Item 5

Item No: **LTC0820 Item 5**

Subject: **TEMPE SOUTH DRAFT LOCAL AREA TRAFFIC MANAGEMENT (LATM) STUDY (MIDJUBURI - MARRICKVILLE WARD/HEFFRON ELECTORATE/INNER WEST PAC)**

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SUMMARY

Council prepared a draft Local Area Traffic Management (LATM) study to address key community concerns about traffic, pedestrian and cycling facilities for the Tempe South area. The LATM study was undertaken to fulfill the development approval conditions for the Tempe Bunnings development at 728-750 Princess Highway, Tempe.
The recommendations aim to align with Council policies and strategies, with an emphasis on improving pedestrian and cyclist movements, whilst retaining safe and acceptable traffic volume and speeds in local streets.
Traffic count data and on-street parking data in a number of areas was collected in February 2020 to assist the study. Further site observations and intersection counts were used to develop a draft plan to mitigate the impact of the Bunnings development.
Community submissions received during the Tempe Bunnings development were reviewed to gauge local traffic and parking concerns in the area. Considering the changes in the local area in Smith Street, a number of recommendations are provided for endorsement and public exhibition of the draft scheme.

RECOMMENDATION

THAT:

1. **The Committee endorse the draft Tempe South Local Area Traffic Management (LATM) Study and proposed treatments for community consultation; and**

2. **The draft report be placed on Public Exhibition, providing a minimum 28 days for community feedback and the results be reported back to the Traffic Committee.**

BACKGROUND

The Tempe South LATM study was undertaken as a condition of consent for the Tempe Bunnings development at 728-750 Princess Highway, Tempe.
The study was undertaken to address traffic and parking impacts arising from the Tempe Bunnings development and the community concerns.

OTHER STAFF COMMENTS

The Tempe South LATM was undertaken by Bitzios Consulting and reviewed existing traffic and parking management in the area. The objective of the local area traffic management planning is to investigate and review the performance of the existing LATM scheme and recommended proposed LATM works. A previous LATM review in Tempe was undertaken in 2011.

The draft LATM study was developed in order to review the traffic management strategy within the Tempe South area. The LATM assessed the traffic conditions as follows:

- Assessment of the traffic volumes, heavy vehicle percentages and vehicle speeds based on the traffic survey results;
- Identification of locations not satisfying with Environmental Performance criteria;
- Analysis of the accident statistics for the 5 year period from 2014 to 2018;
- Review of the community's complaints and concerns raised from the Tempe Bunnings development at 728-750 Princess Highway in relation to traffic and safety issues;
- Assessment of the effectiveness of the existing LATM measures and ensure they are compliant to the up-to-date standard;
- Identification of further opportunities to reduce through traffic volumes and speed of traffic on local streets to address public amenity;
- Identification of pedestrian and cyclist improvements; and
- Development of conceptual LATM proposal options.

The recommendations aim to align with the Inner West Community Strategic Plan (CSP) and the Inner West Integrated Transport Strategy (ITS), by creating a transport planning framework that integrates active and public transport in the land uses to support mode shift from single vehicle travel to active and sustainable transport. Safety for all road users are one of the benefits of the LATM strategy by reducing vehicle speeds through traffic calming treatments.

The study found that local streets in general had a low accident history, and favourable traffic speeds. Treatment options are proposed in locations where safety could be improved anticipating the operation and impact of the Bunnings development. These areas are provided in the attached document and discussed in the report in further detail.

The recommended treatment options are listed below:

Road	Option	Type	Location	Features
Smith Street	1	Road Narrowing & Contrasting Pavement	Immediately south of proposed Bunnings access	• Landscaped kerb blisters with low height shrubs • At-grade contrasting pavement treatment (embossed text pattern)
	2	Mountable Concrete Median Treatment		• Mountable low-profile concrete median with contrasting pavement
	Addition to both options	Right Turn Only Signage	Opposite and facing Bunnings access	• R2-14_R (Right Turn Only) sign
		Line Marking	Between Princes Highway and Bunnings Access	• Edge and centre line markings to provide a visual narrowing of the roadway • Road environment would appear distinctively different to the southern section of Smith Street • Delineation of adjusted lane arrangement near Princes Highway
		Bicycle Facilities	Between Princes Highway and Bunnings Access	• Extend shared path for a short distance from Princes Highway along both sides of Smith Street • Inclusion of an angled bicycle ramp for southbound cyclists to transition between the shared path and Smith Street • Signage and marking to indicate transitions between shared path and on-road cycling
		Widened Footpath	Western side, between No. 48 and	**Option a (Option 1a or Option 2a):**

			South Street	• Widen western footpath • Retain existing kerbside parking on the western side of Smith Street • Shift centreline to suit road width **Option b (Option 1b or Option 2b):** • Widen western footpath with adjacent landscaped verge • Removal of existing kerbside parking on the western side of Smith Street • Some paved parking bays within the landscaped area to offset loss of parking • Turning pocket to allow vehicles to turn right out of No.1 Smith Street
Holbeach Avenue	1	Speed Cushions	Between driveways of 14 and 18 Holbeach Avenue	• Set of four speed cushions of 100mm height, across roadway
	2	Speed Cushions & Road Narrowing		• Set of two speed cushions of 100mm height in travel lanes • Landscaped kerb blisters with low height shrubs
Stanley Street	1	Flat Top Road Hump	Near streetlight outside 14 Stanley Street Near streetlight outside 37 Stanley Street	• Concrete flat top road hump of 100mm height, across road width • Contrasting surface treatment ('terracotta' colour surface of similar)
	2	Road Narrowing		• Landscaped kerb blisters with low height shrubs
Wentworth Street	1	Road Narrowing & Contrasting Pavement	At entry from Princes Highway (specifically south of Tempe Tyre Centre vehicular access) At entry from South Street (specifically north of the drainage pit)	• Landscaped kerb blisters with low height shrubs • At-grade contrasting pavement treatment (embossed text pattern)
	2	Flat Top Road Hump		• Concrete flat top road hump of 100mm height, across road width • Contrasting surface treatment ('terracotta' colour surface of similar)
	Addition to both options	3 Tonne Truck Limit Signage	Outside 846 Princes Highway Outside 45 Wentworth Street	• R6-10-2 and R9-231 (Truck Load Limit) signs • W8-245N_L (Left Arrow) Signage, only on Princes Highway
Barden, Fanning, Hart and Station Streets	-	Contrasting Pavement Threshold[1]	At entry from Princes Highway	• At-grade contrasting pavement treatment (embossed text pattern)

1. Subject to a 40km/h Local Traffic Area proposal and/or Transport for NSW review and approval

PUBLIC CONSULTATION

Consultation to date has not been undertaken, however comments from residents and businesses received during the Tempe Bunnings development were reviewed and treatment options were developed to address local concerns, provide improvement to the public domain and residential amenity. The public exhibition of the Tempe South LATM strategy will provide an opportunity for the community to provide feedback on the options put forward.

FINANCIAL IMPLICATIONS

The cost of proposed treatments arising from the Tempe LATM strategy will range between $273,000 and $445,000 depending on treatment options chosen. This cost takes into consideration 10% contingency and 10% design costs. Approval conditions for the Bunnings

Tempe development require the applicant to cover the cost of design and construction of approved treatments from the final Tempe LATM strategy.

ATTACHMENTS

1.⇩ Draft Tempe South LATM Study

Item 5

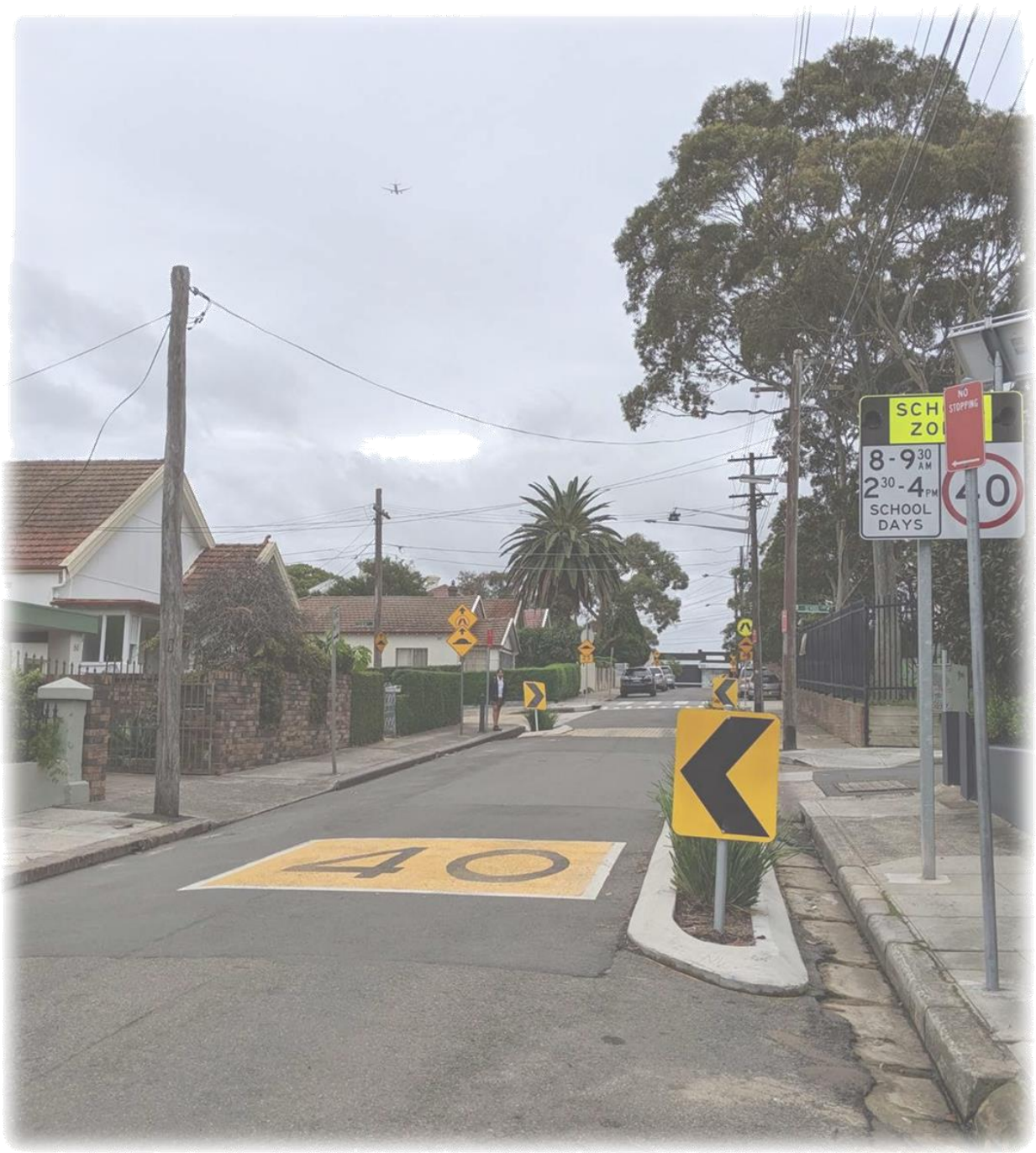
Tempe South LATM Study

Draft Report

BITZIOS consulting
traffic engineering + transport planning

Inner West Council

24 July 2020



Attachment 1

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Document Issue History

Report File Name	Prepared	Reviewed	Issued	Date	Issued to
P4533.001R Tempe South LATM Study – Draft Report_DRAFT	C. Mak / G. Yin	SP. Power	SP. Power	24/07/2020	Sunny Jo <sunny@innerwest.nsw.gov.au>

EXECUTIVE SUMMARY

Background

As part of the conditions of consent for an approved Bunnings Warehouse at 728-750 Princes Highway, the Eastern City Planning Panel has conditioned that a Local Area Traffic Management (LATM) study to be undertaken for the Tempe South area, in order to manage the impacts of the proposed development.

Study Area

The study area for the LATM study consists of local roads in Tempe South, which are Barden Street, Fanning Street, Foreman Street, Hart Street, Holbeach Avenue, Smith Street, South Street, Stanley Street, Station Street, Union Street, Wentworth Street and Zuitton Lane. Data analysed and concept designs developed during the study are limited to these roads.

At the beginning of the study, background information and documents relating to the proposed Bunnings development were reviewed, providing information on future proposed traffic and road changes in the area. This included a desktop study of existing site conditions and review of surrounding land uses and road network information.

Data Review

Crash history, traffic and parking data were analysed as part of the study. Traffic and parking surveys were conducted to capture the levels of traffic and parking demand within the study area. This included tube counts, parking occupancy surveys and intersection counts

Crash history data between January 2014 and December 2018 were analysed. It was found that 10 crashes occur within the study area, with two (2) involving vehicles at intersections with Princes Highway. Five (5) of the crashes occurred along Holbeach Avenue and two (2) occurred along Smith Street. Out of the five (5) Holbeach Avenue crashes, four (4) involved Vulnerable Road Users (VRU), which included motorcyclists, pedal cyclists and pedestrians.

Traffic surveys were undertaken on 19 March 2020, Thursday and 21 March 2020, Saturday, recording relevant data such as traffic volumes, heavy vehicle volumes and 85th percentile speeds. It was found that some of the local roads have relatively higher average daily traffic volumes than other roads in the study area. The 85th percentile speeds on these roads are also relatively higher than the other roads, with speeds of more than 40 km/h but lower than the speed limit of 50 km/h. Some roads with a truck load limit were also found to be used by heavy vehicles.

The crash history and traffic survey data analysed helped to identify roads that require LATM devices in order to provide traffic calming and reduce vehicle speeds, reduce general traffic volumes by deterring traffic, reduce heavy vehicle volumes and reduce crash risk.

Parking occupancy and duration surveys were undertaken for Barden Street, Fanning Street, Smith Street and a section of South Street on 19 March 2020, Thursday and 21 March 2020, Saturday. The data showed that on average, Smith Street had 18 vacant spaces on Thursday and 27 vacant spaces on Saturday.

It is understood that up to 13 parking spaces along Smith Street will be removed as part of the Bunnings development. The parking survey data was used to determine the number of available kerbside parking spaces on a typical Thursday and Saturday and assess the impact of removing spaces due to Bunnings. These numbers then influenced the LATM treatment options proposed along Smith Street, as different LATM devices may also require removal of some kerbside parking spaces. It was found that Smith Street will have very few or no available parking spaces left when excluding parking that was removed due to the Bunnings and the LATM devices. This may result in any parking overflow onto surrounding streets. The existing parking occupancy of around 50% along the surrounding Barden and South Streets mean that these roads are able to absorb any of the Smith Street parking overflow.

Site Audits

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Site audits of existing traffic and parking signage, bicycle and pedestrian facilities, LATM devices and refuse collection issues were undertaken on Wednesday 4 March 2020.

A finding of the audit was the lack of truck load limit signage on the northern end of Wentworth Street near Princes Highway, which is peculiar due to the presence of such signage on the southern end of Wentworth Street and other local roads in the study area. This finding was taken into consideration when developing the LATM concept designs.

Risk Priority Scoring Assessment

A scoring system was developed to determine streets that require LATM treatments. This was based on the crash history and traffic data analysed, and other factors such as existing road width, availability of existing LATM devices, distance to schools and existing and future land use. Points were allocated to each road or road section based on the level of risk. The higher the points, the higher the risk for future crashes, and hence the higher the need for LATM devices.

Based on the scoring criteria, four (4) streets (priority streets), being Smith Street, Holbeach Avenue, Stanley Street and Wentworth Street, had relatively higher scores than other roads in the study area. Therefore, LATM devices are recommended to be implemented on these roads.

Proposed Treatments Justification

A detailed selection criteria and list of suitable LATM measures were developed based on existing devices in the area and typical LATM devices presented in *Austroads Guide to Traffic Management Part 8 - Local Area Traffic Management*.

Treatment options were then proposed for each of the four priority streets to address the specific issue(s) identified:

- **Smith Street Option 1:** Road narrowing using kerb blisters to slow down traffic, with contrasting pavement to highlight the change in road environment
- **Smith Street Option 2:** Mountable concrete median to provide a horizontal deflection and slow down traffic
  - Other Smith Street treatments: on-road and off-road bicycle transitions, extension of shared path and angled on-ramp for cyclists, along with a widened footpath on the western side of Smith Street. An optional landscaped verge may also be provided between the widened footpath and roadway, which will result in the removal of kerbside parking.
- **Holbeach Avenue Option 1**: A set of four speed cushions at mid-block to provide a vertical deflection and slow traffic down
- **Holbeach Avenue Option 2**: A set of two speed cushions at mid-block to provide a vertical deflection and road narrowing using kerb blisters, with the aim of slowing down traffic
- **Stanley Street Option 1**: Flat top road humps at two mid-block locations to provide a vertical deflection and slow traffic down
- **Stanley Street Option 2**: Road narrowing using kerb blisters at two mid-block locations to slow traffic down
- **Wentworth Street Option 1**: Road narrowing using kerb blisters at both ends of the road to slow traffic down, with contrasting pavement to highlight the change in road environment
- **Wentworth Street Option 2**: Flat top road humps at both ends of the road to provide a vertical deflection and slow traffic down

Where possible, landscaping is proposed to improve the aesthetics of the street environment and enhance sense of place.

Additionally, contrasting thresholds have also been proposed for Barden Street, Fanning Street, Hart Street and Station Street to visually separate the local streets and the Princes Highway. This assists in highlighting the local road environment and deter non-local traffic from using these streets. This treatment can also be

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used to support a reduction in speed limit in the future, subject to discussion and approval by Transport for NSW.

Infrastructure Itemisation

Each option was broken down into individual components including signage. Treatments requiring signage include bicycle infrastructure at Smith Street, speed cushions and flat top road humps. Additionally, truck restriction signage will be provided at the northern end of Wentworth Street where there is no existing signage.

Cost Estimation

Indicative costs for each component were estimated based on average standard costs provided by Inner West Council, as well as rates presented within *Local Infrastructure Benchmark Costs (IPART NSW)*. Naturally, the highest cost treatments include those requiring substantial civil works, such as flat top road humps, footpath widening, and kerb blisters.

Estimated costs for each option and measure ranges from $18,000 to $184,000, with the lowest cost treatment being the contrasting pavement, and the highest cost being the Smith Street treatment options.

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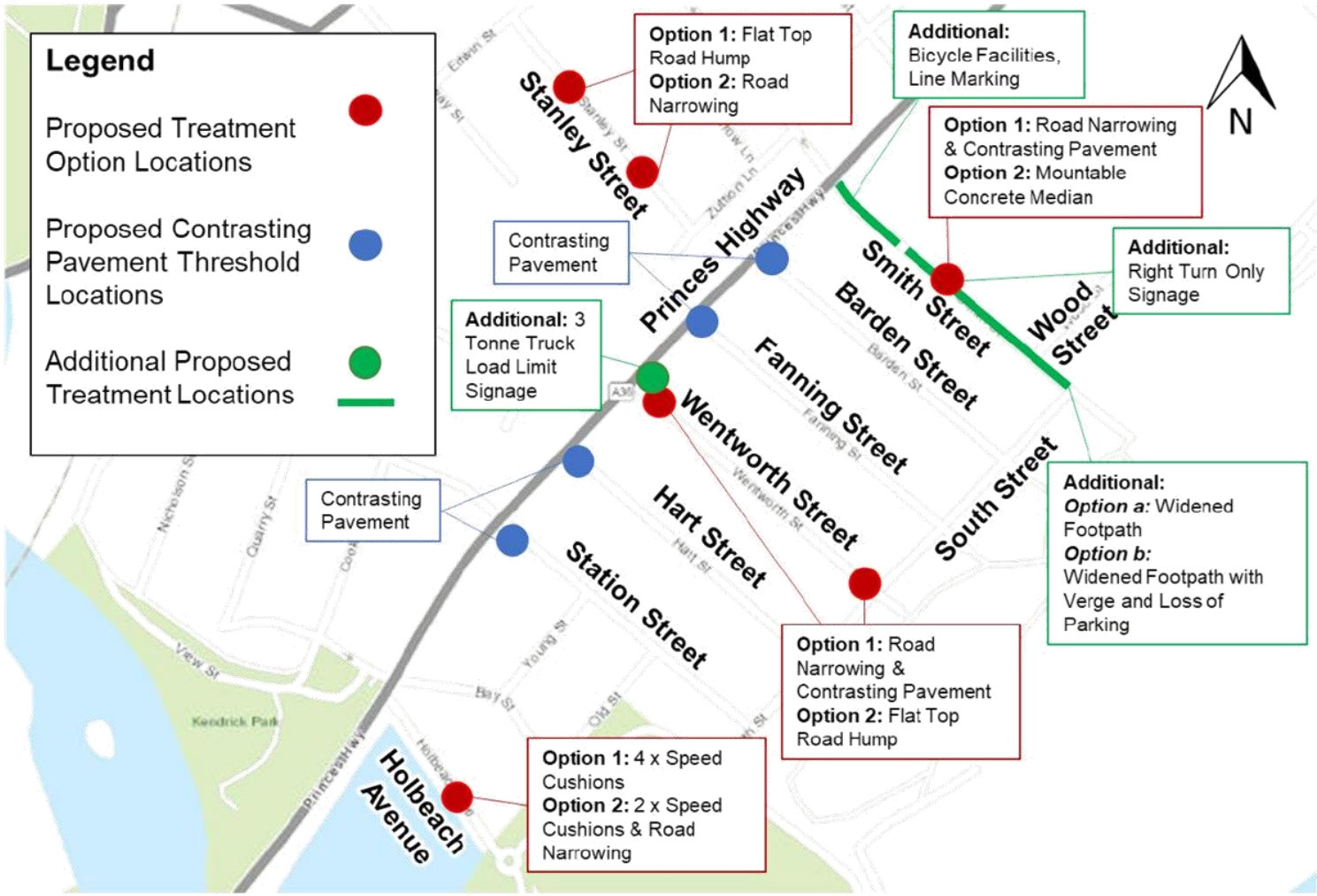
Proposed Treatment Locations



CONTENTS

DRAFT

DRAFT

Tables

DRAFT

Figures

Appendices

DRAFT

Appendix D: LATM Treatment Concept Designs

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1. INTRODUCTION

1.1 Background

As part of the conditions of consent for an approved Bunnings Warehouse at 728-750 Princes Highway, the Eastern City Planning Panel has conditioned that a Local Area Traffic Management (LATM) study to be undertaken for the Tempe South area, in order to manage the impacts of the proposed development.

Inner West Council (Council) has commissioned Bitzios Consulting to undertake this LATM study.

1.2 Study Area

The LATM study area includes the local roads adjoining Princes Highway in the Tempe South precinct, namely:

- Barden Street
- Fanning Street
- Foreman Street
- Hart Street
- Holbeach Avenue (excluding the Tempe Recreation Reserve access road)
- Smith Street
- South Street
- Stanley Street
- Station Street (between Princes Highway and South Street)
- Union Street
- Wentworth Street
- Zuitton Lane

The study area and the proposed development (728-750 Princes Highway) are illustrated in Figure 1.1.

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Figure 1.1: Study Area

1.3 Purpose and Scope

This report details the assessment of the traffic conditions within the Tempe South study area and its findings. The study included:

- Review of existing conditions, including:
  - Surrounding Land Uses
  - Road Hierarchy
  - Public Transport and Active Transport
  - Garbage Collection
  - Parking Controls
- Review of Future developments, including proposed developments and traffic generation
- Crash Data Analysis
- Traffic and Parking Data Analysis, including:
  - Intersection traffic counts
  - Vehicle tube count speed and volume data
  - Heavy vehicle proportions
  - Parking occupancy data
- On site audit, including:
  - Traffic and parking signs

  - LATM and traffic calming devices
  - Bicycle and pedestrian facilities
  - Waste management
- Development of a scoring system and identification of priority streets for treatment
- Development of potential LATM treatments
- Recommendation and assessment of LATM treatments and locations
- Development of an infrastructure schedule based on treatment options
- Cost estimation of each type of the recommended treatment
- Methodology and assumptions used for cost estimation.

1.4 Local Area Traffic Management

1.4.1 What is Local Area Traffic Management

According to *Austroads Guide to Traffic Management Part 8 – Local Area Traffic Management* (AGTM08-16) (summarised):

> *LATM is concerned with the planning and management of the usage of road space within a local traffic area. It involves the use of physical devices, streetscaping 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.*
>
> *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.*
>
> *The primary target of LATM is to change driver behaviour, both directly by physical influence on vehicle operation, and indirectly by influencing the driver's perceptions of what is appropriate behaviour in that street. The objective is to reduce traffic volumes and speeds in local streets to increase amenity, liveability, and improve safety and access for all road users.*
>
> *The need for LATM usually arises from:*
>
> - *an intent to reduce traffic-related problems*
> - *orderly traffic planning and management*
> - *a need to modify 'transport' behaviour*
> - *a desire to improve the community space and sense of place*
> - *a desire to improve environmental, economic and social outcomes*
> - *traffic interventions associated with new development or the implementation of pedestrian and bicycle plans and other local policies (e.g. RTA 2002).*

1.4.2 Stages of a LATM

The general stages involved in preparing a LATM study, as per *AGTM08-16*, are outlined in Table 1.1. This study primarily covers Stage 2 of the LATM process, with partial coverage of Stage 3 items.

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Table 1.1: Stages of a LATM

Tasks	Status in this study
Stage 1: Initiating an LATM program (completed)	
▪ Decide that action is needed ▪ Define study area, precincts and functional hierarchy of roads ▪ Develop study plan, including type of treatments and study costs ▪ Develop consultation strategy ▪ Council decision ▪ Prepare brief for consultant, if required	Completed by Council prior to start of the study
Stage 2: Data collection and problem identification	
▪ Define and collect required data ▪ Identify problems ▪ Identify potential solutions ▪ Define and confirm objectives	▪ Section 2 outlines the existing condition of the study area. ▪ Sections 3 to 5 outlines the data analysis and identification of problems. ▪ Section 6 outlines future conditions to be considered in the development of LATM plans. ▪ Section 8 outlines potential solutions that can be used in the study.
Stage 3: Development of plans	
▪ Clarify suitable strategies (including confirmation of LATM as an appropriate response) ▪ Develop outline schemes and supporting arterial improvements ▪ Consult on draft plans ▪ Assess and refine alternatives ▪ Select, present to council for adoption	▪ Section 8 outlines treatment options proposed
Stage 4: Scheme design	
▪ Location and design of treatments ▪ Consult with nearby owners/occupiers ▪ Prepare contract documents	▪ Section 8 outlines the location of treatment options ▪ Section 9 lists the rationale for the location and design ▪ Section 10 outlines the components of treatments ▪ Section 11 outlines the estimated cost of the treatments
Stage 5: Implementation	
▪ Confirm timing and staging ▪ Conduct additional 'before' studies as required ▪ Community information ▪ Construct/install ▪ Safety audit	Community consultation to be undertaken in the next stage

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Tasks	Status in this study
Stage 6: Monitoring and review	
▪ After' data collection, observation and reports ▪ Identify unanticipated impacts or outcomes ▪ Review technical and community assessment of scheme ▪ Revise as needed and feasible ▪ Record and report process and outcomes	Not undertaken yet

Source: Austroads Guide to Traffic Management Part 8: Local Area Traffic Management

1.5 Referenced Documents

The following documents have been reviewed and referenced as part of this LATM study.

- Draft Integrated Transport Strategy 2019
- Marrickville Bicycle Strategy August 2007
- Marrickville Pedestrian Access and Mobility Plan (PAMP) 2009
- Draft Inner West Council Public Domain Parking Policy 2019
- Crash database provided by Council
- Local Traffic Committee Report and Correspondence relating to traffic and development issues in the study area
- Development Consent conditions in relation to 728—750 Princes Highway, Tempe
  - Joint Regional Planning Panels (JRPP) report
  - Initial and revised traffic assessment reports by Transport and Traffic Planning Associates (TPPA)
  - Peer review of traffic assessment report by GTA Consultants
  - Other assessments
- Austroads Guide to Road Design, Part 6A Pedestrian and Cyclist Paths (AGRD06A-17)
- Austroads Guide to Traffic Management, Part 8 Local Area Traffic Management (AGTM08-16)
- RTA/RMS/Transport for NSW Technical Directions & Guidelines, including:
  - RTA NSW Bicycle Guidelines 2003
  - RTA Guide to Traffic Generating Development, 2002
  - Transport for NSW – Safer Speed policy and Guidelines Version 1 July 2012
  - RMS Permit Parking Guidelines 2005
- Australian Standards AS1742 - Manual of uniform traffic control devices:
  - AS1742.10 – 2009: Part 10: Pedestrian control and protection
  - AS1742.13 – 2009: Part 13: Local area traffic management
- Other RMS/Austroads Guidelines or Australian Standards

1.5.1 Previous LATM Studies

An LATM study was previously conducted by GTA Consultants (for Inner West Council) of the St Peters and Tempe area in 2010 (*St Peters/Tempe LATM Study 2010*). Details on this study are provided in Section 2.10.

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2. EXISTING CONDITIONS

2.1 Geographic Location

The study area is located within the suburb of Tempe, approximately 7km south-east of the Sydney CBD (the City). Tempe is the southernmost suburb within the Inner West LGA.

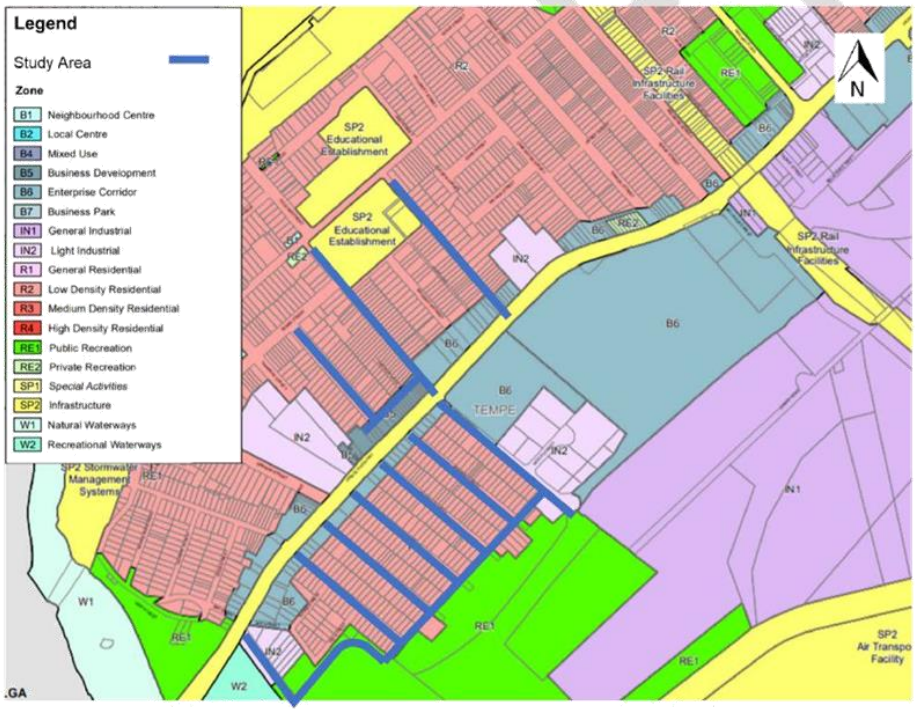
Cooks River and Alexandria Canal run along the western and southern boundaries of Tempe. Wolli Creek is located across Cooks River to the west and Sydney Airport land located across Alexandria Canal to the south.

2.2 Land Use

Based on the Marrickville Council LEP 2011, the study area is primarily comprised of the following land uses:

- R2 – Low Density Residential
- B6 – Enterprise Corridor (Commercial)
- IN2 – Light Industrial

The land zoning map is shown in Figure 2.1.



Source: Marrickville Local Environment Plan 2011, NSW Legislation

Figure 2.1: Tempe Land Zoning Map

2.2.1 Residential

The study area and roads listed in Section 1.1, mostly access low density residential lots, with some service access to commercial lots fronting Princes Highway and Wood Street.

2.2.2 Non-Residential

Commercial

Commercial lots are primarily located along the Princes Highway corridor, including tyre repair shops, motorcycle workshops, cafes, service stations, medical and dental clinics, a pub, a bus depot and other small retail. No large retail developments are located within the study area.

The larger commercial lots occupied by the IKEA Tempe and Decathlon sports stores are located towards the north east of the study area.

Industrial

Industrial land uses are located along the Princes Highway corridor, the eastern side of Smith Street, and Wood Street. As such, heavy vehicles access these lots using Smith Street and Wood Street.

The Tempe Bus Depot is located to the west of the study area on Princes Highway towards Gannon Street.

Schools

Two schools are located to the north of the study area along Unwins Bridge Road. Tempe Public School is further bounded by union Street and Foreman Street.

2.2.3 Parks & Reserves

Located towards the south of the study area are large recreation spaces, including Tempe Lands, Tempe Dog Park, Tempe Golf Range, Tempe Recreation Reserve and Tempe Reserve. They are accessed via Holbeach Avenue and South Street.

2.3 Garbage Collection

Council garbage collection occurs on Fridays between 5:00 AM and 12:00 PM. Previous information indicates that 10.5m refuse collection vehicles are used. There are no fixed garbage collection routes.

2.4 Area Demographics

The 2016 Census data was reviewed to identify travel trends to and from the study area. Nine (9) SA1 level statistical areas (codes 1132807-1132814 and 1132817) cover majority of the suburb of Tempe including the study area, shown in Figure 2.2.

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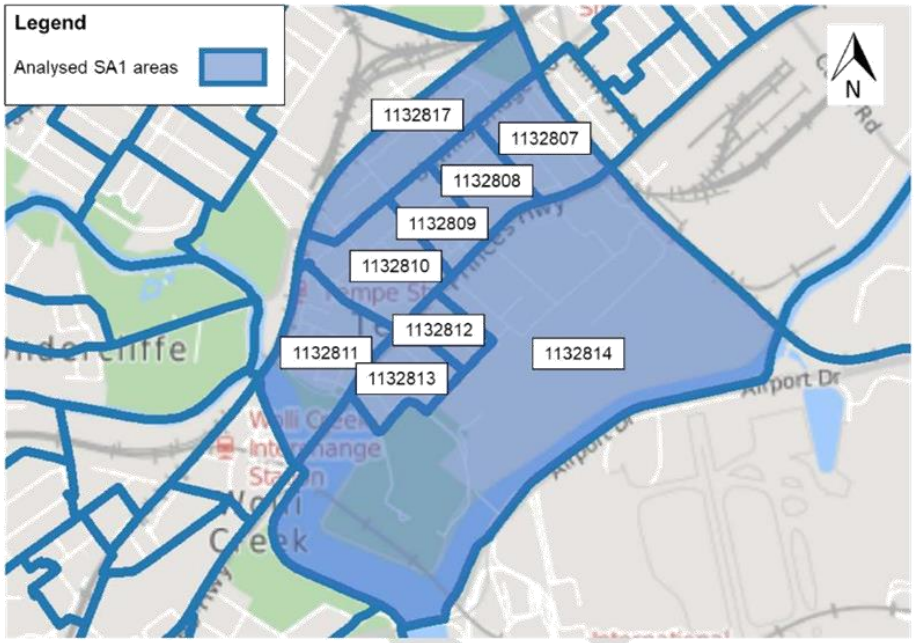


Source: Australian Bureau of Statistics (ABS)

Figure 2.2: Analysed SA1 areas

Census data, including Journey to Work data, for the nine (9) SA1 areas were compared to the Greater Sydney average shown in Table 2.1.

Table 2.1: Tempe Demographic Data

	Tempe SA1 areas	Greater Sydney Average
Age		
Young population between age 20 and 34	21%	23%
Aged population over age 65	12%	14%
Vehicle Ownership		
Vehicle ownership of one (1) motor vehicles or more	85%	88%
Vehicle ownership of two (2) motor vehicles or more	36%	50%
Mode of Travel to Work		
Public transport as mode of travel to work	41%	26%
Private vehicles as mode of travel to work	50%	67%
Bicycle riders as mode of travel to work	3%	1%
Walking only as mode of travel to work	4%	5%

A comparison of statistics reveals:

- The study area features a slightly higher proportion of younger residents and lower proportion of older residents than the Greater Sydney average
- Vehicle ownership in Tempe is less than the Greater Sydney average

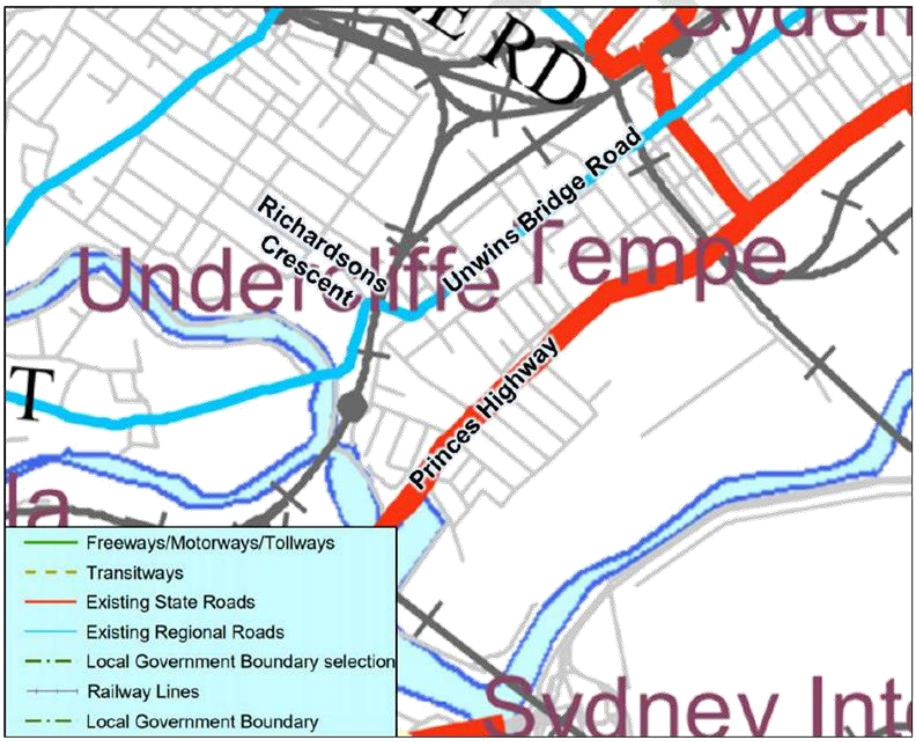
- Consistent with the lower vehicle ownership rate, a high proportion of Tempe residents use public transport to travel to work
- Proportion of residents cycling to work is higher than the Sydney average

Journey to work patterns are likely attributed to the number of public transport services available, including both buses and trains (detailed in Section 2.6) and active transport facilities (including cycling routes) nearby.

2.5 Road Classification

Road Classification in Tempe is shown in Figure 2.3, featuring:

- State Road - Princes Highway within Tempe is a state road (HW1), while
- Regional Road – Unwins Bridge Road from Richardsons Crescent to Campbell Street, and Richardson Crescent from Cooks River to Unwins Bridge Road
- Local Roads - all other roads



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Source: Transport for NSW (Roads & Maritime)

Figure 2.3: Road Classification in Tempe

2.6 Public Transport

2.6.1 Trains

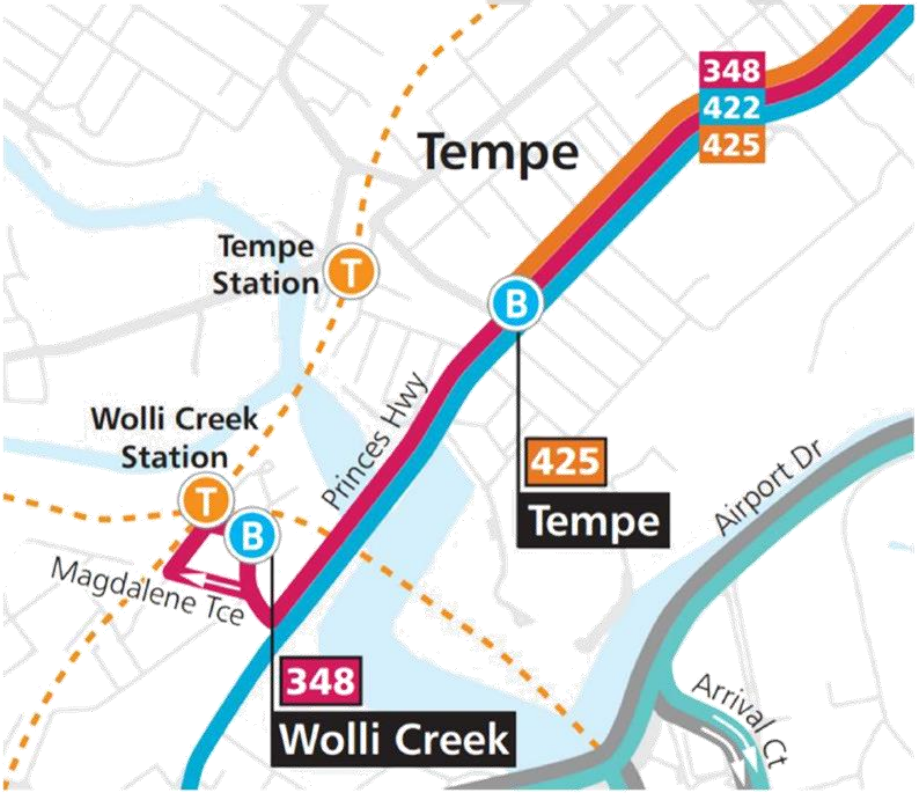
The nearest train station to the study area is Tempe railway station in the west, serviced by the T4 (Eastern Suburbs & Illawarra Line), with services running every 10 minutes per direction on weekdays off-peak. The next nearest station is Wolli Creek railway station located approximately 1km west of the study area and is within walking distance. Wolli Creek is services by both the T4 and T8 (Airport & South Line) services. Both T4 and T8 services stop at stations within the City.

2.6.2 Buses

Three public bus routes operate in the Tempe area along Princes Highway. The public bus network is shown in Figure 2.4. Additionally, there is one school bus route servicing Tempe High School students, which runs along Unwins Bridge Road.

The Tempe bus depot is located at the corner of Princes Highway and Gannon Street, accessed via Princes Highway.

The public and school bus services in Tempe are summarised in Table 2.2.



Source: Transit Systems

Figure 2.4: Public Bus Services in Tempe

Table 2.2: Bus Routes

Route Number	Route Description	Roads Serviced	Weekday Off-peak Frequency (min)
348	Bondi Junction to Wolli Creek	Princes Highway	30
422	Kogarah to Central Pitt Street	Princes Highway	15
425	Tempe to Dulwich Hill	Princes Highway	60
700S (School bus)	Earlwood to Tempe High School	Richardsons Crescent, Unwins Bridge Road, Collins Street	One AM service towards school, one PM service from school

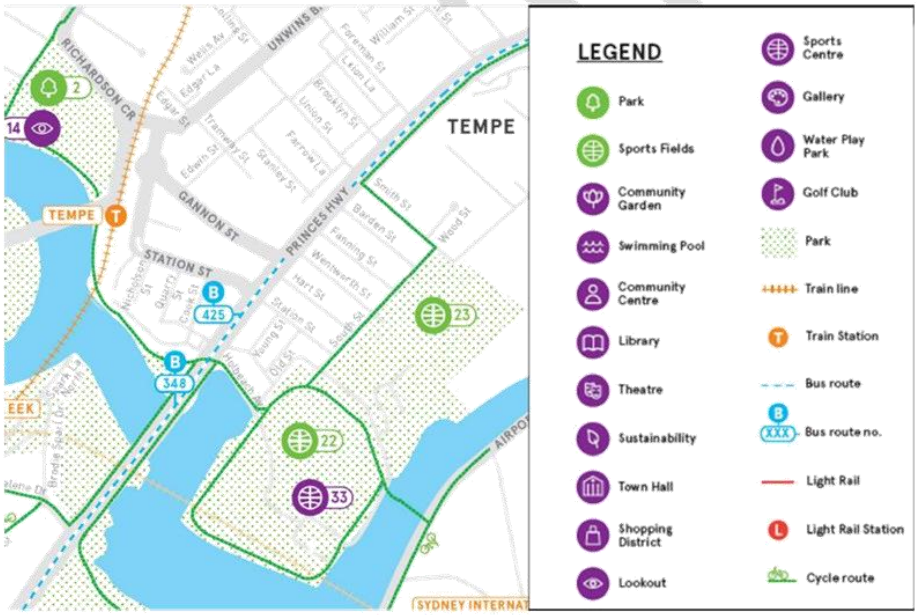
2.7 Other Transport

2.7.1 Bicycles

The local bicycle network (based on the Stay Active in Marrickville Map) is shown in Figure 2.5, and the (previously) proposed bicycle network in the Marrickville Bicycle Strategy 2007 is shown in Figure 2.6.

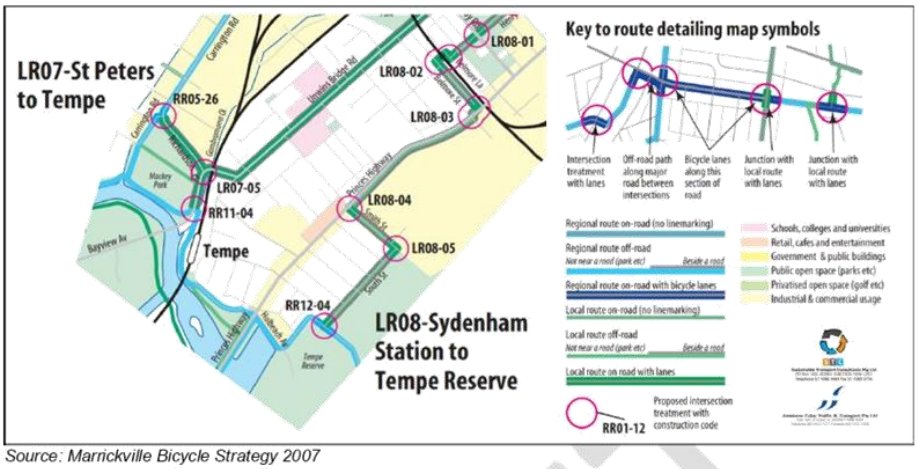
Two routes are present within the study area:

- Local Route L13 (shown as LR08 in Figure 2.6) – following Holbeach Avenue, South Street and Smith Street
- Alexandra Canal cycleway - following Holbeach Avenue, through Tempe Reserve and along Airport Drive on the southern bank of Alexandria Canal



Source: Staying Active in Marrickville Map (Inner West Council)

Figure 2.5: Existing Bicycle Routes in Tempe



Source: Marrickville Bicycle Strategy 2007

Figure 2.6: Proposed Bicycle Network in Tempe

Additionally, there are unpaved off-road paths within Tempe Lands that are used for walking and cycling. Entry points to Tempe Lands are located at the Smith Street cul-de-sac and at various points along South Street.

2.7.1.1 Bicycle Detour

As part of the Sydney Gateway Environment Impact Statement (November 2019), volumes were recorded on the cycleway on the southern bank of Alexandra Canal in March 2019. The average volumes on the cycleway were 600 cyclists and 100 pedestrians per day. During the morning and afternoon peaks, the volumes were 90 cyclists and 10 pedestrians.

Due to the permanent removal of the current shared path along Airport Drive as part of the Sydney Gateway project, a bicycle detour is proposed to follow the road through Tempe Recreation Reserve, to Tempe Wetlands near South Street and through the industrial lands to the east. Details of the detour are described in Section 6.2.2.

2.7.2 Pedestrians

The local footpath network is well connected through and surrounding the study area, with footpaths located along both sides of most roads. Signalised crossings are also provided at intersections and mid-block on Princes Highway and mid-block on Unwins Bridge Road. A pedestrian (zebra) crossing is also located on Union Street outside Tempe Public School.

2.7.3 Carshares

The use of carshare services has been increasingly popular in recent years. Popular carshare services used in Sydney include Car Next Door and GoGet, which operate in the study area and surrounds.

Car Next Door

Car Next Door is a carshare service that allows private car owners to rent their vehicles to other registered users on an hourly or daily service. As of March 2020, six (6) vehicles within or surrounding the study area have been signed up for Car Next Door, shown in Figure 2.7. It is important to note that the shown locations are approximate only.

Go Get

Go Get is another carshare service, where members are able to rent GoGet vehicles from their pods on an hourly or daily basis. As of March 2020, there are no GoGet pods within the study area; however, there are seven (7) nearby car pods within walking distance from the study area, including two (2) within the IKEA Tempe carpark. Additionally, IKEA Tempe has 12 van pods, with vans available to be rented. It is important to note that the pods in IKEA Tempe are located within its carpark and therefore can only be rented during the carpark's opening hours.

The location of GoGet car and van pods around the study area are shown in Figure 2.7.

Source: GoGet & Car Next Door

Figure 2.7: GoGet Pod Locations in Tempe

Bunnings Car Share

As part of the Bunnings development application Consent Condition No.5 four (4) car share spaces are to be provided within the Bunnings development.

2.8 Parking Controls

Kerbside parking controls within the study area are shown in Figure 2.8). Most of the kerbside parking available is unrestricted on-street parallel parking with some time limited parking (one hour) along Union Street and Foreman Street. Due to the narrow nature of the roads in the study area, many vehicles were observed partially parking on the footpath (See Section 5).

Angled parking is provided along Holbeach Avenue near Bay Street. It provides unrestricted parking for residents as well as users of Tempe Recreation Reserve.

Persons with a disability (PWD) spaces are located along Union Street, Foreman Street Wentworth Street and Union Street.

There are 'No Parking' restrictions along Zuitton Lane and Farrow Lane due to their narrow widths. No Stopping restrictions are found along Union Street where kerb blisters are located.

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Figure 2.8: Existing Parking Restrictions

2.9 Truck Load Limits

A 3-tonne truck load limit is implemented in the study area and surrounds, covering local side roads near or connecting to Princes Highway, shown in Figure 2.9.

Wentworth Street was identified to maintain an inconsistent truck restriction, with signage only present at South Street (see traffic sign audit, section 5.2.2). It was confirmed the truck restriction applied along Wentworth street with signage missing at Princes Highway.

A 3-tonne truck load limit does not apply to Holbeach Avenue, South Street, Smith Street, Wood Street, Princes Highway and most of Unwins Bridge Road

Figure 2.9: Truck Load Limit in Tempe

2.10 Previous LATM Study in Tempe

Planning approval of 630-726 Princes Highway (IKEA Tempe development) was granted by the NSW Department of Planning in July 2009. A condition of the approval required an LATM study to be undertaken by Council "to identify the traffic and transport impacts of the proposed development and recommend ways in which any potential adverse impacts on local residential streets could be mitigated." GTA Consultants was commissioned by the then-Marrickville Council to undertake the study which was completed in October 2010. IKEA Tempe opened in November 2011.

The study identified:

- Smith Street, South Street, Union Street and Wentworth Street have higher 85th percentile speeds compared to the other roads in the areas, ranging between 40 and 50 km/h on Thursdays and Saturdays, with 85th percentile speeds along Smith Street exceeding 50 km/h on Saturdays.
- One 'fixed object' crash occurred on Station Street near South Street.
- Speed humps on South Street and Union Street, and the pedestrian crossing on Union Street outside Tempe Public School required repainting of line marking
  - It is important to note that the school crossing on Union Street was not a raised crossing as of 2010, and the nearby speed hump had since been replaced by a pair of kerb blisters with contrasting pavement.
- Recommendation to introduce further LATM devices

The devices and measures implemented included:

- speed cushions on Smith Street
- the right turn ban from Princes Highway to Union Street
- closing the median gap at Station Street
- raised thresholds on Foreman Street, only at Unwins Bridge Road and Princes Highway

The speed cushions on Smith Street were eventually removed in 2012 and 2017 respectively, as a result of resident complaints about the noise produced by trucks driving over the speed cushions.

2.11 Existing LATM Devices & Measures

Existing LATM devices and traffic controls were identified during site audits, detailed in Section 5.2.

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3. CRASH DATA ANALYSIS

3.1 Crash History Data

The NSW Speed Zoning Guidelines recommend a minimum of three years of crash data for a statistical crash analysis. For the purpose of this assessment, crash data between 1 January 2014 and 31 December 2018 was sourced from Council representing five (5) years of data. The data included reported crash events within the entire Inner West Council LGA and were filtered to include crashes within the study area. Crashes along Princes Highway within 15 metres from intersections of the study area roads were also included.

As per Rule 287 (3) of the NSW Road Rules 2014, crashes are only recorded if they are reported to police and when one of the following occurs:

- Any person is killed or injured
- Drivers involved in the crash do not exchange particulars
- When a vehicle involved in the crash is towed away.

The crash history between the five (5) years of data within and surrounding the study area were analysed, and a total of 10 crashes were recorded along streets within the study area. Out of the 10 crashes in the study area, two (2) involved vehicles at intersections with Princes Highway.

3.2 Crash Statistics

3.2.1 Crash History

Figure 3.1 shows the crash history between January 2014 and December 2018.

There is an overall trend of steady number of crashes per year, with less than 3 crashes happening each year. Most of the crashes involve an injury.

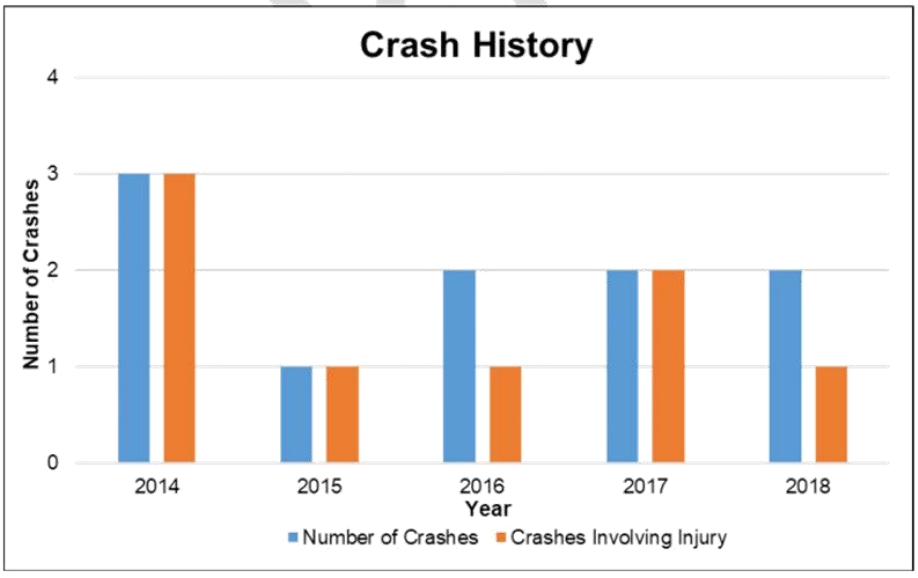

Figure 3.1: Crash History between January 2014 and December 2018

3.2.2 Crash Severity

Table 3.1 summarises the number of crashes within the 5 years of crash data based on crash severity.

Table 3.1: Number of Crashes Based on Crash Severity

Crash Severity	Number of Crashes	Percentage
Fatal	0	0%
Injury	8	80%
Non-casualty (towaway)	2	20%
Total	**10**	**100%**

The crash data shows that the majority of crashes within the study area were not fatal but resulted in injury (72%). The locations of the crashes are shown in Figure 3.2. They are also shown in **Appendix A**.

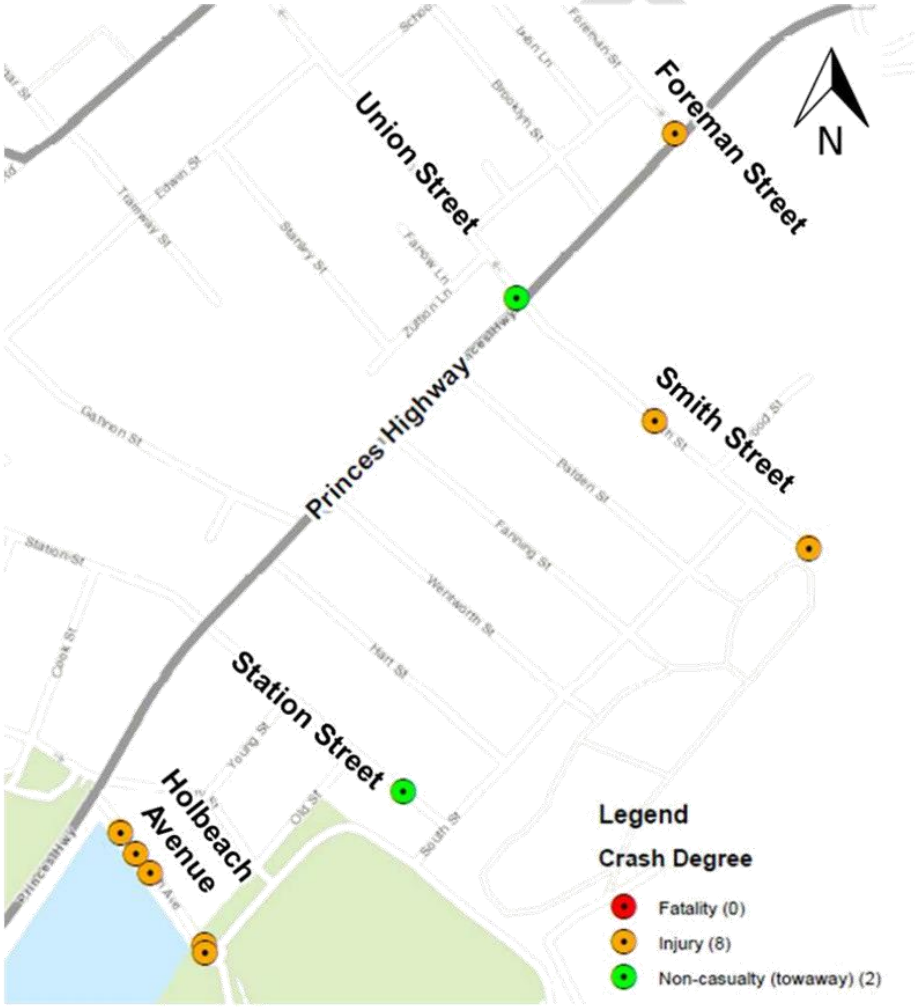

Figure 3.2: Crash Degree Severity

3.2.3 Vulnerable Road Users

Table 3.2 summarises the number of vulnerable road user (VRU) crashes within the 5 years of crash data based on crash severity. VRUs are classified into motorcyclists, pedal cyclists and pedestrians.

Table 3.2: Number of Vulnerable Road User Crashes Based on Crash Severity

Crash Severity	Vulnerable Road User			Total
	Motorcyclist	Pedal Cyclist	Pedestrian	
Fatal	0	0	0	**0**
Injury	2	3	1	**6**
Non-casualty (towaway)	0	0	0	**0**
Total	**2**	**3**	**1**	**6**
Percentage	**33%**	**50%**	**17%**	**-**

The crash data shows that all crashes involving vulnerable road users were not fatal, however, resulted in an injury. There were six (6) vulnerable road user crashes out of the total of 10 crashes, which is a relatively high percentage (60%). Pedal cyclists were recorded to have the highest percentage of vulnerable road user crashes (50%). The location of crashes involving VRU are shown in Figure 3.3. They are also shown in **Appendix A**.

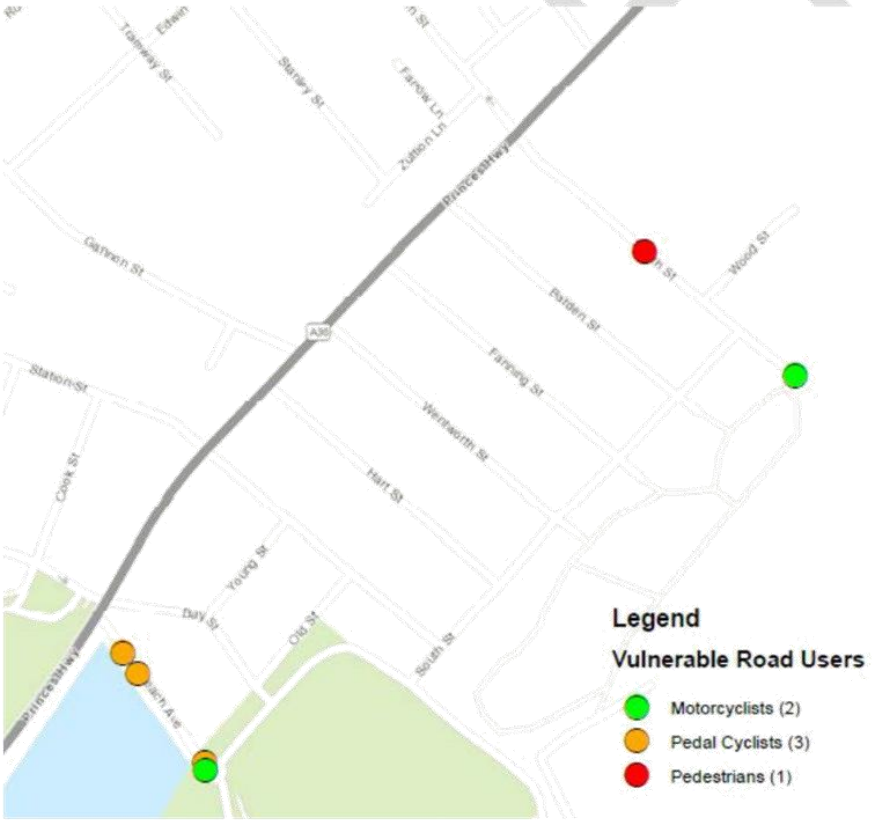

Figure 3.3: Vulnerable Road Users

3.3 Analysis of Trends and Contributing Factors

3.3.1 Crash Type

The 10 crashes were classified into road user movement (RUM) codes, as shown in Table 3.3. The crashes are also further detailed in Table 3.4, ordered by crash severity.

Table 3.3: Crash Summary by Crash Type

Crash Type	RUM Codes	Number of Crashes	Percentage of Total
Crashes involving pedestrians	00 – 09	1	10%
Crashes involving vehicles from adjacent directions	10 – 19	3	30%
Crashes involving vehicles from opposing directions	20 – 29	0	0%
Crashes involving vehicles from the same direction	30 – 39	0	0%
Crashes involving manoeuvring vehicles	40 – 49	4	40%
Crashes involving vehicles overtaking	50 – 59	0	0%
Crashes involving vehicles on path – vehicles hitting parked vehicles or objects on the roadway (e.g. animals, temporary objects)	60 – 69	0	0%
Crashes involving vehicles leaving the roadway on a straight length of road	70 – 79	2	20%
Crashes involving vehicles leaving the roadway on a curve	80 – 89	0	0%
Crashes involving vehicle passengers and miscellaneous crashes	90 – 99	0	0%
Total		**10**	100%

From Table 3.3, the majority of the crashes resulted from manoeuvring issues (40%).

Holbeach Avenue has the highest number of crashes, recording five (5) out of 10 crashes (50%). Out of the five crashes, three (3) involved pedal cyclists (60%), while four (4) crashes resulted from manoeuvring issues (80%).

The crash occurring on Station Street was one of the only non-casualty crashes, which resulted from a vehicle leaving path and crashing into an object or parked vehicle.

Considering this, this analysis will identify any trending issues and/or contributing factors that may have contributed to the likelihood of the aforementioned crash types.

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Table 3.4: Crash Details by Road

Road	Crash Severity	Crash Type	Specific RUM Code	Vulnerable Road User
Holbeach Avenue	Injury	Involving manoeuvring vehicles	RUM 48: From footpath	Pedal Cyclist
Holbeach Avenue	Injury	Involving manoeuvring vehicles	RUM 47: Emerging from driveway	-
Holbeach Avenue	Injury	Involving manoeuvring vehicles	RUM 48: From footpath	Pedal Cyclist
Holbeach Avenue at South Street	Injury	Involving vehicles from adjacent directions	RUM 10: Cross traffic	Motorcyclist
Holbeach Avenue	Injury	Involving manoeuvring vehicles	RUM 49: Other Manoeuvring	Pedal Cyclist
Smith Street	Injury	Involving vehicles leaving the roadway on a straight length of road	RUM 74: Out of control on carriageway	Motorcyclist
Smith Street	Injury	Involving pedestrians	RUM 3: Playing, Working, Lying, Standing on Carriageway	Pedestrian
Princes Highway at Foreman Street	Injury	Involving vehicles from adjacent directions	RUM 13: Right near	-
Station Street	Non-casualty (towaway)	Involving vehicles leaving the roadway on a straight length of road	RUM 71: Left off carriageway into object / parked vehicle	-
Princes Highway at Smith Street	Non-casualty (towaway)	Involving vehicles from adjacent directions	RUM 10: Cross traffic	-

3.3.2 Crash Casualty Rates

Typical casualty crash rates for urban and rural roads are provided within the NSW Speed Zoning Guidelines. A table of typical urban casualty rates from the NSW speed zoning guidelines is shown in Table 3.5.

Table 3.5: Typical Urban Casualty Rates

URBAN TYPICAL CASUALTY RATE *(casualties per km per year)*

Road category	Speed zones						
	50	60	70	80	90	100	110
Motorway / freeway	–	–	0.049	0.039	0.463	0.148	1.219
State highway	0.014	0.450	0.827	0.217	0.177	0.101	0.177
Other classified road	0.102	1.351	1.361	0.360	0.253	0.111	0.007
Unclassified road	0.446	0.874	0.376	0.154	0.077	0.064	0.008

NOTE:
- Discretion is needed in comparing these rates to the rate on a particular section of road. A specific road section may not fall comfortably into any single category.
- The values do not suggest an acceptable level.

Source: Transport for NSW Centre for Road Safety - NSW Speed Zoning Guidelines (Section 3)

The typical urban casualty rate for a 50km/h unclassified road is 0.446 casualties per km per year.

Table 3.6 summarises the number of crashes per year and calculated casualty rate (casualties per year per km) for each section of road. Princes Highway was excluded as all other crashes along the road were not analysed. Station Street was also excluded as the only crash had no casualties.

Table 3.6: Crash Casualty Rate by Road

Road	Length (km)	Casualties						Rate	
		2014	2015	2016	2017	2018	Total	Per year	Per km per year
Holbeach Avenue (south of Princes Highway, between Princes Highway & roundabout)	0.15	3	1	0	1	0	**5**	1	6.7
Smith Street	0.30	0	0	0	1	1	**2**	0.4	1.3
Total		**3**	**1**	**0**	**2**	**1**	**7**	-	-

From the crash casualty rate results calculated in Table 3.6, it can be seen that both Holbeach Avenue and Smith Street present a rate exceeding the typical urban casualty rate of 0.446 casualties per km per year.

3.4 Crash Data Analysis Summary

Based on the crash analysis results, the majority of the crashes resulted from manoeuvring issues. Most of them also involved a vulnerable road user. Holbeach Avenue has the highest number of crashes, the highest number of crashes involving vulnerable road users, and the highest crash casualty rate in the study area.

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4. TRAFFIC SURVEY DATA ANALYSIS

4.1 Environmental Capacity and Speed Performance Standards

The *RTA Guide to Traffic Generating Developments 2002* (GTGD) provides justification for an acceptable environmental limit for each road classification, listed in Table 4.1.

Table 4.1: Environmental Capacity Performance Standards

Road Class	Type	Maximum Speed (km/h)	Max Peak Hour Volume
Local	Access way	25	100
	Street	40	200 goal 300 maximum
Collector	Street	50	300 goal 500 maximum

The *GTGD* also recommends that a typical residential street should ideally exhibit a flow of traffic less than 2,000 vehicles per day (vpd), with a design objective of less than 1,500 vpd to maintain a comfortable traffic environment for local residents.

4.2 Traffic Surveys

4.2.1 Data List

Council has commissioned Austraffic to undertake traffic surveys as part of the study and provided the surveys to Bitzios Consulting for analysis. The traffic surveys undertaken are listed in Table 4.2.

Table 4.2: Traffic Survey Data

Survey	Date(s)	Time	Locations
Intersection Counts	19 March 2020, Thursday	16:00 PM to 18:00 PM	At four locations shown in Figure 4.1: ▪ Princes Highway / Union Street / Smith Street ▪ Smith Street / Wood Street ▪ Unwins Bridge Road / Union Street ▪ Princes Highway / Holbeach Avenue
	21 March 2020, Saturday	11:00 AM to 13:00 PM	
Tube Counts (Volumes & Speed)	19 March 2020, Thursday to 25 March 2020, Wednesday	24-hour	At locations shown in Figure 4.1
Parking Occupancy & Duration	19 March 2020, Thursday	7:00 AM to 7:00 PM	At locations shown in Figure 4.2
	21 March 2020, Saturday	7:00 AM to 7:00 PM	

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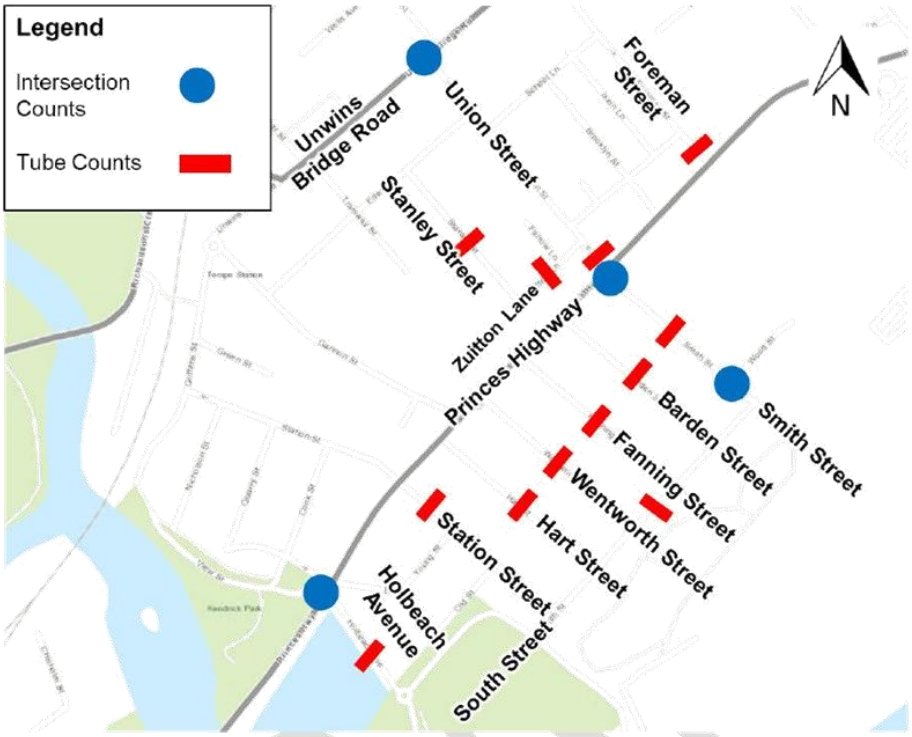

Figure 4.1: Intersection Count & Tube Count Locations

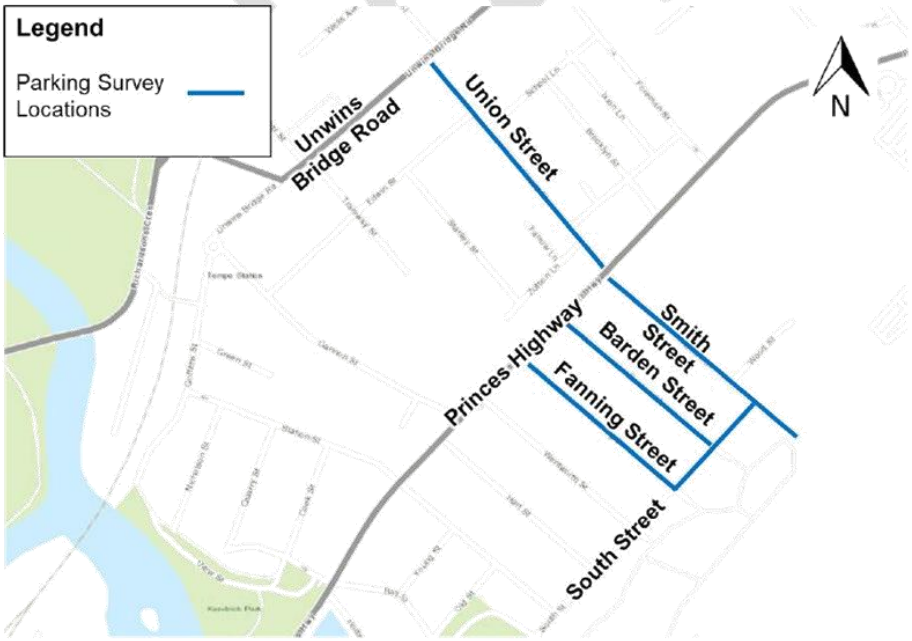

Figure 4.2: Parking Surveys Locations

The data collected was analysed to provide information about traffic operation in the study area, such as volumes and speed. It is important to note that the surveys are undertaken in the midst of the COVID-19 pandemic, as such many workers have opted to stay at home during the dates of the surveys. Therefore, the surveys may not accurately reflect the usual traffic operation before the pandemic.

4.2.2 Intersection Counts

Intersection count surveys were undertaken on a Thursday afternoon and Saturday weekday, for the four intersections listed in Table 4.2. The peak hour intersection counts for the intersections for the Thursday and Saturday are shown in Figure 4.3 and Figure 4.4. It is important to note that there is a No Right Turn restriction from Princes Highway (southwest bound) to Union Street.

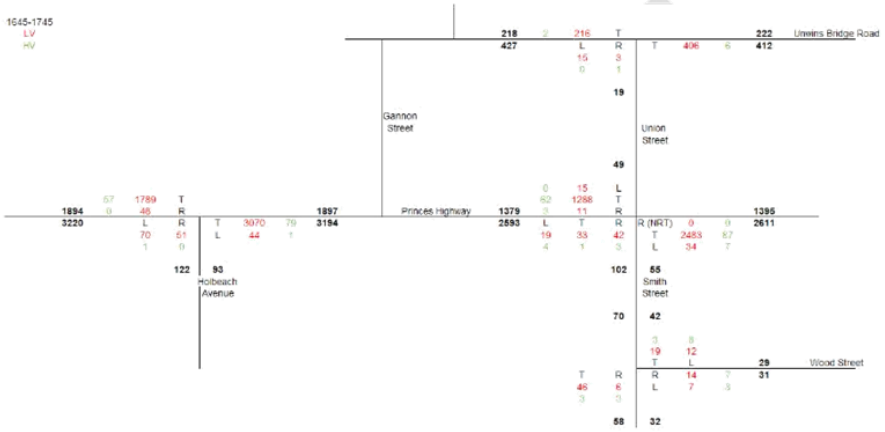

Figure 4.3: Thursday PM Peak Hour Intersection Counts

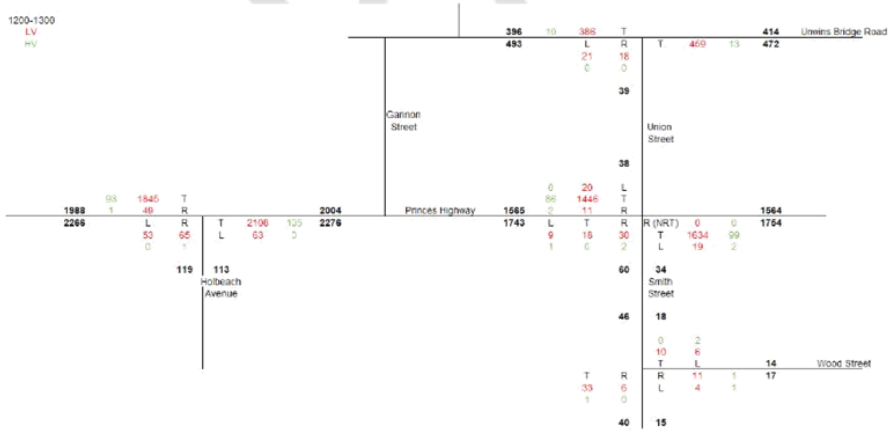

Figure 4.4: Saturday Peak Hour Intersection Counts

The intersection counts are consistent with counts undertaken by Transport and Traffic Planning Associates (TTPA) as part of the Traffic Impact Assessment (TIA) for the Bunnings Development (October 2017) (see Section 6.1.2 for details of the development).

It can be seen that the major vehicular routes are along Princes Highway and along Unwins Bridge Road for the Thursday and Saturday. This is expected as Princes Highway and Unwins Bridge Road are state and regional roads respectively.

As for heavy vehicular movement, due to the truck load limits in the Tempe area (see Section 2.9), heavy vehicles are found along roads without a truck load limit, such as Princes Highway, Smith Street, Wood Street and Unwins Bridge Road. Despite so, with the exception of Princes Highway, the number of heavy vehicles is not high, with at most 15 heavy vehicles per hour.

There are occasional heavy vehicles turning in and out of Holbeach Avenue and Union Street but the numbers are very low (less than 2 per movement). This shows that the existing truck load limit is well implemented and is effective in the Tempe area.

The existing No Right Turn restriction from Princes Highway to Union Street, introduced as part of the previous LATM study (Section 2.10), has also proven effective, with no vehicles observed to be turning right into Union Street.

From the intersection counts, less than 50 vehicles per hour use Union Street. However, tube count surveys will provide a better understanding on the utilisation of Union Street.

4.2.3 Tube Counts

24-hour tube counts were collected for seven days for all the study area roads. Information such as volumes, heavy vehicle composition, and speed data were recorded for both directions of the road.

From the data, the average daily traffic (ADT) volumes, the 85th percentile speeds, and daily heavy vehicle percentage and volumes were extracted for all directions of the locations, shown in Table 4.3. The directions stated were the directions on surveys. Relatively higher values are highlighted orange.

Table 4.3: Tube Count Data Summary

Street	Location	Direction	ADT Volumes	85th Percentile Speed (km/h)	Heavy Vehicle Composition	
					%	Volumes
Barden Street	Between Princes Highway & South Street	EB	71	30.5	4.9%	3
		WB	74	32.8	8.2%	6
Fanning Street	Between Princes Highway & South Street	EB	108	35.5	6.7%	7
		WB	112	34.4	4.3%	5
Foreman Street	Between Princes Highway and Brooklyn Lane	EB	261	34.1	5.7%	15
Hart Street	Between Princes Highway & South Street	EB	273	30.3	3.0%	8
		WB	63	30.4	9.5%	6
Holbeach Avenue	Between Princes Highway & Roundabout	NB	505	44.1	8.9%	45
		SB	551	40.9	4.9%	27
Smith Street	Between Princes Highway & Wood Street	EB	320	46.5	36.0%	115
		WB	604	38.8	25.0%	151
South Street	Between Smith Street & Station Street	NB	510	28.3	6.0%	31
		SB	182	30	25.0%	46
Stanley Street	Between Edwin Street & Zuitton Lane	EB	164	45.5	7.7%	13
		WB	120	41.9	7.8%	9

Station Street	Between Princes Highway & Young Street	EB	85	30.6	3.7%	3
		WB	20	31.7	7.0%	1
Union Street	Between Princes Highway & Zuitton Lane	WB	487	26.9	3.4%	17
Wentworth Street	Between Princes Highway & South Street	EB	72	32.1	6.7%	5
		WB	151	36.1	6.7%	10
Zuitton Lane	Between Union Street & Stanley Street	NB	123	22	5.6%	7
		SB	82	19.9	2.8%	2

Maps showing the values of ADT, 85th percentile speeds, and heavy vehicle percentage and volumes are shown in **Appendix B**.

Traffic Volumes

All local streets in the study area have a VPD of less than 1,500, the comfortable limit for a local residential traffic environment as according to *GTGD*. Moderately high volumes of more than 500 vpd can be observed on Smith Street, South Street and Holbeach Avenue. Relatively low volumes of more than 200 vpd can also be found on Union Street, Foreman Street and Hart Street. This is expected for Union and Foreman Streets as they are one of the more direct routes between Princes Highway and Unwins Bridge Road.

85th Percentile Speeds

All local streets in the study area have an 85th percentile speed of less than the posted speed limit of 50 km/h. Most recorded 85th percentile speeds are less than 40 km/h, with Holbeach Avenue, Stanley Street and Smith Street having speeds between 40 and 50 km/h. It is important to note that on these roads, LATM devices aimed at reducing speeds and narrowing road widths are not present.

Heavy Vehicle Composition

Many of the streets in the study area with the 3-tonne truck load limit have heavy vehicle volumes of 10 or less. However, roads such as Stanley Street, Union Street, Foreman Street and Wentworth Street have volumes of around 10 to 20 heavy vehicles per day.

Roads without the truck load limit have relatively higher heavy vehicle volumes per day, such as Holbeach Avenue, South Street and Smith Street. In particular, Smith Street has heavy vehicle volumes of more than 100 per day in each direction, justified by the commercial and industrial land use along Smith Street and Wood Street.

In terms of heavy vehicle percentages, most of the roads have a heavy vehicle percentage of more than 5%. In particular, Smith Street and South Street have relatively higher heavy vehicle percentages.

4.2.4 Parking Occupancy & Duration

Parking occupancy and duration surveys were undertaken on a Thursday and a Saturday in March 2020. The surveys were conducted in hourly periods between 7:00 AM to 7:00 PM. Roads surveyed are highlighted in Figure 4.2.

The surveys recorded a total of 291 spaces on the roads surveyed. 57% of these spaces were occupied on the Thursday while 54% of the spaces were occupied on the Saturday.

The parking occupancies by time of day and parking durations for the Thursday and Saturday are summarised in Table 4.4 to Table 4.7.

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Table 4.4: Thursday Parking Occupancy Rate by Hourly Period

Road	Side	Section	Restriction	Parking Capacity	0700-0800	0800-0900	0900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900	Average
Fanning Street	West	Entire Section	Unrestricted	34	59%	47%	44%	47%	47%	41%	50%	44%	47%	59%	62%	59%	**50%**
	East	Entire Section	Unrestricted	29	76%	72%	76%	69%	69%	76%	72%	69%	76%	72%	76%	90%	**74%**
Barden Street	West	Entire Section	Unrestricted	30	50%	50%	53%	60%	50%	40%	43%	50%	53%	60%	63%	47%	**52%**
	East	Entire Section	Unrestricted	33	52%	42%	45%	48%	45%	45%	45%	58%	58%	45%	48%	52%	**49%**
South Street	North	Between Fanning St & Barden St	Unrestricted	9	44%	22%	33%	33%	33%	33%	56%	33%	44%	44%	44%	33%	**38%**
		Between Barden St & Smith St	Unrestricted	10	40%	40%	40%	40%	40%	40%	40%	40%	50%	50%	50%	70%	**45%**
	South	Entire Section	Unrestricted	16	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	**1%**
Smith Street	West	Between Princes Hwy & South St	Unrestricted	31	61%	65%	74%	81%	77%	77%	84%	77%	87%	81%	77%	61%	**75%**
		Between South St & cul-de-sac	No Parking	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
	Cul-de-sac	-	No Parking	0	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%	300%[2]	0%	**100%[2]**

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Road	Side	Section	Restriction	Parking Capacity	0700-0800	0800-0900	0900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900	Average
	East	Between cul-de-sac & Wood St	Unrestricted	3	33%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	**86%**
		Between Wood St & Princes Hwy	Unrestricted	27	59%	59%	63%	63%	63%	63%	70%	67%	63%	67%	63%	56%	**63%**
Union Street	East	Between Princes Hwy & Brooklyn Ln	No Parking	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
		Between Brooklyn Ln & School Ln	Unrestricted	7	86%	43%	71%	71%	57%	71%	57%	71%	57%	71%	71%	71%	**67%**
			PWD	1	100%	100%	100%	100%	100%	100%	0%	0%	0%	0%	0%	100%	**58%**
			Unrestricted	15	80%	80%	67%	67%	73%	67%	87%	80%	67%	80%	80%	80%	**76%**
			No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
		Between School Ln & Unwins Bridge Rd	No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
			Unrestricted	8	0%	25%	25%	25%	25%	25%	25%	25%	25%	25%	12%	12%	**21%**
	West	Between Unwins Bridge Rd & Edwin St	No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
			No Parking	0	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**100%[2]**

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Road	Side	Section	Restriction	Parking Capacity	0700-0800	0800-0900	0900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900	Average
			Unrestricted	7	86%	86%	86%	86%	86%	86%	86%	100%	100%	86%	71%	100%	**88%**
			No Stopping	0	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	**100%[2]**
		Between Edwin St & Zuitton Ln	No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
			Unrestricted	27	78%	63%	52%	56%	59%	56%	56%	59%	59%	59%	67%	56%	**60%**
		Between Zuitton Ln & Princes Hwy	No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
			1P[1]	4	75%	75%	75%	75%	75%	75%	25%	50%	50%	75%	50%	25%	**60%**
			No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
Total				**291**	**57%**	**53%**	**55%**	**57%**	**55%**	**54%**	**56%**	**57%**	**58%**	**60%**	**61%**	**56%**	**57%**

Notes:
1. 1P restriction during 8:30 AM - 6:00 PM Mon-Fri
2. A percentage of 100% for a No Stopping or No Parking restriction means there is a vehicle that is illegally stopping or parked. A percentage of 300% means there are three (3) vehicles that are illegally stopping or parked

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Table 4.5: Saturday Parking Occupancy Rate by Hourly Period

Road	Side	Section	Restriction	Parking Capacity	0700-0800	0800-0900	0900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900	Average
Fanning Street	West	Entire Section	Unrestricted	34	50%	50%	41%	44%	41%	53%	62%	56%	59%	56%	50%	59%	**52%**
	East	Entire Section	Unrestricted	29	90%	93%	97%	93%	93%	90%	100%	83%	72%	69%	86%	90%	**88%**
Barden Street	West	Entire Section	Unrestricted	30	60%	53%	57%	50%	47%	57%	53%	53%	50%	47%	50%	40%	**51%**
	East	Entire Section	Unrestricted	33	61%	55%	42%	48%	45%	55%	55%	55%	55%	48%	55%	61%	**53%**
South Street	North	Between Fanning St & Barden St	Unrestricted	9	33%	22%	22%	33%	33%	33%	67%	67%	78%	67%	67%	67%	**49%**
		Between Barden St & Smith St	Unrestricted	10	50%	60%	50%	40%	50%	40%	40%	40%	40%	30%	40%	30%	**43%**
	South	Entire Section	Unrestricted	16	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	6%	**1%**
Smith Street	West	Between Princes Hwy & South St	Unrestricted	31	71%	61%	65%	55%	61%	68%	71%	71%	71%	65%	68%	65%	**66%**
		Between South St & cul-de-sac	No Parking	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
	Cul-de-sac	-	No Parking	0	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%	**100%**[2]

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Road	Side	Section	Restriction	Parking Capacity	0700-0800	0800-0900	0900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900	Average
	East	Between cul-de-sac & Wood St	Unrestricted	3	0%	0%	0%	33%	0%	0%	0%	0%	33%	33%	33%	33%	**14%**
		Between Wood St & Princes Hwy	Unrestricted	27	48%	48%	48%	44%	48%	41%	52%	52%	56%	59%	52%	56%	**50%**
Union Street	East	Between Princes Hwy & Brooklyn Ln	No Parking	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
		Between Brooklyn Ln & School Ln	Unrestricted	7	71%	57%	71%	71%	43%	43%	71%	71%	71%	71%	71%	71%	**65%**
			PWD	1	100%	100%	100%	100%	100%	0%	0%	0%	0%	100%	100%	100%	**67%**
			Unrestricted	15	80%	80%	73%	80%	73%	53%	60%	80%	80%	80%	93%	73%	**76%**
			No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
		Between School Ln & Unwins Bridge Rd	No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
			Unrestricted	8	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	12%	**1%**
	West	Between Unwins Bridge Rd & Edwin St	No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
			No Parking	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**

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Road	Side	Section	Restriction	Parking Capacity	0700-0800	0800-0900	0900-1000	1000-1100	1100-1200	1200-1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900	Average
			Unrestricted	7	71%	71%	71%	71%	57%	43%	43%	71%	86%	86%	71%	0%	**62%**
			No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
		Between Edwin St & Zuitton Ln	No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
			Unrestricted	27	67%	67%	56%	52%	70%	59%	48%	44%	52%	48%	56%	59%	**56%**
		Between Zuitton Ln & Princes Hwy	No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
			1P[1]	4	75%	75%	75%	50%	50%	75%	50%	50%	25%	25%	75%	75%	**58%**
			No Stopping	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**
Total				**291**	**58%**	**55%**	**53%**	**51%**	**52%**	**52%**	**56%**	**55%**	**56%**	**53%**	**57%**	**55%**	**54%**

Notes:
1. 1P restriction during 8:30 AM-12:30 PM Sat
2. A percentage of 100% for a No Stopping or No Parking restriction means there are cars that are illegally stopping or parked.

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Table 4.6: Thursday Parking Duration Proportions

Road	Side	Section	Restriction	Total Vehicles	Parking Duration											
					1 hour	2 hours	3 hours	4 hours	5 hours	6 hours	7 hours	8 hours	9 hours	10 hours	11 hours	12 hours
Fanning Street	West	Entire Section	Unrestricted	47	26%	15%	19%	6%	4%	2%	11%	0%	2%	2%	2%	11%
	East	Entire Section	Unrestricted	51	25%	14%	12%	4%	6%	4%	8%	2%	2%	10%	0%	14%
Barden Street	West	Entire Section	Unrestricted	43	23%	28%	9%	7%	7%	5%	0%	0%	2%	2%	5%	12%
	East	Entire Section	Unrestricted	40	30%	15%	5%	10%	10%	0%	3%	3%	5%	0%	5%	15%
South Street	North	Between Fanning St & Barden St	Unrestricted	9	44%	11%	0%	11%	0%	0%	11%	0%	0%	0%	0%	22%
		Between Barden St & Smith St	Unrestricted	8	38%	0%	0%	13%	0%	0%	0%	0%	0%	0%	13%	38%
	South	Entire Section	Unrestricted	1	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Smith Street	West	Between Princes Hwy & South St	Unrestricted	42	19%	12%	5%	5%	2%	5%	5%	5%	7%	5%	5%	26%
		Between South St & cul-de-sac	No Parking	0	-	-	-	-	-	-	-	-	-	-	-	-
	Cul-de-sac	-	No Parking	4	75%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	East	Between cul-de-sac & Wood St	Unrestricted	3	0%	0%	0%	0%	0%	0%	0%	0%	0%	67%	33%	0%
		Between Wood St & Princes Hwy	Unrestricted	29	17%	14%	3%	3%	0%	7%	3%	3%	10%	3%	0%	34%
Union Street	East	Between Princes Hwy & Brooklyn Ln	No Parking	0	-	-	-	-	-	-	-	-	-	-	-	-

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Road	Side	Section	Restriction	Total Vehicles	Parking Duration											
					1 hour	2 hours	3 hours	4 hours	5 hours	6 hours	7 hours	8 hours	9 hours	10 hours	11 hours	12 hours
		Between Brooklyn Ln & School Ln	Unrestricted	14	43%	7%	14%	7%	0%	0%	0%	7%	14%	0%	0%	7%
			PWD	2	50%	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%
			Unrestricted	30	20%	30%	13%	3%	3%	7%	0%	0%	3%	3%	0%	17%
			No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-
		Between School Ln & Unwins Bridge Rd	No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-
			Unrestricted	2	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	50%	0%
	West	Between Unwins Bridge Rd & Edwin St	No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-
			No Parking	1	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
			Unrestricted	12	42%	0%	0%	0%	0%	17%	0%	0%	8%	0%	0%	33%
			No Stopping	1	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		Between Edwin St & Zuitton Ln	No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-
			Unrestricted	38	34%	16%	5%	0%	5%	3%	8%	3%	0%	3%	0%	24%
		Between Zuitton Ln & Princes Hwy	No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-

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Road	Side	Section	Restriction	Total Vehicles	Parking Duration											
					1 hour	2 hours	3 hours	4 hours	5 hours	6 hours	7 hours	8 hours	9 hours	10 hours	11 hours	12 hours
			1P[1]	9	44%	11%	11%	11%	11%	0%	0%	0%	0%	0%	11%	0%
			No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-
Total				**386**	**28%**	**16%**	**9%**	**5%**	**4%**	**4%**	**4%**	**2%**	**4%**	**4%**	**3%**	**18%**

Notes:
1. 1P restriction during 8:30 AM - 6:00 PM Mon-Fri

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Table 4.7: Saturday Parking Duration Proportions

Road	Side	Section	Restriction	Total Vehicles	Parking Duration											
					1 hr	2 hr	3 hr	4 hr	5 hr	6 hr	7 hr	8 hr	9 hr	10 hr	11 hr	12 hr
Fanning Street	West	Entire Section	Unrestricted	52	37%	13%	15%	4%	6%	4%	0%	2%	4%	2%	2%	12%
	East	Entire Section	Unrestricted	60	25%	17%	10%	3%	7%	7%	2%	3%	7%	2%	0%	18%
Barden Street	West	Entire Section	Unrestricted	40	23%	13%	13%	8%	13%	10%	5%	3%	3%	0%	3%	10%
	East	Entire Section	Unrestricted	45	29%	16%	7%	11%	9%	4%	4%	0%	0%	0%	2%	18%
South Street	North	Between Fanning St & Barden St	Unrestricted	9	22%	11%	0%	11%	0%	22%	0%	0%	11%	0%	0%	22%
		Between Barden St & Smith St	Unrestricted	10	30%	10%	20%	0%	0%	0%	0%	20%	0%	0%	0%	20%
	South	Entire Section	Unrestricted	1	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Smith Street	West	Between Princes Hwy & South St	Unrestricted	39	18%	13%	10%	5%	5%	3%	8%	5%	0%	0%	3%	31%
		Between South St & cul-de-sac	No Parking	0	-	-	-	-	-	-	-	-	-	-	-	-
	Cul-de-sac	-	No Parking	2	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	East	Between cul-de-sac & Wood St	Unrestricted	2	50%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%
		Between Wood St & Princes Hwy	Unrestricted	32	22%	6%	13%	13%	16%	6%	3%	3%	0%	0%	0%	19%
Union Street	East	Between Princes Hwy & Brooklyn Ln	No Parking	0	-	-	-	-	-	-	-	-	-	-	-	-

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Road	Side	Section	Restriction	Total Vehicles	Parking Duration											
					1 hr	2 hr	3 hr	4 hr	5 hr	6 hr	7 hr	8 hr	9 hr	10 hr	11 hr	12 hr
		Between Brooklyn Ln & School Ln	Unrestricted	9	11%	0%	0%	22%	22%	22%	0%	0%	0%	0%	0%	22%
			PWD	2	0%	0%	50%	0%	50%	0%	0%	0%	0%	0%	0%	0%
			Unrestricted	29	24%	10%	10%	14%	17%	3%	0%	0%	3%	3%	0%	14%
			No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-
		Between School Ln & Unwins Bridge Rd	No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-
			Unrestricted	1	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	West	Between Unwins Bridge Rd & Edwin St	No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-
			No Parking	0	-	-	-	-	-	-	-	-	-	-	-	-
			Unrestricted	8	0%	13%	0%	38%	13%	0%	0%	0%	0%	0%	38%	0%
			No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-
		Between Edwin St & Zuitton Ln	No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-
			Unrestricted	46	35%	22%	4%	9%	4%	7%	2%	2%	0%	2%	0%	13%
		Between Zuitton Ln & Princes Hwy	No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-

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Road	Side	Section	Restriction	Total Vehicles	Parking Duration											
					1 hr	2 hr	3 hr	4 hr	5 hr	6 hr	7 hr	8 hr	9 hr	10 hr	11 hr	12 hr
			1P[1]	6	17%	33%	17%	0%	0%	0%	0%	17%	0%	0%	0%	17%
			No Stopping	0	-	-	-	-	-	-	-	-	-	-	-	-
Total				393	26%	14%	10%	8%	9%	6%	3%	3%	2%	1%	2%	16%

Notes:
1. 1P restriction during 8:30 AM-12:30 PM Sat

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A map showing the average parking occupancy rates is provided in **Appendix B**.

Parking Data Summary

The parking occupancy data shows that

- Out of the 291 spaces, about 50 to 60% of the spaces are occupied at any one time on both days.
- There are little differences in parking occupancy between Thursday and Saturday, except for Smith Street.
- For Smith Street, the occupancy rate is higher on the Thursday and lower on Saturday.
  - The occupancy rates for the section of Smith Street southeast of South Street (up to the cul-de-sac) are significantly different between Thursday and Saturday. This is because of the low number of spaces resulting in high fluctuations of occupancy rates.
- For Fanning Street the occupancy rate on the eastern side is higher than the western side on both days, with occupancy rates of 74% and 88% on Thursday and Saturday respectively.
- On the Thursday, there are occasional vehicles parking or stopped at each section with No Stopping or No Parking restrictions. These restrictions are along Smith Street and Union Street.
- The southern side of South Street is rarely occupied, which is consistent with site observations and Street View. This is due to the narrow width of South Street which is only wide enough for a parking lane and a trafficable lane.
- All other roads have parked vehicles on both sides of the road, if allowed
- Parking occupancy is relatively higher on Union Street near the school on Thursdays, with the western and eastern sides having occupancy rates of 88% and 76% respectively.

The parking duration data shows that:

- Almost 400 vehicles parked during the surveyed time period.
- On both Thursday and Saturday:
  - about 27% of all users park less than an hour
  - about 15% park less than 2 hours
  - about 17% of users park for at least 12 hours, i.e. potentially residents

The parking occupancy and duration data will be considered when determining locations and suitability of LATM devices. This data also sets a base line for the parking demand in the study area. This can be used for a comparative study to identify changes in parking demand after any new developments have been built.

An assessment of the Smith Street on-street parking availability considering changes to Smith Street as a result of the proposed Bunnings development is detailed in Section 6.1.2.

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5. SITE INSPECTIONS

5.1 Site Audits - Overview

A site inspection and audit within the study area was undertaken, on Wednesday 4 March 2020, to gain an understanding of the current conditions of the streets within the study area (including parking behaviour), and identify existing LATM devices and traffic control infrastructure. Details on traffic and parking signage were also recorded.

The site audit covered the following traffic items and are detailed in the sections below:

- LATM Devices
- Traffic Signs
- Parking Signs
- Bicycle Facilities
- Pedestrian Facilities
- Waste Management/Collection Issues

5.2 Audit

The signage audit included the following items:

- Type of Sign (and relevant codes) or device
- Direction of sign control
- Restrictions and times of operation
- Condition
- Location (GPS co-ordinates)
- Applicable direction of traffic

Bicycle and Pedestrian Facilities

- Cycle related signage / road markings and their location
- Wayfinding signage and their location
- Kerb ramps and crossings

Waste Management

- Evidence of issues with road geometry or surfaces that can affect waste collection

A database of the audit findings was developed including photographs of signs and infrastructure, located in **Appendix C**.

5.2.1 LATM Audit

An audit of existing LATM devices within the study area was conducted, covering the following aspects:

- LATM type
- Location (including road name)
- Line marking and physical condition

A total of 16 LATM devices were identified within the study area, presented in Table 5.1 and Figure 5.1.

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Table 5.1: Existing LATM Devices & Controls

Road	Traffic Calming or Treatment	Treatment Type
Union Street	Yes	▪ Road Hump (Watts Profile) ▪ Road Hump (Flat Top) – Raised Thresholds ▪ Kerb Blisters ▪ Contrasting Pavement ▪ Raised Pedestrian Crossing (Wombat Crossing) ▪ One-way restriction
Foreman Street	Yes	▪ Road Hump (Watts Profile) ▪ Road Hump (Flat Top) - Raised Thresholds ▪ Kerb Blisters ▪ One-way restriction
Edwin Street	Yes	▪ Road Hump (Flat Top) ▪ Contrasting Pavement
South Street	Yes	▪ Road Hump (Watts Profile)
Holbeach Avenue	Yes	▪ Roundabout (with Pedestrian Refuge Islands)

A number of these devices are in addition to those proposed as part of the previous *St Peters/Tempe LATM Study*. This includes:

- Raised thresholds, kerb blisters, raised pedestrian crossing and contrasting pavement on Union Street
- An additional Watts Profile hump on South Street
- Roundabout at Holbeach Avenue.

Signage associated with the LATM devices are covered under the Traffic Sign Audit in Section 5.2.2.

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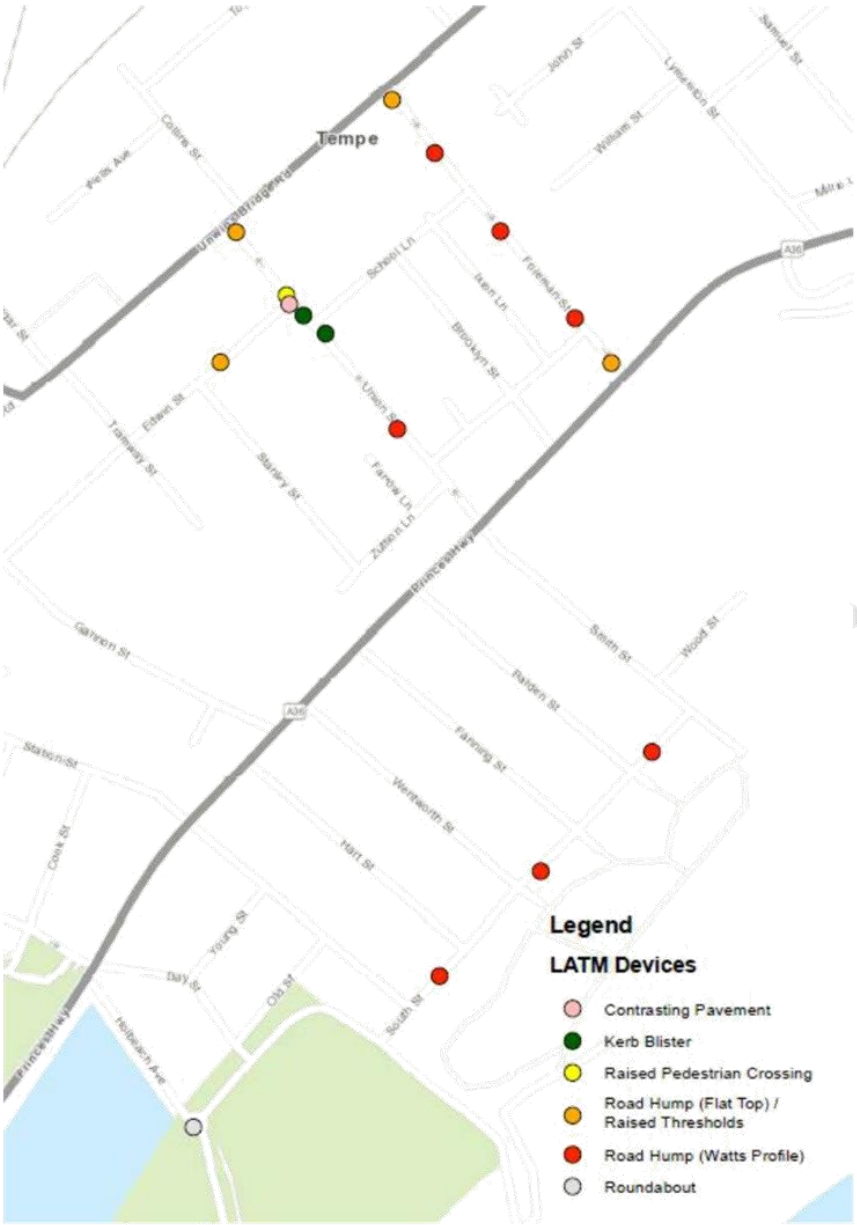

Figure 5.1: Existing LATM Devices

5.2.2 Traffic Sign Audit

The traffic sign audit covered all traffic signs along each roadway, including regulatory, warning and wayfinding signage. Signage associated with LATM devices (such as directional hazard markers or speed hump warning sign) were included in the traffic signage audit. The audit covered:

- Sign type & associated RMS code
- Road and location (including road name and co-ordinates)
- Applicable direction of traffic
- Sign condition
- Visibility obstruction (if any)

A total of 130 traffic signs were recorded within the study area. A database of traffic signs identified in the audit is provided in **Appendix C**.

Majority of the signs were found to be in a good condition with unobstructed visibility. Some signs were found to be vandalised with stickers or graffiti, or faded, however, were still mostly legible. A number of signs were also found to be dislocated or facing the wrong way. Some signs were also obstructed by trees, or covered by another sign immediately above or below the obstructed sign.

A large proportion of the traffic signs are speed hump and speed hump ahead signs (with relevant tag plates), one-way, and the 3-tonne truck load limit signs. The speed hump related signage are mostly along South Street, Union Street and Foreman Street, while the 3-tonne truck load limit signage are located on the entry to roads with the load limit restriction (see Section 2.9).

Table 5.2: Traffic Signs Audit

Traffic Sign Recorded	Sign Code	Locations
No Through Road	G9-18	Holbeach Avenue, Smith Street, Wood Street
Stop	R1-1	Holbeach Avenue
Roundabout Give Way	R1-13	Holbeach Avenue
Give Way	R1-2	Holbeach Avenue, Station Street, Union Street, Foreman Street
Traffic Signal Stop	R1-4	Holbeach Avenue, Smith Street
All Traffic Left Only	R2-14_L	Station Street, Fanning Street
All Traffic Right Only	R2-14_R	School Lane
One Way Left	R2-2_L	Princes Highway, Zuitton Lane, Unwin's Bridge Road, Edwin Street
One Way Right	R2-2_R	School Lane, Princes Highway, Brooklyn Lane, Unwins Bridge Road
Two Way	R2-223	Holbeach Avenue
Keep Left	R2-3	Holbeach Avenue
No Entry	R2-4N	Foreman Street
No Right Turn	R2-6	Unwins Bridge Road
Pedestrian Crossing	R3-1	Union Street
Speed Limit Sign (25 km/h)	R4-1	Holbeach Avenue
School Zone Sign (including illuminated)	R4-230 & R4-230-1	School Lane, Foreman Street, Union Street

Traffic Sign Recorded	Sign Code	Locations
End School Zone	R4-231	Foreman Street, Edwin Street
Local Traffic Area (50 km/h)	R4-240 (50 km/h)	Fanning Street, Barden Street, Smith Street
End Local Traffic Area (50 km/h)	R4-241	Fanning Street, Barden Street, Smith Street
Trucks Prohibited 3-tonne & over	R6-222, R6-10-2 and R9-221	Old Street, Bay Street, Union Street, Fanning Street, Barden Street, Station Street, Hart Street
"When Signals Black Out or Flashing" Tag Plate	R9-201	Smith Street
Hazard Warning Marker	T5-5	Union Street, Foreman Street, Holbeach Avenue
Roundabout Warning	W2-7	Holbeach Avenue
Speed Hump Ahead	W3-4	South Street, Union Street, Edwin Street, Foreman Street
Speed Hump	W5-10	South Street, Union Street, Edwin Street, Foreman Street
Pedestrian Warning	W6-1	Holbeach Avenue, Union Street
Pedestrian Crossing Ahead / Left	W6-2 & W6-2-1	Union Street, Edwin Street
Children Crossing	W6-3	Union Street
"School" Tag Plate	W8-14	Union Street
Speed Tag Plates for Speed Hump signs (various speeds)	W8-2	South Street, Union Street, Edwin Street, Foreman Street
"Refuge Island" Tag Plate	W8-211	Holbeach Avenue

5.2.3 Parking Sign Audit

The parking sign audit captured any signage associated with kerbside and parking controls, including 'No Stopping' and 'No Parking' areas. The audit covered (where applicable):

- Location (road name and co-ordinates)
- Sign type & associated RMS sign code
- Direction of arrow
- Time restrictions and operation days/times
- Applicable traffic direction
- Sign Condition
- Any visibility obstructions

As most of the study area has unrestricted on-street parking, there are very few parking signs with timed or conditional restrictions. The rest of the signs, particularly, those close to intersections, are No Stopping and No Parking signs. A total of 89 parking signs were recorded.

Majority of signs are legible, with some signs heavily faded and illegible (including wording and arrow).

Parking zones associated with the parking signs was previously presented in Figure 2.8. A map of parking signs recorded is provided in **Appendix C**.

5.2.4 Bicycle Facilities Audit

The bicycle facilities audit covered both physical and visual treatments provided for cyclists, such as ramps or crossings and cycle route pavement markings and signage. The audit included:

- Any bicycle-related route-finding signage
- Any shared paths and cycleways
- Any shared bicycle/pedestrian signalised crossing
- Location of bicycle facility (including road name)

Most bicycle facilities are located along the bicycle routes shown in Section 2.7.1, which include Holbeach Avenue, South Street and Smith Street. This includes shared paths and associated signage and bicycle route signage. Signalised shared pedestrian / bicycle crossings are also located at the intersections of Princes Highway / Holbeach Avenue and Princes Highway / Smith Street.

A bicycle on-ramp is also present near the Holbeach Avenue approach to Princes Highway. This allows cyclists along the roadway of Holbeach Avenue to join the shared path along Holbeach Avenue and Princes Highway.

A map of bicycle facilities is provided in **Appendix C**.

5.2.5 Pedestrian Facilities Audit

The pedestrian facilities audit identified features providing accessible pedestrian connectivity within the study area. This included:

- Any kerb ramps
- Any pedestrian refuges
- Any signalised pedestrian crossing or shared bicycle/pedestrian crossings
- Any pedestrian (zebra) crossings

The study area is well-connected by footpaths, with the exception of laneways such as Farrow Lane and Zuitton Lane and were therefore not included as part of the pedestrian facilities audit.

Kerb ramps are present at crossing points at most intersections in the study area.. In most circumstances, the kerb ramps occur in pairs; one on each side of the road. Where pairs of kerb ramps are not present, this creates a break in footpath connectivity, presenting accessibility issues for low mobility pedestrians, such as wheelchair users.

These issues should be further explored and addressed as part of a different study such as a Pedestrian Accessibility Mobility Plan.

5.2.6 Waste Management Audit

The waste management audit focussed on identifying evidence of issues or potential issues affecting waste collection. This may include items such as insufficient geometry, damage to kerbs/corners or other evidence of manoeuvring issues.

Very few issues were found that may affect residential waste collection in the study area.

A kerb runover was observed at the corner of Farrow Lane and Zuitton Lane, shown in Figure 5.2. These roadways feature narrow road widths which would be expected to be limiting for waste collection vehicles.

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Figure 5.2: Kerb Runover at Farrow Lane

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6. FUTURE CONDITIONS

6.1 Future Development

6.1.1 Residential

There are not any known high impact residential developments, such as medium or high-density developments, currently pending within Tempe and the study area.

Based on population forecasts provided by Forecast ID (using Census data from 2006 to 2016), Tempe is expected to experience a negative population growth until 2031. As such, it is expected that there will be very little traffic growth in traffic volumes in Tempe for the next 10 years. This excludes traffic along major through roads and connectors such as Princes Highway or Unwins Bridge Road.

6.1.2 Bunnings Development

The proposed Bunnings Development is to be located at the south-east corner of Princes Highway and Smith Street, with vehicular access to be provided via Smith Street and Princes Highway. A Traffic Impact Assessment (TIA) was undertaken by Transport and Traffic Planning Associates (TTPA) in October 2017, indicating the following proposed road changes (also shown in Figure 6.1):

- A new left turn slip lane from Princes Highway to Smith Street
- Removal of parking on the eastern side of Smith Street and a reduction to one departure lane on Smith Street
- Widening of Smith Street approach to Princes Highway to three lanes
- Customer and delivery access ("Smith Street access") to Bunnings from Smith Street at existing driveway location
- Access to Bunnings from Princes Highway to be located north-east of the Smith Street intersection
- A new unsignalised right turn bay from Princes Highway eastbound to Bunnings Warehouse Princes Highway access
- Only left turns permitted from the Bunnings Princes Highway access
- Relocation of the southwest-bound bus stop on Princes Highway, currently located on the approach to Smith Street.

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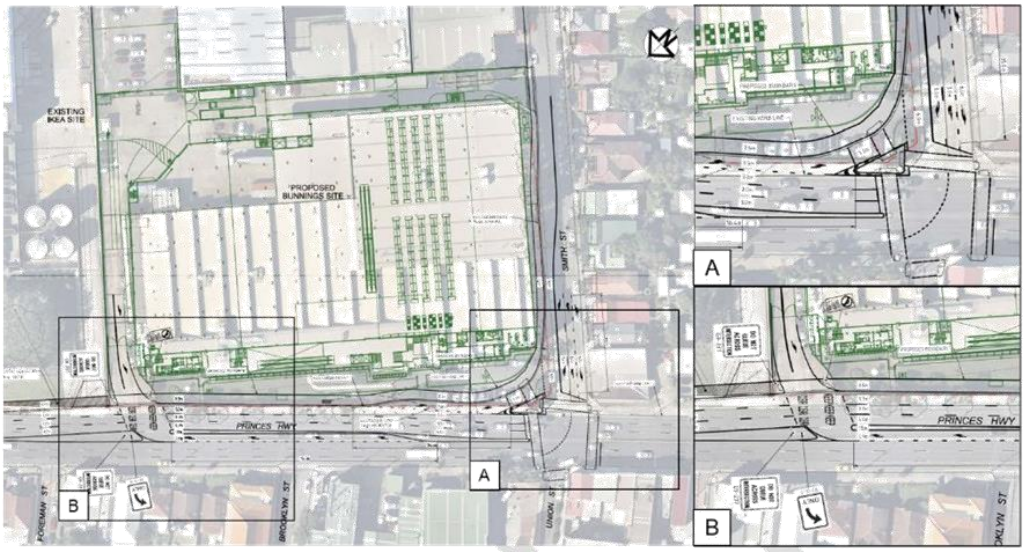

Source: Bunnings Warehouse Tempe – Proposed Road Layout General Arrangement Plan 2 – AT&L 2017

Figure 6.1: Proposed Road Changes

Smith Street On-Street Parking Assessment

It is understood that up to 13 spaces of on-street parking of Smith Street are proposed to be removed as part of the Bunnings development. To mitigate the loss of on-street parking, as part of the Bunnings development application consent conditions (condition number 6), 13 of the car spaces within Bunnings warehouse are to be dedicated as public car parking spaces available to local residents to offset the loss of on street parking. However, these public car spaces are intended to be available during Bunnings trading hours only. This removes the flexibility of parking at any time of the day for any duration. Given that most residents are expected to park overnight or outside business hours, as a worst-case scenario, these spaces will not be considered as part of the assessment. Further, Bunnings customers are assumed to not use on-street parking on Smith Street as 424 on-site parking spaces are provided.

Based on parking occupancy data, Table 6.1 shows the average number of occupied spaces and vacant spaces along Smith Street on the Thursday and Saturday. There are on average 18 vacant spaces along Smith Street on Thursday and 27 vacant spaces on Saturday. The removal of 13 on-street spaces result in an estimated 5 and 14 vacant spaces remaining on Thursday and Saturday respectively. Therefore, Smith Street will be able to cope with the loss of 13 on-street spaces, and residents do not have to seek other on-street parking elsewhere.

Table 6.1: Parking Occupancy on Smith Street

Side	Section	Parking Capacity	Occupied Spaces (Average)	Vacant Spaces
Thursday				
West	Between Princes Highway & South Street	31	23	8
East	Between cul-de-sac & Wood Street	3	3	0
	Between Wood Street & Princes Highway	27	17	10

Side	Section	Parking Capacity	Occupied Spaces (Average)	Vacant Spaces
Total		**61**	**43**	**18**
Saturday				
West	Between Princes Highway & South Street	31	20	11
East	Between cul-de-sac & Wood Street	3	0	3
	Between Wood Street & Princes Highway	27	14	13
Total		**61**	**34**	**27**

Any proposed treatments resulting in the removal of further parking spaces on Smith Street (mainly the western side) may further reduce the number of vacant spaces along Smith Street.

Future Traffic Generation

It is expected that there will be an increase in traffic turning between Princes Highway and Smith Street, due to traffic generated by the proposed Bunnings Development,

The projected peak hour traffic at the intersection is shown in Figure 6.2, with notable increases to the following turn volumes

- Right turn from Smith Street to Princes Highway east-bound
- Left turn from Princes Highway west-bound to Smith Street
- Right turn from Princes Highway east-bound to Smith Street

The projected counts are expected to increase up to 233 vehicles per hour. The intersection upgrade is expected to be able to deal with the increase in traffic volumes.

The increase in volumes along Smith Street will be limited to the section of Smith Street between Princes Highway and the proposed Bunnings access. Generated trips by the Bunnings development are not expected to use Smith Street south of the Bunnings access and subsequently South Street.

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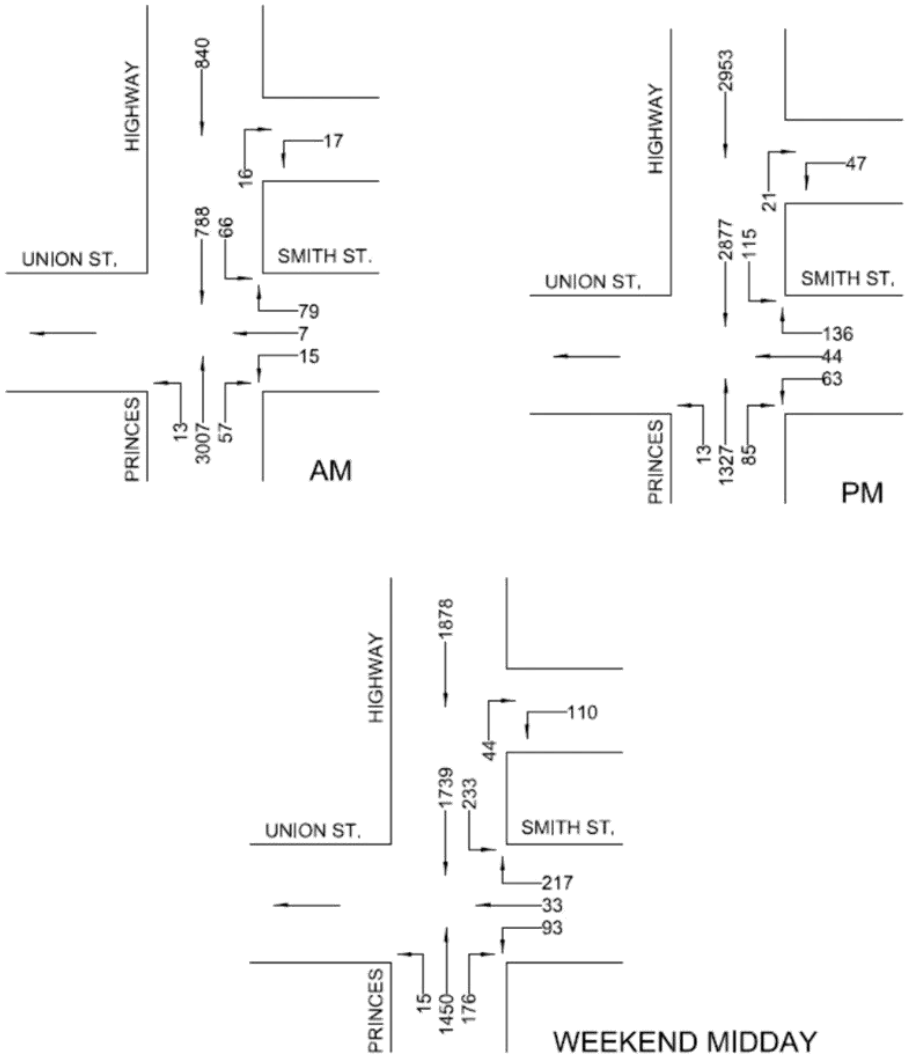


Source: 728-750 Princes Highway Traffic Impact Assessment – Transport and Traffic Planning Associates (TTPA)

Figure 6.2: Projected Peak Hour Turn Counts – Princes Highway / Union Street / Smith Street

6.2 Future Road Network

6.2.1 WestConnex

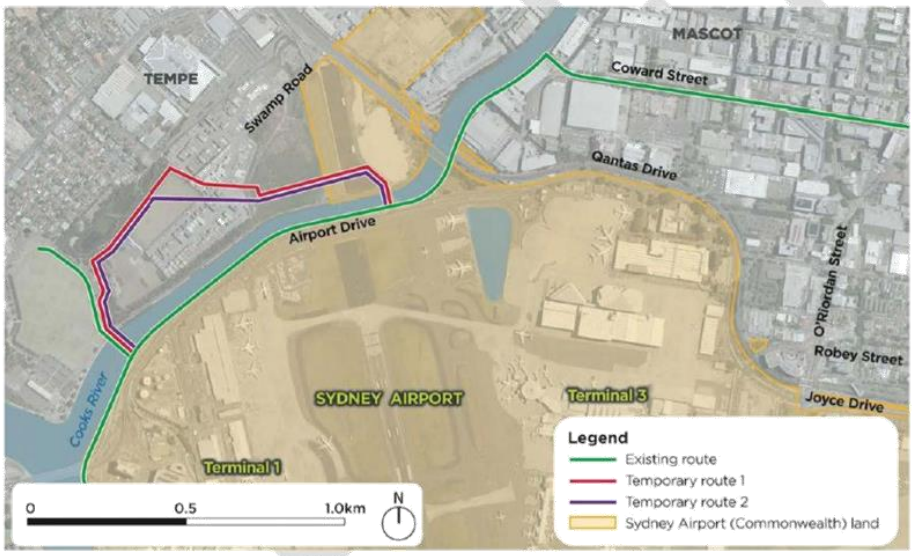
The new M5 tunnels, opening in 2020, will run underneath the study area as part of the WestConnex project. There will be no connections or changes to study area roads. The St. Peters interchange, located approximately 2km northeast of Tempe, will allow the new M5 to connect with roads towards the eastern suburbs such as Mascot and Kingsford, and the City's inner south such as Alexandria and Waterloo.

Currently, traffic from the M5 exit at Arncliffe will run via Princes Highway, through Tempe, then via Canal Road or Sydney Park Road to get to the inner south and eastern suburbs respectively. The opening of the new M5 East and St Peters interchange will be able to provide an alternative route from the existing M5 to these suburbs, bypassing the Tempe area and is expected to reduce traffic along Princes Highway through Tempe.

6.2.2 Sydney Gateway

Sydney Gateway is a future motorway connection between the St Peters interchange and Sydney Kingsford Smith Airport, scheduled to be completed by 2023. The proposed alignment is located adjacent to between Tempe Golf Range and the Alexandria Canal, and does not pass through the study area. However, a construction site is proposed to be located within Tempe Lands on the sites of the Tempe Golf Range and Tempe Dog Park. It is expected for up to 100 light vehicles to access the site via Holbeach Avenue, to be undertaken between 2021 and 2023. Construction vehicle trucks will not be allowed to use Holbeach Avenue to access the Tempe Lands construction site.

Additionally, the current Alexandria Canal shared path will be closed and relocated as part of the project, a temporary active transport link is proposed to run adjacent to Tempe Recreation Reserve and Tempe Lands, shown in Figure 6.3, serving as a temporary detour of the closed shared path. As such, a greater number of cyclists and pedestrians expected towards the south of the study area.



Source: Sydney Gateway Environmental Impact Assessment

Figure 6.3: Sydney Gateway - Temporary Active Transport Link

7. RISK PRIORITY ASSESSMENT

7.1 Methodology

Each study area road was assessed against criteria to determine its risk for future crashes based on the data collected. Criteria included:

- Crash history
- 24-hour vehicle volumes (existing)
- 85th percentile vehicle speeds
- Heavy vehicle volumes (existing)
- Road width
- Availability of existing LATM devices
- Distance to schools
- Land use (future)

Points were allocated to each road or road section based on the level of risk. The higher the points, the higher the risk for future crashes, and hence the higher the need for LATM devices.

a) **Crash History**

- 4 points for crash casualty rates of more than the typical urban casualty rate of 0.446, as listed in Table 3.6.

b) 24-hour vehicle volumes

- 2 points (per direction) for ADT of more than 400, as listed in Table 4.3.

c) **85th percentile vehicle Speeds**

- 2 points (per direction) for 85th percentile speeds of more than 40 km/h, as listed in Table 4.3.

d) Heavy vehicle volumes

- For roads without a truck load limit
  - 1 point (per direction) for daily heavy vehicle volumes of more than 50, as listed in Table 4.3; and
  - 1 point (per direction) for daily heavy vehicle percentages of more than 10%, as listed in Table 4.3.
- For roads with the 3-tonne truck load limit
  - 1 point (per direction) for daily heavy vehicle volumes of more than 10, as listed in Table 4.3; and
  - 1 point (per direction) or daily heavy vehicle percentages of more than 5%, as listed in Table 4.3.

e) Available Road Width

- 4 points for a wider two-way road where the available trafficable road width is more than two car widths
- 2 points for a narrow two-way road where the available trafficable road width is less than two car widths
- 0 points given for a one-way road as the road is typically at least one car width and traffic is unopposed.

f) Existing LATM Devices

- -1 (negative one) point for each LATM devices located on that road. Multiple LATM devices at the same location are counted as one set (e.g. A flat top road hump with kerb blisters and contrasting

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pavement). Roundabouts are excluded, but any pedestrian refuge islands or median islands are included.

g) Distance to Schools

- 4 points if there are school zones.

h) Existing Land Use

- 4 points for local traffic and residential streets. While this does not directly contribute to crash risk, safety is more paramount in a local traffic areas, and residential roads should be given some priority for implementation of LATM schemes.

i) Future Traffic

- 4 points where additional Bunnings Warehouse generated traffic may flow onto
- 4 points for local streets forecasted to have daily volumes are to exceeding 1500

7.2 Assessment

Based on the above scoring criteria, Table 7.1.presents the accumulated scores of each roadway.

Table 7.1: Risk Score by Road

Road	Criteria									Total score
	Crash	Volume	Speed	Heavy Vehicle	Width	Existing LATM	Schools	Existing Lane Use	Future Land Use	
Barden Street	-	-	-	1	2	-	-	4	-	7
Fanning Street	-	-	-	1	2	-	-	4	-	7
Foreman Street	-	-	-	2	-	-5	4	4	-	5
Hart Street	-	-	-	1	2	-	-	4	-	7
Holbeach Avenue (Princes Highway to roundabout)	4	4	4	-	4	-1	-	-	-	15
Holbeach Avenue (roundabout to South Street)	-	-	-	-	4	-	-	-	-	4
Smith Street	-	2	2	4	4	-	-	-	4	16
South Street	-	2	-	1	2	-3	-	4	-	6
Stanley Street	-	-	4	3	4	-	-	4	-	15
Station Street	-	-	-	1	2	-	-	4	-	7
Union Street	-	-	-	1	-	-5	4	4	4	8
Wentworth Street	-	-	-	3	2	-	-	4	-	9
Zuitton Lane	-	-	-	1	2	-	-	-	-	3

Based on the above assessment, Smith Street exhibits the highest score, followed by Holbeach Avenue (between Princes Highway and the roundabout) and Stanley Street. Wentworth Street also has achieved a relatively high score for a local residential road.

Other local streets, including Barden, Fanning, Hart, Station and Union Streets, have an accumulated score between 5 and 8 points. Given the lack of crash history, low vehicle speeds and heavy vehicle composition, these roads may not require any ATM treatments. However, other treatments may be proposed to further deter non-local traffic from using these roads.

7.3 Summary

From the risk priority assessment, LATM devices are recommended to be implemented on:

- Smith Street – to deal with traffic volume, speed and heavy vehicle issues
- Holbeach Avenue – to deal with crash risks, traffic volume and speed issues
- Stanley Street – to deal with speed issues
- Wentworth Street – to deal with heavy vehicle issues

These priority streets are shown in Figure 7.1.

Figure 7.1: Priority Streets for Treatment

8. PRELIMINARY ROAD TREATMENTS

8.1 Traffic Calming and Local Area Traffic Management

Road treatments, including Local Area Traffic Management (LATM) Schemes and traffic calming measures can be implemented to change traffic conditions and speed environments, such that driver behaviour and perception of the road environment would be more appropriate along local residential streets and activity areas.

The primary objectives in introducing LATM schemes as part of this study is to address the following:

- Vehicle speeds
- Vehicle volumes
- Heavy vehicle volumes
- Reducing potential for traffic using local roads (with the exception of Smith Street) to access Princes Highway
- Improving amenity along Smith Street

8.2 Existing Road Treatments

As detailed in Section 2.11, the numerous LATM devices already in use within the study area include:

- Road humps (Watts profile & flat top), including raised thresholds
- Kerb blisters
- Contrasting pavement
- Raised pedestrian (wombat) crossing
- Roundabouts
- Pedestrian refuge islands

The majority of LATM devices are located along Union Street and Foreman Street in the vicinity of Tempe Public School.

8.3 Preliminary Road Treatment Options

To address the issues identified, a wide range of traffic calming devices can be implemented. LATM devices presented in *Austroads Guide to Traffic Management Part 8 – Local Area Traffic Management* were used as a basis for developing a list of suitable devices that could be used.

To create safer local road environments, the key targets for any proposed treatment options include:

- Reducing vehicle speeds
- Minimising traffic levels, including non-resident traffic in local streets
- Deterring heavy vehicles
- Reducing crash risk
- Improving local amenity, including walking and cycling options.

The following traffic calming treatments may potentially be implemented across the study area:

- Entry thresholds
- Flat top road humps
- Raised Pedestrian Crossings
- Speed cushions

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- Slow points
- Road narrowing / Kerb blisters
- Pedestrian refuge / Median / Splitter islands
- Line marking (edge line and/or centreline).

Descriptions of each of these treatments are provided in Table 8.1.

Table 8.1: Road Treatment Types

Name	Type	Description
Entry Threshold	Physical / Visual	▪ Provides a physical and visual gateway to a local street ▪ May control vehicle speeds in both directions ▪ Design can be varied to accommodate different traffic types and road geometries (such as bicycles) ▪ Include raised platforms, medians and kerb blisters ▪ Opportunity to introduce landscaping elements to enhance streetscape ▪ Commonly used throughout study area ▪ May impact large vehicle movements near intersections
Flat Top Road Hump	Physical	▪ Wide raised platform type 'speed hump' ▪ Controls vehicle speeds by vertical deflection and may reduce traffic volumes ▪ More visually appealing than typical speed humps (such as Watts Profile) ▪ Typically 75-150mm high, 2-6m long ▪ Fullwidth designs control speeds in both directions ▪ Design can be varied to adapt to different road geometries and traffic, including medians and kerb blisters ▪ Can be misconstrued as a pedestrian crossing ▪ Typically low cost
Raised Pedestrian Crossing (Wombat Crossing)	Physical	▪ Flat Top Road Hump combined with marked Pedestrian Crossing ▪ Controls vehicle speeds and provides pedestrian crossing location ▪ Improves pedestrian safety by raising walkway (for better visibility) and calming traffic vehicles ▪ Allows for pedestrian priority
Speed Cushions	Physical	▪ Small plastic or rubber 'cushion' in centre of travel lane (or series across travel lanes) ▪ Controls vehicle speeds by vertical deflection ▪ Smaller and narrower than speed humps or flat top road humps ▪ Slows light vehicles with little impact to heavy vehicles (such as buses) ▪ Can be combined with a median and kerb blisters for further control ▪ Low cost and quick installation

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Name	Type	Description
Slow Points	Physical	▪ Controls vehicles by horizontal deflection ▪ Uses series of kerb extensions or blisters on alternating sides of road to create an angled travel lane ▪ Opportunity to introduce landscaping elements to enhance streetscape ▪ Requires considerable length of road to install and potentially high cost ▪ Must consider local driveway access ▪ May impact kerbside parking
Road Narrowing	Physical	▪ Kerb extensions or blisters to reduce available road width at a single point ▪ Use of kerb blisters may allow for kerbside drainage ▪ Often used in conjunction with other treatments (such as entry thresholds and road humps) ▪ Opportunity to introduce landscaping elements to enhance streetscape
Pedestrian Refuge / Median / Splitter Islands	Physical	▪ Raised or flush island positioned at the intersection or the centreline of a street ▪ Narrows lanes ▪ Provide pedestrians with a refuge ▪ Used in areas where there is a need to reduce entry speed of vehicles to a residential street ▪ May not be used on narrow two-lane streets, and where there is insufficient sight distance ▪ Must consider local driveway access ▪ May impact kerbside parking
Line Marking	Visual	▪ May be used where physical treatments are not appropriate ▪ Can provide a visual narrowing of the roadway such that drivers perceive a narrower travel lane and reduce speed ▪ Assists in delineating road components such as cycle lanes and kerbside parking ▪ Available roadway width through bends is visually narrowed when combined with centreline marking ▪ May not be effective along considerably wide roadways
Contrasting Pavement	Visual	▪ Highlight the change in road conditions to drivers ▪ Colour and texture can be designed to fit with local area context ▪ Typically located at start of traffic areas (such as High Pedestrian Activity Areas) ▪ Textured pattern (such as Embossed Hex) can also provide a tactile and audible warning to drivers ▪ Typically low cost

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8.4 Standard LATM Treatments

Based on existing LATM devices found and the types presented by Austroads, a number of potential standard treatment options are proposed for installation across the study area, presented in Table 8.2.

These devices are identified as being appropriate for the context of the study area and address the issues identified on local roads.

Table 8.2: Proposed Standard LATM Treatments

Infrastructure	Description
Flat-top Road Hump	Standard flat top road hump
Speed Cushion	Standard speed cushion(s)
Road Narrowing	Kerb blisters (landscaping)
Median Treatments	Median Island (standard or low-profile)
Line marking	Edge and centre line marking
Contrasting Pavement	Standard at-grade contrasting pavement

Examples of some of these treatments are provided in Figure 8.1 below.

Left to Right: Flat top road hump, road narrowing (kerb blisters with landscaping)

Figure 8.1: Examples of Treatments

There are other treatments that may be implemented or installed additionally, complementing the proposed LATM treatments. Treatments identified as suitable for the study area include:

- Bicycle facilities, including bicycle ramps, shared paths and bicycle markings
- Signage, to complement the LATM treatments
- Footpath widening

8.5 Treatment Criteria

As there is a large range of available LATM devices available, the selection and location of these devices is important to address the specific issues along each street. A range of factors and considerations are to be given in the selection process to determine suitable and appropriate LATM treatments. As such, a treatment selection criteria was developed to inform the selection and location of proposed LATM devices.

8.5.1 Austroads LATM Selection Toolkit

The selection of an appropriate LATM is greatly dependent on the overall objective for the particular roadway, the local context of the road environment and the needs of local road users.

Austroads Guide to Traffic Management Part 8 - Local Area Traffic Management provides a toolkit and selection rubric, which outlines the relative use of different LATM devices based on previous research and practice within Australia and New Zealand. The Austroads Toolkit which provides a description and use of LATM devices is provided in Table 8.3.

Table 8.3: Austroads LATM Toolkit

Measure		Reduce speeds	Reduce traffic volume	Reduce crash risk	Increase pedestrian safety	Increase bicycle safety
Vertical deflection devices (Section 7.2)	Road humps	✓	✓	✓	–	–
	Road cushions	✓	✓	✓	–	✓
	Flat-top road humps	✓	✓	✓	–	✓
	Wombat crossings	✓	✓	✓	✓	✓
	Raised pavements	✓	✓	✓	–	✓
Horizontal deflection devices (Section 7.3)	Lane narrowings/kerb extensions	✓	–	–	✓	–
	Slow points	✓	✓	–	–	–
	Centre blister islands	✓	✓	–	✓	–
	Driveway links	✓	✓	–	✓	✓
	Mid-block median treatments	✓	–	✓	✓	✓
	Roundabouts	✓	✓	✓	–	–
Diversion devices (Section 7.4)	Full road closure	–	✓	✓	✓	✓
	Half road closure	–	✓	✓	✓	✓
	Diagonal road closure	–	✓	✓	✓	✓
	Modified T-intersection	✓	✓	✓	✓	✓
	Left-in/left-out islands	–	✓	✓	✓	–
Signs, linemarking and other treatments (Section 7.5)	Speed limit signs	✓	–	✓	✓	✓
	Prohibited traffic movement signs	–	✓	✓	–	✓
	One-way (street) signs	–	✓	✓	✓	–
	Give-way signs	✓	✓	✓	✓	✓
	Stop signs	✓	✓	✓	✓	✓
	Shared zones	✓	✓	–	✓	✓
	School zones	✓	–	✓	✓	✓
	Threshold treatments	✓	✓	✓	–	✓
	Tactile surface treatments	✓	–	–	–	–
	Bicycle facilities	–	–	✓	–	✓
	Bus facilities	–	✓	–	–	–

8.5.2 Treatment Criteria

The information presented within the Austroads LATM selection toolkit and consideration of other road environment elements was used to develop a specific treatment selection criteria and is presented in Table 8.4.

The criteria include considerations of the following:

- Speed and traffic volume reduction
- Crash risk reduction
- Relative traffic volumes
- Deterrence against non-local traffic
- Pedestrians, bicycles and buses
- Kerbside parking
- Road and traffic noise generation
- Roadway width requirements.

Table 8.4: Proposed Treatment Selection Criteria

Type	Details	Reduce Speed	Reduce Traffic Volumes	Reduce Crash Risk	Suitable for High Traffic Volumes	Deter Non-Local Traffic	Accommodate Pedestrians	Bicycle Friendly	Bus Route friendly	Parking friendly	Noise Considerations	Wide Road required	Other remarks
LATM Treatments													
Road hump	Flat top road hump	Yes	Yes	Yes	Yes	Yes	No	Yes[3]	Yes[4]	Yes	Yes	No	Preferred for lower traffic volumes
Speed Cushion	Speed Cushion	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes[10]	Yes	No[7]	Preferred for lower traffic volumes
Road narrowing	Kerb blisters (landscaping)	Yes	No	No	Yes	Yes	No	No	No[5]	No	No	Yes	Not to be used on bus routes on a one-way street
Median Treatment	Median Island (standard or low-profile)	Yes	No	Yes	Yes	Yes	No	No[5]	Yes[6]	No	No	Yes	Must conform to Transport for NSW standards
Line-Marking	Edge, centre and lane line marking	Yes[1]	No	Yes[2]	Yes	Yes	-	-	Yes	Yes	No	Yes[8]	Parking lane width may vary, minimum 2.1m
Contrasting Pavement	Standard Contrasting Pavement	Yes	No	No	Yes	Yes	-	-	Yes	Yes	Yes[9]	No	Visual and tactile treatment only
Other Treatments													
Bicycle Facilities	Bicycle ramps, shared paths and bicycle markings	-	-	-	-	-	No	Yes	-	-	No	No	
Signage	Signage to complement LATM treatments	varies					-	-	-	-	No	No	

Type	Details	Reduce Speed	Reduce Traffic Volumes	Reduce Crash Risk	Suitable for High Traffic Volumes	Deter Non-Local Traffic	Accommodate Pedestrians	Bicycle Friendly	Bus Route friendly	Parking friendly	Noise Considerations	Wide Road required	Other remarks
Footpath widening	Widened footpath	-	-	-	-	-	Yes	Yes	-	No	No	Yes	

Notes:

1. *If travel lane is sufficiently narrowed*
2. *May effectively reduce kerbside crashes*
3. *Ramps can be designed to be bicycle friendly*
4. *Flat top road humps can be designed to bus friendly specifications (ref. STA guidelines)*
5. *Bus routes require 3.2m to 3.5m wide travel lane, which will not be an effective road narrowing for regular traffic*
6. *If 3.5m travel lane is maintained*
7. *More effective on narrow roads. Installation on bus routes require 3.5m travel lane*
8. *Generally applied to wide road*
9. *Noise to be considered if using textured surface treatment (such as embossed pattern or similar)*

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8.6 Proposed Treatment and Locations

Based on the selection criteria, a number of proposed treatment options were developed for the priority roads identified in Section 7.3. Additional proposed treatments for other roads in the study area were also developed. The proposed treatments are outlined in Table 8.5.

Table 8.5: Proposed Treatment and Locations

Road	Option	Type	Location	Features
Smith Street	1	Road Narrowing & Contrasting Pavement	Immediately south of proposed Bunnings access,	▪ Landscaped kerb blisters with low height shrubs ▪ At-grade contrasting pavement treatment (embossed text pattern)
	2	Mountable Concrete Median Treatment		▪ Mountable low-profile concrete median with contrasting pavement
	Addition to both options	Right Turn Only Signage	Opposite and facing Bunnings access	▪ R2-14_R (Right Turn Only) sign
		Line Marking	Between Princes Highway and Bunnings Access	▪ Edge and centre line markings to provide a visual narrowing of the roadway ▪ Road environment would appear distinctively different to the southern section of Smith Street ▪ Delineation of adjusted lane arrangement near Princes Highway
		Bicycle Facilities	Between Princes Highway and Bunnings Access	▪ Extend shared path for a short distance from Princes Highway along both sides of Smith Street ▪ Inclusion of an angled bicycle ramp for southbound cyclists to transition between the shared path and Smith Street ▪ Signage and marking to indicate transitions between shared path and on-road cycling

DRAFT

Road	Option	Type	Location	Features
		Widened Footpath	Western side of road, between No. 48 and South Street	**Option a (Option 1a or Option 2a):** ▪ Widen western footpath ▪ Retain existing kerbside parking on the western side of Smith Street ▪ Shift centreline to suit road width **Option b (Option 1b or Option 2b):** ▪ Widen western footpath with adjacent landscaped verge ▪ Removal of existing kerbside parking on the western side of Smith Street ▪ Some paved parking bays within the landscaped area to offset loss of parking ▪ Turning pocket to allow vehicles to turn right out of No.1 Smith Street
Holbeach Avenue	1	Speed Cushions	Between driveways of 14 and 18 Holbeach Avenue	▪ Set of four speed cushions of 100mm height, across roadway
	2	Speed Cushions & Road Narrowing		▪ Set of two speed cushions of 100mm height in travel lanes ▪ Landscaped kerb blisters with low height shrubs
Stanley Street	1	Flat Top Road Hump	Near streetlight outside 14 Stanley Street Near streetlight outside 37 Stanley Street	▪ Concrete flat top road hump of 100mm height, across road width ▪ Contrasting surface treatment ('terracotta' colour surface of similar)
	2	Road Narrowing		▪ Landscaped kerb blisters with low height shrubs
Wentworth Street	1	Road Narrowing & Contrasting Pavement	At entry from Princes Highway (specifically south of Tempe Tyre Centre vehicular access) At entry from South Street (specifically north of the drainage pit)	▪ Landscaped kerb blisters with low height shrubs ▪ At-grade contrasting pavement treatment (embossed text pattern)
	2	Flat Top Road Hump		▪ Concrete flat top road hump of 100mm height, across road width ▪ Contrasting surface treatment ('terracotta' colour surface of similar)

DRAFT

Road	Option	Type	Location	Features
	Addition to both options	3 Tonne Truck Limit Signage	Outside 846 Princes Highway Outside 45 Wentworth Street	▪ R6-10-2 and R9-231 (Truck Load Limit) signs ▪ W8-245N_L (Left Arrow) Signage, only on Princes Highway
Barden, Fanning, Hart and Station Streets	-	Contrasting Pavement Threshold[1]	At entry from Princes Highway	▪ At-grade contrasting pavement treatment (embossed text pattern)

1. Subject to a 40km/h Local Traffic Area proposal and/or Transport for NSW review and approval

The following considerations were given when locating each of the above treatments:

- Spacing: a maximum spacing between 80m and 120m was adopted (following *Austroads LATM Guidelines*)
- Presence of existing street lighting and light posts
- Kerb ramps
- Property accesses and driveways
- Road gradients
- Driver sight distances and visibility.

Assessment of the different treatments are further detailed in Section 9.

The locations of the proposed treatments options, contrasting pavement thresholds and additional Smith Street treatments are shown in Figure 8.2 and in **Appendix D**.

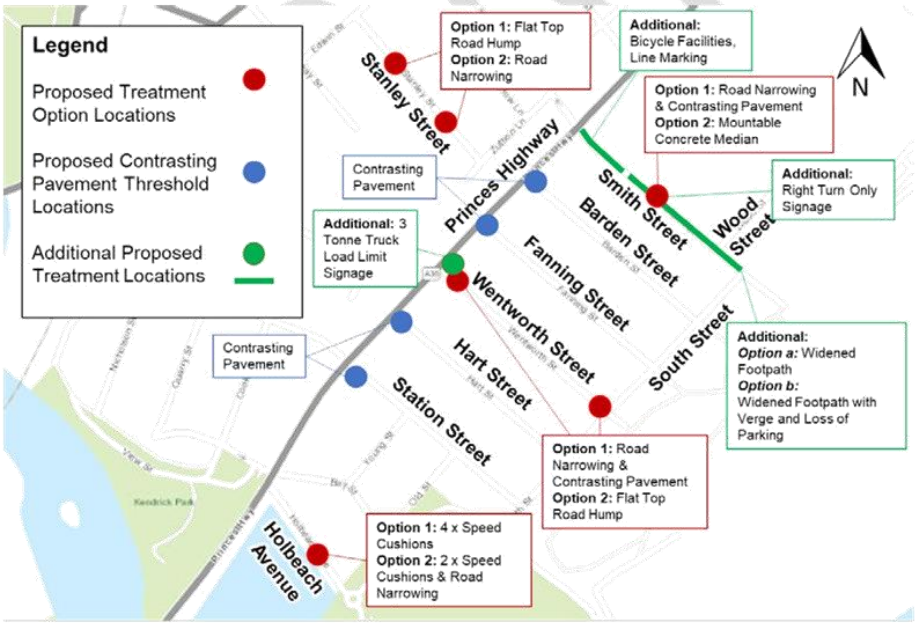
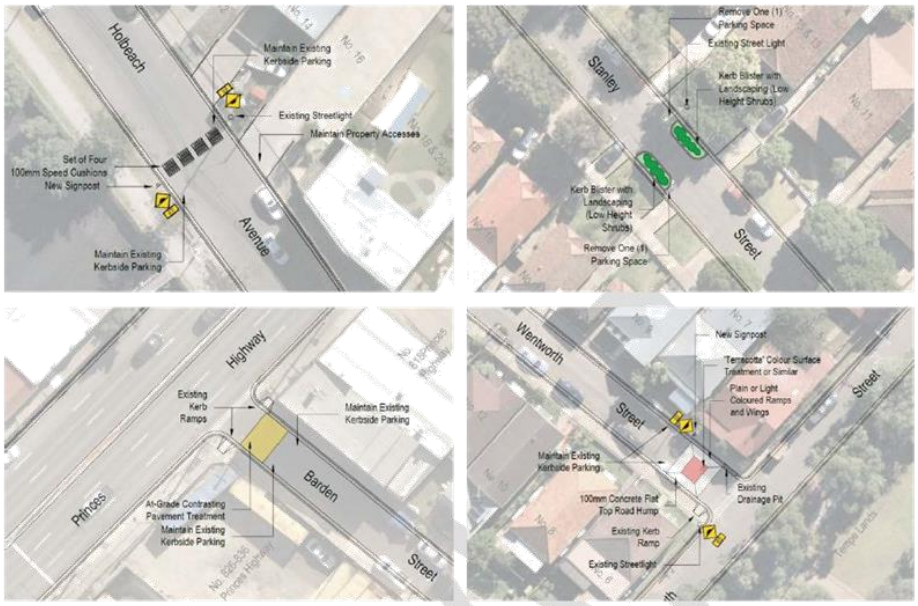


Figure 8.2: Proposed Treatment Locations

8.7 Concept Designs

A sample of concept designs related to the proposed treatment are presented in Figure 8.3. Detailed treatment concept designs are provided in **Appendix D.**



Clockwise from top: Speed Cushions, Road Narrowing (kerb Blisters), Flat Top Road Hump, Kerb Blisters and Contrasting Pavement

Figure 8.3: Sample Concepts of Proposed Treatments

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9. PROPOSED TREATMENT JUSTIFICATION

9.1 Overview

This section describes each treatment option in detail by street and discusses its merits and potential impacts to the road environment such as property access and kerbside parking. The merits and impacts are summarised at the end of this section in Table 9.2 and Table 9.3 respectively.

Any LATM measures proposed may have an impact on the travel time of emergency service vehicles through the area. However, in consideration of the existing road environment along these local streets, any additional proposed LATM measures are not expected to have a significant impact to emergency service vehicle access. Additionally, the treatments proposed are not located along public or school bus routes, therefore, there are no anticipated impacts to buses.

9.2 Smith Street

9.2.1 Issues

As discussed in previous sections, the issues present on Smith Street are:

- Smith Street has relatively high average daily traffic (ADT) volumes, up to 600 vehicles per day in each direction, compared to other local roads in the study area.
- Smith Street has relatively high 85th percentile speeds of up to 46 km/h per direction compared to other local roads.
- Due to industrial land use located along Smith Street and its adjoining Wood Street, heavy vehicles are common along Smith Street. From the tube count data, on average, between 100 and 150 heavy vehicles travel along Smith Street daily in each direction, and make up 25 to 36% of the total daily traffic.
- Based on crash history, three (3) crashes occurred along Smith Street between January 2014 and December 2018, with two (2) crashes resulting in injuries.
- The proposed Bunnings development will be mainly accessed via Smith Street. There are concerns that the development will generate both light and heavy vehicle traffic, not just on Smith Street, but on other local roads such as Barden Street, South Street and Holbeach Avenue.
- Speed cushions were installed along Smith Street, as part of a previous LATM study, were removed in 2012 and 2017 respectively. This was due to resident complaints about the noise produced by trucks driving over the speed cushions. As such, vertical deflection devices such as speed humps were not considered as treatment options on Smith Street.

9.2.2 Location of Treatment Options

Treatment options for Smith Street will be located between the Bunnings access and access to No.1 Smith Street. The placement of treatment options mid-block on Smith Street breaks up the long straight section of the roadway, preventing drivers from gathering speed along the length of the road.

9.2.3 Option 1: Road Narrowing & Contrasting Pavement

This option involves landscaped kerb blisters on each side of the road, and an at-grade embossed text pattern as contrasting pavement between the kerb blisters. Additional measures to Smith Street regardless of Options 1 or 2 are described separately in Section 9.2.5.

DRAFT

Merits

Road narrowing will provide a narrow travel width, similar to existing treatments on neighbouring streets like Barden or Fanning Streets, which have an 85th percentile speed of less than 40 km/h. Therefore, providing road narrowing will strongly encourage traffic to slow down. Lower speeds will in turn increase travel time and may deter non-local traffic from utilising Smith Street.

Landscaping on the kerb blisters will also improve the aesthetics of the roadway and enhance sense of place. It may also provide clearer changes in road geometry for vehicles approaching the treatment.

The contrasting pavement will highlight the entry to a local traffic area by providing a physical and visual gateway treatment to the south section of Smith Street. The differentiation of road environment may be able to deter vehicles from turning left from the proposed Bunnings access onto Smith Street southbound. Combined with road narrowing, the reduced geometry may also be less favourable to heavy vehicles.

Road narrowing will result in a loss of parking along Smith Street. However, the removal of parking will improve sightlines for vehicles exiting the driveways from Bunnings and No.1 Smith Street. It also improves manoeuvrability of these turns as there is a reduced likelihood of parked vehicles obstructing the access points.

Impacts to Parking

The Bunnings development will result in the proposed removal of up to 13 spaces of on-street parking along Smith Street. These spaces are compensated with 13 spaces within Bunnings warehouse, which are open to access during Bunnings trading hours only. This removes the flexibility of parking at any time of the day for any duration. Given that most residents are expected to park overnight or outside business hours, as a worst-case scenario, these spaces will not be considered as part of the assessment.

From the parking surveys conducted on 19th and 21st March 2020, on a Thursday and Saturday respectively, it was deduced that on average, Smith Street has 18 vacant spaces on Thursday and 27 vacant spaces on Saturday. With the loss of 13 parking spaces due to the Bunnings development, this will result in an estimated 5 and 14 vacant spaces remaining on Thursday and Saturday respectively.

Road narrowing will result in a loss of up to two (2) parking spaces on the western side and one (1) space on the eastern side, a total of three (3) spaces. The remaining availability of on-street parking on Smith Street will therefore be able to cope with the further removal of spaces due to road narrowing.

Other Impacts

The kerb blisters will be built between the Bunnings access and the access to No.1 Smith Street. There are no property accesses on the western side at the proposed location. As such, there will be no impacts of the treatments on the accesses along Smith Street.

The at-grade contrasting pavement also means that there will be no additional noise generated as compared to vertical deflection devices such as speed cushions. An at-grade pavement also provides minimal or no impacts to cyclists riding along Smith Street.

The treatment option may have an impact on the travel time of emergency service vehicles through the area. However, in consideration of the existing road environment along these local streets, any additional proposed LATM measures are not expected to have a significant impact to emergency service vehicle access.

9.2.4 Option 2: Mountable Concrete Median

This option is a mountable low-profile concrete median. The pavement on the top of the median will also be contrasted against the road surface. Additional measures to Smith Street regardless of Options 1 or 2 are described separately in Section 9.2.5.

Merits

The change in road geometry highlights local traffic area by providing a physical and visual gateway treatment to the south section of Smith Street. The reduction in geometry also aid in the differentiation of road environment and may deter vehicles turning left from proposed Bunnings access onto Smith Street southbound.

The treatment is a horizontal deflection device and will be able to slow traffic by diverting vehicles around the island, particularly heavy vehicles due to their larger turn radius.

The median island will result in a loss of parking along Smith Street (see next section). Similar to option 1, the removal of parking may improve sightlines of vehicles turning out from the accesses onto Smith Street. It also improves manoeuvrability of these turns as there is a reduced likelihood of parked vehicles obstructing the access points of 1 Smith Street.

The median island is low-profile and mountable to allow vehicles to turn right out of 1 Smith Street onto Smith Street northbound and mount over the median.

Impacts to Parking

As mentioned in Option 1, Smith Street will have an estimated 5 and 14 vacant spaces remaining on Thursday and Saturday respectively, after spaces are removed for the Bunnings development.

The median island will result in a loss of seven (7) parking spaces on the western side and one (1) space on the eastern side, a total of eight (8) spaces. With the removal of these eight spaces, this will result in a **shortage of three (3) spaces** on a Thursday, and residential parking will be displaced onto adjacent streets such as Barden Street or South Street. Parking availability on Saturday will still be able to cope with the additional removal of spaces due to the median island.

On Thursday, Barden Street has a parking occupancy rate of around 50% out of 63 spaces, and South Street between Smith and Fanning Streets has a parking occupancy rate of around 40% out of 19 spaces. This means out of a total of 82 spaces, 39 are occupied and 42 are vacant, and therefore, Barden and South Streets will be able to cope with the additional parking demand of the three displaced vehicles.

It is also important to note that this is based on the worst-case scenario where most residents are expected to park overnight or outside Bunnings trading hours. It is possible that some residents may park within Bunnings overnight.

Other Impacts

As the median island is built in the centre of the roadway, it will not require changes to accesses along Smith Street. Traffic exiting 1 Smith Street will still be able to turn right onto Smith Street northbound by mounting over the concrete median.

The island will also slow down cyclists riding along Smith Street as they need to divert around the island. However, the impact is minimal and the device is still 'bicycle-friendly'.

The treatment option may have an impact on the travel time of emergency service vehicles through the area. However, in consideration of the existing road environment along these local streets, any

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additional proposed LATM measures are not expected to have a significant impact to emergency service vehicle access.

9.2.5 Additional Measures to Options 1 & 2

In addition to the location specific treatment as part of Option 1 and 2, other measures are proposed along Smith Street between Princes Highway and South Street. Some of these measures will also aid in increased connectivity for cyclists along pedestrians and Smith Street.

Right Turn Only Sign

The "Right turn only" sign located opposite and facing Bunnings will enforce turn restrictions, preventing traffic exiting Bunnings from turning left onto Smith Street and using local streets.

Line Marking

Edge and centre line markings will be provided along Smith Street (partially under Option 1, full length under Option 2), in addition to proposed line marking as part of Bunnings development arrangement. It will also provide differentiation between the northern and southern sections of Smith Street. Recommended delineation alignments to tie in with the proposed treatments have also been provided in the concept drawings in **Appendix B**.

Bicycle Infrastructure

To provide off and on road bicycle transitions and connect the route on Smith Street to Princes Highway, the existing shared paths along Princes Highway will be extended on Smith Street, with kerb ramps and delineation. This aims to aid bicycles to transition to mixed traffic (bicycle and vehicles) along Smith Street away from the Princes Highway intersection. This will involve realignment and widening of the existing footpaths to allow one-way bicycle travel at minimum.

An angled bicycle ramp for southbound cyclists will be located on the eastern shared path, along with wayfinding and pavement markings to guide cyclists onto the road. Northbound cyclists will utilise the existing driveway of 48 Smith Street to access the extended shared path. Signage and marking will be used to guide cyclists to transition onto the shared path to travel along the existing Princes Highway shared paths.

On-road bicycle markings spaced evenly along Smith Street reaffirm that Smith Street is a mixed-traffic cycling route.

Widened Footpath

Option a

The non-shared path section of the western footpath will be widened to 2.5m width to provide improved pedestrian facility. This option is known as **Option 1a or 2a** in the concept plans. Kerbside parking will be retained and delineated by edge line marking. The delineation will also provide a road narrowing along Smith Street and assist in slowing down vehicles.

Option b

Alternatively, the kerbside parking may be replaced with a landscaped verge of 1.6m width to provide a form of screening between the widened footpath and the roadway. This option is known as **Option 1b or 2b** in the concept plans. The reduced roadway width will also assist in slowing down vehicles. However, this will result in the loss of 31 kerbside parking spaces on the western side of the road. Six (6) spaces will be retained for parking, resulting in a net loss of 25 spaces on the western side of the road, i.e. a total of 26 spaces on both sides.

As mentioned previously, Smith Street will have an estimated 5 and 14 vacant spaces remaining on Thursday and Saturday respectively, after spaces are removed for the Bunnings development. The removal of 26 spaces will result in the overflow of 21 and 12 spaces onto adjacent streets on Thursday and Saturday respectively. Barden and South Streets, with a total of 42 vacant spaces, will be able to absorb the overflow of parking from Smith Street.

A summary of the loss in parking on Smith Street for the different options is shown in .

Table 9.1: Loss of Smith Street Parking Spaces between Different Options

Option	Western side	Eastern side	Total spaces lost from Design	Spaces removed for Bunnings	Total spaces removed	Existing vacant spaces	Vacant spaces remaining[1]
Thursday							
Option 1a	1	1	**2**	13	**15**	18	**3**
Option 2a	7	1	**8**	13	**21**	18	**-3**
Option 1b	25	1	**26**	13	**39**	18	**-21**
Option 2b	25	1	**26**	13	**39**	18	**-21**
Saturday							
Option 1a	1	1	**2**	13	**15**	27	**12**
Option 2a	7	1	**8**	13	**21**	27	**6**
Option 1b	25	1	**26**	13	**39**	27	**-12**
Option 2b	25	1	**26**	13	**39**	27	**-12**

1. Negative vacant spaces indicates parking demand exceeds capacity, resulting in parking overflow

9.3 Holbeach Avenue

9.3.1 Issues

As discussed in previous sections, the issues present on Holbeach Avenue are:

- Holbeach Avenue has relatively high average daily traffic (ADT) volumes, up to 550 vehicles per day in each direction, compared to other local roads in the study area.
- Holbeach Avenue has relatively high 85th percentile speeds of up to 44 km/h per direction compared to other local roads.
- Based on crash history, five (5) crashes occurred along Holbeach Avenue between January 2014 and December 2018, all resulting in injuries.

9.3.2 Location of Treatment Options

Treatment options for Smith Street will be located between the accesses of 14 and 16 Holbeach Avenue. Placing treatment options mid-block on Holbeach Avenue breaks up the long straight section of the roadway, preventing drivers from speeding up along the road.

The existing streetlight outside 14 Holbeach Avenue will also provide visibility of the device at night.

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9.3.3 Option 1: Speed Cushions

This option involves a set of four (4) speed cushions of 100mm height across the roadway, along with associated signage.

Merits

It is generally uncomfortable for drivers of vehicles to travel over vertical deflections at high speeds. By providing speed cushions as vertical deflections, vehicles will slow down in order to safety travel over the speed cushions. Lower speeds will in turn increase travel time and may deter non-local traffic from utilising Holbeach Avenue as an alternative route.

Impacts to Parking

As speed cushions do not require changes in roadway geometry, there will also be no impacts to kerbside parking or driveway accesses. Vehicles can still park over the road hump.

Other Impacts

The low profile of speed cushions allows for buses and service vehicles to travel to the Tempe recreation area. Bicycles can also safely get over speed cushions after slowing down.

Noise generated from travelling over speed cushions is not an issue as the land use along Holbeach Avenue is non-residential in nature.

9.3.4 Option 2: Speed Cushions and Road Narrowing

This option is similar to option 1 in providing speed cushions. However, only a set of two (2) speed cushions of 100mm height will be provided across the roadway, with landscaped kerb blisters on each side of the road to provide narrowing of the roadway.

Merits

Similar to Option 1 for Smith Street, road narrowing will provide a narrow travel width and will likely be able to force traffic to slow down. Landscaping on the kerb blisters may also improve the aesthetics of the roadway and enhance sense of place. It may also provide clearer changes in road geometry for vehicles approaching the treatment.

Road narrowing will result in a loss of parking along Holbeach Avenue (see next section). However, the removal of parking may improve sightlines of vehicles turning out from the accesses onto Holbeach Avenue. It also improves manoeuvrability of these turns as there is a reduced likelihood of parked vehicles obstructing the access points of 14 and 16 Holbeach Avenue.

Impacts to Parking

Road narrowing will result in a loss of up to one (1) parking space on each side of the road, a total of two (2) spaces. While there are no parking surveys available for Holbeach Avenue, observations during site visit show that there are ample vacant on-street parking spaces along Holbeach Avenue during the daytime. It is very likely that the parking availability of Holbeach Avenue is able to cope with the loss of a mere two spaces.

Other Impacts

Impacts of speed cushions on traffic have been outlined in Option 1 and will not differ in Option 2.

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The kerb blisters will be built between 14 and 16 Holbeach Avenue. There are no property accesses on the western side at the same location. As such, there will be no impacts of the treatments on the accesses along Holbeach Street.

The treatment option (road narrowing) may have an impact on the travel time of emergency service vehicles through the area. However, in consideration of the existing road environment along these local streets, any additional proposed LATM measures are not expected to have a significant impact to emergency service vehicle access.

9.4 Stanley Street

9.4.1 Issues

As discussed in previous sections, the issues present on Stanley Street are:

- Stanley Street has relatively high 85th percentile speeds of up to 45 km/h per direction compared to other local roads, although these speeds are below the speed limit of 50 km/h.
- Stanley Street also has up to 13 heavy vehicles per direction daily, despite the 3 tonne truck load limit imposed.

9.4.2 Location of Treatment Options

Treatment options for Stanley Street will be located at two locations: outside 14 and 37 Stanley Street. The treatments to be installed at both locations will be the same.

Placing treatment options on two mid-block locations along Stanley Street breaks up the long straight section of the roadway, preventing drivers from speeding up along the road. The spacing between both locations are also consistent with spacing recommendations

Existing streetlights outside 13-15 Stanley Street and 37 Stanley Street will also provide visibility of the devices at night.

9.4.3 Option 1: Flat Top Road Hump

This option involves a 100mm high concrete flat top road hump across the roadway at each location. The hump will have a contrasting surface treatment, usually a 'terracotta' colour surface.

Merits

Similar to speed cushions, by providing flat top road humps as vertical deflections, vehicles will slow down in order to safety travel over the humps. Lower speeds will in turn increase travel time and may deter non-local traffic from utilising Stanley Street.

Flat top road humps are consistent with other LATM devices in the area, particularly along Edwin Street.

Impacts to Parking

As flat top road humps do not require changes in roadway geometry, there will also be no impacts to kerbside parking or driveway accesses. Vehicles can still park over the road hump.

Other Impacts

As Stanley Street is not a heavy vehicle or bus route, there will be no noise generated as a result of trucks or buses travelling over the road hump. Bicycles will still be able to safely get over speed cushions.

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9.4.4 Option 2: Road Narrowing

This option involves landscaped kerb blisters on each side of the road at each location.

Merits

Similar to road narrowing options proposed in other roads, road narrowing will provide a narrow travel width and will likely be able to force traffic to slow down. Lower speeds will in turn increase travel time and may deter non-local traffic from utilising Stanley Street.

Landscaping on the kerb blisters may also improve the aesthetics of the roadway and blend into the local landscape. It may also provide clearer changes in road geometry for vehicles approaching the treatment.

Road narrowing will result in a loss of parking along Stanley Street (see next section). However, the removal of parking may improve sightlines of vehicles turning out from the accesses onto Stanley Street. It also improves manoeuvrability of these turns as there is a reduced likelihood of parked vehicles obstructing nearby access points.

Kerb blisters are consistent with other LATM devices in the area, particularly along Union Street.

Impacts to Parking

Road narrowing will result in a loss of up to one (1) parking space on each side of the road at each of the two (2) locations, a total of four (4) spaces. While there are no parking surveys available for Stanley Street, observations made during a site visit show that there are ample vacant on-street parking spaces along Stanley Street during the daytime. It is very likely that the parking availability of Stanley Street is able to cope with the loss of four spaces.

Other Impacts

The kerb blisters will be built in between driveways of properties along Stanley Street. As such, there will be no impacts on the property access.

Road narrowing in general may slightly increase travel time of emergency service vehicles through the area due to reduced speed. However, considering the existing road environment along these local streets, any additional proposed LATM measures are not expected to have a significant impact on emergency service vehicle access.

9.5 Wentworth Street

9.5.1 Issues

As discussed in previous sections, the issues present on Wentworth Street are:

- Wentworth Street has up to 10 heavy vehicles per direction daily, despite the 3-tonne truck load limit imposed.
- A signage audit noted missing truck load limit signage when approaching Wentworth Street from Princes Highway.

9.5.2 Location of Treatment Options

Treatment options for Wentworth Street will be located at two locations: north of South Street (outside 5 Wentworth Street) and south of Princes Highway (outside 846-854 Princes Highway, south of the Tempe Tyre Centre access). The treatments to be installed at both locations will be the same.

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9.5.3 Option 1: Road Narrowing & Contrasting Threshold

This option involves landscaped kerb blisters on each side of the road at each location, and an at-grade embossed text pattern as contrasting pavement between the kerb blisters.

Merits

Similar to Option 1 for Smith Street, providing road narrowing will encourage traffic to slow down. Lower speeds will in turn increase travel time and may deter non-local traffic from utilising Stanley Street.

Landscaping on the kerb blisters may also improve the aesthetics of the roadway and enhance sense of place. It may also provide clearer changes in road geometry for vehicles approaching the treatment.

The contrasting pavement will highlight the local traffic area by providing a physical and visual gateway treatment to Wentworth Street. The differentiation of road environment may discourage vehicles from turning into Wentworth Street, particularly from South Street. Combined with road narrowing, the reduce geometry may also be less favourable to heavy vehicles and deter them from turning into Wentworth Street.

Road narrowing will result in a loss of parking along Wentworth Street. However, the removal of parking may improve sightlines for vehicles exiting driveways onto Wentworth Street. It also improves manoeuvrability of these turns as there is a reduced likelihood of obstruction from parked vehicles .

Impacts to Parking

Road narrowing will result in a loss of up to one (1) parking space on each side of the road at the location south of Princes Highway. There is no nominal loss of parking spaces at the location north of South Street as it is within 10 metres from a T-intersection, meaning it has an existing non-signposted No Stopping restriction. Therefore, a total of two (2) spaces will be lost.

While there are no parking surveys available for Wentworth Street, observations during site visit show that there are ample vacant on-street parking spaces along Wentworth Street during the daytime. It is very likely that the parking availability of Wentworth Street is able to cope with the loss of two spaces.

Other Impacts

At the location south of Princes Highway, the kerb blisters will be built between the property access of 846 Princes Highway and Tempe Tyre Centre access. At the location north of South Street, there are no property accesses adjacent to the device location. As such, there will be no impacts on the accesses along Wentworth Street.

Road narrowing in general may slightly increase travel time of emergency service vehicles through the area due to reduced speed. However, considering the existing road environment along these local streets, any additional proposed LATM measures are not expected to have a significant impact on emergency service vehicle access.

9.5.4 Option 2: Flat Top Road Hump

This option involves a 100mm high concrete flat top road hump across the roadway at each location. The road hump will have a contrasting surface treatment, usually a 'terracotta' colour surface.

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Merits

By providing flat top road humps as vertical deflections, vehicles will slow down in order to safety travel over the humps. Lower speeds will in turn increase travel time and may deter non-local traffic from utilising Wentworth Street.

Impacts to Parking

As flat top road humps do not require changes in roadway geometry, there will also be no impacts to kerbside parking or driveway accesses. Vehicles can still park over the road hump.

Other Impacts

As Wentworth Street is not a heavy vehicle or bus route, there will be no noise generated as a result of trucks or buses travelling over the road hump. Bicycles will still be able to safely get over the road humps.

9.5.5 Additional Measures to Options 1 & 2

In addition to Option 1 or 2, truck restriction (3t limit) is proposed at the northern end of Wentworth Street. The signage along Princes Highway will provide an early indication and warning of the truck restriction along Wentworth Street, while the signage along Wentworth Street south of the Tempe Tyre Centre access will enforce the truck load limit and reinforce the local road environment. The signage aims to reduce heavy vehicles accessing Wentworth Street from Princes Highway, with the exception of delivery vehicles accessing Tempe Tyre Centre.

9.6 Barden, Fanning, Hart and Station Streets

At-grade contrasting threshold pavements are proposed along Barden, Fanning, Hart and Station Streets just south of Princes Highway.

While there are no existing issues with these four roads, LATM measures should still be put in place to further deter non-local traffic from travelling along these local roads, particularly from Princes Highway.

It is understood that a 40 km/h Local Traffic Area, including the study area south of Princes Highway, is intended to be implemented in the future. This reduction in speed limit will be subject to a speed review study, potentially including further proposed traffic calming treatments. These treatments and the 40km/h Local Traffic Area will be subject to review and approval by Transport for NSW.

Merits

The contrasting pavement will highlight the local traffic area by providing a physical and visual gateway treatment to these local roads. The differentiation of road environment may be able to deter vehicles turning left from Princes Highway onto the local roads.

Impacts to Parking

As the threshold pavements require no physical change to the roadway geometry, there will be no impacts to parking. As the proposed locations are within 10 metres from T-intersections, there are already existing No Stopping restrictions at the locations in accordance with the Australian Road Rules.

Other Impacts

As the contrasting pavements do not involve any horizontal or vertical deflection of the roadway, there will be no impacts to property access, cyclists or emergency service vehicles.

9.7 Summary of Merits

The merits of each proposed treatment are summarised in Table 9.2. Deterring non-local traffic was a key objective in all proposed treatments.

Table 9.2: Merits of Proposed Treatments

Road	Option	Type	Rationale
Smith Street	1	Road Narrowing and Contrasting Pavement	▪ Historic non-preference for vertical deflection devices such as speed humps or cushions ▪ Kerb blisters slows traffic by providing a narrow travel width ▪ Can reduce travel width similar to neighbouring streets ▪ Highlights local traffic area by providing a physical and visual gateway treatment to the south section of Smith Street ▪ Differentiation of road environment may deter vehicles turning left from proposed Bunnings access Smith Street south ▪ Reduced geometry less favourable to heavy vehicles ▪ Breaks up long straight section of roadway ▪ Landscaped elements may enhance sense of place ▪ Removal of parking improves sightlines and manoeuvrability of traffic entering Smith Street ▪ No noise impacts to residences ▪ Bicycle friendly (with appropriate road markings)
	2	Mountable Concrete Median Treatment	▪ Historic non-preference for vertical deflection devices such as speed humps or cushions ▪ Highlights local traffic area by providing a physical and visual gateway treatment to the south section of Smith Street ▪ Differentiation of road environment may deter vehicles turning left from proposed Bunnings access Smith Street south ▪ Reduced geometry less favourable to heavy vehicles and slows traffic by diverting vehicles around the island ▪ Breaks up long straight section of roadway ▪ Removal of parking improves sightlines and manoeuvrability of traffic entering Smith Street ▪ No noise impacts to residences ▪ Bicycle friendly (with appropriate road markings) ▪ Low-profile allows right-turning trucks out of 1 Smith Street to mount over the median
		Right Turn Only Signage	▪ Right turn only" sign deters traffic exiting Bunnings from turning left onto Smith Street

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Road	Option	Type	Rationale
	Additional to both options	Line Marking	▪ Difference in line marking between the northern and southern sections of Smith Street provide differentiation of road environment between both sections ▪ Differentiation of road environment may deter vehicles turning left from proposed Bunnings access Smith Street south ▪ Recommended lane delineation alignments tie in with the proposed treatments ▪ Provides clear travel lanes for vehicles and cyclists, with sufficient clearance from parked vehicles and opposing traffic
		Bicycle Facilities	▪ Shared paths allow cyclists to ride between on-road cycling along Smith Street and the Princes Highway shared path without dismounting ▪ Bicycle ramps provide off and on-road bicycle transitions between the Smith Street roadway and the shared path ▪ On-road bicycle markings spaced evenly along Smith Street reaffirm that Smith Street is a mixed-traffic cycling route
		Widened Footpath	▪ Provide improved pedestrian facility ▪ Reduced roadway provides a road narrowing along Smith Street and assist in slowing down vehicles
		Optional Landscaped Verge (Option b)	▪ Provides form of screening from the roadway
Holbeach Avenue	1	Speed Cushions (x4)	▪ Slows vehicles down by providing vertical deflection which may be inconvenient to speeding vehicles ▪ Lower speeds increase travel time and may deter non-local traffic ▪ Allows for bus and service vehicle travel to Tempe recreation area ▪ Does not impact kerbside parking ▪ Minimises impact to driveway access ▪ No noise impacts to residences (industrial area) ▪ Located near street lighting for better visibility at night ▪ Spacing between intersections consistent with recommendations ▪ Bicycle friendly

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Road	Option	Type	Rationale
	2	Speed Cushions (x2) & Road Narrowing	▪ Slows vehicles down by providing vertical deflection which may be inconvenient to speeding vehicles ▪ Lower speeds increase travel time and may deter non-local traffic ▪ Provides further traffic calming by narrowing the available roadway ▪ Landscaped kerb blisters may enhance the local streetscape ▪ Provides physical and visual gateway to area ▪ No noise impacts to residences (industrial area) ▪ Located near street lighting for better visibility at night ▪ Spacing between intersections consistent with recommendations ▪ Bicycle friendly
Stanley Street	1	Flat Top Road Hump	▪ Breaks up long straight section of roadway ▪ Slows vehicles down by providing vertical deflection which may be inconvenient to speeding vehicles ▪ Lower speeds increase travel time and may deter non-local traffic ▪ Consistent with other LATM devices in the area ▪ Located near street lighting for better visibility at night ▪ Treatment spacing consistent with spacing recommendations ▪ Does not impact kerbside parking
	2	Road Narrowing	▪ Slows vehicles down by providing horizontal deflection ▪ Lower speeds increase travel time and may deter non-local traffic ▪ Kerb blisters break up long straight section of roadway ▪ Provides a permanent narrowing of roadway ▪ Landscaped features are visually more appealing and will allow the device to blend into the local streetscape ▪ Located near street lighting for better visibility at night ▪ Treatment spacing consistent with spacing recommendations ▪ Consistent with other LATM devices in the area
Wentworth Street	1	Road Narrowing & Contrasting Pavement	▪ May deter heavy vehicle traffic and slow vehicles down by reducing roadway widths and increasing roadway friction ▪ Lower speeds increase travel time and may deter non-local traffic ▪ Highlights local traffic area by providing a visual gateway treatment to the local roads ▪ Differentiation of road environment may deter vehicles from turning into Wentworth Street

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Road	Option	Type	Rationale
	2	Flat Top Road Hump	▪ Slows vehicles down by providing vertical deflection which may be inconvenient to speeding vehicles ▪ Lower speeds increase travel time and may deter non-local traffic ▪ Highlights local traffic area by providing a visual gateway treatment to the local roads ▪ Differentiation of road environment may deter vehicles turning into Wentworth Street
	Additional to both options	3 Tonne Truck Limit Signage	▪ Deter heavy vehicles from turning into Wentworth Street from Princes Highway, other than to access Tempe Tyre Centre
Barden, Fanning, Hart and Station Streets	-	Contrasting Pavement Threshold	▪ Highlights local traffic area by providing a visual gateway treatment to the local roads ▪ Differentiation of road environment may deter vehicles from turning into these local streets from Princes Highway ▪ Complements existing truck load limit signage

9.8 Summary of Impacts

The possible impacts on kerbside parking, property accesses and cyclists are summarised in Table 9.3.

Table 9.3: Impacts of Proposed Treatments

Road	Option	Type	Impacts to Parking & Access	Impacts to Cyclists
Smith Street	1	Road Narrowing and Contrasting Pavement	▪ Up to two (2) parking spaces removed on the western side and one (1) space on the eastern side Combined with the loss of 13 on-street parking as part of Bunnings development, a total of 16 on-street parking will be lost. Two (2) vacant spaces will still be available on Smith Street on an average Thursday. ▪ No impacts to 1 Smith Street access.	▪ Minimal impacts to cyclists on roadway

DRAFT

Road	Option	Type	Impacts to Parking & Access	Impacts to Cyclists
	2	Mountable Concrete Median Treatment	▪ Up to seven (7) parking spaces removed on the western side and one (1) space on the eastern side. Combined with the loss of 13 on-street parking as part of Bunnings development, a total of 21 on-street parking will be lost. On average Thursday, there will be a **shortage of three (3) spaces** and will result in a flow-on effect of residential parking onto other streets such as Barden Street or South Street. ▪ Right-turning vehicles exiting 1 Smith Street access may and will be allowed to mount over the low-profile median.	▪ Cyclists on roadway will have to slow down to divert around the median treatment
	Additional to both options	Right Turn Only Signage	▪ Vehicles exiting the Bunnings access must turn right	▪ No impact to cyclists
		Line Marking	▪ Minimal impacts	▪ Minimal negative impacts
		Bicycle Facilities	▪ Minimal impacts	▪ Minimal negative impacts
		Widened Footpath	▪ Footpath must be designed to allow access driveways and the roadway ▪ Minimal impacts to parking, as kerbside parking will be retained	▪ No impact to cyclists
		Optional Landscaped Verge (Option b)	▪ Removal of 25 parking spaces on the western side	▪ No impact to cyclists
Holbeach Avenue	1	Speed Cushions (x4)	▪ No impacts to parking, as vehicles are still able to park over speed cushions ▪ No impacts to property accesses.	▪ Minimal impacts to cyclists as they are expected to utilise the shared path adjacent to roadway
	2	Speed Cushions (x2) and Road Narrowing	▪ One (1) parking space removed on each side of the roadway, total two (2) ▪ No impacts to property accesses.	▪ Minimal impacts to cyclists as they are expected to utilise the shared path adjacent to roadway
Stanley Street	1	Flat Top Road Hump	▪ No impacts to parking, as vehicles are still able to park over flat top road humps ▪ No impacts to property accesses.	▪ Cyclists on roadway will have to slow down to safely get over the hump

DRAFT

Road	Option	Type	Impacts to Parking & Access	Impacts to Cyclists
	2	Road Narrowing	▪ For each location: one (1) parking space removed on each side of the roadway, total two (2) per location ▪ No impact to property accesses.	▪ Minimal impacts to cyclists on roadway
Wentworth Street	1	Road Narrowing & Contrasting Pavement	▪ For the location south of Princes Highway: one (1) parking space removed on each side of the roadway, total two (2) spaces ▪ No nominal loss of parking spaces for the location north of South Street, as it is located within 10 metres from a T-intersection, meaning it has an existing non-signposted No Stopping restriction ▪ Minimal impacts to property accesses, including vehicular access to Tempe Tyre Centre. May impact waste access to Tempe Tyre Centre.	▪ Minimal impacts to cyclists on roadway
	2	Flat Top Road Hump	▪ No impacts to parking, as vehicles are still able to park over flat top road humps ▪ No impacts to property accesses.	▪ Cyclists on roadway will have to slow down to safely get over the hump
	Additional to both options	3 Tonne Truck Limit Signage	▪ Any heavy vehicle accidentally turning into Wentworth Street will have to exit via Tempe Tyre Centre	▪ No impact to cyclists
Barden, Fanning, Hart and Station Streets	-	Contrasting Pavement Threshold	▪ No impacts to parking and access.	▪ No impact to cyclists

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10. INFRASTRUCTURE ITEMISATION

10.1 Methodology

Most of the concept designs of LATM treatments were designed against on-site conditions such as road width and geometry, with reference to Australian Standards and Austroads design guidelines. However, the contrasting pavement thresholds presented are typical designs which may be adapted in each treatment location.

The following general costing methodology was adopted:

- Treatments were itemised and broken down into their composite elements, such as reinforced concrete platforms, line marking, signs, and landscaping
- Previous LATM studies, benchmark infrastructure costs and pedestrian facility planning reports recently undertaken in NSW were consulted to estimate a baseline treatment unit cost
- A unit cost per treatment type was developed based on the itemisation and base line unit costs
- The total estimated cost was developed based on the quantity and unit cost of each treatment.

The assumptions and exclusions made as a part of our cost estimations are outlined in the sections below.

10.2 Relevant Guidelines

10.2.1 Australian Standards

AS1742 Manual of Uniform Traffic Control Devices was the primary reference consulted for this study for specifications on traffic calming devices, and relevant signage and line marking. Both *AS1742 Part 10: Pedestrian Control and Protection* and *AS1742 Part 13: Local Area Traffic Management were* consulted for the specifications, with the former relating to refuge and median islands, and wombat crossings, and the latter relating to thresholds and other humps.

The *Roads and Maritime Supplement to Australian Standard 1742 - Manual of Uniform Traffic Control Devices parts 1-15 (Version 2.4)* (known simply as *RMS supplement to AS1742*) was consulted for any Roads and Maritime (RMS) modification or practices that differ from AS1742. The supplement cross references a number of RMS (and its predecessor Roads and Traffic Authority) technical directions, which are listed in Section 10.2.4.

10.2.2 Austroads Guide to Traffic Management

Austroads Guide to Traffic Management Part 8 – Local Area Traffic Management was also consulted for recommended specifications on treatments not covered in AS1742 or the RMS supplement to AS1742.

The *RMS Austroads Guide Supplements – Austroads Guide to Traffic Management Part 8 – Local Area Traffic Management* (known simply as *RMS supplement to Austroads*) was consulted for any Roads and Maritime (RMS) modification or practices that differ from Austroads.

10.2.3 STA Bus Infrastructure Guidelines

The *State Transit Authority Bus Infrastructure Guidelines* outlines a number of infrastructure design aspects which must be taken into considering when implementing traffic calming treatments along bus routes. These are recommended to ensure a minimisation of impacts to bus operations.

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10.2.4 Transport for NSW Technical Directions and Guidelines

Transport for NSW (and its predecessors Roads and Maritime Services (RMS) and Roads and Traffic Authority (RTA)) delineation guidelines were also consulted for specification for zebra crossings and edge and centre line markings:

- *Roads and Traffic Authority Delineation Section 4 – Longitudinal Markings* was consulted for dimensions of edge and centre line markings.
- *Roads and Traffic Authority Delineation Section 7 – Transverse Lines Pedestrian Facilities* was consulted for dimensions of pedestrian (zebra) crossings.

10.3 Treatments

Each proposed treatment option was broken down into its key components, such as physical components and any required signage. Itemised components of the proposed standard treatments may include (but are not limited to):

- Concrete components (such as platforms, kerb blisters, refuge islands etc)
- Line marking or road surface marking
- Surfacing or surface colour treatment
- Signage
- Landscaping
- Civil works

Table 10.1 details the breakdown of each proposed treatment type.

These traffic calming devices are identified as being appropriate for the context of the zone and can assist in creating a safer local road environment.

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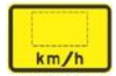
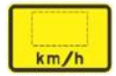
Table 10.1: Proposed Treatments

LATM Treatments	Description	Components	Signs and Posts
Road narrowing	Landscaped kerb blisters with low height shrubs	▪ Kerb blisters ▪ Treatment surfacing ▪ Civil works ▪ Landscaping	n/a
Contrasting pavement	At-grade contrasting pavement treatment (embossed text pattern)	▪ Contrasting pavement (at-grade) ▪ Treatment surfacing ▪ Civil works	n/a
Line marking	Edge, centre line and lane delineation marking	▪ Edge line marking ▪ Centre line marking ▪ Lane Delineation (L1 and C1)	n/a
Mountable concrete median	Mountable low-profile concrete median with contrasting pavement	▪ Low-profile median island ▪ Treatment surfacing ▪ Signage ▪ Civil works	n/a
Right Turn Only signage		▪ Signage ▪ Civil works	▪ 1 x R2-14_R  ▪ 1 x signpost

DRAFT

LATM Treatments	Description	Components	Signs and Posts
Speed cushions	100mm high speed cushions (either in set of 2 or set of 4)	▪ Speed cushions ▪ Signage ▪ Civil works	▪ 2 x W5-10  ▪ 2 x W8-2 (25 km/h)  ▪ 1 x signpost[1]
Flat top road hump	100mm high flat top road hump with contrasting surface treatment ('terracotta' colour surface of similar)	▪ Raised Hump ▪ Line marking ▪ Treatment surfacing ▪ Signage ▪ Civil works	▪ 2 x W5-10  ▪ 2 x W8-2 (25 km/h)  ▪ 1 x signpost[2]
Bicycle facilities	Shared path and Bicycle on-ramp	▪ Footpath demolition ▪ Shared path (new) ▪ Bicycle ramp ▪ Bicycle marking (bicycle symbols and arrows) ▪ Signage ▪ Civil works	▪ 5 x R8-2  ▪ 2 x R7-4  ▪ 3 x signposts

DRAFT

LATM Treatments	Description	Components	Signs and Posts
Widened footpath	Widened footpath of 2.5m width, with optional landscaped verge	▪ Footpath demolition ▪ Footpath (new) ▪ Treatment surfacing ▪ Civil works ▪ Landscaping (verge)	n/a
3 tonne truck limit signage	3 tonne truck limit signage	▪ Signage	▪ 2 x R6-10-2  ▪ 2 x R9-231 (3 tonne)  ▪ 1 x W8-245N_L  ▪ 1 x signpost[3]

Image Source: Transport for NSW

1. The speed cushion treatment will only be installed at Holbeach Avenue, using an existing streetlight pole and a new signpost instead of two signposts.

2.

- The flat top road hump treatment (Option 2) at Wentworth Street north of South Street will utilise an existing streetlight pole and a new signpost

- The flat top road hump treatment (Option 2) at Wentworth Street south of Princes Highway will utilise the signpost used for the 3 tonne truck limit signage, and a new signpost

- The flat top road hump treatment (Option 1) at Stanley Street (at each location) will utilise an existing streetlight pole and a new signpost instead of two signposts. In all cases, only one new signpost is needed.

3. The 3 tonne truck limit signage treatment will only be installed at Wentworth Street south of Princes Highway, using an existing streetlight pole and a new signpost instead of two signposts.

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11. COST ESTIMATION

11.1 Treatments

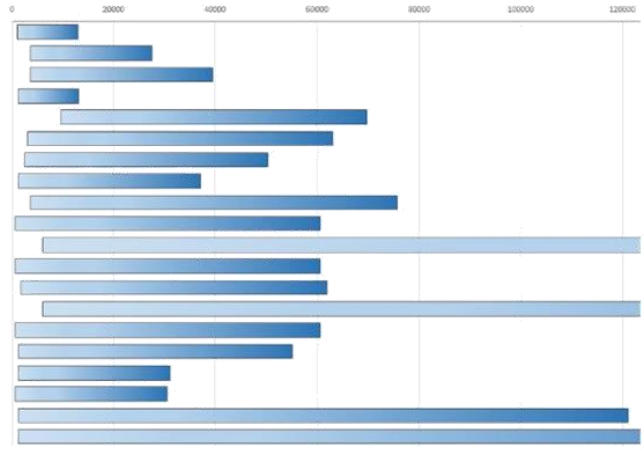
11.1.1 Cost Factors

The cost of implementing these treatments is highly dependent upon the contextual surroundings at each install site. Factors which can affect the costs include:

- Material selection
- Size of treatment
- Accommodation for drainage
- Street lighting
- Any kerb or gutter works
- Adjustments to any pits
- Any landscaping
- Requirement of street closures or traffic control
- Any other additional features, such as supplementary line marking or pedestrian fencing.

In developing cost estimates for the different types of treatments, *Austroads Guide to Traffic Management Part 8 (Local Area Traffic Management)* was consulted. The graph in Figure 11.1 shows the relative construction costs of LATM devices.

Local Area Traffic Management Device	Construction Cost (2015 AUD$)
Road humps (round profile)	1,000 - 12,000
Flat-topped road humps	3,600 - 24,000
Wombat crossing	3,600 - 36,000
Road cushions	1,200 - 12,000
Raised intersection pavements	9,600 - 60,000
Kerbside lane narrowings / kerb extensions - per 100 m	3,000 - 60,000
Slow points (angled or straight)	2,400 - 48,000
Blister islands	1,200 - 36,000
Driveway links - per 100 m	3,600 - 72,000
Median treatments - per 100 m	600 - 60,000
Roundabouts	6,000 - 480,000
Full road closure	600 - 60,000
Half / part / diagonal road closure	1,800 - 60,000
Modified "T" intersection	6,000 - 300,000
Pedestrian crossings	600 - 60,000
Perimeter threshold treatments	1,200 - 54,000
Tactile surface treatments - per 100 m	1,200 - 30,000
Bicycle lanes / bypasses - per 100 m	600 - 30,000
bus only links / bus bypasses - per 100 m	1,200 - 120,000
Shared zones - per 100 m	1,200 - 180,000



Source: Damen (2007) cited in Austroads Guide to Traffic Management Part 8

Figure 11.1: Relative LATM Device Costs

Council has provided average standard costs for various LATM treatments, signage, installation and marking, which is the main source used for cost estimation. The Independent Pricing and Regulatory Tribunal New South Wales (IPART NSW) report *Local Infrastructure Benchmark Costs* was also consulted for the cost estimates of some treatments.

The costs detailed in this report should be taken as indicative only. The final treatment costs will ultimately be subject to detailed design at each specific site location.

11.1.2 Treatment Signage

There is a minimum provision of signs required to be installed to accompany the specific treatments proposed, as previously detailed in Section 10.3. These primarily include warning signage associated with the treatments modifying road geometry, such as 'speed hump' warning signs. The provision of these signs is included within the treatment-specific signage costs.

The standard costs of signs were provided for 3 tonne load limit (two signs), speed hump and speed advisory signs, which is $83 per sign. The standard cost of a galvanised signpost is $105, and the cost of installing a signpost in concrete is $205.

11.1.2.1 Assumptions

The following assumptions were made for estimating treatment-associated signage costs:

- The cost of a single sign was estimated at $83
- All signposts are assumed to be installed in concrete. As such, the total cost for a signpost and its installation was assumed to be $310.
- Parking restriction signs (certain treatments like kerb blisters have specific restrictions on nearby on-street parking) have ***not*** been included, as their implementation will be specific to parking conditions at each location.

The minimum sign requirement for each type of treatment is presented in Table 11.1 below.

Table 11.1: Signage Costs per Treatment

LATM Treatment	No. of Signs (each)	No. of Posts (each)	Cost
Road narrowing	-	-	-
Contrasting pavement	-	-	-
Line marking	-	-	-
Mountable concrete median	-	-	-
Right Turn Only signage (Smith Street)	1	1	$393
Speed cushions	4	1	$642
Flat top road hump	4	1	$642
3 tonne truck limit Signage (Wentworth Street south of Princes Highway)	5	1	$725
Bicycle facilities (Smith Street)	7	3	$1511

It should be noted the values presented in Table 11.1 do not include labour and installation costs, other than the installation of signposts. The costs of the individual signs and posts are shown to be a relatively small component of the total treatment cost.

Depending on Council's sign inventory and the quality of replaced/removed signs, there may be opportunities to recycle use of old signs where appropriate. Due to their nature, these considerations are subject to detailed design and the actual installation process.

11.1.3 Item Unit Costs

The total unit cost of each component of the treatments identified in Table 10.1 have been estimated at the following costs in Table 11.2. It is important to note that these prices are indicative.

Table 11.2: Item Unit Cost

Item	Unit	Unit Cost ($)
Treatment (excludes treatment-specific signage)		
Kerb blister	Each	$5,000
Contrasting pavement (at-grade)	Each	$15,000
Mountable concrete median	Each	$10,000
Speed cushion	Each	$900
Flat top road hump	Each	$35,000
Footpath demolition	Per square metre	$55
New footpath or shared path	Per square metre	$120
Kerb and gutter	Per metre	$115
Bicycle ramp	Each	$5,000
Signage		
Right Turn Only signage at Smith Street	-	$393
Speed cushions signage	Per set of speed cushions	$642
Flat top road hump signage	Per flat top road hump	$642
Bicycle signage at Smith Street	-	$1511
3 tonne truck limit signage at Wentworth Street south of Princes Highway	-	$725
Marking		
Line marking of 100-150mm width (including edge and centreline)	Per metre	$6
Bicycle symbols	Per symbol	$62
Directional symbols (arrow)	Per symbol	$62

These estimates are based on the following assumptions:

- Estimates were prepared for a 'standard' treatment for typical conditions within the study area
  - Dimensions and specifications (other than width) are assumed to be the same for each treatment regardless of site and conditions
- Cost of the treatments exclude costs of treatment-specific signage (speed hump warning signs for flat top road humps etc.)
- Costs of treatment-specific and associated sign posts exclude associated parking restriction signs (see Section 11.1.2).
- Flat top road humps have the same cost as a raised pedestrian crossing, which has a cost of $35,000 based on Council's average standard costs
- Footpath widening or shared path construction includes a complete demolition of the old footpath and construction of a 100mm tall reinforced concrete footpath
- Landscaping and maintenance costs are not included

11.2 Landscaping

The provision of landscaped treatments allows for visually attractive devices with additional functionality. For example, landscaped kerb blisters deter pedestrians from using devices such as flat-top road humps as road crossing devices.

Landscaped treatments can contribute to a more positive community reception of new traffic calming devices. Residents may be inclined to more readily accept a device which contributes to the local streetscape aesthetic with landscaping reflective of the contextual surrounds. Conversely, there may be community backlash over an excessive implementation of devices perceived as intrusive and utilitarian due to the impact to local amenity.

An example of a landscaped versus non-landscaped kerb blister is displayed in Figure 11.2.

Figure 11.2: Kerb Blisters – Landscaping (left) and Standard (right)

However, providing landscaping on treatments requires additional costs, both capital costs for the installation process (soil infill, plant species, etc.) and on-going maintenance costs (watering, general upkeep of the plants, potential future replacements).

Austroads Guide to Traffic Management Part 8, citing City of Knox's Annual LATM Program Review (2002), suggests that the construction costs of an LATM can be reduced by 20-25% with the removal of landscaped features.

11.3 Maintenance

Maintenance costs are an additional consideration when installing treatments, dependent upon a number of factors including:

- Material choice: concrete treatments tend to have a longer life-span than those made out of asphalt or small unit pavers, therefore requiring less future maintenance costs
- Any supplementary elements to the treatment, including street furniture and accompanying warning signage is vulnerable to ongoing damage and potential vandalism
- Devices which require a horizontal deflection of the vehicle (chicane slow points, wide median splitter islands, etc.) may require further reinforcement works to the pavement to handle the side pressures exerted by the vehicle tyres
- Line marking and road symbols must be maintained and refreshed if their condition deteriorates, as efficiency and effectiveness is strongly linked to their visibility.

The high degree of variability in maintenance costs renders it difficult to estimate with a satisfactory degree of accuracy. Maintenance needs and costs will be monitored by Council following the installation of the treatments.

11.4 Estimated Total Treatment Costs

The estimated treatment cost for the entire study area is itemised in Table 11.3. This cost includes all treatment and sign costs identified in the earlier sections. Lengths measured for line marking treatments are approximate only.

Table 11.3: Treatment Unit Costs

Road	Option	Item	Unit Cost ($)	Quantity	Total ($)	Including 10% Contingency Cost & 10% Design Cost
Smith Street	Option 1a - Road Narrowing & Contrasting Pavement (including additional measures)	Kerb blisters	$5,000	2	$10,000	$12,000
		Contrasting pavement	$15,000	1	$15,000	$18,000
		Right Turn Only signage	$393	1	$393	$472
		Line marking	$6 / m	approx. 350m	$2,100	$2,520
		Shared path (western)	$120 / m^2	approx. 30m x 2m	$7,200	$8,640
		Shared path (eastern)	$120 / m^2	approx. 65m x 2.5m	$19,500	$23,400
		Bicycle ramp	$5,000	1	$5,000	$6,000
		Bicycle symbols and arrows	$62	11	$682	$818
		Footpath demolition	$55 / m^2	approx. 230m x 1.5m	$18,975	$22,770
		New footpath	$120 / m^2	approx. 200m x 2m	$48,000	$57,600
		Kerb and gutter	$115 / m	approx. 230m	$26,450	$31,740
		Total			**$153,300**	**$183,960**
	Option 1b - Road Narrowing & Contrasting Pavement (including additional measures)	Similar to Option 1a	$153,900	1	$153,300	$183,960
		Less one kerb blister	$5,000	*- 1*	*- $5,000*	*- $6,000*
		Less line marking (on western side)	$6 / m	*- 100 m*	*- $600*	*- $720*
		Verge landscaping	TBD	-	-	-
		Total			**$147,700 + verge landscaping**	**$177,240 + verge landscaping**

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Road	Option	Item	Unit Cost ($)	Quantity	Total ($)	Including 10% Contingency Cost & 10% Design Cost
Smith Street	Option 2a - Mountable Concrete Median Treatment (including additional measures)	Mountable concrete median	$10,000	1	$10,000	$12,000
		Right turn only signage	$393	1	$393	$472
		Line marking	$6 / m	approx. 500m	$3,000	$3,600
		Shared path (western)	$120 / m^2	approx. 30m x 2m	$7,200	$8,640
		Shared path (eastern)	$120 / m^2	approx. 65m x 2.5m	$19,500	$23,400
		Bicycle ramp	$5,000	1	$5,000	$6,000
		Bicycle symbols and arrows	$62	11	$682	$818
		Footpath demolition	$55 / m^2	approx. 230m x 1.5m	$18,975	$22,770
		New footpath	$120 / m^2	approx. 200m x 2m	$48,000	$57,600
		Kerb and gutter	$115 / m	approx. 230m	$26,450	$31,740
		Total			**$139,200**	**$167,040**
	Option 2b - Mountable Concrete Median Treatment (including additional measures)	Similar to Option 1a	$138,900	1	$139,200	$167,040
		Less line marking (on western side)	$6 / m	*- 140 m*	*- $840*	*- $1,008*
		Verge landscaping	TBD	-	-	-
		Total			**$138,360 + verge landscaping**	**$166,032 + verge landscaping**
Holbeach Avenue	Option 1 - Speed Cushions	Speed cushions	$900	4	$3,600	$4,320
		Speed cushion signage	$642	1 set	$642	$770
		Total			**$4,242**	**$4,666**
	Option 2 - Speed Cushions & Road Narrowing	Speed cushions	$900	2	$1,800	$4,320
		Kerb blister	$5,000	2	$10,000	$12,000
		Speed cushion signage	$642	1	$642	$770
		Total			**$14,242**	**$17,090**

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Road	Option	Item	Unit Cost ($)	Quantity	Total ($)	Including 10% Contingency Cost & 10% Design Cost
Stanley Street	Option 1 – Flat Top Road Hump	Flat top road humps	$35,000	2	$70,000	$84,000
		Flat top road hump signage	$642	2	$1,284	$1,541
		Total			**$71,284**	**$85,541**
	Option 2 – Road Narrowing	Kerb blisters	$5,000	4	$20,000	$24,000
		Total			**$20,000**	**$24,000**
Wentworth Street	Option 1 - Road narrowing & Contrasting Pavement (including additional measures)	Kerb blisters	$5,000	4	$20,000	$24,000
		Contrasting pavement	$15,000	2	$30,000	$36,000
		3 Tonne Truck Limit signage	$725	1 set	$725	$870
		Total			**$50,275**	**$60,870**
	Option 2 - Flat Top Road Hump (including additional measures)	Flat top road humps	$35,000	2	$70,000	$84,000
		Flat top road hump signage	$642	2	$1,284	$1,541
		3 Tonne Truck Limit signage	$725	1 set	$725	$870
		Total			**$72,009**	**$86,411**
Barden Street	Contrasting Pavement Threshold	Contrasting Pavement	$15,000	1	**$15,000**	**$18,000**
Fanning Street	Contrasting Pavement Threshold	Contrasting Pavement	$15,000	1	**$15,000**	**$18,000**
Hart Street	Contrasting Pavement Threshold	Contrasting Pavement	$15,000	1	**$15,000**	**$18,000**
Station Street	Contrasting Pavement Threshold	Contrasting Pavement	$15,000	1	**$15,000**	**$18,000**

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12. CONCLUSION

In order to manage the traffic impacts related to the proposed Bunnings Development at No. 728-750 Princes Highway, an LATM study was conducted on behalf of Inner West Council. The study area included a number of local streets within Tempe South adjoining the Princes Highway.

The study reviewed existing conditions on site and expected future traffic conditions within the local area and makes recommendation on appropriate LATM treatment options to be implemented along certain streets.

A summary of key processes undertaken and findings in this study is as follows:

- Background information and documents relating to the proposed Bunnings development were reviewed, providing information on future proposed traffic and road changes in the area
- Existing site conditions, surrounding land uses and road network information was reviewed
- A site inspection and audit was conducted, including identification of existing LATM devices, traffic signs, parking signs and restrictions, pedestrian and bicycle facilities, and refuse collection issues
- Traffic and parking surveys were conducted to capture the levels of traffic and parking demand within the study area. This included tube counts, parking occupancy surveys and intersection counts
- The survey of on-street parking on Smith Street showed that on average, there are 18 vacant spaces on Thursday and 27 vacant spaces on Saturday. After the removal of spaces due to the Bunnings development and the proposed LATM treatments Smith street parking is expected to be at capacity.
- The traffic survey data was analysed and identified streets requiring further LATM devices in order to:
  - Provide traffic calming and reduce vehicle speeds
  - Reduce general traffic volumes by deterring traffic
  - Reduce Heavy Vehicle volumes
  - Reduce crash risk
- A scoring system was developed to determine priority streets requiring LATM treatments
- A detailed selection criteria and list of suitable LATM measures were developed based on existing devices in the area and typical LATM devices presented in *Austroads Guide to Traffic Management Part 8 - Local Area Traffic Management*
- Two LATM Treatment options were presented for each priority street. These treatment options included:
  - Holbeach Avenue – Outside No. 14 and No 16 Holbeach Avenue
    - Option 1: *Speed Cushions*, set of four across roadway
    - Option 2: *Speed Cushions*, set of two with *Kerb Blisters*
  - Smith Street – Outside No. 28 Smith Street and south of proposed Bunnings Access
    - Option 1: Road Narrowing using *Kerb blisters* and *contrasting pavement marking*
    - Option 2: *Mountable Concrete Median* and associated *line marking*
    - Both options are to be supplemented by *Right Turn Only signage*, *edge line marking, bicycle ramp, and shared path* between Princes Highway and the LATM treatment, and *widened footpath* between Princes Highway and South Street. An optional *landscaped verge* may also be provided between the widened footpath and roadway, which will result in the removal of kerbside parking.
  - Stanley Street – Outside No. 14 and No. 35 Stanley Street
    - Option 1: *Flat Top Road Hump*
    - Option 2: Road narrowing using *Kerb Blisters*

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- Wentworth Street – South of Princes Highway and North of South Street
  - Option 1: Road narrowing using *Kerb Blisters* and *contrasting pavement marking*
  - Option 2: *Flat Top Road Hump*
  - Both options will include *3 Tonne Truck Limit signage* at Princes Highway and Wentworth Street to deter heavy vehicles from entering Wentworth Street
- Additionally, contrasting pavements were proposed for the entries of Barden, Fanning, Hart and Station Streets from Princes Highway.
- Each treatment was assessed for its merits and impacts to parking, property accesses, cyclists and emergency service vehicles.
- Concept designs of each treatment were developed
- The treatments proposed were itemised into their constituent parts, including signage and line marking
- The type and number of signs associated with each type of treatment were identified, along with the number of signposts required
- A baseline treatment unit cost was established, based on:
  - Previous experience
  - IPART Benchmark infrastructure costs
  - Austroads Guide to Traffic Management Part 8
  - A review of previous LATM studies and pedestrian facility planning reports for other studies in NSW
- A standard cost of signs (such as speed hump warning signs etc.) was included in the treatment unit cost
- Ancillary signs such as advance warning signs and parking restriction signs were not included in the treatment unit cost, as they are subject to the specific implementation site of each treatment
- Estimated costs for each option or measure, including contingency and design costs, range from **$18,000** to **$184,000**, with an at-grade contrasting pavement as the least cost option and treatment options along Smith Street resulting with the highest cost.

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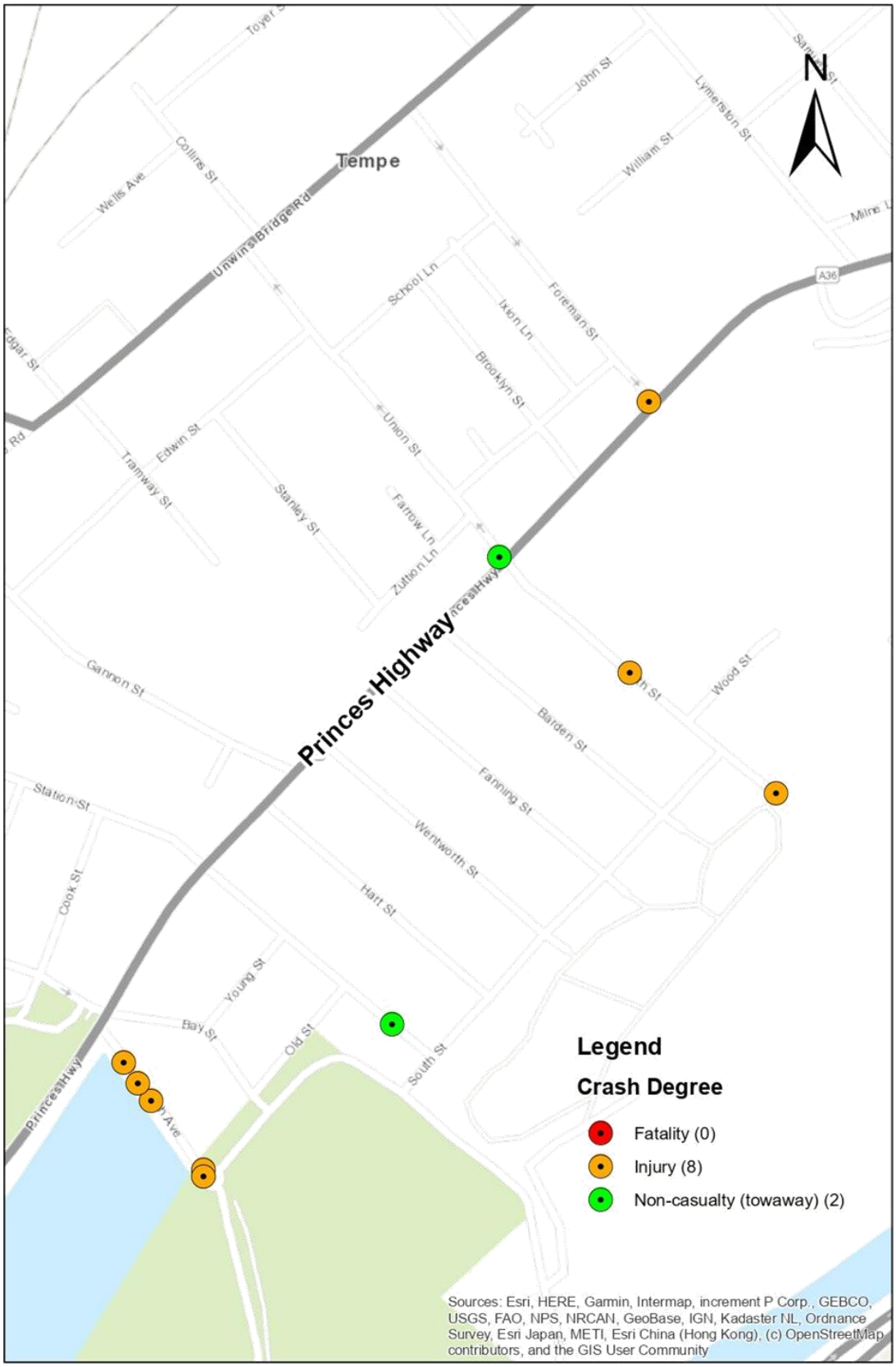
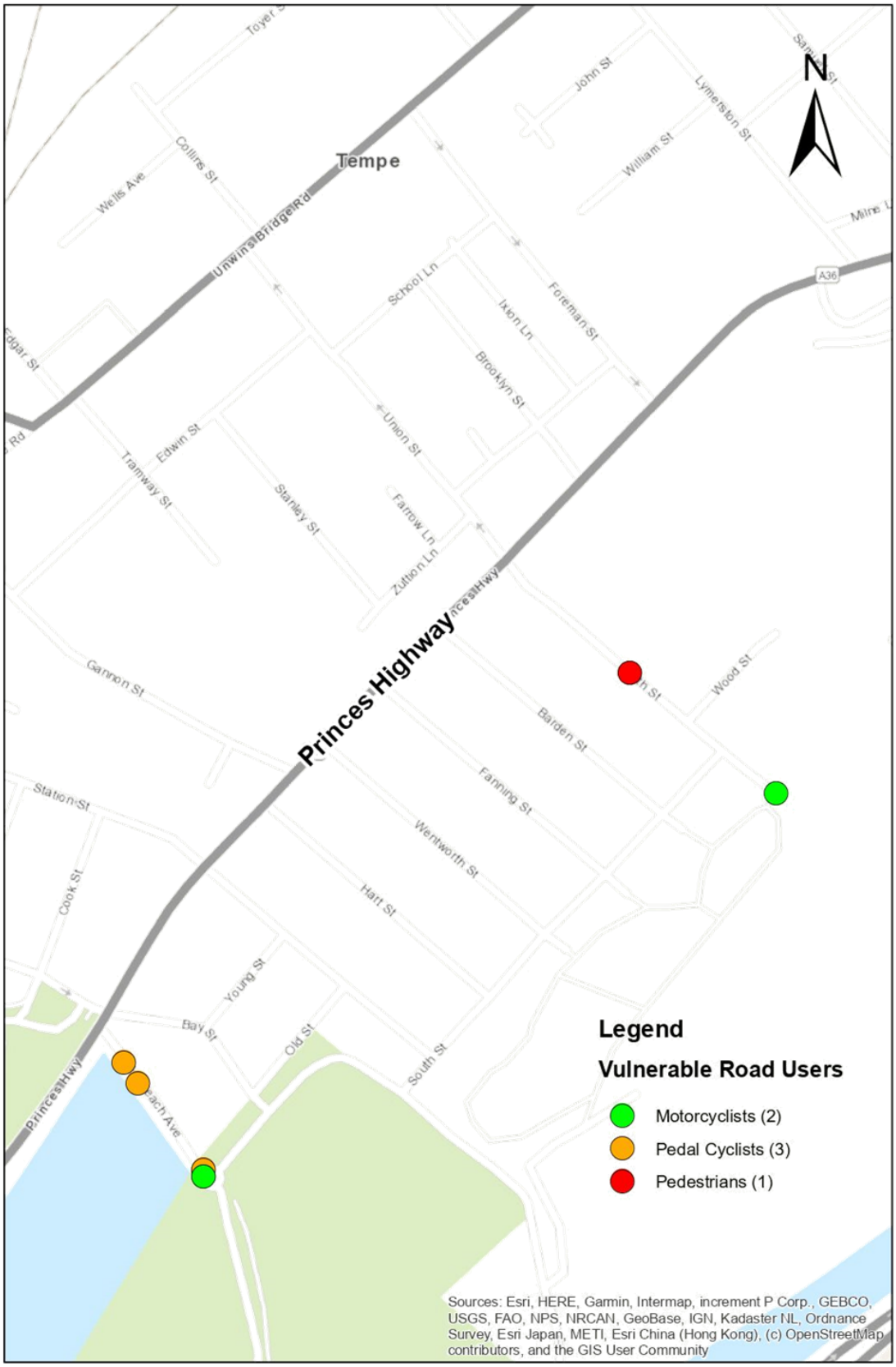
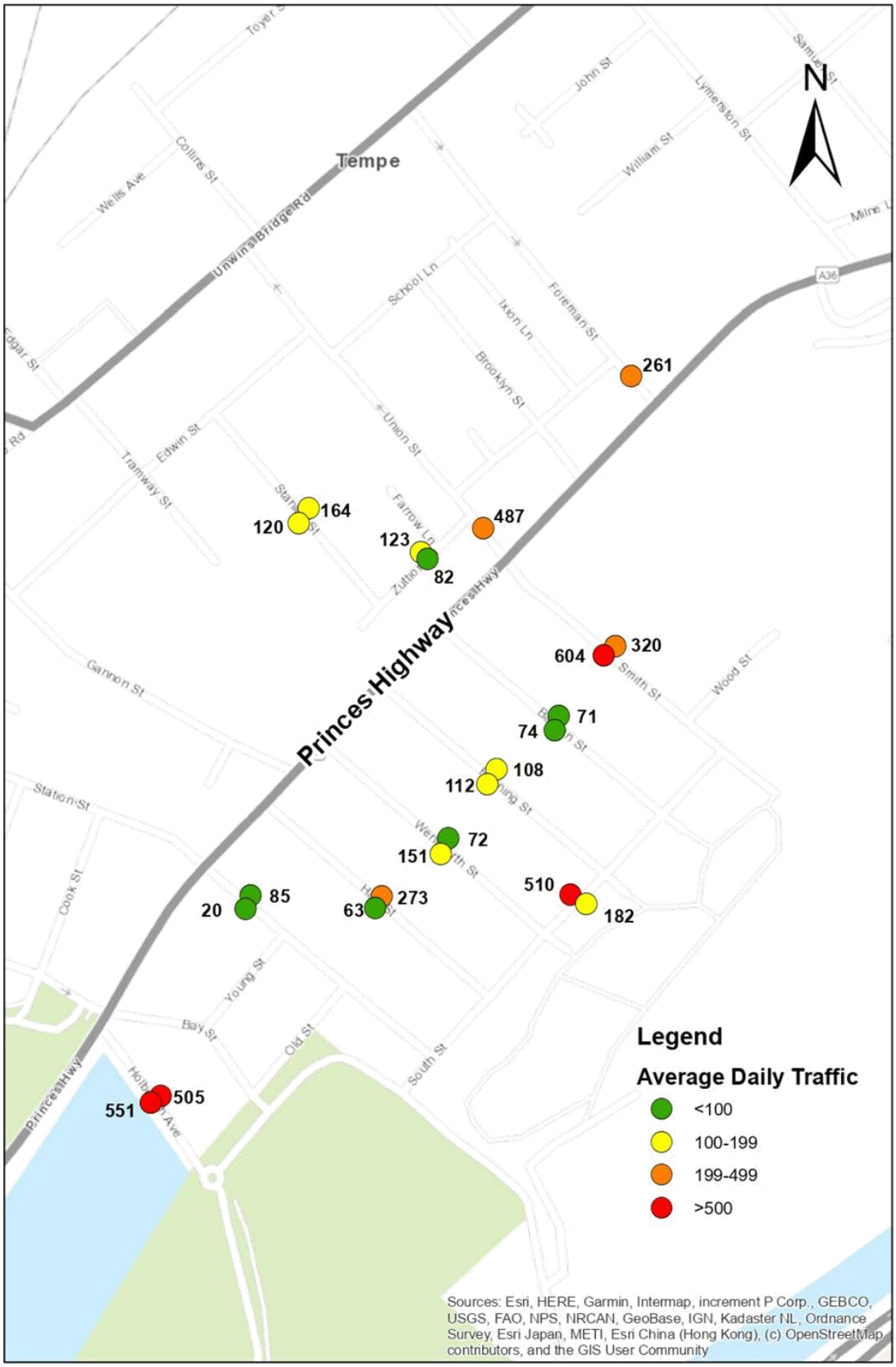
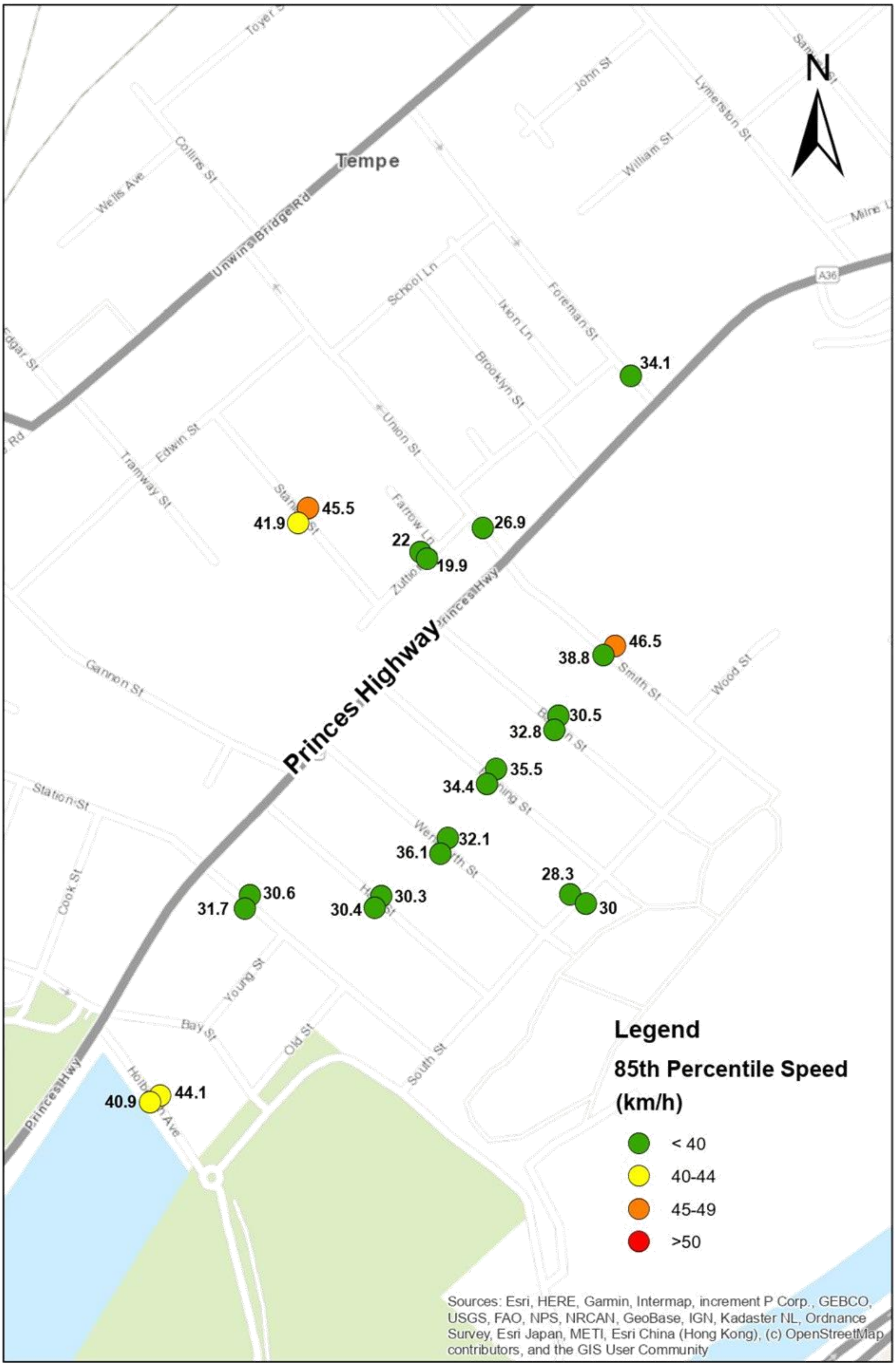
Appendix A: Crash Data Maps

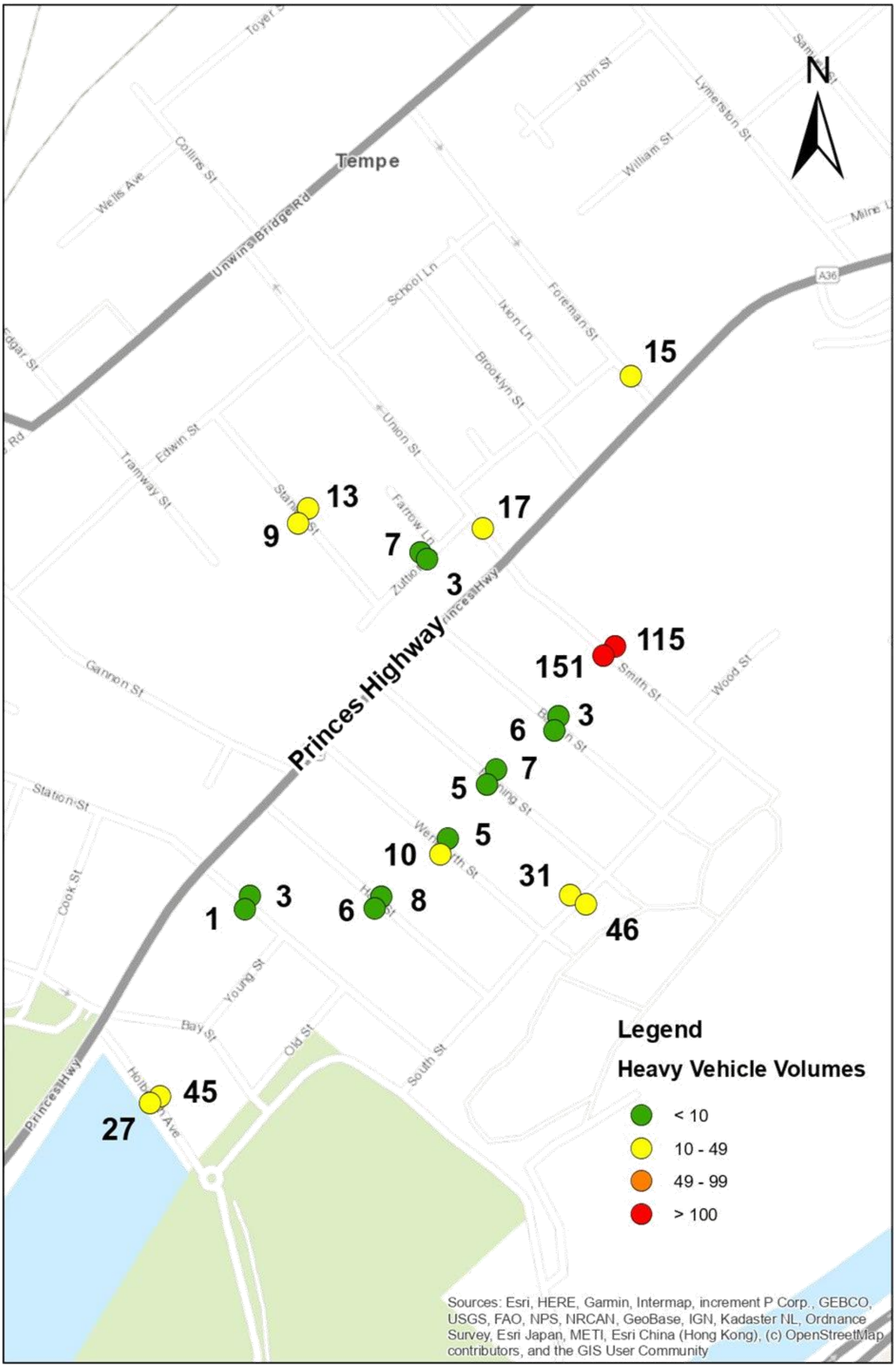

N
Tempe
Princes Highway
Unwins Bridge Rd
Wells Ave
Collins St
John St
Lyrnerston St
William St
School Ln
Ikon Ln
Foreman St
Brooklyn St
Union St
Edwin St
Tramway St
Stanley St
Farrow Ln
Zutton Ln
Gannon St
Barden St
Fanning St
Wentworth St
Station St
Cook St
Hart St
Young St
Bay St
Old St
South St
Wood St
A36
Legend
Crash Degree
Fatality (0)
Injury (8)
Non-casualty (towaway) (2)
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

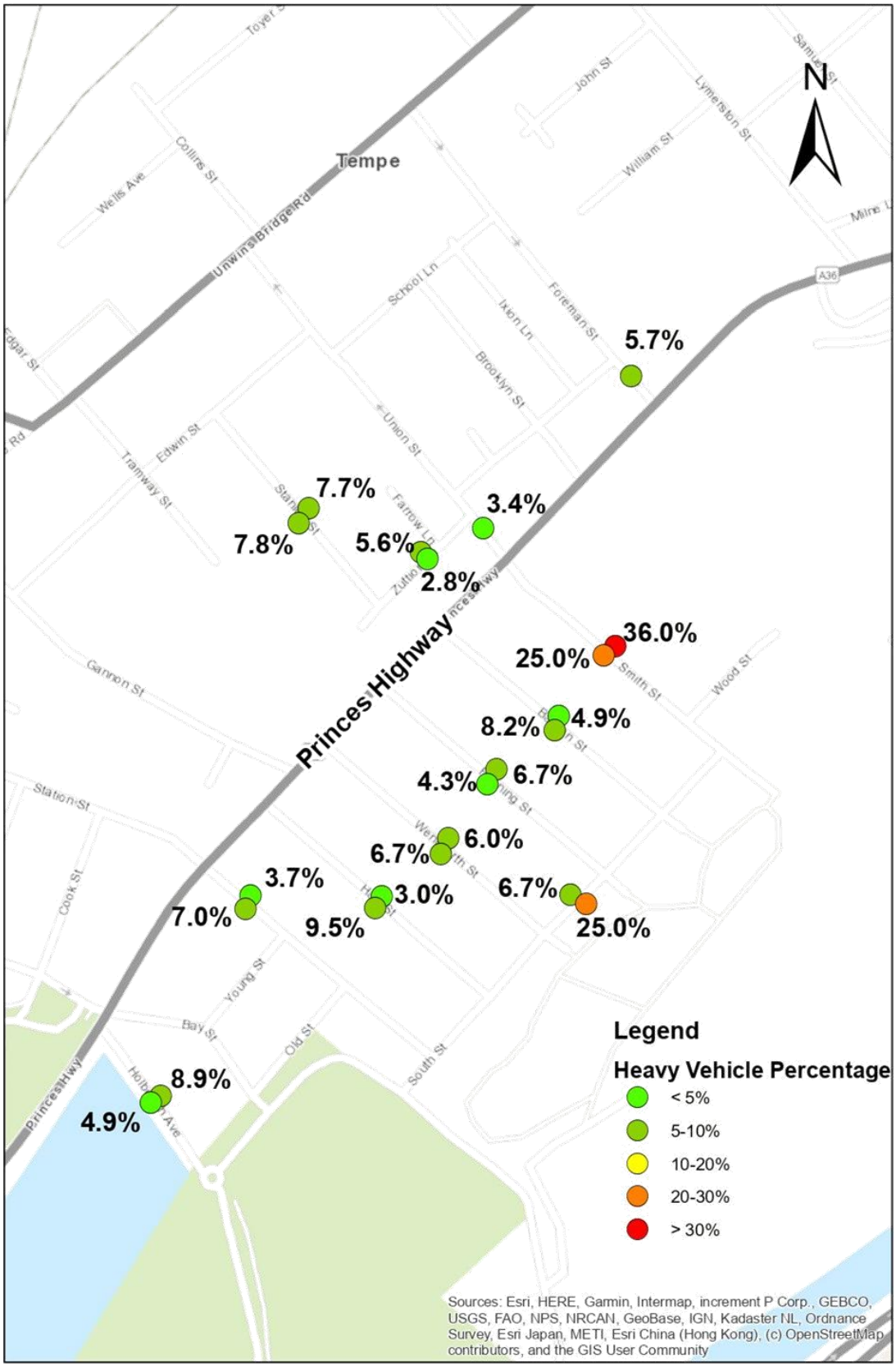

N
Tempe
Princes Highway
Unwins Bridge Rd
Wells Ave
Collins St
John St
Lyncraston St
William St
School Ln
Ixion Ln
Foreman St
Brooklyn St
Union St
Edwin St
Tramway St
Stanley St
Farrow Ln
Zutton Ln
Gannon St
Barden St
Fanning St
Wentworth St
Hart St
Station St
Cook St
Young St
Bay St
Old St
South St
Wood St
A36
Legend
Vulnerable Road Users
Motorcyclists (2)
Pedal Cyclists (3)
Pedestrians (1)
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Appendix B: Tube Count & Parking Data Maps


N
Tempe
Unwins Bridge Rd
Princes Highway
Wells Ave
Collins St
John St
Lyme Ston St
William St
School Ln
Ixion Ln
Foreman St
Brooklyn St
Union St
Edwin St
Tramway St
Farrow Ln
Gannon St
Smith St
Wood St
Station St
Cook St
Young St
Bay St
Old St
South St
261
164
120
487
123
82
320
604
71
74
108
112
72
151
85
20
273
63
510
182
505
551
Legend
Average Daily Traffic
<100
100-199
199-499
>500
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community


N
Tempe
Princes Highway
Princes Hwy
Unwins Bridge Rd
Toyer St
John St
Lymerston St
William St
Milne L
A36
Collins St
Wells Ave
School Ln
Ixion Ln
Foreman St
Brooklyn St
Edgar St
Union St
Edwin St
Tramway St
Farrow Ln
Gannon St
Smith St
Wood St
Station St
Cook St
Young St
Bay St
Old St
South St
34.1
45.5
41.9
22
19.9
26.9
46.5
38.8
30.5
32.8
35.5
34.4
32.1
36.1
28.3
30
30.6
31.7
30.3
30.4
44.1
40.9
Legend
85th Percentile Speed (km/h)
< 40
40-44
45-49
>50
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community


Tempe
Princes Highway
Unwins Bridge Rd
Collins St
Wells Ave
John St
Lymerston St
William St
Milne L
A36
School Ln
Ixion Ln
Foreman St
Brooklyn St
Union St
Edwin St
Tramway St
Farrow Ln
Edgar St
Gannon St
Smith St
Wood St
Station St
Cook St
Young St
Bay St
Old St
South St
Princes Hwy
N
15
13
9
17
7
3
115
151
3
6
7
5
5
10
31
46
3
1
6
8
45
27
Legend
Heavy Vehicle Volumes
< 10
10 - 49
49 - 99
> 100
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community


N
Tempe
Princes Highway
Unwins Bridge Rd
Wells Ave
Collins St
John St
Lyme Ston St
William St
School Ln
Ikon Ln
Foreman St
Brooklyn St
Union St
Tramway St
Edwin St
Farrow Ln
Gannon St
Smith St
Wood St
Station St
Cook St
Young St
Bay St
Old St
South St
Princes Hwy
A36
5.7%
7.7%
7.8%
3.4%
5.6%
2.8%
36.0%
25.0%
8.2%
4.9%
4.3%
6.7%
6.0%
6.7%
3.7%
7.0%
3.0%
9.5%
6.7%
25.0%
8.9%
4.9%
Legend
Heavy Vehicle Percentage
< 5%
5-10%
10-20%
20-30%
> 30%
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community


N
Tempe
Princes Highway
Unwins Bridge Rd
Wells Ave
Collins St
John St
Lymerston St
William St
School Ln
Ixion Ln
Foreman St
Brooklyn St
Edwin St
Tramway St
Stanley St
Farrow Ln
Zutton Ln
Gannon St
Station St
Cook St
Wentworth St
Hart St
Young St
Bay St
Old St
South St
Holbeach Ave
Wood St
A36
21%
88%
76%
60%
58%
67%
60%
63%
75%
49%
52%
86%
74%
50%
45%
38%
Legend
Thursday Average
Parking Occupancy (%)
< 50 %
50 - 69 %
70 - 89 %
> 89 %
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community


N
Tempe
Princes Highway
Unwins Bridge Rd
Princes Hwy
1%
62%
76%
56%
67%
65%
58%
50%
66%
53%
51%
88%
52%
14%
43%
49%
Collins St
Wells Ave
School Ln
Ixion Ln
Foreman St
Brooklyn St
Edgar St
Edwin St
Tramway St
Stanley St
Farrow Ln
Zutton Ln
Smith St
Wood St
Gannon St
Station St
Wentworth St
Hart St
Cook St
Young St
Bay St
Old St
South St
Holbeach Ave
John St
William St
Lymerston St
Milne L
A36
Legend
Saturday Average
Parking Occupancy (%)
< 50 %
50 - 69 %
70 - 89 %
> 89 %
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

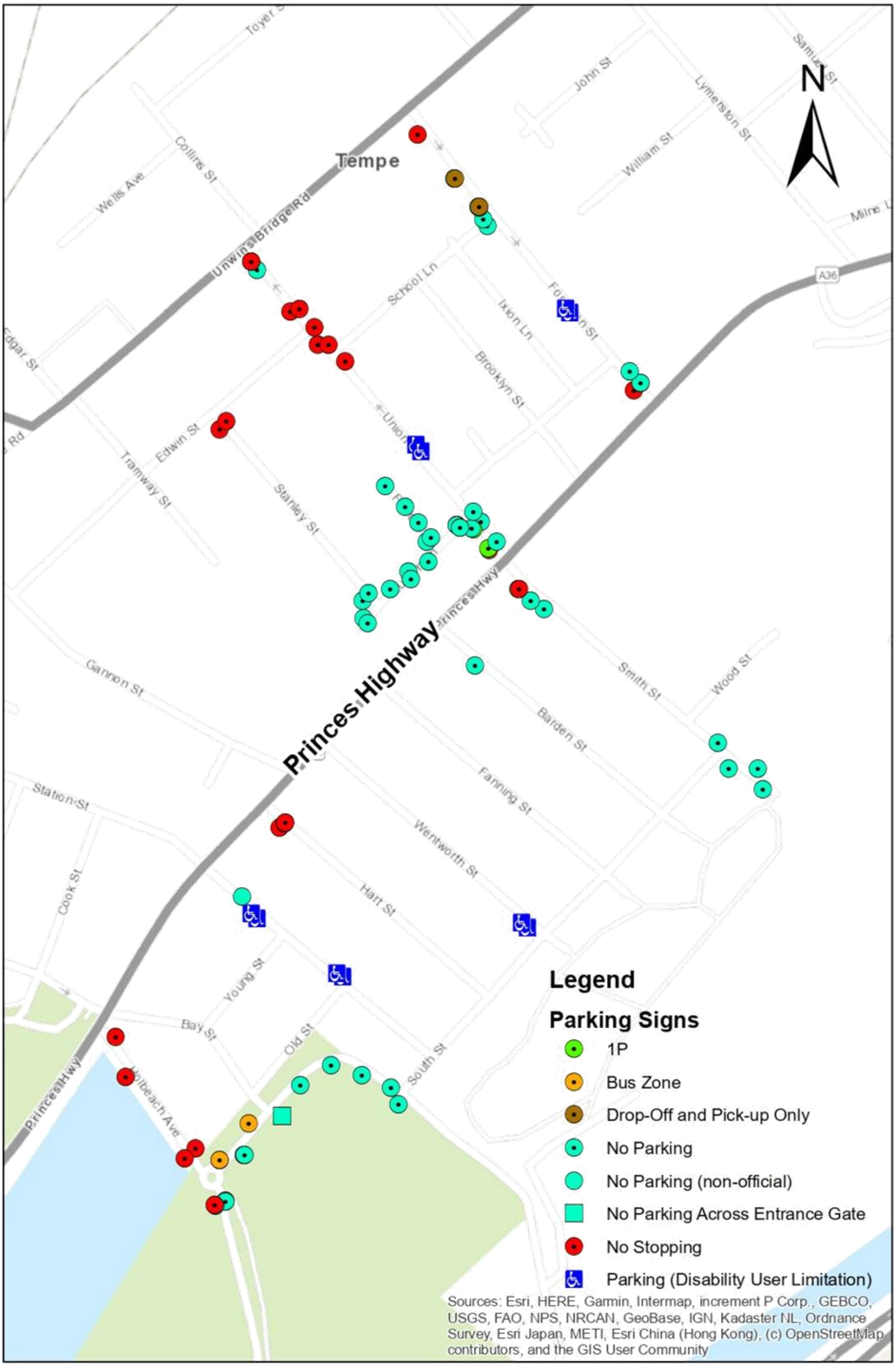
Appendix C: Site Audit Data and Maps

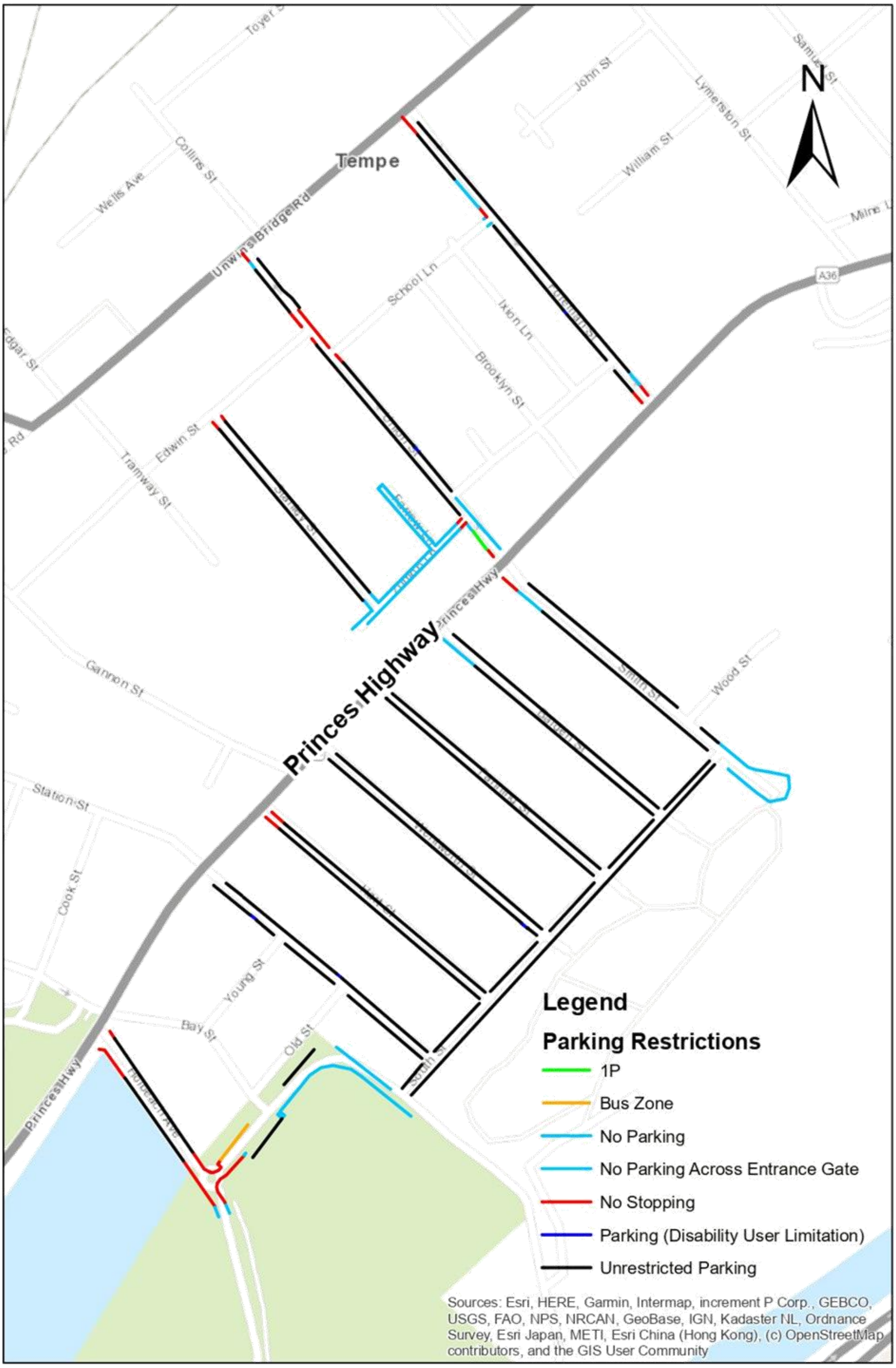
P4533 Tempe South LATM Study

Parking Signs - Site Audit

Number	Street	Direction of Traffic	Condition	Restrictions	Time_1	Day_1	Time_2	Day_2	Direction of Arrow	Obstruction	Sign Code	x	y	Other
001	Barden Street	Northbound	Faded	No Parking					Right		R5-40 (LR)	151.162	-33.9242	
001	Farrow Lane	Northbound	Good	No Parking					Both		R5-40 (LR)	151.162	-33.9233	
101	Farrow Lane	Northbound	Good	No Parking					Both		R5-40 (LR)	151.162	-33.9233	
102	Farrow Lane	Northbound	Good	No Parking					Both		R5-40 (LR)	151.162	-33.9231	
104	Farrow Lane	Southbound	Good	No Parking					Right		R5-40 (R)	151.161	-33.9229	
103	Farrow Lane	Northbound	Good	No Parking					Both		R5-40 (LR)	151.161	-33.923	
001	Foreman Street	Southbound	Good	No Stopping					Left		R5-400 (L)	151.164	-33.9221	
002	Foreman Street	Southbound	Good	No Stopping					Right		R5-400 (R)	151.164	-33.9221	
003	Foreman Street	Southbound	Good	No Parking					Left		R5-40 (L)	151.164	-33.9221	
004	Foreman Street	Southbound	Good	No Parking					Right		R5-40 (R)	151.164	-33.922	
005	Foreman Street	Southbound	Good	Parking (Disability User Limitation)					Right		R5-1-3 (R)	151.163	-33.9215	
006	Foreman Street	Southbound	Good	Parking (Disability User Limitation)					Left		R5-1-3 (L)	151.163	-33.9215	
008	Foreman Street	Southbound	Good	No Stopping					Left		R5-400 (L)	151.162	-33.9207	
009	Foreman Street	Southbound	Faded	No Parking	8am -930am	School Days	230pm - 4pm	School Days	Right		R5-41 (R)	151.162	-33.9207	
010	Foreman Street	Southbound	Good	Drop-Off and Pick-up Only								151.162	-33.9207	Tag Plate
011	Foreman Street	Southbound	Faded	No Parking	8am - 930am	School Days	230pm - 4pm	School Days	Left		R5-41 (L)	151.162	-33.9205	
012	Foreman Street	Southbound	Good	Drop-Off and Pick-up Only								151.162	-33.9205	Tag Plate
013	Foreman Street	Southbound	Good	No Stopping					Right		R5-400 (R)	151.162	-33.9202	
001	Hart Street	Northbound	Good	No Stopping					Right		R5-400 (R)	151.16	-33.9255	
002	Hart Street	Southbound	Good	No Stopping					Left		R5-400 (L)	151.16	-33.9254	
003	Hart Street	Southbound	Good	No Stopping					Left		R5-400 (L)	151.16	-33.9254	Sign on wall
001	Holbeach Avenue	Southbound	Good	No Stopping					Left		R5-400 (L)	151.159	-33.927	
002	Holbeach Avenue	Southbound	Good	No Stopping					Left		R5-400 (L)	151.16	-33.9283	
003	Holbeach Avenue	Southbound	Good	No Parking					Right		R5-40 (R)	151.16	-33.9283	
004	Holbeach Avenue	Northbound	Good	No Parking					Left		R5-40 (L)	151.16	-33.9283	
005	Holbeach Avenue	Northbound	Good	No Stopping					Right		R5-400 (R)	151.16	-33.9283	
006	Holbeach Avenue	Southbound	Damaged	No Stopping					Right		R5-400 (R)	151.16	-33.9279	Signpost fallen
007	Holbeach Avenue	Northbound	Good	No Stopping					Left		R5-400 (L)	151.159	-33.928	
008	Holbeach Avenue	Northbound	Good	No Stopping					Right		R5-400 (R)	151.159	-33.9274	
019	Holbeach Avenue	Northbound	Good	No Parking					Both		R5-40 (LR)	151.161	-33.9276	
009	Holbeach Avenue	Eastbound	Good	No Stopping					Left		R5-400 (L)	151.16	-33.928	
010	Holbeach Avenue	Eastbound	Good	Bus Zone					Right		R5-20	151.16	-33.928	
011	Holbeach Avenue	Eastbound	Good	Bus Zone					Left		R5-20	151.16	-33.9277	
012	Holbeach Avenue	Westbound	Good	No Stopping					Right		R5-400 (R)	151.16	-33.9279	
013	Holbeach Avenue	Westbound	Good	No Parking					Left		R5-40 (L)	151.16	-33.9279	
014	Holbeach Avenue	Eastbound	Vandalised/Graffitied	No Parking Across Entrance Gate							Custom	151.16	-33.9276	Located on Entrance Gate, No Arrows
015	Holbeach Avenue	Eastbound	Good	No Parking					Both		R5-40 (LR)	151.161	-33.9274	
016	Holbeach Avenue	Westbound	Good	No Parking					Both		R5-40 (LR)	151.161	-33.9273	
017	Holbeach Avenue	Westbound	Good	No Parking					Both		R5-40 (LR)	151.161	-33.9273	
018	Holbeach Avenue	Southbound	Good	No Parking					Both		R5-40 (LR)	151.161	-33.9274	
001	School Lane	Westbound	Good	No Parking					Left		R5-40 (L)	151.162	-33.9209	
002	School Lane	Eastbound	Good	No Parking					Right		R5-40 (R)	151.162	-33.9208	
001	Smith Street	Northbound	Good	No Parking					Left		R5-40 (L)	151.164	-33.925	
002	Smith Street	Northbound	Vandalised/Graffitied	No Parking					Both		R5-40 (LR)	151.165	-33.9252	
003	Smith Street	Southbound	Good	No Parking					Both		R5-40 (LR)	151.165	-33.925	
004	Smith Street	Southbound	Good	No Parking					Right		R5-40 (R)	151.164	-33.9248	
005	Smith Street	Northbound	Faded	No Parking					Right	Tree	R5-40 (R)	151.163	-33.9238	
007	Smith Street	Northbound	Faded	No Parking					Both		R5-40 (LR)	151.163	-33.9237	
008	Smith Street	Northbound	Faded	No Parking					Left		R5-40 (L)	151.162	-33.9236	
009	Smith Street	Northbound	Good	No Stopping					Right		R5-400 (R)	151.163	-33.9236	
001	Stanley Street	Northbound	Good	No Parking					Left		R5-40 (L)	151.161	-33.9237	
002	Stanley Street	Northbound	Good	No Stopping					Right		R5-400 (R)	151.16	-33.9224	
003	Stanley Street	Southbound	Good	No Stopping					Left		R5-400 (L)	151.16	-33.9224	
004	Stanley Street	Southbound	Vandalised/Graffitied	No Parking					Right		R5-40 (R)	151.161	-33.9237	
001	Station Street	Southbound	Good	Parking (Disability User Limitation)					Left		R5-1-3 (L)	151.161	-33.9266	
002	Station Street	Southbound	Good	Parking (Disability User Limitation)					Right		R5-1-3 (R)	151.161	-33.9266	
003	Station Street	Northbound	Good	Parking (Disability User Limitation)					Right		R5-1-3 (R)	151.16	-33.9261	
004	Station Street	Northbound	Good	Parking (Disability User Limitation)					Left		R5-1-3 (L)	151.16	-33.9261	
005	Station Street	Southbound	Good	No Parking (non-official)							Not an official si	151.16	-33.926	Resident Parking Only Keep Driveway Clear
001	Union Street	Northbound	Vandalised/Graffitied	No Stopping					Left		R5-400 (L)	151.162	-33.9233	
002	Union Street	Northbound	Good	1P	830am - 6pm	Mon-Fri	830am - 1230pm	Sat	Right		R5-1-1 (R)	151.162	-33.9233	
003	Union Street	Northbound	Good	No Parking					Both		R5-40 (LR)	151.162	-33.9233	
004	Union Street	Northbound	Vandalised/Graffitied	No Parking					Both		R5-40 (LR)	151.162	-33.9231	
005	Union Street	Northbound	Good	1P	830am - 6pm	Mon-Fri	830am - 1230pm	Sat	Left		R5-1-1 (L)	151.162	-33.9232	
006	Union Street	Northbound	Faded	No Parking					Right		R5-40 (R)	151.162	-33.9232	
007	Union Street	Northbound	Damaged	No Parking					Both		R5-40 (LR)	151.162	-33.9231	
008	Union Street	Northbound	Faded	No Stopping					Right		R5-400 (R)	151.161	-33.9218	
009	Union Street	Northbound	Good	No Stopping					Left		R5-400 (L)	151.16	-33.9215	
010	Union Street	Northbound	Good	No Parking					Right		R5-40 (R)	151.16	-33.9212	
011	Union Street	Northbound	Good	No Parking					Left		R5-40 (L)	151.16	-33.9212	
012	Union Street	Northbound	Good	No Stopping					Right		R5-400 (R)	151.16	-33.9212	
013	Union Street	Northbound	Good	No Stopping					Right		R5-400 (R)	151.161	-33.9215	

Number	Street	Direction of Traffic	Condition	Restrictions	Time_1	Day_1	Time_2	Day_2	Direction of Arrow	Obstruction	Sign Code	x	y	Other
014	Union Street	Northbound	Good	No Stopping					Both		R5-400 (LR)	151.161	-33.9217	
016	Union Street	Northbound	Good	No Stopping					Left		R5-400 (L)	151.161	-33.9219	
015	Union Street	Northbound	Good	No Stopping					Both		R5-400 (LR)	151.161	-33.9218	
017	Union Street	Northbound	Good	Parking (Disability User Limitation)					Right		R5-1-3 (R)	151.162	-33.9225	
018	Union Street	Northbound	Faded	Parking (Disability User Limitation)					Left		R5-1-3 (L)	151.162	-33.9226	
001	Wentworth Street	Northbound	Good	Parking (Disability User Limitation)					Right		R5-1-3 (R)	151.163	-33.9262	
002	Wentworth Street	Northbound	Good	Parking (Disability User Limitation)					Left		R5-1-3 (L)	151.163	-33.9262	
001	Zuttion Lane	Eastbound	Good	No Stopping					Right		R5-400 (R)	151.162	-33.9232	
002	Zuttion Lane	Eastbound	Good	No Parking					Left		R5-40 (L)	151.162	-33.9232	
003	Zuttion Lane	Westbound	Faded	No Stopping					Left		R5-400 (L)	151.162	-33.9232	
004	Zuttion Lane	Westbound	Faded	No Parking					Right		R5-40 (R)	151.162	-33.9232	
005	Zuttion Lane	Westbound	Faded	No Parking					Both		R5-40 (LR)	151.162	-33.9234	
006	Zuttion Lane	Eastbound	Good	No Parking					Both		R5-40 (LR)	151.161	-33.9235	
007	Zuttion Lane	Westbound	Good	No Parking					Both		R5-40 (LR)	151.162	-33.9236	
008	Zuttion Lane	Eastbound	Good	No Parking					Both		R5-40 (LR)	151.161	-33.9236	
009	Zuttion Lane	Eastbound	Good	No Parking					Both		R5-40 (LR)	151.161	-33.9239	
010	Zuttion Lane	Westbound	Good	No Parking					Left		R5-40 (L)	151.161	-33.9239	Sign on wall


N
Tempe
Princes Highway
Unwins Bridge Rd
Princes Hwy
Legend
Parking Signs
1P
Bus Zone
Drop-Off and Pick-up Only
No Parking
No Parking (non-official)
No Parking Across Entrance Gate
No Stopping
Parking (Disability User Limitation)
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community


N
Tempe
Unwins Bridge Rd
Wells Ave
Collins St
John St
William St
Lymerston St
School Ln
Ixion Ln
Brooklyn St
Edgar St
Edwin St
Tramway St
A36
Princes Hwy
Princes Highway
Gannon St
Smith St
Wood St
Station St
Cook St
Young St
Bay St
Old St
Princes Hwy
Legend
Parking Restrictions
1P
Bus Zone
No Parking
No Parking Across Entrance Gate
No Stopping
Parking (Disability User Limitation)
Unrestricted Parking
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

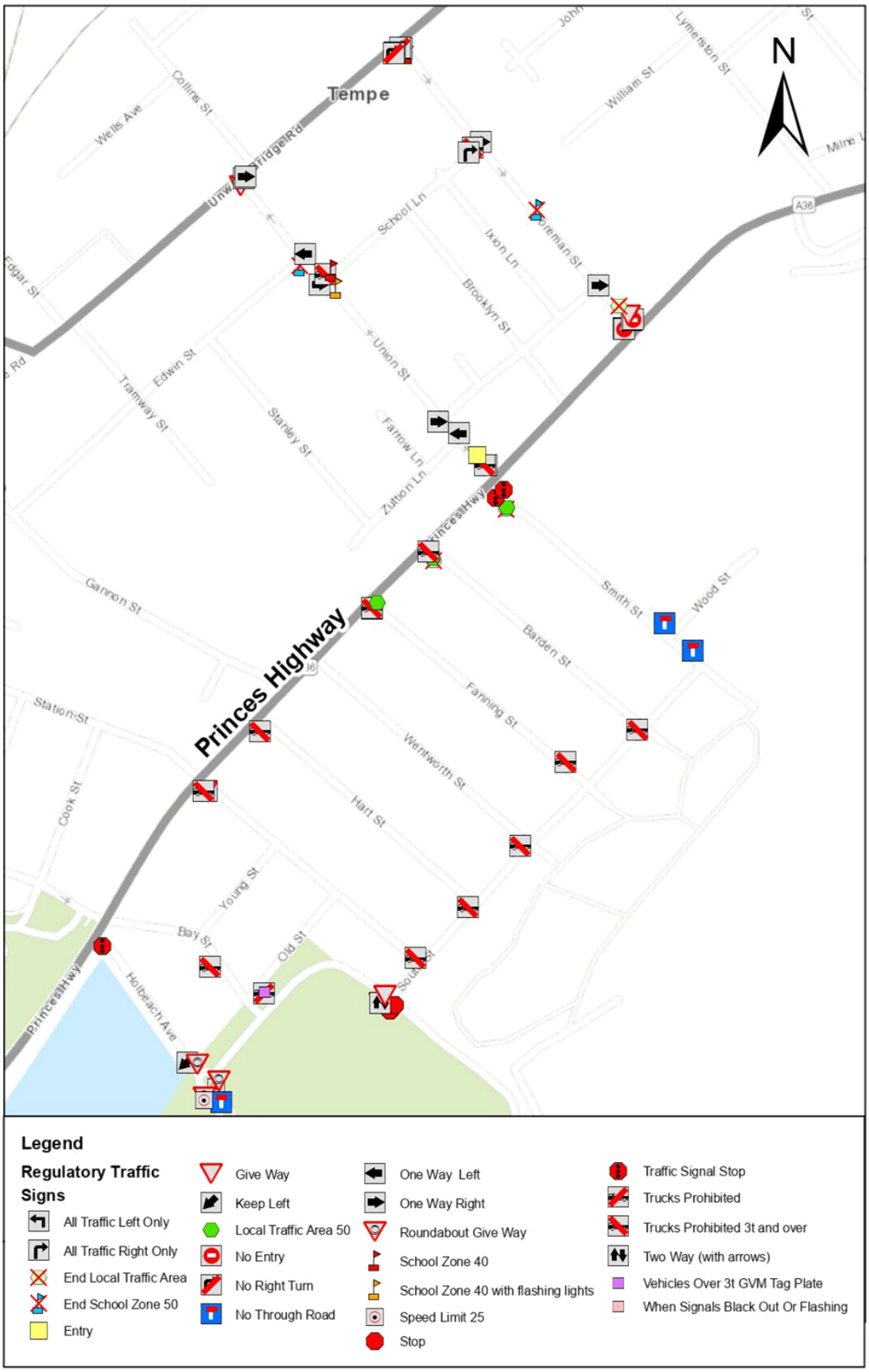
P4533 Tempe South LATM Study

Traffic Signs - Site Audit

Street	Sign	Direction	Condition	Obstruction	Code	x	y	Comments
Barden Street	Trucks Prohibited 3t and over	Northbound	Good		R6-222	151.164	-33.925	
Barden Street	End Local Traffic Area	Northbound	Vandalised/Graffitied		R4-241	151.162	-33.924	
Barden Street	Local Traffic Area 50	Southbound	Vandalised/Graffitied		R4-240 (50 km/h)	151.162	-33.924	
Barden Street	Trucks Prohibited 3t and over	Southbound	Vandalised/Graffitied		R6-222	151.162	-33.924	
Bay Street	Trucks Prohibited 3t and over	Northbound	Good		R6-222	151.160	-33.927	
Brooklyn Lane	One Way Right	Eastbound	Faded		R2-2 (R)	151.163	-33.922	At Foreman Street
Brooklyn Lane	One Way Right	Westbound	Vandalised/Graffitied		R2-2 (R)	151.162	-33.923	At Union Street
Edwin Street	Speed Hump	Eastbound	Good		W5-10	151.160	-33.922	
Edwin Street	15 km/h Tag Plate	Eastbound	Vandalised/Graffitied		W8-2	151.160	-33.922	
Edwin Street	Speed Hump Ahead	Westbound	Good		W3-4	151.161	-33.922	
Edwin Street	End School Zone 50	Westbound	Good		R4-231	151.161	-33.922	
Edwin Street	One Way Left	Eastbound	Good		R2-2 (L)	151.161	-33.922	At Union Street
Edwin Street	Pedestrian Crossing Left	Eastbound	Good		W6-2-1	151.161	-33.922	
Fanning Street	Trucks Prohibited 3t and over	Northbound	Good		R6-222	151.163	-33.926	
Fanning Street	All Traffic Left Only	Northbound	Good		R2-14	151.161	-33.924	
Fanning Street	Trucks Prohibited 3t and over	Southbound	Good		R6-222	151.161	-33.924	
Fanning Street	Local Traffic Area 50	Southbound	Faded		R4-240 (50 km/h)	151.161	-33.924	
Foreman Street	No Entry	Northbound	Good		R2-4n	151.164	-33.922	
Foreman Street	No Entry	Northbound	Good		R2-4n	151.164	-33.922	
Foreman Street	Give Way	Southbound	Good		R1-2	151.164	-33.922	
Foreman Street	Hazard Warning Marker	Southbound	Vandalised/Graffitied		T5-5	151.164	-33.922	
Foreman Street	Hazard Warning Marker	Southbound	Vandalised/Graffitied		T5-5	151.164	-33.922	
Foreman Street	End Local Traffic Area	Southbound	Good		R4-241	151.164	-33.922	
Foreman Street	Speed Hump	Southbound	Good		W5-10	151.163	-33.922	
Foreman Street	15 km/h Tag Plate	Southbound	Good		W8-2	151.163	-33.922	
Foreman Street	End School Zone 50	Southbound	Good		R4-231	151.163	-33.921	Sign facing perpendicular to road
Foreman Street	Speed Hump	Southbound	Faded		W5-10	151.163	-33.921	
Foreman Street	15 km/h Tag Plate	Southbound	Faded		W8-2	151.163	-33.921	
Foreman Street	Speed Hump	Southbound	Good		W5-10	151.162	-33.920	
Foreman Street	15 km/h Tag Plate	Southbound	Good		W8-2	151.162	-33.920	Sign loose/slanted
Foreman Street	Speed Hump Ahead	Southbound	Damaged		W3-4	151.162	-33.920	
Foreman Street	School Zone 40	Southbound	Good		R4-230	151.162	-33.920	Signpost bent
Foreman Street	Speed Hump	Southbound	Good		W5-10	151.162	-33.920	
Foreman Street	25 km/h Tag Plate	Southbound	Good		W8-2	151.162	-33.920	
Foreman Street	Speed Hump	Southbound	Good		W5-10	151.161	-33.920	
Foreman Street	25 km/h Tag Plate	Southbound	Good		W8-2	151.161	-33.920	
Foreman Street	Trucks Prohibited 3t and over	Southbound	Good		R6-222	151.161	-33.920	
Hart Street	Trucks Prohibited 3t and over	Southbound	Damaged		R6-222	151.160	-33.925	
Hart Street	Trucks Prohibited 3t and over	Northbound	Good		R6-222	151.162	-33.927	
Holbeach Avenue	Roundabout Warning	Southbound	Good		W2-7	151.159	-33.927	
Holbeach Avenue	Pedestrian Warning	Southbound	Good		W6-1	151.159	-33.927	Pairs with "Refuse Island" Tag Plate
Holbeach Avenue	Refuge Island Tag Plate	Southbound	Good		W8-211	151.159	-33.928	Pairs with "Pedestrian" Warning Symbol Sign
Holbeach Avenue	Keep Left	Southbound	Good		R2-3	151.160	-33.928	On Pedestrian Refuge
Holbeach Avenue	Roundabout Give Way	Southbound	Good		R1-13	151.160	-33.928	
Holbeach Avenue	Speed Limit 25	Southbound	Good		R4-1	151.160	-33.928	
Holbeach Avenue	Roundabout Give Way	Northbound	Good		R1-13	151.160	-33.928	
Holbeach Avenue	No Through Road	Southbound	Good		G9-18	151.160	-33.928	
Holbeach Avenue	Hazard Warning Marker	Northbound	Vandalised/Graffitied		T5-5	151.160	-33.928	
Holbeach Avenue	Speed Limit 25	Southbound	Good	Tree	R4-1	151.160	-33.928	
Holbeach Avenue	Traffic Signal Stop	Northbound	Good		R1-4n	151.159	-33.927	
Holbeach Avenue	Stop	Northbound	Good		R1-1	151.161	-33.928	
Holbeach Avenue	Stop	Northbound	Good		R1-1	151.161	-33.928	
Holbeach Avenue	Roundabout Give Way	Westbound	Good		R1-13	151.160	-33.928	
Holbeach Avenue	Roundabout Warning	Westbound	Good		W2-7	151.161	-33.927	
Holbeach Avenue	Give Way	Southbound	Faded		R1-2	151.161	-33.928	
Holbeach Avenue	Two Way (with arrows)	Northbound	Good		R2-223	151.161	-33.928	
Holbeach Avenue	Give Way	Southbound	Good		R1-2	151.161	-33.927	Signpost slanted

Street	Sign	Direction	Condition	Obstruction	Code	x	y	Comments
Old Street	Trucks Prohibited	Eastbound	Good		R6-10-2	151.160	-33.927	Pairs with "Vehicles over 3t GVM" Sign
Old Street	Vehicles Over 3t GVM Tag Plate	Eastbound	Good	"Trucks Prohibited" Sign	R9-221	151.160	-33.927	Pairs with "Trucks Prohibited" Sign
Princes Highway	One Way Left	Eastbound	Faded		R2-2 (L)	151.162	-33.923	At Union Street
Princes Highway	One Way Left	Westbound	Good		R2-2 (L)	151.164	-33.922	At Foreman Street
Princes Highway	One Way Right	Eastbound	Vandalised/Graffitied		R2-2 (R)	151.164	-33.922	At Foreman Street
School Lane	One Way Right	Westbound	Good		R2-2 (R)	151.161	-33.922	At Union Street, signpost slanted
School Lane	One Way Right	Eastbound	Good		R2-2 (R)	151.162	-33.921	At Foreman Street
School Lane	Trucks Prohibited 3t and over	Westbound	Good		R6-222	151.162	-33.921	
School Lane	School Zone 40	Westbound	Faded		R4-230	151.162	-33.921	
School Lane	All Traffic Right Only	Eastbound	Vandalised/Graffitied		R2-14	151.162	-33.921	
School Lane	Trucks Prohibited 3t and over	Eastbound	Good		R6-222	151.161	-33.922	
School Lane	School Zone 40	Eastbound	Good	Obstructed by trees	R4-230	151.161	-33.922	
Smith Street	No Through Road	Southbound	Good		G9-18	151.164	-33.925	
Smith Street	End Local Traffic Area	Northbound	Good		R4-241	151.163	-33.924	
Smith Street	Local Traffic Area 50	Southbound	Vandalised/Graffitied		R4-240 (50 km/h)	151.163	-33.924	
Smith Street	Traffic Signal Stop	Northbound	Good		R1-4n	151.162	-33.924	
Smith Street	Traffic Signal Stop	Northbound	Good		R1-4n	151.162	-33.923	Pairs with "When Signals Black Out Or Flashing" Sign
Smith Street	When Signals Black Out Or Flashing Tag Plate	Northbound	Good		R9-201	151.162	-33.923	Pairs with Traffic Signal Stop Sign
South Street	Speed Hump Ahead	Eastbound	Good		W3-4	151.161	-33.927	
South Street	10 km/h Tag Plate	Eastbound	Good		W8-2	151.162	-33.927	Attached high up on an electric pole
South Street	Speed Hump	Westbound	Good		W5-10	151.162	-33.927	
South Street	15 km/h Tag Plate	Westbound	Good		W8-2	151.162	-33.927	
South Street	Speed Hump Ahead	Eastbound	Good		W3-4	151.162	-33.926	
South Street	Speed Hump	Eastbound	Good		W5-10	151.163	-33.926	
South Street	15 km/h Tag Plate	Eastbound	Good		W8-2	151.163	-33.926	
South Street	Speed Hump	Westbound	Good	Tree	W5-10	151.163	-33.926	
South Street	15 km/h Tag Plate	Westbound	Good	Tree	W8-2	151.163	-33.926	
South Street	Speed Hump	Eastbound	Faded		W5-10	151.164	-33.925	
South Street	15 km/h Tag Plate	Eastbound	Faded		W8-2	151.164	-33.925	
South Street	Speed Hump	Westbound	Faded		W5-10	151.164	-33.925	Also slightly bent
South Street	15 km/h Tag Plate	Westbound	Faded		W8-2	151.164	-33.925	
South Street	Speed Hump Ahead	Westbound	Vandalised/Graffitied		W3-4	151.164	-33.925	
Station Street	Trucks Prohibited 3t and over	Northbound	Faded		R6-222	151.162	-33.927	
Station Street	All Traffic Left Only	Northbound	Good		R2-14	151.160	-33.926	
Station Street	Give Way	Northbound	Damaged	All Traffic Left Only' sign	R1-2	151.160	-33.926	
Station Street	Trucks Prohibited 3t and over	Southbound	Vandalised/Graffitied		R6-222	151.160	-33.926	

Street	Sign	Direction	Condition	Obstruction	Code	x	y	Comments
Union Street	Trucks Prohibited 3t and over	Northbound	Good		R6-222	151.162	-33.923	
Union Street	Entry	Northbound	Vandalised/Graffitied		Custom	151.162	-33.923	Into Private Property (No. 669 Princes Highway), Sign on wall
Union Street	Speed Hump	Northbound	Good	Tree	W5-10	151.162	-33.923	
Union Street	15 km/h Tag Plate	Northbound	Faded		W8-2	151.162	-33.923	
Union Street	Children Crossing	Northbound	Damaged		W6-3	151.162	-33.923	Pairs with "School" Warning Sign
Union Street	School Tag Plate	Northbound	Damaged		W8-14	151.162	-33.923	Pairs with "Children Crossing" Symbol Sign
Union Street	Pedestrian Crossing Ahead	Northbound	Good		W6-2	151.161	-33.922	
Union Street	Pedestrian Crossing Ahead	Northbound	Good		W6-2	151.161	-33.922	
Union Street	Speed Hump Ahead	Northbound	Good		W3-4	151.161	-33.922	
Union Street	Hazard Warning Marker	Northbound	Good		T5-5	151.161	-33.922	
Union Street	Hazard Warning Marker	Northbound	Vandalised/Graffitied		T5-5	151.161	-33.922	
Union Street	Speed Hump	Northbound	Good		W5-10	151.161	-33.922	
Union Street	25 km/h Tag Plate	Northbound	Good		W8-2	151.161	-33.922	
Union Street	Pedestrian Crossing	Southbound	Good		R3-1	151.161	-33.922	Facing the wrong way (facing north)
Union Street	Hazard Warning Marker	Northbound	Good		T5-5	151.160	-33.921	
Union Street	Speed Hump	Northbound	Good		W5-10	151.160	-33.921	
Union Street	Pedestrian Warning	Northbound	Good		W6-1	151.160	-33.921	
Union Street	10 km/h Tag Plate	Northbound	Good		W8-2	151.160	-33.921	
Union Street	Give Way	Northbound	Good		R1-2	151.160	-33.921	
Union Street	Hazard Warning Marker	Northbound	Good		T5-5	151.160	-33.921	
Union Street	Speed Hump	Northbound	Good		W5-10	151.160	-33.921	
Union Street	Pedestrian Warning	Northbound	Good		W6-1	151.160	-33.921	
Union Street	10 km/h Tag Plate	Northbound	Good		W8-2	151.160	-33.921	
Union Street	Pedestrian Crossing	Northbound	Good		R3-1	151.161	-33.922	
Union Street	Speed Hump	Northbound	Good		W5-10	151.161	-33.922	
Union Street	25 km/h Tag Plate	Northbound	Vandalised/Graffitied		W8-2	151.161	-33.922	
Union Street	Hazard Warning Marker	Northbound	Good		T5-5	151.161	-33.922	
Union Street	School Zone 40 with flashing lights	Northbound	Good		R4-230-1	151.161	-33.922	
Unwins Bridge Road	One Way Left	Eastbound	Good		R2-2 (L)	151.160	-33.921	At Union Street
Unwins Bridge Road	One Way Right	Westbound	Faded		R2-2 (R)	151.160	-33.921	At Union Street
Unwins Bridge Road	One Way Right	Eastbound	Good		R2-2 (R)	151.162	-33.920	At Foreman Street
Unwins Bridge Road	No Right Turn	Eastbound	Good		R2-6	151.162	-33.920	
Unwins Bridge Road	One Way Left	Westbound	Good		R2-2 (L)	151.161	-33.920	At Foreman Street
Unwins Bridge Road	No Right Turn	Eastbound	Good		R2-6	151.161	-33.920	
Wentworth Street	Trucks Prohibited 3t and over	Northbound	Faded		R6-222	151.163	-33.926	
Wood Street	No Through Road	Eastbound	Good		G9-18	151.164	-33.925	
Zuttion Lane	One Way Left	Eastbound	Good		R2-2 (L)	151.162	-33.923	At Union Street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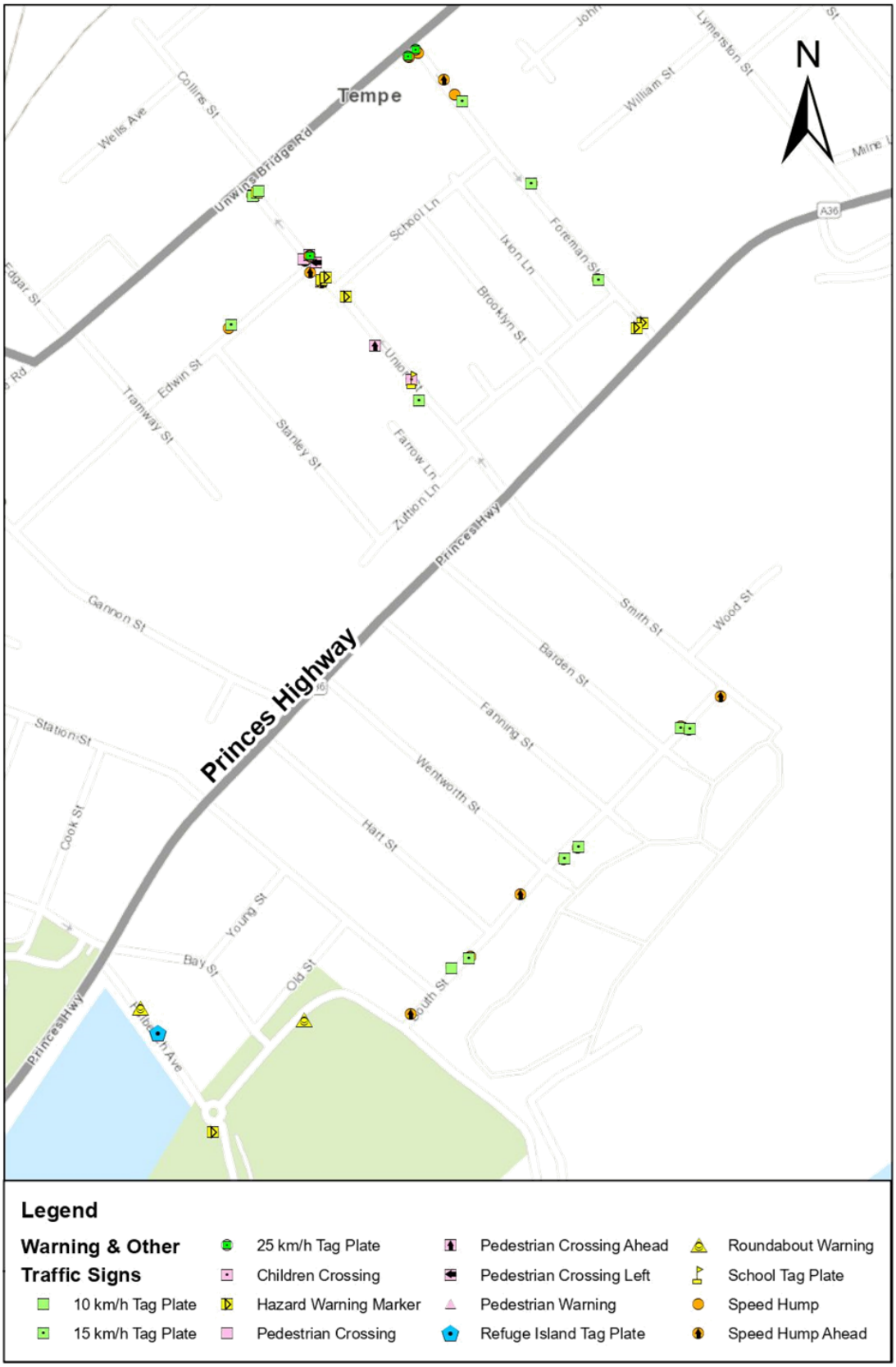
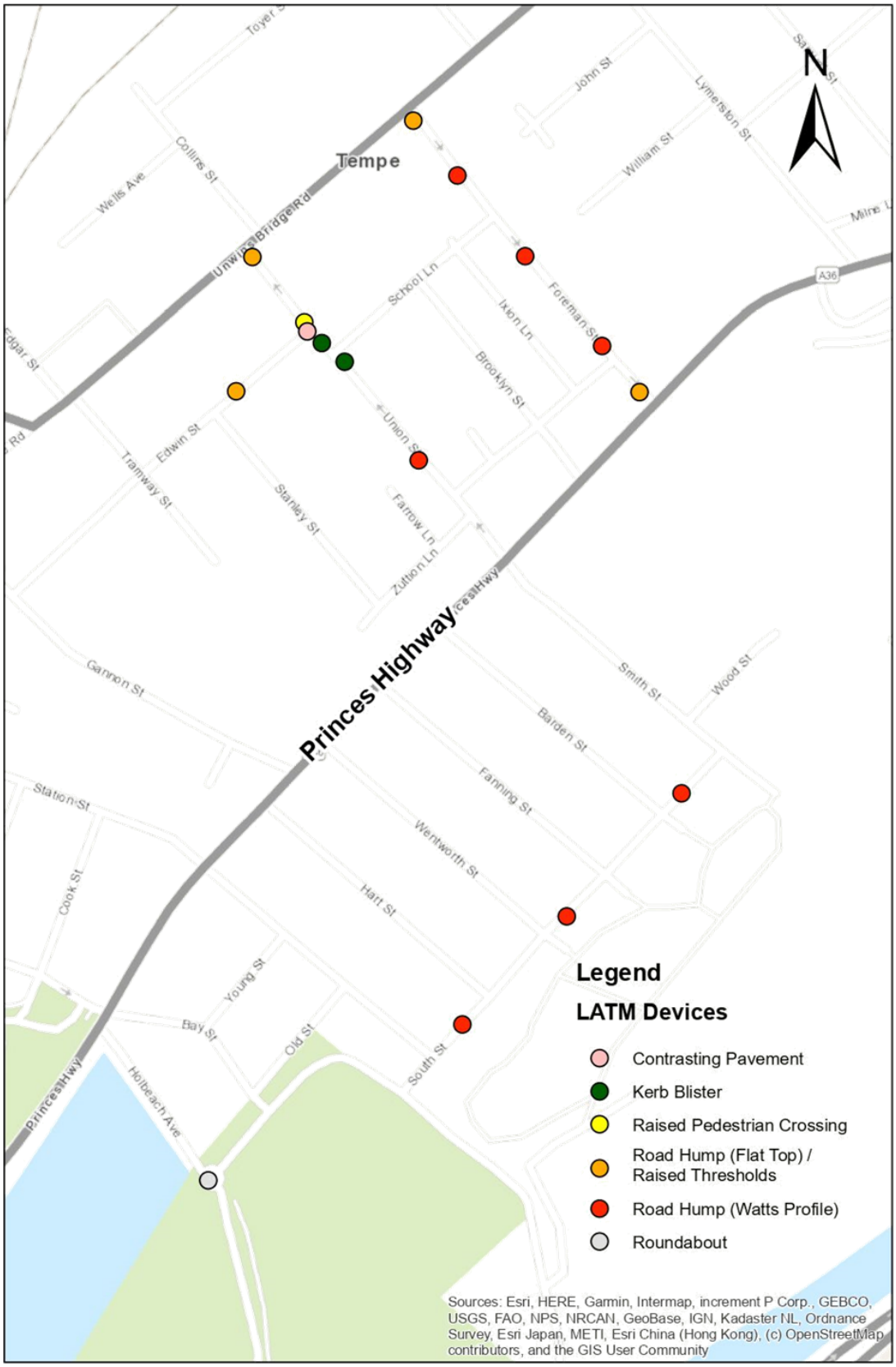
Tempe
Princes Highway
Wells Ave
Collins St
Tridge Rd
School Ln
Ixion Ln
Brooklyn St
Union St
Edwin St
Tramway St
Stanley St
Farrow Ln
Zution Ln
Gannon St
Station St
Cook St
Young St
Bay St
Old St
Holbeach Ave
Smith St
Wood St
Barden St
Fanning St
Wentworth St
Hart St
William St
Lyneston St
A36
Legend
Regulatory Traffic Signs
All Traffic Left Only
All Traffic Right Only
End Local Traffic Area
End School Zone 50
Entry
Give Way
Keep Left
Local Traffic Area 50
No Entry
No Right Turn
No Through Road
One Way Left
One Way Right
Roundabout Give Way
School Zone 40
School Zone 40 with flashing lights
Speed Limit 25
Stop
Traffic Signal Stop
Trucks Prohibited
Trucks Prohibited 3t and over
Two Way (with arrows)
Vehicles Over 3t GVM Tag Plate
When Signals Black Out Or Flashing


N
Tempe
Princes Highway
Unwin's Bridge Rd
Wells Ave
Collins St
School Ln
Ixion Ln
Foreman St
Brooklyn St
Edwin St
Tramway St
Stanley St
Farrow Ln
Zuttion Ln
Gannon St
Smith St
Wood St
Barden St
Fanning St
Wentworth St
Hart St
Station St
Cook St
Young St
Bay St
Old St
South St
Princes Hwy
A36
Legend
Warning & Other Traffic Signs
10 km/h Tag Plate
15 km/h Tag Plate
25 km/h Tag Plate
Children Crossing
Hazard Warning Marker
Pedestrian Crossing
Pedestrian Crossing Ahead
Pedestrian Crossing Left
Pedestrian Warning
Refuge Island Tag Plate
Roundabout Warning
School Tag Plate
Speed Hump
Speed Hump Ahead

P4533 Tempe South LATM Study

LATM Devices - Site Audit

Type	Street	Comments	x	y
Road Hump (Flat Top)	Edwin Street	On Edwin Street east of Stanley Street	151.16	-33.9221
Contrasting Pavement	Edwin Street	Contrasting Pavement	151.161	-33.9217
Road Hump (Flat Top)	Foreman Street	With kerb blisters and contrasting pavement	151.164	-33.9221
Road Hump (Watts Profile)	Foreman Street	Parking over hump	151.163	-33.9218
Road Hump (Watts Profile)	Foreman Street	Parking over hump	151.163	-33.9211
Road Hump (Watts Profile)	Foreman Street	Parking over hump	151.162	-33.9205
Road Hump (Flat Top)	Foreman Street	With kerb blisters and contrasting pavement	151.162	-33.9201
Roundabout	Holbeach Avenue	With kerb blister at Holbeach Avenue northbound approach	151.16	-33.9281
Road Hump (Watts Profile)	South Street	Parking over hump	151.162	-33.927
Road Hump (Watts Profile)	South Street	Faded line marking	151.163	-33.9261
Road Hump (Watts Profile)	South Street	Parking over hump	151.164	-33.9252
Road Hump (Watts Profile)	Union Street	Parking over hump	151.162	-33.9227
Kerb Blister	Union Street	A pair of kerb blisters with contrasting pavement	151.161	-33.9218
Raised Pedestrian Crossing	Union Street	Also recorded as Ped facility	151.161	-33.9216
Road Hump (Flat Top)	Union Street	With kerb blisters	151.16	-33.9211
Kerb Blister	Union Street	Only one at eastern Side of Union Street	151.161	-33.9219


N
Tempe
Princes Highway
Unwins Bridge Rd
Wells Ave
Collins St
John St
Lyme Ston St
William St
School Ln
Ikon Ln
Foreman St
Brooklyn St
Union St
Edwin St
Tramway St
Stanley St
Farrow Ln
Zutton Ln
Gannon St
Smith St
Wood St
Barden St
Fanning St
Wentworth St
Hart St
Station St
Cook St
Young St
Bay St
Old St
South St
Holbeach Ave
A36
Legend
LATM Devices
Contrasting Pavement
Kerb Blister
Raised Pedestrian Crossing
Road Hump (Flat Top) / Raised Thresholds
Road Hump (Watts Profile)
Roundabout
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

P4533 Tempe South LATM Study

Pedestrian Facilities - Site Audit

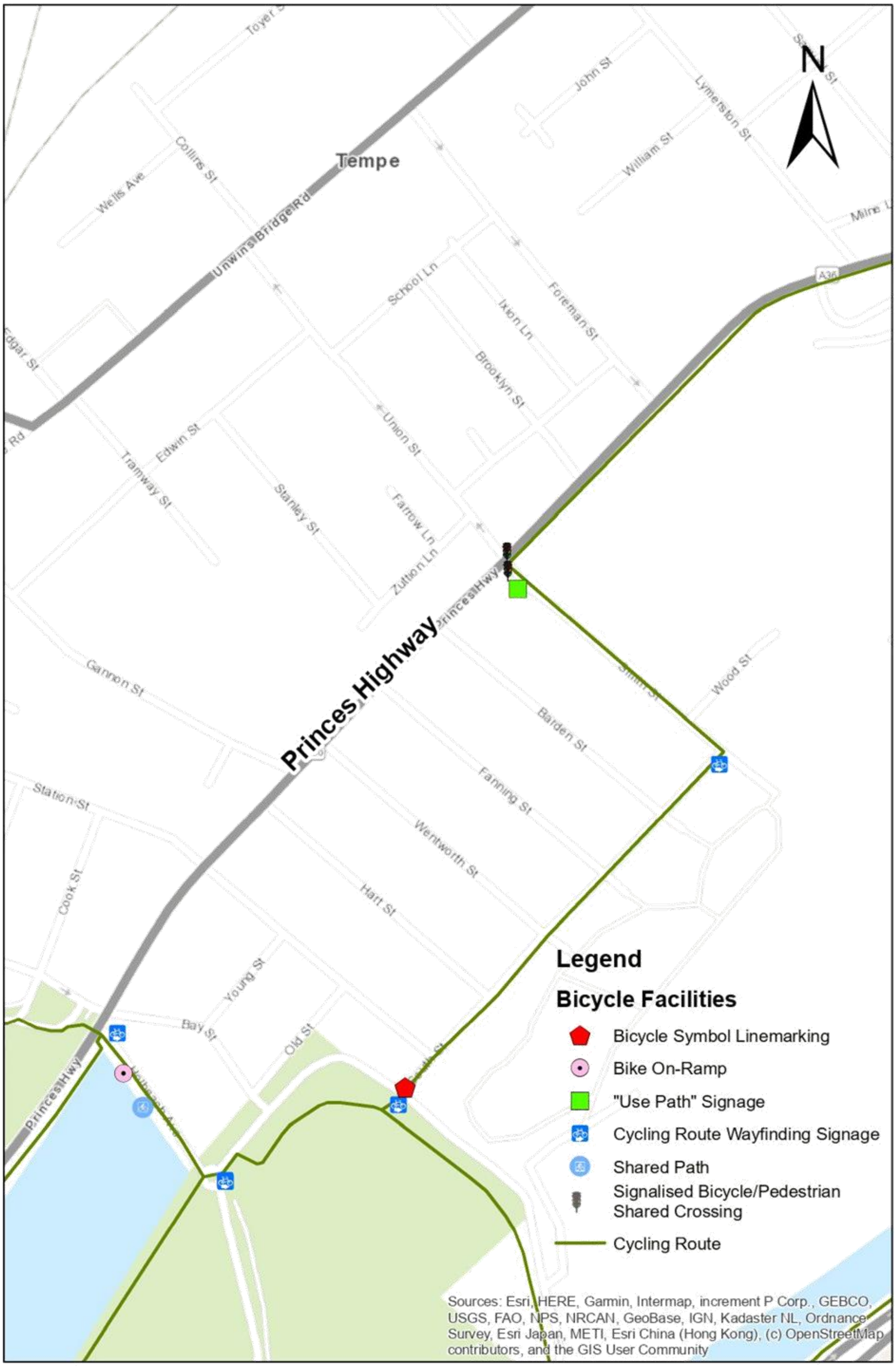
Street	Type	Comments	ObjectId	x	y
Barden Street	Kerb Ramp		13	151.162	-33.924
Collins Street	Pedestrian Refuge		41	151.16	-33.9209
Collins Street	Kerb Ramp		42	151.16	-33.921
Collins Street	Kerb Ramp		49	151.16	-33.9209
Edwin Street	Kerb Ramp		29	151.161	-33.9217
Edwin Street	Kerb Ramp		31	151.161	-33.9217
Fanning Street	Kerb Ramp		11	151.161	-33.9244
Foreman Street	Kerb Ramp		32	151.164	-33.9222
Foreman Street	Kerb Ramp		38	151.161	-33.9201
Foreman Street	Kerb Ramp		50	151.162	-33.92
Foreman Street	Kerb Ramp		51	151.164	-33.9222
Hart Street	Kerb Ramp		23	151.16	-33.9253
Hart Street	Kerb Ramp		24	151.16	-33.9254
Hart Street	Kerb Ramp	No footpath connectivity from northern side of South Street	27	151.162	-33.9268
Hart Street	Kerb Ramp	No footpath connectivity onto northern side of South Street	28	151.162	-33.9267
Holbeach Avenue	Signalised Pedestrian Crossing		2	151.159	-33.927
Holbeach Avenue	Pedestrian Refuge	In conjunction with Roundabout	3	151.16	-33.928
Holbeach Avenue	Kerb Ramp		6	151.16	-33.9281
Holbeach Avenue	Kerb Ramp		7	151.16	-33.9281
Holbeach Avenue	Kerb Ramp		8	151.16	-33.928
Holbeach Avenue	Kerb Ramp	Stormwater drain located on kerb ramp	9	151.16	-33.9281
Holbeach Avenue	Kerb Ramp	No footpath western side of Holbeach Avenue	10	151.16	-33.928
Holbeach Avenue	Kerb Ramp		52	151.159	-33.927
Holbeach Avenue	Kerb Ramp		53	151.159	-33.927
Princes Highway	Signalised Pedestrian Crossing		4	151.159	-33.927
Princes Highway	Signalised Pedestrian Crossing		12	151.161	-33.9243
Princes Highway	Signalised Pedestrian Crossing		18	151.162	-33.9235
Princes Highway	Kerb Ramp		22	151.162	-33.9235
Princes Highway	Signalised Pedestrian Crossing		25	151.162	-33.9234
Princes Highway	Kerb Ramp		26	151.163	-33.9234
Princes Highway	Kerb Ramp		47	151.162	-33.9233
Princes Highway	Kerb Ramp		48	151.162	-33.9234
Princes Highway	Kerb Ramp		54	151.159	-33.927
Smith Street	Signalised Pedestrian Crossing		20	151.162	-33.9235
Smith Street	Kerb Ramp		21	151.162	-33.9235

Street	Type	Comments	ObjectId	x	y
Smith Street	Kerb Ramp		45	151.162	-33.9235
South Street	Kerb Ramp	Only connectivity to southern side of South Street	30	151.162	-33.9272
Stanley Street	Kerb Ramp	no connectivity to Eastern Side	14	151.16	-33.9224
Union Street	Signalised Pedestrian Crossing		5	151.162	-33.9233
Union Street	Pedestrian Crossing	Raised. Also recorded as LATM	34	151.161	-33.9216
Union Street	Kerb Ramp		37	151.161	-33.9218
Union Street	Kerb Ramp		39	151.161	-33.9218
Union Street	Continuous Footpath	Corresponding road hump recorded as LATM	43	151.16	-33.9211
Union Street	Kerb Ramp		44	151.162	-33.9234
Union Street	Kerb Ramp		46	151.162	-33.9233
Unwins Bridge Road	Signalised Pedestrian Crossing	With pedestrian fencing	40	151.161	-33.9204
Wentworth Street	Kerb Ramp	No connectivity	33	151.163	-33.9263
Wentworth Street	Kerb Ramp		35	151.161	-33.9249
Wentworth Street	Kerb Ramp		36	151.161	-33.9249
Zuttion Lane	Kerb Ramp	No connectivity to other side as there are no footpaths on Zuitton Lane	16	151.161	-33.9237
Zuttion Lane	Kerb Ramp		17	151.162	-33.9231
Zuttion Lane	Kerb Ramp		19	151.162	-33.9231

P4533 Tempe South LATM Study

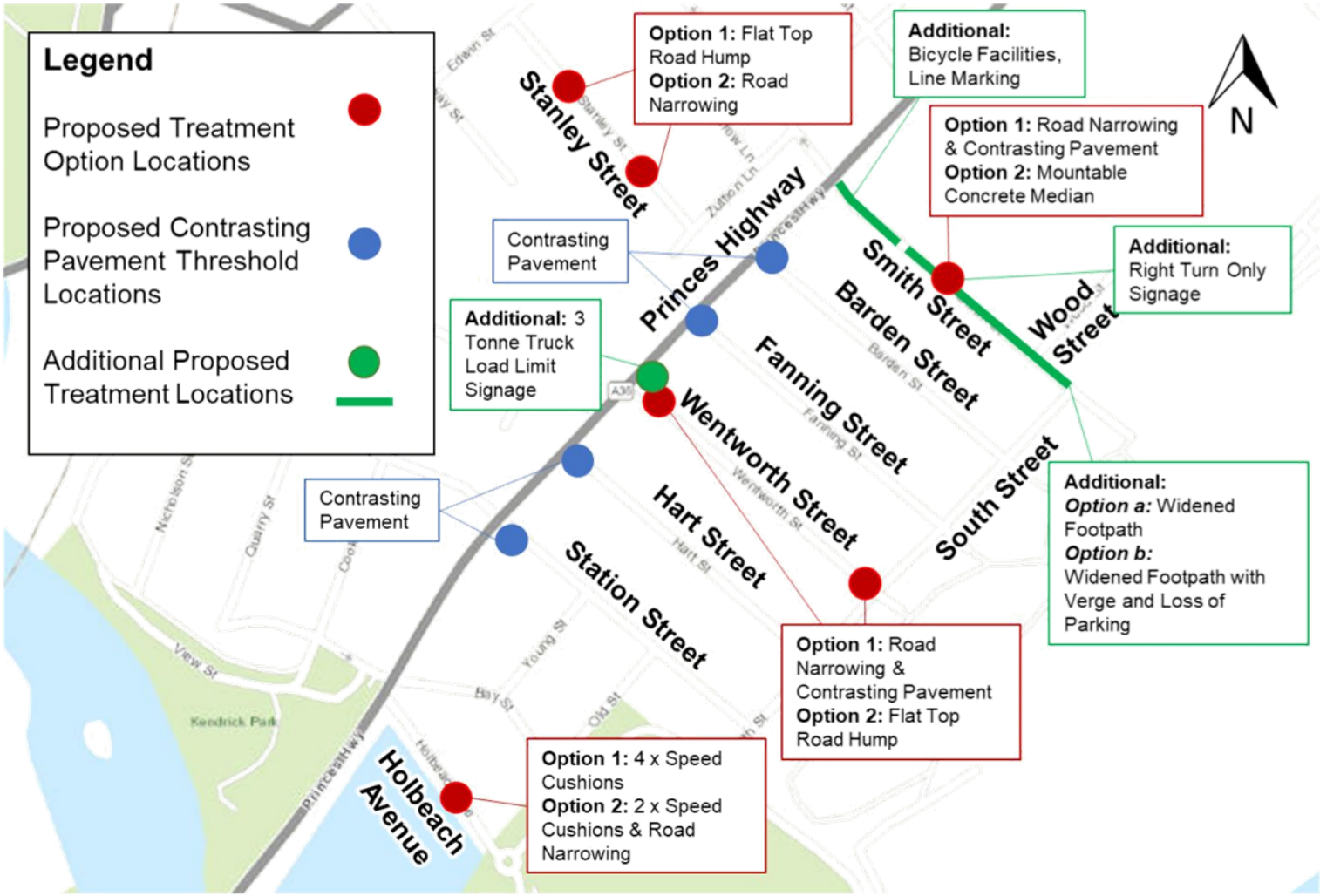
Cycling Facilities - Site Audit

Type	Street	Comments	x	y
Route Wayfinding	Holbeach Avenue	"Route L13 Sydenham Green"	151.159	-33.927
Shared Path	Holbeach Avenue	Princes Highway to Roundabout western side, sticker on southbound sign	151.159	-33.9276
Bike On Ramp	Holbeach Avenue	Connects to Shared Path for bikes northbound	151.159	-33.9273
Route Wayfinding	Holbeach Avenue	Left Arrow	151.16	-33.9281
Route Wayfinding	Holbeach Avenue	Left Arrow	151.161	-33.9276
Route Wayfinding	Holbeach Avenue	Right Arrow	151.16	-33.9281
Signalised Shared Crossing	Princes Highway		151.162	-33.9234
Cycle Direction	Smith Street	"Use Path", onto path at Princes Highway, shared crossing	151.162	-33.9236
Signalised Shared Crossing	Smith Street		151.162	-33.9235
Bicycle Symbol Linemarking	South Street	Faded	151.161	-33.9274
Route Wayfinding	South Street	Left Arrow and Right Arrow	151.164	-33.925



N
Tempe
Unwins Bridge Rd
Princes Highway
Princes Hwy
John St
Lymerston St
William St
Milne L
Collins St
Wells Ave
School Ln
Ixion Ln
Foreman St
Brooklyn St
Edgar St
Union St
Edwin St
Tramway St
Stanley St
Farrow Ln
Zutton Ln
Gannon St
Smith St
Wood St
Barden St
Fanning St
Station St
Wentworth St
Hart St
Cook St
Young St
Bay St
Old St
A36
Legend
Bicycle Facilities
Bicycle Symbol Linemarking
Bike On-Ramp
"Use Path" Signage
Cycling Route Wayfinding Signage
Shared Path
Signalised Bicycle/Pedestrian Shared Crossing
Cycling Route
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Appendix D: LATM Treatment Concept Designs


Legend
Proposed Treatment Option Locations
Proposed Contrasting Pavement Threshold Locations
Additional Proposed Treatment Locations
Option 1: Flat Top Road Hump
Option 2: Road Narrowing
Stanley Street
Additional: Bicycle Facilities, Line Marking
N
Option 1: Road Narrowing & Contrasting Pavement
Option 2: Mountable Concrete Median
Contrasting Pavement
Princes Highway
Smith Street
Barden Street
Wood Street
Additional: Right Turn Only Signage
Additional: 3 Tonne Truck Load Limit Signage
Fanning Street
Wentworth Street
Hart Street
Station Street
South Street
Contrasting Pavement
Additional:
Option a: Widened Footpath
Option b: Widened Footpath with Verge and Loss of Parking
Option 1: Road Narrowing & Contrasting Pavement
Option 2: Flat Top Road Hump
Holbeach Avenue
Option 1: 4 x Speed Cushions
Option 2: 2 x Speed Cushions & Road Narrowing


Stanley Street Option 1
No Loss of Parking
Existing Street Light
Plain or Light Coloured Ramps and Wings
Maintain Existing Kerbside Parking
'Terracotta' Colour Surface Treatment or Similar
New Signpost
100mm Concrete Flat Top Road Hump
Maintain Existing Kerbside Parking
Stanley Street
No. 19 & 17
No. 15 & 13
No. 11
No. 9 & 7
No. 5
No. 20
No. 18
No. 16
No. 14
No. 12
N
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E: admin@bitziosconsulting.com.au
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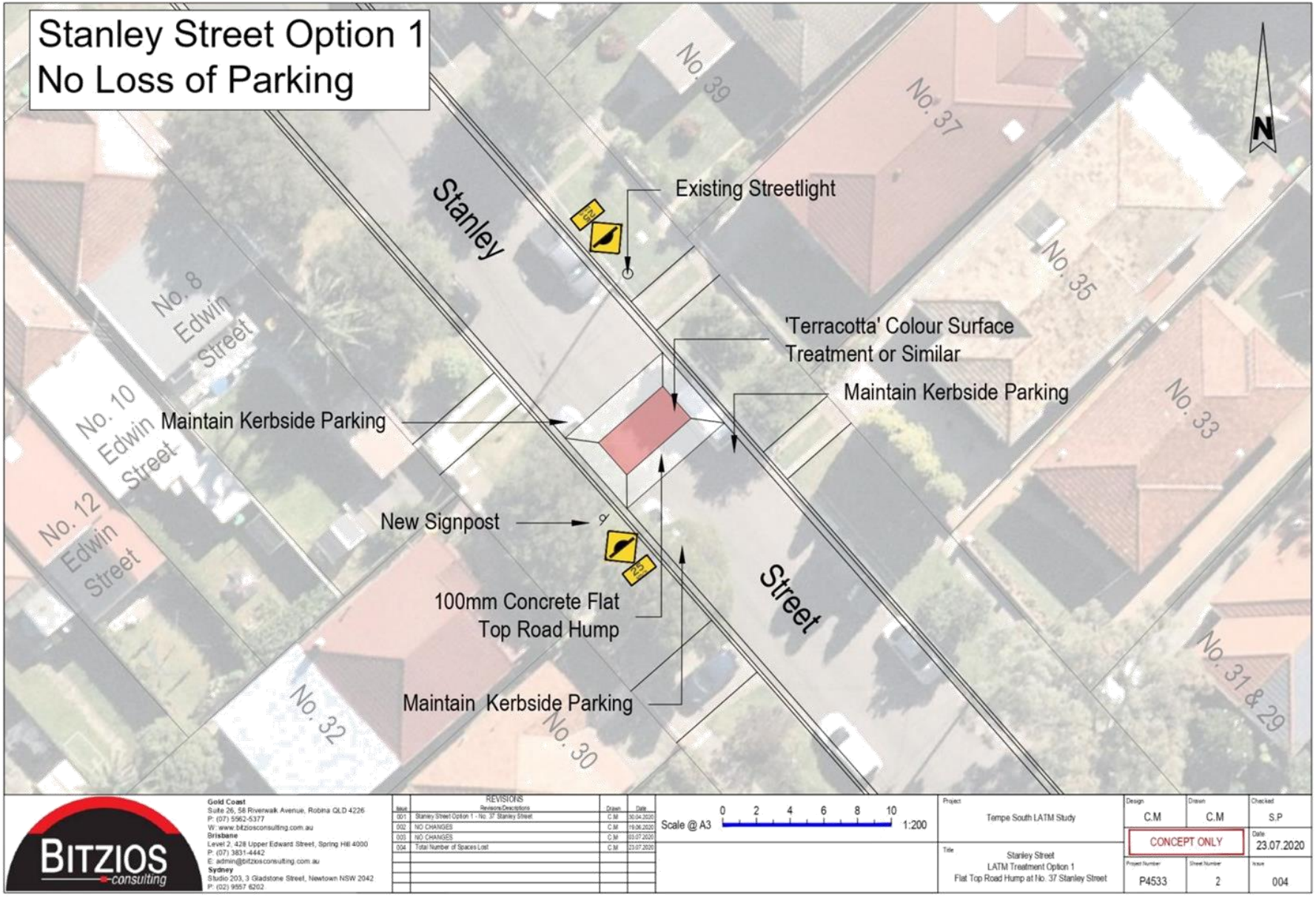
REVISIONS
Issue
Revisions/Descriptions
Drawn
Date
001 Stanley Street Option 1 - No. 14 Stanley Street C.M 30.04.2020
002 NO CHANGES C.M 19.06.2020
003 NO CHANGES C.M 03.07.2020
004 Total Number of Spaces Lost C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Stanley Street
LATM Treatment Option 1
Flat Top Road Hump at No. 14 Stanley Street
Design C.M
Drawn C.M
Checked S.P
CONCEPT ONLY
Date 23.07.2020
Project Number P4533
Sheet Number 1
Issue 004


Stanley Street Option 1
No Loss of Parking
Stanley
Street
No. 39
No. 37
No. 35
No. 33
No. 31 & 29
No. 8 Edwin Street
No. 10 Edwin Street
No. 12 Edwin Street
No. 32
No. 30
N
Existing Streetlight
'Terracotta' Colour Surface Treatment or Similar
Maintain Kerbside Parking
Maintain Kerbside Parking
New Signpost
100mm Concrete Flat Top Road Hump
Maintain Kerbside Parking
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REVISIONS
Issue | Revisions/Descriptions | Drawn | Date
001 | Stanley Street Option 1 - No. 37 Stanley Street | C.M | 30.04.2020
002 | NO CHANGES | C.M | 19.06.2020
003 | NO CHANGES | C.M | 03.07.2020
004 | Total Number of Spaces Lost | C.M | 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Stanley Street
LATM Treatment Option 1
Flat Top Road Hump at No. 37 Stanley Street
Design C.M
Drawn C.M
Checked S.P
CONCEPT ONLY
Date 23.07.2020
Project Number P4533
Sheet Number 2
Issue 004


Stanley Street Option 2
Loss of Two (2) Parking Spaces
Remove One (1) Parking Space
Existing Street Light
Kerb Blister with Landscaping (Low Height Shrubs)
Kerb Blister with Landscaping (Low Height Shrubs)
Remove One (1) Parking Space
Stanley
Street
No. 19 & 17
No. 15 & 13
No. 11
No. 9 & 7
No. 5
No. 20
No. 18
No. 16
No. 14
No. 12
N
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Issue
Revisions/Descriptions
Drawn
Date
001 Stanley Street Option 2 - No. 14 Stanley Street C.M 30.04.2020
002 NO CHANGES C.M 19.06.2020
003 NO CHANGES C.M 03.07.2020
004 Total Number of Spaces Lost C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Stanley Street
LATM Treatment Option 2
Kerb Blisters at No. 14 Stanley Street
Design C.M
Drawn C.M
Checked S.P
CONCEPT ONLY
Date 23.07.2020
Project Number P4533
Sheet Number 3
Issue 004


Stanley Street Option 2
Loss of Two (2) Parking Spaces
Existing Streetlight
Remove One (1) Parking Space
Kerb Blister with Landscaping (Low Height Shrubs)
Kerb Blister with Landscaping (Low Height Shrubs)
Remove One (1) Parking Space
Stanley Street
No. 39
No. 37
No. 35
No. 33
No. 31 & 29
No. 30
No. 32
No. 8 Edwin Street
No. 10 Edwin Street
No. 12 Edwin Street
N
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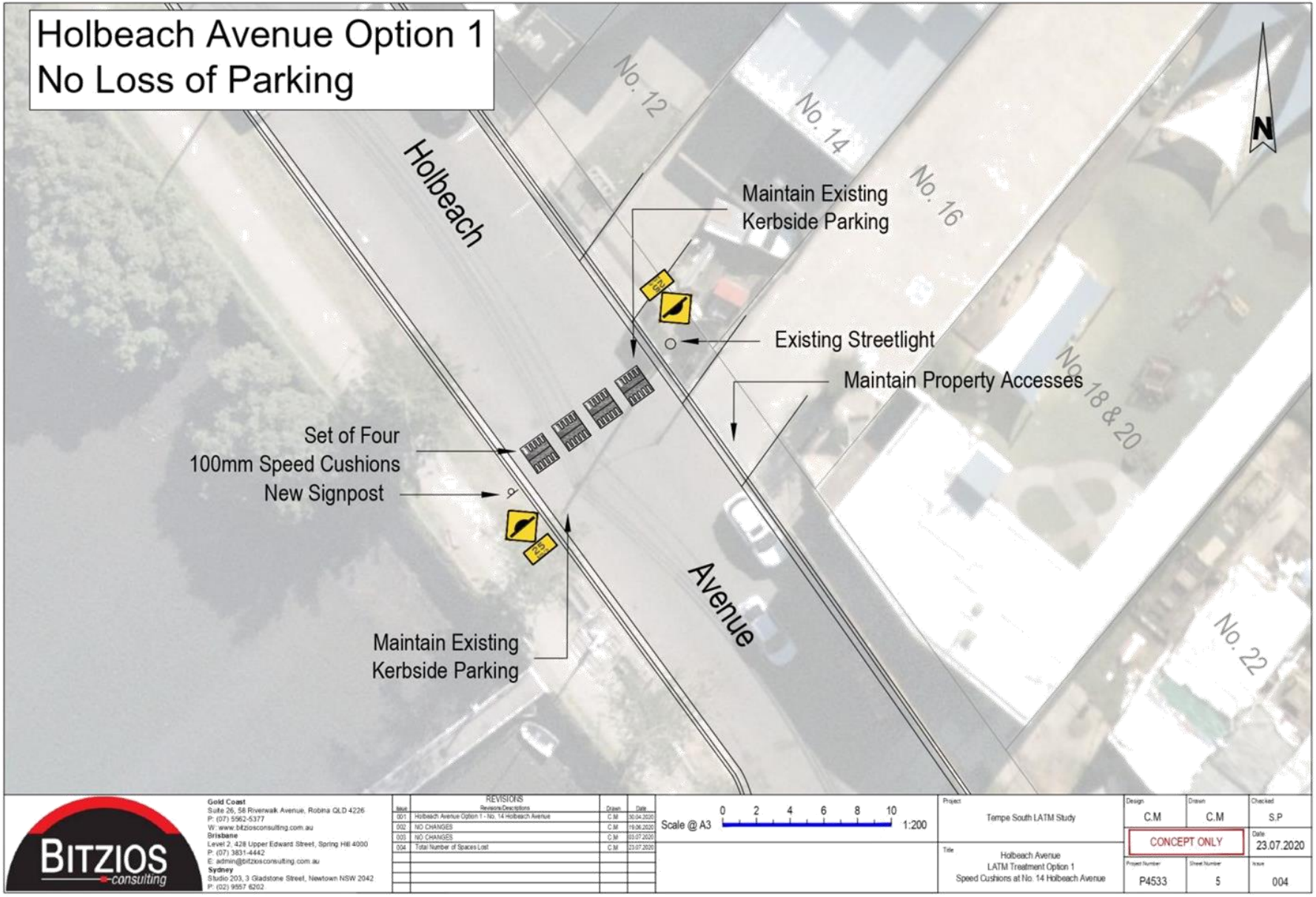
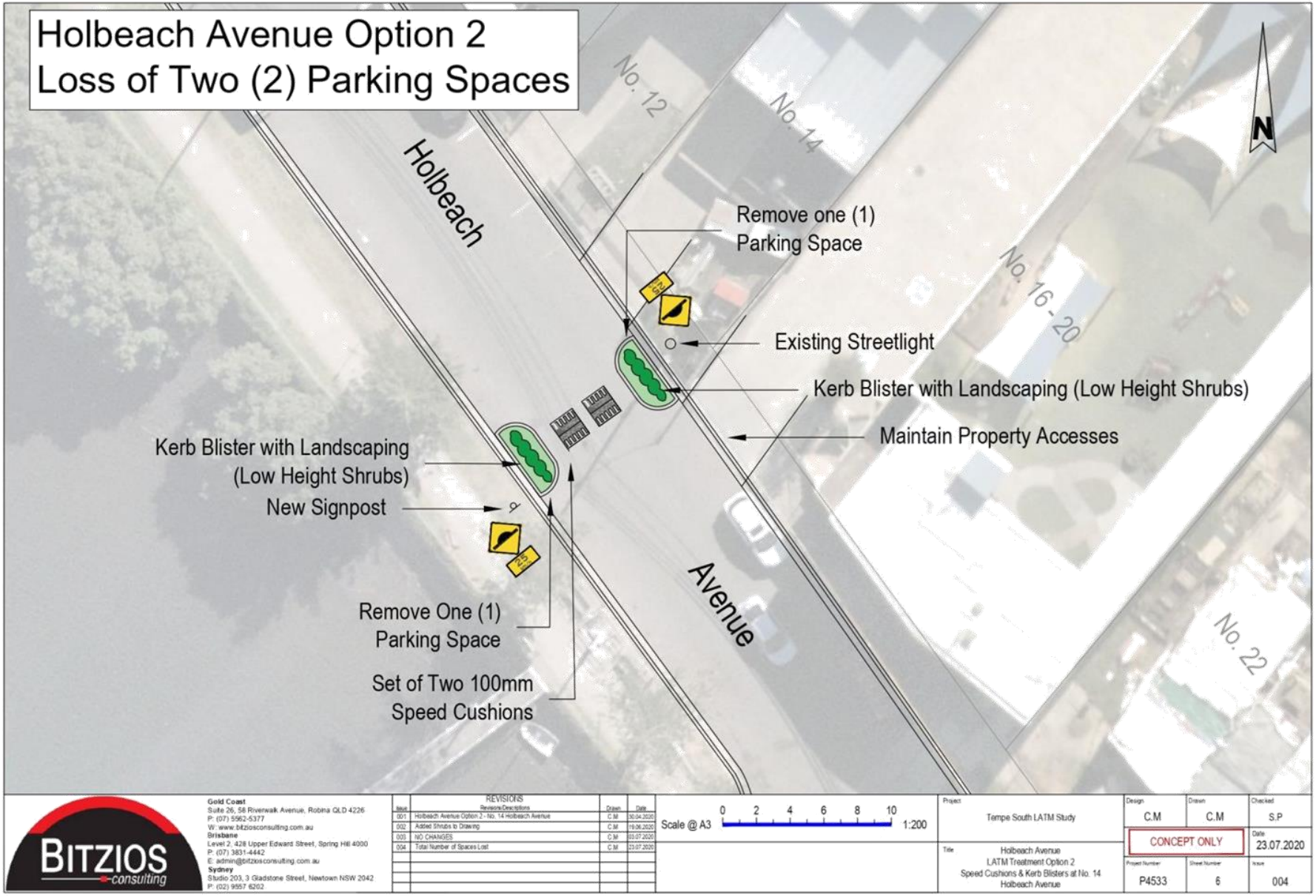
Issue
Revisions/Descriptions
Drawn
Date
001 Stanley Street Option 2 - No. 37 Stanley Street C.M 30.04.2020
002 NO CHANGES C.M 19.06.2020
003 NO CHANGES C.M 03.07.2020
004 Total Number of Spaces Lost C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Stanley Street
LATM Treatment Option 2
Kerb Blisters at No. 37 Stanley Street
Design C.M
Drawn C.M
Checked S.P
CONCEPT ONLY
Date 23.07.2020
Project Number P4533
Sheet Number 4
Issue 004


Holbeach Avenue Option 1
No Loss of Parking
No. 12
No. 14
No. 16
No. 18 & 20
No. 22
Holbeach
Avenue
N
Maintain Existing
Kerbside Parking
Existing Streetlight
Maintain Property Accesses
Set of Four
100mm Speed Cushions
New Signpost
Maintain Existing
Kerbside Parking
Scale @ A3
0 2 4 6 8 10
1:200
Tempe South LATM Study
Holbeach Avenue
LATM Treatment Option 1
Speed Cushions at No. 14 Holbeach Avenue
CONCEPT ONLY
23.07.2020
P4533
5
004


Holbeach Avenue Option 2
Loss of Two (2) Parking Spaces
No. 12
No. 14
No. 16-20
No. 22
Holbeach
Avenue
N
Remove one (1)
Parking Space
Existing Streetlight
Kerb Blister with Landscaping (Low Height Shrubs)
Maintain Property Accesses
Kerb Blister with Landscaping
(Low Height Shrubs)
New Signpost
Remove One (1)
Parking Space
Set of Two 100mm
Speed Cushions
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REVISIONS
Issue
Revisions/Descriptions
Drawn
Date
001 Holbeach Avenue Option 2 - No. 14 Holbeach Avenue C.M 30.04.2020
002 Added Shrubs to Drawing C.M 19.06.2020
003 NO CHANGES C.M 03.07.2020
004 Total Number of Spaces Lost C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Holbeach Avenue
LATM Treatment Option 2
Speed Cushions & Kerb Blisters at No. 14
Holbeach Avenue
Design
C.M
Drawn
C.M
Checked
S.P
CONCEPT ONLY
Date
23.07.2020
Project Number
P4533
Sheet Number
6
Issue
004


Wentworth Street Option 1
Loss of Two (2) Parking Spaces
Wentworth Street
Street
South
Tempe Lands
No. 9
No. 7
No. 5
No. 12
No. 10
No. 8
No. 6
N
Remove One (1) Parking Space
Kerb Blister with Landscaping (Low Height Shrubs)
At-Grade Contrasting Pavement Treatment
Remove One (1) Parking Space
Kerb Blister with Landscaping (Low Height Shrubs)
Existing Drainage Pit
Existing Kerb Ramp
Existing Streetlight
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REVISIONS
Issue
Revisions/Descriptions
Drawn
Date
001 Wentworth Street Option 1 - No. 23 Wentworth Street C.M 30.04.2020
002 Moved to north of South Street C.M 19.06.2020
003 NO CHANGES C.M 03.07.2020
004 Total Number of Spaces Lost C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Wentworth Street
LATM Treatment Option 1
Kerb Blisters north of South Street
Design
C.M
Drawn
C.M
Checked
S.P
CONCEPT ONLY
Date
23.07.2020
Project Number
P4533
Sheet Number
7
Issue
004


Wentworth Street
Option 1
Loss of Two (2)
Parking Spaces
New R6-10-2, R9-231 and
W8-245N_L Signs
New Signpost
Kerb Blister with
Landscaping (Low
Height Shrubs)
Remove One (1)
Parking Space
Retain Existing Property Access
Retain Existing
Tempe Tyre
Centre Access
Kerb Blister with
Landscaping (Low
Height Shrubs)
At-Grade Contrasting
Pavement Treatment
Remove One (1)
Parking Space
Retain Existing
Waste Access
Princes Highway
Wentworth
Street
No. 846-854 Princes Highway
No. 856-868 Princes
Highway
(Tempe Tyre & Wheel
Centre)
No. 45
No. 43
No. 41
No. 46
No. 44
No. 39
N
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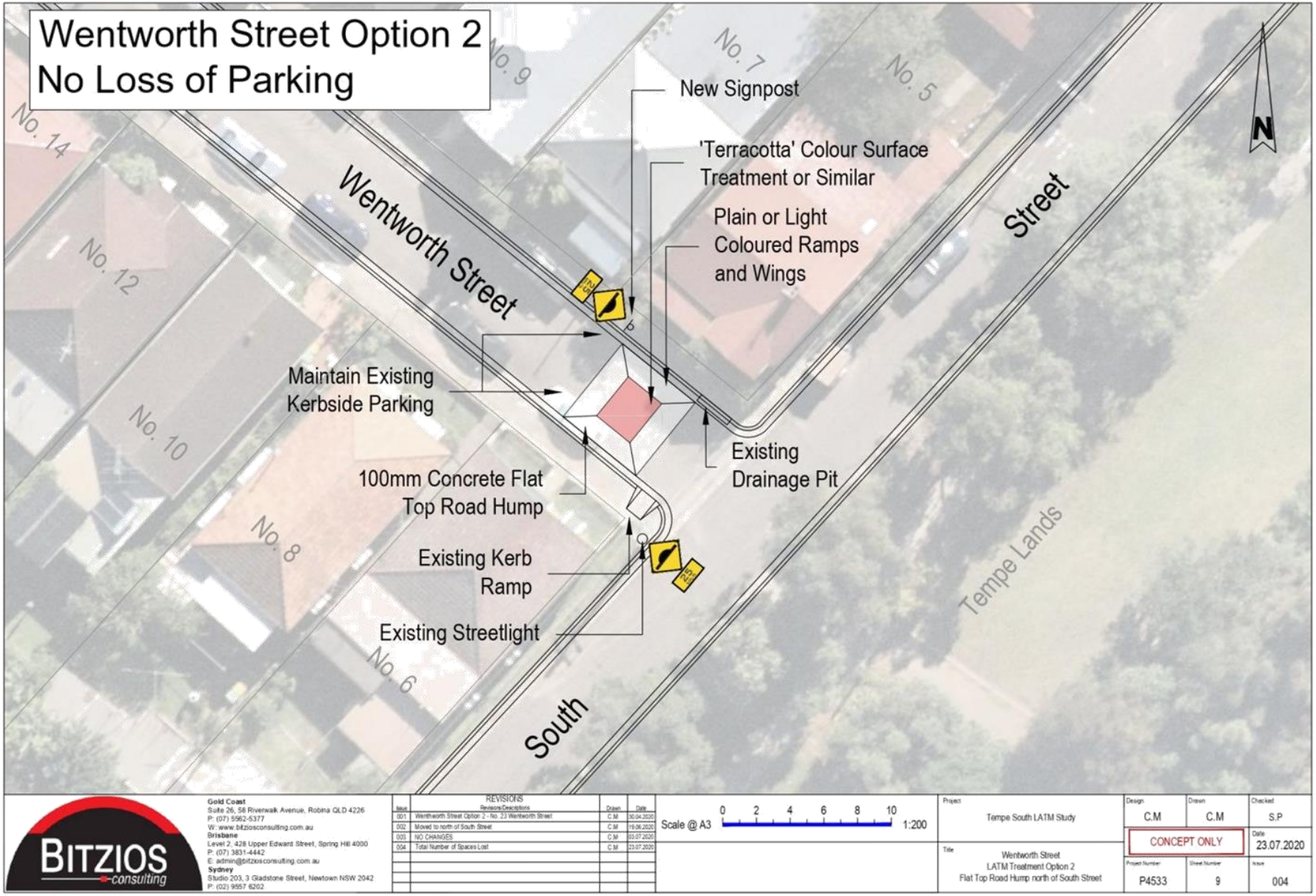
REVISIONS
Issue
Revision/Descriptions
Drawn
Date
001 Wentworth Street Option 1 - No. 35 Wentworth Street C.M 30.04.2020
002 Moved to south of Princes Highway C.M 19.06.2020
003 NO CHANGES C.M 03.07.2020
004 Total Number of Spaces Lost C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Wentworth Street
LATM Treatment Option 1
Kerb Blisters south of Princes Highway
Design
C.M
Drawn
C.M
Checked
S.P
CONCEPT ONLY
Date
23.07.2020
Project Number
P4533
Sheet Number
8
Issue
004


Wentworth Street Option 2
No Loss of Parking
New Signpost
'Terracotta' Colour Surface Treatment or Similar
Plain or Light Coloured Ramps and Wings
Maintain Existing Kerbside Parking
100mm Concrete Flat Top Road Hump
Existing Drainage Pit
Existing Kerb Ramp
Existing Streetlight
Wentworth Street
Street
South
Tempe Lands
No. 14
No. 12
No. 10
No. 8
No. 6
No. 9
No. 7
No. 5
N
Gold Coast
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Sydney
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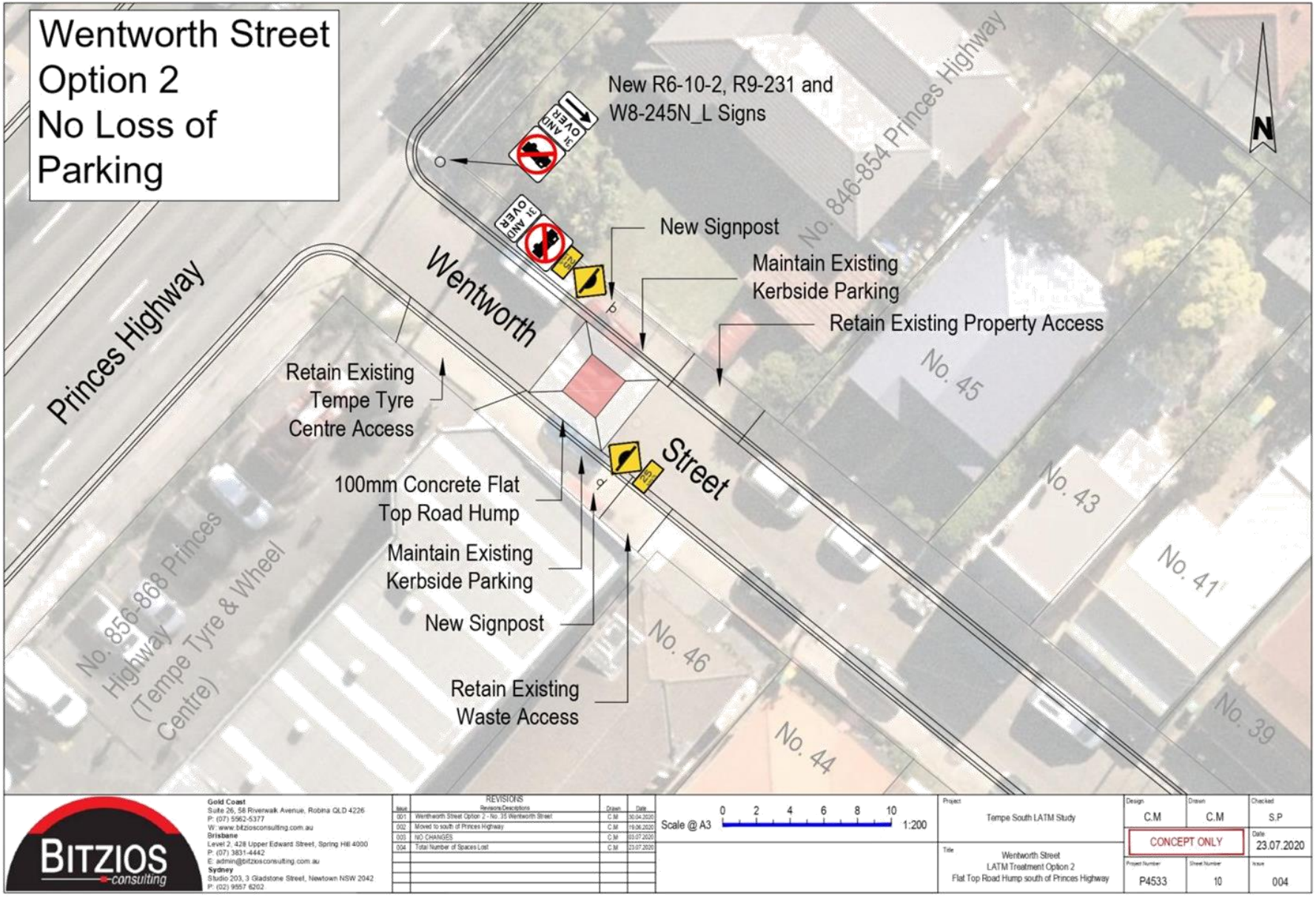
BITZIOS consulting
REVISIONS
Issue
Revisions/Descriptions
Drawn
Date
001 Wentworth Street Option 2 - No. 23 Wentworth Street C.M 30.04.2020
002 Moved to north of South Street C.M 19.06.2020
003 NO CHANGES C.M 03.07.2020
004 Total Number of Spaces Lost C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Wentworth Street
LATM Treatment Option 2
Flat Top Road Hump north of South Street
Design
C.M
Drawn
C.M
Checked
S.P
CONCEPT ONLY
Date
23.07.2020
Project Number
P4533
Sheet Number
9
Issue
004


Wentworth Street
Option 2
No Loss of
Parking
New R6-10-2, R9-231 and
W8-245N_L Signs
New Signpost
Maintain Existing
Kerbside Parking
Retain Existing Property Access
Retain Existing
Tempe Tyre
Centre Access
100mm Concrete Flat
Top Road Hump
Maintain Existing
Kerbside Parking
New Signpost
Retain Existing
Waste Access
Princes Highway
Wentworth
Street
No. 846-854 Princes Highway
No. 856-868 Princes
Highway
(Tempe Tyre & Wheel
Centre)
No. 45
No. 43
No. 41
No. 46
No. 44
No. 39
N
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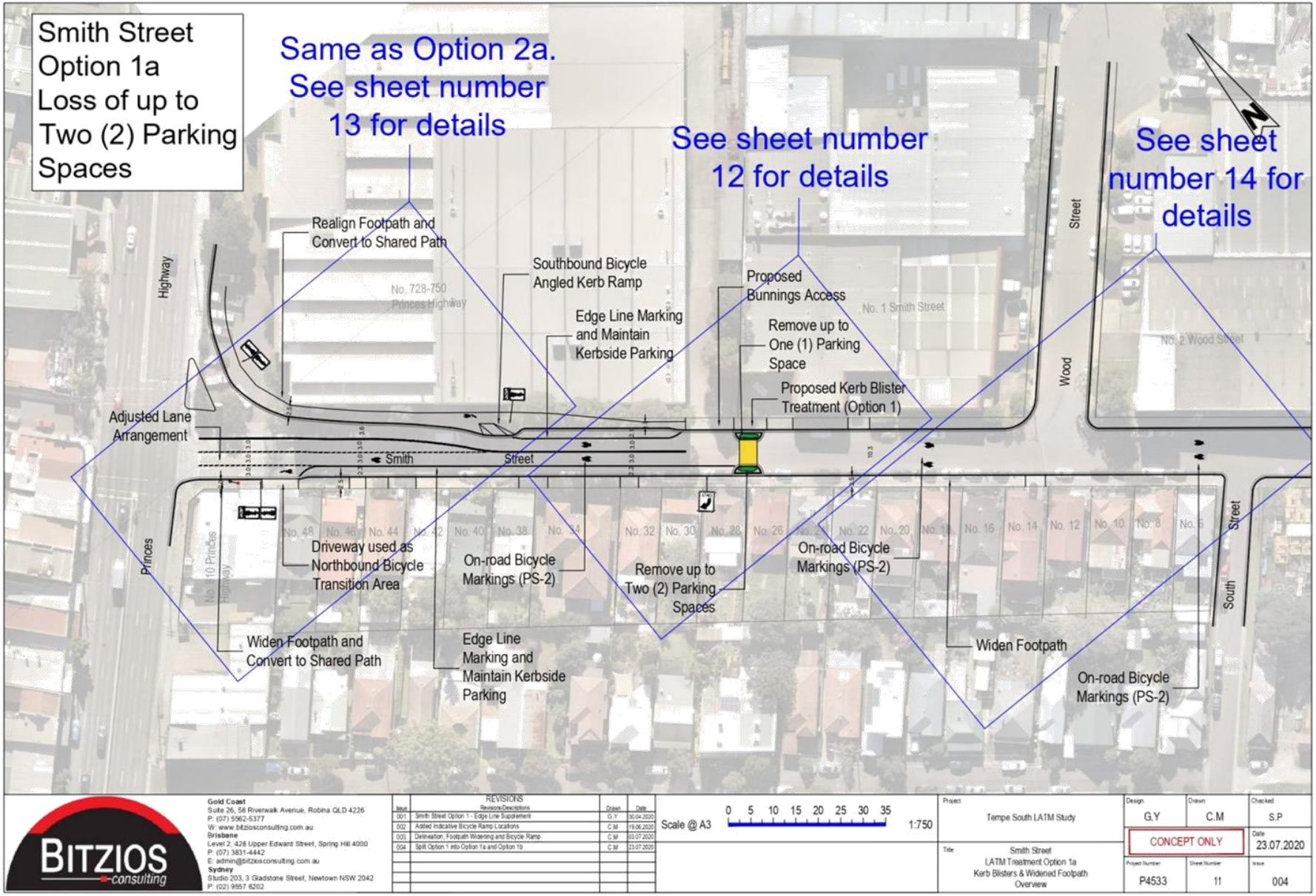
REVISIONS
Issue
Revisions/Descriptions
Drawn
Date
001 Wentworth Street Option 2 - No. 35 Wentworth Street C.M 30.04.2020
002 Moved to south of Princes Highway C.M 19.06.2020
003 NO CHANGES C.M 03.07.2020
004 Total Number of Spaces Lost C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Wentworth Street
LATM Treatment Option 2
Flat Top Road Hump south of Princes Highway
Design
C.M
Drawn
C.M
Checked
S.P
CONCEPT ONLY
Date
23.07.2020
Project Number
P4533
Sheet Number
10
Issue
004


Smith Street
Option 1a
Loss of up to
Two (2) Parking
Spaces
Same as Option 2a.
See sheet number
13 for details
See sheet number
12 for details
See sheet
number 14 for
details
Realign Footpath and
Convert to Shared Path
Southbound Bicycle
Angled Kerb Ramp
Edge Line Marking
and Maintain
Kerbside Parking
Proposed
Bunnings Access
Remove up to
One (1) Parking
Space
Proposed Kerb Blister
Treatment (Option 1)
Adjusted Lane
Arrangement
Driveway used as
Northbound Bicycle
Transition Area
On-road Bicycle
Markings (PS-2)
Remove up to
Two (2) Parking
Spaces
On-road Bicycle
Markings (PS-2)
Widen Footpath and
Convert to Shared Path
Edge Line
Marking and
Maintain Kerbside
Parking
Widen Footpath
On-road Bicycle
Markings (PS-2)
Princes Highway
Smith Street
Wood Street
South Street
No. 728-750 Princes Highway
No. 1 Smith Street
No. 2 Wood Street
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E: admin@bitziosconsulting.com.au
Sydney
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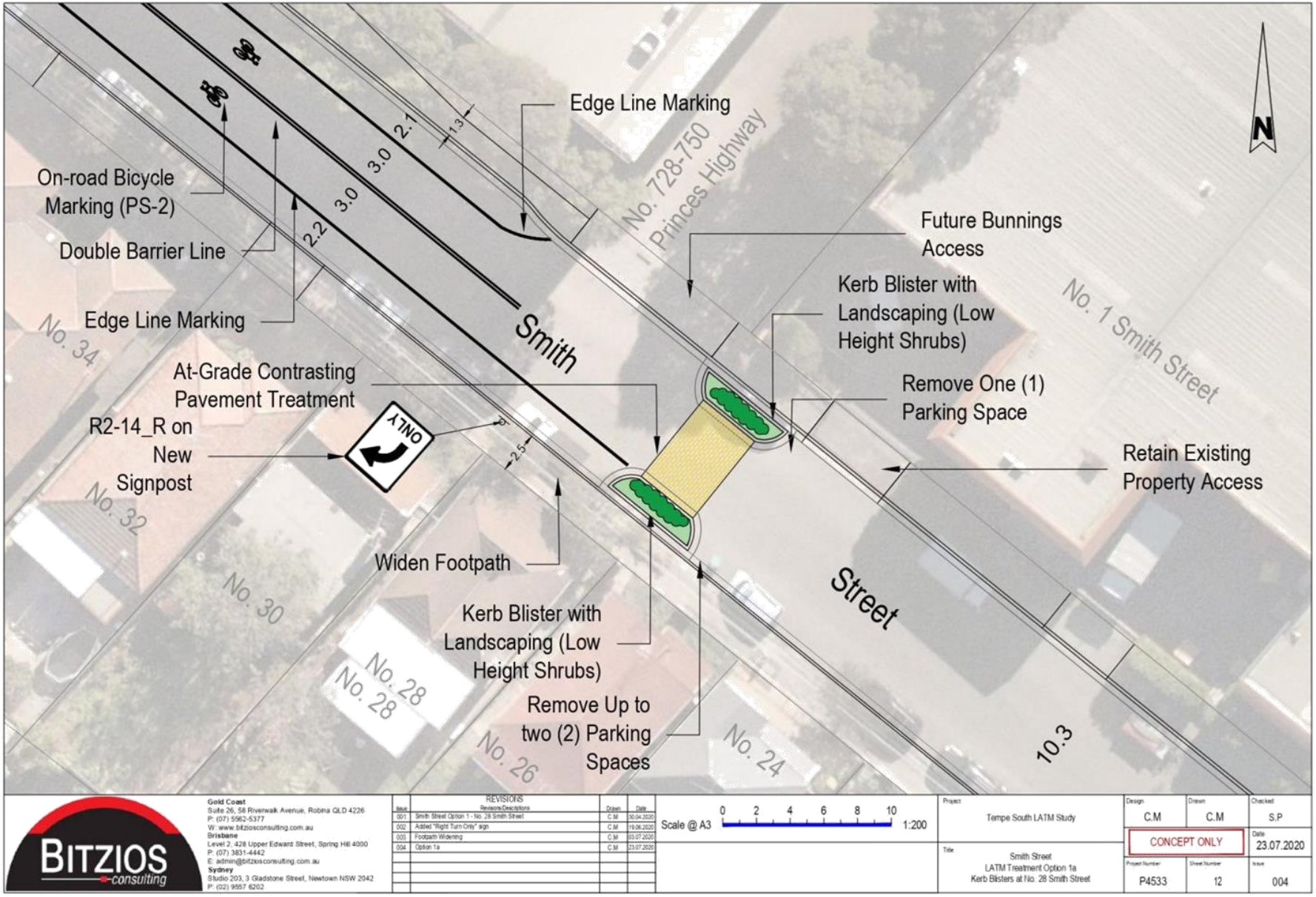
P: (02) 9557 6202
REVISIONS
Issue | Revisions/Descriptions | Drawn | Date
001 | Smith Street Option 1 - Edge Line Supplement | G.Y | 30.04.2020
002 | Added Indicative Bicycle Ramp Locations | C.M | 19.06.2020
003 | Delineation, Footpath Widening and Bicycle Ramp | C.M | 03.07.2020
004 | Split Option 1 into Option 1a and Option 1b | C.M | 23.07.2020
Scale @ A3
0 5 10 15 20 25 30 35
1:750
Project
Tempe South LATM Study
Title
Smith Street
LATM Treatment Option 1a
Kerb Blisters & Widened Footpath
Overview
Design G.Y
Drawn C.M
Checked S.P
CONCEPT ONLY
Date 23.07.2020
Project Number P4533
Sheet Number 11
Issue 004


Edge Line Marking
On-road Bicycle Marking (PS-2)
Double Barrier Line
Edge Line Marking
At-Grade Contrasting Pavement Treatment
R2-14_R on New Signpost
ONLY
Widen Footpath
Kerb Blister with Landscaping (Low Height Shrubs)
Remove Up to two (2) Parking Spaces
Future Bunnings Access
Kerb Blister with Landscaping (Low Height Shrubs)
Remove One (1) Parking Space
Retain Existing Property Access
No. 728-750 Princes Highway
No. 1 Smith Street
Smith
Street
No. 34
No. 32
No. 30
No. 28
No. 28
No. 26
No. 24
10.3
3.0
3.0
2.2
2.1
1.3
2.5
N
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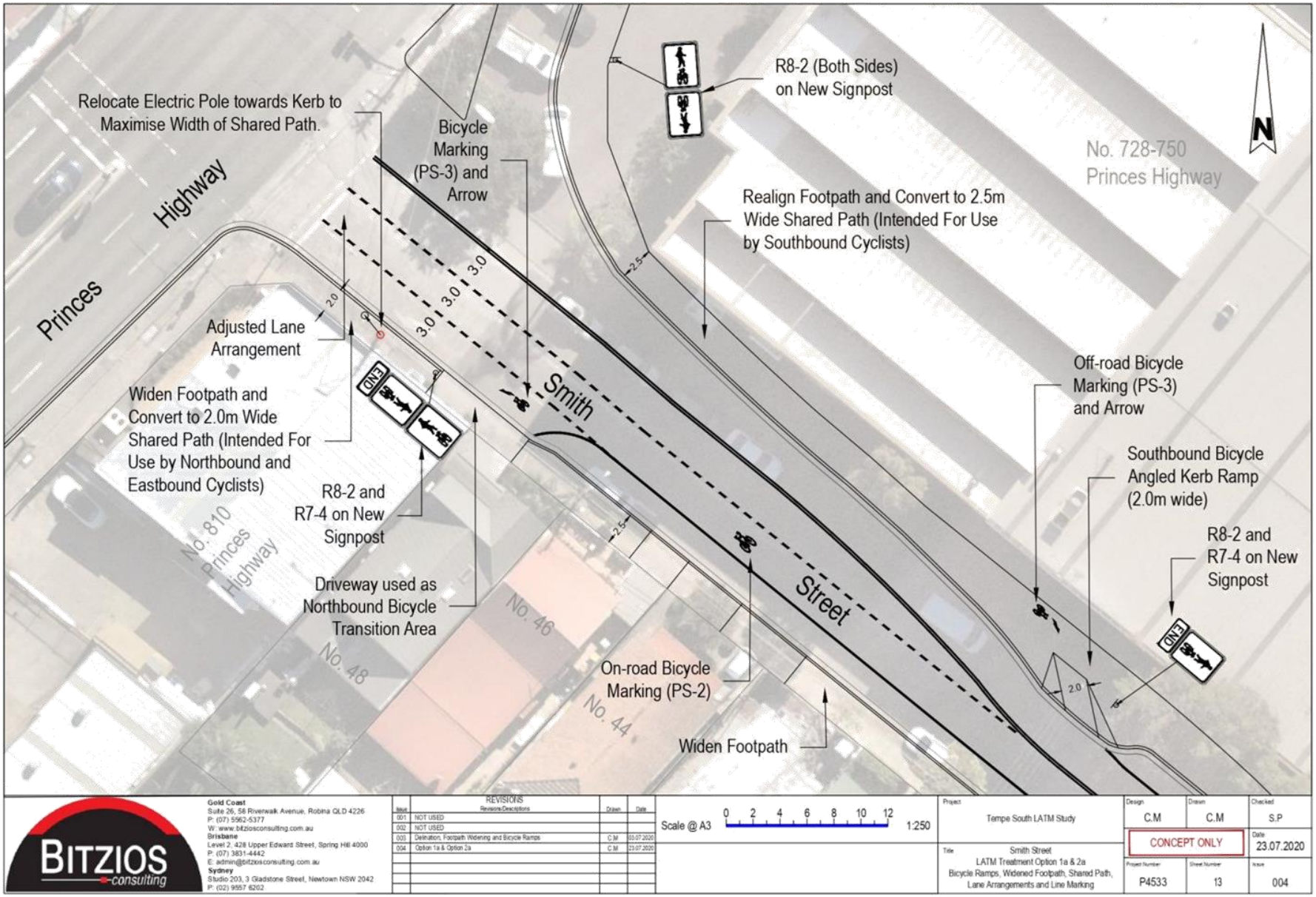
REVISIONS
Issue
Revisions/Descriptions
Drawn
Date
001 Smith Street Option 1 - No. 28 Smith Street C.M 30.04.2020
002 Added "Right Turn Only" sign C.M 19.06.2020
003 Footpath Widening C.M 03.07.2020
004 Option 1a C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Smith Street
LATM Treatment Option 1a
Kerb Blisters at No. 28 Smith Street
Design
C.M
Drawn
C.M
Checked
S.P
CONCEPT ONLY
Date
23.07.2020
Project Number
P4533
Sheet Number
12
Issue
004


Relocate Electric Pole towards Kerb to Maximise Width of Shared Path.
Bicycle Marking (PS-3) and Arrow
R8-2 (Both Sides) on New Signpost
No. 728-750 Princes Highway
Realign Footpath and Convert to 2.5m Wide Shared Path (Intended For Use by Southbound Cyclists)
Princes Highway
Adjusted Lane Arrangement
Widen Footpath and Convert to 2.0m Wide Shared Path (Intended For Use by Northbound and Eastbound Cyclists)
R8-2 and R7-4 on New Signpost
Smith Street
Off-road Bicycle Marking (PS-3) and Arrow
Southbound Bicycle Angled Kerb Ramp (2.0m wide)
R8-2 and R7-4 on New Signpost
No. 810 Princes Highway
Driveway used as Northbound Bicycle Transition Area
No. 46
No. 48
No. 44
On-road Bicycle Marking (PS-2)
Widen Footpath
N
3.0
3.0
3.0
2.0
2.5
2.5
2.0
END
END
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REVISIONS
Issue | Revisions/Descriptions | Drawn | Date
001 NOT USED
002 NOT USED
003 Delineation, Footpath Widening and Bicycle Ramps C.M 03.07.2020
004 Option 1a & Option 2a C.M 23.07.2020
Scale @ A3 0 2 4 6 8 10 12 1:250
Project: Tempe South LATM Study
Title: Smith Street LATM Treatment Option 1a & 2a Bicycle Ramps, Widened Footpath, Shared Path, Lane Arrangements and Line Marking
Design C.M
Drawn C.M
Checked S.P
CONCEPT ONLY
Date 23.07.2020
Project Number P4533
Sheet Number 13
Issue 004

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Issue	REVISIONS Revisions/Descriptions	Drawn	Date
001	NOT USED		
002	NOT USED		
003	Footpath Widening and Linemarking	C.M	03.07.2020
004	Option 1a	C.M	23.07.2020

Scale @ A3 0 2 4 6 8 10 12 1:250

Project: Tempe South LATM Study

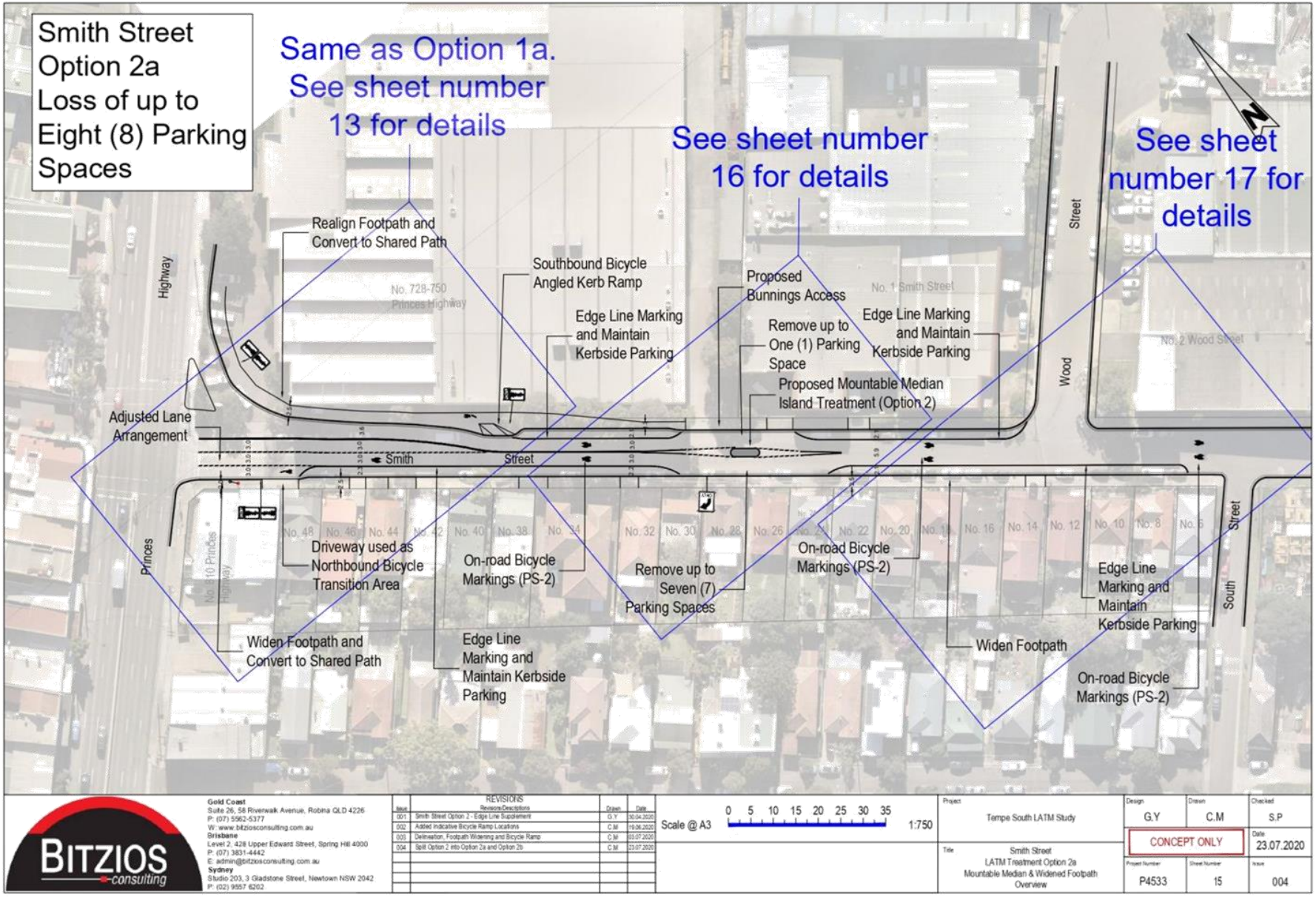
Title: Smith Street LATM Treatment Option 1a Widened Footpath and Line Marking near South Street

Design	Drawn	Checked
C.M	C.M	S.P

CONCEPT ONLY

Date: 23.07.2020

Project Number	Sheet Number	Issue
P4533	14	004


Smith Street
Option 2a
Loss of up to
Eight (8) Parking
Spaces
Same as Option 1a.
See sheet number
13 for details
See sheet number
16 for details
See sheet
number 17 for
details
Realign Footpath and
Convert to Shared Path
Southbound Bicycle
Angled Kerb Ramp
Edge Line Marking
and Maintain
Kerbside Parking
Proposed
Bunnings Access
Remove up to
One (1) Parking
Space
Edge Line Marking
and Maintain
Kerbside Parking
Proposed Mountable Median
Island Treatment (Option 2)
Adjusted Lane
Arrangement
Smith
Street
Driveway used as
Northbound Bicycle
Transition Area
On-road Bicycle
Markings (PS-2)
Remove up to
Seven (7)
Parking Spaces
On-road Bicycle
Markings (PS-2)
Edge Line
Marking and
Maintain
Kerbside Parking
Widen Footpath and
Convert to Shared Path
Edge Line
Marking and
Maintain Kerbside
Parking
Widen Footpath
On-road Bicycle
Markings (PS-2)
Highway
Princes
Wood
Street
South
No. 728-750
Princes Highway
No. 1 Smith Street
No. 2 Wood Street
No. 48
No. 46
No. 44
No. 42
No. 40
No. 38
No. 34
No. 32
No. 30
No. 28
No. 26
No. 24
No. 22
No. 20
No. 18
No. 16
No. 14
No. 12
No. 10
No. 8
No. 6
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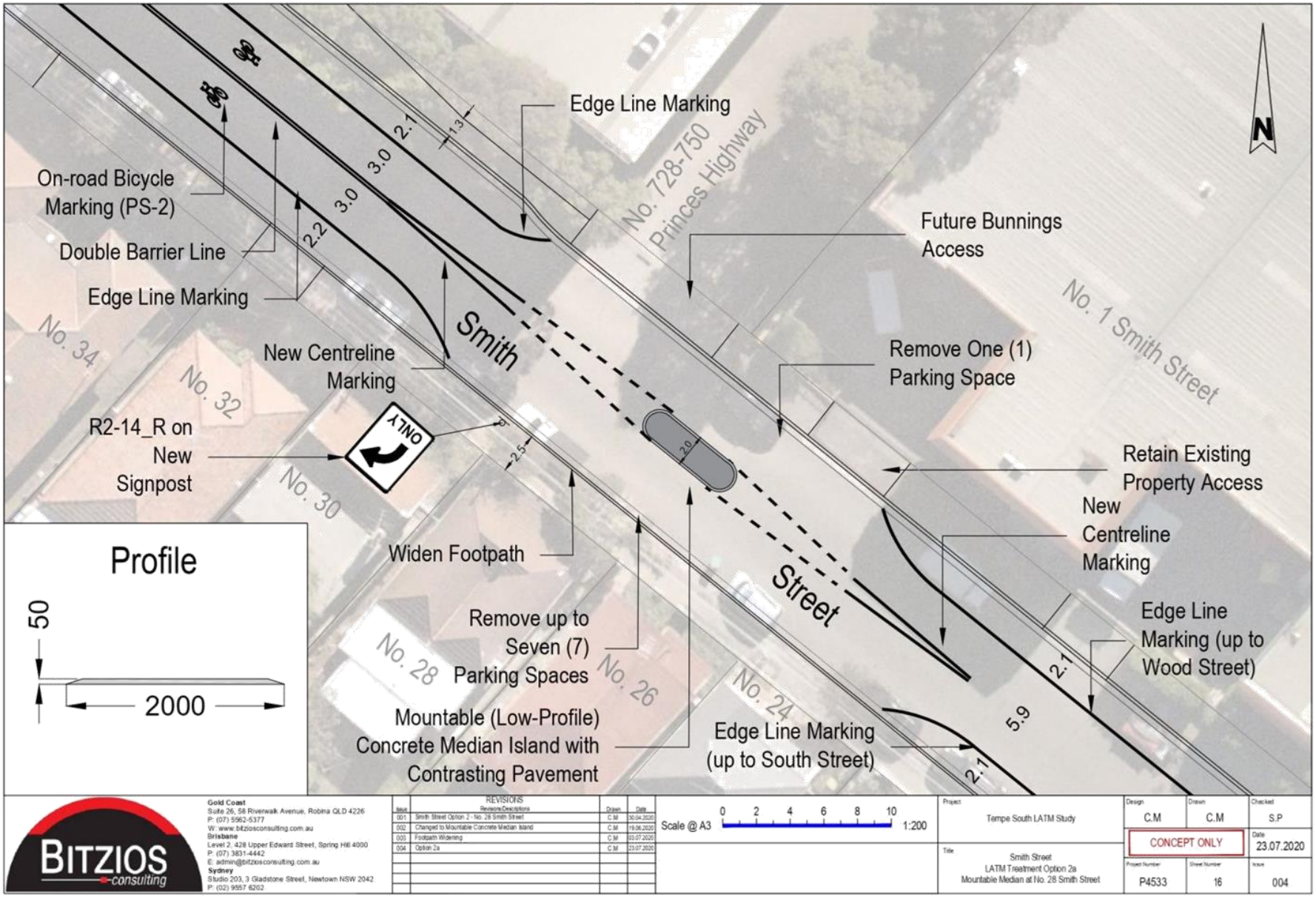
REVISIONS
Issue
Revisions/Descriptions
Drawn
Date
001 Smith Street Option 2 - Edge Line Supplement G.Y 30.04.2020
002 Added Indicative Bicycle Ramp Locations C.M 19.06.2020
003 Delineation, Footpath Widening and Bicycle Ramp C.M 03.07.2020
004 Split Option 2 into Option 2a and Option 2b C.M 23.07.2020
Scale @ A3
0 5 10 15 20 25 30 35
1:750
Project
Tempe South LATM Study
Title
Smith Street
LATM Treatment Option 2a
Mountable Median & Widened Footpath
Overview
Design
G.Y
Drawn
C.M
Checked
S.P
CONCEPT ONLY
Date
23.07.2020
Project Number
P4533
Sheet Number
15
Issue
004


Edge Line Marking
On-road Bicycle Marking (PS-2)
Double Barrier Line
Edge Line Marking
New Centreline Marking
R2-14_R on New Signpost
Widen Footpath
Remove up to Seven (7) Parking Spaces
Mountable (Low-Profile) Concrete Median Island with Contrasting Pavement
Edge Line Marking (up to South Street)
Future Bunnings Access
Remove One (1) Parking Space
Retain Existing Property Access
New Centreline Marking
Edge Line Marking (up to Wood Street)
No. 728-750 Princes Highway
No. 1 Smith Street
Smith Street
No. 34
No. 32
No. 30
No. 28
No. 26
No. 24
ONLY
3.0
3.0
2.2
2.1
1.3
2.5
2.0
5.9
2.1
2.1
N
Profile
50
2000
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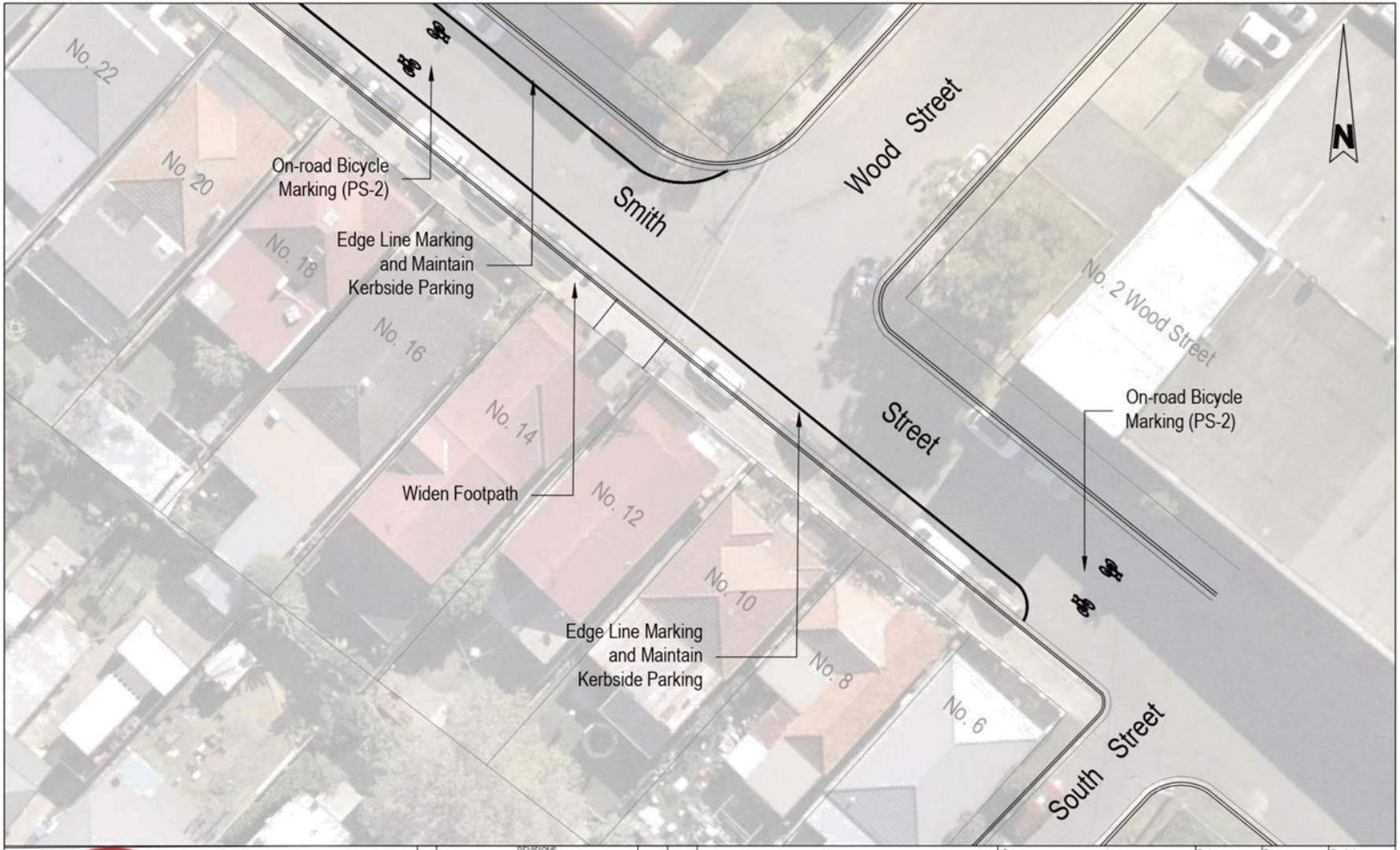
REVISIONS
Issue | Revisions/Descriptions | Drawn | Date
001 | Smith Street Option 2 - No. 28 Smith Street | C.M | 30.04.2020
002 | Changed to Mountable Concrete Median Island | C.M | 19.06.2020
003 | Footpath Widening | C.M | 03.07.2020
004 | Option 2a | C.M | 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Smith Street
LATM Treatment Option 2a
Mountable Median at No. 28 Smith Street
Design C.M
Drawn C.M
Checked S.P
CONCEPT ONLY
Date 23.07.2020
Project Number P4533
Sheet Number 16
Issue 004


No. 22
No. 20
No. 18
No. 16
No. 14
No. 12
No. 10
No. 8
No. 6
No. 2 Wood Street
On-road Bicycle Marking (PS-2)
Edge Line Marking and Maintain Kerbside Parking
Widen Footpath
Edge Line Marking and Maintain Kerbside Parking
On-road Bicycle Marking (PS-2)
Smith Street
Wood Street
South Street
N
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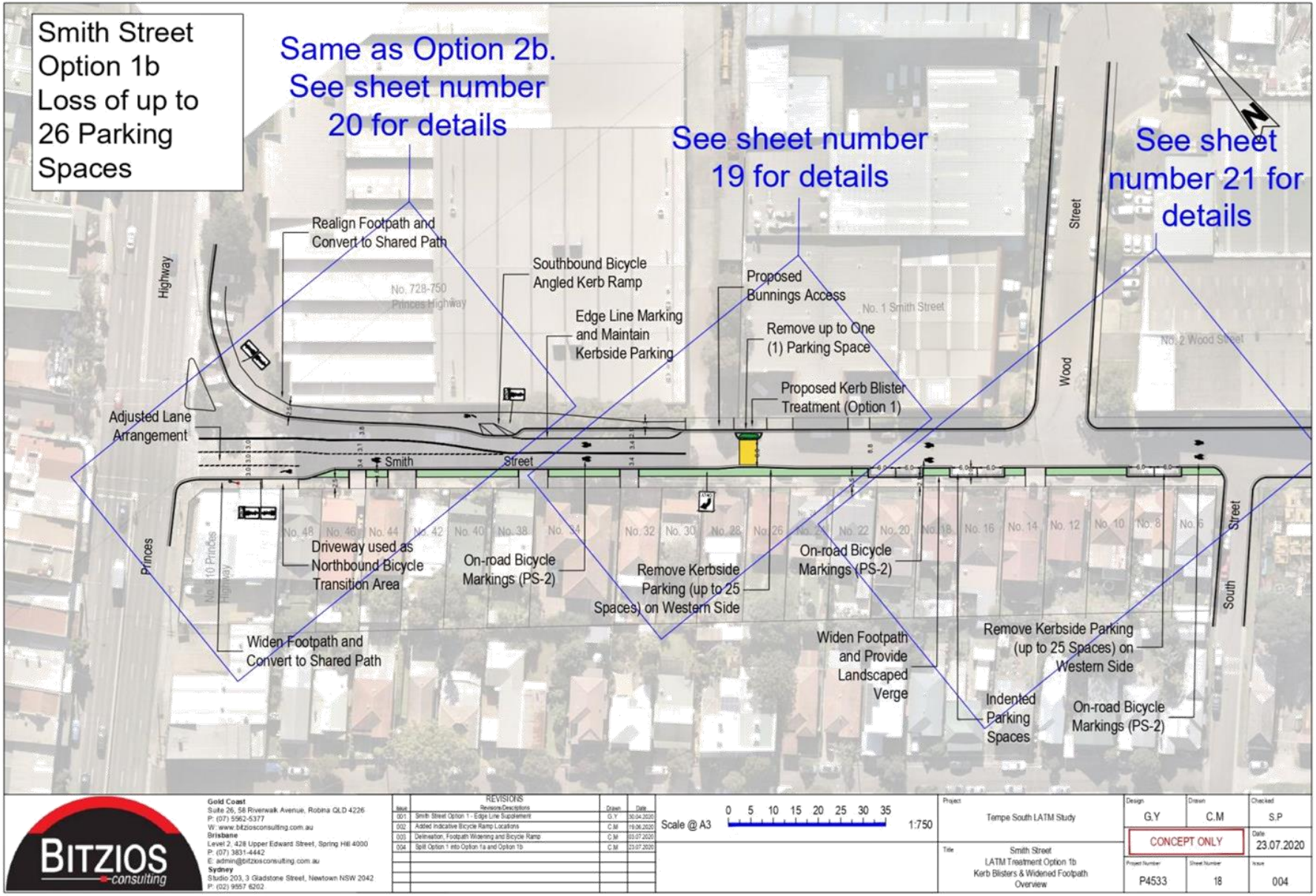
REVISIONS
Issue
Revisions/Descriptions
Drawn
Date
001 NOT USED
002 NOT USED
003 Footpath Widening and Linemarking C.M 03.07.2020
004 Option 2a C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10 12
1:250
Project
Tempe South LATM Study
Title
Smith Street
LATM Treatment Option 2a
Widened Footpath and Line Marking near South Street
Design
C.M
Drawn
C.M
Checked
S.P
CONCEPT ONLY
Date
23.07.2020
Project Number
P4533
Sheet Number
17
Issue
004


Smith Street Option 1b Loss of up to 26 Parking Spaces
Same as Option 2b. See sheet number 20 for details
See sheet number 19 for details
See sheet number 21 for details
Realign Footpath and Convert to Shared Path
Southbound Bicycle Angled Kerb Ramp
Edge Line Marking and Maintain Kerbside Parking
Proposed Bunnings Access
Remove up to One (1) Parking Space
Proposed Kerb Blister Treatment (Option 1)
Adjusted Lane Arrangement
Driveway used as Northbound Bicycle Transition Area
On-road Bicycle Markings (PS-2)
Remove Kerbside Parking (up to 25 Spaces) on Western Side
On-road Bicycle Markings (PS-2)
Widen Footpath and Convert to Shared Path
Widen Footpath and Provide Landscaped Verge
Remove Kerbside Parking (up to 25 Spaces) on Western Side
Indented Parking Spaces
On-road Bicycle Markings (PS-2)
Princes Highway
Smith Street
Wood Street
No. 728-750 Princes Highway
No. 1 Smith Street
No. 2 Wood Street
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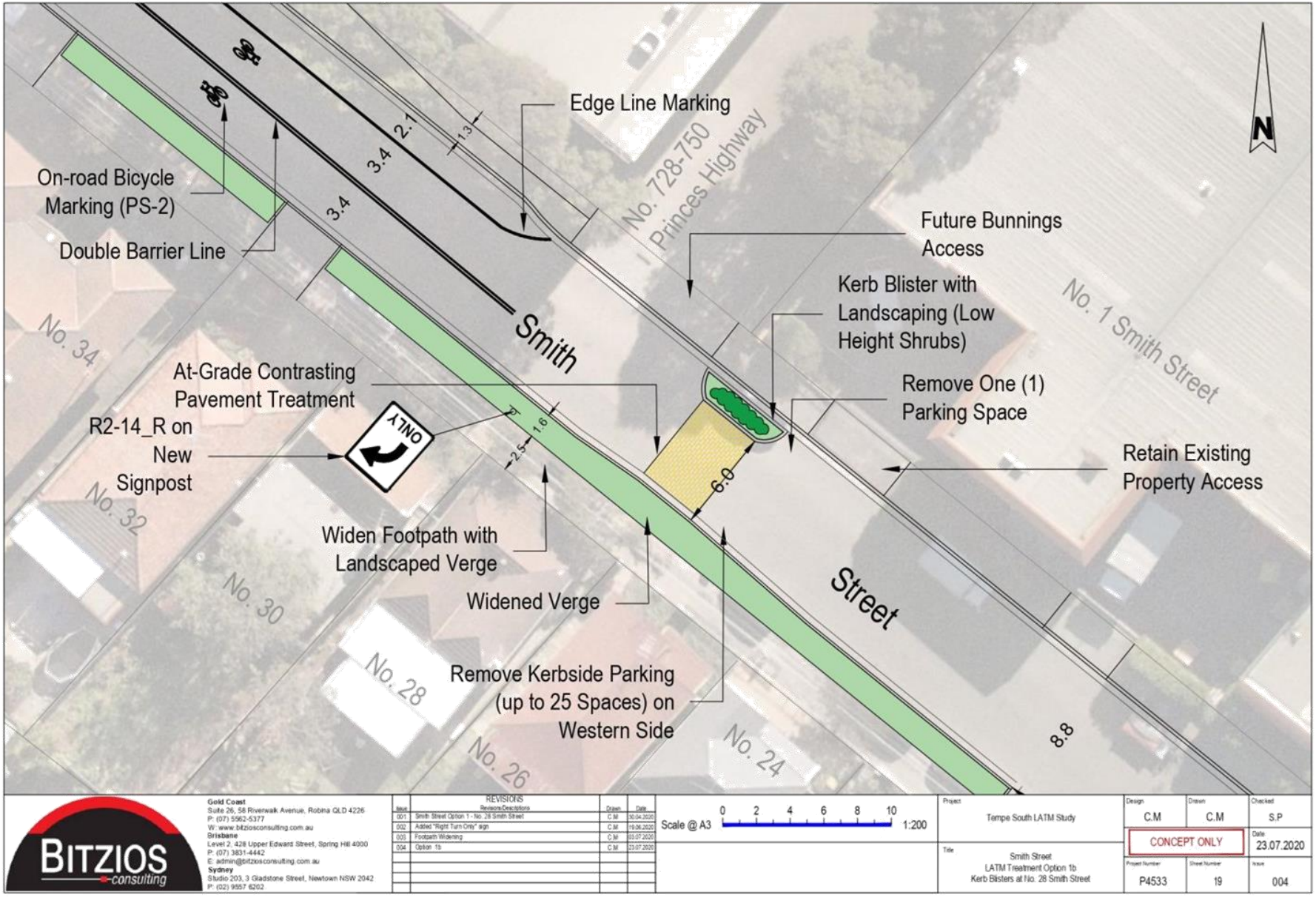
REVISIONS
Issue | Revisions/Descriptions | Drawn | Date
001 | Smith Street Option 1 - Edge Line Supplement | G.Y | 30.04.2020
002 | Added Indicative Bicycle Ramp Locations | C.M | 19.06.2020
003 | Delineation, Footpath Widening and Bicycle Ramp | C.M | 03.07.2020
004 | Split Option 1 into Option 1a and Option 1b | C.M | 23.07.2020
Scale @ A3
0 5 10 15 20 25 30 35
1:750
Project: Tempe South LATM Study
Title: Smith Street LATM Treatment Option 1b Kerb Blisters & Widened Footpath Overview
Design: G.Y
Drawn: C.M
Checked: S.P
CONCEPT ONLY
Date: 23.07.2020
Project Number: P4533
Sheet Number: 18
Issue: 004


Edge Line Marking
On-road Bicycle Marking (PS-2)
Double Barrier Line
Future Bunnings Access
Kerb Blister with Landscaping (Low Height Shrubs)
Remove One (1) Parking Space
Retain Existing Property Access
At-Grade Contrasting Pavement Treatment
R2-14_R on New Signpost
Widen Footpath with Landscaped Verge
Widened Verge
Remove Kerbside Parking (up to 25 Spaces) on Western Side
No. 728-750 Princes Highway
No. 1 Smith Street
No. 34
No. 32
No. 30
No. 28
No. 26
No. 24
Smith
Street
ONLY
3.4
2.1
1.3
3.4
1.6
2.5
6.0
8.8
N
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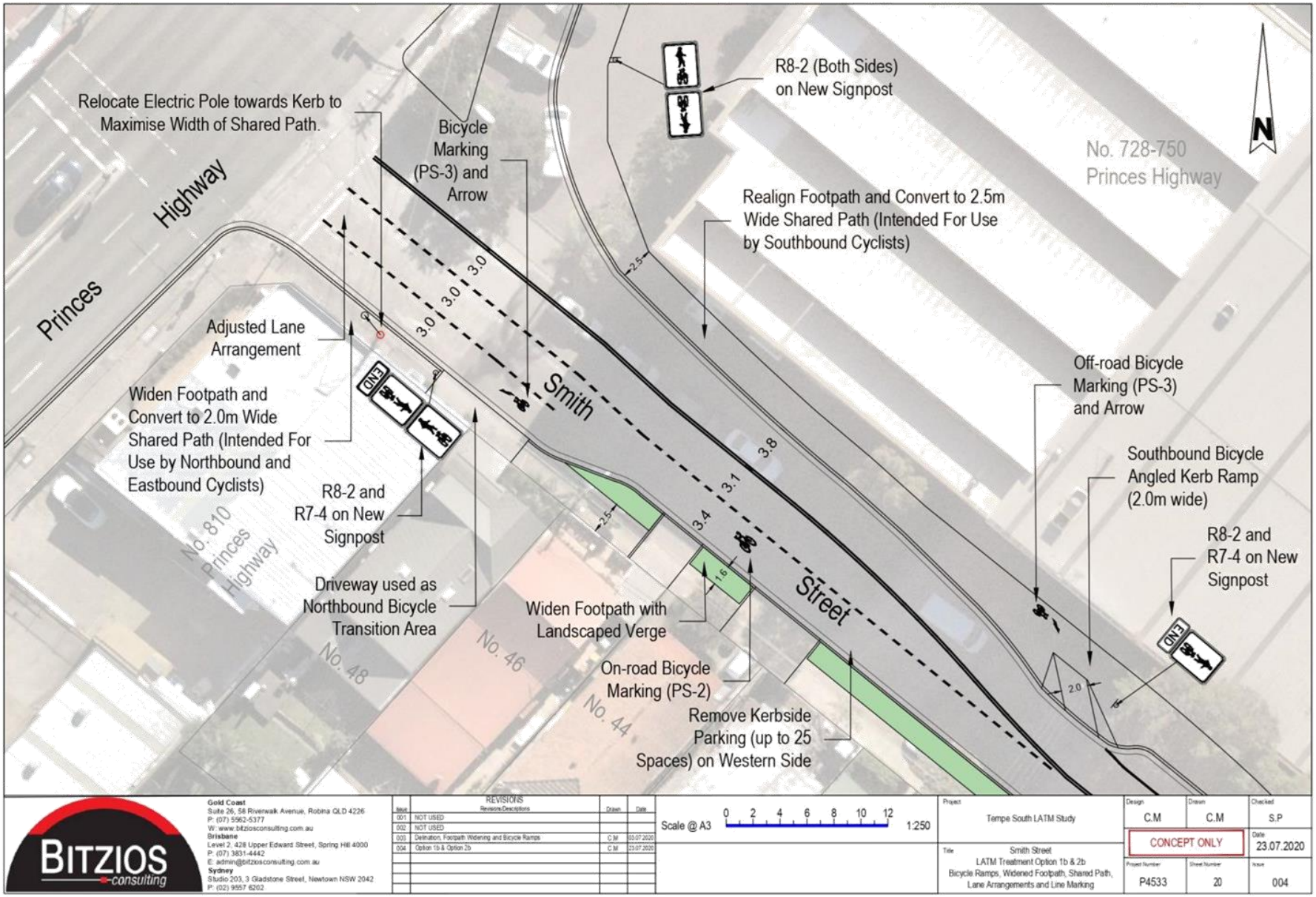
REVISIONS
Issue
Revisions/Descriptions
Drawn
Date
001 Smith Street Option 1 - No. 28 Smith Street C.M 30.04.2020
002 Added "Right Turn Only" sign C.M 19.06.2020
003 Footpath Widening C.M 03.07.2020
004 Option 1b C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Smith Street
LATM Treatment Option 1b
Kerb Blisters at No. 28 Smith Street
Design
C.M
Drawn
C.M
Checked
S.P
CONCEPT ONLY
Date
23.07.2020
Project Number
P4533
Sheet Number
19
Issue
004


Relocate Electric Pole towards Kerb to Maximise Width of Shared Path.
Bicycle Marking (PS-3) and Arrow
R8-2 (Both Sides) on New Signpost
No. 728-750 Princes Highway
Realign Footpath and Convert to 2.5m Wide Shared Path (Intended For Use by Southbound Cyclists)
Princes Highway
Adjusted Lane Arrangement
Widen Footpath and Convert to 2.0m Wide Shared Path (Intended For Use by Northbound and Eastbound Cyclists)
R8-2 and R7-4 on New Signpost
No. 810 Princes Highway
Smith Street
Off-road Bicycle Marking (PS-3) and Arrow
Southbound Bicycle Angled Kerb Ramp (2.0m wide)
R8-2 and R7-4 on New Signpost
Driveway used as Northbound Bicycle Transition Area
Widen Footpath with Landscaped Verge
On-road Bicycle Marking (PS-2)
Remove Kerbside Parking (up to 25 Spaces) on Western Side
No. 48
No. 46
No. 44
3.0
3.0
3.0
2.5
3.8
3.1
3.4
2.5
1.6
2.0
N
END
END
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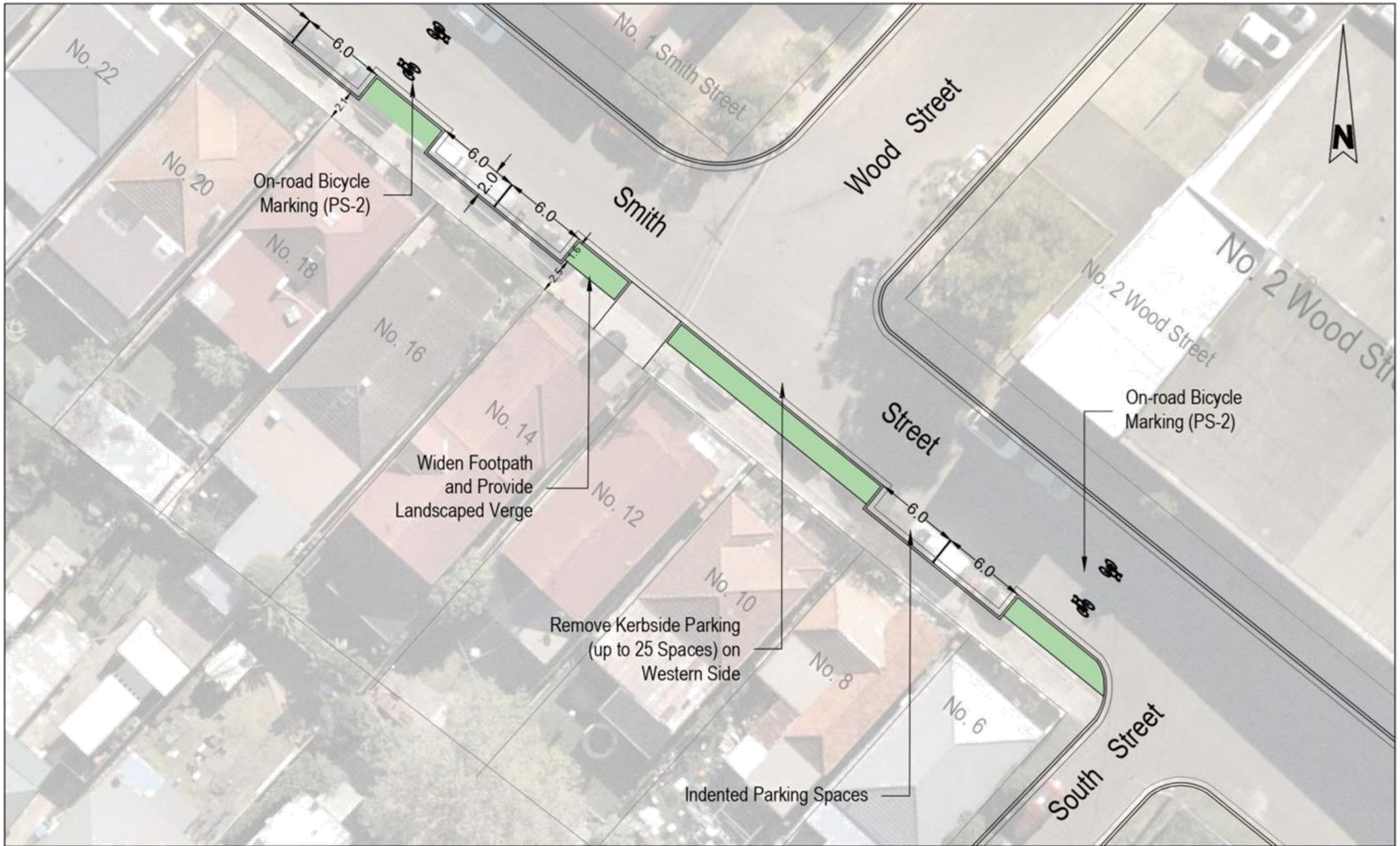
REVISIONS
Issue | Revisions/Descriptions | Drawn | Date
001 NOT USED
002 NOT USED
003 Delineation, Footpath Widening and Bicycle Ramps C.M 03.07.2020
004 Option 1b & Option 2b C.M 23.07.2020
Scale @ A3 0 2 4 6 8 10 12 1:250
Project: Tempe South LATM Study
Title: Smith Street LATM Treatment Option 1b & 2b Bicycle Ramps, Widened Footpath, Shared Path, Lane Arrangements and Line Marking
Design C.M
Drawn C.M
Checked S.P
CONCEPT ONLY
Date 23.07.2020
Project Number P4533
Sheet Number 20
Issue 004



Issue	Revisions/Descriptions	Drawn	Date	
001	NOT USED			
002	NOT USED			
003	Footpath Widening and Linemarking	C.M	03.07.2020	
004	Option 1b	C.M	23.07.2020	

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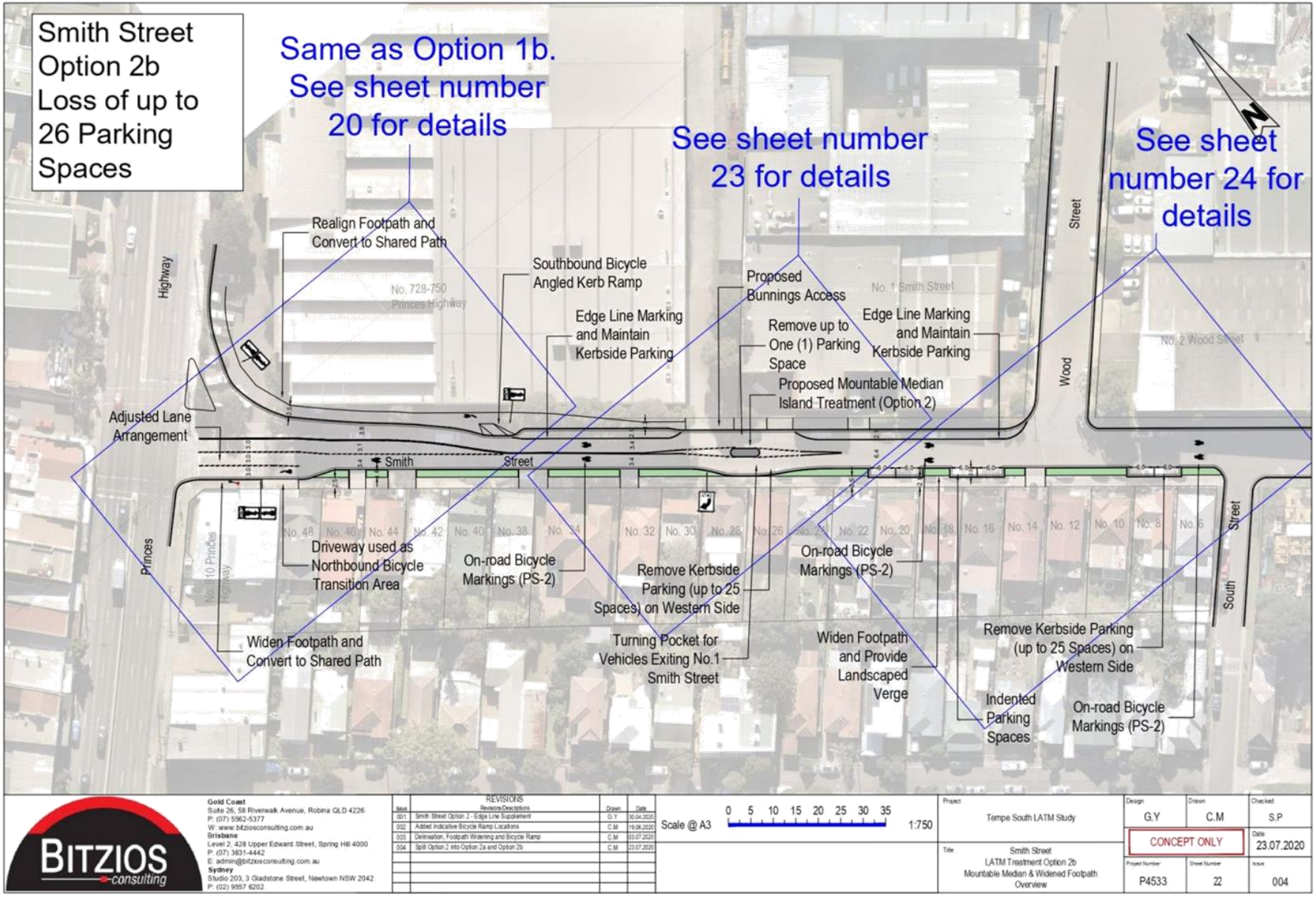
Scale @ A3 0 2 4 6 8 10 12 1:250

Project: Tempe South LATM Study
Title: Smith Street LATM Treatment Option 1b Widened Footpath and Line Marking near South Street
Design: C.M | Drawn: C.M | Checked: S.P
CONCEPT ONLY | Date: 23.07.2020
Project Number: P4533 | Sheet Number: 21 | Issue: 004


Smith Street Option 2b Loss of up to 26 Parking Spaces
Same as Option 1b. See sheet number 20 for details
See sheet number 23 for details
See sheet number 24 for details
Realign Footpath and Convert to Shared Path
Southbound Bicycle Angled Kerb Ramp
Edge Line Marking and Maintain Kerbside Parking
Proposed Bunnings Access
Remove up to One (1) Parking Space
Edge Line Marking and Maintain Kerbside Parking
Proposed Mountable Median Island Treatment (Option 2)
Adjusted Lane Arrangement
Driveway used as Northbound Bicycle Transition Area
On-road Bicycle Markings (PS-2)
Remove Kerbside Parking (up to 25 Spaces) on Western Side
On-road Bicycle Markings (PS-2)
Widen Footpath and Convert to Shared Path
Turning Pocket for Vehicles Exiting No.1 Smith Street
Widen Footpath and Provide Landscaped Verge
Remove Kerbside Parking (up to 25 Spaces) on Western Side
Indented Parking Spaces
On-road Bicycle Markings (PS-2)
Princes Highway
Smith Street
Wood Street
South Street
No. 728-750 Princes Highway
No. 1 Smith Street
No. 2 Wood Street
No. 48 No. 46 No. 44 No. 42 No. 40 No. 38 No. 34 No. 32 No. 30 No. 28 No. 26 No. 24 No. 22 No. 20 No. 18 No. 16 No. 14 No. 12 No. 10 No. 8 No. 6
No. 8-10 Princes Highway
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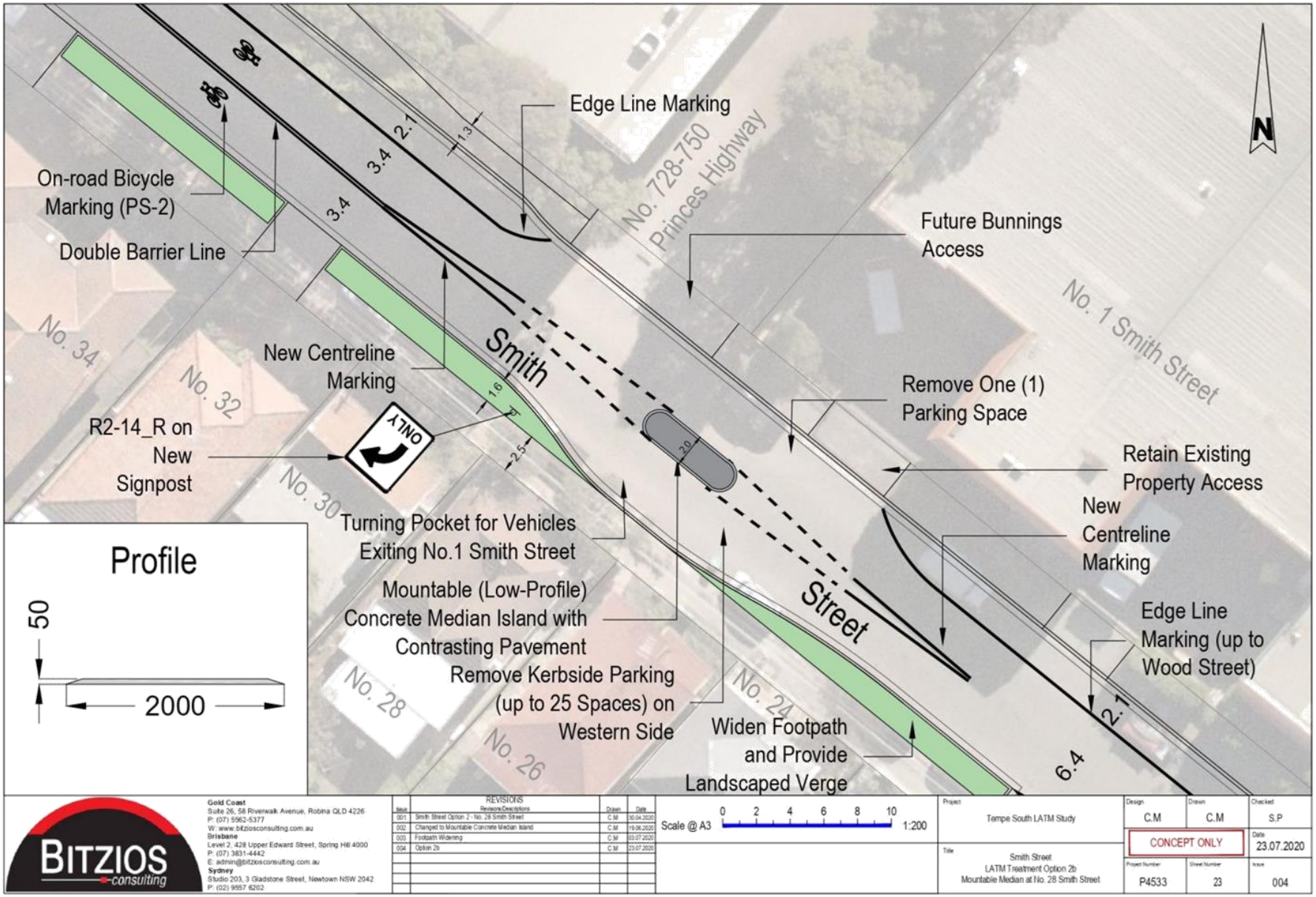
REVISIONS
Issue | Revisions/Descriptions | Drawn | Date
001 | Smith Street Option 2 - Edge Line Supplement | G.Y | 30.04.2020
002 | Added Indicative Bicycle Ramp Locations | C.M | 19.06.2020
003 | Delineation, Footpath Widening and Bicycle Ramp | C.M | 03.07.2020
004 | Split Option 2 into Option 2a and Option 2b | C.M | 23.07.2020
Scale @ A3
0 5 10 15 20 25 30 35
1:750
Project: Tempe South LATM Study
Title: Smith Street LATM Treatment Option 2b Mountable Median & Widened Footpath Overview
Design: G.Y
Drawn: C.M
Checked: S.P
CONCEPT ONLY
Date: 23.07.2020
Project Number: P4533
Sheet Number: 22
Issue: 004


Edge Line Marking
On-road Bicycle Marking (PS-2)
Double Barrier Line
New Centreline Marking
R2-14_R on New Signpost
ONLY
Turning Pocket for Vehicles Exiting No.1 Smith Street
Mountable (Low-Profile) Concrete Median Island with Contrasting Pavement
Remove Kerbside Parking (up to 25 Spaces) on Western Side
Widen Footpath and Provide Landscaped Verge
Future Bunnings Access
Remove One (1) Parking Space
Retain Existing Property Access
New Centreline Marking
Edge Line Marking (up to Wood Street)
Smith
Street
No. 728-750 Princes Highway
No. 1 Smith Street
No. 34
No. 32
No. 30
No. 28
No. 26
No. 24
N
Profile
50
2000
3.4
2.1
1.3
3.4
1.6
2.5
20
2.1
6.4
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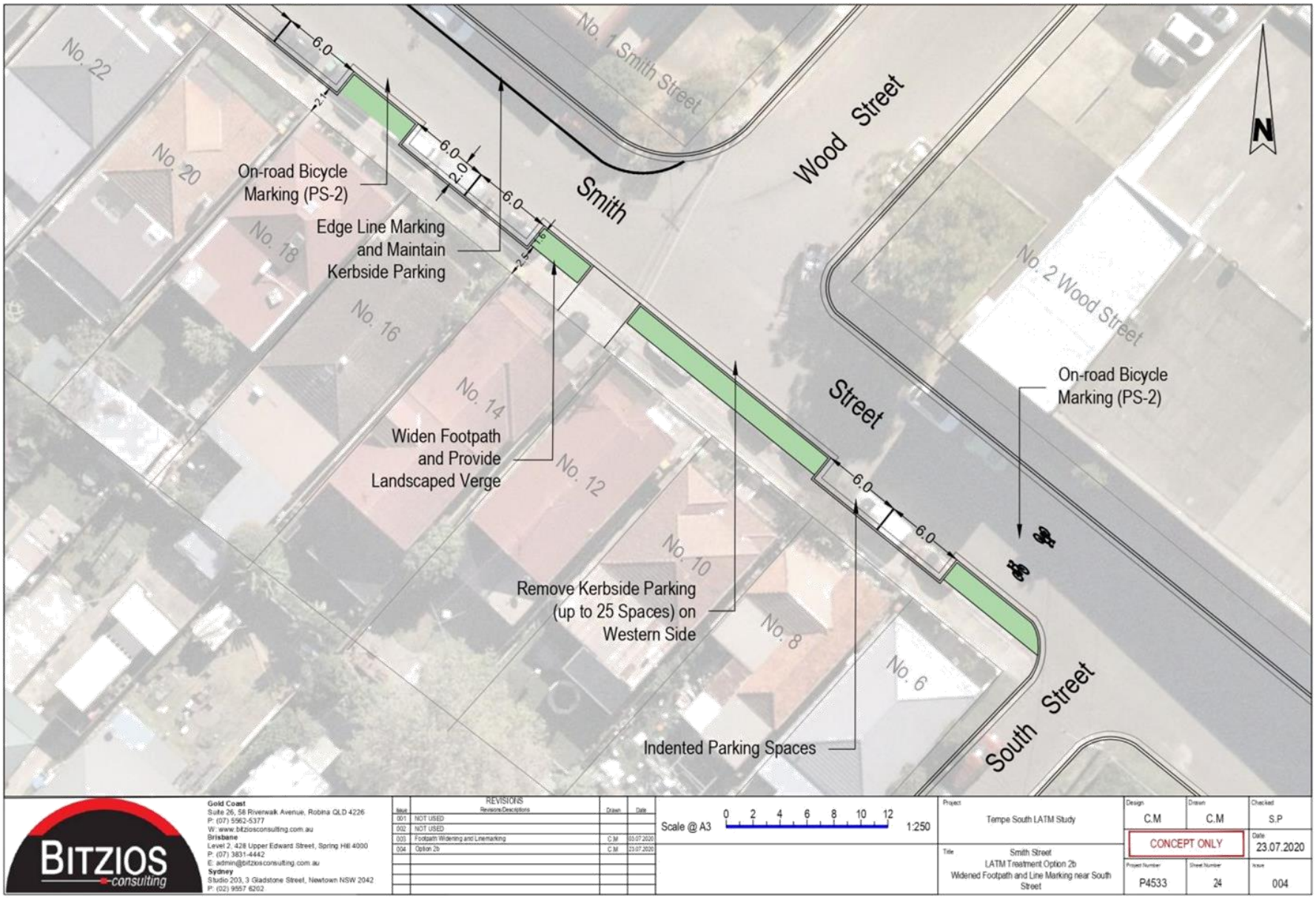
REVISIONS
Issue | Revisions/Descriptions | Drawn | Date
001 | Smith Street Option 2 - No. 28 Smith Street | C.M | 30.04.2020
002 | Changed to Mountable Concrete Median Island | C.M | 19.06.2020
003 | Footpath Widening | C.M | 03.07.2020
004 | Option 2b | C.M | 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Smith Street
LATM Treatment Option 2b
Mountable Median at No. 28 Smith Street
Design C.M
Drawn C.M
Checked S.P
CONCEPT ONLY
Date 23.07.2020
Project Number P4533
Sheet Number 23
Issue 004


No. 22
No. 20
No. 18
No. 16
No. 14
No. 12
No. 10
No. 8
No. 6
No. 1 Smith Street
No. 2 Wood Street
Wood Street
Smith Street
South Street
6.0
2.1
1.6
On-road Bicycle Marking (PS-2)
Edge Line Marking and Maintain Kerbside Parking
Widen Footpath and Provide Landscaped Verge
Remove Kerbside Parking (up to 25 Spaces) on Western Side
Indented Parking Spaces
On-road Bicycle Marking (PS-2)
N
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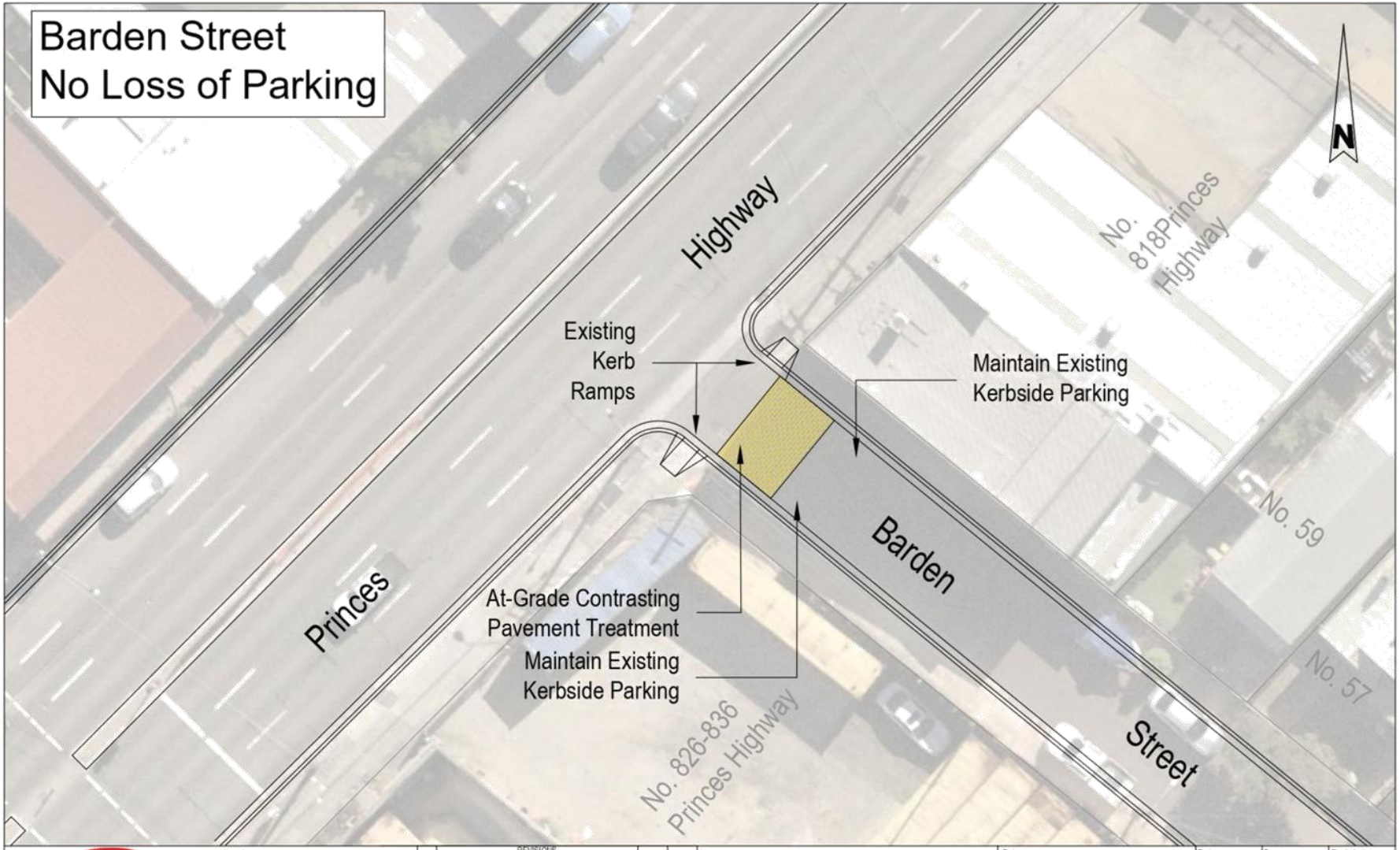
REVISIONS
Issue
Revisions/Descriptions
Drawn
Date
001 NOT USED
002 NOT USED
003 Footpath Widening and Linemarking C.M 03.07.2020
004 Option 2b C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10 12
1:250
Project
Tempe South LATM Study
Title
Smith Street
LATM Treatment Option 2b
Widened Footpath and Line Marking near South Street
Design C.M
Drawn C.M
Checked S.P
CONCEPT ONLY
Date 23.07.2020
Project Number P4533
Sheet Number 24
Issue 004


Barden Street
No Loss of Parking
N
Highway
Princes
Barden
Street
Existing
Kerb
Ramps
Maintain Existing
Kerbside Parking
At-Grade Contrasting
Pavement Treatment
Maintain Existing
Kerbside Parking
No. 818Princes
Highway
No. 59
No. 57
No. 826-836
Princes Highway
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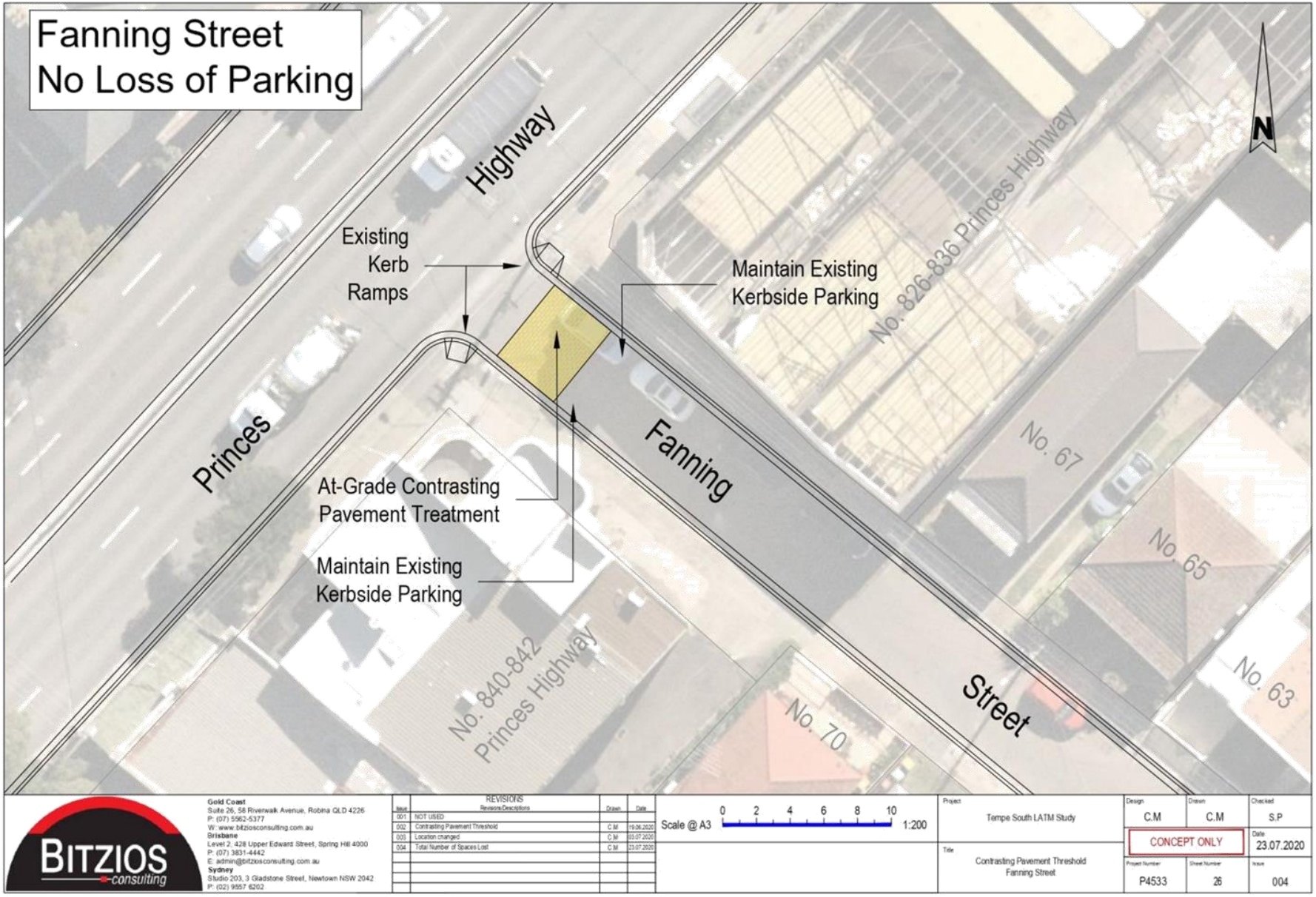
REVISIONS
Issue
Revisions/Descriptions
Drawn
Date
001 NOT USED
002 NOT USED
003 Contrasting Pavement Threshold C.M 03.07.2020
004 Total Number of Spaces Lost C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Contrasting Pavement Threshold
Barden Street
Design
C.M
Drawn
C.M
Checked
S.P
CONCEPT ONLY
Date
23.07.2020
Project Number
P4533
Sheet Number
25
Issue
004


Fanning Street
No Loss of Parking
Existing
Kerb
Ramps
Maintain Existing
Kerbside Parking
At-Grade Contrasting
Pavement Treatment
Maintain Existing
Kerbside Parking
Princes
Highway
Fanning
Street
No. 826-836 Princes Highway
No. 840-842
Princes Highway
No. 67
No. 65
No. 63
No. 70
N
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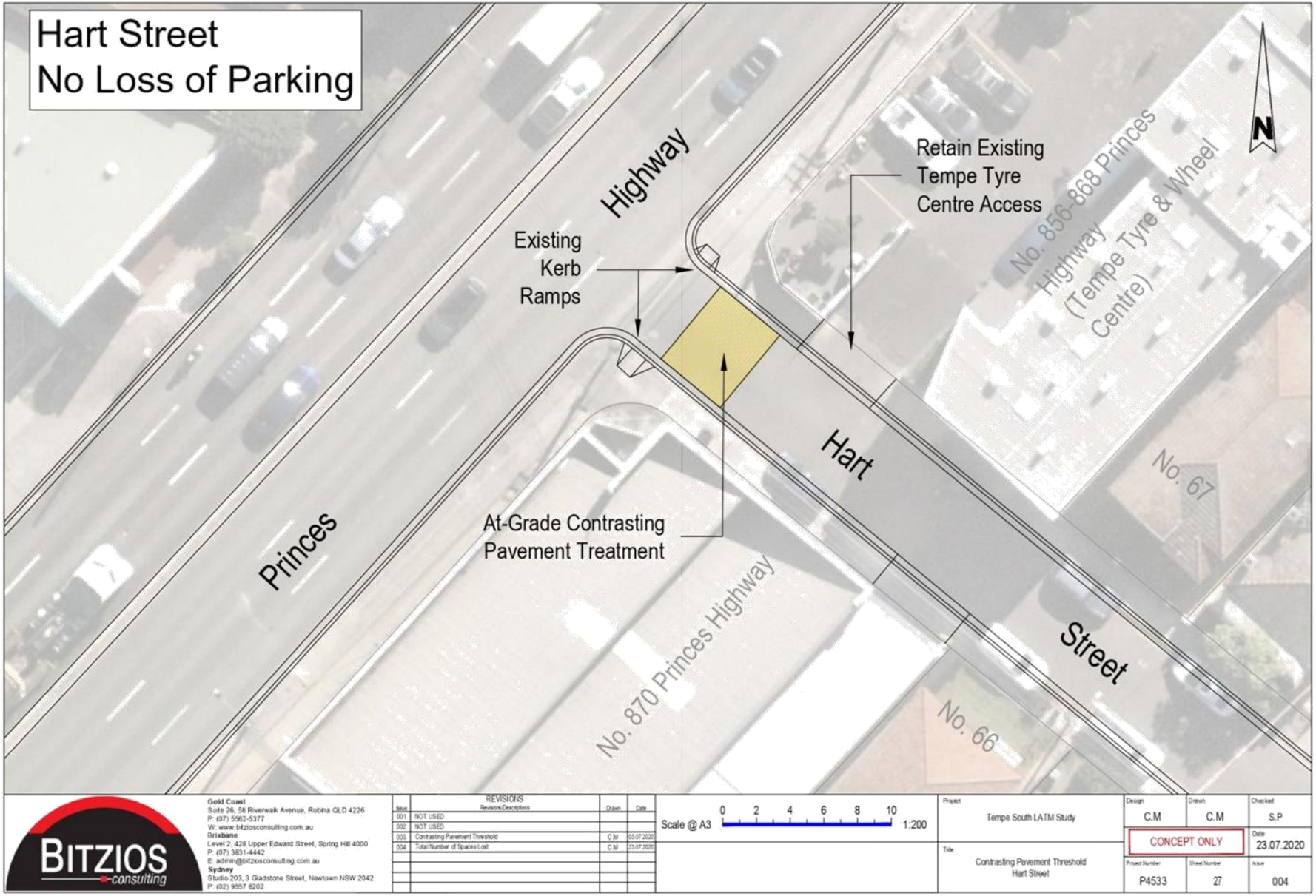
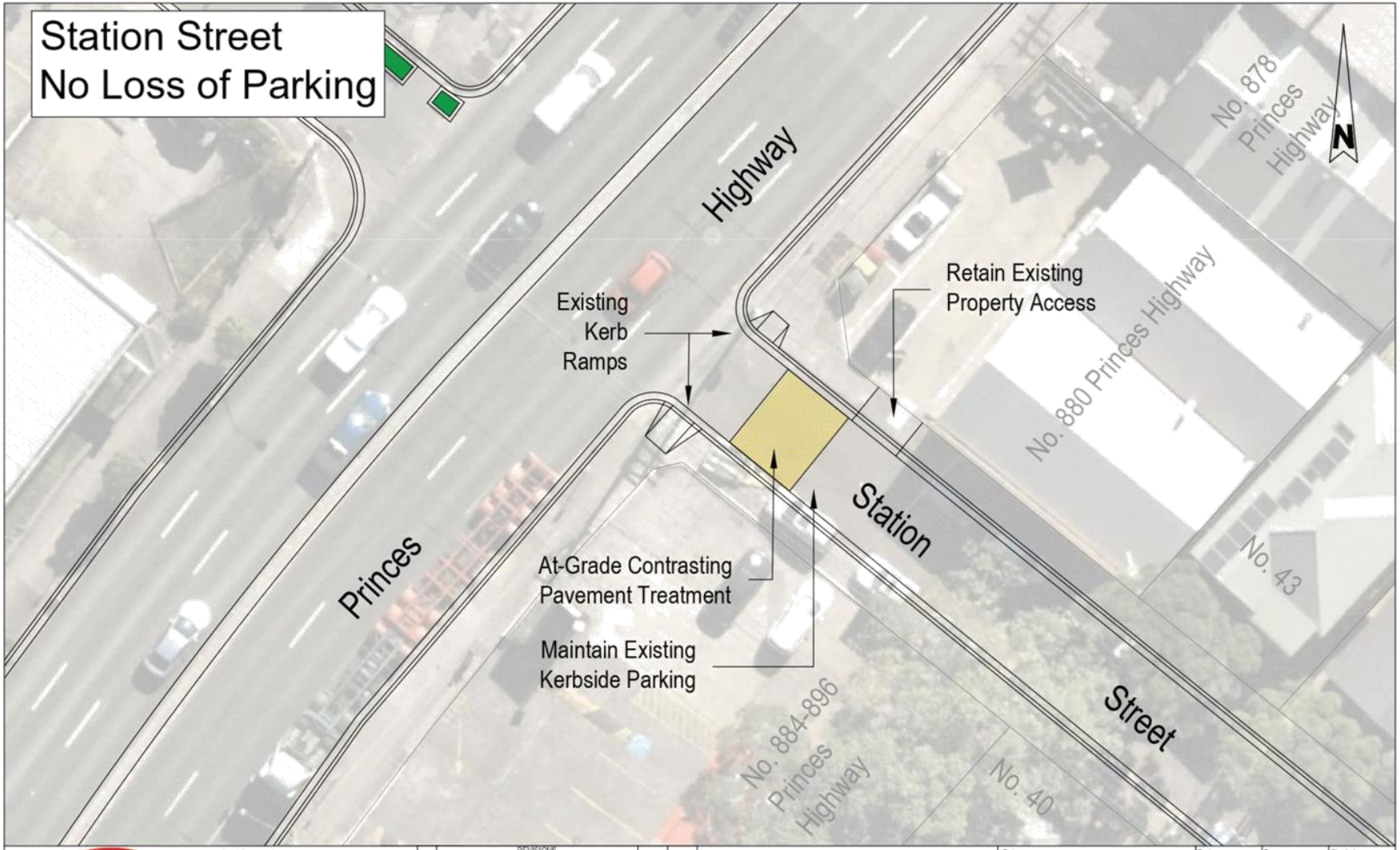
P: (02) 9557 6202
REVISIONS
Issue
Revisions/Descriptions
Drawn
Date
001 NOT USED
002 Contrasting Pavement Threshold C.M 19.06.2020
003 Location changed C.M 03.07.2020
004 Total Number of Spaces Lost C.M 23.07.2020
Scale @ A3
0 2 4 6 8 10
1:200
Project
Tempe South LATM Study
Title
Contrasting Pavement Threshold
Fanning Street
Design
C.M
Drawn
C.M
Checked
S.P
CONCEPT ONLY
Date
23.07.2020
Project Number
P4533
Sheet Number
26
Issue
004


Hart Street
No Loss of Parking
Highway
Princes
Hart
Street
Retain Existing
Tempe Tyre
Centre Access
Existing
Kerb
Ramps
At-Grade Contrasting
Pavement Treatment
No. 856-868 Princes Highway (Tempe Tyre & Wheel Centre)
No. 67
No. 870 Princes Highway
No. 66
N
Scale @ A3
0 2 4 6 8 10
1:200
Tempe South LATM Study
Contrasting Pavement Threshold
Hart Street
CONCEPT ONLY
P4533
27
004
23.07.2020


Station Street
No Loss of Parking
Highway
Princes
Station
Street
Existing
Kerb
Ramps
Retain Existing
Property Access
At-Grade Contrasting
Pavement Treatment
Maintain Existing
Kerbside Parking
No. 878
Princes
Highway
No. 880 Princes Highway
No. 43
No. 884-896
Princes
Highway
No. 40
N
Scale @ A3
0 2 4 6 8 10
1:200
Tempe South LATM Study
Contrasting Pavement Threshold
Station Street
C.M
C.M
S.P
CONCEPT ONLY
23.07.2020
P4533
28
004
REVISIONS
001 NOT USED
002 NOT USED
003 Contrasting Pavement Threshold C.M 03.07.2020
004 Total Number of Spaces Lost C.M 23.07.2020