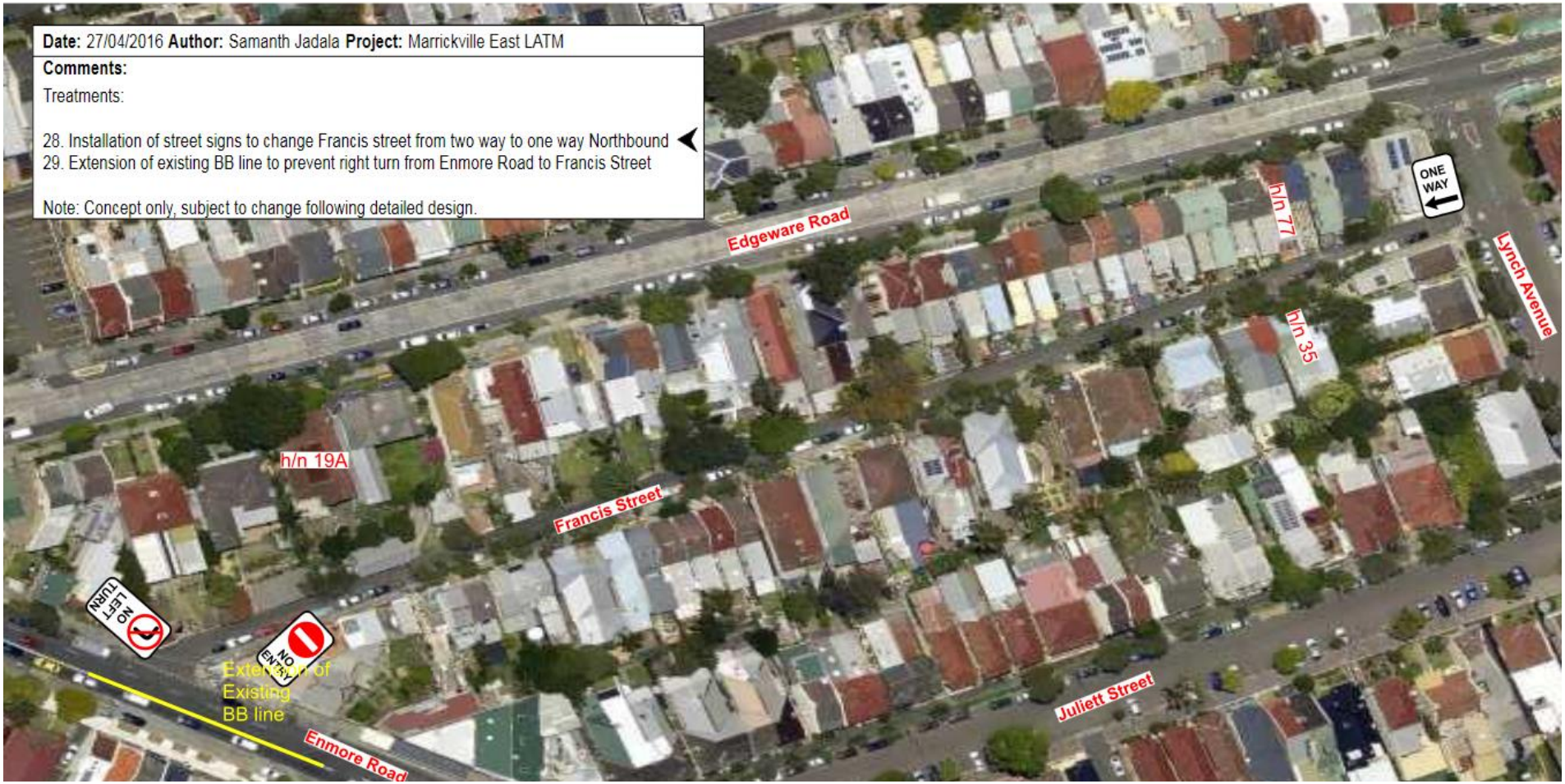


Figure 8: Item 7: Francis Street

Figure 9: Item 8: Juliett Street

Figure 10: Item 9: Lynch Avenue / Edgeware Road

Figure 11: Item 10: Shelleys Ln/ Llewellyn Street

Figure 12: Item 11: Black Street

Figure 13: Item 12: Juliett St with and including Lynch Ave

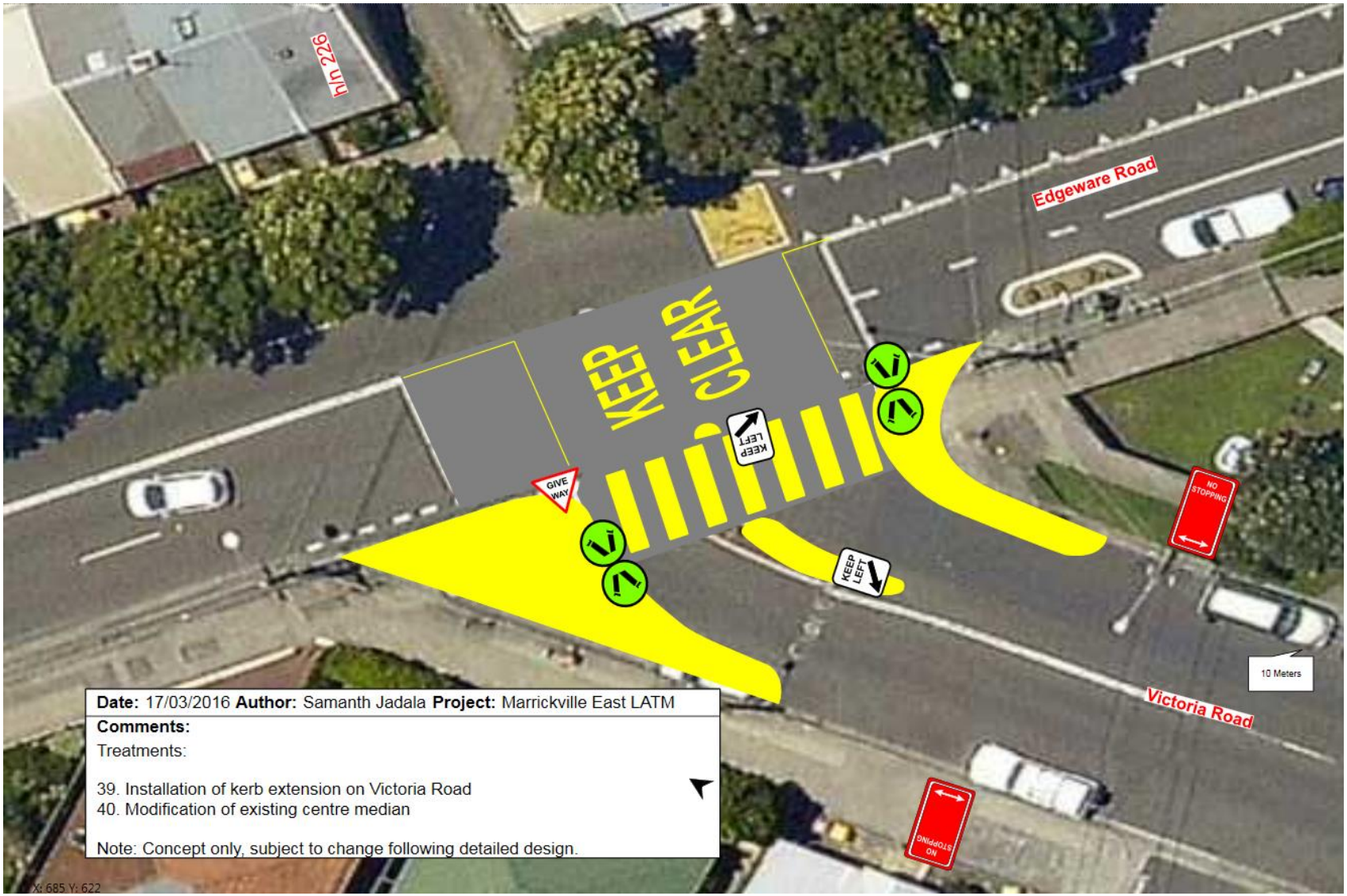


Figure 14: Item 13: Victoria Rd/Edgeware Road Intersection

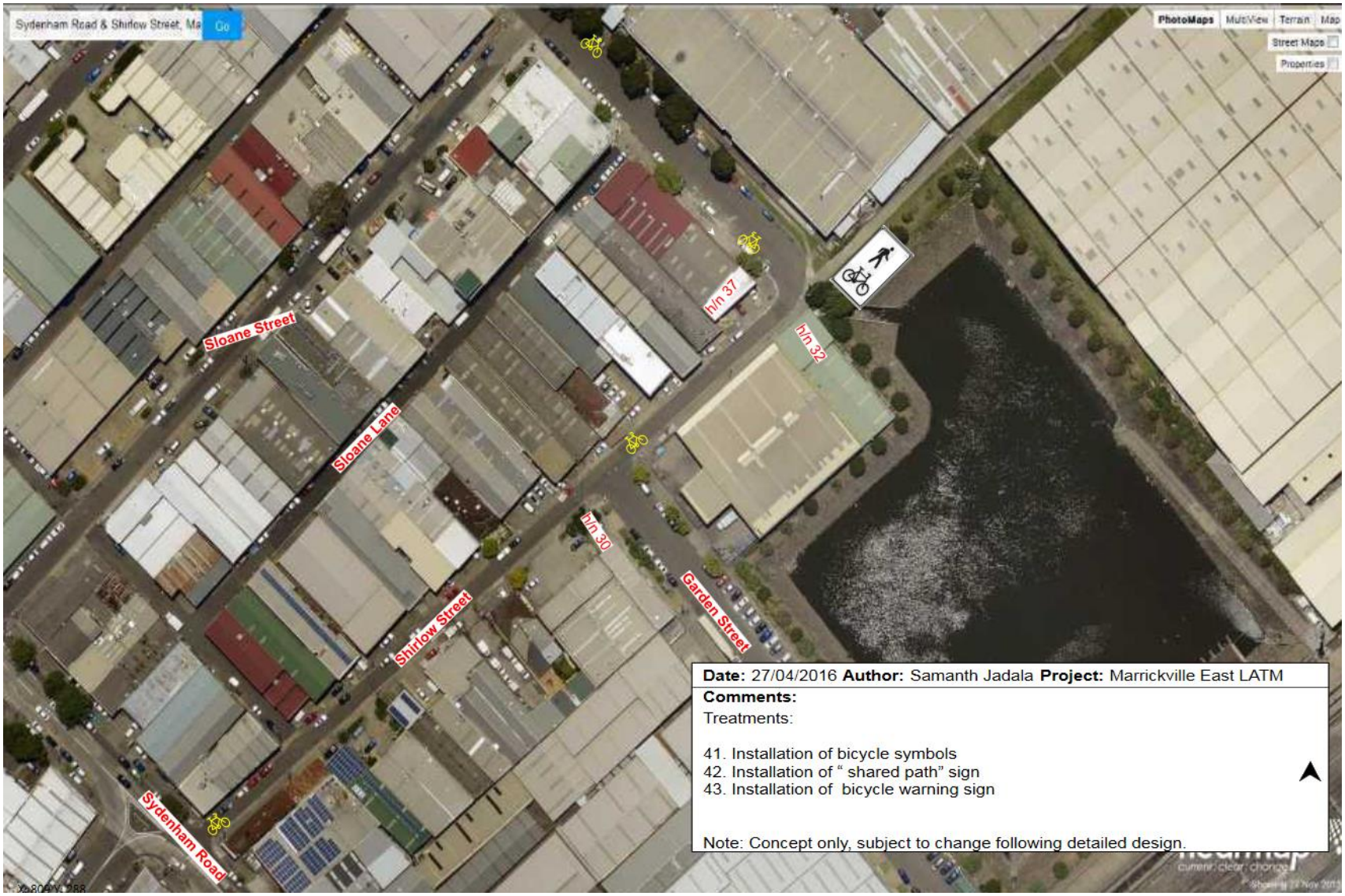


Figure 15: Item 14: Sydenham Rd, Shirlow St, Sydney Steel St, Edinburgh Rd, Smidmore St

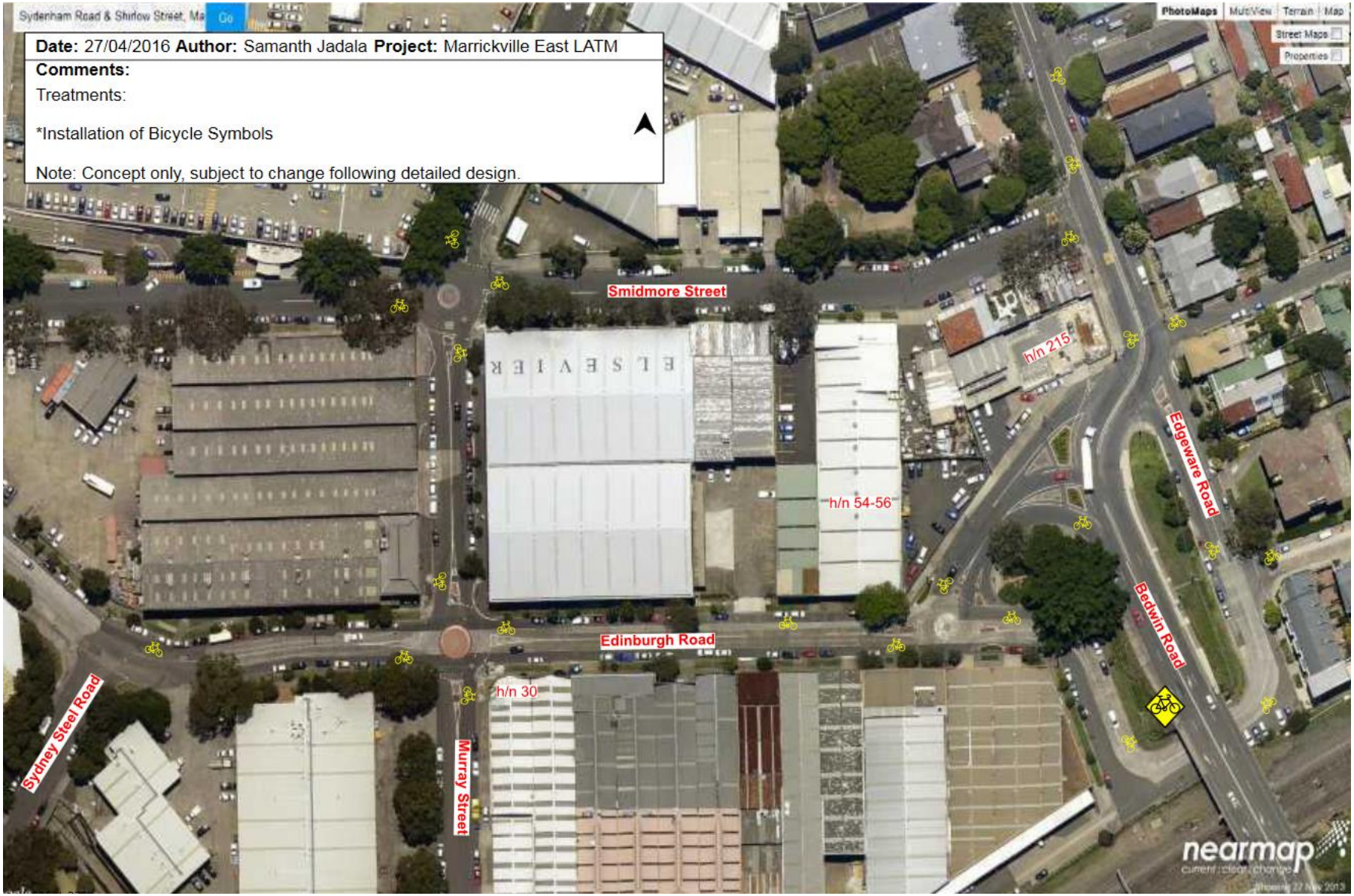


Figure 16: Refer to Item 14