## Design for a better *future /*

CITY OF SYDNEY

OXFORD STREET CYCLEWAY

REVIEW OF ENVIRONMENT FACTORS

**\\S**P

SEPTEMBER 2023

# Question today Imagine tomorrow Create for the future

#### Oxford Street Cycleway Review of Environment Factors

City of Sydney

WSP Level 27, 680 George Street Sydney NSW 2000 GPO Box 5394 Sydney NSW 2001

Tel: +61 2 9272 5100 Fax: +61 2 9272 5101 wsp.com

REV	DATE	DETAILS
1	29/04/22	Draft 1
2	16/08/23	Final

	NAME	DATE	SIGNATURE
Prepared by:	T. Nguyen A. Pinnock	29/04/22	Que Manuela
	P. Karmacharya	11/09/23	higyate
Reviewed by:	B. Lean	29/04/22	Buutter
Approved by:	B. Groth	11/09/23	Baroth

This document may contain confidential and legally privileged information, neither of which are intended to be waived, and must be used only for its intended purpose. Any unauthorised copying, dissemination or use in any form or by any means other than by the addressee, is strictly prohibited. If you have received this document in error or by any means other than as authorised addressee, please notify us immediately and we will arrange for its return to us.

## TABLE OF CONTENTS

wsp

EXECUTIVE SUMMARYV		
1	INTRODUCTION11	
1.1	PROPOSAL IDENTIFICATION11	
1.2	PURPOSE OF THE REPORT11	
2	NEED AND OPTIONS CONSIDERED14	
2.1	STRATEGIC NEED FOR THE PROPOSAL14	
2.2	PROPOSAL OBJECTIVES AND DEVELOPMENT CRITERIA	
2.3	ALTERNATIVES AND OPTIONS CONSIDERED 19	
2.4	PREFERRED OPTION21	
2.5	DESIGN REFINEMENTS	
3	PROPOSAL DESCRIPTION23	
3.1	SITE LOCATION AND CONTEXT	
3.2	DESIGN	
3.3	CONSTRUCTION ACTIVITIES	
4	STATUTORY AND PLANNING FRAMEWORK40	
<b>4</b> 4.1	STATUTORY AND PLANNING FRAMEWORK40 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 197940	
-	ENVIRONMENTAL PLANNING AND ASSESSMENT	
4.1	ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979	
4.1 4.2	ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979	
4.1 4.2 4.3	ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979	
4.1 4.2 4.3 4.4	ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979	
4.1 4.2 4.3 4.4 4.5	ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979	
4.1 4.2 4.3 4.4 4.5 4.6	ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979	
4.1 4.2 4.3 4.4 4.5 4.6 5	ENVIRONMENTAL PLANNING AND ASSESSMENT         ACT 1979         40         LOCAL ENVIRONMENTAL PLANS         41         OTHER RELEVANT NSW LEGISLATION         43         COMMONWEALTH LEGISLATION         44         ECOLOGICALLY SUSTAINABLE DEVELOPMENT         45         CONFIRMATION OF STATUTORY POSITION         46	
4.1 4.2 4.3 4.4 4.5 4.6 5 5.1	ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 197940LOCAL ENVIRONMENTAL PLANS41OTHER RELEVANT NSW LEGISLATION43COMMONWEALTH LEGISLATION44ECOLOGICALLY SUSTAINABLE DEVELOPMENT45CONFIRMATION OF STATUTORY POSITION45COMMUNITY AND AGENCY CONSULTATION46CONSULTATION STRATEGY46	
4.1 4.2 4.3 4.4 4.5 4.6 5 5.1 5.2	ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 197940LOCAL ENVIRONMENTAL PLANS41OTHER RELEVANT NSW LEGISLATION43COMMONWEALTH LEGISLATION44ECOLOGICALLY SUSTAINABLE DEVELOPMENT45CONFIRMATION OF STATUTORY POSITION45COMMUNITY AND AGENCY CONSULTATION46COMMUNITY INVOLVEMENT46	
4.1 4.2 4.3 4.4 4.5 4.6 5 5.1 5.2 5.3	ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 197940LOCAL ENVIRONMENTAL PLANS41OTHER RELEVANT NSW LEGISLATION43COMMONWEALTH LEGISLATION44ECOLOGICALLY SUSTAINABLE DEVELOPMENT45CONFIRMATION OF STATUTORY POSITION45COMMUNITY AND AGENCY CONSULTATION46COMMUNITY INVOLVEMENT46ABORIGINAL COMMUNITY INVOLVEMENT47	

# wsp

6	ENVIRONMENTAL ASSESSMENT	49
6.1	TRAFFIC AND TRANSPORT	49
6.2	NOISE AND VIBRATION	60
6.3	AIR QUALITY	66
6.4	NON-ABORIGINAL HERITAGE	68
6.5	HYDROLOGY, FLOODING, AND WATER QUALITY	72
6.6	SOCIO ECONOMIC	73
6.7	OTHER IMPACTS	76
6.8	CUMULATIVE IMPACTS	81
7	ENVIRONMENTAL MANAGEMENT	82
7.1	ENVIRONMENTAL MANAGEMENT PLANS (OR SYSTEM)	82
7.2	SUMMARY OF SAFEGUARDS AND MANAGEMENT MEASURES	82
7.3	LICENSING AND APPROVALS	88
8	CONCLUSION	89
8.1	JUSTIFICATION	89
8.2	OBJECTS OF THE EP&A ACT	90
8.3	CONCLUSION	92
9	CERTIFICATION	93
10	BIBLIOGRAPHY	94
TERMS	S AND ACRONYMS USED IN THIS REF	94

#### LIST OF TABLES

TABLE 2.1 OTHER STRATEGIC STRATEGIES AND POLICIES	15
TABLE 2.2 OVERVIEW OF OPTION 2 – CENTRE RUNNING CYCLEWAY	19
TABLE 2.3 OVERVIEW OF OPTION 3 – NORTHSIDE BI-	
DIRECTIONAL CYCLEWAY	20
TABLE 2.4 OPTIONS ANALYSIS	20
TABLE 2.5 OVERVIEW OF DESIGN REFINEMENT	22
TABLE 3.1 SUMMARY OF PROPOSAL FEATURES	24
TABLE 3.2 KEY DESIGN ELEMENTS	33

# wsp

TABLE 3.3 E	XISTING ENGINEERING CONSTRAINTS	34
TABLE 3.4 P	ROPOSED CONSTRUCTION METHODOLOGY	35
TABLE 3.5 IN	IDICATIVE PLANT AND EQUIPMENT REQUIRED FOR	
	CONSTRUCTION	
	YDNEY LEP LAND USE ZONING	
TABLE 6.1 B	US SERVICES WITHIN STUDY AREA	51
TABLE 6.2 C	ONSTRUCTION IMPACTS	55
TABLE 6.3 O	PERATIONAL IMPACT OF THE PROPOSAL	56
TABLE 6.4 T	RAFFIC AND TRANSPORT SAFEGUARDS AND MANAGEMENT MEASURES	59
TABLE 6.5 N	ON-RESIDENTIAL SENSITIVE RECEIVERS LOCATED NEAR THE PROPOSED WORKS AND DISTANCE	60
TABLE 6.6 N	OISE AREA CRITERIA FOR NOMINATED CONSTRUCTION NOISE AS A RESULT OF THE PROPOSED WORKS	62
TABLE 6.7 N	OISE AREA CRITERIA FOR NOMINATED CONSTRUCTION NOISE AS A RESULT OF THE PROPOSED WORKS AT NIGHT	63
TABLE 6.8 P	REDICTED NOISE IMPACT TO NON-RESIDENTIAL SENSITIVE RECEIVERS	63
TABLE 6.9 P	REDICTED NOISE IMPACT DURING EVENING AND NIGHT TO SENSITIVE RECEIVERS	63
TABLE 6.10 I	NOISE AND VIBRATION SAFEGUARDS AND MANAGEMENT MEASURES	64
TABLE 6.11 I	HISTORICAL ITEMS NEAR THE PROPOSAL	68
TABLE 6.12	SAFEGUARDS AND MANAGEMENT MEASURES FOR HYDROLOGY, FLOODING AND WATER QUALITY	70
	PROPOSAL AREA DEMOGRAPHICS SUMMARY	
TABLE 6.14 (	OTHER POTENTIAL ENVIRONMENTAL IMPACTS AS A RESULT OF THE PROPOSAL	76
TABLE 7.1 S	UMMARY OF SAFEGUARDS AND ENVIRONMENTAL MANAGEMENT MEASURES	83
TABLE 7.2	SUMMARY OF LICENSING AND APPROVALS REQUIRED	

#### LIST OF FIGURES

FIGURE 2.1.1.1 OVERVIEW OF THE PROPOSAL	13
FIGURE 3.1.1.1 SURROUNDING LAND USE	24
FIGURE 3.1.2.1 OVERVIEW OF PROPOSAL FEATURES BY ID (1 OF 2)	
FIGURE 3.1.2.2 OVERVIEW OF PROPOSAL FEATURES BY ID (2 OF 2)	

# wsp

FIGURE 3.2.1.1 PROPOSED LANE CONFIGURATION OF OXFORD STREET (SECTION VIEW)	34
FIGURE 3.2.1.2 PROPOSED LANE CONFIGURATION OF OXFORD STREET WITH BUS MEDIAN ISLAND (SECTION VIEW)	34
FIGURE 3.3.8.1 LAYDOWN AREAS FOR THE PROPOSAL	38
FIGURE 6.1.1.1 EXISTING CYCLING INFRASTRUCTURE ON OXFORD STREET AND SURROUNDS	50
FIGURE 6.1.1.2 EXISTING PARKING RESTRICTIONS ON OXFORD STREET	52
FIGURE 6.1.2.1 TEMPORARY BUS STOP LOCATIONS DURING CONSTRUCTION	54
FIGURE 6.1.2.2 OVERVIEW OF MAJOR CHANGES TO OPERATION OF OXFORD STREET AND LIVERPOOL STREET	56
FIGURE 6.4.2.1 APPROXIMATE HERITAGE CURTILAGE OF THE 'GOVERNOR'S DOMAIN AND CIVIC PRECINCT' (IN RED OUTLINE) AND THE PROPOSAL (IN BLUE SHADING)	70
FIGURE 6.4.2.2 PROXIMITY OF OXFORD STREET HERITAGE	70
CONSERVATION AREA (RED HASHED) AND THE	
PROPOSAL (BLUE SHADING)	71

#### LIST OF APPENDICES

APPENDIX A	OPTION 2 DESIGN	
APPENDIX B	OPTION 3 (PREFERRED DES	SIGN)
APPENDIX C	CONSIDERATION OF SECTION	ON 171 FACTORS
	MATTERS OF NATIONAL EN SIGNIFICANCE CHECKLIST	VIRONMENTAL
APPENDIX E	T&I SEPP CONSULTATION C	CHECKLIST
APPENDIX F	TRAFFIC AND TRANSPORT	ASSESSMENT
APPENDIX G	HERITAGE IMPACT STATEM	1ENT
APPENDIX H	ENGAGEMENT REPORT	
	CONSTRUCTION AND MAINT ESTIMATOR	ENANCE NOISE

## **EXECUTIVE SUMMARY**

This document is a Review of Environmental Factors (REF) for construction and operations of a new cycleway (hereafter referred to as the 'Oxford Street Cycleway', or 'the Proposal' under Division 5.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). The purpose of the REF is to describe the Proposal, to document the likely impacts of the Proposal on the environment, and to detail the safeguards and management measures that would be implemented when constructing and operating the Proposal.

This REF has been prepared by WSP on behalf of the City of Sydney.

## THE PROPOSAL

The City of Sydney proposes to construct a new bi-directional cycleway between Liverpool Street, CBD and Flinders Street toward Darlinghurst/Surry Hills. The new cycleway would comprise an arrangement that provides a safer cycle network for commuters while maintaining pedestrian access. The construction footprint is defined as the extent of the land that would be directly used for the construction of the Proposal, which begins in the Sydney CBD on Liverpool Street at Castlereagh Street and extending for approximately 900 kilometres to the south-east along Oxford Street and ends approximately at Flinders Street towards Darlinghurst/ Surry Hills.

The proposed cycleway would be inserted into the existing road carriageway between existing footpath kerb alignments, minimising civil works and changes to services and utilities.

The key features of the Proposal include:

- Establishment of temporary construction compounds required to construct the Proposal.
- Construction of a new bi-directional cycleway along Liverpool approximately 900 metres in length
- New pavement markings including pedestrian lane markings and roadway line markings
- Adjustment of existing road and pavement, including modification to existing kerb alignment and kerb connections, street signage, footpath and median islands
- Modification of kerb side uses (parking, delivery, no stopping) along Oxford Street
- New asphalt resurfacing of the majority of the roadway within the extent of works, from Elizabeth Street to Flinders Street
- Removal and replacement of old median islands for bus boarding areas with an enlarged painted median island at the intersection of Liverpool Street and Elizabeth Street, including a bus shelter and garden beds
- Establishment of a new cycleway access entrance at the intersection of Liverpool Street and Elizabeth Street
- Relocation of existing bus stops from Liverpool Street to Elizabeth Street
- Provision of a new bus lane along Oxford Street (westbound and eastbound) and Elizabeth Street (southbound)
- Ongoing use and operation of the road
- New line marking on adjacent pavement, roads and on the cycleway.

Utility adjustments are not determined at this level of design and would be further evaluated and identified in detailed design. Work involving adjustment, relocation, upgrade or replacement of utilities would be subject to separate approval from the relevant authority.

## NEED FOR THE PROPOSAL

Usage forecasts and studies have estimated additional levels of cycling which would be generated from the expansion and improvement of cycle networks. The construction and operation of the cycleway at Oxford Street would provide benefits arising from increased levels of cycling including travel time savings, environmental savings including greenhouse gas emissions, air pollution and noise, savings on public transport vehicle operation and purchase, infrastructure investment timing and budget and health benefits and journey ambience to its users. The Proposal would also reduce congestion, improve safety, provide road connection to new residential communities, and provide additional road capacity to cater for future demands. The Proposal would also improve urban amenity around Sydney CBD by providing better pedestrian and cycling facilities and improved urban landscaped areas for the benefit of the local community and visitors.

Construction of the cycleway at Oxford Street would separate vehicular and cycle traffic, enabling exclusive use of the path for cyclists. Cyclists would be segregated from general traffic by a physical barrier and would have a significant influence on emolliating safety concerns the commuters may have. The Proposal would have a long-term benefit on cycle usage, meeting the strong shift in Sydney's cycling demand.

The proposed cycleway is consistent with government objectives, specifically to improve access for cyclists while minimising the potential impacts on the environment. The inner Sydney Regional Bicycle Network is anticipated to play an important role in supporting local and NSW Government objectives to increase cycle mode shares. The Proposal's upgrade of improved road infrastructure and active transport supports the existing and future development of the area and aligns with the Future Transport Strategy, NSW State Infrastructure Strategy 2022-2042, Sydney's Cycling Future: Cycling for Everyday Transport and Active Transport Strategy.

## PROPOSAL OBJECTIVES AND DEVELOPMENT CRITERIA

The Proposal objectives are to:

- Improve active transport connections and access to public transport along one of Sydney's key roads for residents, visitors, and commuters.
- Minimise traffic disruptions on the surrounding road network during construction by minimising major civil works such as kerb realignment or impacts on underground utilities.
- Improve road safety for cyclists.
- Enable future transport network flexibility.
- Improve safety for pedestrians by improving pedestrian connectivity.
- Address stakeholder issues raised by Transport for NSW and from past community consultation.
- Integrate a multimodal approach including people walking and cycling, place, parking, bus customers, services and deliveries, people driving to destinations on the street, and through traffic.

The development criteria adopted during concept support the proposal objectives and include:

- Designing the Proposal in a manner that is informed by environmental investigations to minimise adverse impacts while maximising environmental benefits.
- Satisfying the technical and procedural requirements of City of Sydney Council, Transport for NSW (TfNSW) and other stakeholders with respect to the design of the Proposal.
- Optimising the concept design to ensure that the Proposal can be practically and efficiently constructed and maintained while meeting all other proposal objectives.
- Applying appropriate urban design, landscape, and visual principles in the concept design of the Proposal elements

- Designing all connections, modifications, and improvements necessary to link the proposed works to existing road system.
- Planning temporary arrangements that minimises disruption to local and through traffic and that maintain access to adjacent properties during construction.
- Developing, implementing, and maintaining effective management systems for quality, work health and safety, environmental, proposal reporting, risk management, value management and value engineering, constructability assessment, safety audits and community participation.

## OPTIONS CONSIDERED

Three options were considered. Option 1 was 'do minimum', Option 2 was a centre-running cycleway, which would include public transport upgrades along Liverpool and Oxford Street. Option 3 involved active and public transport upgrades along the Liverpool and Oxford Street resulting in a northside bi-directional cycleway. The option of 'do nothing' was discounted as it would not meet the Proposal objectives.

Option 2 included the following:

- A 730 metre, 2-way centre-running cycleway with one city-bound traffic lane converted into a separated cycleway on Oxford Street.
- A 300 metre, 2-way centre-running cycleway between College Street and Elizabeth Street, on the northern side of the road between Elizabeth Street and Castlereagh Street.
- A 700 metre, 2-way kerbside cycleway on the western side of College Street.

Stakeholder issues raised by Transport for NSW and from past community consultation described Option 2 as 'unsafe' and 'inaccessible' due to the connectivity issue of the centre-running design. Option 3 included active and public transport upgrades along the Liverpool and Oxford Street resulting in a northside bi-directional cycleway.

Option 3 included the following:

- A 2-way northside bi-directional cycleway ranging between 2.4 and 3.6 metres on Oxford Street. This would also
  include intersection upgrades and modification at College Street, Crown Street, and Palmer Street including
  pavement markings, kerb adjustments/extensions, and pedestrian crossings.
- A 2-way northside bi-directional cycleway ranging between 2.5 and 3.4 metres on Liverpool Street. This would
  include installation of new median separating the cycleway from road traffic, and modification road treatments
  including painted median, pavement markings, pedestrian crossing, and kerb extension.
- New painted median separating northbound and southbound traffic lanes on Flinders Street.

Option 3 was selected as the preferred option as it addressed the Proposal objectives by providing an increased capacity, improved road safety for cyclists. In addition, Option 3 improved safety for pedestrians and provided a design that improves safety and accessible connections, improves active transport facilities, and minimises environmental impacts.

## STATUTORY AND PLANNING FRAMEWORK

State Environmental Planning Policy (Transport and Infrastructure) 2021 (T&I SEPP) contains planning provisions for infrastructure, planning controls and reserves land for the protection of corridors and the land use planning and assessment framework for appropriate development at Port Kembla, Botany and Newcastle. Under Division 17 section 2.112 of the T&I SEPP, the development of 'pedestrian and cyclist facilities such as footpaths, street lighting, kerb adjustments and ramps, pedestrian fences, refuges, holding rails and bollards' is exempt development if it is carried out by or on behalf of a public authority. Development for the purpose of a road or road infrastructure may be carried out by

or on behalf or a public authority without consent on any land under Division 17 section 2.108 of the SEPP (Transport and Infrastructure).

As the Proposal involves a new cycle path and road or road infrastructure facilities and is to be carried out by City of Sydney, it can be assessed under Division 5.1 of the EP&A Act.

## COMMUNITY AND STAKEHOLDER CONSULTATION

Community consultation activities for the proposal would be undertaken during the public display period of this REF. Public feedback is invited during the public display period to help the City of Sydney understand what is important to customers and the community. Further information about these specific consultation activities is included in Chapter 5 of this REF.

Various methods were used to inform and engage with the variety of stakeholders of the Proposal. These methods included online briefings, letters, community notifications via letterbox drops or email, stakeholder emails, website updates, media releases and pop-up display and would continue through the public display of the REF.

Following early stakeholder consultation for the works, a number of updates were added to the proposed methodology to provide a measured response to the feedback on design criteria. Through consultation and feedback from community and stakeholders, general support from respondents was widespread. The specific topic most frequently mentioned by community members who supported the proposal was safety. Respondents primarily praised the proposed cycleway for their potential to improve safety for cyclists, but also for pedestrians, motorists, and other road users. The majority of comments submitted by respondents on the City of Sydney's online survey took the view that the cycling routes are currently dangerous, and the proposed cycleway would improve safety, making it an overall more pleasant experience and therefore encouraging more people to cycle instead of drive. Community responses generally welcomed the initiative to improve cycle infrastructure in this area especially.

Key issues and concerns raised through community and stakeholder engagement was the potential disruption to traffic during construction, particularly on Oxford Street, and changes to kerbside uses. Some of the comments received on the online survey also noted that with worsened traffic, cycling and driving along these streets may become more dangerous rather than of safer.

## **ENVIRONMENTAL IMPACTS**

A number of specialist assessments have been completed to identify potential environmental impacts associated with the construction of the Proposal and its operation. Potential environmental impacts during construction and operation of the Proposal have been identified which, with the implementation of appropriate safeguards and management measures are not considered significant.

Key impacts and benefits that would likely occur as a result of the Proposal are summarised in the sections below.

## TRAFFIC AND TRANSPORT

The Proposal would result in temporary traffic and transport impacts during construction and operation. Light and heavy vehicle movements associated with construction of the Proposal would cause temporary traffic impacts, with partial lane and road closures, interruption to traffic operation, bus stops, footpaths on Oxford Street and road access may occur from the movement of construction vehicles and hauling of materials. Despite the identified traffic impacts, an acceptable Level of Service (LoS) would be retained during the PM peak period in both construction and operational scenarios.

Impacts to public transport would occur, predominantly to bus routes due to lane closures and increased traffic. Bus routes for busses 311 and 340 will be permanently rerouted to Wentworth Avenue with the introduction of a prohibition

on right turn movements from the Elizabeth Street south approach to Liverpool Street. The existing eastbound bus stops would be temporarily relocated along Oxford Street during the construction period.

Pedestrian facilities would be affected during construction works however, pedestrians will be diverted around the partial lane closures.

Operational traffic impacts are beneficial as the Proposal would provide cyclists with an improved cycling experience as well as improved road safety. Cyclists will be able to move to the dedicated cycleway instead of riding on the existing route, shared with bus lanes and traffic lanes, improving the overall commuter experience and safety.

Impacts to traffic and transport will be addressed and monitored as a part of the Construction Traffic Management Plan (CTMP), which would be prepared by the contractor, in consultation with the City of Sydney.

## NOISE AND VIBRATION

Construction of the Proposal would result in noise impacts at nearby sensitive receiver locations however, the impacts would be short-term and temporary. The nearest receivers to the proposal are predicted to be subject to worst-case noise impacts, particularly when noise intrusive equipment such as pavement grinder and concrete drills are in use near to receivers based on all equipment working simultaneously. There would frequently be periods when works would result in construction noise level being much lower than the worst-case levels being predicted.

Where possible, the Proposal would be constructed during standard construction hours. However, some activities would be required to be carried out outside of standard construction hours due to safety and traffic disruption reasons. During construction, the main potential sources of construction vibration upon the receivers would be from construction vehicles, however the impacts would be minimal.

## AIR QUALITY

Existing ambient air quality within the Proposal area measures at 'good' index values according to the regional data from NSW Department of Planning, Industry and the Environment. The Proposal may negatively impact air quality in the surrounding area due to dust generation, traffic and equipment emissions during construction. During the operation phase, the Proposal is expected to improve air quality as it encourages use of active and public transport, reducing reliance on vehicles and therefore lowering carbon emissions (greenhouse gas emissions (GHG)).

## NON-ABORIGINAL HERITAGE

The Proposed cycleway is expected to have minor to no impacts to heritage items. The proposed works would border the southern heritage curtilage boundary of the 'Governor's Domain and Civic Precinct' and would have a possible minor impact on 'founding civic institutions and emerging civic space' (defined in the Referral Guidelines 2021) due to its proximity to significant historical buildings, however the proposed works are limited to the kerb and roadway. The cycleway will somewhat encroach on the southern boundary of Hyde Park; however, this will be minimised for the most part by the existing footpath with sandstone kerb and sandstone retaining wall which borders the outside of the outside of Hyde Park along Elizabeth, Liverpool and College Streets. The addition of the cycleway will therefore have little to no impact on the significance of Hyde Park or to the existing views between the park and the significant buildings.

On 2 February 2023, a decision by the NSW Heritage Council was gazetted which had the effect of adding the "Sydney Mardi Gras Parade Route" as a new heritage listing (no 02068) to the State Heritage Register (SHR). A large proportion of the cycleway route is located within the heritage curtilage of the new listed item. Notably, a range of site specific exemptions have been granted under Section 57(2) of the *Heritage Act 1977* (Heritage Act), including the carrying out of road work or traffic control works within the meaning of the *Roads Act 1993* by or on behalf of Transport for NSW/Roads and Maritime Services (exemption 3(a)). The Proposed works fall under the site-specific exemptions, and therefore would not require approval under Section 57(1) of the Heritage Act.

The Proposed works are considered acceptable from a heritage perspective as it maintains the identified heritage values of the area. During operations of the Proposal there would be no heritage impacts. The Proposal is expected to enhance the locality of the area by providing an added amenity to visitors, residences, and businesses.

## GREENHOUSE GAS AND CLIMATE CHANGE

Transport emissions are currently the second largest component of NSW greenhouse gas emissions, and 86 per cent of these emissions are from road transport (Department of the Environment and Energy, 2014). Construction of the Proposal would result in minor greenhouse gas emissions through construction vehicles and the operation of plant and equipment. Operation of the Proposal would reduce greenhouse gas emissions from traffic delays through Oxford Street and would therefore have a net beneficial impact on greenhouse gas emissions in the area.

## WASTE

Construction of the Proposal would generate the following waste materials:

- Residual road material (concrete, asphalt, aggregate).
- Surplus building material (fencing, scrap material).
- Packing materials (pallets, crates, plastics).
- Food waste and general site waste and litter.
- Wastewater from facilities, vehicle wash down, and dust suppression.
- Residual chemical waste (oils, lubricants, waste fuels, batteries).

A Waste Management Plan would be prepared and implemented to classify waste and provide measures for storage, transport and disposal.

## JUSTIFICATION AND CONCLUSION

The Proposal is subject to determination under Division 5.1 of the EP&A Act. This REF has examined and taken into account to the fullest extent possible all matters affecting, or likely to affect the environment by reason of the proposed activity. The majority of impacts from the Proposal would be short-term, and with the implementation of proposed safeguards and management measures, any potential environmental impacts from the proposal are considered minor. A Construction Management Plan (CEMP) will be prepared and implemented to mitigate against the potential environmental impacts of the Proposal. In conclusion, the Proposal's impacts are not likely to be significant and therefore preparation of an Environmental Impact Statement under Division 5.1 Subdivision 3 of the EP&A Act is not required.

# **1** INTRODUCTION

This chapter introduces the Proposal and provides the context of the environmental assessment. In introducing the Proposal, the objectives and development history are detailed, and the purpose of the report provided.

### 1.1 PROPOSAL IDENTIFICATION

The Proposal is located in City of Sydney starting within the CBD on Liverpool Street at Castlereagh Street and extends about 900 metres south-east along Oxford Street and Flinders Street toward Darlinghurst/Surry Hills.

The Proposal would include the following key elements:

- New bi-directional cycleway, approximately 900 metres in length
- New or modified medians separating cycleway from roadway
- New median islands for bus boarding areas, with bus shelter and garden beds
- New pavement markings including pedestrian lane markings and roadway line markings
- Kerb realignments and kerb connections
- New asphalt resurfacing of most of the roadway within the extent of works, from Elizabeth Street to Flinders Street
- Modification of turn restrictions
- Relocation of bus shelters from Liverpool Street to Elizabeth Street
- Modification of kerbside uses (e.g. parking, delivery, no stopping) along Oxford Street
- New bus lane along Oxford Street (westbound and eastbound) and Elizabeth Street (southbound)

The Proposal overview is shown in Figure 2.1.1.1. Chapter 3 describes the Proposal in more detail.

## 1.2 PURPOSE OF THE REPORT

This review of environmental factors (REF) has been prepared by WSP on behalf of City of Sydney. For the purposes of these works, City of Sydney is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the REF is to describe the Proposal, to document the likely impacts of the Proposal on the environment, and to detail mitigation and management measures to be implemented.

The description of the proposed work and assessment of associated environmental impacts has been undertaken in the context of clause 228 of the Environmental Planning and Assessment Regulation 2000, the factors in *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (Is an EIS required? guidelines) (DUAP, 1995/1996), *Roads and Related Facilities EIS Guideline (DUAP 1996)*, the *Biodiversity Conservation Act 2016 (BC Act), the Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In doing so, the REF fulfils the requirements of:

Section 5.5 of the EP&A Act, including that City of Sydney examine and take into account to the fullest extent
possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the Proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Division 5.2 of the EP&A Act
- The significance of any impact on threatened species as defined by the BC Act and/or FM Act, in section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report
- The significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there
  is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are
  required and able to be secured.
- The potential for the Proposal to significantly impact any other matters of national environmental significance or Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the Australian Government Department of Agriculture, Water and the Environment for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

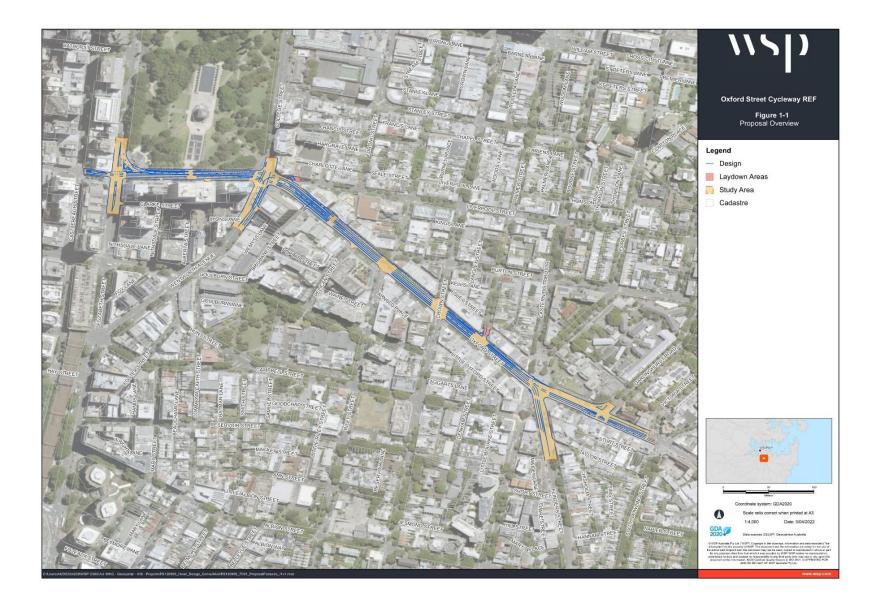


Figure 2.1.1.1 Overview of the Proposal

Project No PS126995 Oxford Street Cycleway Review of Environment Factors City of Sydney WSP August 2023 Page 13

# 2 NEED AND OPTIONS CONSIDERED

## 2.1 STRATEGIC NEED FOR THE PROPOSAL

This chapter describes the need for the Proposal in term of its strategic setting and operational need. It identifies the options considered and the selection of the preferred option.

#### 2.1.1 FUTURE TRANSPORT STRATEGY

The *NSW Future Transport Strategy* (TfNSW, 2022) outlines a framework to address transport challenges in NSW and supersedes Future Transport 2056: Shaping the Future released in 2018 with a broader consideration of population growth and global megatrends impacting transport. It integrates planning for roads, freight and all other modes of transport and sets out initiatives, solutions, and actions to deliver customer and community-first outcomes in transport.

The Proposal's upgrade of improved road infrastructure and active transport supports the existing and future development of the area and aligns with the following Future Transport Strategy visions:

- liveability, amenity and economic success of communities and places are enhanced by transport
- every customer enjoys safe travel, regardless of transport mode or location, across a high-performing, integrated and efficient network
- transport enables everyone to get the most out of life, wherever they live and whatever their age, ability or personal circumstances.

Specifically, the Proposal is consistent with the Future Transport Strategy by:

- generating greater local opportunities for residents and businesses to access jobs within 30 minutes
- creating 15-minute neighbourhoods by improving and prioritising walking, cycling and micro-mobility with safer and better pathways, cycleways, and connections
- supporting the Sydney region by improving road connections to all Three Cities
- providing additional active transport infrastructure that improves liveability and provides improves local and subregional connections.

#### 2.1.2 NSW STATE INFRASTRUCTURE STRATEGY 2022-2042

The *NSW Infrastructure Strategy* 2022-2042 (NSW Government, 2022) is the fourth edition of NSW Government's inaugural State Infrastructure Strategy (SIS) plans over the last 10 years, and builds upon the suite of complementary strategies including the 2012 SIS, 2014 SIS and 2018 SIS.

The *NSW Infrastructure Strategy 2022-2042* offers a framework for informed decision making on infrastructure investment and policy planning during the next 20 years, underpinned by 9 key objectives and 57 recommendations.

Based on the Proposal's scope of works and objectives, the Proposal specifically supports three of the nine strategic directions:

- Integrating infrastructure, land use and service planning
- Service growing communities
- Achieve an orderly and efficient transition to Net Zero

#### 2.1.3 SYDNEY'S CYCLING FUTURE: CYCLING FOR EVERYDAY TRANSPORT

This document presents a new direction for planning and prioritisation of cycling in Sydney. It supports cycling as a method of everyday transport and aims to invest and connect bicycle networks, promote better use of cycling networks and engage with government, councils, developers and bicycle users.

As the Proposal is to upgrade active transport facilities including cycling infrastructure along Oxford Street, the Proposal supports this strategy by aligning with the following goals:

- Integrating bike riding into the way communities are designed to make cycling journeys safer and more connected
- Improving bicycle access to public transport to encourage cycling as part of longer transport journeys
- Delivering local initiatives that make the greatest improvements to safety and local access.

#### 2.1.4 ACTIVE TRANSPORT STRATEGY

The *NSW Active Transport Strategy (TfNSW, 2022)* builds upon the Future Transport Strategy to present a focused vision on walking, cycling and personal mobility in the future of transport. It strives for long-term ambitions to double active transport trips in the next 20 years. To support this vision, the Strategy presents recommendations on guide planning, investment, and priority actions across the next 5 years.

The Proposal aligns closely with the vision of the Active Transport Strategy, specifically through:

- Delivering safe, connected, and continuous cycling networks and supporting facilities to establish cross-city connections and expand local bike networks
- Providing safer and better precincts and main streets to offer an equitable access of mobility for people of all abilities
- Promoting walking and cycling and encouraging an uptake in active transport for improved liveability and quality of life

#### 2.1.5 OTHER SUPPORTING NSW STRATEGIES AND POLICIES

The Proposal is supported under the policies, goals, objectives, and targets of other strategic planning documents as summarised in Table 2.1.

NAME	DESCRIPTION	RELEVANCY
The Greater Sydney	The Greater Sydney Region Plan - A Metropolis of	The Proposal directly aligns with two
Region Plan - A	Three Cities envisages three cities where most	key objectives including 'A city
Metropolis of Three	residents live within 30 minutes of their jobs,	supported by infrastructure' and 'a well-
Cities (Greater Sydney	education and health facilities, services and leisure	connected city' by providing improved
Commission, 2018a)	opportunities. The plan includes ten directions with	active and public transport upgrades to
	related objectives, strategies and actions.	and from the Sydney CBD.

Table 2.1 Other strategic strategies and policies

NAME	DESCRIPTION	RELEVANCY
Eastern City District Plan (Greater Sydney Commission, 2018b)	The District Plan is a 20-year plan that guides the implementation of the Region Plan at a district level which includes the City of Sydney. It includes 22 planning priorities across five themes: infrastructure and collaboration, liveability, productivity, sustainability, and implementation.	<ul> <li>The Proposal aligns with the following planning priorities:</li> <li>Planning for a city supported by infrastructure</li> <li>Fostering healthy, creative, culturally rich and socially connected communities</li> <li>Creating and renewing great places and local centres and respecting the District's heritage.</li> </ul>
City Plan 2036: Local strategic planning statement (City of Sydney, 2020)	A 20-year land use vision that links the NSW Government's strategic plans and the City of Sydney's community strategic plan, <i>Sustainable</i> <i>Sydney 2030</i> , and the planning controls that guide development. The Plan includes five themes of Planning priorities.	<ul> <li>The Proposal aligns with four of the five themes of the Plan across Infrastructure and Liveability which include:</li> <li>Movement for walkable neighbourhoods and a connected city</li> <li>Align development and growth with supporting infrastructure</li> <li>A creative and socially connected city</li> <li>Creating great places</li> </ul>
Sustainable Sydney 2030-2050 (City of Sydney, 2022)	The City of Sydney's overarching community strategic plan that sets a vision for a Green, Global and Connected city. The Plan includes 10 strategic directions to guide the future of the city.	<ul> <li>The Proposal supports four strategic directions including:</li> <li>A transformed and innovative economy</li> <li>Design excellence and sustainable development</li> <li>A city for walking, cycling and public transport</li> <li>Resilient and diverse communities</li> </ul>
2026 Road Safety Action Plan (TfNSW, 2023*)	The 2026 Road Safety Action Plan builds upon the success of the Road Safety Plan 2021 to enhance safety on the road network and accelerate safety features in vehicles. It also aligns the Towards Zero vision with Future Transport Strategy 2056, which aims to have a NSW transport network with zero trauma by 2050.	The Proposal is consistent with the directions set out in 2026 Road Safety Action Plan as it would provide a better road design with improved safety outcomes for vehicles, cyclists, and pedestrians.
NSW Road Safety Strategy 2012–2021 (TfNSW, 2020)	This strategy sets key objectives to be achieved in the next decade. It focuses on lowering fatalities and serious injuries and encourages shared responsibility for road safety outcomes.	The Proposal is consistent with this strategy, addressing a key objective to enhance and improve safety.

NAME	DESCRIPTION	RELEVANCY
Sydney's Walking Future: Connecting People and Places (TfNSW, 2013)	This document supports walking as a method of everyday transport and aims to invest in and connect people to places through safe walking networks, promote walking transport and engage with government, councils, developers and non- government organisations.	The Proposal includes improved connectivity for pedestrians through upgraded kerbs as well as multimodal connections to bike and bus facilities.
NSW Premier's Priorities and State priorities (NSW Government, 2019)	The NSW Government has identified 14 Premier's priorities for the state to grow the economy, deliver well connected communities with quality local environments, provide high quality education and break the cycle of disadvantage.	Premier Priority 11 aims to increase the proportion of homes in urban areas within 10 minutes' walk of quality green, open and public space by 10 per cent by 2023. The Proposal would address this priority by improving the walkability, connectivity and accessibility of public spaces along Liverpool and Oxford Street which will promote healthier lifestyles and bring people from surrounding residential neighbourhoods together.
Oxford Street cultural and creative precinct plan (City of Sydney, 2021)	The precinct plan is an amendment of the Sydney Local Environmental Plan 2012 and Sydney Development Control Plan 2012 to revitalise Oxford Street between Hyde Park and Greens Road while recognising its culture and community significance. The proposed precinct plan allows for greater height and floor space and protect heritage items, public spaces and local character.	The Proposal would support the revitalisation of the cultural precinct by promoting enhanced connectivity in the area for pedestrians and cyclists.
A City for all Draft Community Safety Action Plan 2018-2023 (City of Sydney, 2018)	<ul> <li>The goal of the plan is to contribute to increasing actual and perceived safety in Sydney. The plan sets out four priority areas for action:</li> <li>Safe streets and spaces</li> <li>Crime prevention and response</li> <li>Ready and resilient</li> <li>A safe global destination.</li> </ul>	The Proposal would support the priority area of 'safe streets and spaces' by improving safety along Liverpool and Oxford Street.

## 2.2 PROPOSAL OBJECTIVES AND DEVELOPMENT CRITERIA

#### 2.2.1 PROPOSAL OBJECTIVES

The objective of the Proposal is to achieve positive outcomes related to improving accessibility, enhancing the safety of road crossings, more space for pedestrians and cyclists, and linking to Sydney's *Inner City Regional Bicycle Network*.

Specific key objectives related to this Proposal are:

- Improve active transport connections and access to public transport along one of Sydney's key roads for residents, visitors, and commuters
- Minimise traffic disruptions on the surrounding road network during construction by minimising major civil works such as kerb realignment or impacts on underground utilities
- Improve road safety for cyclists
- Enable future transport network flexibility
- Improve safety for pedestrians by improving pedestrian connectivity
- Address stakeholder issues raised by Transport for NSW and from past community consultation
- Integrate a multimodal approach including people walking and cycling, place, parking, bus customers, services and deliveries, people driving to destinations on the street, and through traffic.

#### 2.2.2 DEVELOPMENT CRITERIA

- Designing the Proposal in a manner that is informed by environmental investigations to minimise adverse impacts while maximising environmental benefits.
- Satisfying the technical and procedural requirements of City of Sydney Council, Roads & Maritime Services (RMS) and other stakeholders with respect to the design of the Proposal Work.
- Optimising the concept design to ensure that the Proposal can be practically and efficiently constructed and maintained while meeting all other proposal objectives.
- Applying appropriate urban design, landscape, and visual principles in the concept design of the Proposal elements
- Designing all connections, modifications, and improvements necessary to link the proposed works to existing road system.
- Planning temporary arrangements that minimises disruption to local and through traffic and that maintain access to adjacent properties during construction.
- Developing, implementing and maintaining effective management systems for quality, work health and safety, environmental, proposal reporting, risk management, value management and value engineering, constructability assessment, safety audits and community participation.

#### 2.2.3 URBAN DESIGN OBJECTIVES

Urban design objectives of the Proposal include:

- Provide a safe and separated cycle connection suitable for all riding abilities
- Maintain and respect the heritage significance
- Enhance the built and natural environment
- Deliver a high-quality, universally accessible public domain
- So far as practicable, protect and enhance key spaces, places, views, vistas, civic and community destinations
- Improve commuters experience
- Preserve and enhance activity along the adjacent streetscapes
- Develop a place-based design language and approach
- Ensure high design quality and constructability.

## 2.3 ALTERNATIVES AND OPTIONS CONSIDERED

The options assessment considered three options:

- Option 1: 'Do Minimum'
- Option 2: Centre-running cycleway
- Option 3: Northside Bi-directional cycleway

The selection of the preferred option would align with the strategic need along with the Proposal's objectives, development criteria and urban design standards and principles.

The City of Sydney sought feedback on the Oxford Street cycleway between 18 November and 18 December 2020. An engagement summary and analysis were completed in January 2021 which identified key issues and opportunities to inform the Oxford Street cycleway upgrades. Community and stakeholder consultation details are discussed in Chapter 5.

#### 2.3.1 IDENTIFIED OPTIONS

#### 2.3.1.1 OPTION 1 – 'DO MINIMUM'

This option would result in no upgrades along Liverpool and Oxford Street nor improved active or public transport upgrades. The existing conditions would be unchanged under this option and normal routine road maintenance would continue to be carried out.

#### 2.3.1.2 OPTION 2 – CENTRE-RUNNING CYCLEWAY

This option would include active and public transport upgrades along Liverpool and Oxford Street, resulting in a centrerunning cycleway. An overview of this option is provided in Table 2.2.

FEATURE	DESCRIPTION	
Oxford Street	<ul> <li>2-way centre-running cycleway with one city-bound traffic lane converted into a separated cycleway</li> <li>Length: 730m</li> </ul>	
Liverpool Street	<ul> <li>2-way centre-running cycleway between College Street and Elizabeth Street, on the northern side of the road between Elizabeth Street and Castlereagh Street</li> <li>Length: 300m</li> </ul>	
College Street	<ul> <li>2-way kerbside cycleway on the western side of College Street</li> <li>Length: 700m</li> </ul>	

Table 2.2 Overview of Option 2 – Centre Running cycleway

Refer to Appendix A for further details of Option 2.

#### 2.3.1.3 OPTION 3 – NORTHSIDE BI-DIRECTIONAL CYCLEWAY

This option would include active and public transport upgrades along Liverpool and Oxford Street resulting in a northside bi-directional cycleway. An overview of this option is provided in Table 2.3.

#### Table 2.3 Overview of Option 3 - Northside Bi-directional cycleway

FEATURE	DESCRIPTION
Oxford Street	<ul> <li>2-way northside bi-directional cycleway ranging between 2.4 and 3.6 metres</li> </ul>
	<ul> <li>New median separating the cycleway from road traffic</li> </ul>
	<ul> <li>New median island to include relocated bus shelter and new garden beds</li> </ul>
	— New pedestrian crossing connecting to a new median island
	— Modified lane markings reducing traffic lanes to accommodate new cycleway
	<ul> <li>Intersection upgrades and modifications at College Street, Crown Street, and Palmer Street including pavement markings, kerb adjustments/extensions, and pedestrian crossings</li> </ul>
Liverpool Street	<ul> <li>2-way northside bi-directional cycleway ranging between 2.5 and 3.4 metres</li> </ul>
	<ul> <li>New median separating the cycleway from road traffic</li> </ul>
	— Modified kerb zone provisions (e.g. bus zone to no parking zone)
	— Enlarged median island
	— Relocated bus stop
	<ul> <li>Modified road treatments including painted median, pavement markings, pedestrian crossing, and kerb extension</li> </ul>
Flinders Street	<ul> <li>New painted median separating northbound and southbound traffic lanes</li> </ul>

Refer to Appendix B for further details of Option 3.

#### 2.3.2 ANALYSIS OF OPTIONS

Each option was reviewed against the Proposal objectives outlined in Section 2.2.1. A summary of the options analysis is provided in Table 2.4.

Table 2.4 Options analysis

KEY OBJECTIVE	OPTION 1	OPTION 2	OPTION 3	ANALYSIS
Improve active transport connections and access to public transport along one of Sydney's key roads for residents, visitors, and commuters	X	V	V	Option 1 would maintain the existing infrastructure as is. Options 2 and 3 would provide improved transport connections and access along Oxford Street.
Minimise traffic disruptions on the surrounding road network during construction by minimising major civil works such as kerb realignment or impacts on underground utilities	N/A	Х	V	No construction work would be involved for Option 1. Ongoing maintenance would occur as required. Civil works would be greater for Option 2 compared to Option 3 to facilitate the centre-running cycleway design. Option 3 also included a refined design for kerb alignments and avoidance of underground utilities.

KEY OBJECTIVE	OPTION		OPTION	ANALYSIS
	1	2	3	
Improve road safety for cyclists	X	$\checkmark$	×	Option 1 would maintain the existing infrastructure as is.
	~	•		Options 2 and 3 would provide improved road safety for cyclists.
Enable future transport network flexibility				Option 1 would maintain the existing infrastructure as is.
	Х	~	~	Options 2 and 3 would support and enable future transport network flexibility by improving multimodal transport upgrades.
Improve safety for pedestrians by improving pedestrian connectivity				Option 1 would maintain the existing infrastructure as is.
	X	X	~	Option 2 prioritises cycleway and bus transport with limited pedestrian safety upgrades.
				Option 3 improves safety for pedestrians by improving pedestrian connectivity through mid-block crossings to the new bus island and improved kerb/footpath connections.
Address stakeholder issues raised by Transport for NSW and from past				Option 1 would maintain the existing infrastructure as is.
community consultation	Х	X	~	Option 2 was described from previous consultation as 'unsafe' and 'inaccessible' due to the connectivity issue of the centre-running design.
				Option 3 responds to the consultation to date by providing a design that improves safety and accessible connections.
Integrate a multimodal approach including people walking and cycling, place, parking,		,		Option 1 would maintain the existing infrastructure as is.
bus customers, services and deliveries, people driving to destinations on the street, and through traffic.	X	$\checkmark$	<b>√</b>	Options 2 and 3 provide a multimodal approach.

## 2.4 PREFERRED OPTION

Option 3 was identified as the preferred option as it aligns with the proposal objectives, development criteria, and urban design objectives.

In developing the preferred option, ecologically sustainable development considerations were included to minimise environmental risks. The design of Option 3 also considered key stakeholder and community engagement input. Further details of stakeholder engagement and the assessed impacts are in Chapters 5 and 6, respectively.

## 2.5 DESIGN REFINEMENTS

Since the selection of the preferred option, the concept design was further developed during detailed design based on further stakeholder feedback and inputs. Table 2.5 summarises design refinements of Option 3 and is assessed in this REF.

Toble 2.5	Overview	of docian	rofinament
Table 2.5	Overview	or design	refinement

Feature	Design refinement description		
Elizabeth Street	— Installation of new bus zone		
Oxford Street	<ul> <li>New no left turn restriction onto Palmer Street</li> <li>New left turn restriction for vehicles over 9.0m long into Riley Street</li> <li>Removal left and right turns from Liverpool Street for eastbound traffic</li> </ul>		
Liverpool Street	<ul> <li>Access from Oxford Street is restricted to only cyclists and pedestrians</li> <li>Reduction of car parking and loading zone spots east of Oxford Street</li> <li>Installation of bollards at entrance of Little Liverpool Street</li> <li>Removal of shared right turn and through lane on eastern approach with replacement of single auxiliary single right turn lane</li> </ul>		
Flinders Street	<ul> <li>Reduction of northbound lanes (3 to 2 lanes) using a zip-merge</li> </ul>		
Wentworth Avenue	<ul> <li>New northbound bus stop and zone</li> <li>Removal of five loading and ticketed parking zones</li> </ul>		
Palmer Street	— Installation of bicycle lane and storage		

# **3 PROPOSAL DESCRIPTION**

Chapter 3 describes the Proposal and summarises key design parameters, features, construction methods, and associated infrastructure and activities. The description of the Proposal is based on a concept design and is subject to detailed design.

## 3.1 SITE LOCATION AND CONTEXT

The Proposal is located in the City of Sydney starting within the CBD on Liverpool Street at Castlereagh Street and extends about one kilometre south-east along Oxford Street and Flinders Street toward Darlinghurst/Surry Hills.

#### 3.1.1 SURROUNDING LAND USES

The land uses surrounding the Proposal are shown in Figure 3.1.1.1 and include the following:

- B8 Metropolitan Centre	<ul> <li>SP2 Infrastructure</li> </ul>
- RE1 Public Recreation	<ul> <li>Classified Road (between Crown Street and</li> </ul>
— B4 Mixed use	Oxford and Flinders Street)
- B2 Local Centre	<ul> <li>Health Services Facilities</li> </ul>
<ul> <li>R1 General Residential</li> </ul>	<ul> <li>Public Administration Building</li> </ul>
	<ul> <li>Educational Establishment</li> </ul>

Some of the key developments in the area along the Proposal are:

- Hyde Park
- Taylor Square
- St Vincent's Hospital
- Darlinghurst Courthouse

- University of Notre Dame Australia
- Sacred Heart Health Service
- National Art School
- Commercial and retail businesses

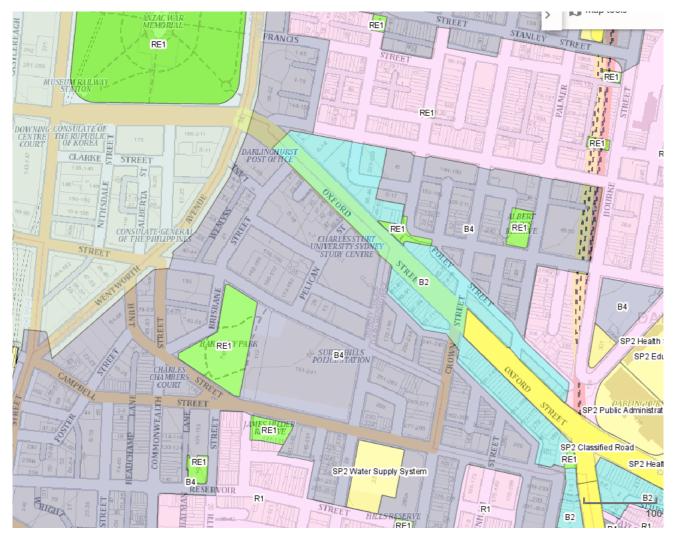


Figure 3.1.1.1 Surrounding land use

#### 3.1.2 THE PROPOSAL

The City of Sydney proposes to improve cycling and public transport for about 900 metres along Liverpool Street and Oxford Street between Castlereagh Street and Flinders Street. The Proposal involves new bi-directional cycleway and related medians, kerb modifications, pavement markings, bus transport upgrades including relocated bus stops, new lanes, a median island as well as improved pedestrian crossings.

Detailed features of the Proposal are summarised in Table 3.1 and identified in Figure 3.1.2.1 and Figure 3.1.2.2.

Table 3.1 Summary of Proposal features

ID	LOCATION	DESCRIPTION
1	Elizabeth St between Liverpool St and Bathurst St	<ul> <li>Incorporation of Museum Station, Liverpool St Stand A (stop ID: 200071) into Museum Station, and Elizabeth St Stand C (stop ID: 200073).</li> <li>Installation of new Bus Zone, south of Stand C on Elizabeth St.</li> </ul>

ID	LOCATION	DESCRIPTION
2	Liverpool St between	— Removal of northern-most westbound traffic lane for new cycleway
	Castlereagh St and Elizabeth St	<ul> <li>New cycleway along Liverpool St about 3.4m in width on the western side and about 2.5m in width on the eastern side</li> </ul>
		<ul> <li>New medians alongside cycleway, approximately 0.4 and 0.9m in width on the eastern and western side respectively with an approximately 10.5m gap in between</li> </ul>
		<ul> <li>Modified existing ticketed parking zone to no stopping zone</li> </ul>
		<ul> <li>Existing kerb alignment on western left of Liverpool St-Elizabeth St intersection will generally be maintained</li> </ul>
3	Liverpool St and Elizabeth St intersection	<ul> <li>Modified pavement markings for westbound through traffic along Liverpool St</li> </ul>
		<ul> <li>New pavement markings to connect cycling traffic across intersection between cycleways</li> </ul>
		— New painted median with diagonal markings on southern approach
		— Removal of right turns from north and south approaches on Elizabeth St
		<ul> <li>Removal of shared right turn and through lane on eastern approach on Liverpool St with creation of single auxiliary right turn lane</li> </ul>
		North-east corner of Liverpool St and Elizabeth St:
		<ul> <li>Removal and replacement of old median splitter island with enlarged median island</li> </ul>
		<ul> <li>Extension of kerb outwards from Museum Station exit</li> </ul>
		<ul> <li>New cycleway access entrance</li> </ul>
		— Upgraded pedestrian crossing alignment at the intersection
4	Liverpool St between Elizabeth St and College St	<ul> <li>Relocation of existing bus stop at Museum Station, Liverpool St Stand A (stop ID: 200071) to Museum Station, Elizabeth St Stand C (stop ID: 200073)</li> </ul>
		<ul> <li>Retention of westbound bus stop Museum Station, Liverpool St, Stand G (stop ID: 200072)</li> </ul>
		<ul> <li>New 3.2m cycleway installed along northern side of road</li> </ul>
		<ul> <li>New no parking zone behind the westbound bus zone</li> </ul>
		<ul> <li>New 0.5m bike lane separator alongside cycleway</li> </ul>
		<ul> <li>Installation of middle median separating eastbound and westbound traffic along Liverpool St</li> </ul>
		<ul> <li>Modified existing ticketed parking zone along north and south section of Liverpool St to no stopping zone</li> </ul>
		<ul> <li>Modified existing bus zone to no stopping zone</li> </ul>

ID	LOCATION	DESCRIPTION
5	Oxford St and College St intersection	<ul> <li>New pavement markings for northbound and southbound traffic along College St and Wentworth Ave</li> </ul>
		<ul> <li>New diagonal pavement markings in the intersection separating road and bicycle traffic</li> </ul>
		- Removal of left and right turns from Liverpool St for eastbound traffic
		<ul> <li>New median on northbound side of College St to separate cycleway transition from left side of roadway</li> </ul>
6	Wentworth Ave	— Kerb extension along eastern side of Wentworth Ave
	between Oxford St and Commonwealth St	<ul> <li>New pavement markings with proposed removal of one through lane from Wentworth Avenue northbound onto College St and kerb extension</li> </ul>
		— New northbound bus stop between Commonwealth St and Lyons Lane
		- Removal of five existing loading and ticketed parking zone to bus zone
7	Liverpool St east of Oxford St (Little	<ul> <li>Access into/out of Liverpool St from Oxford St is restricted to bicycles and pedestrians</li> </ul>
	Liverpool St)	— Modification to parking and loading zone allocation including:
		<ul> <li>Existing parallel parking will be replaced by angled parking with reduction from 6 to 4 car spaces</li> </ul>
		— Existing loading zone spaces will be reduced from 3 to 2 spaces
		<ul> <li>New time restrictions implemented to accommodate changes to car and loading allocation</li> </ul>
		— Two existing car sharing spaces will be maintained
8	Oxford St between	<ul> <li>New bollards placed at entrance to Little Liverpool St</li> </ul>
	Liverpool St and Pelican St	<ul> <li>New cycleway ranging between 2.4m and 3.6m in width along northern side of the road</li> </ul>
		— New median separating cycleway from road traffic
		<ul> <li>Relocated existing bus stop from kerb on new median island, separating cycleway from road traffic</li> </ul>
		<ul> <li>New garden beds on new median island</li> </ul>
		<ul> <li>New pedestrian crossing lane markings across cycleway for access to relocated bus stop on new median island</li> </ul>
		— New midblock signalised pedestrian crossing
9	Oxford St between	<ul> <li>New cycleway about 3m wide along northern side of road</li> </ul>
	Pelican St and Riley St	<ul> <li>New median about 0.6m separating cycleway from road traffic with gap in median to accommodate signalised pedestrian crossing</li> </ul>
		— New left turn restrictions for vehicles above 9.0m long into Riley St
		<ul> <li>New bicycle crossing on the eastern leg of the Riley St/Oxford St intersection</li> </ul>

ID	LOCATION	DESCRIPTION
10	Oxford St between Riley St and Crown St	<ul> <li>New cycleway about 3m wide along northern side of road</li> <li>New median separating cycleway from road traffic approximately 1m in width with gap to accommodate signalised pedestrian crossing</li> </ul>
11	Oxford St and Crown St intersection	<ul> <li>New pavement markings for signalised pedestrian crossings across Oxford St</li> <li>Widening of south-east kerb alignment at the intersection to accommodate for left turn movement for buses</li> <li>Adjustment to pedestrian crossing line marking to suit south-east kerb modification</li> </ul>
12	Oxford St between Crown St and Palmer St	<ul> <li>New cycleway ranging between 2.4m and 3m in width between bus stop and passenger waiting area respectively</li> <li>Relocated existing bus stop from kerb on new 2.5m median island</li> <li>New garden beds on new median island</li> <li>New pedestrian crossing lane markings across cycleway for access to relocated bus stop on new median island</li> </ul>
13	Oxford St and Palmer St intersection	<ul> <li>New pavement markings for signalised pedestrian crossings</li> <li>New no left turn restriction from Oxford St onto Palmer St</li> <li>Modified Palmer St as a one-way road between Foley St and Oxford St</li> <li>Extended north-west kerb on Palmer St to restrict left turns from Oxford St onto Palmer St</li> <li>Installation of bicycle lane and storage on Palmer St to connect to Oxford St cycleway with the local streets</li> </ul>
14	Oxford St between Palmer St and Flinders St	<ul> <li>New cycleway about 3m wide along northern side of road</li> <li>New median about 1.3m wide separating cycleway from road traffic</li> <li>Extended kerb along northern side of Oxford St from The Oxford Hotel until eastern signalised pedestrian crossing</li> <li>Modified existing loading zone to no stopping zone, removing five loading zone spots along northern side of Oxford St</li> <li>Modified existing signalised pedestrian crossing including new pavement markings</li> <li>New pavement markings for new signalised pedestrian crossing lanes</li> </ul>
15	Oxford St between Flinders St and Victoria St	<ul> <li>New pavement markings for:</li> <li>westbound lane markings between Darlinghurst Rd and Victoria St for three traffic lanes instead of the existing four traffic lanes</li> <li>westbound lane markings between Flinders St and Darlinghurst Rd for two traffic lanes instead of the existing three traffic lanes</li> <li>New painted median approximately 2.5m wide with diagonal markings separating eastbound and westbound traffic lanes</li> <li>New painted traffic island at the Oxford St/Darlinghurst Rd intersection</li> </ul>

ID	LOCATION	DESCRIPTION
16	Flinders St between Oxford St and Linden Ln	<ul> <li>New painted median with diagonal markings separating northbound and southbound traffic lanes, approximately 2.5m wide at northern end</li> <li>Modification of three to two northbound lanes using a zip-merge treatment</li> </ul>

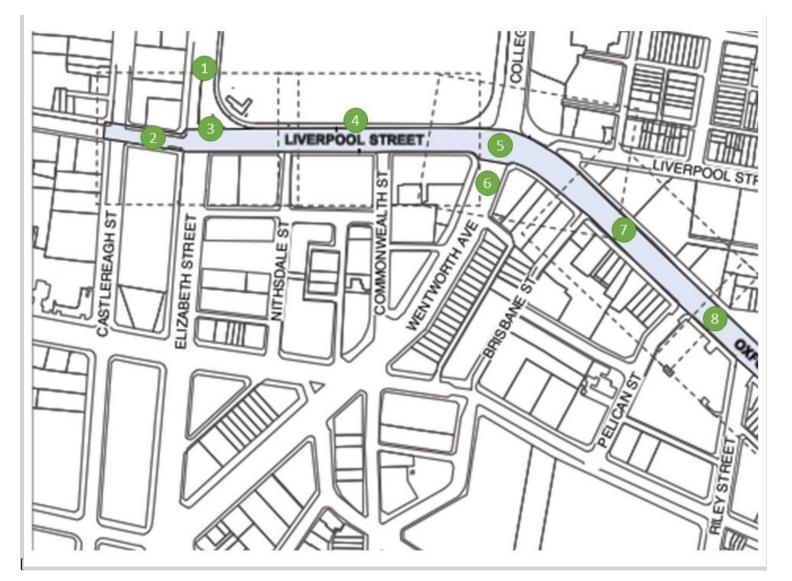


Figure 3.1.2.1 Overview of Proposal features by ID (1 of 2)

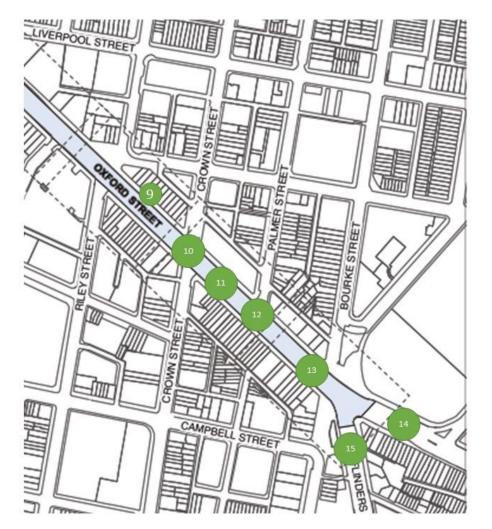
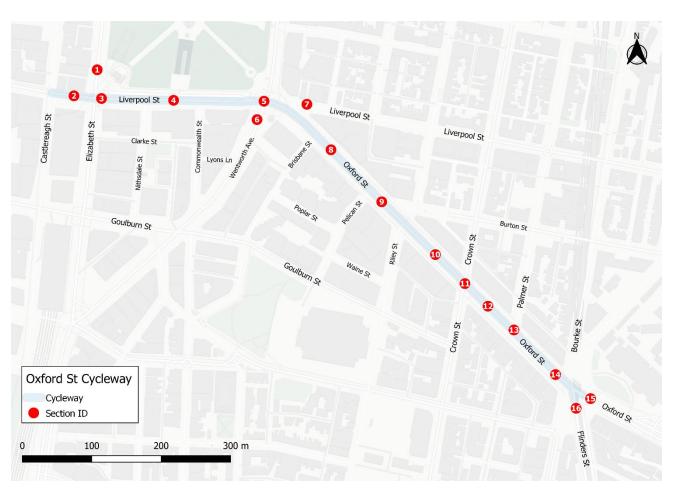


Figure 3.1.2.2 Overview of Proposal features by ID (2 of 2)

- 1 Elizabeth St between Liverpool St and Bathurst St
- 2 Liverpool St between Castlereagh St and Elizabeth St
- 3 Liverpool St and Elizabeth St intersection
- 4 Liverpool St between Elizabeth St and College St
- 5 Oxford St and College St intersection
- 6 Wentworth Ave between Oxford St and Commonwealth St
- **7** Liverpool St east of Oxford St
- Oxford St between Liverpool St and Pelican St
- Oxford St between Pelican St and Riley St
- 0 xford St between Riley St and Crown St
- Oxford St and Crown St intersection
- 12 Oxford St between Crown St and Palmer St
- 13 Oxford St and Palmer St intersection
- Oxford St between Palmer St and Flinders St
- 15 Oxford St between Flinders St and Victoria St
- **16** Flinders St between Oxford St and Linden Ln



### 3.2 DESIGN

The concept design was prepared to meet the Proposal objectives and is described in the following sections. The proposed concept design would be developed further during the detailed design stage.

#### 3.2.1 DESIGN CRITERIA

The design criteria and reference documents that have been applied to the concept design of the Proposal include the following:

#### Australian Standards

- Australian Standards - AS 1428 - 2009 - Design access for mobility

#### Austroads

- Austroads Design Vehicles and Turning Path Templates guide (Austroads, 2013)
- Austroads Guide to Road Design package Part 5A
- Austroads Guide to Traffic Management package (2017)
- Design Vehicles and Turning Path Templates Guide (Austroads, 2013)

#### **Transport for New South Wales Guidelines**

- Cycleway Design Toolbox (Transport for NSW, 2020)
- State Transit Bus Infrastructure Guide (NSW State Transit, 2011)
- Transport for NSW Technical Direction and Design Guidelines
- Transport for NSW Walking Space Guide Towards Pedestrian Comfort and Safety (2020)
- Bus Priority Infrastructure Planning Toolbox (2021)
- Sydney's Cycling Future Cycling for everyday transport (2013)
- Transport for NSW Supplements to Australian Standards

#### City of Sydney

- Sydney Streets Design Code (2021)
- Inclusive and Accessible Public Domain Guidelines (2019)
- City of Sydney Streets Technical Specifications (2019)
- City of Sydney Standard Cycleway Treatments
- City of Sydney Standard Drawings (Version 5 December 2019)

The following considerations have informed the concept design:

- the Proposal objectives, as detailed in Section 2.2
- minimising adverse environmental impacts including disruption to local and through traffic

The design criteria for the Proposal is summarised in Table 3.2. Section views of the Proposal are shown in Figure 3.2.1.1 and Figure 3.2.1.2.

Table 3.2 Key design elements

KEY ELEMENT	DESCRIPTION
Posted speed	— 40 km/h: Oxford Road
	— 40 km/h: Liverpool Street
Design speed	— 40 km/h: Oxford Street
	— 20km/h: Oxford Street (cycling)
	— 40 km/h: Liverpool Street
Lane widths	Cycleway to range from 2.4 metres to 3.8 metres
Floating bus stops	Minimum of 2.5 metres
Cycle lane width	Cycle lane width to range from 2.4 metres to 3.4 metres in width but predominantly will be 3.0 metres in width.
Footpath width	As per existing. Localised widening proposed to suit the design.
Bus lane width	3.2 metres
Road grade	As per existing.
Drainage	Downpipe connections to pipes to be connected via saddle joint, or alternatively placement of a shallow pipe underneath the existing gutter.
	Pipe class 4 adopted for reinforced concrete pipes.
	A minimum pipe grade of 1% adopted.
	A minimum pipe size of 375mm adopted.
	A minimum pope cover of 600mm adopted. Pipes that have less than 300mm of cover to be concrete encased with 150mm thick concrete surrounding the entire conduit. A higher pipe class or concrete encasement to be used otherwise, if necessary.
Kerbside arrangement	Loading zone (3-4 spaces) to be removed along the northern side of Oxford Street between Palmer Street and Flinders Street. The shared loading and ticketed parking zone (3-4 spaces) to be removed along the western side of Wentworth Avenue between Commonwealth Street and Lyons Lane.
	Existing parallel parking to be replaced by angled parking in the section of Little Liverpool Street, between Oxford Street and Hargrave Street.
	Car share spaces to be provided in the existing loading zone.
	4 car parking spaces to be available as 1/4P during the day and 2P at night
	2 loading zone to be available during the day and 2P at night.
	Existing car share space to be maintained.
Landscaping	Generally minimal and opportunistic in median island separating the cycleway and road

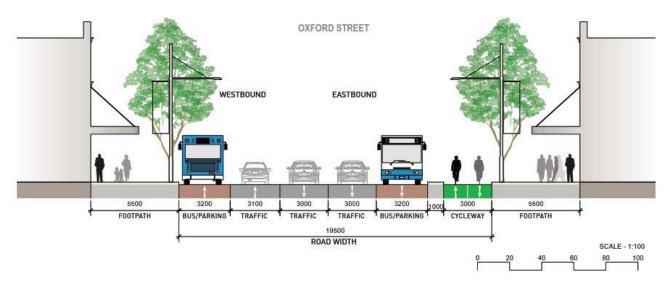
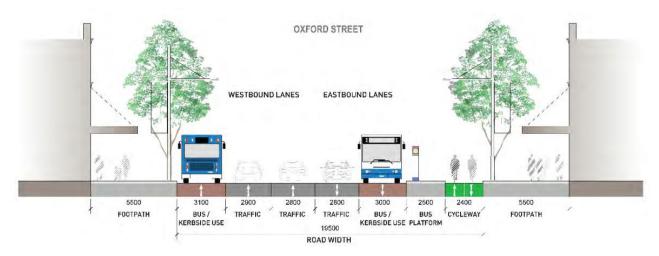


Figure 3.2.1.1 Proposed lane configuration of Oxford Street (section view)





## 3.2.2 ENGINEERING CONSTRAINTS

Table 3.3 identifies key issues and constraints for the design and construction of the Proposal and have informed the development of the concept design.

Table 3.3	Existing	engineering	constraints
Table 3.3	EXISTING	engineering	constraints

CONSTRAINT	COMMENT
Road geometry/construction staging	Existing pavement levels are to be maintained where possible
Drainage	Presence of existing significant drainage infrastructure including culverts and concrete channels which require extension and upgrade. Works have been developed to avoid and minimise where possible.

CONSTRAINT	COMMENT
Utilities	Electrical, gas, telecommunications, water, sewer and stormwater utilities to be maintained during the construction of the Proposal.
	Reducing the impact to existing stormwater management system through initiatives such as the introduction of median breaks and narrow medians to maintain current capacity within the design.
Property access	Maintaining access to properties through alternative routing during temporary lane closures while construction works are being completed.
Traffic and transport	Relocation of existing traffic signals, bus stops and changes to kerbside use. Alternative routes for temporary lane and road closures have been developed to avoid and minimise impacts where possible.

## 3.3 CONSTRUCTION ACTIVITIES

The indicative methodology, staging, work hours, plant and equipment to construct the Proposal are described in this section.

## 3.3.1 WORK METHODOLOGY

The construction methodology would be further developed by the nominated Contractor during the detailed design of the Proposal in consultation with City of Sydney and Transport for NSW.

The actual construction work methods may vary from the description assessed in this REF due to the identification of additional constraints before work starts, ongoing detailed design refinements, feedback from community and stakeholder consultation, and contractor requirements/limitations.

The Proposal would be built in accordance with Transport for NSW construction specifications under a construction environmental management plan (CEMP). The specifications would outline environmental performance and management including vegetation removal, stockpile management and erosion and sediment control.

The proposed construction methodology for the Proposal is identified in Table 3.4.

Table 3.4 Proposed construction methodology

WORK METHODOLOGY		
Stage 1	Site establishment	
Stage 2	Adjustment to underground/above ground services	
Stage 3	Relocation of bus stops, including shelters	
Stage 4	Installation of kerbs, median islands, bus island platforms	
Stage 5	TCS and new smart pole installation, reconfigure existing detectors	
Stage 6	Grind and resurfacing of pavement	
Stage 7	Installation of line marking and signposting	

### 3.3.2 CONSTRUCTION WORKFORCE

The assumed construction workforce for this Proposal would average 20 workers, with a peak of 35 workers.

As with most works undertaken in the CBD, workers would be sourced locally subject to availability. Workers would be encouraged to use public and active transport to travel to/from the construction site due to the high accessibility of the project area to public and active transport infrastructure. No parking for workers will be provided on site. Work vehicles would be needed on-site to access tools and equipment.

### 3.3.3 CONSTRUCTION HOURS AND DURATION

Most of the works required for the Proposal would be undertaken within the proposed work hours:

10am to 3pm on weekdays Heavy vehicles will use the most direct routes to the arterial road network to access the site. From the westerly direction, this may include the use of College Street, Elizabeth Street and Wentworth Street. From the eastern direction this may include Flinders Street and Oxford Street east of Taylor Square.

The haulage route would avoid local streets and minimise impact to sensitive noise receivers, such as residential areas and schools.

- 10am to 3pm on weekdays
- 8pm to 5am Sunday to Thursday
- 8pm Friday to 5am Monday (full weekend)

Certain works may need to occur outside recommended standard hours to minimise impact to the operation of the road network and reliability of public transport services and active transport.

Approval from City of Sydney and Transport for NSW would be required for any out of hours work and the impacted community would be notified at least 7 calendar days' in advance.

Subject to approval, construction is expected to commence in Q2 2023 and take around 15 months to complete.

#### 3.3.4 PLANT AND EQUIPMENT

An indicative list of plant and equipment that would be required to construct the Proposal is provided in Table 3.5. Additional plant and equipment likely to be used would be identified during detailed design by the nominated Contractor.

Table 3.5 Indicative plant and equipment required for construction

EQUIPMENT		
— Utility vehicles, rigid trucks, bob cats	— Environmental controls	
— Pavement milling, grader and compactor	— Silt socks	
— Variable messaging signs	— Rubbish skips	
— Traffic control vehicles	— Temporary fencing	
— Concrete drills	— Safety cones	
<ul> <li>Pavement grinding machine</li> </ul>	— Traffic signs	
— Quick-cut saw / Road saw / Block cutter	— Bollards	
— Generators	— Variable Message Sign (VMS)	
<ul> <li>Various powered and unpowered hand tools</li> </ul>		
— Handheld spray-painting gun for pavement markings		
<ul> <li>Pedestrian and traffic barriers</li> </ul>		

### 3.3.5 EARTHWORKS

Minimal earthworks are expected. Demolition and excavation associated with replacement of the existing road pavement and/or kerb and gutter will be required. Earthworks and estimated quantities would be further refined prior to the start of construction during detailed design.

### 3.3.6 SOURCE AND QUANTITY OF MATERIALS

Materials would be sourced from local areas where practicable. The ability to reuse the material would depend on its physical and chemical properties. Material unsuitable for reuse would be managed in accordance with resource management hierarchy principles, including (in order of priority):

reused as engineered fill onsite

transferred:

- to another City of Sydney project for reuse in accordance with the NSW Environment Protection Authority (EPA) *Excavated Public Road Material Order* (EPA, 2014) resource recovery exemption
- to an approved City of Sydney stockpile site for future re-use, only if a specific project has been identified before stockpiling and the *Protection of the Environment Operations Act 1997* (POEO Act) waste regulatory requirements have been met. If a project cannot be identified the material would not be stockpiled within the Proposal
- off site for reuse by a third party in accordance with a relevant EPA Excavated Public Road Material resource recovery exemption or relevant planning approval
- to a licenced waste recovery site
- for disposal at a licenced facility
- as otherwise provided for by the relevant waste legislation.

Natural resources required for construction of the Proposal would include aggregates and sand for use in concrete. The type of aggregate and sand would be specified during detailed design. Pavement materials may include heavily bound sub-base and asphalt concrete. Manufactured items, including structural steel and precast concrete components would also be required.

Materials would be sourced from appropriately licensed facilities. Wherever possible, materials would be sourced from commercial suppliers in nearby areas or other viable sources such as other nearby infrastructure planning proposals. No materials currently proposed to be used for the Proposal are considered to be in short supply.

If additional fill material is required that cannot be sourced from within the construction footprint, it would be imported from a suitably licensed quarry. Surplus material that cannot be used within the construction footprint would be reused on other projects or disposed of in the order of priority detailed above.

### 3.3.7 TRAFFIC MANAGEMENT AND ACCESS

#### VEHICLE MOVEMENTS

Traffic generated by construction activities includes light vehicles, as well as heavy vehicles for periodic delivery and removal of materials, and construction plant and equipment.

The traffic generated as part of the construction works is not expected to exceed 50 light vehicle movements and 30 heavy vehicle movements per day during peak construction periods.

Pedestrian access will be maintained at all times during construction. Traffic management measures would be put into place prior to the commencement of works in order to provide a safe environment for road users, cyclists and pedestrians. Variable messaging would be provided to warn cyclists and vehicles of changed traffic conditions.

#### HAULAGE ROUTES

Haul routes describe the roads that the construction traffic and delivery vehicles would use to enter and leave the area. Heavy vehicles will use the most direct routes to the arterial road network to access the site. From the westerly direction, this may include the use of College Street, Elizabeth Street and Wentworth Street. From the eastern direction, this may include Flinders Street and Oxford Street east of Taylor Square. The haulage route would avoid local streets and minimise impact to sensitive noise receivers, such as residential areas and schools.

#### ROAD AND LANE ACCESS/CLOSURES

Traffic and transport impacts associated with road and lane closures are assessed in Section 6.1 of this REF. Measures to manage traffic delays and impacts on local access that may occur as a result of road and lane closures would be outlined in a Traffic Management Plan (TMP).

#### TRAFFIC MANAGEMENT, CONTROL AND SIGNAGE

Where possible, construction activities would be programmed to minimise the impact on traffic using the local and regional road network.

Standard traffic management measures would be used to minimise the traffic impact expected during construction. These measures would be identified in a TMP for the Proposal and would be developed in accordance with Transport for NSW's *Traffic Control at Work Sites Manual* (Roads and Maritime 2018) and Transport for NSW *Specification G10 - Traffic Management* (Roads and Maritime, 2015).

Detailed construction methods and associated management plans (such as Traffic Control Plans (TCPs)) and a CEMP would also be developed by the Contractor to manage potential traffic and access impacts.

#### 3.3.8 ANCILLARY FACILITIES

A temporary construction compound would be required to accommodate a site office, amenities, laydown and storage area for materials. Materials would be stored at the Contractor's yard and, if needed, dropped off at one of the nominated construction compounds and shown in Figure 3.3.8.1:

- Oxford Street / Little Liverpool Street
- Oxford Street / Palmer Street

Two parking spaces at Little Liverpool Street would be affected by ancillary facilities. One loading zone space would be affected by the Palmer Street compound area.

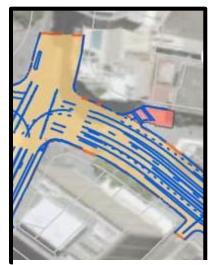




Figure 3.3.8.1 Laydown areas for the Proposal

Project No PS126995 Oxford Street Cycleway Review of Environment Factors City of Sydney

## 3.3.9 PUBLIC UTILITY ADJUSTMENT

The proposed works associated with the cycleways are unlikely to require substantial adjustment of any public utilities. However, should any potential service conflicts be identified during the detailed design and documentation phase, consultation with the relevant utility service provider will be required.

### 3.3.10 PROPERTY ACQUISITION

There is no property acquisition expected to be part of the Proposal.

During construction works there may be some temporary disruption to vehicular access to properties adjacent to the route. Traffic control measures would be implemented to ensure that reasonable access is maintained to the affected properties.

# 4 STATUTORY AND PLANNING FRAMEWORK

This chapter provides the statutory and planning framework for the Proposal and considers the provisions of related state environmental planning policies, Local Environmental Plans (LEP) and other legislation.

## 4.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) establishes the system of environmental planning and assessment in NSW. This Proposal is subject to the environmental impact assessment and planning approval requirements of Division 5.1 of the EP&A Act. Division 5.1 specifies the environmental impact assessment requirements for activities undertaken by public authorities, such as City of Sydney, which do not require development consent under Part 4 of the Act.

In accordance with Section 5.5 of the EP&A Act, City of Sydney, as the proponent and determining authority, must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the Proposal.

Clause 228 of the Environment Planning and Assessment Regulation 2000 (EP&A Regulation) prescribes the minimum factors which must be considered when determining if an activity assessed under Division 5.1 of the EP&A Act has or is likely to have a significant effect on the environment. Chapter 6 of the REF provides an environmental impact assessment of the Proposal in accordance with clause 228, and Appendix C specifically responds to the factors for consideration under clause 228.

# 4.1.1 STATE ENVIRONMENTAL PLANNING POLICY (TRANSPORT AND INFRASTRUCTURE) 2021

State Environmental Planning Policy (Transport and Infrastructure) (T&I SEPP) 2021 contains planning provisions for infrastructure, planning controls and reserves land for the protection of corridors and the land use planning and assessment framework for appropriate development at Port Kembla, Botany and Newcastle. The T&I SEPP prevails over most other Environmental Planning Instruments (EPIs) to the extent of any inconsistency including LEPs. The clauses of T&I SEPP relevant to the proposal are discussed in the following sections.

Under Division 17 section 2.112 of the T&I SEPP, the development of 'pedestrian and cyclist facilities such as footpaths, street lighting, kerb adjustments and ramps, pedestrian fences, refuges, holding rails and bollards' is exempt development if it is carried out by or on behalf of a public authority. Development for the purpose of a road or road infrastructure may be carried out by or on behalf or a public authority without consent on any land under Division 17 section 2.108 of the SEPP (Transport and Infrastructure).

As the Proposal involves a new cycle path and road or road infrastructure facilities and is to be carried out by City of Sydney, it can be assessed under Division 5.1 of the EP&A Act.

Part 2 Division 1 of SEPP (Transport and Infrastructure) contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by T&I SEPP (where applicable), is discussed in Chapter 5 of this REF.

### 4.1.2 STATE ENVIRONMENTAL PLANNING POLICY (PLANNING SYSTEMS) 2021

State Environmental Planning Policy (Planning Systems) 2021 provides that development is 'State Significant Development' and would require approval from the Minister from Department of Planning, Industry and Environment under Part 4 of the EP&A Act if:

- The development on the land requires development consent under Part 4 of the Act
- The development has a capital investment value of more than \$30 million.

The Proposal is permitted without development consent under T&I SEPP. The Proposal has a capital investment value of less than \$30 million. Therefore, the Proposal does not trigger the State Significant Development provisions of the SEPP (Planning Systems).

SEPP	CONSIDERATION
State Environmental Planning Policy (Resilience and Hazards) 2021	This SEPP contains planning provisions for land use planning within the coastal zone, to manage hazardous and offensive development and provides a state-wide planning framework for the remediation of contaminated land and to minimise the risk of harm. This SEPP requires consent authorities to consider whether the site is or is likely to be contaminated and determines categories of remediation requiring consent. Consent is not required because the works may be carried out without consent under T&I SEPP. Section 6.7 contains an assessment of the likelihood of contamination in the study area.
State Environmental Planning Policy (Biodiversity and Conservation) 2021	This SEPP consolidates a range of previous SEPPs related to vegetation, koala habitat, bushland, drinking water, and harbour catchment. The Proposal does not overlap with provisions of this SEPP so no permits or approvals are required.

#### 4.1.3 OTHER STATE ENVIRONMENTAL PLANNING POLICIES

## 4.2 LOCAL ENVIRONMENTAL PLANS

The Proposal is permissible without development consent under SEPP (Transport and Infrastructure) and therefore provisions within Local Environmental Plans would not apply. However, for purposes of this REF they were considered and are outlined for reference below.

## 4.2.1 SYDNEY LOCAL ENVIRONMENTAL PLAN 2012

The Proposal is located within the City of Sydney local government area (LGA) and development is regulated by the Sydney Local Environmental Plan 2012 (LEP). The Proposal is located within the following land use zones under the 2012 Sydney LEP:

- B2 Local Centre
- B4 Mixed Use
- B8 Metropolitan Centre
- SP2 Infrastructure (Classified Road)

The objectives of these land use zonings are discussed in Table 4.1 and shown in Figure 3.1.1.1.

#### Table 4.1 Sydney LEP land use zoning

ZONE	RELEVANT PROVISION DETAILS
B2 Local Centre	The objectives of zone B2 are:
	<ul> <li>To provide a range of retail, business, entertainment and community uses that serve the needs of people who live in, work in and visit the local area.</li> </ul>
	— To encourage employment opportunities in accessible locations
	— To maximise public transport patronage and encourage walking and cycling.
	— To allow appropriate residential uses so as to support the vitality of local centres.
	The Proposal is consistent with the objectives of zone B2 as it would provide improved infrastructure to active transport and bus transport to encourage use of public transport and encourage walking and cycling.
B4 Mixed Use	The objectives of zone B4 are:
	— To provide a mixture of compatible land uses
	<ul> <li>To integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise public transport patronage and encourage walking and cycling.</li> </ul>
	— To ensure uses support the viability of centres.
	The Proposal is consistent with the objectives of zone B4 as it would provide improved infrastructure to active transport and bus transport to encourage use of public transport and encourage walking and cycling connecting to business, office, residential, retail and other development.
<b>B8</b> Metropolitan Centre	The objectives of zone B8 are:
	<ul> <li>To recognise and provide for the pre-eminent role of business, office, retail, entertainment and tourist premises in Australia's participation in the global economy.</li> </ul>
	<ul> <li>To provide opportunities for an intensity of land uses commensurate with Sydney's global status.</li> </ul>
	<ul> <li>To permit a diversity of compatible land uses characteristic of Sydney's global status and that serve the workforce, visitors and wider community.</li> </ul>
	<ul> <li>To encourage the use of alternatives to private motor vehicles, such as public transport, walking or cycling.</li> </ul>
	<ul> <li>To promote uses with active street frontages on main streets and on streets in which buildings are used primarily (at street level) for the purposes of retail premises.</li> </ul>
	The Proposal is consistent with the objectives of zone B8 as it would provide improved infrastructure to active transport and bus transport to encourage use of public transport and encourage walking and cycling along one of Sydney's iconic streets promoting Sydney's global status.

ZONE	RELEVANT PROVISION DETAILS
SP2 Infrastructure (Classified Road)	<ul> <li>The objectives of zone SP2 are:</li> <li>To provide for infrastructure and related uses.</li> <li>To prevent development that is not compatible with or that may detract from the provision of infrastructure</li> <li>The Proposal is consistent with the objectives of zone SP2 as it would provide upgraded road related infrastructure, to improve travel times, safety within the area and improved connectivity through improved infrastructure to active transport and bus transport.</li> </ul>

## 4.3 OTHER RELEVANT NSW LEGISLATION

## 4.3.1 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) provides the legal framework for the management of air, noise, water and waste pollution. Under Part 3.2 of the POEO Act, the carrying out of scheduled development work as defined in clause 35, Schedule 1 - road construction (meaning the construction or widening of roads) is relevant to the Proposal.

Road construction is a scheduled activity under Schedule 1 of the POEO Act if it results in the following:

- Four or more traffic lanes (not including bicycle lanes or lanes used for entry or exit),
- The road is classified or proposed to be classified as a main road for at least three kilometres of its length in the metropolitan area.

Based on the concept design and construction methodologies proposed (refer to Section 3.4.1) an Environment Protection Licence (EPL) would not be required as the Proposal would involve upgrading about one kilometre and no road widening is involved.

### 4.3.2 HERITAGE ACT 1977

The *Heritage Act 1977* (Heritage Act) provides for the conservation of buildings, works, archaeological relics and places of heritage value. It principally achieves this by listing, and therefore protecting, heritage values under a number of registers. This includes the State Heritage Register (SHR), the Heritage and Conservation Register (HCR), LEP heritage schedules, public authority heritage and conservation registers, termed section 170 registers, and Interim Heritage Orders (IHOs).

The Heritage Act requires City of Sydney to assess the Proposal's impact on historic buildings, places, objects, works, relics and archaeological sites, and to ensure their cultural heritage value is protected. Refer to Section 6.4 for more detail.

The Heritage Act sets out provisions that require a heritage impact assessment to be prepared where the Proposal has the potential to impact on any values that are protected under the Heritage Act. Finally, the Heritage Act sets out a process for obtaining permission from the NSW Heritage Council, as administrators of the Heritage Act, to investigate, excavate and/or impact on a heritage-listed item.

The Proposal would have minor impacts and is not expected to require further approval under the Heritage Act prior to works commencing. Impacts to heritage items are discussed further in Section 6.4.

### 4.3.3 NATIONAL PARKS AND WILDLIFE ACT 1979

There is no reserved land under the *National Parks and Wildlife Act 1997* (NPW Act) within the Proposal. The harming or desecrating of Aboriginal objects or places is an offence under section 86 of the NPW Act. Under section 90, an

Aboriginal heritage impact permit may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons.

The NSW Environment, Energy and Science Group (previously Office of Environment and Heritage) has published the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (Department of Environment, Climate Change and Water (DECCW), 2010).

### 4.3.4 ROADS ACT 1993

Section 138 of the *Roads Act 1993* (Roads Act) requires consent from the relevant road authority for the carrying out of work in, on or over a public road. However, clause 5(1) in Schedule 2 of the Roads Act states that public authorities do not require approval for works on unclassified roads.

The Proposal would involve work classified roads under the Roads Act. The Proposal also includes work on local roads. A road occupancy licence may be required and obtained under Section 138 of the Roads Act in order to perform works for the Proposal. Where works are required that would impact on local roads of the Proposal, ongoing consultation with Transport for NSW would occur, as required.

### 4.3.5 CROWN LANDS MANAGEMENT ACT 2016

The *Crown Lands Management Act 2016* (Crown Lands Act) replaces the *Crowns Lands Act 1989* from 1 July 2018. The Crown Lands Act is intended to ensure that Crown land is managed for the benefit of the people of NSW and to provide for the proper assessment and management of Crown land in accordance with the principles of the Act. The Act sets out the conditions under which Crown land is permitted to be occupied, used, sold, leased, licensed or otherwise dealt with.

There are no identified Crown land within the Proposal.

## 4.4 COMMONWEALTH LEGISLATION

## 4.4.1 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a referral to the Australian Government is required for proposed actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land.

A referral is not required for proposed road activities that may affect nationally listed threatened species, endangered ecological communities and migratory species. There are no expected impacts to these biodiversity matters. These and other biodiversity impacts are discussed in Chapter 6 of the REF.

#### FINDINGS - MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

The assessment of the Proposal's impact on matters of national environmental significance and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant matters of national environmental significance or on Commonwealth land. Accordingly, the Proposal has not been referred to the Australian Government Department of Agriculture, Water and the Environment under the EPBC Act.

## 4.4.2 ABORIGINAL AND TORRES STRAIT ISLANDER HERITAGE PROTECTION ACT 1984

There is an obligation on a person who discovers anything which he or she has reasonable grounds to suspect are Aboriginal remains to report that discovery to the Environment Minister, giving particulars of the remains and their location. The Proposal does not impact any previously identified Aboriginal sites and/or places (refer Section 6.7). Protocols for unexpected finds are detailed in mitigation measures in Chapter 7.

## 4.4.3 NATIVE TITLE ACT 1993

The *Native Title Act 1993* recognises and protects native title. The Act covers actions affecting native title, outlining processes for determining whether native title exists and compensation for actions affecting native title. It establishes the Native Title Registrar, the National Native Title Tribunal, the Register of Native Title Claims, the Register of Indigenous Land Use Agreements, and the National Native Title Register. Under the Act, an action includes proposed public infrastructure on land or waters that affects native title rights or interest.

A search of the National Native Title Tribunal's Native Title Vision website was undertaken, with no Native Title holders/claimants identified within or near the proposal. If Native Title holder/claimants are identified during detailed design of the Proposal, City of Sydney would provide a notice of the Proposal to NTSCORP under section 24KA of the Act and would be invited to comment on the Proposal.

## 4.5 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

City of Sydney is committed to ensuring that its projects are implemented in a manner that is consistent with the principles of ecologically sustainable development (ESD). The principles of ESD are generally defined under the provisions of clause 7(4) of Schedule 2 to the EP&A Regulation as:

- The precautionary principle if there are threats of serious or irreversible damage, a lack of full scientific uncertainty should not be used as a reason for postponing measures to prevent environmental degradation
- Intergenerational equity the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations
- Conservation of biological diversity and ecological integrity the diversity of genes, species, populations and their communities, as well as the ecosystems and habitats they belong to, should be maintained or improved to ensure their survival
- Improved valuation, pricing and incentive mechanisms environmental factors should be included in the valuation of assets and services.

The principles of ESD have been adopted by City of Sydney throughout the development and assessment of the Proposal.

## 4.6 CONFIRMATION OF STATUTORY POSITION

The Proposal is categorised as development for the purpose of a road and/or road infrastructure facilities and is being carried out by or on behalf of a public authority. Under Division 17 section 2.112 of the T&I SEPP the Proposal is permissible without consent. The Proposal is not State significant infrastructure or State significant development. The Proposal can be assessed under Division 5.1 of the EP&A Act. City of Sydney is the determining authority for the Proposal. This REF fulfils City of Sydney's obligation under section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

# 5 COMMUNITY AND AGENCY CONSULTATION

This chapter discusses the consultation undertaken to date for the Proposal and the consultation proposed for the future. Part 2.2 Division 1 of the T&I SEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development.

The City of Sydney prepared an Engagement Report to summarise key engagement activities held and feedback received from community and key stakeholders, available in Appendix H of this report.

## 5.1 CONSULTATION STRATEGY

The consultation process has been designed to ensure a high level of understanding and awareness amongst the local community and stakeholders of the proposed cycleway. The proposal is located within proximity to residential and commercial area of Sydney CBD. Located within a busy urban environment, Oxford Street acts as a significant link connecting major bike routes across Sydney and the street supports businesses along the Oxford Street retail and entertainment strip.

The Proposal has the potential to disrupt local traffic, and community consultation would be required to keep the community informed and incorporate their needs into the design where feasible.

## 5.2 COMMUNITY INVOLVEMENT

### 5.2.1.1 NOTIFICATION AND CONSULTATION

#### EARLY ENGAGEMENT

In November and December of 2020, the City of Sydney consulted on a plan for a centre running pop-up cycleway on Oxford Street, however following community consultation and concerns raised regarding safety of a centre running cycleway, the design was reconsidered with the proposal of a higher quality bi-directional cycleway on the northern side of Oxford and Liverpool streets.

Following this feedback, the connection was redesigned and workshopped with TfNSW in order to get in principle approval to reconsult the community. The best option for Oxford and Liverpool streets is to have the cycleway on the north side. The College Street cycleway is proceeding with the same plan consulted on in November 2020 and so was not re-exhibited. The purpose of the engagement was to make plans available for comments that will inform a report to Council who will make a determination on the project. Engagement outcomes will also inform reports to Local Pedestrian, Cycling and Traffic Calming Committee.

The City of Sydney provided notification including description of the works and the construction period, to properties on the alignment of the cycleway.

Meetings with key stakeholders prior to community engagement to present plans, discuss access, public space use and any perceived impacts were held by City of Sydney project staff.

#### COMMUNITY ENGAGEMENT ACTIVITIES

Community members were provided an opportunity to register their interest in the bi-directional cycleway through the council website: <u>Oxford Street cycleway: Your feedback on updated designs - City of Sydney (nsw.gov.au)</u>. The community could also provide feedback on proposed works, which can inform the concept design and raise issues relating to the ongoing development of the Proposal. This opportunity was open till 5pm on Thursday 25 November 2021.

The City of Sydney held an online information session to brief community members about the project. The sessions were held on the following dates:

- Wednesday 10 November 2021: 11:30am to 12:30pm
- Thursday 11 November 2021: 4:30pm to 5:30pm

Drop-in sessions were held in the following locations for community to collect feedback and to find out more about the project.

- Tuesday 16 November 2021: 4:30pm to 6pm Taylor Square north
- Wednesday 17 November: 4:30pm to 6pm Taylor Square north
- Thursday 18 November: 7:30am to 9am Taylor Square south

Additionally, community feedback and suggestions was sent to sydneycycleways@cityofsydney nsw.gov.au or by post to the City of Sydney postal address. In terms of online engagement, The Sydney Your Say page was visited 1012 times during the consultation period, with the plan downloaded 213 times.

A notification letter was also sent to 12,500 properties and 126 people dropped 193 pins on the Social PinPoint mapbased survey.

The City of Sydney received a total of 31 emails submissions during the public exhibition period.

#### 5.2.1.2 ENGAGEMENT SUMMARY AND COMMUNITY FEEDBACK

From the online survey, submissions were made on the online platform from community members.

- 78 comments were made supporting the project.
- 15 comments were made opposing the project.
- 127 submissions provided qualified responses and suggestions.

Key themes raised through the online survey submissions included:

- Continue safe riding connections to Centennial Park, Flinders Street, St Vincent's Hospital and Kings Cross
- Ensure that access to the bus stops over the cycleway is safe, clearly marked and shelters not covered in advertising
- Ensure light phasing prioritises people walking and riding
- Ensure that the design prioritises safety and access for people walking
- Support the closure of Liverpool Street

## 5.3 ABORIGINAL COMMUNITY INVOLVEMENT

A search for known Aboriginal heritage items in the vicinity of the Proposal area was undertaken on 1 April 2022 using the Aboriginal Heritage Information Management system (AHIMS) database. The AHIMS search did not identify any known Aboriginal sites close to the Proposal area.

The extensive landscape modification that has occurred across the Proposal suggests that intact evidence of Aboriginal land use is unlikely to occur within the boundaries of the Proposal. Similarly, the high level of disturbance would suggest that the archaeological potential of the area is low. Therefore, it was not considered necessary to undertake specific Aboriginal consultation.

## 5.4 T&I ISEPP CONSULTATION

Division 1, clauses 2.10 to 2.16 of the T&I SEPP specify the requirements for consultation with councils and other public authorities for infrastructure development carried out by or on behalf of a public authority. Consultation is required in relation to specified development or development that impacts on:

- Council related infrastructure or services (clause 2.10)
- Local heritage (clause 2.11)
- Flood liable land (clause 2.12 and 2.13)
- Public authorities other than councils (clause 2.14).

Appendix D contains a T&I SEPP consultation checklist that documents how T&I SEPP consultations requirements have been considered.

## 5.5 GOVERNMENT AGENCY AND STAKEHOLDER INVOLVEMENT

City of Sydney project staff held meetings with key government agencies and stakeholders prior to community engagement to present plans. The meetings were held with the following stakeholders:

- Transport for NSW
- Anzac Memorial
- Sydney Gay and Lesbian Mardi Gras
- Community and business leaders
- Woollahra Municipal Council
- Member for Sydney, Alex Greenwich's office

Other stakeholders include utilities, residents and businesses impacted by the Proposal, business chambers and groups, public transport users and providers, road users, media and community groups.

## 5.6 ONGOING OR FUTURE CONSULTATION

Details of the project on the City of Sydney website will be maintained throughout to reflect any updates to the proposed cycleway.

Further engagement activities area planned out throughout the Proposal development and construction phases and into operation. The City of Sydney would keep the community updated, touching base at Proposal milestones and also contacting required stakeholder.

# 6 ENVIRONMENTAL ASSESSMENT

## 6.1 TRAFFIC AND TRANSPORT

This section summarises the assessed impacts to traffic and transport likely to occur through the construction and operation of the Proposal. A Traffic and Transport Impact Assessment (TTIA) report was prepared to inform this section (Appendix F).

6.1.1 EXISTING ENVIRONMENT

#### 6.1.1.1 ROAD CLASSIFICATION

Oxford Street is both a regional road (between Wentworth Avenue to Crown Street) and a State Road (east of Crown Street). Other State Roads in the study area include Flinders Street, the Eastern Distributor Tunnel and South Dowling Street.

#### 6.1.1.2 OXFORD STREET

Oxford Street is a direct east-west travel route between Bondi Junction and Sydney CBD. Within the study area, Oxford Street is predominantly a six-lane, two-way road which includes bus lanes running on both the eastbound and westbound kerbside lanes of the corridor.

Given its direct travel route to Sydney CBD, Oxford Street functions as a trunk public transport route and has high demand for pedestrians and cyclists. It is considered a corridor with significant movement as it is a trunk public transport route connecting metropolitan and strategic centre in Sydney CBD and Bondi Junction respectively. It is considered a high-place corridor due to the activity it creates for people, the physical form and its values to people. This includes the significant presence of heritage buildings on Oxford Street and the importance of the place to the local residents.

An assessment of cyclist travel demand on Oxford Street was undertaken in the TTIA, which indicated an overall increase in daily bicycle activities along the length of corridor in both March and October of 2020 (the initial period of the COVID-19 pandemic), which was particularly notable at the intersection of Oxford Street and Flinders Street.

#### 6.1.1.3 ACTIVE TRANSPORT

There are several existing separated cycling infrastructure and low trafficked bicycle friendly streets within the vicinity of the study area. As shown in Figure 6.1.1.1, separated cycleways are currently available on Bourke Street and Campbell Street. In addition, there are numerous streets which incorporate either on-road line and pavement marking to indicate the presence of cyclists on the road network or bike lanes. The treatment are a mix of bicycle shoulder or mixed traffic condition. Cycling infrastructure is available on Liverpool Street (east of Oxford Street), Yurong Street, Riley Street, Crown Street, Palmer Street, Burton Street, Forbes Street, Brisbane Street and Greens Road, which primarily exist as a combination of bicycle shoulders and mixed traffic conditions.

In addition to the existing bicycle network and this proposal, separated cycleway works are being planned on College Street and Oxford Street east of Flinders Street. Currently, cyclists travel in mixed traffic conditions on either general traffic lanes or bus lanes.

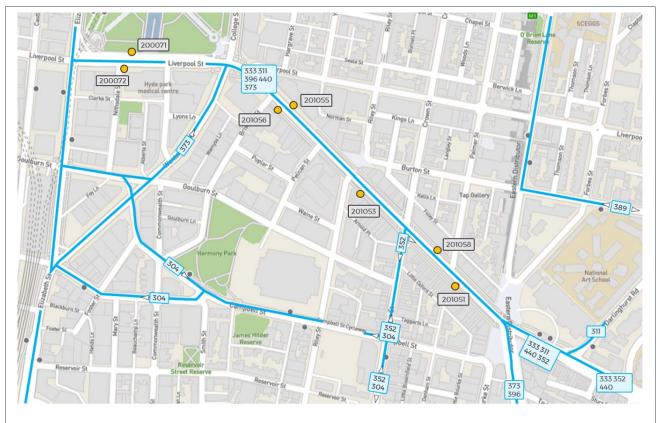


*Source: Sydney cycling map (City of Sydney, 2020)* Figure 6.1.1.1 Existing cycling infrastructure on Oxford Street and surrounds

For people walking in the study area, paved footpaths, designated pedestrian crossing points and road narrowing at intersections are observed on the network to make the walking environment accessible, safe and convenient. Anecdotal observations during a site visit however, indicate the need to consider increased activation and continuous footpath treatments at laneways to provide a more enjoyable walking environment that provides an experience for people.

#### 6.1.1.4 BUS OPERATIONS

The study area is well serviced by public buses, particularly with Oxford Street being a trunk route, providing direct routes to/from the Sydney CBD and the eastern and south-eastern suburbs. The timetable of bus services along Oxford Street was reviewed by Transport for NSW in December 2021. As part of the review, Oxford Street was maintained as a high-frequency route albeit some reduction in overall bus volumes. Some routes however would see increased frequencies. According to Transport for NSW's timetables, bus stops located west of Flinders Street can expect buses to arrive every 2-3 minutes, and up to 5-7 minutes east of Flinders Street. The current services are listed and depicted in Table 6.1



Number	Route
304	City Circular Quay to Green Square (Loop Service)
311	Central Belmore Park to City Millers Point via Darlinghurst and Potts Point
333	North Bondi to City Circular Quay via Bondi Junction
352	Marrickville Metro to Bondi Junction via Oxford Street, Crown Street and King Street
373	Coogee to City Museum (Loop Service)
389	Bondi Junction to Pyrmont
396	Maroubra Beach to City Circular Quay
440	Bondi Junction to Rozelle

Table 6.1 Bus services within study area

#### 6.1.1.5 KERBSIDE USES

Several parking restrictions exist along Oxford Street and serve a variety of purposes (e.g. taxi, bus, loading, and mail zones). The kerbside uses are shown in Figure 6.1.1.2. Additionally, the local roads in the study area generally serve as time-restricted parking, with allowances for residents to obtain permits to be exempt from these time restrictions in residential areas. Many of these parking areas are ticketed.

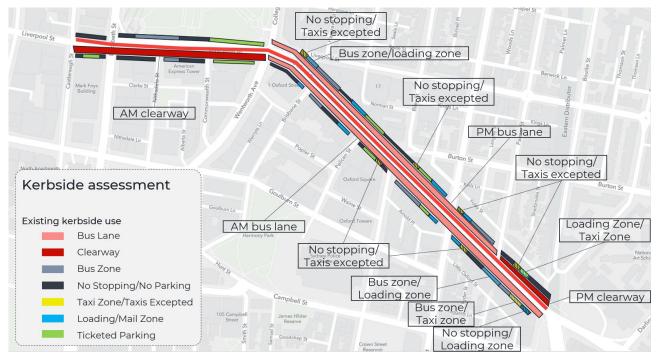


Figure 6.1.1.2 Existing parking restrictions on Oxford Street

## 6.1.2 POTENTIAL IMPACTS

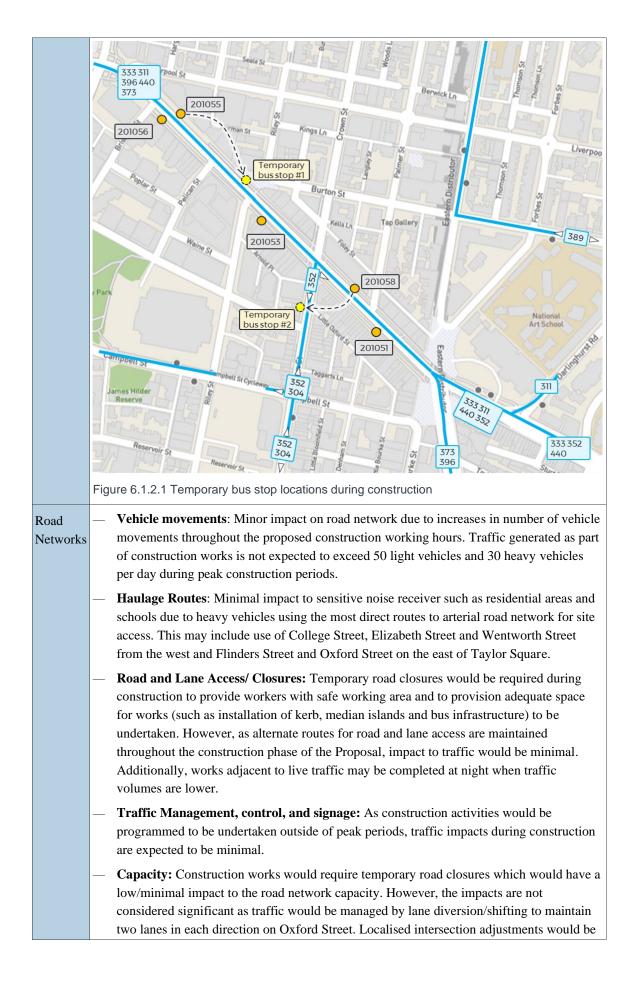
#### 6.1.2.1 CONSTRUCTION

This section discusses the traffic and transport impact due to the construction of the project with the activities described in Section 3.3. With the proposal requiring modification of existing road conditions, it is anticipated that partial road closures, interruption to traffic operations, bus stops and footpaths on Oxford Street during the construction of the project. The potential traffic and access impacts expected during the construction of the Proposal include:

- Temporary traffic delays from the movement of construction vehicles and hauling of materials
- Temporary partial road closures during construction of the cycleway
- Temporary partial road closures to accommodate a staged approach to closing traffic lanes during resurfacing works
- Public transport impacts on bus routes
  - Temporary delays due to lane closures.
  - Routes 311 and 340 would be permanently rerouted to Wentworth Avenue with the introduction of a prohibition on right turn movements from the Elizabeth Street south approach to Liverpool Street.
  - Existing eastbound bus stops would be temporarily relocated along Oxford Street during construction. For
    example, during the construction of island platform for the bus stop opposite Brisbane Street, the stop may be
    temporarily relocated to the east of the adjacent mid-block crossing to maintain service.
  - Sections of the footpath would be closed during construction, with pedestrians diverted around the closures.

Potential traffic impacts on the existing environment through the construction stage of the Proposal are detailed in Table 6.2

AREA OF IMPACT	IMF	PACT
Active Transport		Minimal or no changes to pedestrian access throughout the construction phase. If temporary interruption to footpath is required, alternative detour would be made available around the construction area to minimise the impact on access to transport.
		Reduced speed limit for incoming traffic using Oxford Street traffic lanes, maintained at 40km/h or reduced further to minimise conflict with general traffic.
		Not expected to have significant impacts to active transport on Oxford Street as street access to both vehicles and pedestrians would be maintained throughout the construction phase of the Proposal.
Public Transport		Temporary bus stop facilities required due to the construction of bus boarding islands on Oxford Street (eastbound) at opposite Brisbane Street (201055) and east of Crown Street (201058).
		Temporary bus stop locations as depicted in Figure 6.1.2.1 while the two eastbound bus stops are being constructed.
		Increased boarding time may be experienced during the temporary arrangements with additional passengers boarding/ alighting, however it is not likely to be significantly different from the current operation across the two stops.
		Minor impacts to be expected to queueing space on Crown Street due to temporary relocation of the two bus stops.
		No impacts to heavy rail network or accessibility to nearby station (Museum Station).

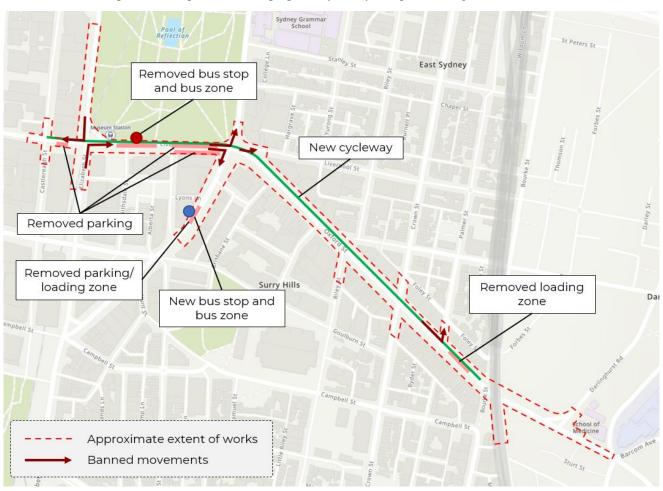


	 required to accommodate the necessary work area during construction, which would have minimal impact on the road network capacity. <b>Road condition:</b> There would be no impacts to road condition which would impact travel time or travel experience for commuters as pavement works would generally be limited to the area around the proposed cycleway. In summary, no significant impacts to the road network are expected during the construction of the Proposal.
Property Access	 <ul><li>Works are anticipated to have no impacts on access to loading and servicing for businesses and residents (including for emergency vehicle access and egress) as access would be maintained throughout the construction period.</li><li>In limited circumstances short-term restrictions for particular loading zones may need to be imposed with prior consultation with affected parties. The associated impacts would be minimised through the implementation of the mitigation measures identified in Section 6.1.</li></ul>
Kerbside Uses	 It is likely that construction activities would temporarily affect the availability of existing on-street parking. Notably, temporary relocation of bus stops on the northern kerbside of Oxford Street west of Riley Street and western kerbside of Crown Street, south of Oxford Street would displace the existing 1-hour parking (available between 8:30am-3pm on weekdays and 8:30am-6pm on weekends). However, essential kerbside uses would be maintained or relocated as appropriate. Changes to impact to kerbside uses would depend on the staging of works and will be considered more in detail in the development of the Construction Traffic Management Plan (CTMP)

Table 6.2 Construction Impacts

Traffic delays and access impediments as a result of the construction of the Proposal will be managed through the implementation of a CTMP.

#### 6.1.2.2 OPERATION



An overview of the operational impact due to the proposed cycleway is depicted in Figure 6.1.2.2.

Figure 6.1.2.2 Overview of major changes to operation of Oxford Street and Liverpool Street

Operational impacts of the proposal are as discussed in Table 6.3 Operational impact of the Proposal.

Table 6.3 Operational impact of the Proposal

AREA OF IMPACT	ІМРАСТ
Active Transport	<ul> <li>The proposed cycleway would result in a significant positive impact for active transport users, who would have an improved experience when travelling along Liverpool Street and Oxford Street.</li> </ul>
	<ul> <li>Operation of the Proposal would provide an improved cycling experience with improved road safety as a result of the separation of cyclists in comparison to the existing arrangement where which is shared with vehicular traffic.</li> </ul>
Pedestrians	<ul> <li>Operation of the Proposal would result in improved amenity for pedestrians, these include:</li> <li>Improved pedestrian priority and reduced conflict with turning traffic through the closure of little Liverpool Street from Oxford Street, and the provision of a continuous footpath along the north side of Oxford Street.</li> </ul>
	<ul> <li>Reduced road crossing dwell time at Palmer Street–Oxford Street intersection through the closure of Palmer Street to inbound traffic. Pedestrians are currently provided with minimum</li> </ul>

	green time at the start of the phase to allow left-turn inbound traffic to proceed thereafter. The removal of the left turn movement into Palmer Street will ensure pedestrians are given the right of way for the entire phase time provided for the Oxford Street east-west movement.
	<ul> <li>Removed pedestrian conflicts with turning vehicles at intersections associated proposed turning restrictions.</li> </ul>
	<ul> <li>Increased footpath space and queuing capacity for pedestrians post kerb realignment at certain locations along the cycleway.</li> </ul>
Public Transport	Bus routes: Some changes to eastbound bus routes following the removal of the Museum Station, Liverpool Street, Stand A bus stop (stop ID: 200071) would occur, with westbound routes remaining unchanged. Currently, the bus routes of 311, 333, 392N, 396, and 440 use this bus stop, new bus routes would be required due to the merging of this bus stop with Museum Station, Elizabeth Street, Stand C (stop ID: 200073). This location is approximately 125 metres walking distance from the existing bus stop opposite Brisbane Street and 200 metres from existing bus top east of Crown Street, which would potentially increase walking time for bus users. There would be no change to the route taken by 333, 392N, and 396 routes, and would stop at Museum Station, Elizabeth Street, Stand C instead. The bus route for the 311 and 440 routes would change, as there would no longer be a bus stop along Liverpool Street to load/offload passengers. These two services would now travel northwards along Wentworth Avenue rather than Elizabeth Street, and offload passengers at a new bus stop proposed for Wentworth Avenue between Lyons Lane and Commonwealth Street.
	Bus stops and bus zones: There would be several new bus stops as a part of the Proposed Development, there would be a new bus stop on the western side of Wentworth Avenue betwee Lyons Lane and Commonwealth Street. This bus stop would service some of the bus routes displaced from the removal of the Museum Station, Liverpool Street, Stand A bus stop. The associated bus zones would also be removed, with the bus zone adjacent to Hyde Park to be relocated to the new bus stop. The walking distance from the south-western Museum Station entry/exit point to the existing Stand A bus stop (to be removed) is approximately 50 m, compared to the walking distance to a new bus zone south of Stand C on Elizabeth Street from this entry/exit point being 65 m, which is where some Stand A buses would depart from following the bus route changes. Additionally, Shuttle buses which currently use the Liverpool Street Stand A bus stop, which services the Anzac Memorial would be encouraged to use the westbound bus stop east of Nithsdale Street, as this location provides direct access to the signalised mid-block pedestrian crossing to the memorial. The existing kerbside bus stops along the northern kerbside of Oxford Street (opposite Brisbane Street and at Palmer Street) would be provided on a median island with a boarding platform separated from the cycleway. Pedestrians would have to cross the cycleway at the marked pedestrian crossings to access these two bus stops. The new bus stop on Wentworth Avenue would potentially have new bus shelters installed.
	Bus stop capacity: The TIA conducted an analysis of the Opal ticketing data to estimate the number of passengers waiting at each stop and their waiting time. The assessment concluded th there would likely be sufficient space for bus passengers at the proposed bus boarders to wait to board their bus, as well as for bus passengers alighting. Accordingly, no impacts to bus stop capacity constraints are anticipated during to operation of the proposal.
	<ul> <li>Train Station: It is envisaged that there would be no impact to Museum Train station pedestria access, its services or access for Sydney Trains maintenance vehicles due to the operation of the Proposal.</li> </ul>

Traffic Network	— The extent of impact to the traffic network has been investigated by Transport for NSW separately. This has been done in the context of state and local policies for Sydney CBD, movement and place function of Oxford Street, road space allocation and the potential to extend the cycleway further east (known as the Oxford Street East Cycleway). Evidence of reduced traffic demand and increase in cycling demand between the eastern suburbs and the CBD are currently apparent, as well as aligned with the reallocation of road space introduced on Oxford Street (in both this project and the proposed Oxford Street East cycleway). However, the overall impact to the traffic network would be continually monitored and reviewed by Transport for NSW. The City of Sydney would also work collaboratively with Transport for NSW to address significant issues identified post opening of the cycleway. This includes during special events (Mardi Gras) where sections of Oxford Street are expected to be closed to host the parade.
Property Access	— Property access would be affected as a result of road network implemented as part of the proposal. These changes mainly relate to the closure of Little Liverpool Street from Oxford Street (eastbound) (following installation of bollards and No left turn) and the removal of access to Palmer Street (northbound) from Oxford Street following the change of Palmer Street to one-way only traffic between Foley Street and Oxford Street.
	<ul> <li>Impacts to property access would be minimal with the availability of alternative routes from origins and destinations. To identify alternative route choices, the Table 5.2 in the TIA presents alternative routes from different impacted origins and destinations.</li> </ul>
Kerbside Uses	Changes and impact to kerbside uses would depend on the staging of works through the construction of the Proposal and would be considered in more detail in the development if the CTMP. It is likely that during construction that availability of on-street parking restrictions would be temporarily affected however essential kerbside uses are to be maintained or relocated.
	Parking: There would be an overall reduction of two car parking spaces (4 spaces down from 6) in the short section of Little Liverpool Street between Oxford Street and Hargrave Street. In addition, the existing loading zone would be reduced from 3 spaces to 2 spaces. One car parking space on Oxford Street northern kerbside immediately east of Little Liverpool Street would also be removed to accommodate changes due to construction on Oxford Street, which may have an impact on vehicle parking facilities on the locations.
	Loading zones: Changes to loading zones would be required as part of the operation of the cycleway. The loading zone (3-4 spaces) would need to be removed along the northern side of Oxford Street between Palmer Street and Flinders Street. The shared loading and ticketed parking zone (3-4 spaces) would be removed along the western side of Wentworth Avenue between Commonwealth Street and Lyons Lane.

## 6.1.3 SAFEGUARDS AND MANAGEMENT MEASURES

Table 6.4 lists safeguards and management measures that would be implemented for identified impacts described in Section 6.1.2.

IMPACT	SAFEGUARDS	RESPONSIBILITY	TIMING
Traffic management and Traffic Network	<ul> <li>A Construction Traffic Management Plan (CTMP) would be prepared in accordance to Transport for NSW <i>Traffic Control at Worksites</i> and relevant Austroads guidelines and in consultation with the road authority to identify potential transport related delays and disruptions that may arise during the works.</li> <li>Overall impact to the traffic network would be continually monitored and reviewed by Transport for NSW. The City of Sydney will work collaboratively with Transport for NSW to address significant issues identified, post the opening of the cycleway.</li> </ul>	Contractor, Transport for NSW and City of Sydney	Construction
Access changes due to proposed turn bans	Details of road networks changes to existing road network arrangements and available detour options would be communicated to affected residents, businesses and road users (eg through letterbox drops, VMSs) in advance of the changes being implemented.	Contractor	Construction and operation
Temporary lane/road closures	<ul> <li>Temporary lane closures to accommodate proposed construction works on Oxford Street would be limited to night time periods to minimise traffic impacts.</li> <li>Road Occupancy Licences (ROLs) would be sought for all temporary lane closures and implemented in accordance with applicable conditions. Any long-term temporary lane/road closures would be assessed and approval sought from the relevant road authority. Any short-term temporary lane closures would be undertaken outside of the peak periods to minimise impacts to the road network</li> </ul>	Contractor	Construction
Property access during construction	<ul> <li>Access to affected properties would be maintained during construction, or if adversely impacted, a suitable alternative would be provided in consultation with relevant landowners.</li> <li>Access to properties would be maintained during construction, however where short-term interruption is required, suitable alternative access arrangements would be provided in consultation with the affected property owners and business owners as appropriate.</li> </ul>	Contractor	Construction
Public transport services	<ul> <li>Temporary relocation of bus stops on the northern kerbside of Oxford Street would be required to construct the proposed median island for the bus stop. Ongoing liaison would be undertaken with Transport for NSW and bus service providers regarding the temporary relocation of bus stops prior and during construction.</li> </ul>	Contractor	Construction

Table 6.4 Traffic and transport safeguards and management measures

Emergency access	<ul> <li>Access for emergency vehicles would be maintained at all times</li> </ul>	Contractor	Construction and operation
Bus stop Capacity	— As a part of the proposed cycleway design, existing kerbside eastbound bus stops on Oxford Street at Brisbane Street and Palmer Street would be provided with median islands to be used as bus boarders to manage operational conflict between passenger boarding/alighting and the cycleway. The condition would be monitored to minimise bus passengers queueing into the cycleway.	Contractor	Operation
Loading zone and associated loading/ unloading area	<ul> <li>Loading zones along the northern kerbside would be provided with a median island/platform so that loading/unloading activities do not encroach onto the cycleway.</li> </ul>	Contractor	Operation

## 6.2 NOISE AND VIBRATION

This section summarises the assessed impacts to noise and vibration likely to occur through the construction and operation of the Proposal. Subject to approval, construction is expected to commence in Q2 2023 and take around 15 months to complete. The Construction and Maintenance Noise Estimator Tool (Transport for NSW 2017) was used to estimate noise impacts of the proposed works (Appendix I).

A distance-based (noisiest plant) scenario was used to estimate noise impacts from the proposed works, described in Section 3.3. The distance-based scenario was used to determine the extent of noise impacts and noisiest plant was used to simulate the worst-case scenario. This approach provides a conservative assessment which assumes the maximum potential impact from noise.

## 6.2.1 EXISTING ENVIRONMENT

The existing noise and environment are typical of an established urban area and heavily trafficked vehicular throughfare. Background noise is dominated by vehicular traffic and pedestrian and related noise. Category R5 (Sydney CBD, predominantly commercial) has been selected as the representative noise area category. The locational context of proposed construction works is as shown in Section 3.1.

The distances to the closest noise sensitive receivers of each category are as summarised below:

Table 6.5 Non-residential sensitive receivers located near the proposed works and distance

RECEIVER CATEGORY	RECEIVER AND INDICATIVE DISTANCE TO CONSTRUCTION WORKS
Classroom at schools and other	— Oxford College, 50m
educational institutions	<ul> <li>Charles Sturt University Study Centres, 50m</li> </ul>
	— The University of Notre Dame Australia, 150m
	— The Oxford and Cambridge Group, 170m
Medical centre, hospital wards and	— Darlinghurst Central Medical Centre, 50m
operating theatre	<ul> <li>St Vincent's Private Hospital Sydney, 300m</li> </ul>

RECEIVER CATEGORY	RECEIVER AND INDICATIVE DISTANCE TO CONSTRUCTION WORKS
	— Uspace Ward, 450m
Place of worship	— Morbius Shrine, 20m
	— Interfaith Church, 90m
Active recreation	— Anzac memorial, 5m, adjacent to Liverpool Street in the north
	— Harmony Park, 200m
	— Albert Sloss Reserve, 165m
	— Green Park, 300m
Passive recreation	— World Square, 200m
	— Oxford Village, 30m
Industrial premise	Not applicable (NA)
Office and retail outlets	Several located within 15 to 20 metres of proposed works.

For R5 Noise area category, the RBL/ $L_{A90}$ , the background noise level during standard work hours is 60 dBA, 55 dBA in the evening and 50 dBA at night.

### 6.2.2 POTENTIAL IMPACTS

#### 6.2.2.1 CONSTRUCTION

#### CONSTRUCTION NOISE CRITERIA

The EPA's *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change, 2009) is the principal guideline for the assessment and management of construction noise in NSW. The ICNG recommends standard hours of construction as:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sundays and public holidays: no works.

Noise management levels (NMLs) have been determined for receivers as per the procedure in the ICNG. The ICNG prescribes set noise management levels for non-residential receivers such as commercial, schools and places of worship. Noise management levels for residential receivers are calculated based on the rating background level (RBL) + 10dB (A) (for daytime periods) or the RBL + 5 dB(A) (for evening and night time periods). In addition, a 'highly noise affected' level of 75 dB(A) for residential receivers represents the point above which the ICNG indicates there may be strong community reaction to noise. Where works exceed the noise management levels, all reasonable and feasible measures (such as equipment selection and location, construction scheduling and respite periods) should be implemented to reduce noise levels as far as practicable.

#### DESCRIPTION OF EXISTING ENVIRONMENTAL AND POTENTIAL IMPACTS

It is expected that there will be traffic disruptions during the construction phase and increase in related noise and vibration levels along Liverpool Street, Oxford Street and other road intersections. This includes the noise of construction vehicles and the use of machinery on site including concrete drills, pavement grinders and generators.

Construction tasks associated with the Proposal include grinding and resurfacing of pavement, installation of kerbs, medians islands, bus island platforms as well as the installation of line marking and signposting and are likely to temporarily increase noise within the vicinity. Traffic generated as part of construction works is expected to be up to 50 light vehicles and 30 heavy vehicles per day during peak construction periods, which represents negligible increase on existing movements in the area. The impact of the increase in traffic noise on the nearby receivers would be minimal given the traffic movements would be temporary during the construction stage.

The proposed work schedule for the proposal is described in Section 3.3.3. Construction activities would be carried out during standard working hours; however, some works would be undertaken outside of hours at night during the following periods:

- 8pm to 5am Sunday to Thursday
- 8pm Friday to 5am Monday (full weekend)

The noise area category for the Proposal has been selected as R5 as the Proposal is located within the Sydney CBD where the surrounding is predominantly commercial and densely concentrated with skyscrapers. The works are in area in which majority of traffic is during the weekdays with smaller number of traffic volumes during the weekends. Within the Transport for NSW Construction Noise Calculator Tool, the Concrete Saw has been chosen as an equivalent as there is no plant item for Concrete Drills listed. Given the selected noise area category, predicted noise levels for residential receivers is as represented in Table 6.6.

Table 6.6 Noise area criteria for nominated construction noise as a result of the proposed	works
--	-------

NOISE AREA CATEGORY	PERIOD	R5
RBL or L <sub>A90</sub> Background level (dB(A))	Day	60
	Evening	55
	Night	50
LAeq (15minute) Noise Management Level (dB(A))	Day	70
	Day (OOHW)	65
	Evening	60
	Night	55

The noisiest work activity during night-time will be from the noise generated during with the use of the concrete saw. Table 6.2.2.2 outlines the predicted noise impacts from construction activities from works carried out at night.

Table 6.7 Noise area	criteria for nominated	d construction noise as	a result of the pr	oposed works at night
		1 CONSTRUCTION NOISE as	a result of the pr	oposed works at hight

Catchment Distances	NML, dB(A)	Predicted noise levels, dB(A)	Recommended additional mitigation measures
NCA1 (25m, in line of sight)	80	85	N, R1, DR
NCA2 (60m, in line of sight)	70	75	N, R1, DR
NCA3 (155m, in line of sight)	60	65	N, R1, DR
NCA4 (240m, in line of sight)	55	60	N, R1, DR

There are a number of non-residential sensitive receivers located where the proposed works would be carried out. Table 6.2.2.3 outlines the predicted noise impacts to non-residential receivers listed in 6.2.1.

Table 6.8 Predicted noise impact to non-residential sensitive receivers

SENSITIVE RECEIVER	STANDARD HOURS			
	PERIOD	NML	AFFECTED DISTANCE (M)	PREDICTED NOISE LEVELS
Classroom at schools and other educational institutions	Day	55	240	75
Medical centre, hospital wards and operating theatre	Day	65	105	75
Place of worship	Day	55	240	75
Active recreation	Day	65	105	75
Passive recreation	Day	60	155	75
Industrial premise	Day	75	35	75
Office and retail outlets	Day	70	60	75

Additionally, the predicted noise impact to sensitive receiver during out of hours work (OOWH) is as shown on Table 6.9.

Table 6.9 Predicted noise impact during evening and night to sensitive receivers

SENSITIVE RECEIVER	STANDARD HOURS			
	PERIOD	NML	AFFECTED DISTANCE (M)	PREDICTED NOISE LEVELS
Medical centre, hospital wards and	Evening	65	105	70
operating theatre	Night	65	105	70
Place of worship	Evening	55	240	60

SENSITIVE RECEIVER	STANDARD HOURS			
	PERIOD	NML	AFFECTED DISTANCE (M)	PREDICTED NOISE LEVELS
	Night	55	240	60
Active recreation	Evening	65	105	70
Passive recreation	Evening	60	155	65
Industrial premise	Evening	75	35	80
	Night	75	35	80
Office and retail outlets	Evening	70	60	75
	Night	70	60	75

As detailed in Table 6.2.2.2 and Table 6.2.2.3 above, construction noise levels are predicted to exceed the corresponding noise management levels. Consistent with the *Interim Construction Noise Guideline* ICNG (DECC, 2009), reasonable and feasible mitigation measures would be implemented to avoid or reduce these exceedances.

As construction is planned to be carried out outside of standard working hours, nearby residents would be impacted by temporary sleep disturbance due to noisy activities. The *EPA Road Noise Policy* advises that noise events above the background noise level, rather than the peak background noise levels are likely to cause sleep disturbance. Noise characteristics that influence sleep disturbance are considered to be the number of noisy events heard distinctly above background level, and the peak level and emergence of these events. The work would have intermittent noise impacts.

### 6.2.2.2 OPERATION

There would be no substantial net increase in noise and vibration activities as a result of the operation of the cycleway.

## 6.2.3 SAFEGUARDS AND MANAGEMENT MEASURES

Table 6.10lists safeguards and management measures that would be implemented for identified impacts described in Section 6.2.2.

IMPACT	ENVIRONMENTAL SAFEGUARDS	RESPONSIBILITY	TIMING
Construction noise and vibration	<ul> <li>A Construction Noise and Vibration Management Plan (CNVMP) will be prepared and implemented as part of the CEMP. The CNVMP will generally follow the approach in the <i>Interim Construction Noise Guideline (ICNG) (DECC, 2009)</i> and identify:</li> <li>A monitoring program to assess performance against relevant noise and vibration criteria.</li> <li>Arrangements for consultation with community, including notification and complaint handling procedures.</li> <li>Contingency measures to be implemented in the event of non-compliance with noise and vibration criteria.</li> </ul>	Contractor	Detailed design/ Pre- construction

Table 6.10 Noise and vibration safeguards and management measures

IMPACT	ENVIRONMENTAL SAFEGUARDS	RESPONSIBILITY	TIMING
Construction noise and vibration	The CNVMP will also contain a comprehensive night works approval procedure, including:	Contractor	Pre- construction
	<ul> <li>Maintain a rolling schedule of upcoming weekend work periods.</li> </ul>		
	<ul> <li>Inclusion of scheduled respite for the community for extended periods of night work</li> </ul>		
	<ul> <li>Methods for assessment and review of impacts</li> </ul>		
	<ul> <li>Methods for expanded community engagement, notification and agreements.</li> </ul>		
	<ul> <li>Records of community engagement, and proposed mitigation measures.</li> </ul>		
Construction noise and vibration	All sensitive receivers (e.g., schools and local residents) likely to be affected will be notified at least seven calendar days prior to commencement of any works associated with the activity that may have an adverse noise or vibration impact. The notification will provide details of:	Contractor/ City of Sydney	Detailed design/ Pre- construction
	— The project		
	— The construction period and construction hours		
	<ul> <li>Contact information for project management staff</li> </ul>		
	— How to make a complaint or report an incident		
	— How to obtain further information.		
Construction noise and vibration	All employees, contractors and subcontractors are to receive awareness training in control of noise and vibration as part of their regular site induction and updated prior to any significant period of nightwork:	Contractor	Pre- construction
	<ul> <li>All relevant proposal specific and standard noise and vibration mitigation measures</li> </ul>		
	<ul> <li>Relevant road occupancy licence and approval conditions</li> </ul>		
	<ul> <li>Permissible hours of work</li> </ul>		
	— Any limitations on high noise generating activities.		
	<ul> <li>Location of nearest sensitive receivers</li> </ul>		
	— Designated loading/unloading areas and procedures.		
	<ul> <li>Environmental incident procedures.</li> </ul>		
Construction noise and vibration	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Works generating high noise and/or vibration levels would be scheduled during less sensitive time periods where feasible.	Contractor	Pre- construction
	Where it is unavoidable to conduct works in standard hours for safety of workers and the public, for the safe and efficient		

IMPACT	ENVIRONMENTAL SAFEGUARDS	RESPONSIBILITY	TIMING
	operation of the road network or to maintain critical access to local services, then an assessment and approval process will be undertaken as per the CNVMP and RMS Construction Noise and Vibration Guidelines.		
Construction noise and vibration	Where feasible and reasonable, high noise generating work should be carried out during standard construction hours and in continuous blocks of no more than three hours with at least one hour respite between each block of work generating high noise impact, where the location of the work is likely to impact the same receiver.	Contractor	Pre- construction
Construction noise and vibration	<ul> <li>The following will be implemented for deliveries to and from the proposal:</li> <li>Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers or</li> <li>Loading/unloading areas are to be shielded or screened if close to sensitive receivers</li> <li>Delivery vehicles are to be fitted with straps rather than chains for unloading, wherever possible</li> <li>When establishing work areas, ancillary facilities and laydowns consideration will be given to arranging the site to limit the need for reversing associated with regular/repeatable movements, where safe and where space permits.</li> </ul>	Contractor	Pre- construction
Construction noise and vibration	Consideration will be given to the layout of the ancillary facilities in order to maximise distance and shielding to nearby receivers (e.g. positioning of earth bunds and hoarding to maximise shielding to residential receivers). Longer term screening and shielding of the boundaries of the site and will also be included in the CEMP, following a quantitative assessment of the risk of noise impact in pre-construction and proximity to sensitive receivers.	Contractor	Pre- construction
Construction vibration	Vibration intensive equipment size will be selected to avoid working within the structural damage minimum working distances. The use of less vibration intensive methods of construction or equipment will be considered where feasible and reasonable.	Contractor	Pre- construction

## 6.3 AIR QUALITY

## 6.3.1 EXISTING ENVIRONMENT

The local air environment at the Proposal site is typical of an urban area. Vehicle emissions from the CBD and along Oxford Street and Flinders Street would be potential sources of emissions in the area.

A search of the National Pollutant Inventory carried out on 14 April 2022 for the 2019-2020 reporting period identified 72 substances emitted from 18 sources in the Sydney LGA (DEE, 2022). In addition, a review of air quality concentration data on 14 April 2022 from the NSW Department of Planning and Environment for the Sydney East region identified "Good" air quality (DPE, 2022).

The nearest sensitive receivers to the Proposal are the residences along Liverpool Street and Oxford Street, commuters using the Museum train station and pedestrians along Oxford Street.

### 6.3.2 POTENTIAL IMPACTS

#### 6.3.2.1 CONSTRUCTION

The main air quality impacts that have the potential to occur during construction include dust and exhaust generated from plant, equipment and site vehicles. Impacts from construction equipment and vehicles are expected to be minor and temporary.

Excavation and any other earthwork activities may generate dust during construction of the Proposal.

#### 6.3.2.2 OPERATION

The Proposal is expected to improve air quality as it encourages use of active and public transport, reducing reliance on vehicles and therefore lowering carbon emissions (greenhouse gas emissions (GHG)).

IMPACT	ENVIRONMENTAL SAFEGUARDS	RESPONSIBILITY	TIMING
Air quality	An Air Quality Management Plan (AQMP) would be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to:	Contractor	Detailed design / Pre- construction
	— Potential sources of air pollution		
	<ul> <li>Air quality management objectives consistent with any relevant published EPA and/or Office of Environment and Heritage (OEH) guidelines</li> </ul>		
	— Mitigation and suppression measures to be implemented		
	<ul> <li>Methods to manage work during strong winds or other adverse weather conditions</li> </ul>		
	— A progressive rehabilitation strategy for exposed surfaces.		
	Vehicles transporting waste or other materials that may produce odours or dust would be covered during transportation.	Contractor	Construction
	Stockpiles or areas that may generate dust would be managed to suppress dust emissions in accordance with Technical Guideline EMS-TG-010: Stockpile Site Management Guideline (RTA, 2011b)	Contractor	Construction

#### 6.3.3 SAFEGUARDS AND MANAGEMENT MEASURES

## 6.4 NON-ABORIGINAL HERITAGE

A Heritage Impact Statement (HIS) was prepared to assess the potential impacts of the Proposal (City Plan, 2022). An assessment of impacts was undertaken to listed heritage items, as well as impacts to areas of archaeological potential. The following section is a summary of the key findings of the HIS. The full HIS is provided in Appendix G of this REF.

## 6.4.1 HISTORICAL BACKGROUND

The Proposal is within the 'Governor's Domain and Civic Precinct' which dates back to the establishment of the colony between 1788 to 1810 and to date is listed as an item on the Australian National Heritage List.

Development of the area expanded during 1816 when Francis Greenway pioneered the work as the Acting Civil Architect and Assistant Engineer. He was responsible for instigating the role of custodian of public architecture maintained continuously in New South Wales. A key factor in successfully applying this design was the use of sandstone and brick buildings applying it as an architectural façade to the colonial streetscape.

Also, during the 19<sup>th</sup> century, public open space was also a key historical component of the area when Charles Moore was responsible for defining the character of public open space to align with the colonial planning ideals of the time. The park is the oldest public park in Sydney and dates as far back as 1788. Hyde Park was officially proclaimed for public recreation in 1810 by Governor Macquarie. Its current design is from the 1920s applying City Beautiful Principles and contains significant monuments, fountains and memorials including the ANZAC War Memorial, the Archibald Fountain and Sandringham Garden.

## 6.4.2 EXISTING ENVIRONMENT

There are a number of historical items near the Proposal area as identified on the National Heritage List, State Heritage Register and the LEP. There are no items identified on the Commonwealth Heritage List. Table 6.11 summarises the proximity of heritage items near the Proposal.

SOURCE	HISTORICAL ITEM/SITE
Australian National Heritage List	— 'Governor's Domain and Civic Precinct', Macquarie Street, Sydney, item no. 106103
State Heritage Register	<ul> <li>'Museum Railway Station including interiors', Elizabeth Street, SHR no. 01207</li> <li>'Darlinghurst Court House group including interior, fencing and grounds', 138 Oxford Street, SHR no. 00792</li> <li>'Busby's Bore', Centennial Park to College Street, SHR no. 00568</li> </ul>
Sydney LEP 2012	<ul> <li>'Museum Railway Station including interiors', Elizabeth Street, item no. 11743</li> <li>'Hyde Park including north and south park reserves, Archibald Memorial Fountain, Anzac Memorial, Pool of Remembrance, stone perimeter walls and steps, St James Station, Museum Station, Dalley Statue, Oddfellows Memorial, Captain Cook Statue, Frazer Fountain, Fort Macquarie Cannon, Emden Gun, Thornton Obelisk, Sundial, former public toilets, Busby's Bore Fountain, Sandringham Gardens including memorial gates/pergola, Nagoya Gardens, Chess Board, F J Walker Fountain, John Baptist Fountain, Busby's Bore and archaeology', 110-120 Elizabeth Street, item no. I1654</li> </ul>

Table 6.11 Historical items near the Proposal

SOURCE	HISTORICAL ITEM/SITE
	<ul> <li>Former "Mark Foy's Emporium" including interiors and forecourt', 143-147 Liverpool Street, item no. I1854</li> </ul>
	<ul> <li>Burdekin Hotel including interior', 2-4 Oxford Street, item no. I379</li> </ul>
	<ul> <li>Brighton Hotel including interior', 75-77 Oxford Street, item no. I390</li> </ul>
	<ul> <li>Former Oxford Street Municipal Chambers including interior', 82-106 Oxford Street, item no. I392</li> </ul>
	<ul> <li>Darlinghurst Court House group including interior, fencing and grounds', 138 Oxford Street, Item no. I403</li> </ul>

#### SYDNEY MARDI GRAS PARADE ROUTE

On 2 February 2023, a decision by the NSW Heritage Council was gazetted which had the effect of adding the "Sydney Mardi Gras Parade Route" as a new Heritage Listing No 02068 to the State Heritage Register (SHR). A large proportion of the cycleway route is located within the heritage curtilage of the new listed item. Notably, a range of site specific exemptions were subsequently granted on 5 April 2023 under Section 57(2) of the Heritage Act an extract of which are provided below.

*The following activities described below under 'Exemptions' are exempted from Heritage Council approval under Section 57(1) of the Act:* 

- (i) Where such activities are in accordance with the 'Standard exemptions for engaging in or carrying out activities / works' published in the NSW Government Gazette.
- (ii) Where works do not involve disturbance of a relic; and/or
- (iii) Where a relic is disturbed, all works shall cease, and the Heritage Council be contacted within a reasonable time and furnish the Heritage Council with such information concerning the relic as the Heritage Council may reasonably require.

The following Site Specific Exemptions

- •••
- 3. Works by or on behalf of Transport for NSW / Roads and Maritime Services.

The following activities:

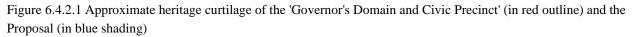
a) The carrying out of road work or traffic control works within the meaning of the Roads Act 1933 relevant to: part of MR172 (Oxford Street between Crown Street ending at Boundary Street) and MR171 (ANZAC Parade from Lang Road into Flinders Street to the intersection with Oxford Street at Taylor Square) and part of Road 7310 (Oxford Street between Wentworth Avenue and Crown Street) shown in the curtilage plan for the item, are exempt from subsection 57(1) of the Heritage Act 1977, subject to all excavation or disturbance of land being carried out in accordance with any approval for those works issued under the Environmental Planning and Assessment Act 1979

The Proposed works fall under the site-specific exemptions, and therefore would not require approval under Section 57(1) of the Heritage Act.

#### GOVERNER'S DOMAIN AND CIVIC PRECINCT

Part of the Proposal along Elizabeth and Liverpool Street (shown in Figure 6.4.2.1) are within the listing boundaries of the 'Governor's Domain and Civic Precinct' listed on the Australian National Heritage List and as an item of National

heritage significance (Item No. 106103). The Precinct is of outstanding heritage value to the nation for its capacity to connect people to the early history of Australia including interactions between Indigenous people and British colonisers. The Proposal would be subject to controls outlined in the Governor's Domain and Civic Precinct: Heritage Place Environment Protection and Biodiversity and Conservation Act (1999): Referral Guidelines 2021 (Referral Guidelines 2021). The Referral Guidelines 2021 defines 'significant impacts' as works with the potential to have sufficient impact on the established significance and values of the Heritage Place; the guidelines in turn establish that any works are likely to have a significant impact. Impacts assessed under these guidelines are described in Section 6.4.3.





#### SYDNEY LEP 2012

The noted heritage items summarised in Table 6.11 are listed in Part 1 of Schedule 5 of the Sydney LEP 2012. It should be noted that the Proposal is partially located within the Oxford Street Heritage Conservation Area under Part 2 of Schedule 5 of the Sydney LEP 2012 (shown in Figure 6.4.2.2). Oxford Street has state historical significance as in the early twentieth century, Oxford Street provided the main artery connecting the centre of Sydney with the coast, contributing to the rise and popular and enduring beach culture in Sydney. Further along east of Oxford Street (beyond the limits of the Proposal), the road also has heritage significance as identified in the Paddington Urban Heritage

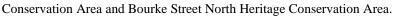




Figure 6.4.2.2 Proximity of Oxford Street Heritage Conservation Area (red hashed) and the Proposal (blue shading)

### 6.4.3 POTENTIAL IMPACTS

### 6.4.3.1 CONSTRUCTION

Based on the findings and assessment of the HIS, the Proposal is expected to have minor to no impacts to heritage items:

- Works along the northern side of the Proposal would border the southern heritage curtilage boundary of the 'Governor's Domain and Civic Precinct'. The proposed work has a possible minor impact on 'founding civic institutions and emerging civic space' (defined in the Referral Guidelines 2021) due to its proximity to significant historical buildings; however, the proposed works are limited to the kerb and roadway.
- The Proposal encroaches on the southern boundary of Hyde Park; however, this would be minimised for the most
  part by the existing footpath with sandstone kerb and sandstone retaining wall which borders the outside of the Park
  along Elizabeth, Liverpool and College Streets. The proposed works are not expected to extend beyond the footpath
  near the sandstone retaining wall.
- Works within the heritage curtilage of the Sydney Mardi Gras Parade Route fall under the site specific exemptions granted under Section 57(2) of the Heritage Act As a result, the works for the cycleway to alter the fabric of the roadway do not require any additional clarification or approval by the Heritage Council. All relevant works would be undertaken in accordance with the requirements of the exemptions.
- There are no expected large-scale or deep excavation impacting any historical items below surface. There may be an exception of signage installation; however, these proposed works are considered acceptable from a heritage perspective as it maintains the identified heritage values of the area.

In addition, the Proposal would have no impacts on the established archaeological significance; however, if archaeological items are discovered, safeguards and measures would be implemented as summarised in Section 6.4.4.

### 6.4.3.2 OPERATIONS

During operations of the Proposal there would be no historical impacts. The Proposal is expected to enhance the locality of the area by providing an added amenity to visitors, residences, and businesses.

### 6.4.4 SAFEGUARDS AND MANAGEMENT MEASURES

IMPACT	ENVIRONMENTAL SAFEGUARDS	RESPONSIBILITY	TIMING
Non- Aboriginal Heritage	The Standard Management Procedure - Unexpected Heritage Items (TfNSW, 2015) would be followed in the event that any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered. This may also consider a stop-work initiative and any exposed findings to be property assessed in accordance with the provisions of the NSW Heritage Act 1977.	Contractor	Detailed design / pre- construction

### 6.5 HYDROLOGY, FLOODING, AND WATER QUALITY

### 6.5.1 EXISTING ENVIRONMENT

#### SURFACE WATER

A search on the NSW ePlanning database on 14 April 2022 indicated that the Proposal area is not located within a flood planning area due to the elevation and topography of the local area. The proposal is located in a highly built-up area with existing roads and footpaths which makes it less prone to floods. There are no watercourses or wetlands in or within the vicinity of the Proposal area.

The closest water body to the Proposal area is Sydney Harbour, located approximately 950 metres northwest.

#### GROUNDWATER

Depth to groundwater within the proposal area is unknown. A search of the Australian Groundwater Explorer database on 1 April 2022 indicates that there are no registered groundwater bores within 500 metres of the Proposal area. There is one registered monitoring groundwater bore approximately 400 metres southwest of the Proposal, however this is unlikely to be impacted.

#### STORMWATER DRAINAGE

In general, it can be said that the existing drainage along the cycleway is minimal, with only 5 kerb inlet pits across the proposed 1.7km cycleway. The drainage network was modelled in 12D using the detailed survey provided by Cardno. The survey information provided topographic survey of the existing pits and invert levels, and gaps in the network was filled with digitised QL-D alignments. The existing kerb and gutter is used to convey discharge from the numerous downpipe kerb outlets present along the cycleway.

### 6.5.2 POTENTIAL IMPACTS

#### 6.5.2.1 CONSTRUCTION

The construction of the Proposal is unlikely to change flooding behaviour or hazards within the Sydney CBD. There would be no impacts to existing groundwater systems or behaviours. The Oxford Street cycle path is located within an urban area which is predominantly hardstand (e.g. concrete and paving).

Without mitigation measures, pollutants could potentially be transported to nearby stormwater drains during periods of heavy rainfall and further flow into nearby waterways including Sydney Harbour. Activities which could disturb soil during construction have the potential to impact upon local water quality as a result of erosion and run-off of sediments. Accidental spills of fuels, oils and other chemicals from construction vehicles, machinery and equipment may also impact on soil and local water quality.

#### 6.5.2.2 OPERATION

The Proposal is unlikely to impact on hydrology, flooding and water quality during operation.

### 6.5.3 SAFEGUARDS AND MANAGEMENT MEASURES

Table 6.12 Safeguards and management measures for hydrology, flooding and water quality during operation

IMPACT	ENVIRONMENTAL SAFEGUARDS	RESPONSIBILITY	TIMING
Hydrology, flooding and water quality	Prepare an Erosion and Sediment Control Plan (ESCP)	Contractor	Design and Pre- Construction
	Ensure emergency spill kits and relevant trained staff are to be on hand during all stages of construction	Contractor	Pre- Construction
	All fuels, chemicals and liquids are to be stored appropriately in an impervious area away from drainage or areas prone to flooding	Contractor	Construction
	Open excavations and loose soils on the site are to be covered to prevent run off or stockpiled and removed upon classification	Contractor	Construction
	Regular sweeping and management of drains, gutters, roads and access ways is to be undertaken so they are free of sediment	Contractor	Construction

### 6.6 SOCIO ECONOMIC

### 6.6.1 EXISTING ENVIRONMENT

The Proposal would primarily be located within an existing road corridor within the Sydney CBD. Land uses surrounding the Proposal comprise of high density commercial and residential buildings.

Community, religious and educational facilities located within the broader area include:

- ANZAC War Memorial (90 metres north)
- Australian Museum (250 metres north)
- Darlinghurst Courthouse (100 metres southeast)

- National Art School (150 metres southeast)
- Sydney Grammar School (200 metres north)
- The University of Notre Dame Australia (200 metres southeast)
- St Vincent's Hospital Sydney (300 metres southeast)

In addition to these identified facilities, Oxford Street is closed for the annual Sydney Gay and Lesbian Mardi Gras Parade. The parade attracts on average 500,000 attendees per year.

Sensitive receivers that have the potential to be influenced by the Proposal include:

- Local residents and commuters, particularly on Liverpool Street and Oxford Street
- Business owners on Liverpool Street and Oxford Street.

A review of the 2016 Australian Bureau of Statistics (ABS) Census data was undertaken for City of Sydney, Darlinghurst and Surry Hills. Table 6.13 provides an overview of the demographics of the area surrounding the Proposal. There was no transport mode split between train and bus for the suburbs of Darlinghurst and Surry Hills and results are shown as a combined mode percentage.

SUBURB	POPULATION		EMPLOYMENT		TRANSPORT	MODE (%)	
		AGE	%	Walk	Train	Bus	Bike
City of Sydney	17,000	30	90%	44	18	10	3%
Darlinghurst	11,000	34	92%	35	3	0	N/A
Surry Hills	16,000	35	92%	32	3.	5	N/A

Table 6.13 Proposal area demographics summary

### 6.6.2 POTENTIAL IMPACTS

#### 6.6.2.1 CONSTRUCTION

Construction of the Proposal has the potential to temporarily impact customers, pedestrians, residents, motorists, and other receivers as a result of:

- Temporary changes to vehicular, bicycle and pedestrian access along Liverpool Street and Oxford Street
- Temporary vehicular and pedestrian detours due to intermittent closures of Little Liverpool Street and Palmer Street
- Temporary impacts to local traffic movements due to an increase in truck movements in the area, delivering site materials, plant and equipment
- Construction noise, dust and visual impacts
- Increased travel time for vehicles and pedestrians due to road closures.

Access for emergency services would be maintained at all times and it is not anticipated that access to residential properties would be affected during construction of the Proposal.

Traffic disruptions on the surrounding road network during construction would be minimised wherever possible by minimising major civil works such as kerb realignment or impacts on underground utilities. Construction work would be managed to ensure pedestrian and cyclist access would be maintained along Liverpool Street and Oxford Street. Where work is carried out that may potentially disrupt the existing pedestrian facilities, appropriate signage and/or traffic controllers would be positioned to notify pedestrians of the temporary arrangements.

#### 6.6.2.2 OPERATION

Overall, the Proposal would provide positive socio-economic benefits to the City of Sydney LGA, with particular benefits to commuters who travel to and from the CBD via Liverpool Street and Oxford Street. Benefits include:

- Improved access to public transport by providing an accessible route to Oxford Street
- Improved active transport connections along Liverpool Street and Oxford Street from the upgraded footpaths and cycleways
- Potentially increased use of public transport along Oxford Street
- Improved road safety for cyclists and pedestrians.

### 6.6.3 SAFEGUARDS AND MANAGEMENT MEASURES

IMPACT	ENVIRONMENTAL SAFEGUARDS	RESPONSIBILITY	TIMING
Socio- economic	<ul> <li>Notification would be given to affected community members prior to the works taking place. The notification is to include:</li> <li>Details of the Proposal</li> <li>The duration of works and working hours</li> <li>Any changed traffic or access arrangements</li> <li>How to lodge a complaint or obtain more information</li> <li>Contact name and details.</li> </ul>	City of Sydney	Pre- construction / Construction
	All complaints would be recorded on a complaints register and attended to promptly.	City of Sydney / Contractor	Construction
	Existing access for nearby and adjoining properties would be maintained at all times during the works unless otherwise agreed by the affected property owner.	Contractor	Construction
	The community would be notified of all work outside standard hours which have the potential to impact noise sensitive receivers.	City of Sydney	Pre- construction / Construction

### 6.7 OTHER IMPACTS

### 6.7.1 EXISTING ENVIRONMENT, POTENTIAL IMPACTS AND SAFEGUARDS

Table 6.14 Other potential environmental impacts as a result of the Proposal

ENVIRONMENTAL TOPIC	EXISTING ENVIRONMENT	POTENTIAL IMPACTS	SAFEGUARDS	RESPONSIBILITY	TIMING
Aboriginal heritage	A search for known Aboriginal heritage items in the vicinity of the Proposal was undertaken on 5 June 2023 using the Aboriginal Heritage Information Management system (AHIMS) database. The AHIMS search did not identify any known Aboriginal sites in the vicinity of the Proposal area (within 500m). The extensive landscape modification that has occurred across the Proposal area suggests that intact evidence of Aboriginal land use is unlikely to occur within the boundaries of the Proposal.	Construction of the Proposal involves minimal ground disturbance which could have the potential to impact Aboriginal sites, if present. As there are no known Aboriginal heritage items located within the vicinity of the Proposal area, and no significant excavations proposed, it is unlikely that the Proposal would affect Aboriginal heritage during construction. An Unexpected Finds Protocol (UFP) would be established and implemented if any Aboriginal heritage items were found during construction of the Proposal.	A Standard Management Procedure - Unexpected Finds Protocol (UFP) (TfNSW, 2015) would be established as part of the CEMP. The UFP would provide specific guidance on measures and controls to be implemented for managing unexpected impacts on Aboriginal heritage.	Contractor	Detailed design / Pre- construction
Biodiversity	A Protected Matters Search of the Department of Agriculture, Water and the Environment (DAWE) database on 1 April 2022 within the Proposal area identified eight listed Threatened Ecological Communities (TEC), 72 listed Threatened Species and 61 listed Migratory Species. The NSW Biodiversity Values Map and Threshold Tool did not identify any areas of	It is unlikely there would be impacts on biodiversity as a result of construction or operation of the Proposal as the area is highly developed and urbanised. No clearance of vegetation or tree removal is required for the Proposal.	N/A	N/A	N/A

ENVIRONMENTAL TOPIC	EXISTING ENVIRONMENT	POTENTIAL IMPACTS	SAFEGUARDS	RESPONSIBILITY	TIMING
	Biodiversity Value (DPE, 2020) in the Proposal area.				
Soils and contamination	The <u>eSPADE</u> spatial viewer indicated that most of the Proposal area is located in disturbed terrain and there is no presence of acid sulfate soils. A search of the NSW EPA Contaminated Land records on 31 March 2022 revealed no contaminated sites within a one-kilometre radius of the Proposal area. A search of the NSW POEO register and NSW EPA PFAS Investigation Program Database on 14 March 2022 indicated there are no contaminated sites or PFAS investigation sites within one kilometre of the Proposal.	<ul> <li>Excavation and other earthworks such as stockpiling activities could result in the following impacts:</li> <li>Erosion of exposed soil and stockpiled materials</li> <li>Dust generation from excavation and vehicle movements over exposed soil</li> <li>Increase in sediment loads entering the stormwater system and/or local runoff.</li> <li>Contamination impacts are negligible as the Proposal area is disturbed terrain, therefore previous contaminants are not expected to occur.</li> </ul>	N/A	N/A	N/A
Landscape visual	The Proposal area is located within a heavily urbanised area of Sydney including high density commercial and residential buildings. The existing streetscape and on- road character is visually distinguished by asphalt, paving, street furniture, landscaping, and street signage.	During construction of the Proposal there would be increased presence of construction equipment and vehicles. However, these impacts would be short term and therefore are expected to be minor. The Proposal would not have long-term visual impacts during operation as it would be similar to existing conditions within the Sydney CBD. There would be a minor improvement in the landscape as the Proposal would include enhanced	N/A	N/A	N/A

ENVIRONMENTAL TOPIC	EXISTING ENVIRONMENT	POTENTIAL IMPACTS	SAFEGUARDS	RESPONSIBILITY	TIMING
		landscaping from the proposed garden beds on the bus transit islands.			
Climate change	The existing climate in Sydney is characterised by warm summers and mild winters with rainfall throughout the year. Climate change generally refers to the warming temperatures and altered climate conditions associated with the increased concentration of greenhouse gases in the atmosphere. Over time, it is expected that Sydney will experience more extreme weather because of greenhouse gas emissions and climate change. This will include stronger winds, heavier rainfall, and hotter temperatures.	Construction activities, including the use of construction equipment and site vehicles, would result in some limited greenhouse gas emissions. Greenhouse gas emissions associated with the use of construction material are also anticipated. The Proposal would potentially reduce greenhouse gas emissions during operation as there would be improved active and public transport options encouraging use of alternate modes.	N/A	N/A	N/A
	Greenhouse gas emissions associated with vehicles travelling in Sydney and Oxford Street are likely to have the greatest impact on climate change at the Proposal.				
Hazards and Risk	The existing environment of the Proposal area is a busy, high-traffic area for pedestrians, cyclists, and drivers. A key potential risk is road traffic / risk of road traffic incidents which have the potential to cause injury.	<ul> <li>Risks associated with the construction of the Proposal include:</li> <li>Occupational work health and safety issues associated with the workforce undertaking construction of the proposal</li> <li>Environmental impacts from the transport, storage and use of fuels, chemicals and other dangerous goods required for the construction work.</li> </ul>	<ul> <li>A Hazard and Risk Management</li> <li>Plan (HRMP) would be prepared</li> <li>and implemented as part of the</li> <li>CEMP. The HRMP would include,</li> <li>but not be limited to:</li> <li>Details of hazards and risks</li> <li>associated with the activity</li> <li>Measures to be implemented</li> <li>during construction to</li> <li>minimise these risks</li> </ul>	Contractor	Detailed design / Pre- construction

ENVIRONMENTAL TOPIC	EXISTING ENVIRONMENT	POTENTIAL IMPACTS	SAFEGUARDS	RESPONSIBILITY	TIMING
		Risks during operation of the Proposal would likely reduce as there would be enhanced safety from the improved active and public transport upgrades.	<ul> <li>Record keeping for materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials</li> <li>A monitoring program to assess performance in managing identified risks</li> <li>Contingency measures to be implemented in the event of unexpected hazards, risks arising and emergency situations.</li> </ul>		
			The HRMP would be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or OEH publications.		
Waste and resource management	Waste present within the Proposal area would likely be from ongoing day and nighttime activities of commuters, residents, and visitors including litter and debris.	<ul> <li>The Proposal is not expected to generate large quantities of waste materials during construction and operations. The following waste streams may result:</li> <li>— Oil, grease and other liquid wastes from the maintenance of construction equipment and operational maintenance vehicles</li> </ul>	<ul> <li>A Waste Management Plan</li> <li>(WMP) would be prepared and implemented as part of the CEMP.</li> <li>The WMP would include but not be limited to:</li> <li>Measures to avoid and minimise waste associated with the project</li> </ul>	Contractor	Construction

ENVIRONMENTAL TOPIC	EXISTING ENVIRONMENT	POTENTIAL IMPACTS	SAFEGUARDS	RESPONSIBILITY	TIMING
		<ul> <li>Packaging materials from items delivered to site, such as pallets, crates, cartons, plastics and wrapping materials</li> </ul>	<ul> <li>Classification of wastes and management options (re-use, recycle, stockpile, disposal)</li> </ul>		
		— General garbage and refuse.	<ul> <li>Statutory approvals required for managing on- and off-site waste, or application of any relevant resource recovery exemptions</li> </ul>		
			<ul> <li>Procedures for storage, transport and disposal</li> </ul>		
			<ul> <li>Monitoring, record keeping and reporting.</li> </ul>		
			The WMP would align with the Environmental Procedure - Management of Wastes on Transport for NSW Land (Transport, 2014) and relevant Transport Waste fact sheets.		
			There would be no disposal or re- use of construction waste on to other land.		
			Waste would not to be burnt on site.		
			Waste material, other than vegetation and tree mulch, would not be left on site once the works have been completed.		

### 6.8 CUMULATIVE IMPACTS

The assessment identified committed and approved projects that would be built or would operate in the local area over the coming years that may indirectly affect the local area. The interaction of individual elements of the Proposal and the cumulative effects of the Proposal with other concurrent and future projects have the potential to give rise to cumulative impact.

At the time of writing, a number of changes to the road network and land uses within the vicinity of the area are being proposed in parallel. This includes Oxford Street Cultural and Creative precinct's potential to increase the floor space in developments surrounding Oxford Street, which would result in the increase of transport demand to/ from the precinct. The proposed cycleway would thus benefit this project by providing a safe cycling facility to access this precinct.

This Proposal however, may impact the capacity of bus services and bus stop, due to increased bus trips correlating to greater employment opportunities in the precinct.

A review was undertaken of the NSW Government Major Projects Planning Portal on 1 April 2022 and the development application tracker for the City of Sydney.

There are no significant cumulative environmental impacts from the Proposal as there are no relevant surrounding projects identified.

## 7 ENVIRONMENTAL MANAGEMENT

This chapter describes how the Proposal would be managed to reduce potential environmental impacts throughout detailed design, construction and operation. A framework for managing the potential impacts is provided. A summary of site-specific environmental safeguards is provided and the licence and/or approval requirements required prior to construction are also listed.

### 7.1 ENVIRONMENTAL MANAGEMENT PLANS (OR SYSTEM)

A number of safeguards and management measures have been identified in the REF in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the Proposal. Should the Proposal proceed, these safeguards and management measures would be incorporated into the detailed design and applied during the construction and operation of the Proposal.

A Construction Environmental Management Plan (CEMP) would be prepared to describe the safeguards and management measures identified. The CEMP would provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The CEMP would be prepared prior to construction of the Proposal and must be reviewed and certified by the City of Sydney prior to the commencement of any on-site works. The CEMP would be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the *QA Specification G36-Enviornmental Protection (Management System)*.

### 7.2 SUMMARY OF SAFEGUARDS AND MANAGEMENT MEASURES

Environmental safeguards and management measures outlined in this REF will be incorporated into the detailed design phase of the Proposal and during construction and operation of the Proposal, should it proceed. These safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The safeguards and management measures are summarised in Table 7.1.

Table 7.1 Summary of	of safeguards and	environmental	management measures

ІМРАСТ	ENVIORNMENTAL SAFEGUARD	RESPONSIBILITY	TIMING
Traffic and transport	A Construction Traffic Management Plan (CTMP) would be prepared in accordance to Transport for NSW <i>Traffic Control at Worksites</i> and relevant Austroads guidelines and in consultation with the road authority to identify potential transport related delays and disruptions that may arise during the works.	Contractor	Construction
Road access	<ul> <li>Details of road networks changes to existing road network arrangements and available detour options would be communicated to affected residents, businesses and road users (e.g. through letterbox drops, VMSs) in advance of the changes being implemented.</li> <li>Affected residents and businesses would be notified of the access changes prior to construction.</li> </ul>	Contractor	Construction and operation
Temporary lane/road closuresTemporary lane closures to accommodate proposed construction works on Oxford Street are to be undertaken at night time to minimise impact to the road network capacity during the peak operating hours.Road Occupancy Licence (ROL) would be sought for all temporary lane closures and its conditions complied with. Any long-term temporary lane/road closures are to be assessed and approval sought from the relevant road authority. Any short-term temporary lane closures would be undertaken outside of the peak periods to minimise impact to the road network. Access to affected properties would be maintained, or if adversely impacted, provide a suitable alternative.		Contractor	Construction
Property access	Access to affected properties would be maintained during construction, or if adversely impacted, a suitable alternative would be provided in consultation with relevant landowners.	Contractor	Construction

	Access to properties would be maintained during construction, however where short-term interruption is required, suitable alternative access arrangements would be provided in consultation with the affected property owners and business owners as appropriate.		
Public transport services	Temporary relocation of bus stops on the northern kerbside of Oxford Street would be required to construct the proposed median island for the bus stop. The Proposal will require appropriate liaison with bus service providers and notification at existing bus stops prior and during construction.	Contractor	Construction and operation
Emergency access	Access for emergency vehicles would be maintained at all times	Contractor	Construction and operation
Bus stop capacity	As a part of the proposed cycleway design, existing kerbside eastbound bus stops on Oxford Street at Brisbane Street and Palmer Street would be provided with median islands to be used as bus boarders to manage operational conflict between passenger boarding/alighting and the cycleway. The condition would be monitored to minimise bus passengers queueing into the cycleway.	Contractor	Operation
Kerbside uses	<ul> <li>Existing loading zones are proposed to be maintained throughout the corridor to ensure existing freight tasks can continue. Loading zones along the northern kerbside are proposed to be provided with a median island/platform so that loading/unloading activities do not encroach onto the cycleway.</li> <li>There is no like-for-like replacement proposed for the loss of car parking spaces at this location. On-street car parking spaces can still be found in the</li> </ul>	Contractor	Operation
	adjacent side streets such as Elizabeth Street, Wentworth Avenue, and Crown Street and public off-street car parking facility nearby including Wilson Parking at 70 Riley Street.		
Air Quality	An Air Quality Management Plan (AQMP) would be prepared and implemented as part of the CEMP. The AQMP will include, but not be limited to: — Potential sources of air pollution	Contractor	Detailed design/ Pre-construction and construction

	<ul> <li>Air quality management objectives consistent with any relevant published EPA and/or Office of Environment and Heritage (OEH) guidelines</li> </ul>		
	<ul> <li>Mitigation and suppression measures to be implemented.</li> </ul>		
	<ul> <li>Methods to manage work during strong winds or other adverse weather conditions</li> </ul>		
	<ul> <li>A progressive rehabilitation strategy for exposed surfaces.</li> </ul>		
	Vehicles transporting waste or other materials that may produce odours or dust would be covered during transportation.		
	Stockpiles or areas that may generate dust would be managed to suppress dust emissions in accordance with Technical Guideline EMS-TG-010: Stockpile Site Management Guideline (RTA, 2011b)		
Non-Aboriginal Heritage	The Standard Management Procedure - Unexpected Heritage Items (TfNSW, 2015) would be followed in the event that any unexpected heritage items, archaeological remains or potential relics of Non-Aboriginal origin are encountered.	Contractor	Detailed design / pre-construction
	This may also consider a stop-work initiative and any exposed findings to be property assessed in accordance with the provisions of the NSW Heritage Act 1977.		
	Works within the heritage curtilage of the Sydney Mardi Gras Parade Route would be undertaken in accordance with the exemptions granted under Section 57(2) of the Heritage Act.		
Hydrology, flooding and water quality	The relevant contractor would prepare an Erosion and Sediment Control Plan (ESCP). Emergency spill kits and relevant trained staff would be on hand during all stages of construction.	Contractor	Design / Pre- Construction and Construction
	All fuels, chemicals and liquids are to be stored appropriately in an impervious area away from drainage or areas prone to flooding		
	Open excavations and loose soils on the site are to be covered to prevent run off or stockpiled and removed upon classification.		

	Regular sweeping and management of drains, gutters, roads and access ways is to be undertaken so they are free of sediment		
Socio-economic	<ul> <li>Notification would be given to affected community members prior to the works taking place. The notification is to include:</li> <li>Details of the Proposal</li> <li>The duration of works and working hours</li> <li>Any changed traffic or access arrangements</li> <li>How to lodge a complaint or obtain more information</li> <li>Contact name and details.</li> <li>Existing access to nearby and adjoining properties would be maintained at all</li> </ul>	City of Sydney / Contractor	Pre-construction/ Construction
	times during the works unless otherwise agreed by the affected property owner. The community would be notified of all work outside standard hours which have the potential to impact sensitive noise receivers		
Aboriginal Heritage	A Standard Management Procedure - Unexpected Finds Protocol (UFP) (TfNSW, 2015) would be established as part of the CEMP. The UFP would provide specific guidance on measures and controls to be implemented for managing unexpected impacts on Aboriginal heritage.	Contractor	Detailed design / Pre-construction
Hazards and risks	<ul> <li>A Hazard and Risk Management Plan (HRMP) would be prepared and implemented as part of the CEMP. The HRMP would include, but not be limited to:</li> <li>Details of hazards and risks associated with the activity</li> <li>Measures to be implemented during construction to minimise these risks</li> <li>Record keeping for materials present on the site, material safety data sheets, and personnel trained and authorised to use such materials</li> </ul>	Contractor	Construction
	<ul> <li>A monitoring program to assess performance in managing identified risks</li> <li>Contingency measures to be implemented in the event of unexpected hazards, risks arising and emergency situations.</li> </ul>		

	The HRMP would be prepared in accordance with relevant guidelines and standards, including relevant Safe Work Australia Codes of Practice, and EPA or OEH publications.	
Waste and resource management	A Waste Management Plan (WMP) would be prepared and implemented as part of the CEMP. The WMP would include but not be limited to:	
	- Measures to avoid and minimise waste associated with the project	
	<ul> <li>Classification of wastes and management options (re-use, recycle, stockpile, disposal)</li> </ul>	
	<ul> <li>Statutory approvals required for managing on- and off-site waste, or application of any relevant resource recovery exemptions</li> </ul>	
	— Procedures for storage, transport and disposal	
	— Monitoring, record keeping and reporting.	
	The WMP would align with the <i>Environmental Procedure - Management of Wastes on Transport for NSW Land</i> (Transport, 2014) and relevant Transport Waste fact sheets.	
	There would be no disposal or re-use of construction waste on to other land.	
	Waste would not to be burnt on site.	
	Waste material, other than vegetation and tree mulch, would not be left on site once the works have been completed.	

### 7.3 LICENSING AND APPROVALS

Table 7.2 identifies the permits and licences that would be required if necessary to construct the Proposal.

INSTRUMENT	REQUIREMENT	TIMING
<i>Roads Act 1993</i> (s138)	Road occupancy licence to dig up, erect a structure or carry out work in, on or over a road.	Prior to start of the activity.
Heritage Act 1977 (s60)	Permit to carry out activities to an item listed on the State Heritage Register or to which an interim heritage order applies from the Heritage Council of NSW.	Prior to start of activity (if required)
Water Management Act 2000	The need for an application to extract or use groundwater would be determined during detailed design and as part of construction methodology.	Prior to start of the activity (if required).

 Table 7.2
 Summary of licensing and approvals required

## 8 CONCLUSION

This chapter provides the justification for the Proposal taking into account its biophysical, social and economic impacts, the suitability of the site and whether or not the Proposal is in the public interest. The Proposal is also considered in the context of the objectives of the EP&A Act, including the principles of ecologically sustainable development as defined in Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

### 8.1 JUSTIFICATION

While there would be some environmental impacts as a consequence of the Proposal including impacts to traffic, noise and vibration, air quality, non-Aboriginal heritage, hydrology and socio-economic environment, impacts have been avoided or minimised wherever possible through design and will be further mitigated by standard and site-specific mitigation measures and safeguards.

Compared with the 'do minimum' option, the Proposal would have beneficial effects of traffic safety and active transport connections along Oxford Street. The identified impacts in this REF would outweigh the identified impacts and risks associated with this Proposal.

### 8.1.1 SOCIAL FACTORS

The Proposal would achieve positive social outcomes by providing improved public and active transport connectivity along one of Sydney's key and iconic roads. The upgrades would improve the area by increasing accessibility and encourage use of alternative transport.

There would be some minor and temporary construction impacts including traffic, noise, visual, hydrology and heritage further reduced by the implementation of management measures outlined in Chapter 7.

### 8.1.2 BIOPHYSICAL FACTORS

As the Proposal is not expected to involve any vegetation clearance or tree removal, there are no expected impacts to biodiversity.

The Proposal is not likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the *Biodiversity Conservation Act 2016* or *Fisheries Management Act 1994* and is not likely to significantly impact threatened species, ecological communities or migratory species, within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999*.

### 8.1.3 ECONOMIC FACTORS

The capital investment needed to build the Proposal is likely to deliver local and regional economic benefit through the creation of construction jobs and purchase of materials from local manufacturing and construction businesses.

There may be some minor indirect economic operational benefit as the Proposal would attract more individuals to the area, increasing patronage to nearby shops, cafes, and restaurants.

### 8.1.4 PUBLIC INTEREST

The Proposal is in the public interest as it supports the local and State strategic objectives by improving transport through multimodal options. Management measures would be implemented during construction to minimise any environmental and social impacts of the Proposal.

Community consultation, as described in Chapter 5 of this REF, is ongoing for the Proposal to inform the community with the Proposal outcomes. City of Sydney would maintain consultation with the community as the design and construction of the proposal progresses.

### 8.2 OBJECTS OF THE EP&A ACT

INSTRUMENT	REQUIREMENT
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The Proposal would improve the social and economic welfare of the community by providing improved public and active transport in the area. The Proposal design, impact, safeguards and management measures detailed in this REF allow for the proper management, development and conservation of natural and artificial resources.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	Ecologically sustainable development in relation to the proposal is in Section 8.2.1.
1.3(c) To promote the orderly and economic use and development of land.	Not relevant to the Proposal.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the Proposal.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	No biodiversity impacts are expected from the Proposal.
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The potential impacts on Aboriginal and non-Aboriginal heritage are discussed in Section 6.7 and 6.4 respectively.
	No Aboriginal archaeological sensitivity was identified within the study area. Impacts to non-Aboriginal heritage would be minimised where possible through the design phase.
1.3(g) To promote good design and amenity of the built environment.	The Proposal has been designed in accordance with the urban design objectives and principles
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the Proposal.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the Proposal.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	The Proposal development process has involved consultation with relevant stakeholders. Refer to Chapter 5 for an overview.

### 8.2.1 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been an integral consideration throughout the development of the Proposal. ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD are discussed below.

### THE PRECAUTIONARY PRINCIPLE

The precautionary principle deals with reconciling scientific uncertainty about environmental impacts with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation. This principle was considered during the options assessment. The precautionary principle has guided the assessment of environmental impacts for this REF and the development of mitigation measures.

Specialist studies were undertaken for the following issues to provide accurate and impartial information for the evaluation of options and development of the Proposal:

- Traffic and transport
   Aboriginal heritage
- Non-Aboriginal heritage

In developing the Proposal, the best available technical information, environmental standards and measures have been used to minimise environmental risks. The preferred option minimises vegetation clearance, with particular consideration of sensitive areas. The preferred option minimises potential impacts of property acquisition and other existing land uses, while also taking into consideration supporting the future land use and development of the area.

#### INTERGENERATIONAL EQUITY

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Intergenerational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The Proposal would not result in any impacts that are likely to adversely impact on the health, diversity or productivity of the environment for future generations. The Proposal would provide improved transport opportunities through public and active transport minimising carbon emissions for improved amenity and air quality.

### CONSERVATION OF BIOLOGICAL DIVERSITY AND ECOLOGICAL INTEGRITY

This principle reinforces the previous two principles in requiring the diversity of genes, species and communities, as well as the ecosystems and habitats to which they belong, be maintained and improved to ensure their survival.

As part of the assessment process, a comprehensive assessment of the existing local environment has been carried out to recognise and manage any potential impacts of the Proposal on local biodiversity. The Proposal would not impact biological diversity or ecological integrity.

### IMPROVED VALUATION, PRICING AND INCENTIVIE MECHANISMS

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by the carrying out of a project, including air, water, land and living things.

This REF has examined the environmental consequences of the Proposal and identified mitigation measures for aspects that may possibly experience adverse impacts. Implementation of these mitigation measures would increase the capital costs of the Proposal. Therefore, environmental resources were valued in economic terms during concept design. In addition, the concept design was developed with an objective of minimising potential impacts on the surrounding environment, thereby minimising costs to the environment.

In summary, the Proposal is generally in accord with the principles of ESD. The Proposal would provide better facilities for pedestrians and cyclists as well as improve public transport connections. The Proposal provides a sustainable balance between environmental and economic objectives.

### 8.3 CONCLUSION

The Proposal is subject to assessment under Division 5.1 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration (where relevant) of conservation agreements and plans of management under the NPW Act, biodiversity stewardship sites under the BC Act, wilderness areas, areas of outstanding value, impacts on threatened species and ecological communities and their habitats and other protected fauna and native plants. It has also considered potential impacts to matters of national environmental significance listed under the Federal EPBC Act.

A number of potential environmental impacts from the Proposal have been avoided or reduced during the concept design development and options assessment. The Proposal as described in the REF best meets the project objectives but would still result in some impacts on traffic, noise and vibration, non-Aboriginal heritage, landscape visual and socio-economic. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. A Construction Management Plan (CEMP) will be prepared and implemented to mitigate against the potential environmental impacts during the construction phase of the proposal. The Proposal would also improve road safety, provide enhanced active transport networks, minimise road flooding issues and support future development of nearby precincts.

On balance the Proposal is considered justified, and the following conclusions are made.

### SIGNIFICANCE OF IMPACT UNDER NSW LEGISLATION

The Proposal would be unlikely to cause a significant impact on the environment. Therefore, it is not necessary for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Public Spaces under Division 5.2 of the EP&A Act. A Biodiversity Development Assessment Report or Species Impact Statement is not required. The Proposal is subject to assessment under Division 5.1 of the EP&A Act.

### SIGNIFICANCE OF IMPACT UNDER AUSTRALIAN LEGISLATION

The Proposal is not likely to have a significant impact on matters of national environmental significance or the environment of Commonwealth land within the meaning of the *Environment Protection and Biodiversity Conservation Act 1999.* A referral to the Australian Department of Agriculture, Water and the Environment is not required.

## 9 CERTIFICATION

This review of environmental factors provides a true and fair review of the Proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the Proposal.

Firoth

Ben Groth Principal, Planning & Approvals WSP 16 Aug 2023

I have examined this review of environmental factors and accept it on behalf of City of Sydney

Stinto

Stephen Smith Design Manager City of Sydney Date: 20 September 2023

## 10 **BIBLIOGRAPHY**

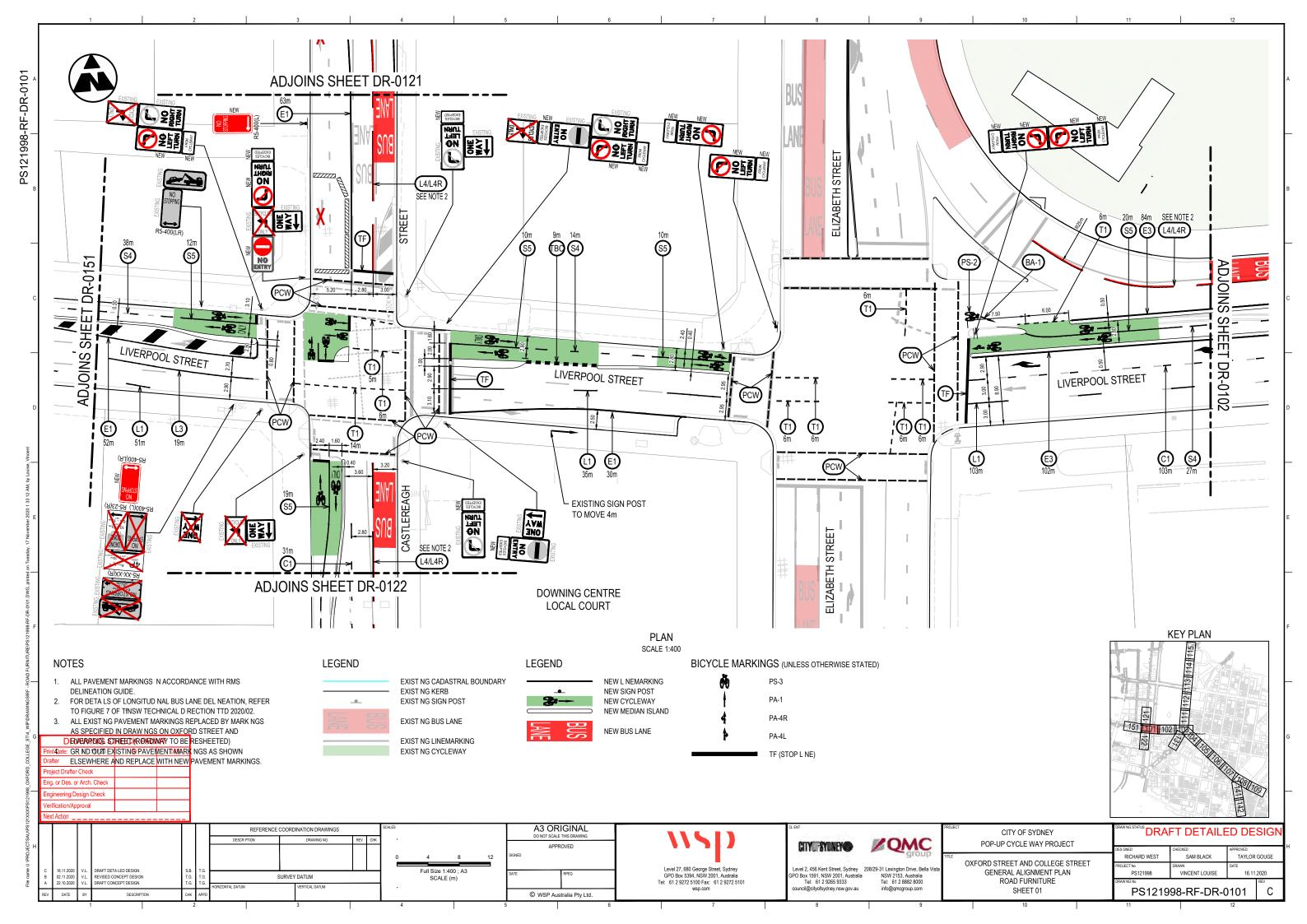
### TERMS AND ACRONYMS USED IN THIS REF

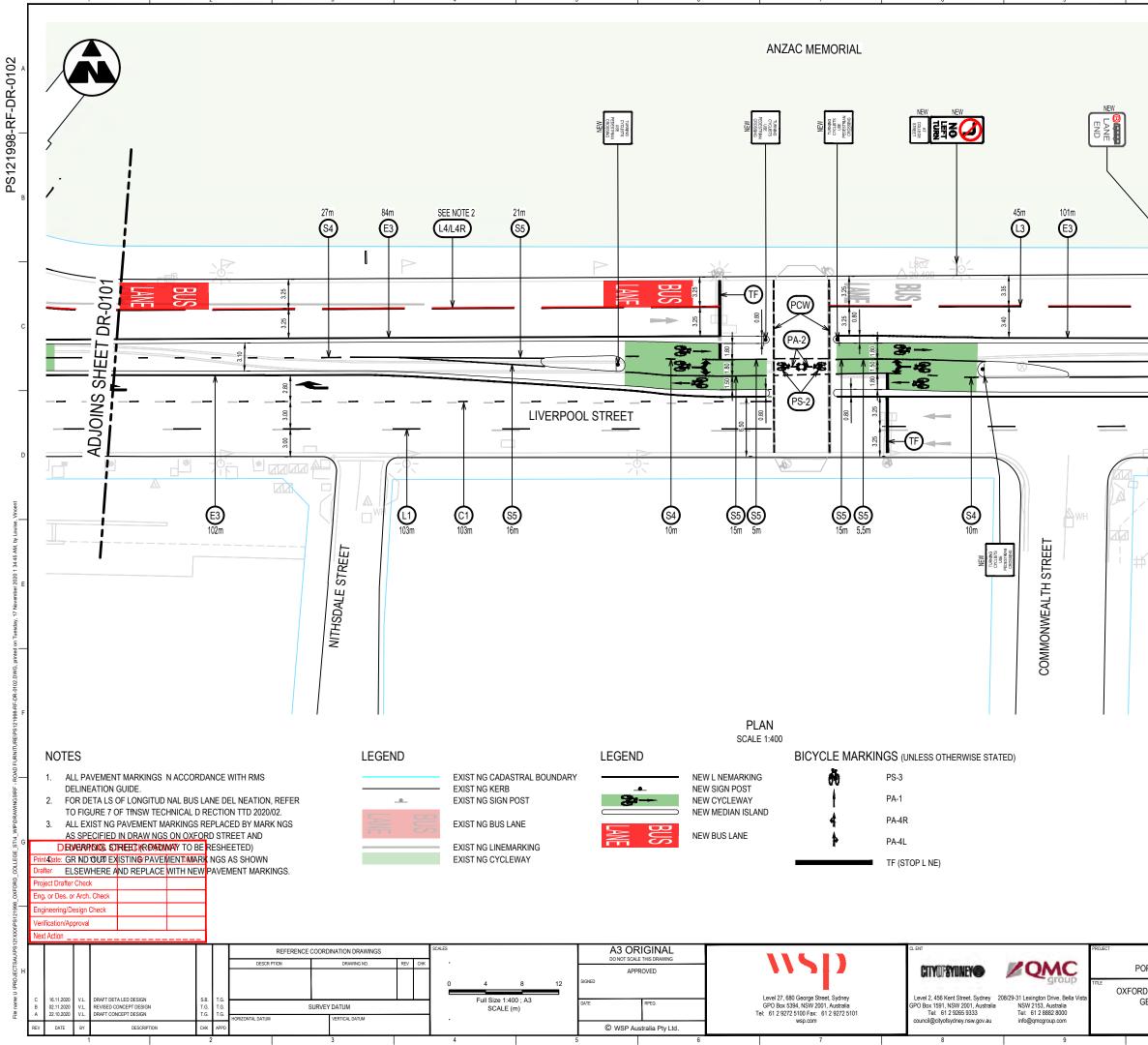
ABS	Australian Bureau of Statistics
AHIMS	Aboriginal Heritage Management system
AQMP	Air Quality Management Plan
BC Act	Biodiversity Conservation Act 2016
CBD	Central Business District
CEMP	Construction Environmental Management Plan
CNVMP	Construction Noise and Vibration Management Plan
CoS	City of Sydney
DAWE	Department of Agriculture, Water, and the Environment
DPE	Department of Planning and Environment
DGRs	Director General's Requirements
EPBC	Environment Protection and Biodiversity Conservation Act 1999
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
ESCP	Erosion and Sediment Control Plan
FM Act	Fisheries Management Act 1994
GHG	Greenhouse Gas Emissions
HCR	Heritage and Conservation Register
HRMP	Hazard and Risk Management Plan
ICNG	Interim Construction Noise Guideline
IHO	Interim Heritage Orders
LEP	Local Environmental Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NMLs	Noise Management Levels

OEH	Office of Environmental Heritage
POEO	Protection of the Environment Operations Act 1997
RBL	Rating Background Level
REF	Review of Environmental Factors
RMS	Roads & Maritime Services
ROLs	Road Occupancy Licences
SHR	State Heritage Register
ТСР	Traffic Control Plans
TTIA	Traffic and Transport Impact Assessment
TEC	Threatened Ecological Communities
TfNSW	Transport for New South Wales
SEPPs	State Environmental Planning Policies
UFP	Unexpected Finds Protocol
WMP	Waste Management Plan

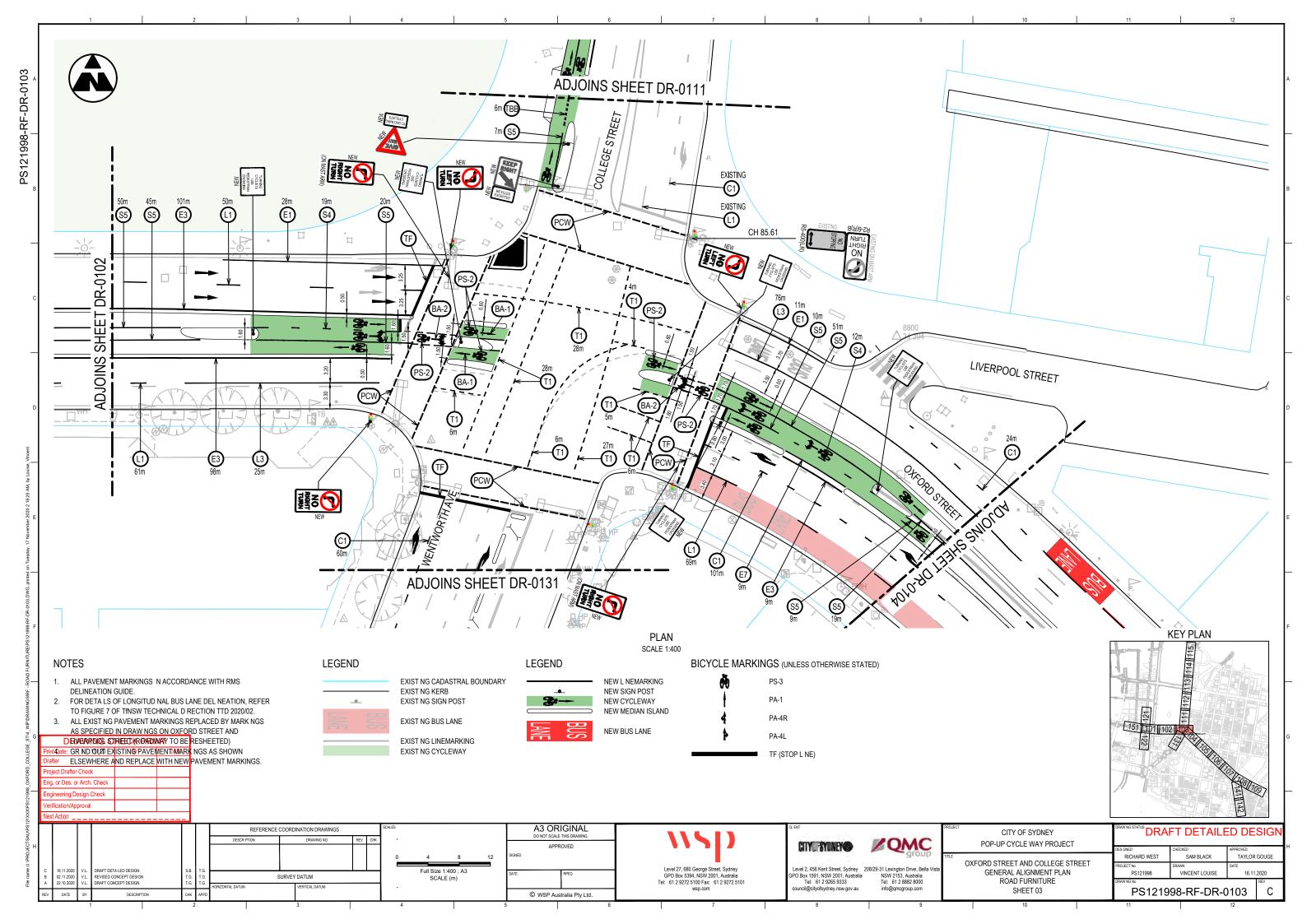
# APPENDIX A OPTION 2 DESIGN

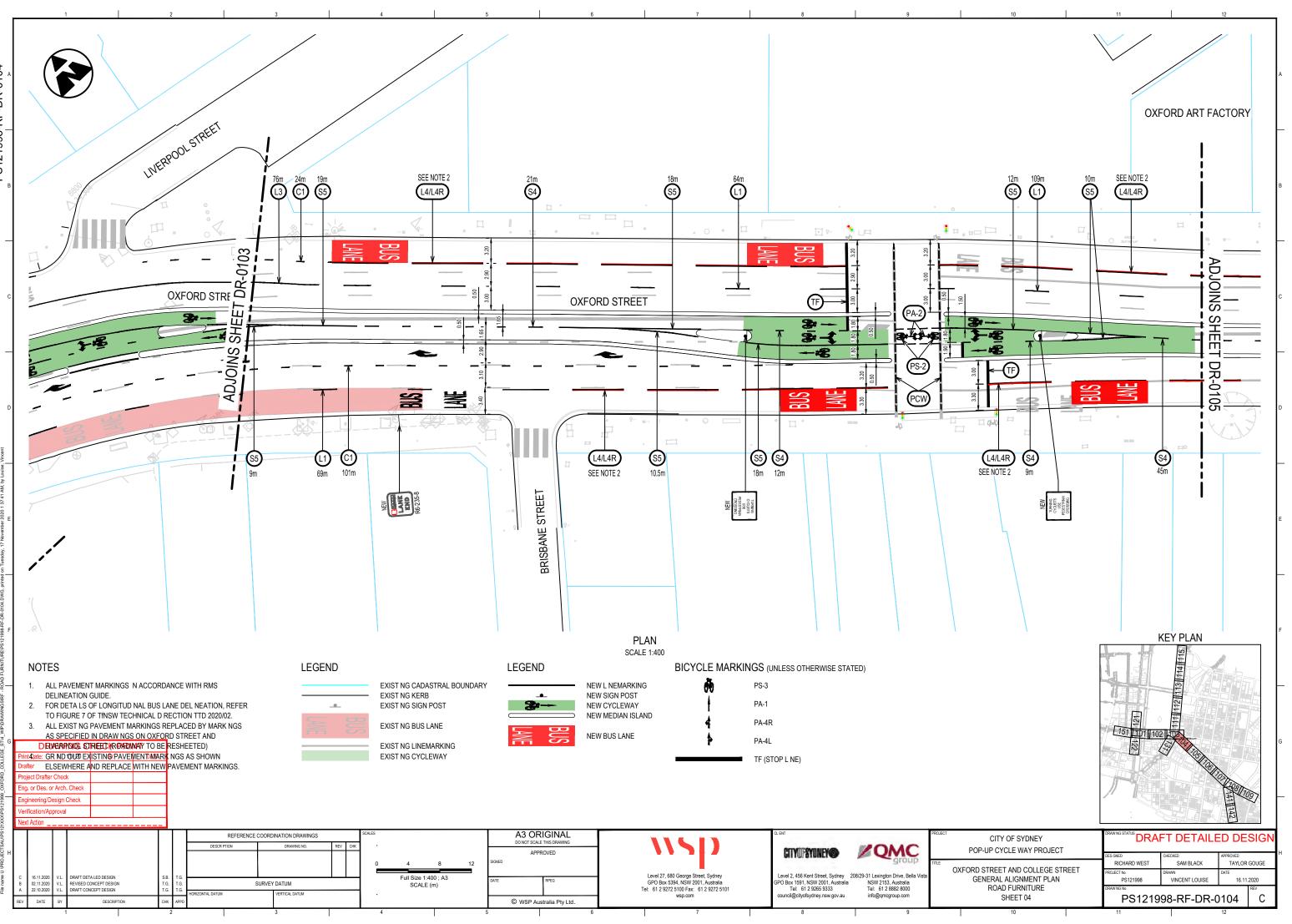


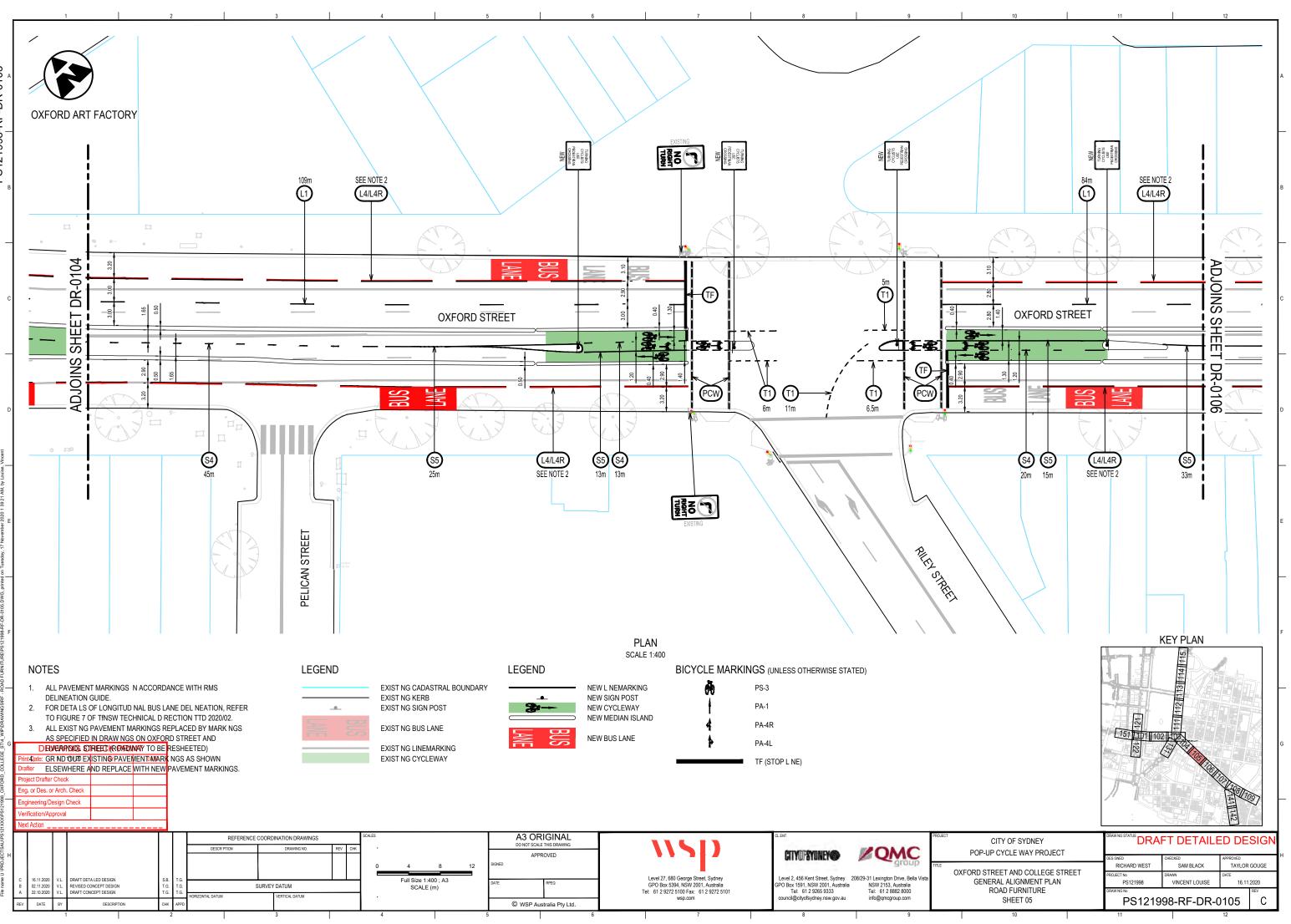


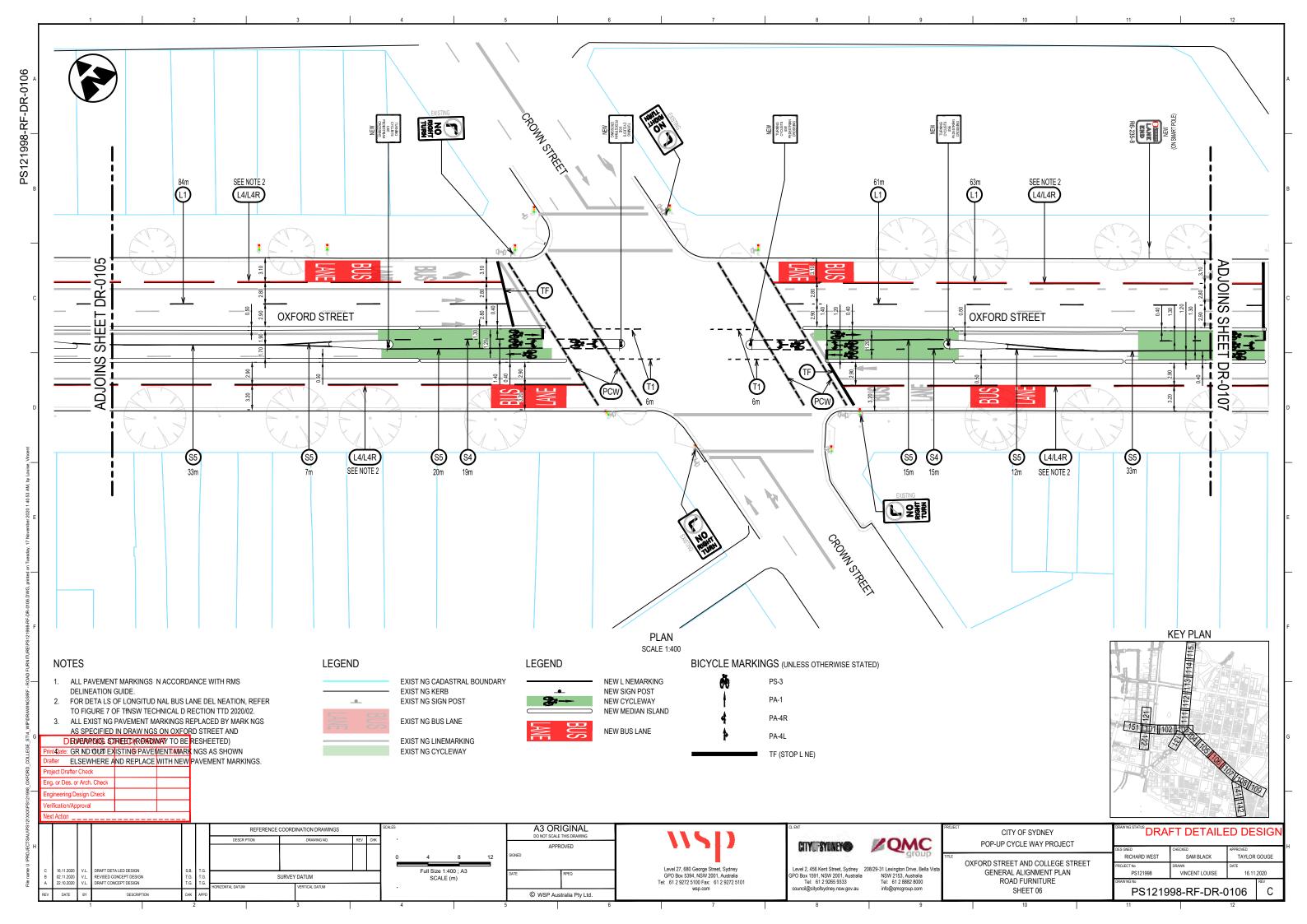


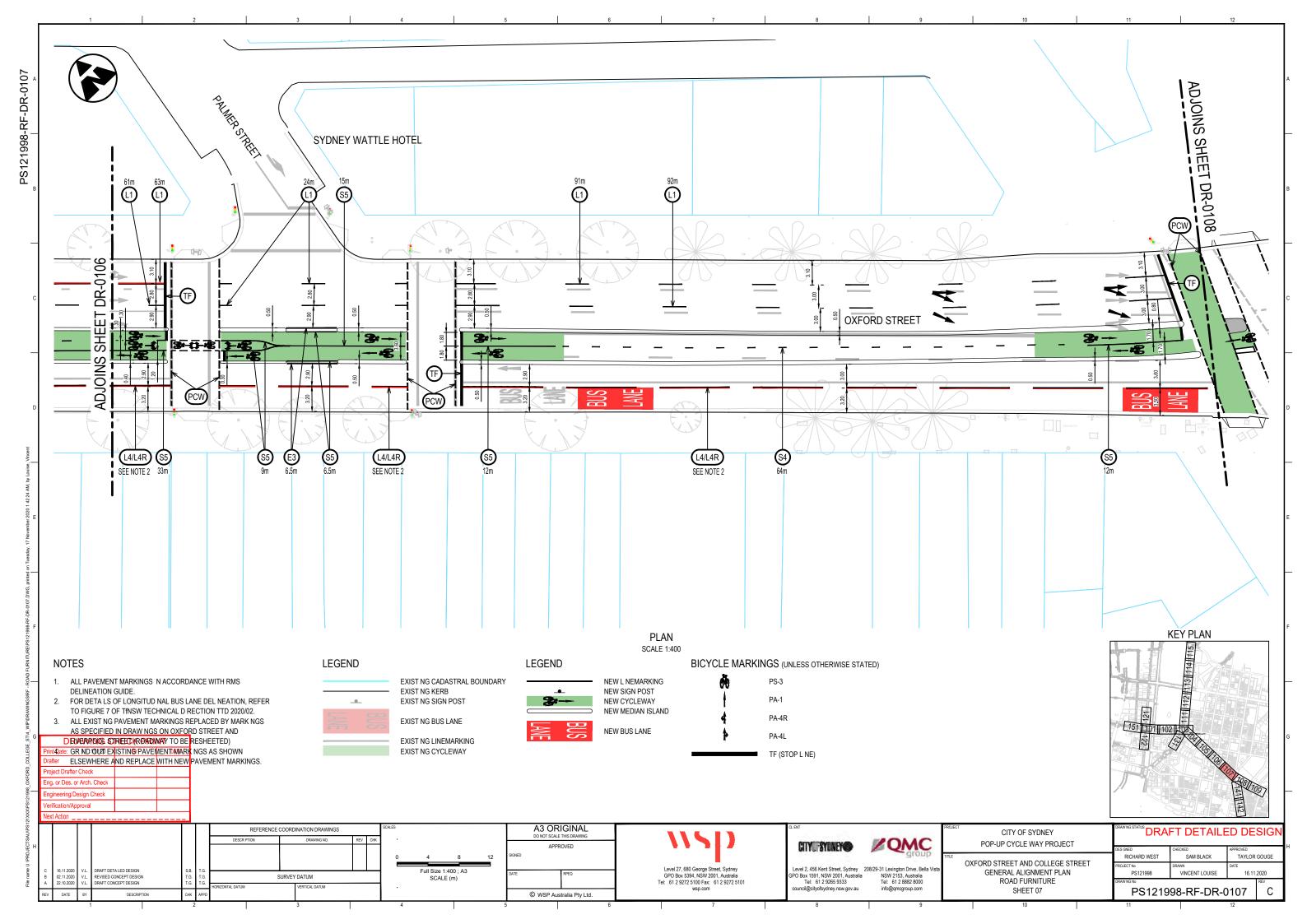
10	11		12
	50m 50m 101 101 101 101 101 101 101 101 101 1		
		KEY PLAN	CHINE -
CITY OF SYDNEY OP-UP CYCLE WAY PROJECT	DES GNED RICHARD WEST PROJECT No PS121998	CHECKED SAM BLACK DRAWN VINCENT LOUISE	APPROVED TAYLOR GOUGE DATE 16.11.2020
GENERAL ALIGNMENT PLAN ROAD FURNITURE	DRAW NG No	- 998-RF-DR-(	REV

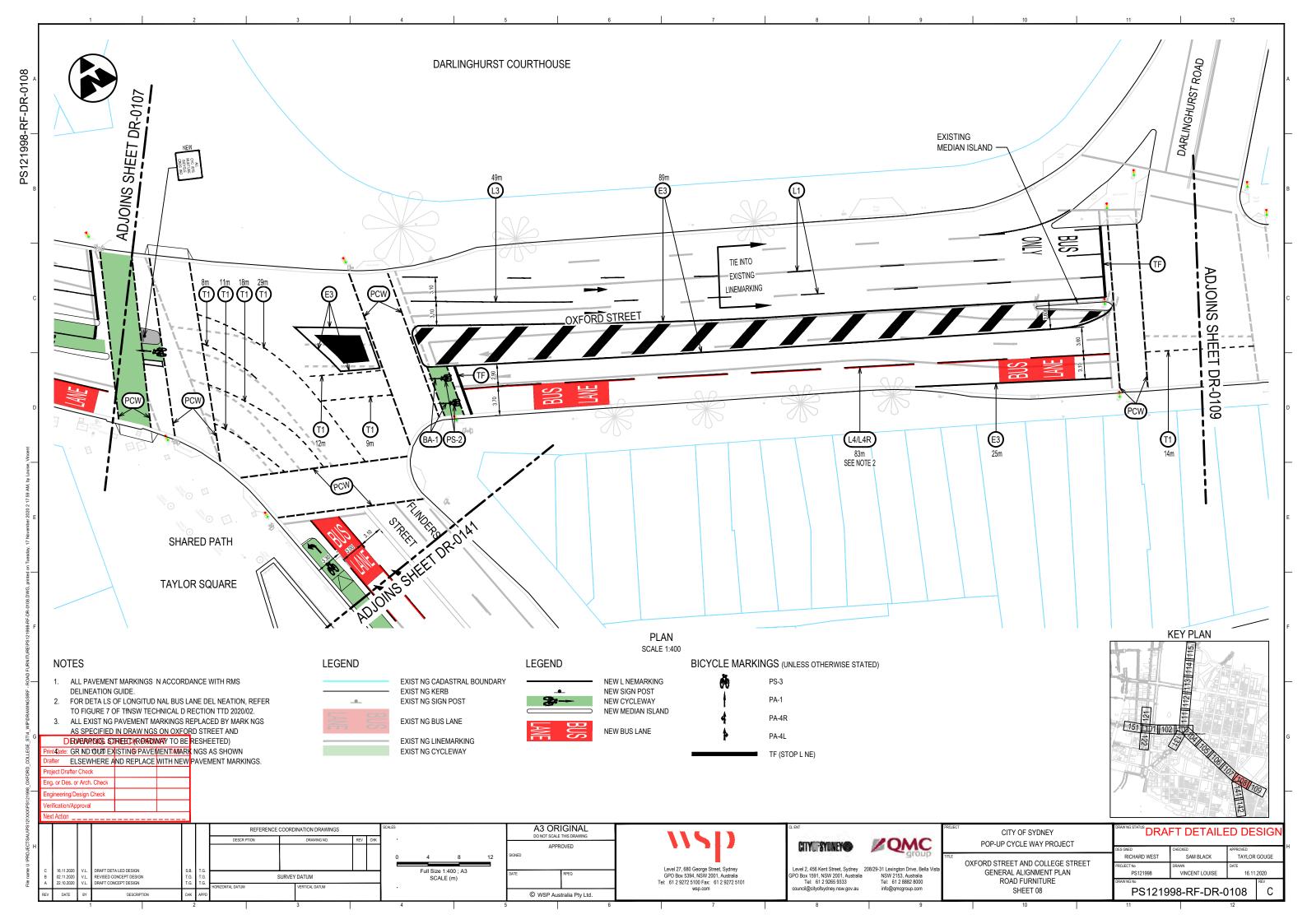


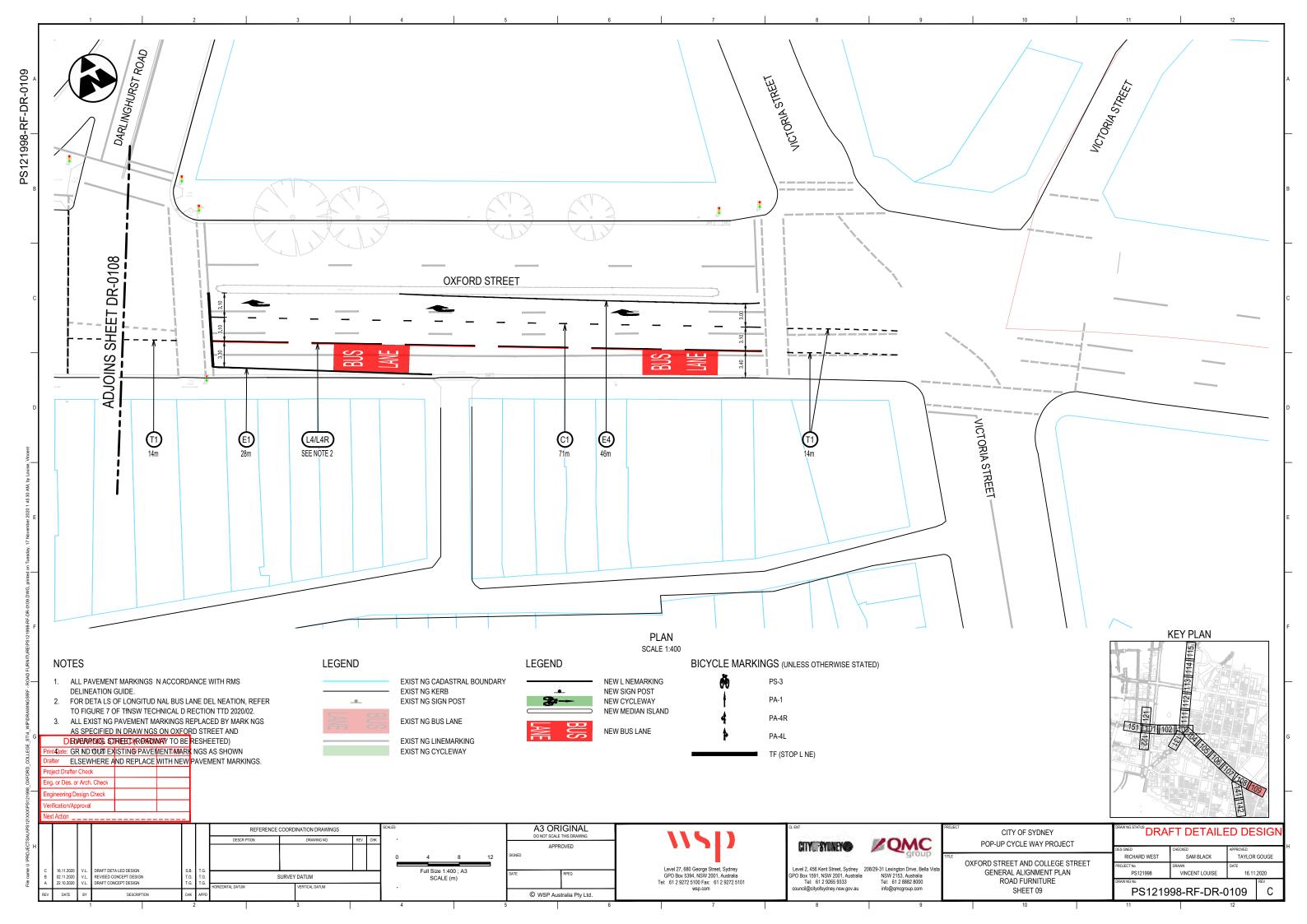


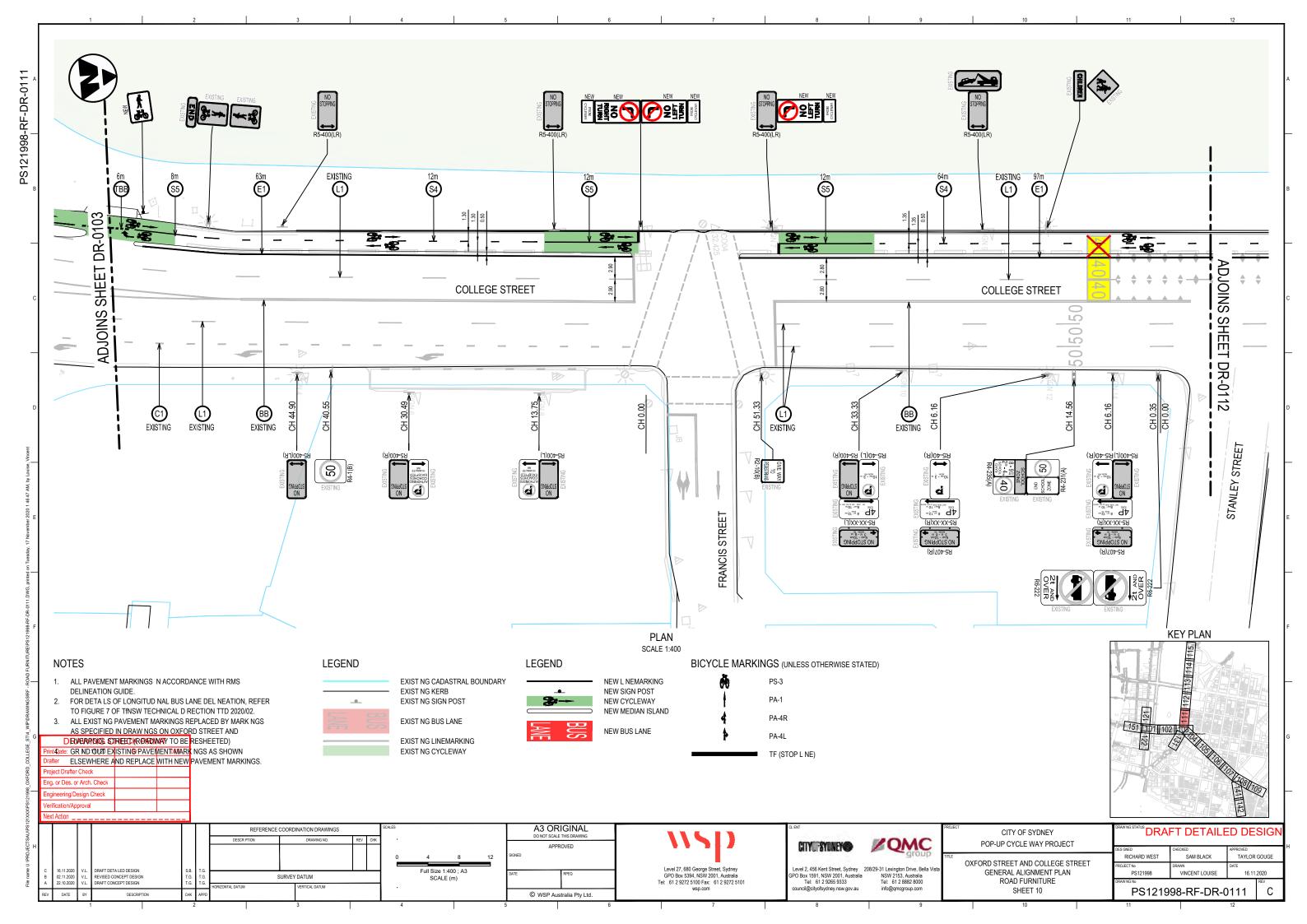


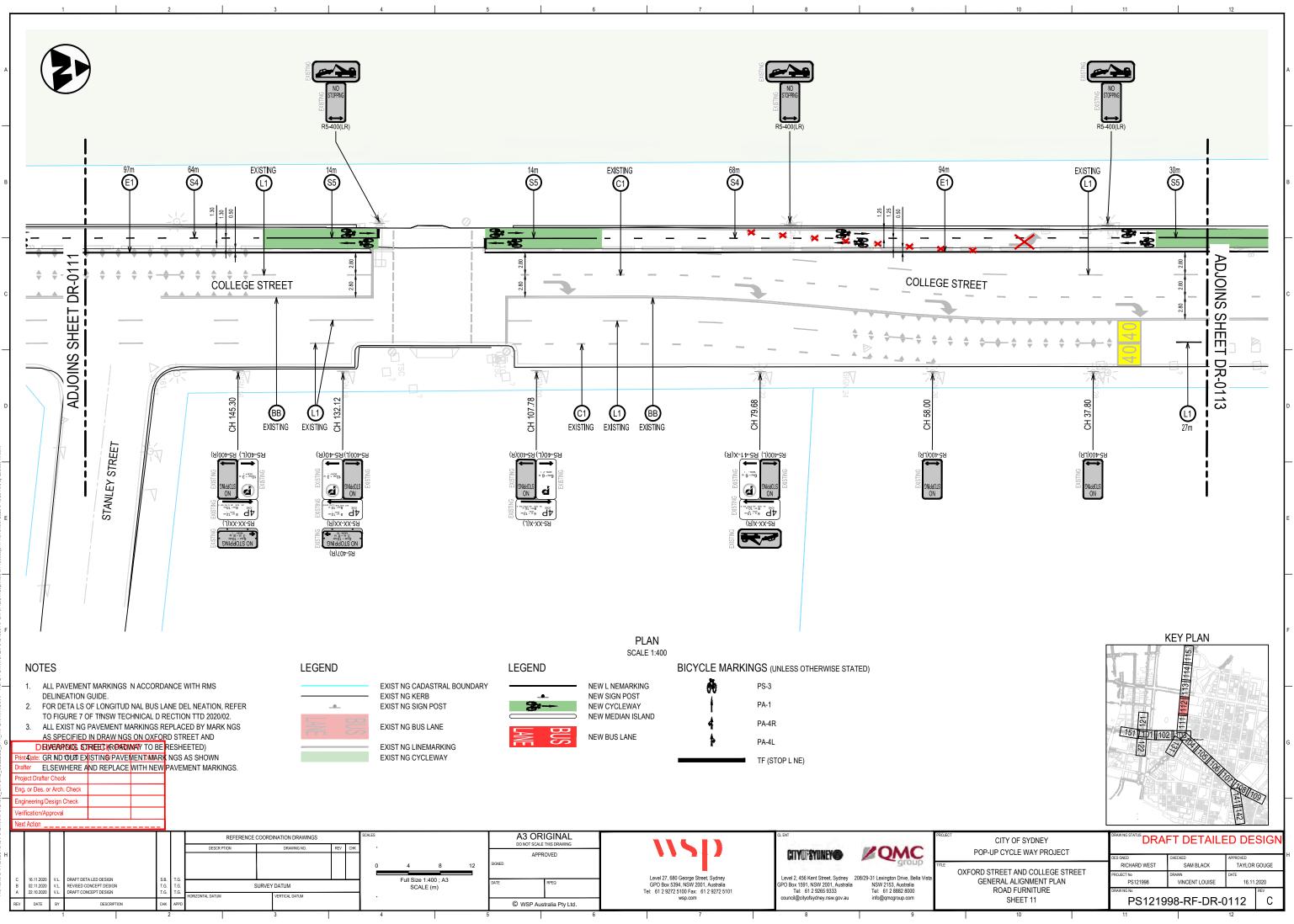




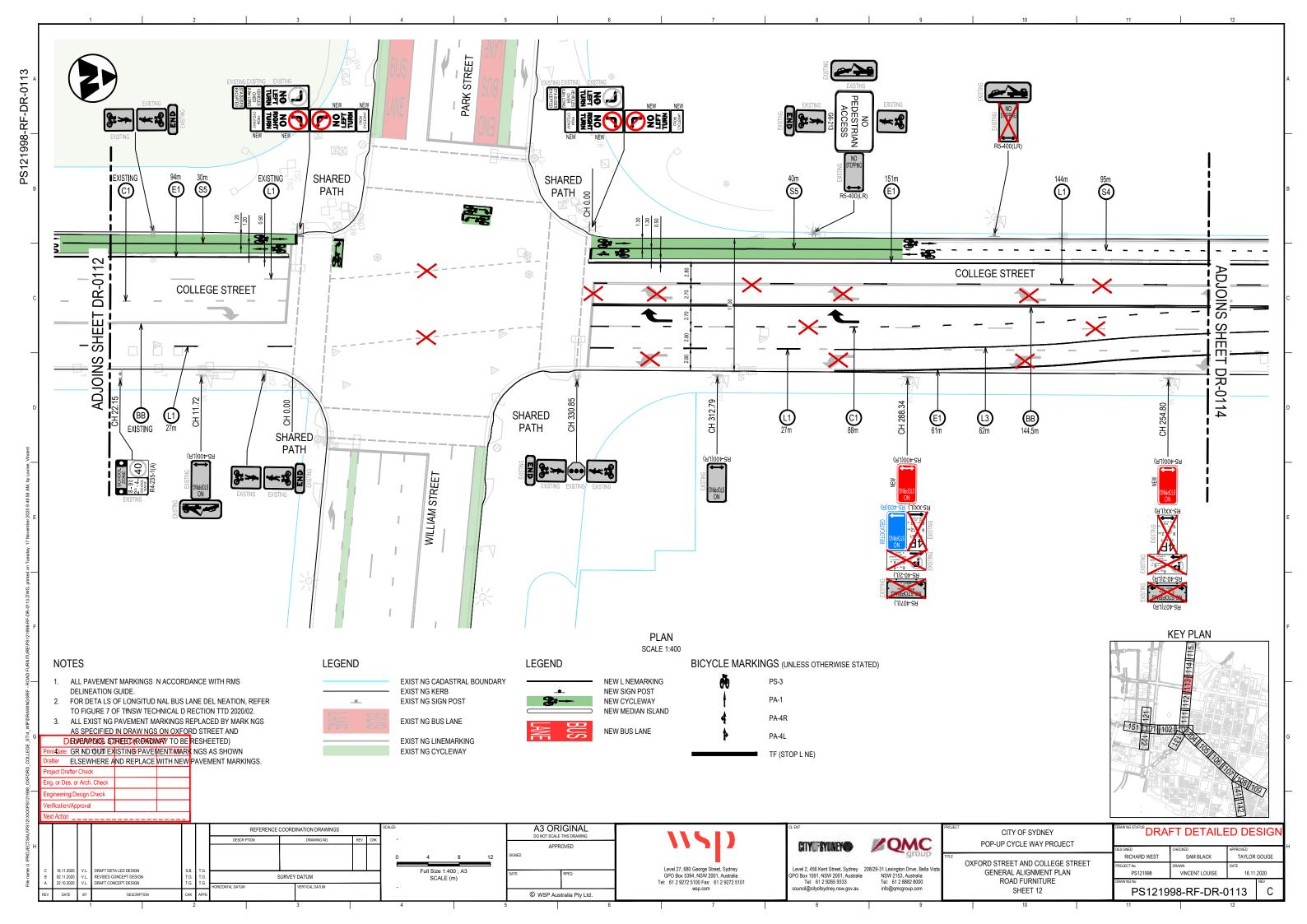


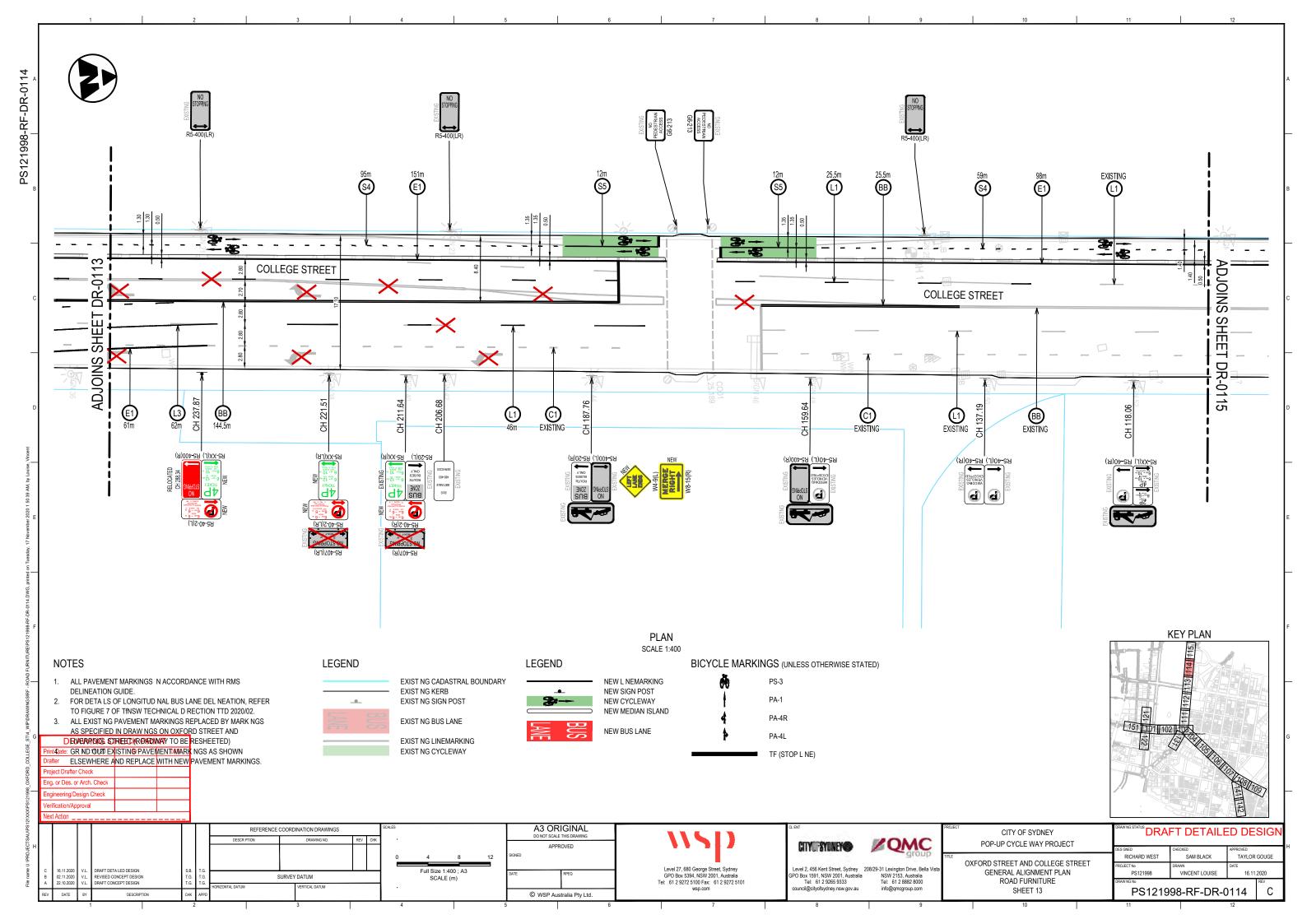


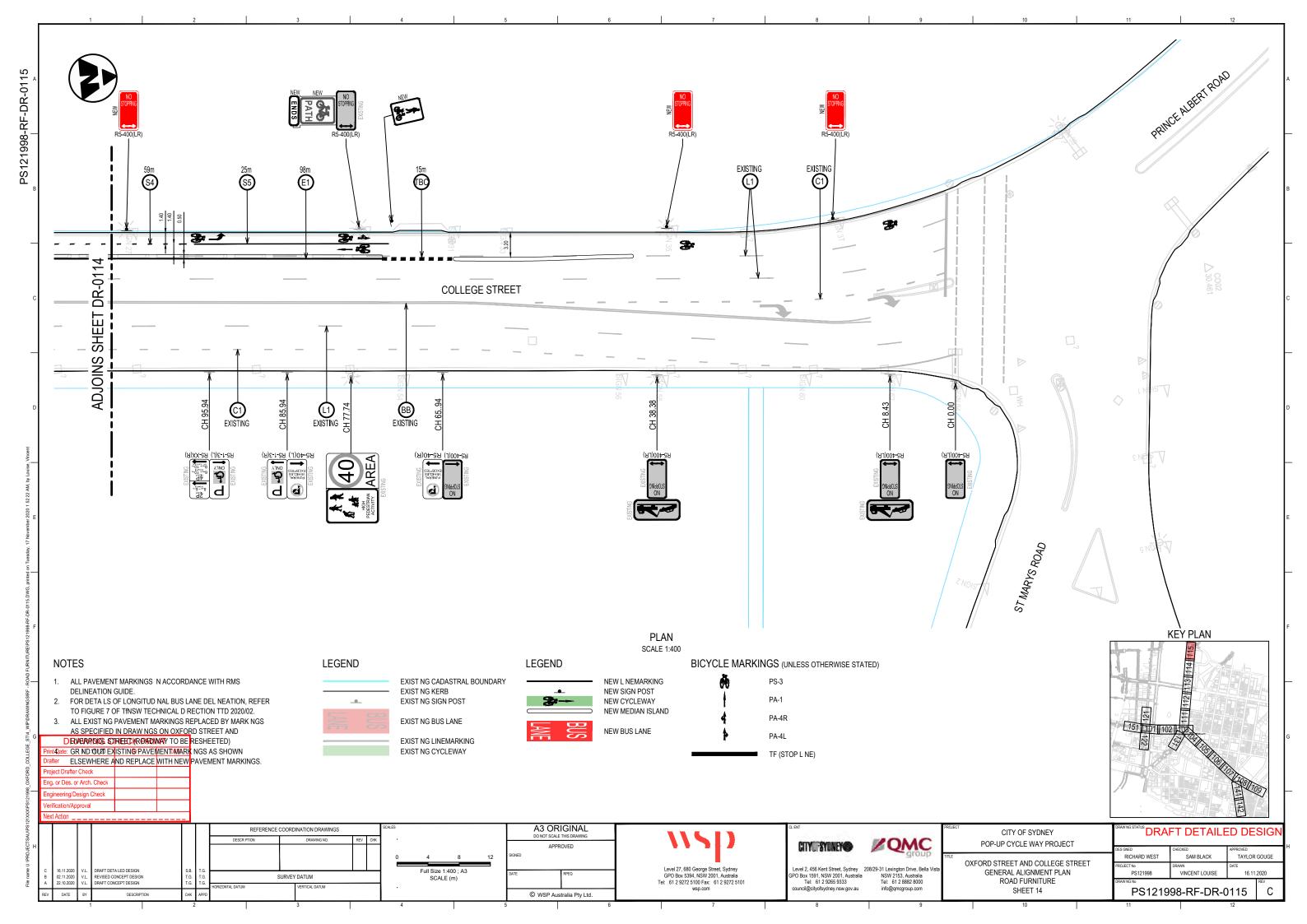


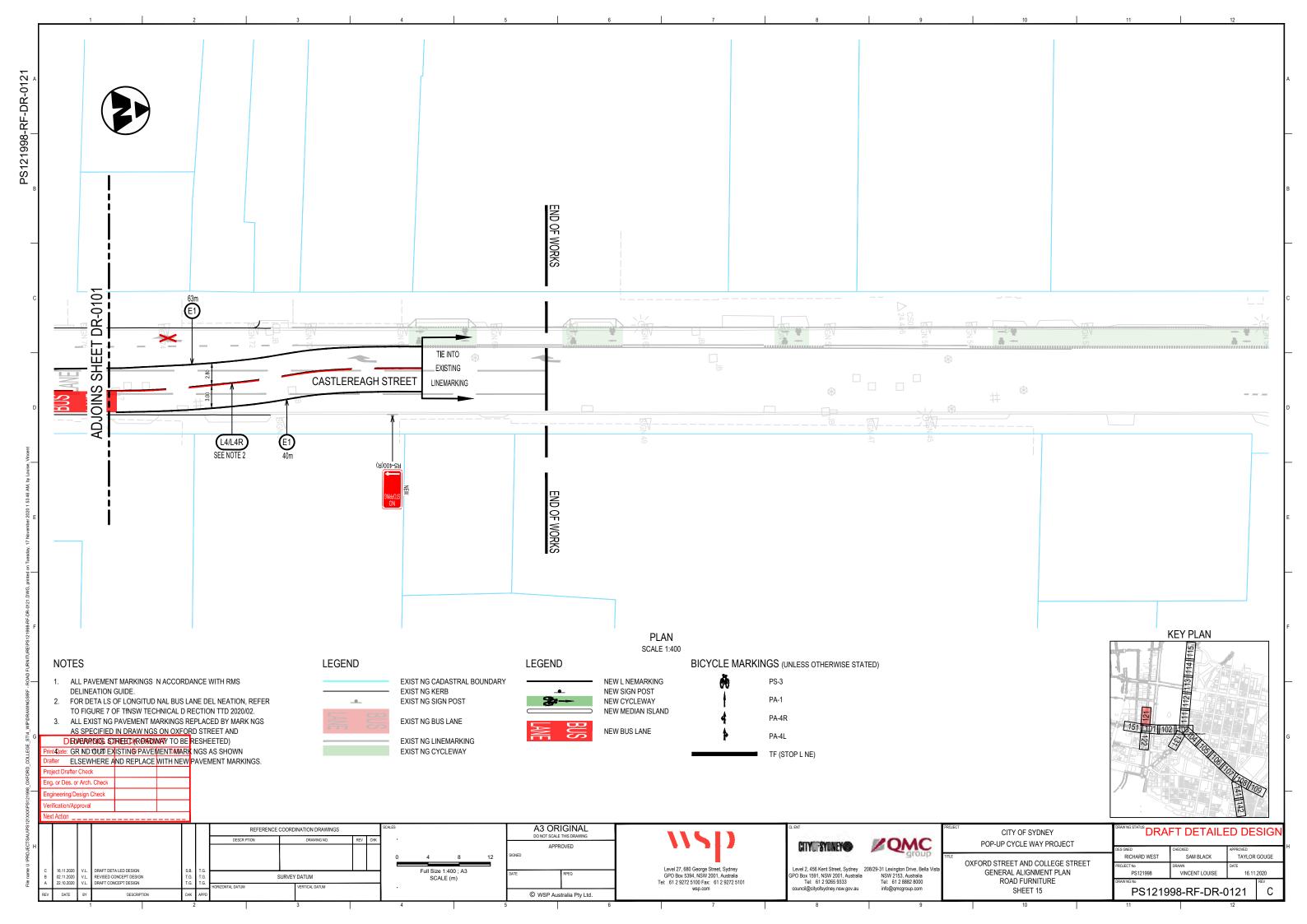


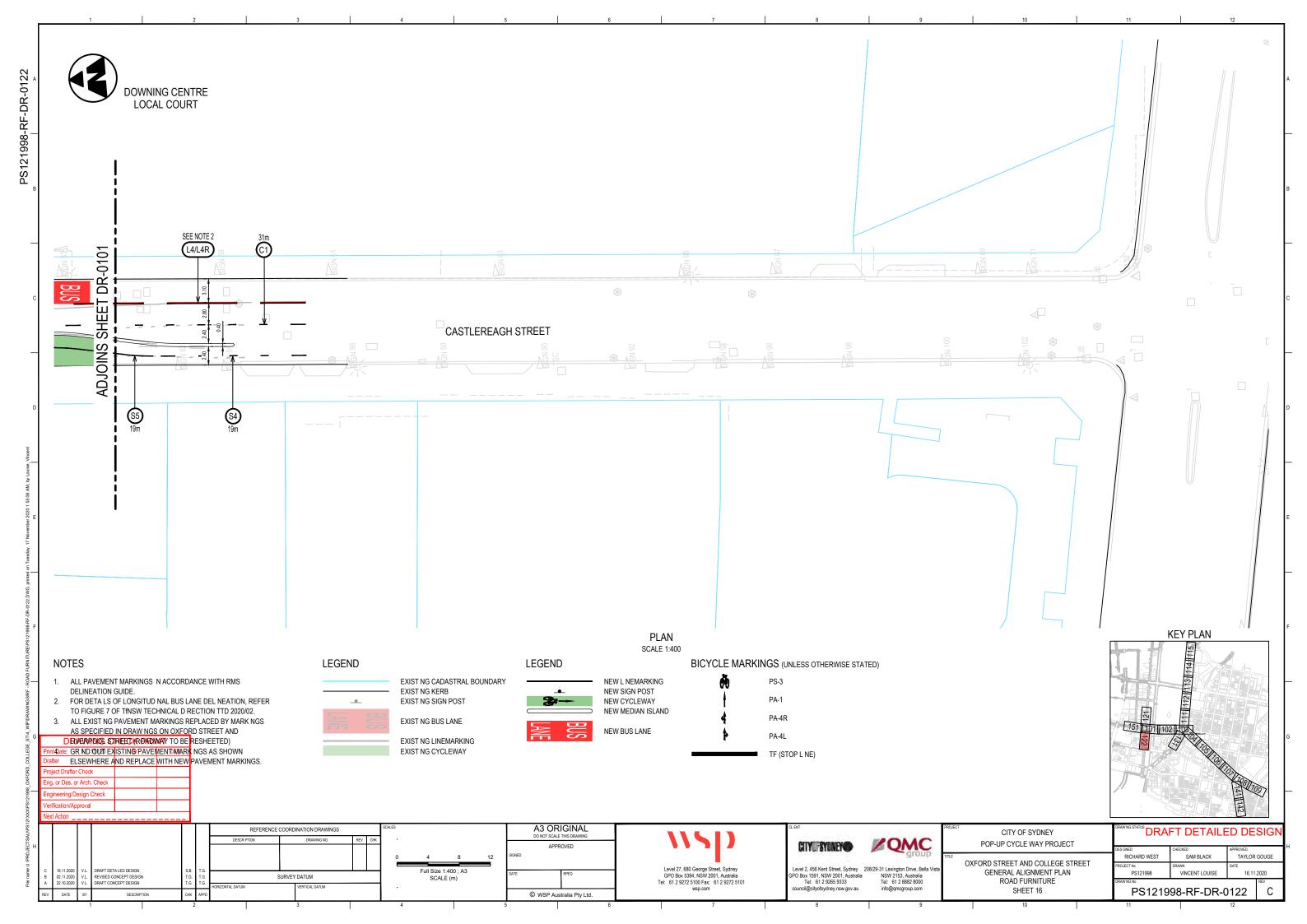
PS121998-RF-DR-0112

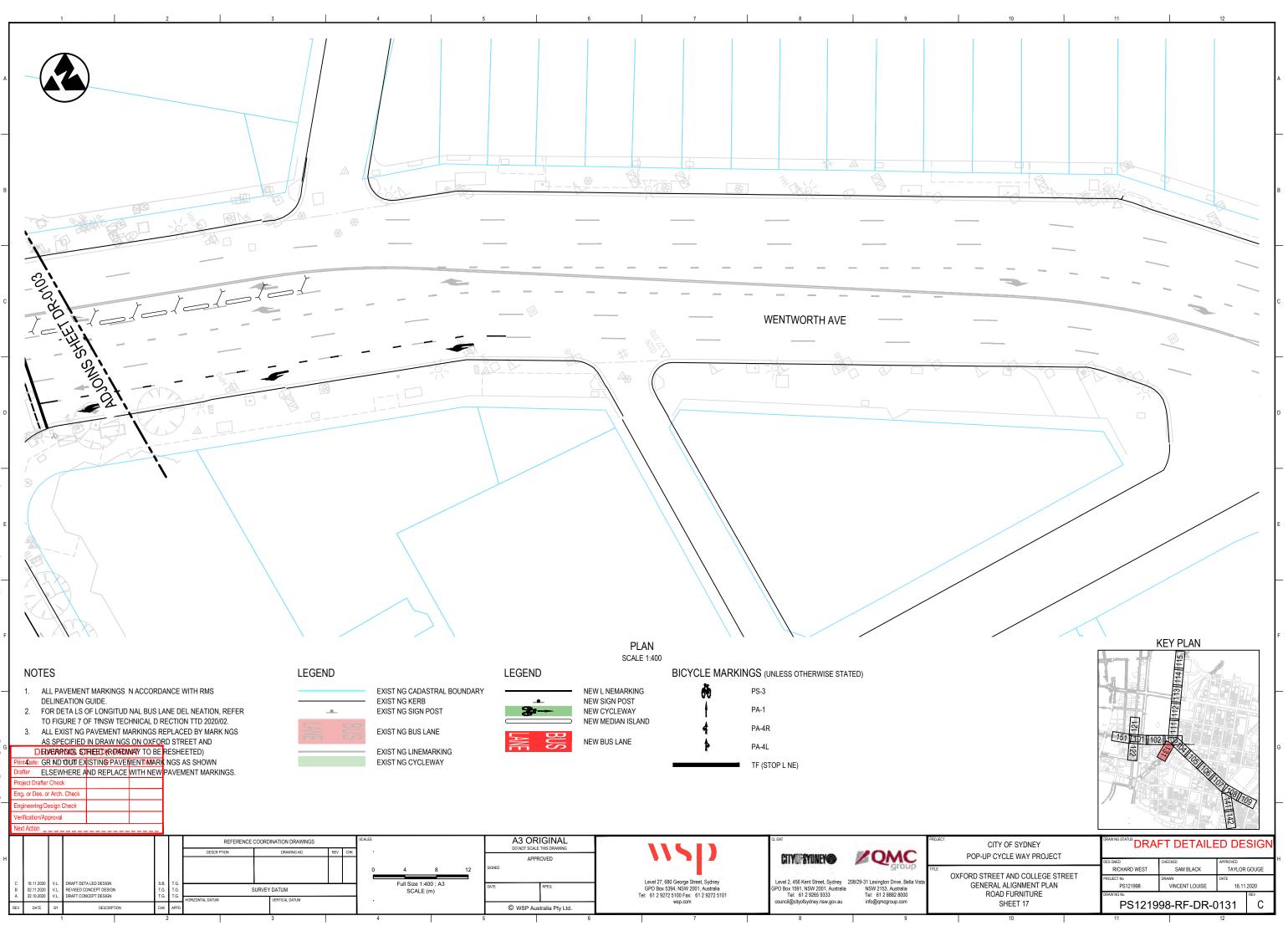


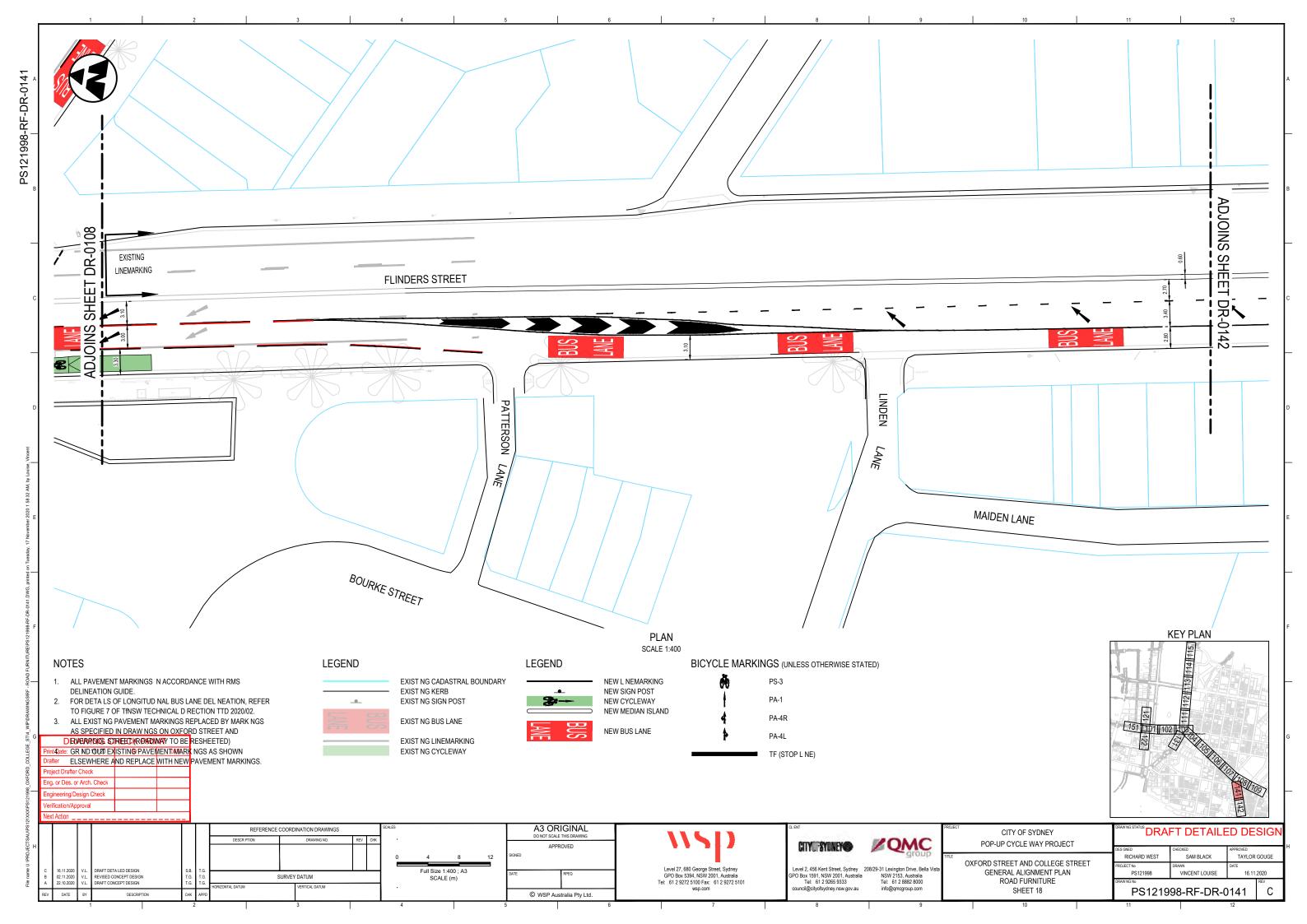


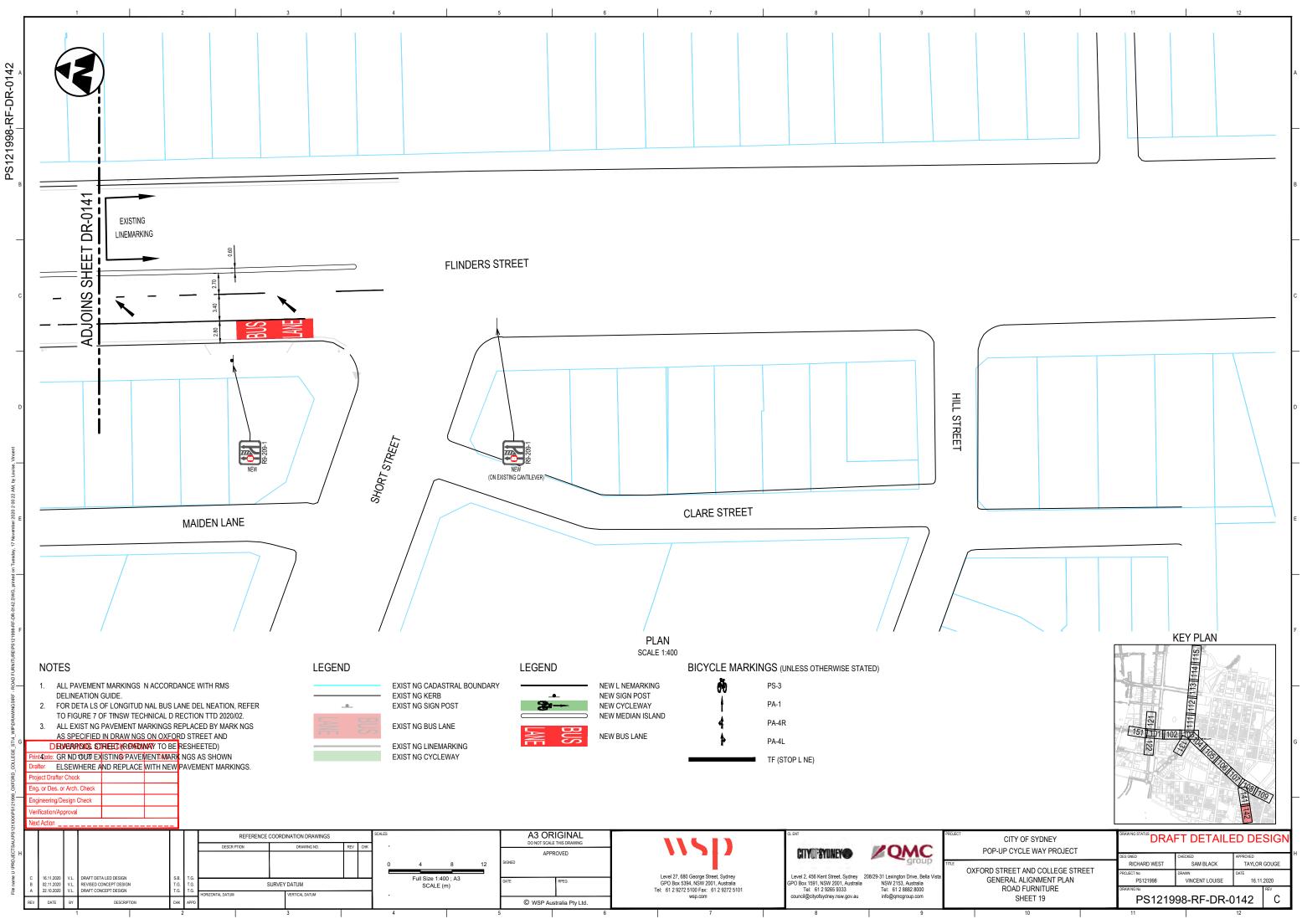


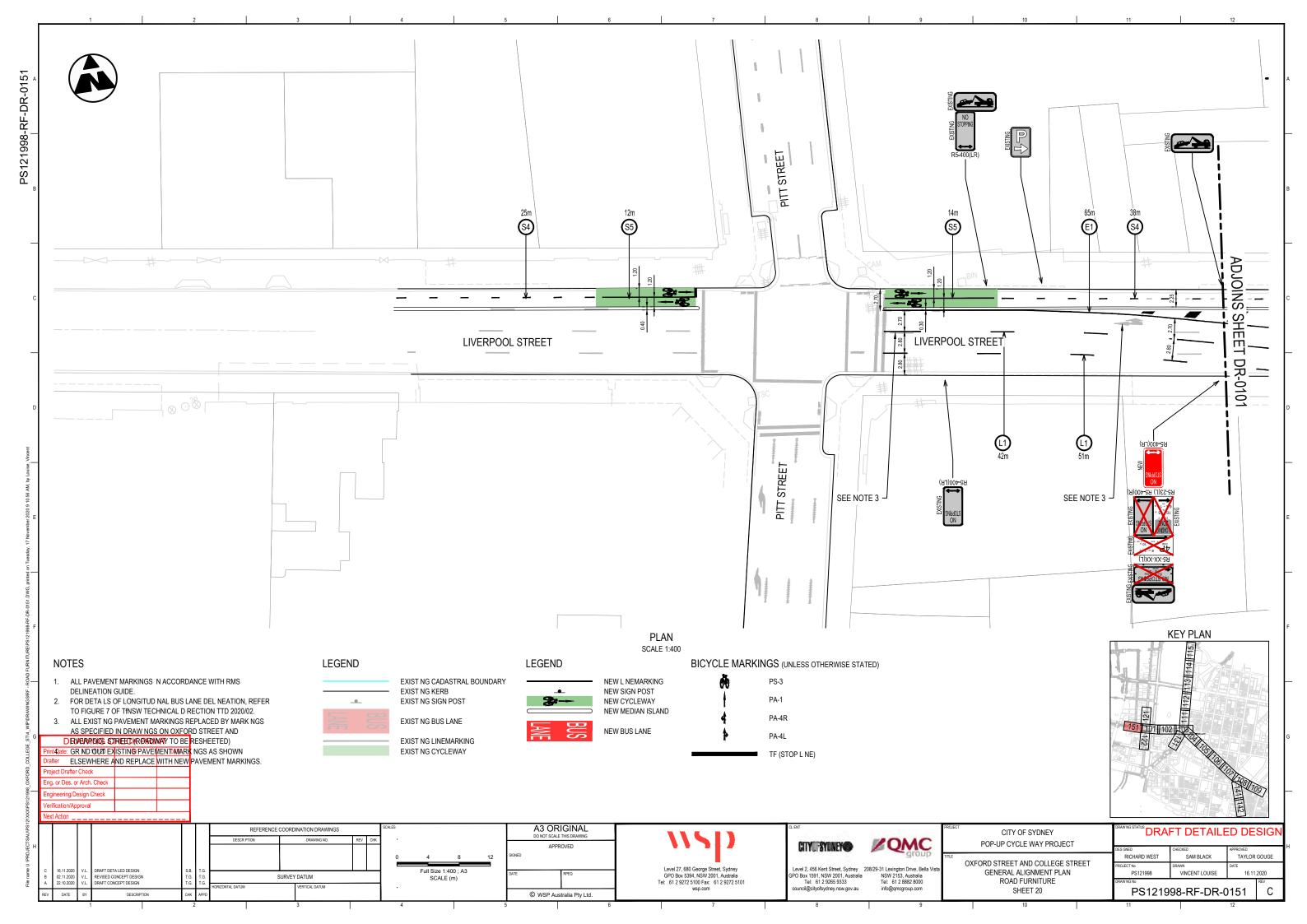












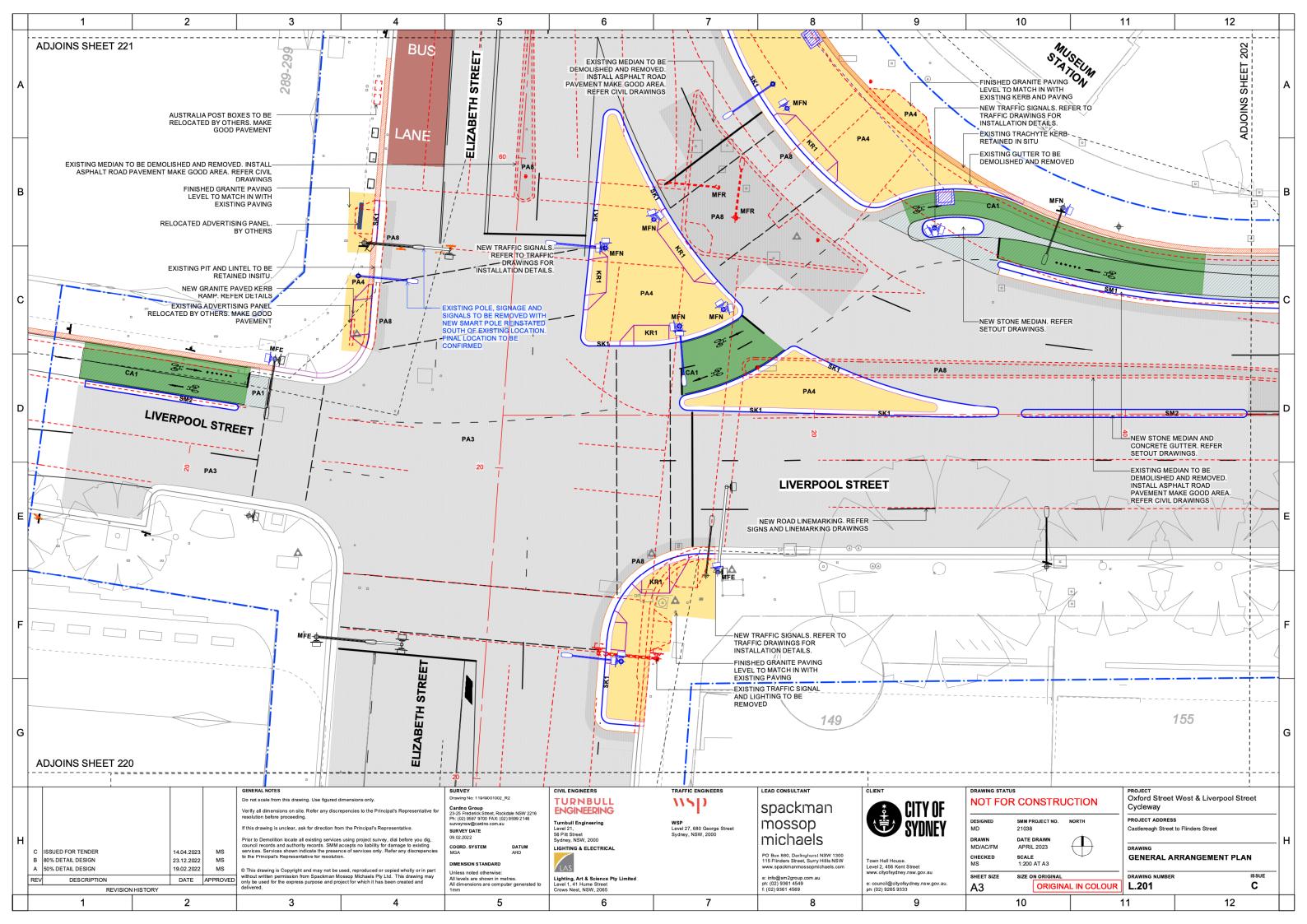
## **APPENDIX B** OPTION 3 (PREFERRED DESIGN)

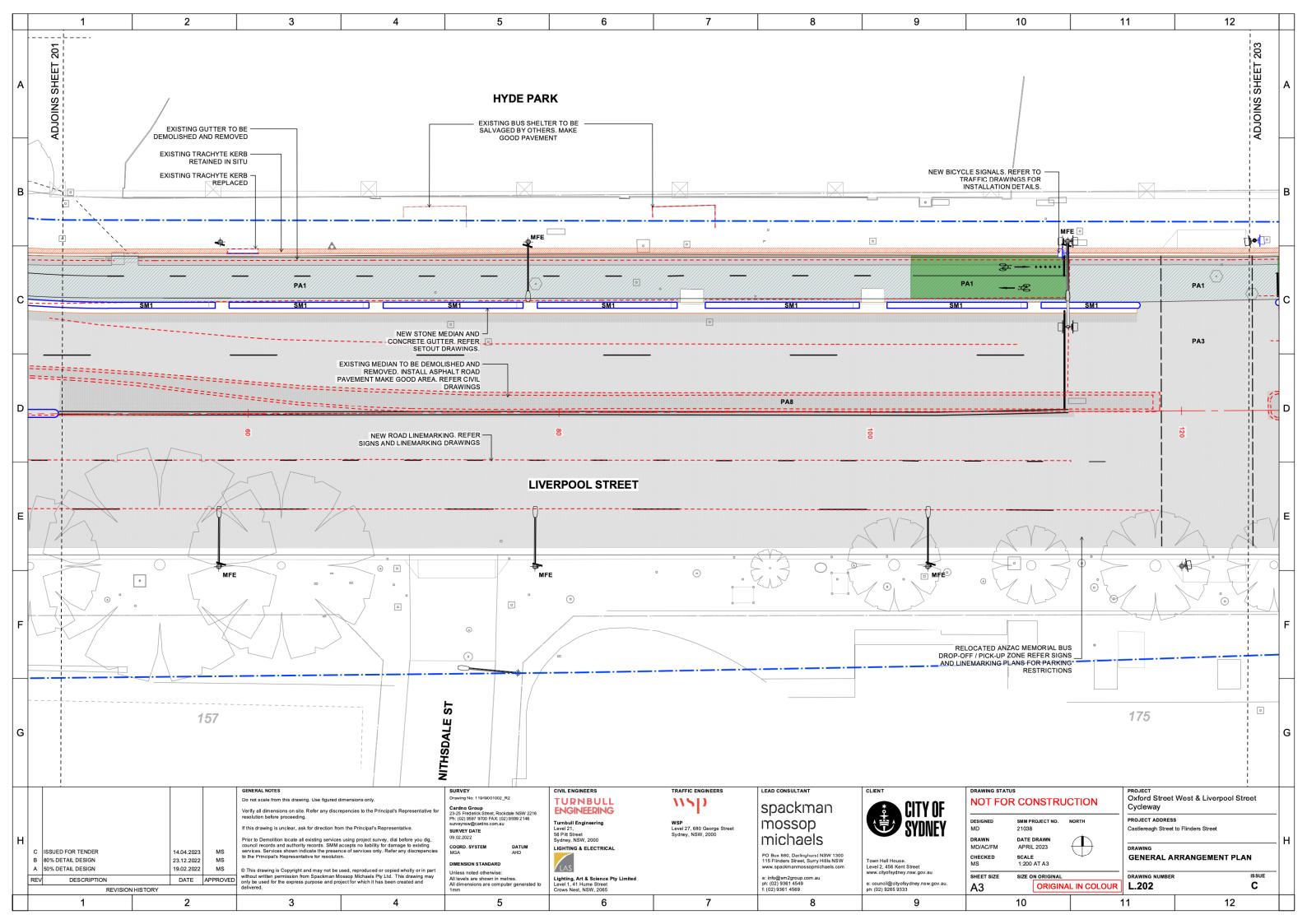


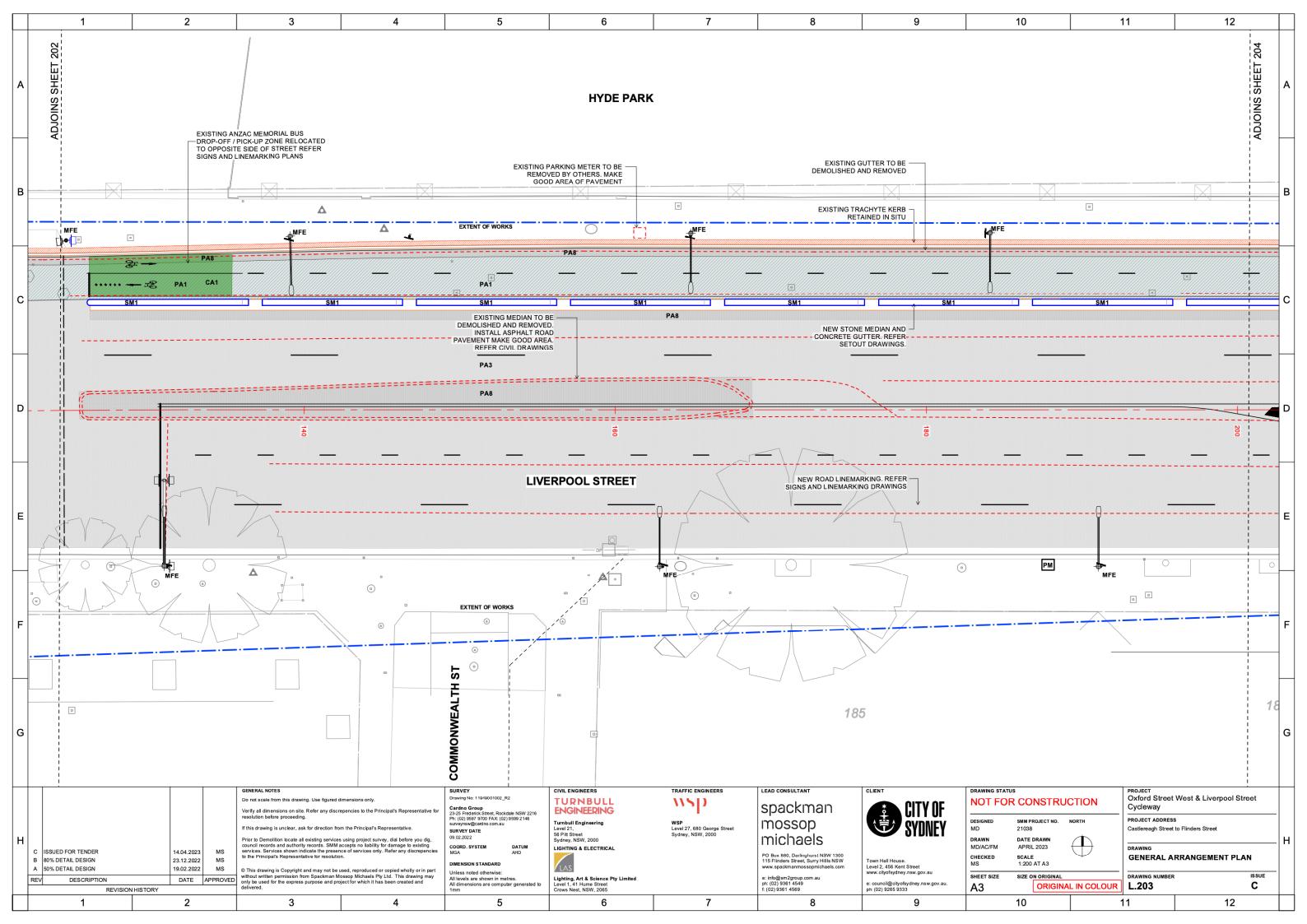
	1 2 3	4	5	6	7	8	9	10	11	1:	2
	GENERAL ARRANGEMENT LEGEND										
A	LEGEND										A
	GENERAL	LANDSCAPE FINISHES		ROAD & PAVE	MENT MARKING						
	EXTENT OF WORKS	EXISTING GARDEN BED		MARKINGS AND POST LOO REFER TO THE TRAFFIC E	CATION SHOWN INDICATIVELY. ENGINEERING DRAWINGS; SIGNS JARKINGS AND SIGNS DESIGN AND						
	NEW OR RELOCATED ITEM.			ROAD MARKING FOR M	ARKINGS AND SIGNS DESIGN AND						
		FURNITURE & FIXTURES									
	EXISTING ITEM TO BE RELOCATED     EXISTING LINEMARKING TO BE REMOVED	SIGNAGE POST - NEW (1)		- PEDESTRIAN	CROSS WALK						
в	EXISTING ITEM TO BE RETAINED	= <sup>)</sup> = SIGNAGE POST - REMOVED									в
		SIGNAGE POST - EXISTING	-	DASHED LANE     SOLID LANE D							
	AWNING LINE	=>= SIGNAGE POST - TO BE RELOCATED		DIRECTIONAL							
		B  Bollard	610/ 608/	BICYCLE MARKING							
	KERBS & MEDIANS	<b>F1</b> LEAN RAIL AND BALUSTRADE	5	EDGE LINE - T	1L01						
	SK1 STONE KERB (300W X 300D)	F2 BUS SHELTER	-	🙁 SHARED PATH	HMARKER - T1S02						
c	SK2 STONE KERB (200W X 300D)	F3 O EXISTING RELOCATED BIN	•		ARKER - T1S15						с
	SK3 STONE LAYBACK KERB (300W X 300D)	F4         EXISTING BIN TO BE RETAINED           F5         Image: Constrained bit of the second		STOP LINE	F						
	SR4 SALVAGED INACHTE KERD	F5         Image: New Seating (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	NED								
	SN3 FLUSH STONE KERD AT RAISED THRESHOLDS (SUW X 1900)			SOLID LANE D	DIVIDER						
	SM2 STONE MEDIAN - TYPE 2	F7 BICYCLE HOOPS		DASHED LANE	EDIVIDER						
				H BICYCLE PAVI	EMENT MARKING						
D	DRAINAGE DESIGN     INDICATIVE LOCATION EXISTING PIT TO BE	PM PARKING METER (1)		₩₩₩₩₩ DIRECTIONAL	ARROWS						D
		T1 TACTILES - WARNING (2)(610)		KERB RAMPS							
	TO BE MODIFIED	TACTILES - DIRECTIONAL		KR1 GRANITE PED							
	REFER DRAINAGE DESIGN FOR PIT AND PIPE SCHEDULES AND LOCATIONS	LIGHTING & ELECTRICA	L	KR2 GRANITE VEH							
	SCHEDULES AND LOCATIONS	SPN SIGNAL POST - NEW		KR3 ASPHALT CYC							
	PAVEMENT	SPR SIGNAL POST - REMOVED									
	REFER CIVIL PAVEMENT PLANS	SPE • SIGNAL POST - EXISTING	1)	KR4 GRANITE CYC	LE RAMP						
E	PA1 ASPHALT CYCLEWAY	MFN - MULTI FUNCTION POLE - NEW (	0								E
	PA2 ASPHALT THRESHOLD PA3 ASPHALT MILL AND RESHEET										
	PA4 PAVED FOOTPATH 1	STREET LIGHT OUTREACH ARM									
		STREET LIGHT OUTREACH ARM	REMOVED								
		STREET LIGHT OUTREACH ARM	EXISTING								
	PA7 PAVED MEDIAN	SIGNAL LANTERN - NEW									
F	PA8 ASPHALT ROAD RECONSTRUCTION										F
	CA1 COLOURED ASPHALT SURFACE COATING - CYCLEWAY	SIGNAL LANTERN - RETAINED									
	CA2 COLOURED ASPHALT SURFACE COATING - BUS LANE	NOTES									
$\left  - \right $		1. REFER TO POLES SCHEDULE FOR FULL LI	ST OF COMPONENTS AND MODIFICA	TIONS.							
		2. REFER TO LIGHTING DRAWINGS FOR FULL 3. REFER TO CIVIL ENGINEER'S DRAWINGS F									
		3. REFER TO CIVIL ENGINEER'S DRAWINGS I KERB SETOUT AND STRUCTURAL REQUIREN SURFACE LEVEL	IENTS. EXISTING PIT LIDS WITHIN PR	OPOSED PAVEMENT TO BE RAISED FLU	USH WITH FINISHED						
G		4. REFER TO LIGHTING AND ELECTRICAL DR PAVEMENTS AND SURFACES.									G
		<ol> <li>5. REFER TO TRAFFIC CONTROL SIGNAL PL/ DETECTORS, SIGNAL PITS ETC.</li> <li>6. THESE DRAWINGS TO BE READ IN CONJU</li> </ol>			GS, LOOP						
		0. THESE DRAWINGS TO BE READ IN CONSU									
	GENERAL NOTES Do not scale from this drawing	g. Use figured dimensions only.	SURVEY Drawing No: 119/19001002_R2		TRAFFIC ENGINEERS	LEAD CONSULTANT	CLIENT		PROJECT Oxford	Street West & Liverpoo	ol Street
		Refer any discrepencies to the Principal's Representative for	Cardno Group 23-25 Frederick Street, Rockdale NSW 2216 Ph: (02) 9597 9700 FAX: (02) 9599 2146	TURNBULL ENGINEERING	wsp	spackman	CITY OF	NOT FOR CONSTRUC		lay	
	If this drawing is unclear, ask f	for direction from the Principal's Representative.	surveynsw@cardno.com.au SURVEY DATE	Turnbull Engineering Level 21, 56 Pitt Street	WSP Level 27, 680 George Street Sydney, NSW, 2000	mossop	<b>SYDNEY</b>	DESIGNED SMM PROJECT NO. MD 21038		ADDRESS gh Street to Flinders Street	
H c	ISSUED FOR TENDER 14.04.2023 MS services. Services shown indic	existing services using project survey, dial before you dig, records. SMM accepts no liability for damage to existing cate the presence of services only. Refer any discrepencies	09.02.2022 COORD. SYSTEM DATUM MGA AHD	Sydney, NSW, 2000 LIGHTING & ELECTRICAL		michaels		DRAWN DATE DRAWN MD/AC/FM APRIL 2023			H
в	80% DETAIL DESIGN         23.12.2022         MS         to the Principal's Representative           50% DETAIL DESIGN         19.02.2022         MS         © This drawing is Copyright and	nd may not be used, reproduced or copied wholly or in part	DIMENSION STANDARD Unless noted otherwise:	LAS		PO Box 880, Darlinghurst NSW 1300 115 Flinders Street, Surry Hills NSW www.spackmanmossopmichaels.com	Town Hall House. Level 2, 456 Kent Street www.cityofsydney.nsw.gov.au	CHECKED SCALE MS 1:200 AT A3	COVE	RAL ARRANGEMENT R SHEET	
RE	without written permission from	n Spackman Mossop Michaels Pty Ltd. This drawing may burpose and project for which it has been created and	All levels are shown in metres. All dimensions are computer generated to 1mm	Lighting, Art & Science Pty Limited Level 1, 41 Hume Street Crows Nest, NSW, 2065		e: info@sm2group.com.au ph: (02) 9361 4549 f: (02) 9361 4569	e: council@cityofsydney.nsw.gov.au ph: (02) 9265 9333	SHEET SIZE SIZE ON ORIGINAL	L IN COLOUR	NUMBER	C
	1 2 3	4	5	6	7	8	9	10	11	1	2
	· ·			•	•	,	•	,		,	

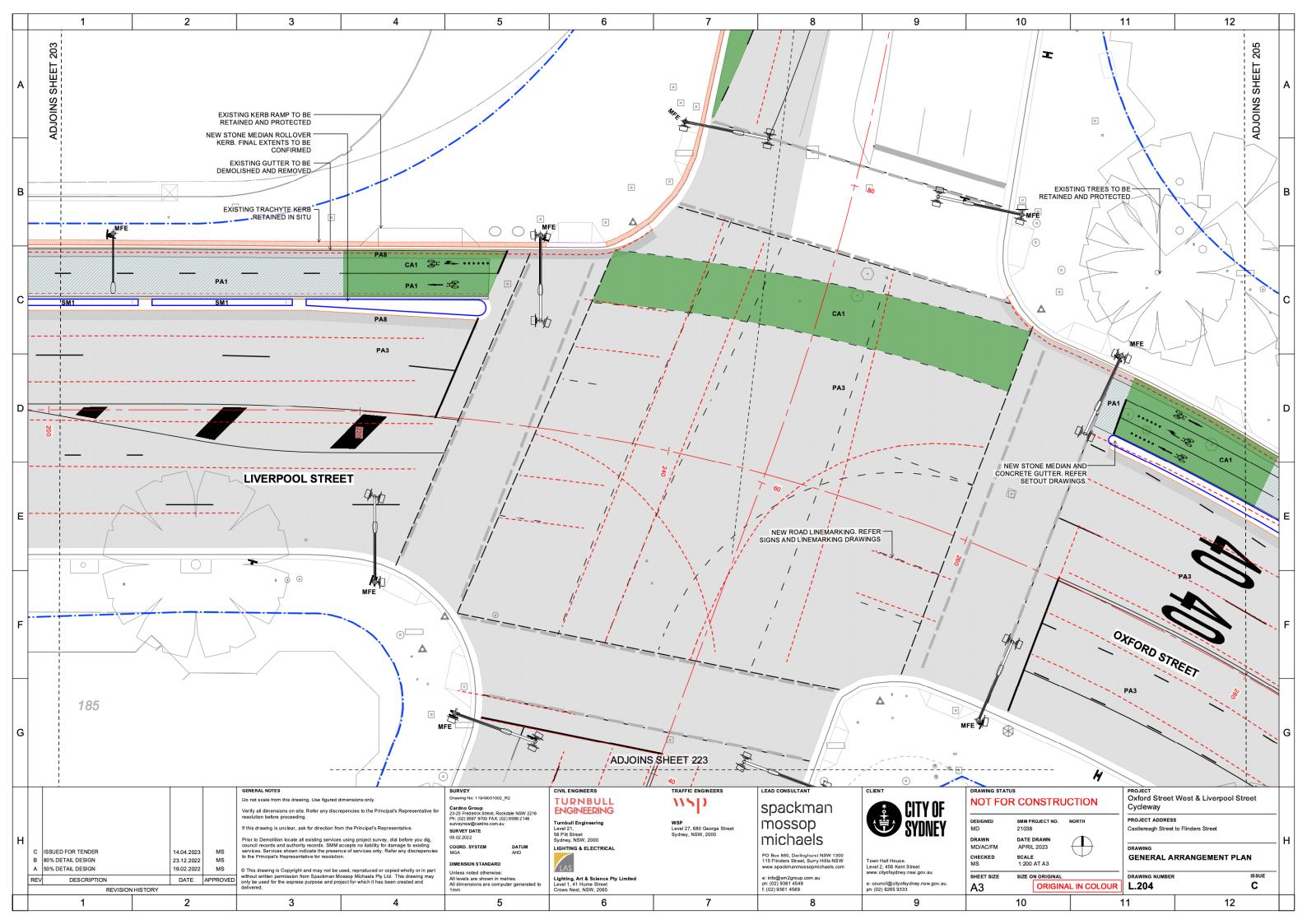
DATE APPROVED	without written permission from Spackman Mossop Michaels Pty Ltd. This drawing ma only be used for the express purpose and project for which it has been created and
19.02.2022 MS	© This drawing is Copyright and may not be used, reproduced or copied wholly or in p
23.12.2022 MS	to the Principal's Representative for resolution.
14.04.2023 MS	council records and authority records. SMM accepts no flability for damage to existing services. Services shown indicate the presence of services only. Refer any discrepent to the Principal's Representative for resolution.
	ir this drawing is unclear, ask for direction from the Principal's Representative. Prior to Demolition locate all existing services using project survey, dial before you did

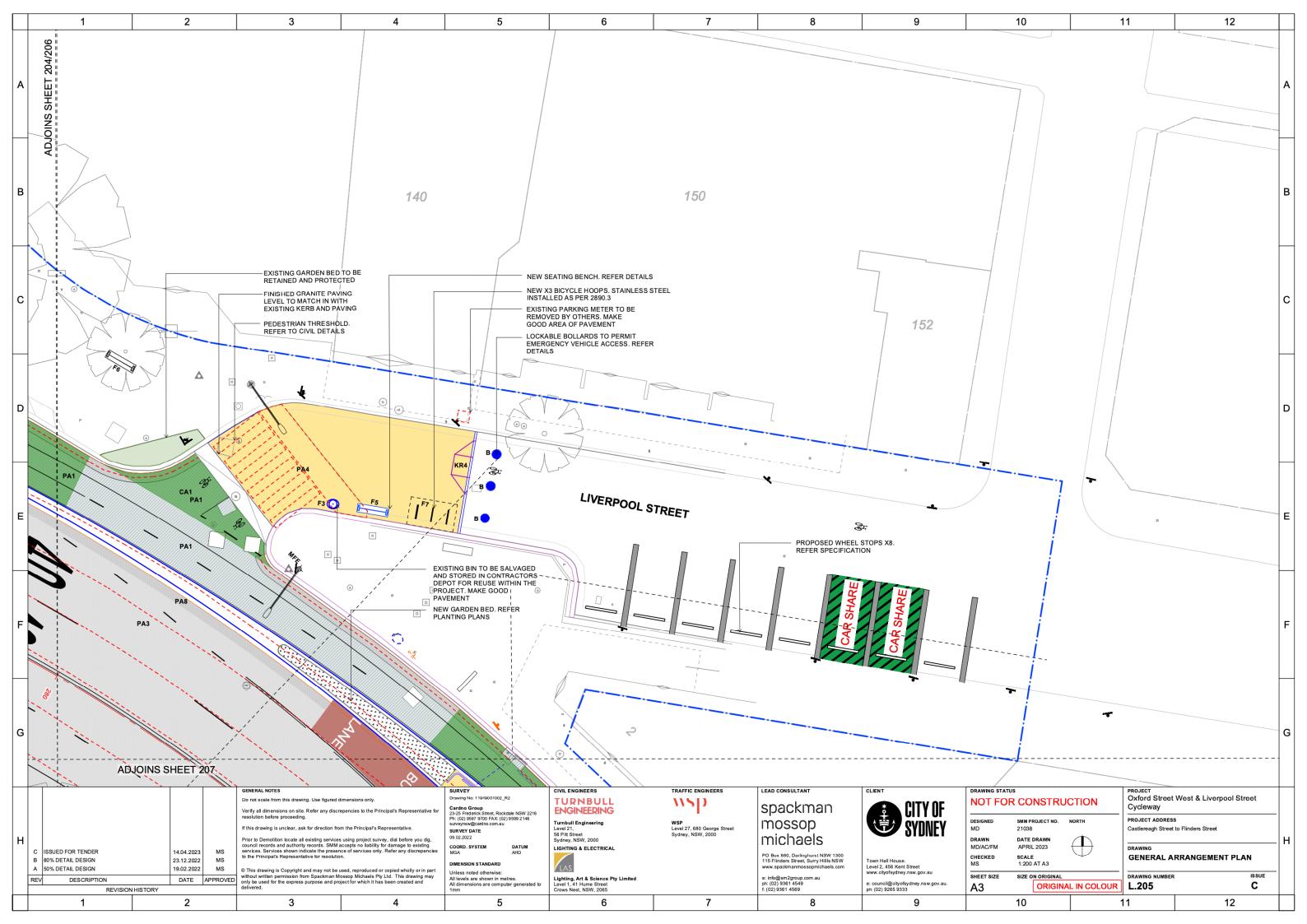
, Rockdale NSW 2216 X: (02) 9599 2146 m.au	TURNBULL ENGINEERING Turnbull Engineering	WSP
	Level 21, 56 Pitt Street Sydney, NSW, 2000	Level 27, 680 Geo Sydney, NSW, 20
DATUM AHD IRD vise:		
in metres. omputer generated to	Lighting, Art & Science Pty Limited Level 1, 41 Hume Street Crows Nest, NSW, 2065	
5	6	7

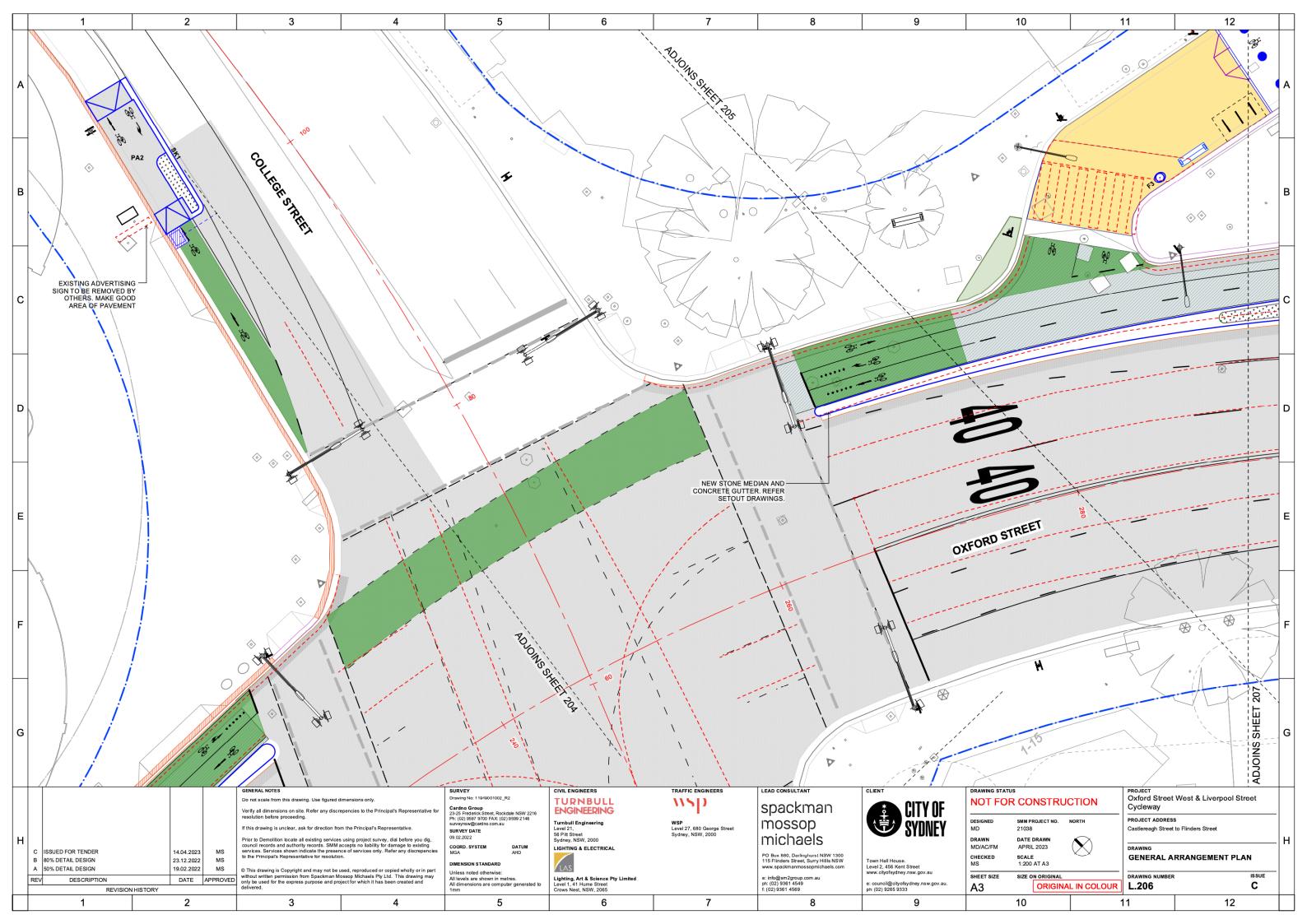


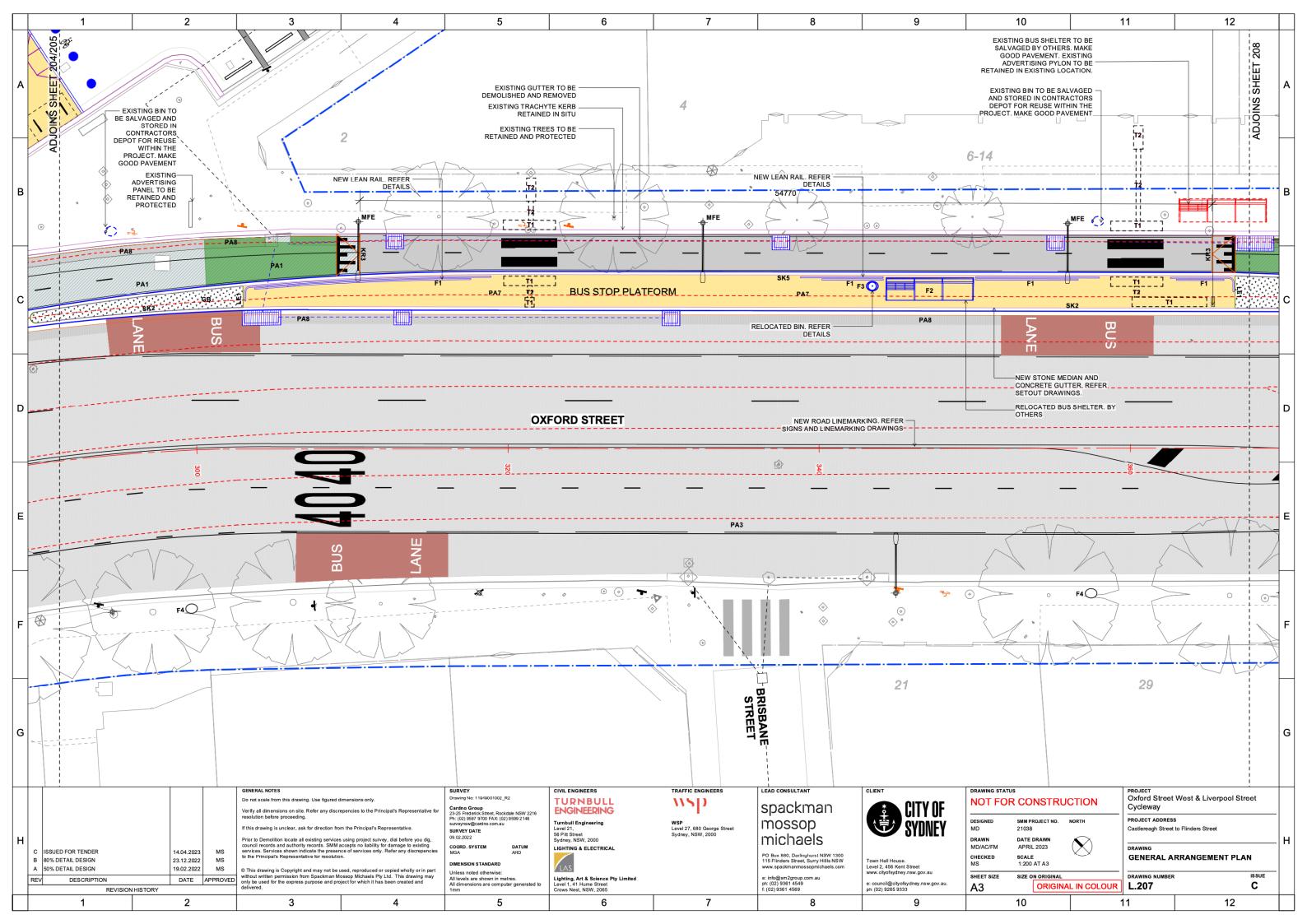


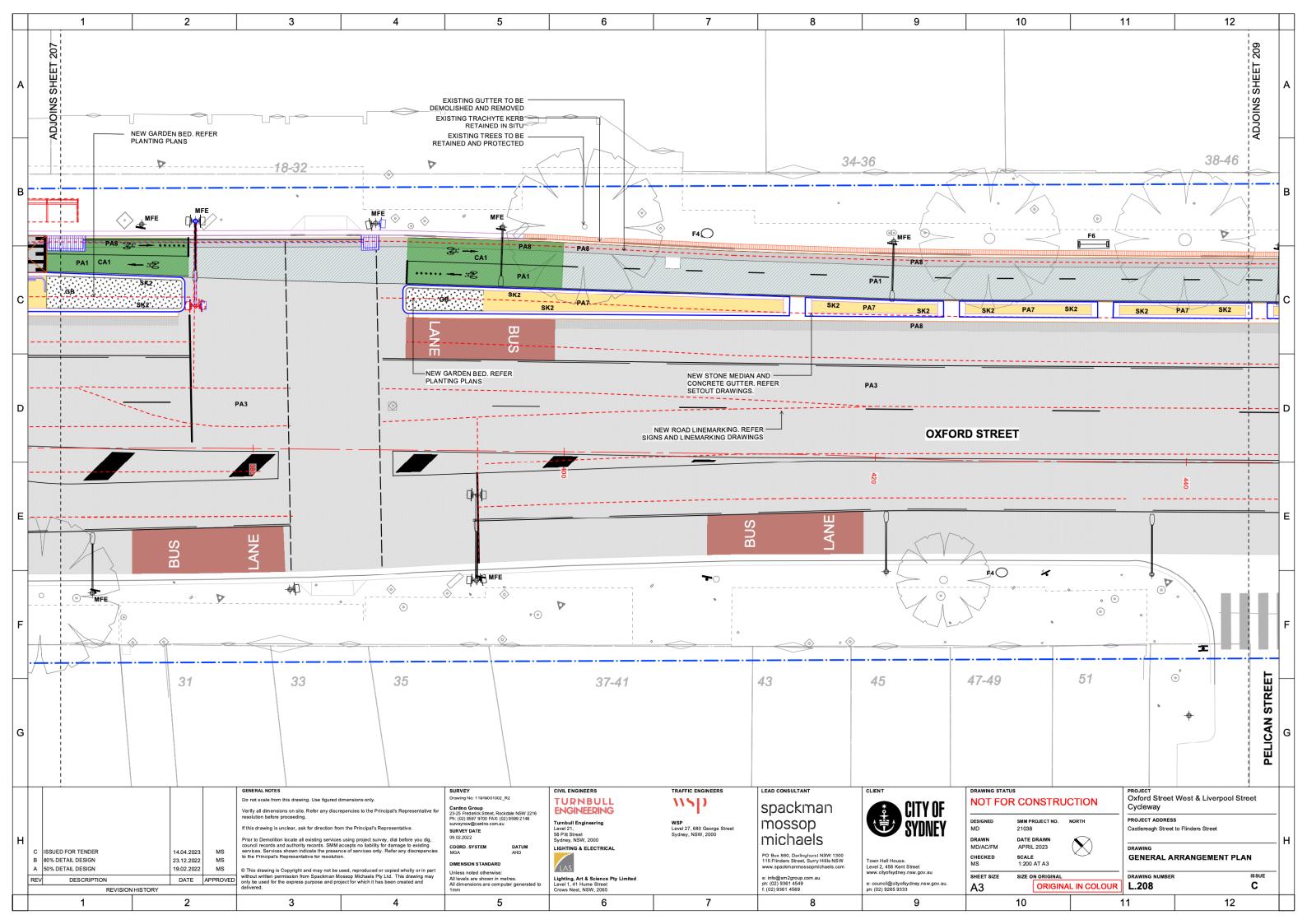


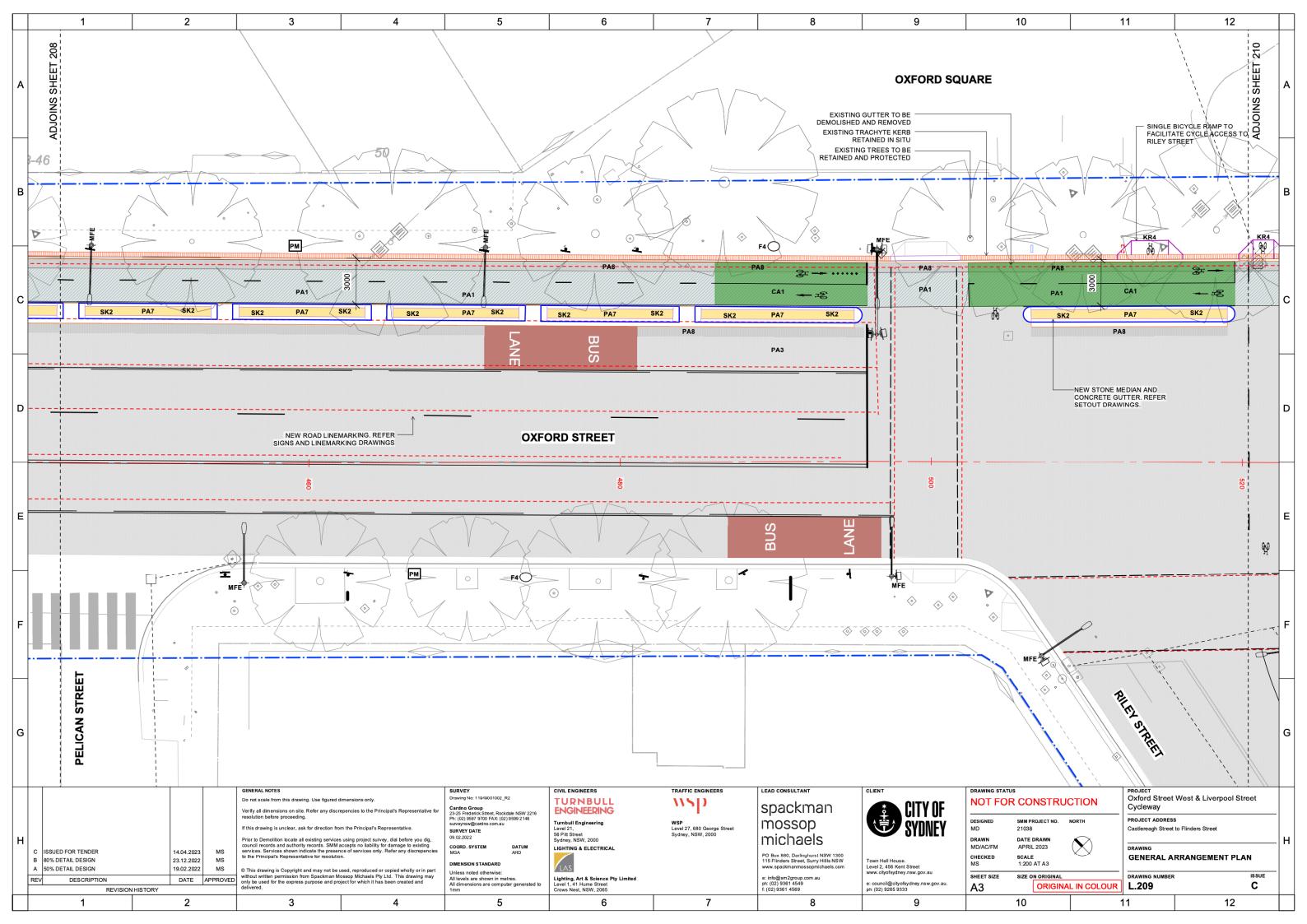


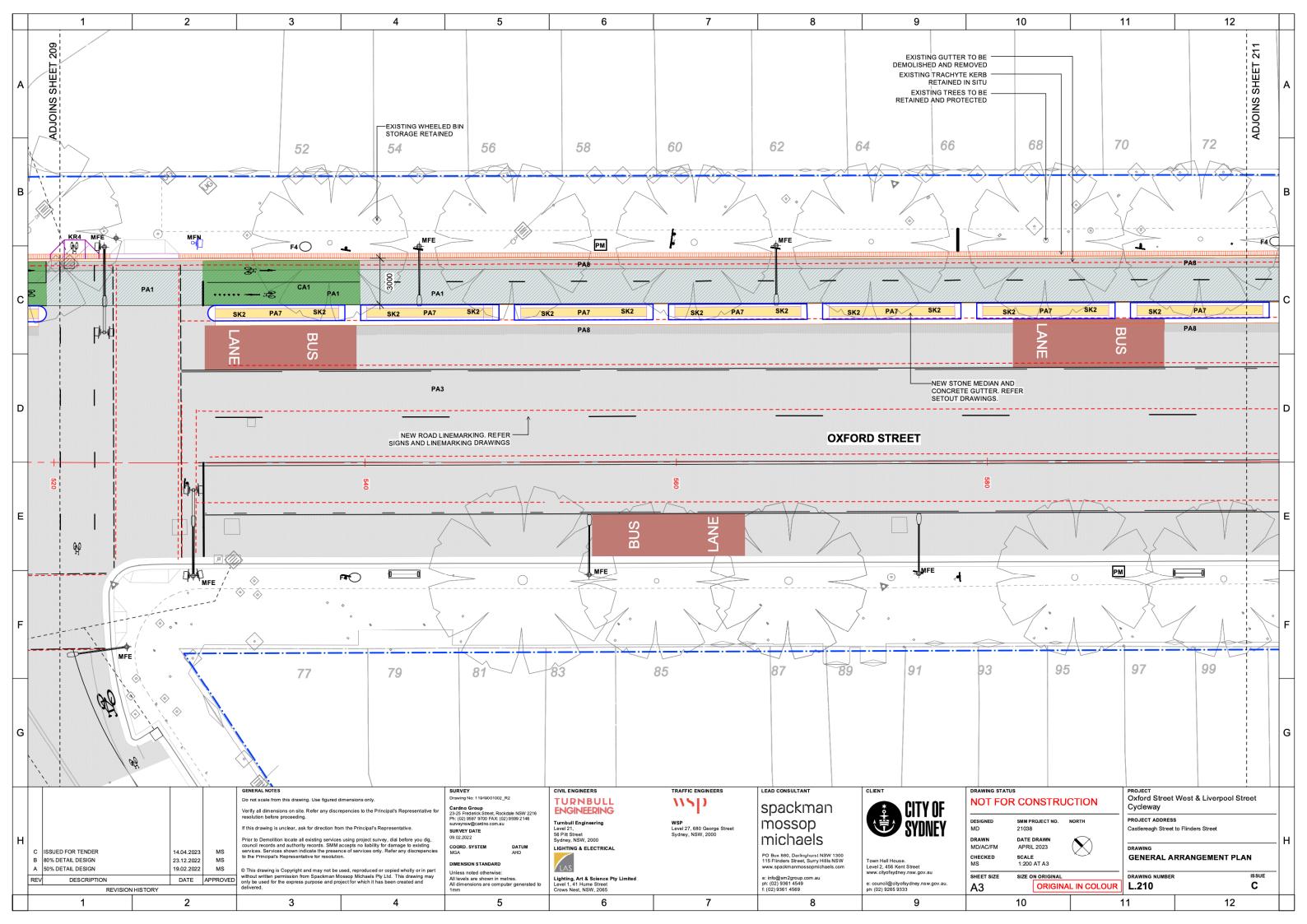


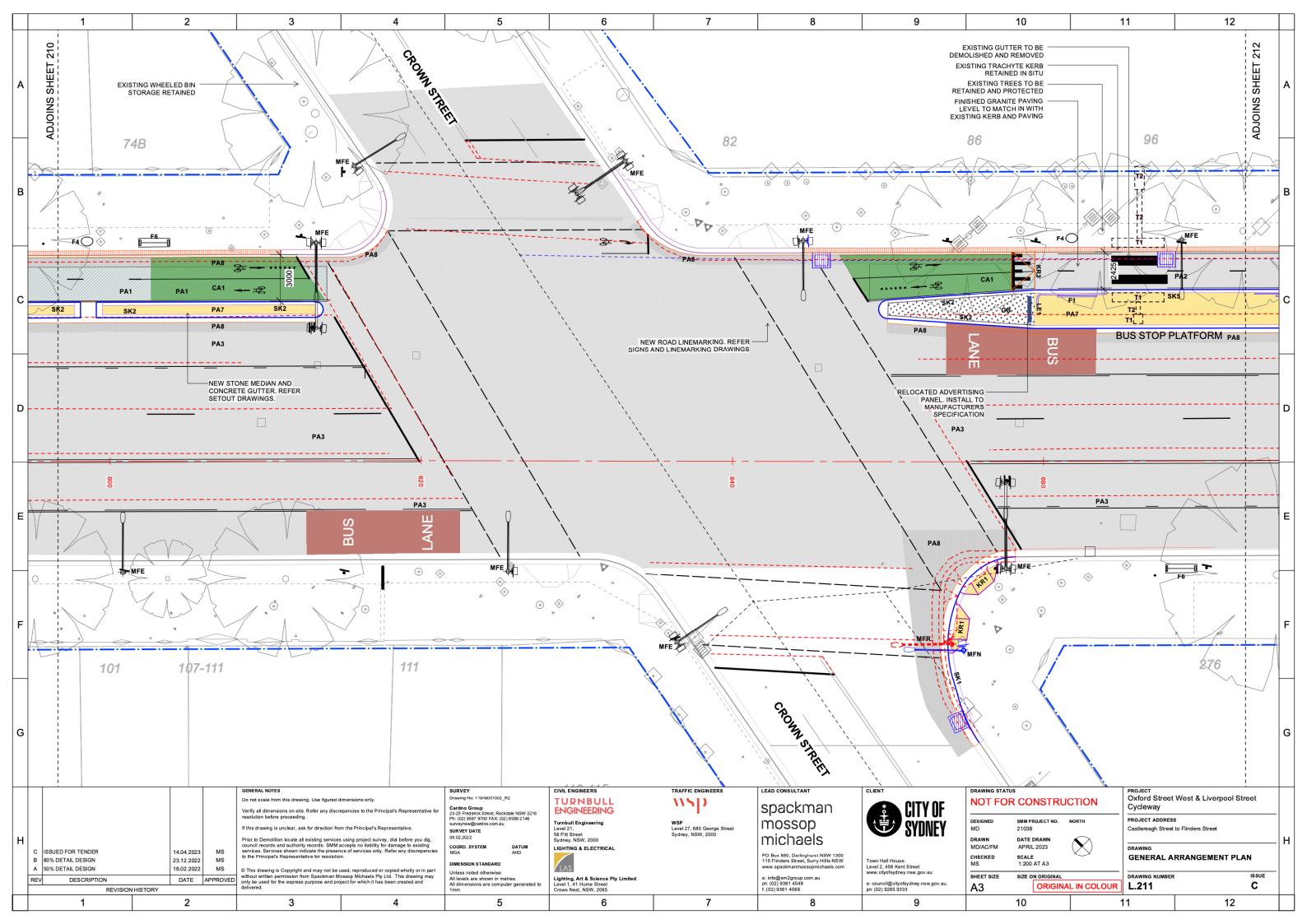


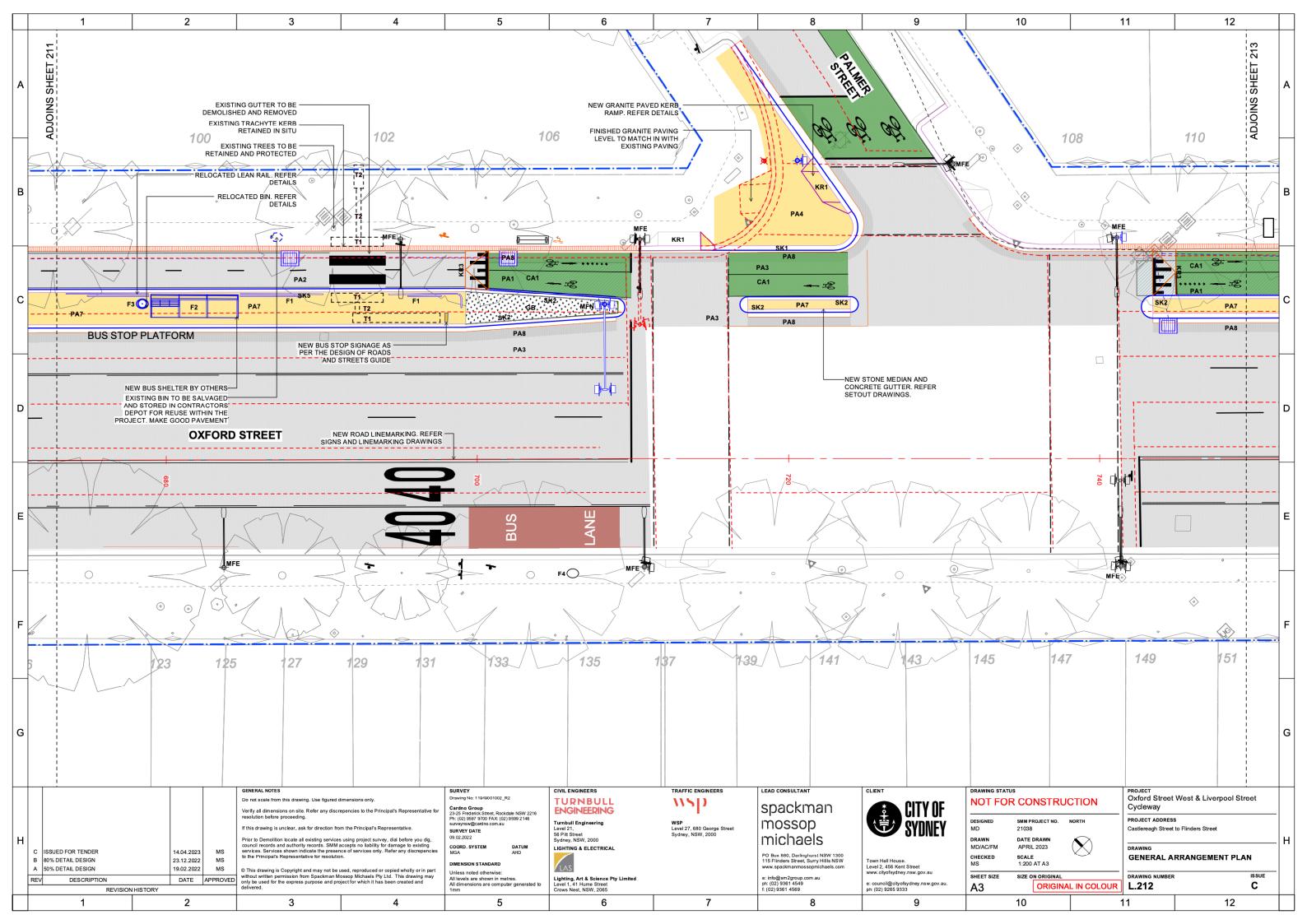


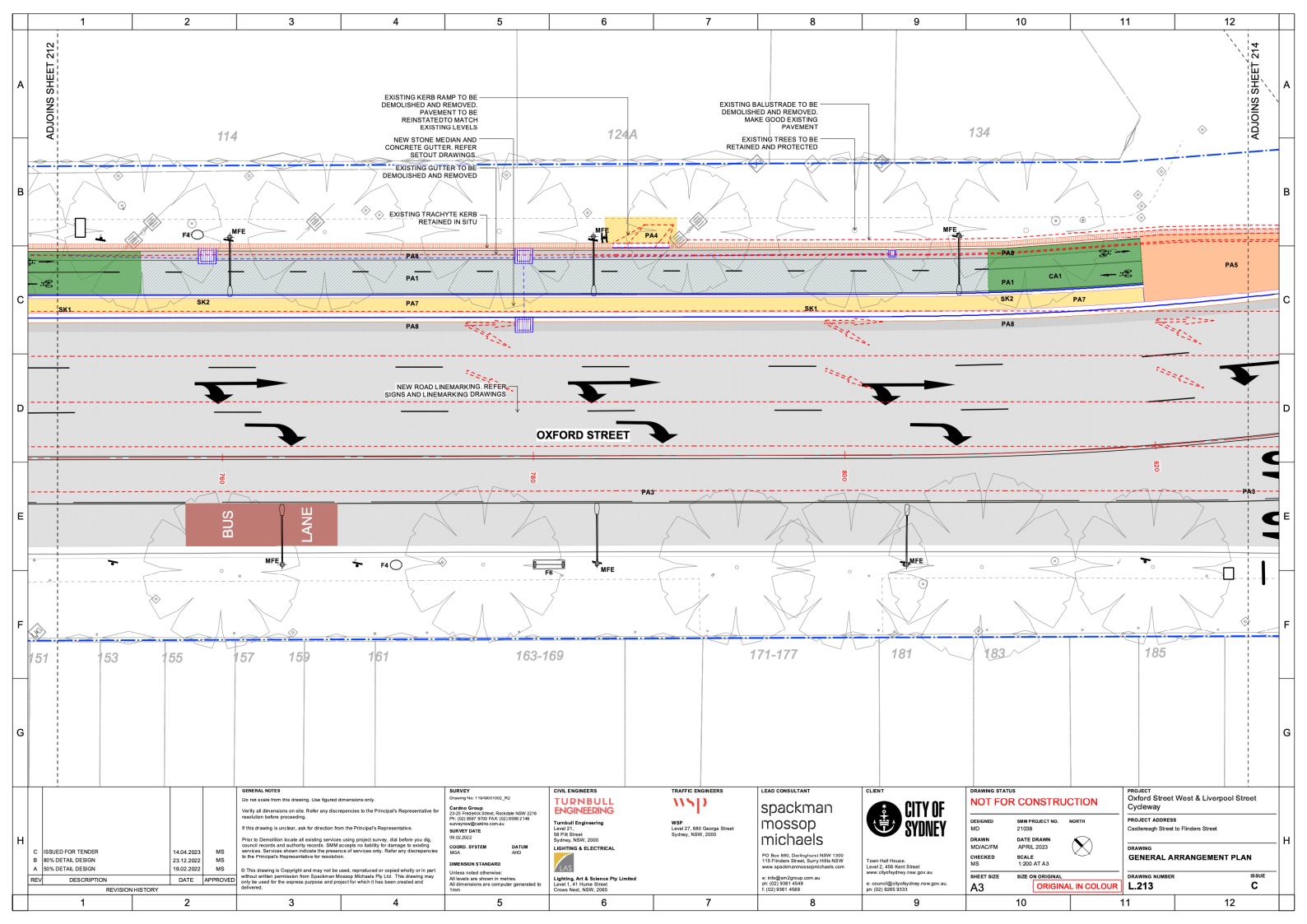


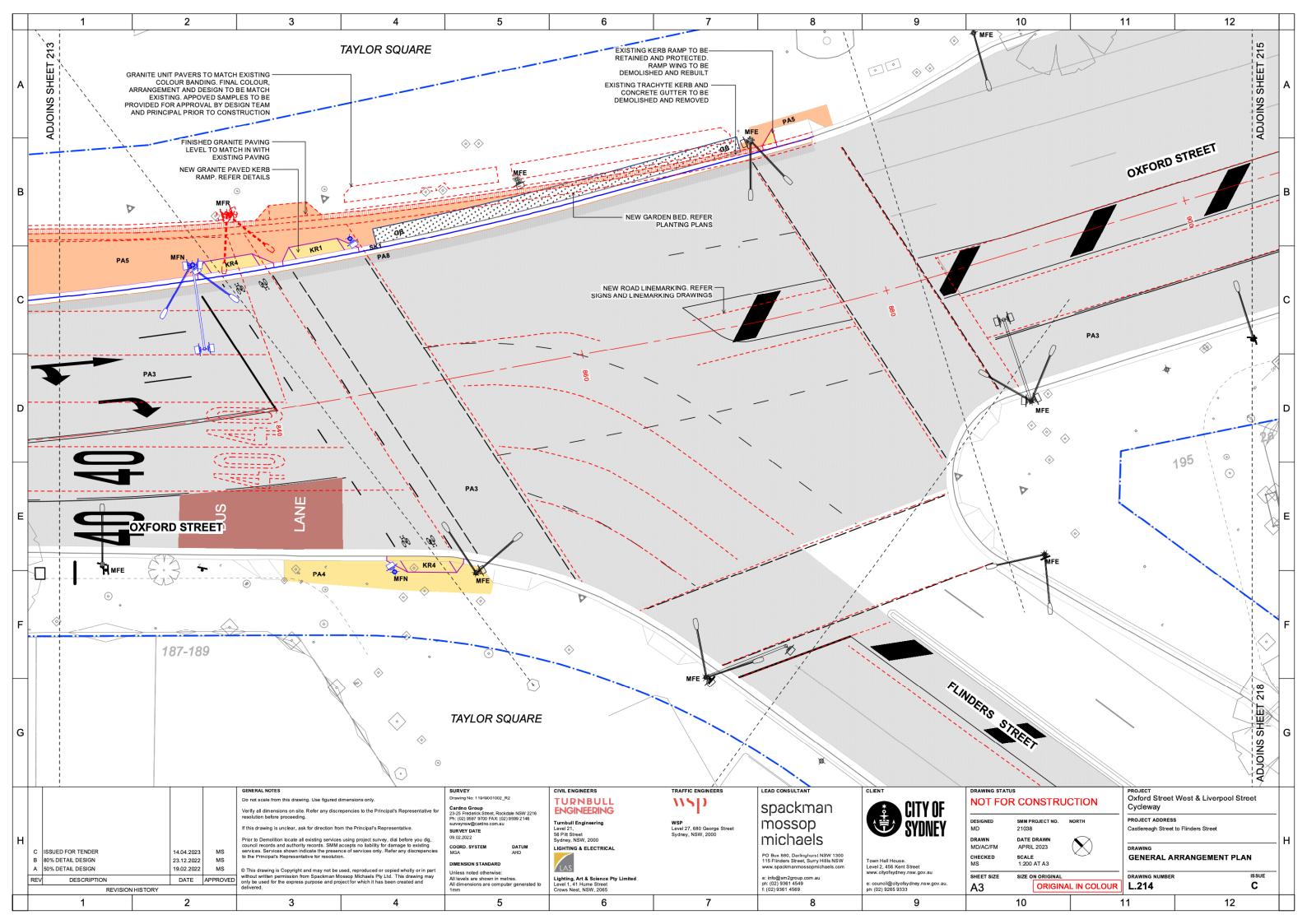


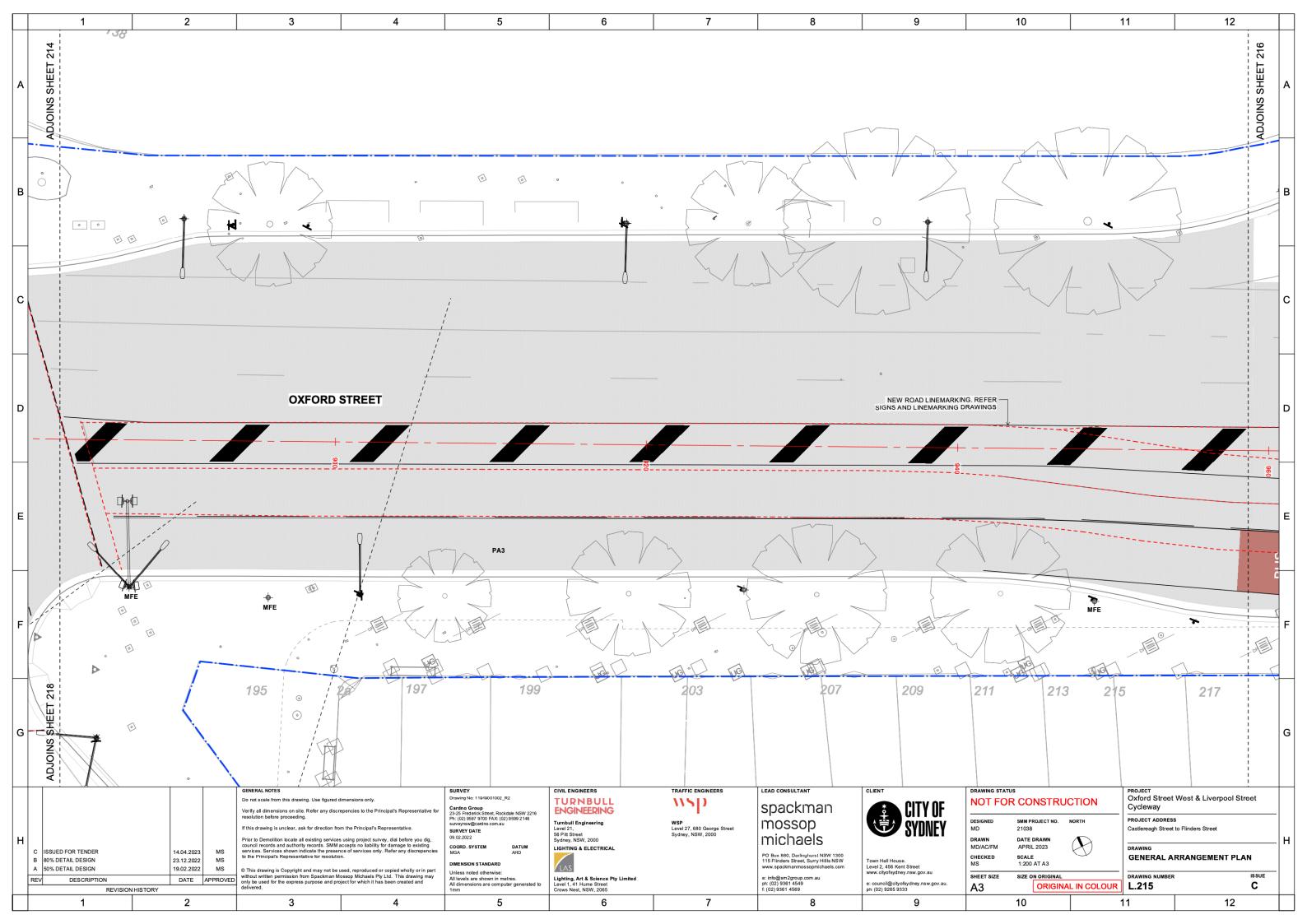


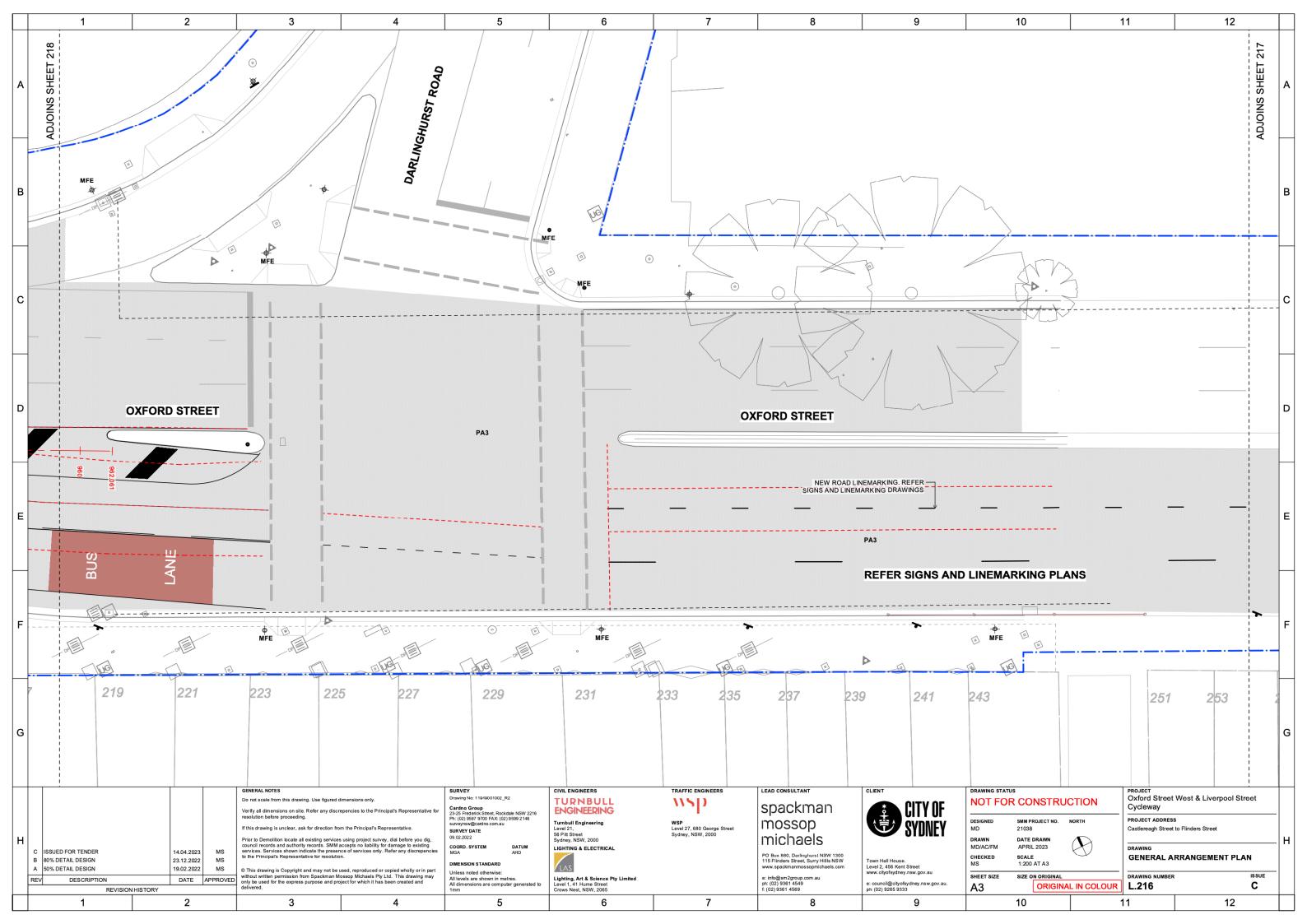


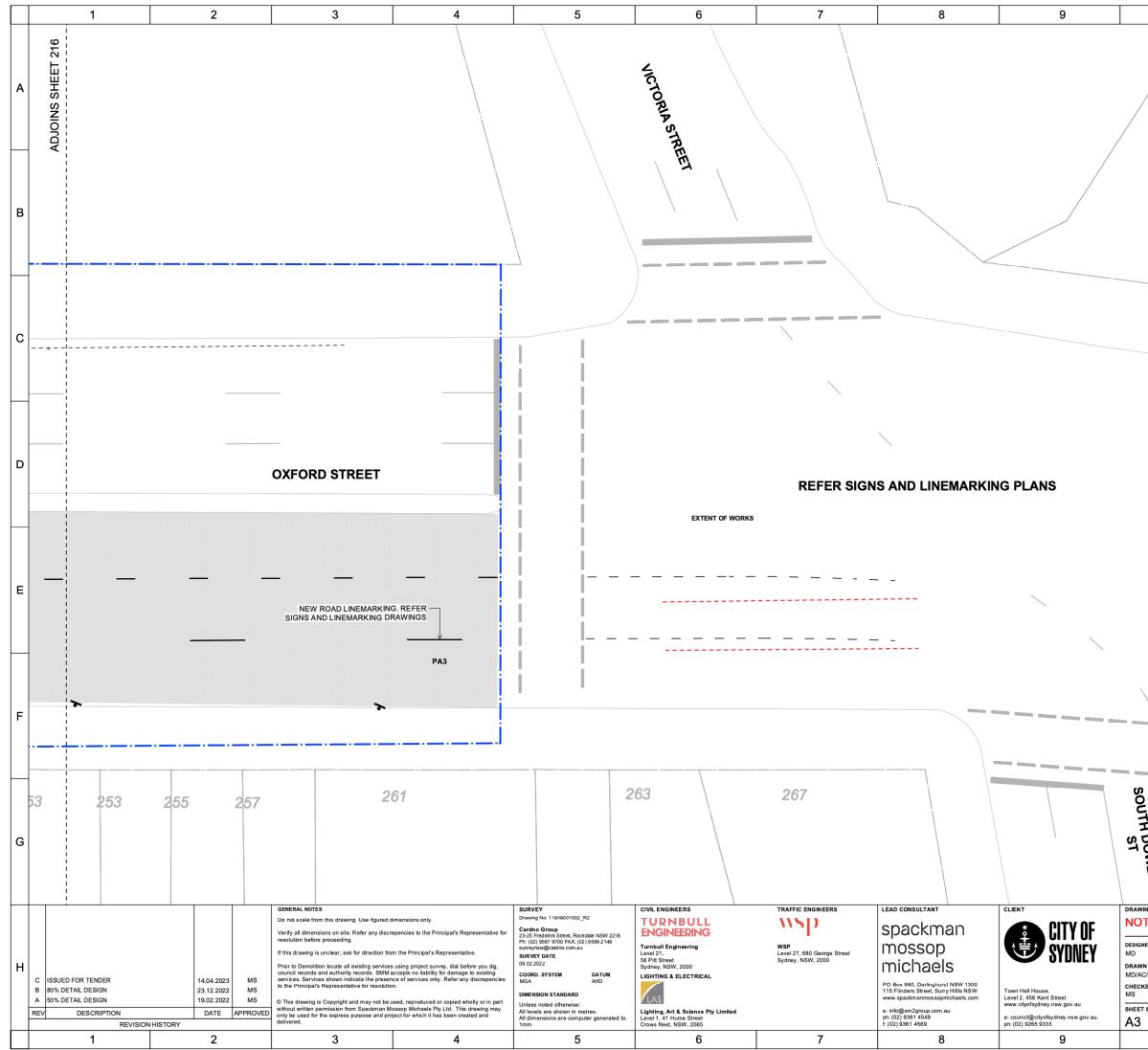




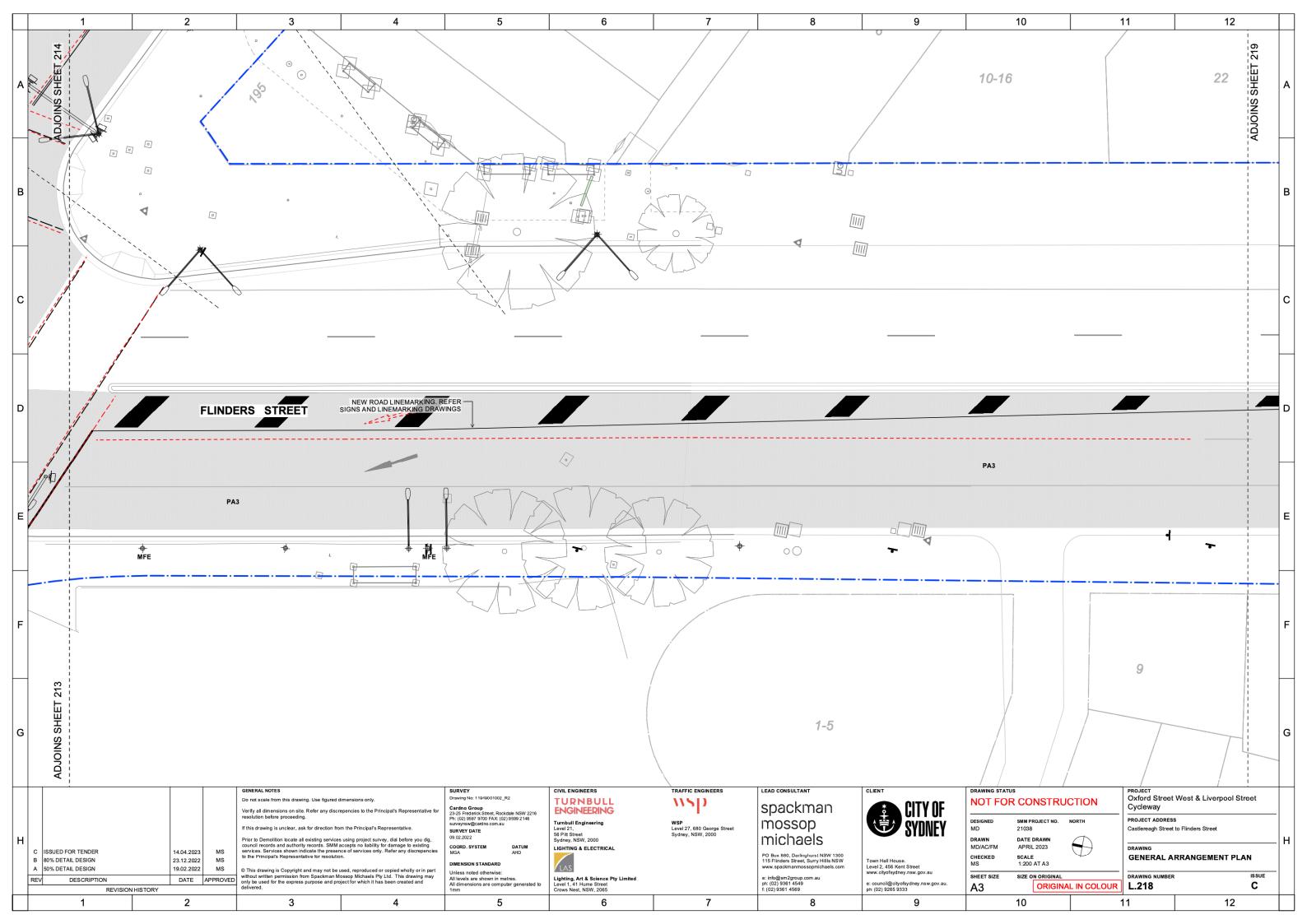


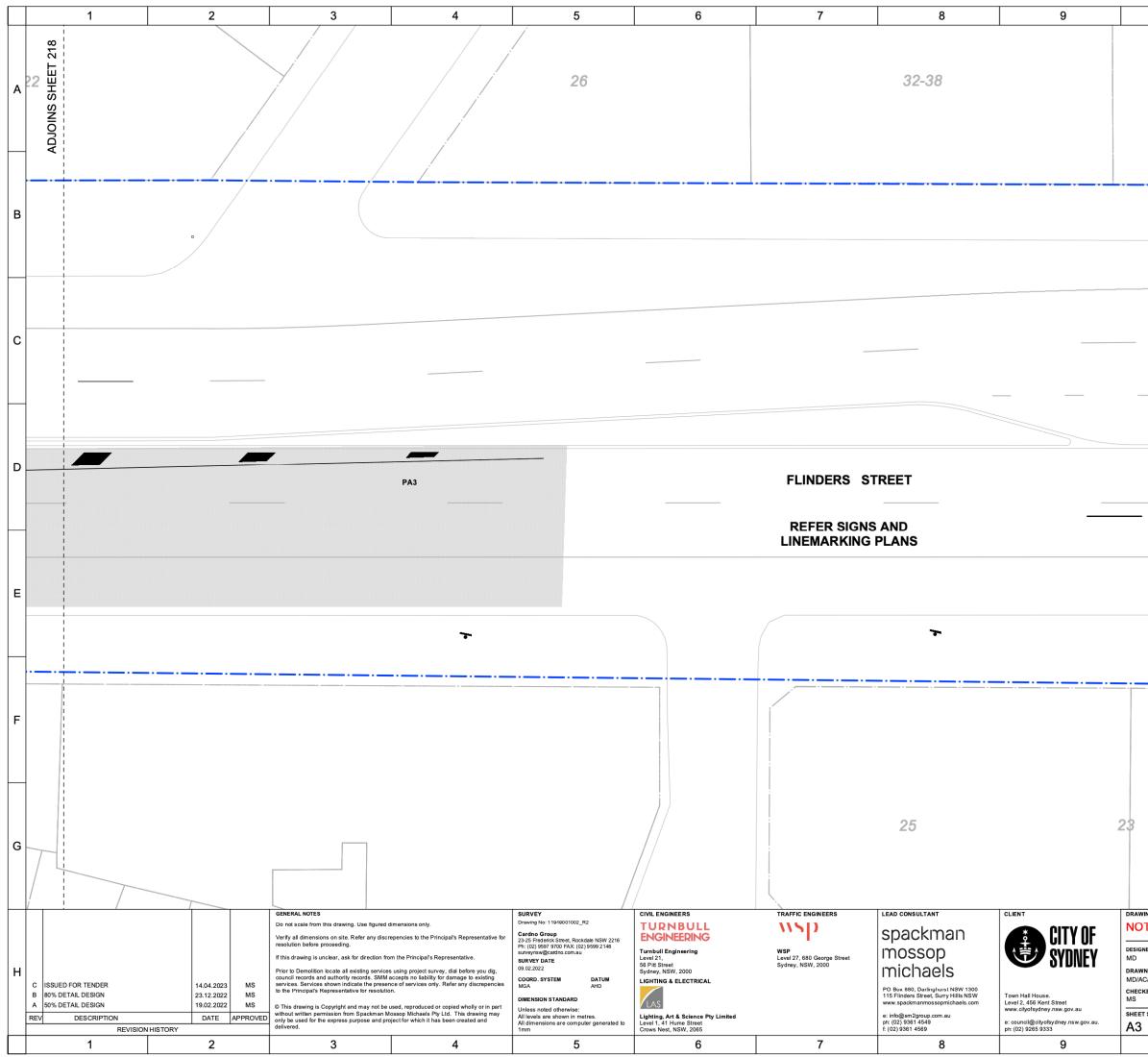




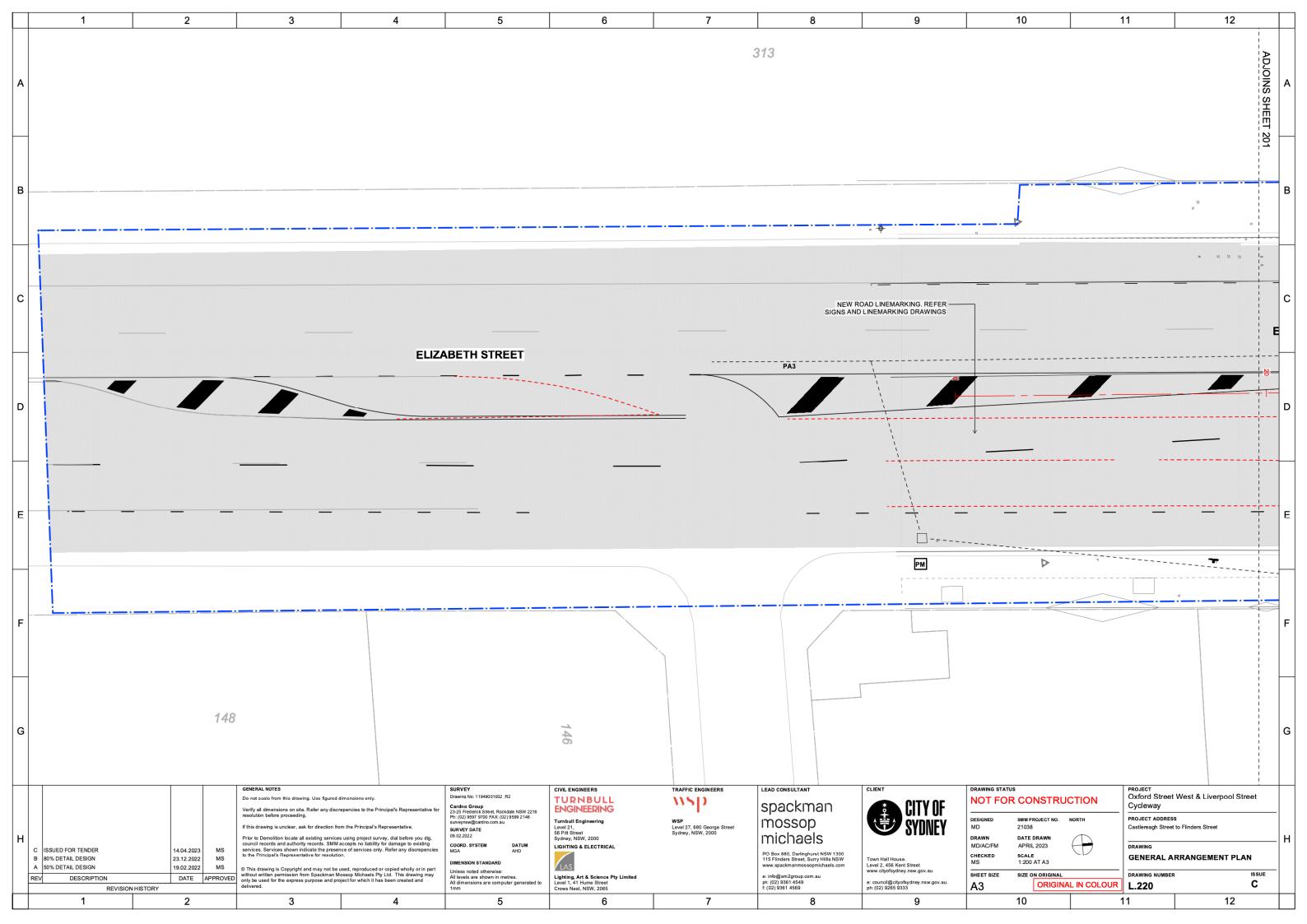


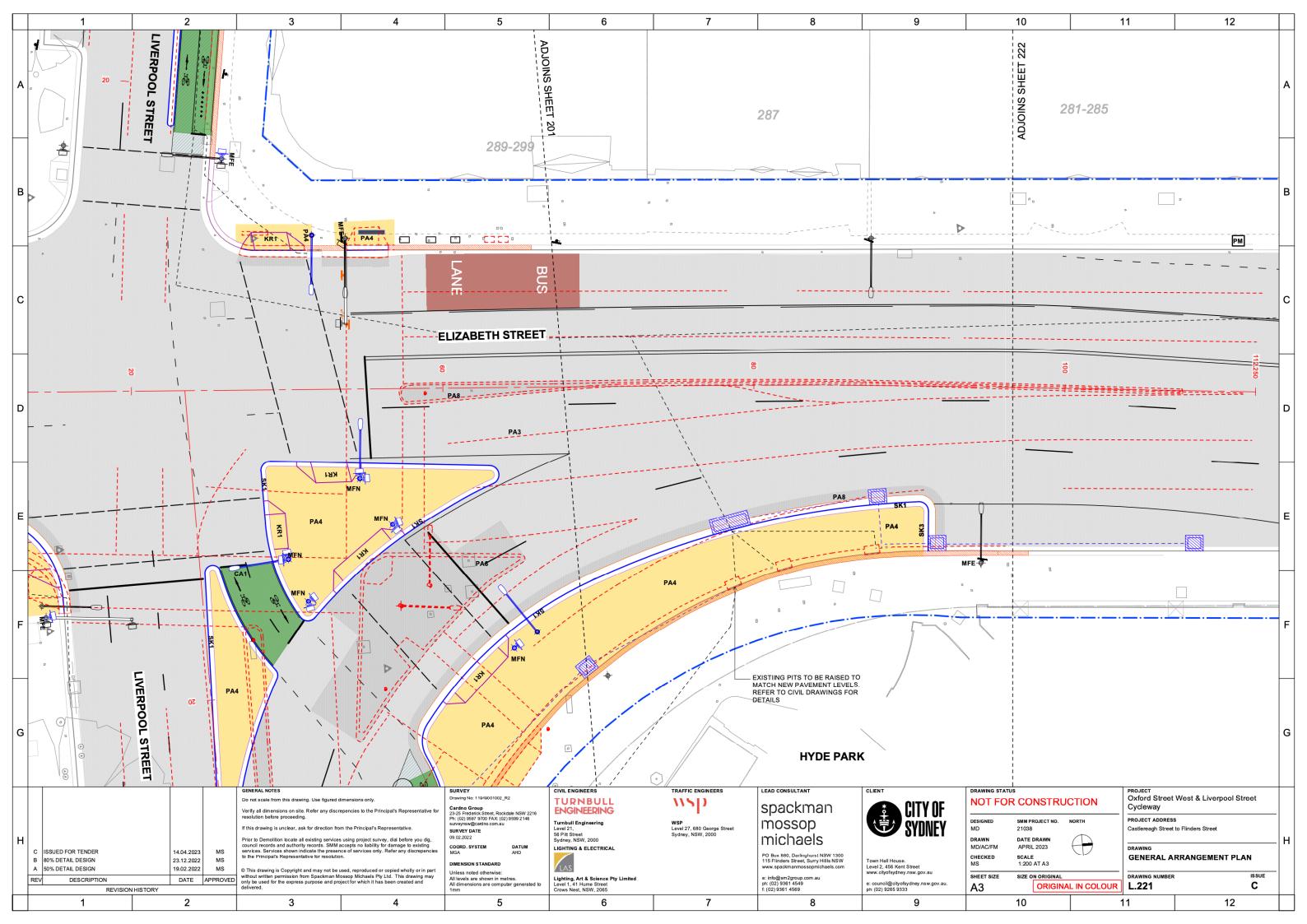
10		1	1	12	
		/			A
					В
					с
					D
					E
					F
DOUTH DOWLING					G
ING STATUS T FOR CONS NED SMM PROJE 21038 IN DATE DRAI C/FM APRIL 202 KED SCALE 1:200 AT / T SIZE SIZE ON OF	аст но. но wn 23 ( А3	TION IRTH	Cycleway PROJECT ADDRESS Castlereagh Street DRAWING	to Flinders Street RRANGEMENT PLAN	н
0		IN COLOUR	L.217	С	
10		1	1	12	

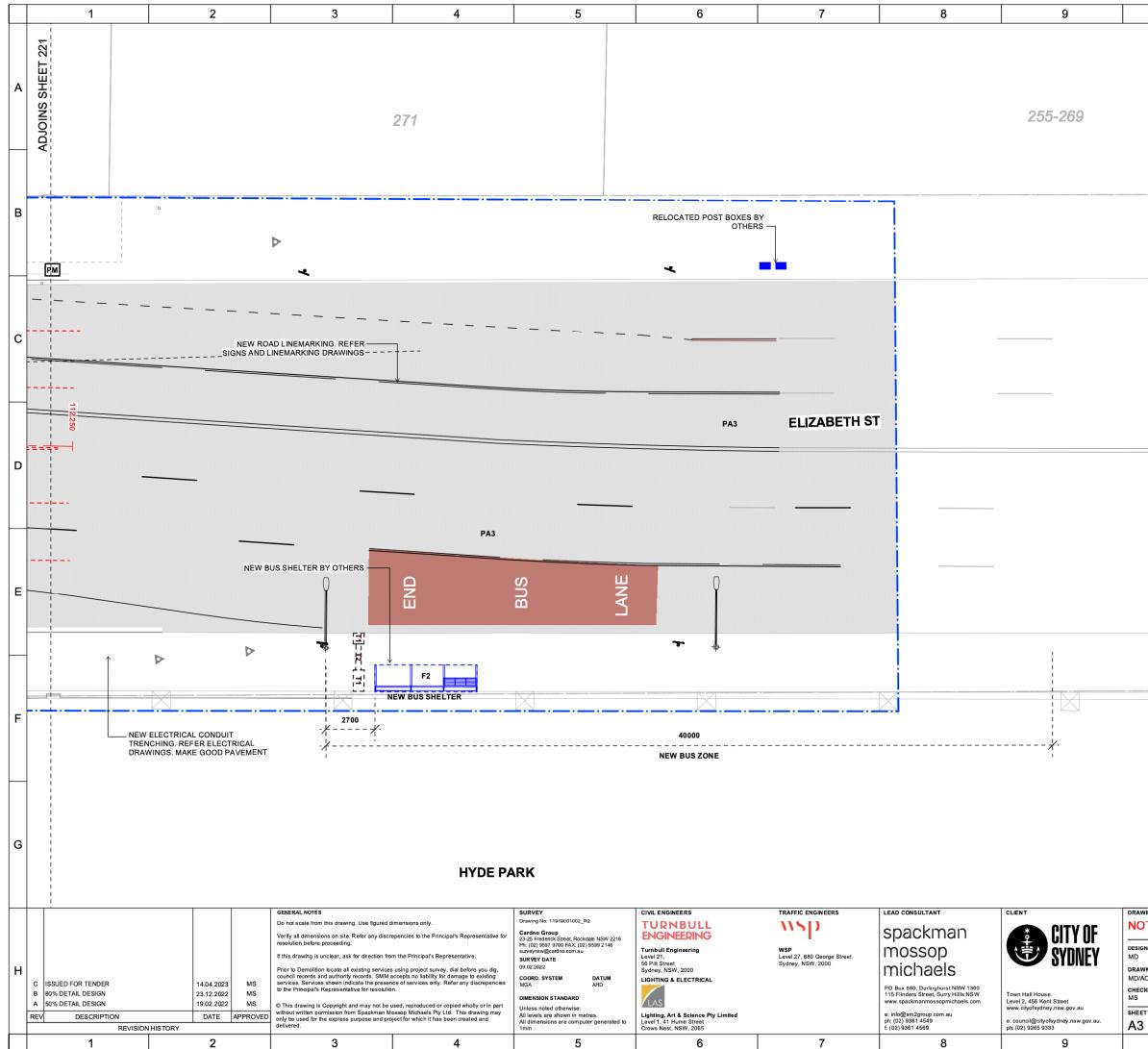




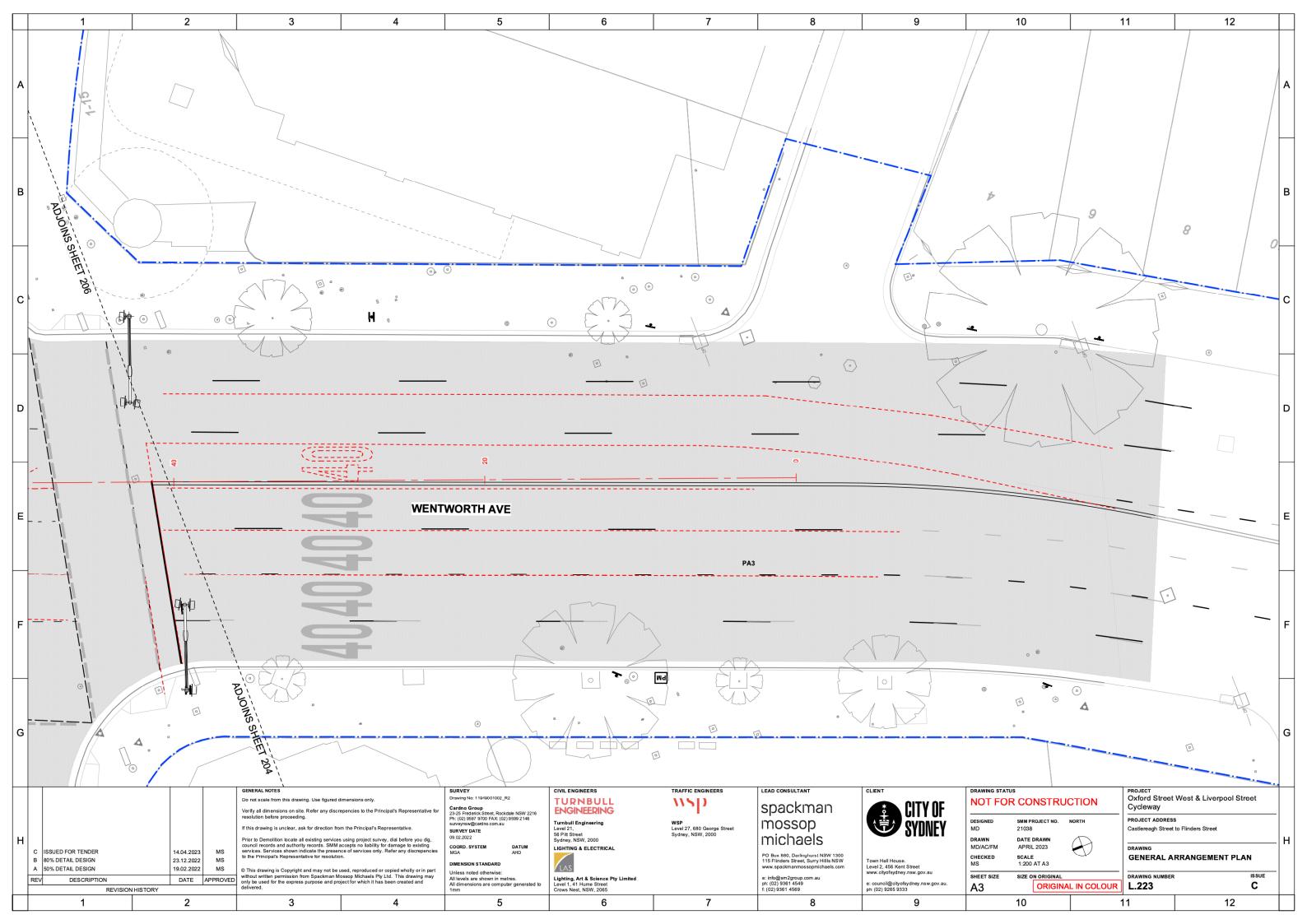
10		1	1	12		
	0-42		4	4	46	А
						В
						с
						D
						E
						F
						G
ED SMM 210 N DAT C/FM API ED SCA 1:21	38 E DRAWN RIL 2023 LLE DO AT A3 E ON ORIGINAL		Cycleway PROJECT ADDRESS Castlereagh Street DRAWING GENERAL A DRAWING NUMBER	to Flinders Street	AN ISSUE	н
10		L IN COLOUR	<b>L.219</b>	12	С	







					-	
	10	1	1	1	2	
						А
						В
						с
						D
		7				E
						F
						G
ied N C/FM Ked	CONSTRUC SMM PROJECT NO. 21038 DATE DRAWN APRIL 2023 SCALE 1:200 AT A3 SIZE ON ORIGINAL		Cycleway PROJECT ADDRESS Castlereagh Street DRAWING GENERAL A DRAWING NUMBER	to Flinders Street		н
	ORIGINA 10		<b>L.222</b>	1	2	
			••	, I	-	. !



## **APPENDIX C** CONSIDERATION OF SECTION 171 FACTORS



#### Consideration of section 171 factors

In addition to the requirements of the Guideline for Division 5.1 assessments (DPE 2022) and the Roads and Related Facilities EIS Guideline (DUAP 1996) as detailed in the REF, the following factors, listed in section 171 of the Environmental Planning and Assessment Regulation 2021, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

FACTOR		IMPA	СТ	
	N/A	Negative	Nil	Positive
a. Any environmental impact on a community?				
The proposal would result in some temporary construction impacts to the local community, particularly in relation to construction noise and impacts and the movement of traffic and pedestrian access. These impacts would mainly affect nearby residents and road users.				
The impacts would be managed through the implementation of mitigation measures outlined in Chapter 7 of the REF.				$\checkmark$
Once complete the use of the cycleway would continue to operate as a road infrastructure. There were no identified significant negative environmental impacts on the community. The bi-directional cycleway would cater to increased riding demand for cycling and helps reduce environmental impacts from vehicular modes as more people utilise cycling as a method of travel.				
b. Any transformation of a locality?				
The proposal would result in modifications to the existing road infrastructure in a road corridor and a public space. During construction activities there would a minor, temporary and short-term change to the existing locality through the changes in traffic routes and pedestrian access. The permanent modifications in the locality from the proposal would be the improvement in accessibility, enhancing the safety of road crossings, more space for pedestrians and cyclists, and linking to Sydney's <i>Inner City Regional Bicycle Network</i> .				√
c. Any environmental impact on the ecosystems of the locality?				
There are no negative environmental impacts on the ecosystems of the locality as the proposal is an urban CBD environment with no noted vegetation and the scope of construction wok is low and a minor impact.			$\checkmark$	
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?				
There are no negative impacts on the quality of the aesthetic, recreational, scientific, or other environmental quality or value of the locality. The project's permanent elements improve the urban qualities and streetscape value along Oxford Street.				$\checkmark$

 Table C.1
 Environmental planning and assessment regulation 2000 checklist

FACTOR		IMP/	АСТ	
	N/A	Negative	Nil	Positive
e. Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?				
The proposal is not anticipated to have an effect on the aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance of the locality. There are no Aboriginal heritage sites in or immediate adjacent to the proposal site. A substantial portion of the proposal is located within the curtilage of the Sydney Mardi Gras Parade Route, which is listed on the State Heritage Register (no 02068). A heritage impact assessment (refer to section 6.4) has confirmed that the works for the proposal fall under the site specific exemptions issued under Section 57(2) of the Heritage Act. The proposal would be undertaken in accordance with the requirements of the exemptions.			✓	
f. Any impact on the habitat of protected fauna (within the meaning of the <i>National Parks and Wildlife Act</i> 1974)?			$\checkmark$	
There are no impacts on this environmental factor as the proposal is located within an urban centre of Sydney			·	
g. Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?			$\checkmark$	
There are no impacts on this environmental factor as the proposal is located within an urban centre of Sydney				
h. Any long-term effects on the environment?				
The proposal provides positive long-term effects on the environment by promoting alternative transport for users including bike and bus and reducing potential emissions from vehicular transport.				<b>√</b>
i. Any degradation of the quality of the environment?				
The proposal would have no degradation of the quality of the environment. There would be positive quality of the environment as it improves safety and cycling for users as well as promotes alternative transport improving the quality of the environment.				~
j. Any risk to the safety of the environment?				
The proposal would improve safety of the environment as the cycleway includes a bi-directional and protected cycleway as well as improved pedestrian access.				$\checkmark$
k. Any reduction in the range of beneficial uses of the environment?			/	
There has been no reduction in the range of beneficial uses of the environment			v	
l. Any pollution of the environment?				
No additional pollution is expected during the construction of the proposal. Any pollution created during construction would follow the requirements under the specified Waste Management Plan and City of Sydney waste management policies.			$\checkmark$	

FACTOR	IMPACT				
	N/A	Negative	Nil	Positive	
m. Any environmental problems associated with the disposal of waste?					
The proposal is not expected to have environmental problems associated with the disposal of waste. Any waste identified during construction would follow the requirements under the specified Waste Management Plan and City of Sydney waste management policies.			$\checkmark$		
n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?					
Materials required for the construction of the proposal are readily available and would volumes and amounts required would not increase demand on natural resources that are in short supply.			$\checkmark$		
o. Any cumulative environmental effect with other existing or likely future activities?			$\checkmark$		
There are no expected cumulative impacts related to the Proposal.					
<ul> <li>p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?</li> <li>Not applicable</li> </ul>	$\checkmark$				
<ul> <li>q. Applicable local strategic planning statements, regional strategic plans made under the Act, Division 3.1</li> </ul>					
The proposal is consistent with the <i>Future Transport Strategy</i> , <i>NSW State</i> <i>Infrastructure Strategy 2022-2042</i> , <i>Sydney's Cycling Future: Cycling for</i> <i>Everyday Transport, Active Transport Strategy</i> and the NSW strategies and policies discussed in section 2.1.5. The proposal would contribute to ongoing improvements and demands for safe road infrastructure and transport links within the CBD for riders.				~	
r. Other relevant environmental factors.					
In considering the potential impacts of this proposal all relevant environmental factors have been considered, refer to Chapter 6 of this REF.				$\checkmark$	

## **APPENDIX D** MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE CHECKLIST



Under the environmental assessment provisions of the *Environment Protection and Biodiversity Conservation Act 1999*, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the Proposal should be referred to the Australian Government Department of the Environment.

A referral is not required for proposed actions that may affect nationally listed threatened species, populations, endangered ecological communities and migratory species. Impacts on these matters are still assessed as part of the REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Table D.1	Matters of National Environmental Significance checklist
-----------	--

FACTOR	IMPACT
a Any impact on a World Heritage property?	Nil
No. The Proposal would not impact any World Heritage listed properties.	
b Any impact on a National Heritage place?	Nil
No. The Proposal would not impact any National Heritage places.	
c Any impact on a wetland of international importance?	Nil
The Proposal would not have any impact on a wetland of international importance.	
d Any impact on a listed threatened species or communities?	Nil
The Proposal would not have any impact on a listed threatened species of community.	
e Any impacts on listed migratory species?	Nil
The Proposal is considered unlikely to impact upon migratory species due to the lack of suitable habitat in the vicinity of the Proposal.	
f Any impact on a Commonwealth marine area?	Nil
The Proposal would not have any impact on a Commonwealth marine area.	
g Does the proposal involve a nuclear action (including uranium mining)?	Nil
The Proposal does not involve a nuclear action.	
Additionally, any impact (direct or indirect) on Commonwealth land?	Nil
No. The Proposal would not impact Commonwealth land.	

# **APPENDIX E** T&I SEPP CONSULTATION CHECKLIST



#### Development within the Coastal Zone

DEVELOPMENT TYPE	DESCRIPTION		IF 'YES' CONSULT WITH	ISEPP CLAUSE
-	Is the proposal within a coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?	No	N/A	T&I SEPP cl. 2.14

#### Council related infrastructure or services

DEVELOPMENT TYPE	POTENTIAL IMPACT	YES / NO	IF 'YES' CONSULT WITH	ISEPP CLAUSE
Stormwater	Are the works likely to have a <i>substantial</i> impact on the stormwater management services which are provided by council?	No	N/A	T&I SEPP cl.2.10(1)(a)
Traffic	Are the works likely to generate traffic to an extent that will <i>strain</i> the capacity of the existing road system in a local government area?	Yes	City of Sydney (the proponent)	T&I SEPP cl.2.10(1)(b)
Sewerage system	Will the works involve connection to a council owned sewerage system? If so, will this connection have a <i>substantial</i> impact on the capacity of any part of the system?	No	N/A	T&I SEPP cl.2.10(1)(c)
Water usage	Will the works involve connection to a council owned water supply system? If so, will this require the use of a <i>substantial</i> volume of water?	No	N/A	T&I SEPP cl.2.10(1)(d)
Temporary structures	Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a <i>minor</i> or <i>inconsequential</i> disruption to pedestrian or vehicular flow?	No	N/A	T&I SEPP cl.2.10(1)(e)
Road & footpath excavation	Will the works involve more than <i>minor</i> or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?	No	N/A	T&I SEPP cl.2.10(1)(f)

#### Local heritage items

DEVELOPMENT	POTENTIAL IMPACT	YES /	IF 'YES' CONSULT	ISEPP
TYPE		NO	WITH	CLAUSE
Local heritage	Is there is a local heritage item (that is not also a State heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than minor or inconsequential?	Yes	N/A	T&I SEPP cl.2.11

#### Flood liable land

DEVELOPMENT TYPE	POTENTIAL IMPACT	YES / NO	IF 'YES' CONSULT WITH	ISEPP CLAUSE
Flood liable land	Are the works located on flood liable land? If so, will the works change flood patterns to more than a <i>minor</i> extent?	No	N/A	T&I SEPP cl.2.12
Flood liable land	Are the works located on flood liable land? (to any extent). If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance?	No	N/A	T&I SEPP cl.2.12

Note: Flood liable land means land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled Floodplain Development Manual: the management of flood liable land published by the New South Wales Government.

#### Public authorities other than councils

DEVELOPMENT TYPE	POTENTIAL IMPACT	YES / NO	IF 'YES' CONSULT WITH	ISEPP CLAUSE			
National parks and reserves	Are the works adjacent to a national park or nature reserve, or other area reserved under the <u>National</u> <u>Parks and</u> <u>Wildlife Act</u> <u>1974</u> , or on land acquired under that Act?	No	N/A	T&I SEPP cl.2.15(2)(a)			
National parks and reserves	Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	No	N/A	T&I SEPP cl. 2.15(2)(b)			
Navigable waters	Would the works or over navigable			ed or floating structure in	No	N/A	T&I SEPP cl.2.15(2)(c)
Artificial light	Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on	No	N/A	T&I SEPP cl.2.15(2)(d)			

	the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)			
Defence communications buffer land	Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhardt LEP 2012, Narrandera LEP 2013 and Urana LEP 2011.	No	N/A	T&I SEPP cl. 2.15(2)(e)
Mine subsidence land	Are the works on land in a mine subsidence district within the meaning of the <u>Mine</u> <u>Subsidence</u> <u>Compensation</u> <u>Act 1961</u> ?	No	N/A	T&I SEPP cl. 2.15(2)(f)

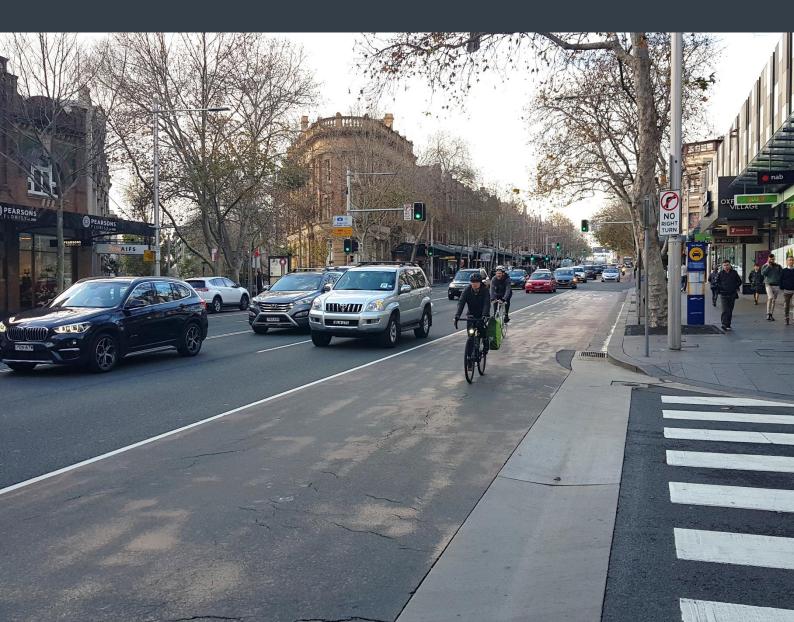
# APPENDIX F TRAFFIC AND TRANSPORT ASSESSMENT



City of Sydney

Oxford Street and Liverpool Street Cycleways Transport Impact Assessment AUGUST 2023

# **\\**\$|)



## Question today Imagine tomorrow Create for the future

#### Oxford Street and Liverpool Street Cycleways Transport Impact Assessment

City of Sydney

WSP Level 27, 680 George Street Sydney NSW 2000 GPO Box 5394 Sydney NSW 2001

Tel: +61 2 9272 5100 Fax: +61 2 9272 5101 wsp.com

REV	DATE	DETAILS
Draft	02/05/2022	Draft
A	16/06/2023	Final draft
В	04/08/2023	Final – include TfNSW findings

	NAME	DATE	SIGNATURE
Prepared by:	Nathan Wong	04/08/2023	4
Reviewed by:	Ody Murlianto	04/08/2023	mostanto
Approved by:	Richard West	04/08/2023	Aut:

WSP acknowledges that every project we work on takes place on First Peoples lands.

We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

This document may contain confidential and legally privileged information, neither of which are intended to be waived, and must be used only for its intended purpose. Any unauthorised copying, dissemination or use in any form or by any means other than by the addressee, is strictly prohibited. If you have received this document in error or by any means other than as authorised addressee, please notify us immediately and we will arrange for its return to us.

PS126995-WSP-P&M-REP-002 RevB

August 2023

# Table of contents

wsp

1	Introduction1
1.1	Site location and context 1
1.2	Project objectives 1
1.3	Report objectives 2
1.4	Structure of this report 2
1.5	Strategic context
1.5.1 1.5.2	State-level policies
1.6	Referenced documents5
2	Proposal description7
2.1	Oxford Street Cycleway7
2.1.1	Overview of proposed design 7
2.1.2	Details of proposed design
2.1.3	Access changes
2.1.4	Affected local accesses12
2.2	Construction activities 13
2.2.1	Work methodology13
2.2.2	Construction workforce
2.2.3	Construction hours and Duration
2.2.4	Ancillary facilities14
005	Diant and a submant 14
2.2.5	Plant and equipment
2.2.6	Earthworks14
2.2.6 2.2.7	Earthworks
2.2.6 2.2.7 2.2.8	Earthworks
2.2.6 2.2.7 2.2.8 <b>3</b>	Earthworks
2.2.6 2.2.7 2.2.8 3 3.1	Earthworks       14         Source and quantity of materials       14         Public utility adjustment       14         Existing conditions       15         Existing Facilities       15
2.2.6 2.2.7 2.2.8 <b>3</b> <b>3.1</b> 3.1.1 3.1.2 3.1.3	Earthworks    14      Source and quantity of materials    14      Public utility adjustment    14      Existing conditions    15      Existing Facilities    15      Road Classification    15      Oxford Street    16      Active transport    17
2.2.6 2.2.7 2.2.8 <b>3</b> <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4	Earthworks.       14         Source and quantity of materials       14         Public utility adjustment       14         Existing conditions       15         Existing Facilities       15         Road Classification       15         Oxford Street       16         Active transport       17         Bus operations       18
2.2.6 2.2.7 2.2.8 <b>3</b> <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5	Earthworks.       14         Source and quantity of materials       14         Public utility adjustment       14         Existing conditions       15         Existing Facilities       15         Road Classification       15         Oxford Street       16         Active transport       17         Bus operations       18         Kerbside uses       19
2.2.6 2.2.7 2.2.8 <b>3</b> <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 <b>3.1</b>	Earthworks.       14         Source and quantity of materials       14         Public utility adjustment       14         Existing conditions       15         Existing Facilities       15         Road Classification       15         Oxford Street       16         Active transport.       17         Bus operations       18         Kerbside uses       19         Oxford Street travel demand       21
2.2.6 2.2.7 2.2.8 <b>3</b> <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 <b>3.1</b> 3.1.4 3.1.5 <b>3.1</b>	Earthworks.14Source and quantity of materials14Public utility adjustment14Existing conditions15Existing Facilities15Road Classification15Oxford Street16Active transport17Bus operations18Kerbside uses19Oxford Street travel demand21Methodology overview21
2.2.6 2.2.7 2.2.8 <b>3</b> <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 <b>3.1</b> 3.1.4 3.1.5 <b>3.1</b> 3.1.1 3.1.2	Earthworks.       14         Source and quantity of materials       14         Public utility adjustment       14         Existing conditions       15         Existing Facilities       15         Road Classification       15         Oxford Street       16         Active transport       17         Bus operations       18         Kerbside uses       19         Oxford Street travel demand       21         Methodology overview       21         Existing travel demand       23
2.2.6 2.2.7 2.2.8 <b>3</b> <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 <b>3.1</b> 3.1.4 3.1.5 <b>3.1</b> 3.1.1 3.1.2 3.1.3	Earthworks.14Source and quantity of materials14Public utility adjustment14Existing conditions15Existing Facilities15Road Classification15Oxford Street16Active transport.17Bus operations18Kerbside uses19Oxford Street travel demand21Methodology overview21Existing travel demand23Cyclist demand25
2.2.6 2.2.7 2.2.8 <b>3</b> <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.1 3.1.2 3.1.3 3.1.4	Earthworks.14Source and quantity of materials14Public utility adjustment14Existing conditions15Existing Facilities15Road Classification15Oxford Street16Active transport.17Bus operations18Kerbside uses19Oxford Street travel demand21Methodology overview21Existing travel demand25Pedestrian demand26
2.2.6 2.2.7 2.2.8 <b>3</b> <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 <b>3.1</b> 3.1.4 3.1.5 <b>3.1</b> 3.1.1 3.1.2 3.1.3	Earthworks.14Source and quantity of materials14Public utility adjustment14Existing conditions15Existing Facilities15Road Classification15Oxford Street16Active transport.17Bus operations18Kerbside uses19Oxford Street travel demand21Methodology overview21Existing travel demand23Cyclist demand25
2.2.6 2.2.7 2.2.8 <b>3</b> <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.2 3.1.3 3.1.4 3.1.2	Earthworks.14Source and quantity of materials14Public utility adjustment14Existing conditions15Existing Facilities15Road Classification15Oxford Street16Active transport.17Bus operations18Kerbside uses19Oxford Street travel demand21Methodology overview21Existing travel demand25Pedestrian demand26Buses28
2.2.6 2.2.7 2.2.8 <b>3</b> <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.2 3.1.3 3.1.4 3.1.5 <b>3.1</b>	Earthworks14Source and quantity of materials14Public utility adjustment14Existing conditions15Existing Facilities15Road Classification15Oxford Street16Active transport17Bus operations18Kerbside uses19Oxford Street travel demand21Methodology overview21Existing travel demand25Pedestrian demand26Buses28Road Safety Review32Construction impact.34
2.2.6 2.2.7 2.2.8 <b>3</b> <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 <b>3.1</b> 3.1.1 3.1.2 3.1.3 3.1.4 3.1.2 3.1.3 3.1.4 3.1.5 <b>3.1</b> <b>3.1</b> .1 <b>3.1</b> .2 <b>3.1</b> .1 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .5 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .5 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .5 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .5 <b>3.1</b> .2 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .5 <b>3.1</b> .4 <b>3.1</b> .5 <b>3.1</b> .4 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .2 <b>3.1</b> .3 <b>3.1</b> .4 <b>3.1</b> .5 <b>3.1</b> .4 <b>3.1</b> .5	Earthworks14Source and quantity of materials14Public utility adjustment14Existing conditions15Existing Facilities15Road Classification15Oxford Street16Active transport17Bus operations18Kerbside uses19Oxford Street travel demand21Methodology overview21Existing travel demand25Pedestrian demand26Buses28Road Safety Review32

# wsp

4.3	Road network impact36
4.3.1 4.3.2 4.3.3 4.3.4 4.3.5 4.3.6	Vehicle Movements36Haulage Routes36Road and Lane access/closures36Traffic Management, control, and signage36Capacity38Road condition38
4.4	Property accesses/access to loading and servicing
4.5	Kerbside uses
5	Proposed operational impact
5.1	Active transport
5.1.1 5.1.2	Cyclists
5.2	Public transport42
5.2.1 5.2.2 5.2.3 5.2.4	Bus routes
5.3	Traffic network impact45
5.3.1 5.3.2 5.3.3 5.3.4	Assessment Criteria46Intersection performance46General Travel Time Comparison48Bus Travel Time Summary51
5.4	Property accesses53
5.4.1 5.4.2 5.4.3	Turn bans
5.5	Kerbside uses55
5.5.1 5.5.2	Loading zones
6	Mitigation measures57
6.1	Construction57
6.2	Operational58
7	Conclusion

#### List of tables

Table 1.1	Referenced documents	5
Table 3.1	Bus services within study area	19
Table 3.2	Date of data collected	22
Table 3.3	Crash severity and type	32

#### 

#### List of figures

Figure 1.1	Location map	1
Figure 3.1	Road Network Classifications in study area	15
Figure 3.2	Oxford Street typical existing road width and features	16
Figure 3.3	Movement and place function	17
Figure 3.4	Existing cycling infrastructure on Oxford Street and surrounds	18
Figure 3.5	Existing parking restrictions on Oxford Street	20
Figure 3.6	Map of approximate extent of works and intersections where data was collected.	21
Figure 3.7	Traffic volumes at TfNSW traffic counters between the eastern suburbs and CBD	22
Figure 3.8	Mode share by intersection during the AM peak (8:00 – 9:00 AM)	23
Figure 3.9	Mode share by intersection during the PM peak (5:30 – 6:30 PM)	24
Figure 3.10	Mode share by intersection during the Saturday peak (1:15–2:15 PM)	24
Figure 3.11	Weekday cyclist activities along Liverpool Street and Oxford Street	25
Figure 3.12	Saturday cyclist activities along Liverpool Street and Oxford Street	25
Figure 3.13	College Street–Oxford Street–Wentworth Avenue– Liverpool Street intersection	26
Figure 3.14	Oxford Street–Flinders Street intersection	26
Figure 3.15	Weekday pedestrian activities along Liverpool Street and Oxford Street	27
Figure 3.16	Saturday pedestrian activities along Liverpool Street and Oxford Street	27
Figure 3.17	Weekday pedestrian activities across the Liverpool Street and Oxford Street corridor	28
Figure 3.18	Saturday pedestrian activities across the Liverpool Street and Oxford Street corridor	28
Figure 3.19	Location of bus stops along Oxford Street	29
Figure 3.20	Weekday bus boarding captured by the Opal ticketing system at specific bus stops	29

# wsp

Figure 3.21	Weekday bus alighting captured by the Opal ticketing system at specific bus stops
Figure 3.22	Weekend bus boarding captured by the Opal ticketing system at specific bus stops
Figure 3.23	Weekend bus alighting captured by the Opal ticketing system at specific bus stops
Figure 3.24	Weekday bus passengers onboard at arrival at specific bus stops
Figure 3.25	Weekend bus passengers onboard at arrival at specific bus stops
Figure 3.26	Crash type and degree of severity by location
Figure 4.1	Temporary bus stop locations during construction
Figure 4.2	Example of traffic management during construction of cycleway
Figure 5.1	Overview of major changes to operation of Oxford Street and Liverpool Street
Figure 5.2	Path widths for 50/50 directional split of pedestrians and cyclists
Figure 5.3	Cyclist demand assuming six per cent bicycle mode share
Figure 5.4	Cyclist demand assuming 10 per cent bicycle mode share
Figure 5.5	Proposed changes to bus routes and bus stops
Figure 5.6	Fruin level of service for queueing 44
Figure 5.7	Eastbound travel time comparison – AM Peak
Figure 5.8	Westbound travel time comparison – AM Peak
Figure 5.9	Eastbound travel time comparison – PM Peak
Figure 5.10	Westbound travel time comparison – PM Peak
Figure 5.11	Eastbound travel time comparison – Saturday Peak
Figure 5.12	Westbound travel time comparison – Saturday Peak 50
Figure 5.13	Summary of banned movements resulting from required operational changes
Figure 5.14	Possible alternative routes for Liverpool Street–Elizabeth Street, Liverpool Street–Oxford Street–College Street– Wentworth Avenue intersection turn bans
Figure 5.15	Possible alternative routes for Oxford Street–Little Liverpool Street and Liverpool Street–Elizabeth Street intersection turn/access turn bans
Figure 5.16	Possible alternative routes for Oxford Street–Palmer Street intersection turn ban

### List of appendices

Appendix A Concept Design

Appendix B Oxford Street West and Liverpool Street Cycleway – Traffic and Transport Impact Assessment by Transport for NSW

## 1 Introduction

## 1.1 Site location and context

The purpose of the Oxford Street West cycleway is to provide a bidirectional cycleway along the northern kerbside of Oxford Street and Liverpool Street between Flinders Street and Castlereagh Street.

The design corridor is defined as follows and shown in Figure 1.1:

- Oxford Street between Flinders Street and College Street
- Liverpool Street between College Street and Castlereagh Street.

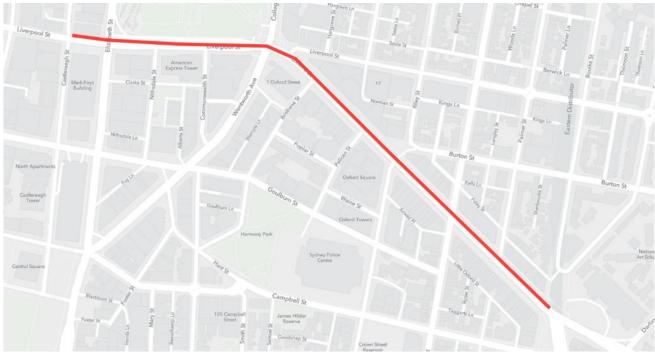


Figure 1.1

Location map

## 1.2 Project objectives

The objectives which informed the development of the cycleway design are:

- Create safe bike network connections that could be comfortably used by a 12-year-old riding independently.
- Design for a 'light construction' cycleway, fitting the works within existing kerbs to the extent possible and minimising the need for major civil works such as kerb realignment or impacts on underground utilities.
- Prioritise footpath width for pedestrians.
- Address stakeholder issues raised by Transport for NSW (TfNSW) and from past community consultation.
- Consider all road users and uses, including people walking and cycling, place, parking, bus customers, services and deliveries, people driving to destinations on the street, and through traffic.

## 1.3 Report objectives

The purpose of this report is to assess the potential traffic and transport impacts from the construction and operation of the Project to support the REF submission. Specifically, this report has the following objectives:

- Describes the existing conditions for all modes of transport in the study area including general access vehicles, freight (including restricted access vehicles), public transport (rail services, bus services and point-to-point transport) and active transport (bicycles and pedestrians).
- Describes the existing environment (road function, classification, and operation) in the study area that are likely to be affected by the construction and operation of the project.
- Assesses the impacts of the project to the surrounding road network, including the potential impacts of construction activities and associated vehicle movements.
- Recommend mitigation measures to manage identified traffic and transport construction impacts of the project.

### 1.4 Structure of this report

Section 1 Introduction: Describes the context of the Project in terms of location and its role in the regional road network. This section also describes the purpose of this report in the REF submission.

Section 2 Proposal description: Describes the proposal including its design, proposed access changes and construction activities.

Section 3 Existing conditions: Describes the existing condition of the road network, transport services and abutting developments.

Section 4 Construction impact: Provides an analysis of the Project's impacts during construction.

Section 5 Proposed operational impact: Provides an analysis of the Project's operational impacts.

Section 6 Mitigation measures: Discusses and recommends the available mitigation measures to address any significant impacts identified in Sections 4 and 5.

Section 7 Conclusion: Provides concluding remarks on the assessment and recommended mitigation measures.

### 1.5 Strategic context

1.5.1 State-level policies

#### 1.5.1.1 Future Transport Strategy 2056

Future Transport 2056 is a 40-year vision for the State's transport system, supported by a suite of plans. The Strategy aims to deliver six state-wide customer outcomes including Successful Places. The Successful Places outcome notes that 'walking or cycling is the most convenient option for short trips around centres and local areas, supported by a safe road environment and suitable pathways.

Future Transport 2056 builds on principles and objectives for walking and cycling set out in the State Infrastructure Strategy, to encourage active transport for short trips.

It prioritises the delivery of connected cycling networks within 10 kilometres of metropolitan city centres, and within five kilometres of strategic centres. It also prioritises walking access to public transport and key destinations.

Future Transport 2056 also embeds a Movement and Place Framework into transport planning decisions. The Framework aims to integrate efficient movement of people and goods with the amenity and quality of places, to contribute to the attraction, success and sustainability of our cities and towns.

Under the Framework, streets that prioritise 'place' can be designed in a way that prioritise spaces for people and for walking and cycling. The Movement and Place principles work to support street environments that deliver place outcomes such as health and well-being benefits and movement outcomes such as moving people and goods safely, reliably and efficiently and encouraging sustainable transport modes. The Framework identifies different street environments and the necessary considerations to support those environments. Pedestrian and bicycle treatments should be considered to improve place qualities as well as access to and within places.

#### 1.5.1.2 Greater Sydney Region Plan–A Metropolis of Three Cities

The Greater Sydney Region Plan (GSRP) is the NSW Government's metropolitan strategy for the Greater Sydney region. Over the next 40 years, the GSRP aims to transform Greater Sydney into a metropolis of three cities: The Western Parkland City, Central River City and the Eastern Harbour City. The 'Harbour CBD' is the metropolitan centre at the heart of the Eastern Harbour City and is the largest economic centre in Australia. The GSRP aims to make the Harbour CBD stronger and more competitive and acknowledges the importance of innovation and diverse activities in and near the Harbour CBD. A summary of key transport related actions included in the plan are:

- Headline indicator: 'Walkable Places'.
- 30-minute cities where people live within 30 minutes by public transport to jobs, education, and health services in their nearest strategic or metropolitan centre.
- Directions and indicators include designing places for people; a well-connected city that is more accessible and walkable; and an efficient city with reduced transport-related greenhouse gas emissions.
- Walking and cycling support place outcomes and planning priorities (infrastructure and collaboration, liveability, productivity, and sustainability).
- Connected to the Green Grid and open spaces.

#### 1.5.1.3 Eastern City District Plan

The Eastern City District Plan (ECDP) is a 20-year strategy which gives effect to the GSRP in the City of Sydney and the remainder of the Eastern City District. It is intended to inform local level strategic planning and the assessment of planning proposals.

It recognises the Harbour CBD as having a strong cultural, arts and education focus. One of the ECDP's objectives is to sustain communities through vibrant public places, walking and cycling and cultural, artistic and tourism assets.

#### 1.5.1.4 Building Momentum–State Infrastructure Strategy 2018-2038

The State Infrastructure Strategy (SIS) is a 20-year plan which sets out the investments in infrastructure that is integrated with land use planning. The SIS aims to prioritise achievable and affordable infrastructure investments which deliver the highest economic, employment and liveability benefits to the people of NSW. Key summaries of this plan relevant to transport are:

- Business cases for investment in a network of protected cycleways linking major strategic centres across the three cities; in partnership with local government and aligned with the Green Grid (Recommendation 50).
- 10-year rolling program that prioritises active transport at high volume and high-profile locations in partnership with local government (Recommendation 51).
- Investment in walking and cycling infrastructure and parks and open spaces as part of the ongoing integration of health into land use planning and transport strategies (Recommendation 99).

#### 1.5.2 Local-level policies

#### 1.5.2.1 Sustainable Sydney 2030

Sustainable Sydney 2030 is the City's overarching community strategic plan that sets a vision for a Green, Global and Connected city. It is the City's highest level strategic plan which provide strategic directions to guide the City's future commitments, projects and services.

The 10 strategic directions to guide the future of the city are:

- 1 a globally competitive and innovative city
- 2 a leading environmental performer
- 3 integrated transport for a connected city
- 4 a city for walking and cycling
- 5 a lively and engaging city centre
- 6 resilient and inclusive local communities
- 7 a cultural and creative city
- 8 housing for a diverse population
- 9 sustainable development, renewal and design
- 10 implementation through effective governance and partnerships.

#### 1.5.2.2 City Plan 2036

City Plan 2036 is the City's Local Strategic Planning Statement which reinforces the links between the NSW Government's strategic plans and the City's community strategic plan (Sustainable Sydney 2030) and the planning controls that guide development in the City. The planning statement sets out:

- the 20-year vision for land use planning in the city
- the basis or context for planning
- the planning priorities and actions needed to achieve the vision
- the governance and monitoring of the priorities and actions

The Planning Statement builds on the themes of Green, Global and Connected. The City's vision is for a connected city that is easy to get around with a local network for walking and cycling, and opportunities and activities are connected by transit routes between the villages, city centre and the rest of Sydney.

#### 1.5.2.3 Cycling Strategy and Action Plan 2018

This plan sets out the City's commitment to making bicycle transport easier and safer, to make it an attractive and feasible option for more people. This action plan's priorities are set out as follows:

- Connect the network-build a bike network to make it safer for people to ride in Sydney.
- Support people to ride–understand and address barriers and help people to start and continue riding.
- Support business-partner with employers to encourage staff to ride.
- Lead by example-share our expertise and be a positive influence for improvements for cycling within and beyond our boundaries.

As part of this action plan, the City made a commitment to complete the 11 regional bicycle routes and substantially complete the local bike route network. One of the main priorities is to complete the Oxford Street regional bike network between Taylor Square the existing Liverpool Street cycleway.

## 1.6 Referenced documents

Table 1.1 below lists and describe a number of documents which have been referenced as part of this study.

Document	Description and relevance
Oxford Street (Taylor Square to Castlereagh Street) Street Operation and Configuration (WSP, 2019)	This study provides an integrated transport planning approach to develop a concept design for the preferred option of a cycleway on Oxford Street (between Taylor Square to Castlereagh Street) being one of the priority regional bike network route to be completed as part of the Cycling Strategy and Action Plan (City of Sydney, 2018). This study looks into three different design options including centre running cycleways and a northern kerbside running cycleway.
Strategic Design Report (WSP, 2021)	This design report details the design specifications, challenges, available options, traffic management, and tie-ins that were done to develop a strategic design of a separated bi-directional cycleway on the northern kerbside of Oxford Street between Taylor Square and Castlereagh Street. The strategic design was completed by the design team in consultation with the City of Sydney and Transport for NSW. This study is the foundation for the design team to continue with the concept and detailed designs of the cycleway.
Draft Sydney Development Control Plan 2012 – Oxford Street Cultural and Creative Precinct (City of Sydney, 2021)	The draft Development Control Plan (DCP) is to amend the Sydney Development Control Plan 2012, adopted by Council on 14 May 2012 and which came into effect on 14 December 2012. This DCP seeks to insert precinct specific provisions to guide future development within the Oxford Street Cultural and Creative Precinct. This document also includes the fine grain of the DCP to be considered as part of development applications of eligible developments.
Oxford Street Cultural and Creative Precinct Planning Proposal (City of Sydney, 2021)	This document explains the objectives and justification for proposed amendments to the Sydney Local Environmental Plan 2012 (Sydney LEP 2012) that will apply to land identified within the Oxford Street corridor between Whitlam Square and Greens Road in Darlinghurst, known as the Oxford Street Cultural and Creative Precinct. This document also provides the proposed changes to the LEP maps as part of the planning proposal.
Austroads Guide to Road Design	The <i>Guide to Road Design</i> is a set of comprehensive Austroads guides developed to capture the contemporary practice of member organisations in road design. It provides guidance to designers in the production of safe, economical and efficient road designs, which are most relevant in developing feasible mitigation measures suggested in this report.

Table 1.1Referenced documents

Document	Description and relevance		
Austroads Guide to Traffic Management	The <i>Guide to Traffic Management</i> captures the contemporary traffic management practice including emerging techniques and technologies, and relevant international experience.		
	For this study, this guide provides valuable guidance and considerations to achieve efficient, safe and economical management of road traffic.		
Traffic Control at Work Sites v6.0 (TfNSW, 2020)	This manual has been developed with an aim to maximise safety by ensuring that traffic control at work sites within NSW consistently complies with best practice. It is intended to help personnel to comply with the Work Health and Safety Act 2011 and the Work Health and Safety Regulation 2017.		
	This guide refers to Australian Standards 1742 ( <i>Manual of uniform traffic control devices</i> ) and 1743 ( <i>Road signs – specifications</i> ) to ensure consistent application with the Australian Standards.		
Technical Directions	Various technical directions published by TfNSW, encompassing design guidelines as accepted in New South Wales roads (e.g. safety barriers, design of traffic facilities, traffic signal design, delineation).		
Australian Standards (1742, 1743 series)	The Australian Standards most directly applicable to this study area as follows: Traffic control devices for general use (1742.2–2009): This Standard specifies requirements for regulatory and warning signs, pavement markings and other devices for general use on roads including intersections, between intersections and specific situations (substandard horizontal and vertical curves) which may be relevant to this study.		
	Traffic control for works on roads (1742.3–2009): This Standard specifies the traffic control measures and devices to be used to warn, instruct and guide road users in the safe negotiation of work sites on roads including unsealed roads together with footpaths, shared paths and bicycle paths adjacent to the roadway.		
	Road signs–specifications (1743–2018): This Standard specifies graphics, fonts, layout and size requirements together with an abridge materials and manufacturing specification for the manufacture of the standard road signs provided for in the AS1742 series.		

## 2 Proposal description

## 2.1 Oxford Street Cycleway

#### 2.1.1 Overview of proposed design

The City of Sydney proposes to improve cycling and public transport along Liverpool Street and Oxford Street between Castlereagh Street and Flinders Street. The Concept Design is included as Appendix A. Key features of the proposal are:

- new bi-directional cycleway, approximately 900 metres in length
- new or modified medians separating cycleway from roadway and directional travel
- new median islands for bus boarding areas with bus shelter and garden beds
- new pavement markings including pedestrian markings and roadway line markings
- kerb realignments and kerb connections
- new asphalt resurfacing of most of the roadway in the extent of works, from Elizabeth Street to Flinders Street
- modification of turn restrictions
- relocation of bus shelter from Liverpool Street to Elizabeth Street
- change to some kerbside uses along oxford street

#### 2.1.2 Details of proposed design

A new bidirectional cycleway will be installed along the length of the corridor, between Castlereagh Street and Flinders Street, along Liverpool Street and Oxford Street. This cycleway will range from 2.4 m to 3.4 m in width, but predominantly, will be 3.0 m in width.

To accommodate, a westbound traffic lane will be removed along Oxford Street between College Street and Palmer Street. The eastbound traffic lanes will shift to allow the installation of the cycleway and median separator islands along the northern side of the road. New pavement markings will be drawn to accommodate the change in road lanes, as well as for areas where the roadway has been resurfaced with new asphalt.

Resulting from this there will be three eastbound traffic lanes and two westbound traffic lanes, inclusive of one bus lane in each direction, along Oxford Street. Parking and bus lanes will range from 2.9 m to 3.8 m in width, generally narrowest at bus stops, and predominantly 3.2 m wide. Some important details specific to certain sections are below.

Additionally, the design of the cycleway has incorporated consultation outcome with the Mardi Gras committee to accommodate future street parades annually held on Oxford Street. These include considerations of median island designs to accommodate float movements and pedestrian movements.

#### 2.1.2.1 Elizabeth Street between Liverpool Street and Bathurst Street

- Incorporation of Museum Station, Liverpool Street, Stand A (stop ID: 200071) into Museum Station, Elizabeth Street, Stand C (stop ID: 200073). A new Bus Zone will be installed south of Stand C on Elizabeth Street.
- 2.1.2.2 Liverpool Street between Castlereagh Street and Elizabeth Street
- removal of northern-most westbound traffic lane to allow for installation of the new cycleway\
- new cycleway installed, approximately 3.4 m in width at the western side and approximately 2.5 m at the eastern side

- new medians installed alongside cycleway, approximately 0.4 m in width on the eastern side, approximately 0.9 m in width on the western side, with approximately 10.5 m gap in between
- removal of two parking spots, one retained
  - removed ticketed parking zone changed to no stopping zone
- generally maintain the existing kerb alignment on the western leg of Liverpool Street-Elizabeth Street intersection
- 2.1.2.3 Liverpool Street–Elizabeth Street intersection
- removal of right turns from both north and south approaches of Elizabeth Street
- right turn lanes removed from both north and south approaches of Elizabeth Street
  - northern right turn lane closed by new unbroken line lane markings
  - southern right turn lane closed and replaced with new painted median with diagonal markings
- removal of shared right turn and through lane from eastern approach. Right turn movement will be serviced by a single auxiliary right turn lane.
- new pavement markings to connect cycling traffic across intersection between cycleways

#### 2.1.2.4 North-east corner of Liverpool Street–Elizabeth Street

- removal of old median splitter island, construction of new median islands larger than existing medians
- extension of kerb outwards from Museum Station exit
- new cycleway installed
- adjustments to pedestrian crossing alignment at the intersection

#### 2.1.2.5 Liverpool Street between Elizabeth Street and College Street

- removal of bus shelters for bus stop at Museum Station, Liverpool Street, Stand A (stop ID: 200071)
  - relocation of bus stop to Museum Station, Elizabeth Street, Stand C (stop ID: 200073)
  - existing bus zone to be changed to no stopping zone
- new cycleway installed along northern side of road, approximately 3.2 m in width
- new medians separating cycleway from road traffic, with gaps to facilitate stormwater flows
  - approximately 0.5 m in width west of midblock pedestrian crossing, approximately 1 m in width east of midblock pedestrian crossing
- removal of median island separating eastbound and westbound road traffic
  - installation of approximately 0.5 m wide middle medians separating eastbound and westbound traffic along Liverpool Street at the intersections with Nithsdale Street and Commonwealth Street
- removal of parking spots along north and south of this section of road
  - total loss of 18 parking spots (10 parking spots along the north, 8 parking spots along the south)
  - ticketed parking zones changed to no stopping zone
- retain westbound bus stop Museum Station, Liverpool Street, Stand G (stop ID: 200072)
- new no parking zone located behind the westbound bus zone
  - private buses from the ANZAC Memorial which currently utilise the eastbound bus zone will be instructed to pick up/drop off in this westbound bus zone

#### 2.1.2.6 Oxford Street–College Street intersection

- new pavement markings for northbound and southbound traffic along College Street and Wentworth Avenue
- new diagonal delineation pavement markings in the intersection to separate road traffic and bicycle traffic
- removal of left and right turns from Liverpool Street for eastbound traffic
- new median on College Street to separate cycleway transition from road traffic
  - placed on northbound side of College Street to separate a cycleway transition on the left side of the roadway

#### 2.1.2.7 Wentworth Avenue between Oxford Street and Goulburn Street

- modification to pavement markings with the proposed removal of one through lane from Wentworth Avenue northbound onto College Street and kerb extension
- new northbound bus stop between Commonwealth Street and Lyons Lane
  - loss of five parking (signposted as Loading Zone [10am-3pm Monday-Friday; 6am-10am Saturday] and 1P other times) to a bus zone

#### 2.1.2.8 Liverpool Street east of Oxford Street (Little Liverpool Street)

- Access into/out of Little Liverpool Street from Oxford Street will be restricted to bicycles and pedestrians only. New bollards to be placed at the entrance of Little Liverpool Street to enforce this.
- The short section of Little Liverpool Street between Oxford Street and Hargrave Street will be converted as a twoway road. Existing parallel parking will be replaced by angled parking. The existing loading zone, car share spaces and car parking spaces will be provided. However, the overall number of car parking spaces will be reduced from 6 spaces to 4 spaces and loading zone from 3 spaces to 2 spaces.

To manage this change, the spaces will be time restricted to correspond to the kerb side use demand (i.e. loading and short-term parking during the day and longer stay at night):

- 4 car parking spaces to be available as 1/4P during the day (8:30am-6pm Monday to Friday; 8:30am-12:30pm Saturday) and 2P at night (6pm-10pm Monday to Friday; 12:30pm-10pm Saturday; and 8am-10pm Sunday and public holiday). The 1P restriction currently apply to the three car parking spaces on the northern kerbside of Little Liverpool Street will be removed
- Two loading zone will be available during the day (8am-6pm Monday to Friday and 8am-12:30pm Saturday), with the space to be used as 2P at night (6pm-10pm Monday to Friday; 12:30pm-10pm Saturday; and 8am-10pm Sunday and public holiday).
- The number of existing car share spaces (2 spaces) will be maintained.

#### 2.1.2.9 Oxford Street between Liverpool Street and Pelican Street

- new bollards placed at entrance to Little Liverpool Street to restrict vehicular access into/out of little Liverpool Street from Oxford Street.
- new cycleway installed along northern side of road.
  - approximately 2.4 m in width to the west of the midblock signalised pedestrian crossing.
  - approximately 3.0 m in width starting from approximately 30 m to the east of the midblock signalised pedestrian crossing towards Pelican Street.
  - approximately 3.6 m in width at the intersection of Oxford Street-College Street, for three bicycle lanes of 1.2 m width each.

- removal of one car parking space on Oxford Street northern kerbside immediately east of Little Liverpool Street to accommodate eastbound tracking of design vehicles on Oxford Street
- relocation of bus stop from kerb onto median separating cycleway from road traffic
- new median separating cycleway from road traffic
  - approximately 2.5 m wide at bus stop which transitions to 1.0 m wide outside of the bus stop area
  - gap for midblock signalised pedestrian crossing
  - garden beds placed in median either side of bus passenger waiting area
- new pedestrian crossing lane markings across cycleway for access to relocated bus stop

#### 2.1.2.10 Oxford Street between Pelican Street and Riley Street

- new cycleway installed along northern side of road, approximately 3.0 m in width
- new median to separate cycleway from road traffic, approximately 0.6 m in width
  - gap in median to accommodate signalised pedestrian crossing
- existing right turn restrictions into Riley Street maintained
- new left turn restriction for vehicles above 9.0 metres long into Riley Street
- new bicycle crossing on the eastern leg of the Riley Street/Oxford Street intersection to link proposed cycleway with the existing on-street shoulder bicycle lane on Riley Street
- 2.1.2.11 Oxford Street between Riley Street and Crown Street
- new cycleway installed along northern side of road, approximately 3.0 m in width
- new median to separate cycleway from road traffic, approximately 1 m in width
  - gap in median to accommodate signalised pedestrian crossing

#### 2.1.2.12 Oxford Street–Crown Street intersection

- existing turning restrictions maintained
- new pavement markings for signalised pedestrian crossings across Oxford Street
- widening of south-east kerb alignment at the intersection to accommodate left turn movements for buses
- adjustments to pedestrian crossing line marking to suit kerb modification om the south-east corner

#### 2.1.2.13 Oxford Street between Crown Street and Palmer Street

- new cycleway installed along northern side of road, approximately 2.4 m in width adjacent to bus stop, transition to approximately 3.0 m width away from bus passenger waiting area
- relocation of bus stop from kerb onto median separating cycleway from road traffic
- new median island to separate cycleway from road traffic and for relocated bus stop and passenger waiting area, approximately 2.5 m in width
  - new garden beds on either side of passenger waiting area
- new pedestrian crossing lane markings across cycleway for access to relocated bus stop

#### 2.1.2.14 Oxford Street–Palmer Street intersection

- new pavement markings for signalised pedestrian crossings
- new turning restriction; no left turn from Oxford Street onto Palmer Street
- palmer Street becomes a one-way road between Foley Street and Oxford Street
- extension of north-west kerb to prevent left turns from Oxford Street onto Palmer Street
- installation of a bicycle lane and bicycle storage on Palmer Street to connect the Oxford Street cycleway with the local streets

#### 2.1.2.15 Oxford Street between Palmer Street and Flinders Street

- new cycleway installed along northern side of road, approximately 3.0 m in width
- new median to separate cycleway from road traffic, approximately 1.3 m in width
- extension of kerb from existing kerb along the northern side of Oxford Street, from The Oxford Hotel until the eastern signalised pedestrian crossing
  - dedicated cycleway terminates at The Oxford Hotel and cyclist path rises onto kerb
- removal of five loading zone spots along northern side of Oxford Street
  - loading zone changed to no stopping zone
- existing signalised pedestrian crossing on the west side of Oxford Street-Flinders Street intersection altered
  - northern side of existing crossing shifted approximately 8 m eastwards
  - southern side of existing crossing not moved
  - new pavement markings for new signalised pedestrian crossing placement
  - new pavement markings to allow for cyclist and pedestrian crossing lanes

#### 2.1.2.16 Oxford Street between Flinders Street and Victoria Street

- new pavement markings due to removal of one westbound traffic lane along Oxford Street
  - painted median with diagonal markings between Flinders Street and Darlinghurst Road, approximately 2.5 m in width, separating eastbound and westbound traffic lanes
  - new westbound lane markings between Darlinghurst Road and Victoria Street for three traffic lanes instead of the existing four traffic lanes
  - new westbound lane markings between Flinders Street and Darlinghurst Road for two traffic lanes instead of the existing three traffic lanes
  - new painted traffic island at the Oxford Street–Darlinghurst Road intersection to direct right turning traffic from Oxford Street and right turning traffic from Darlinghurst Road

#### 2.1.2.17 Flinders Street between Oxford Street and Linden Lane

- new painted median with diagonal markings separating northbound and southbound traffic lanes, due to removal of one northbound traffic lane. A zip-merge treatment will be installed to merge the 3 northbound lanes to 2.
  - approximately 2.5 m wide at northern end, tapering off to an unbroken line lane marking at Taylor Street

#### 2.1.3 Access changes

As part of the proposed cycleway works, some changes to road access are necessary to alleviate the impact that changed traffic conditions may have on road users. Changes to road access are detailed in Section 2.1.2 and its sub-sections, and summarised below:

- no right turn from Elizabeth Street (northbound) onto Liverpool Street (eastbound)
- no right turn from Elizabeth Street (southbound) onto Liverpool Street (westbound)
- no left turn from Liverpool Street (eastbound) onto College Street (northbound)
- no right turn from Liverpool Street (eastbound) onto Wentworth Avenue (southbound)
- no left turn from Oxford Street (eastbound) onto Palmer Street (northbound).

#### 2.1.4 Affected local accesses

There will be some changes to local access as part of the proposed cycleway works. In summary, it will include:

- the closure of Little Liverpool Street from Oxford Street following installation of bollards
- no access to Palmer Street from Oxford Street following the change of Palmer Street to one-way traffic only between Foley Street and Oxford Street
  - existing restrictions for traffic exiting Palmer Street remain; traffic can still exit Palmer Street onto Oxford Street and travel east.

## 2.2 Construction activities

The indicative methodology, staging, work hours, plant and equipment to construct the Proposal are described in this section. Subject to approval, construction is expected to commence in Q2 2023 and take around 15 months to complete.

#### 2.2.1 Work methodology

The construction methodology would be further developed by the nominated Contractor during the detailed design of the Proposal in consultation with City of Sydney and Transport for NSW.

The actual construction work methods may vary from the description assessed in the REF due to the identification of additional constraints before work starts, ongoing detailed design refinements, feedback from community and stakeholder consultation, and contractor requirements/limitations.

The Proposal would be built under City of Sydney and Transport for New South Wales construction specifications under a construction environmental management plan (CEMP). The proposed construction activities for the Proposal are identified below. This staging is indicative and is based on the current concept design and subject to change once the detailed design is finalised. The staging is intended to minimise the impact to the operation of the road network, public transport and active transport. Staging is also important to ensure the constructability and sequencing of the work.

- 1 site establishment
- 2 adjustment to underground/above ground services
- 3 temporary and permanent relocation of bus stops, including shelters and other associated infrastructure
- 4 installation of kerbs, median islands, bus island platforms
- 5 TCS and new smart pole installation, reconfiguration of existing detectors
- 6 milling and resurfacing of pavement
- 7 installation of line marking and signposting

Materials would be stored at the contractor's yard and, if needed, dropped off to a designated satellite compound area onsite depending on the work location. The closure of Liverpool Street (east of Oxford Street) and the inbound lane of Palmer Street from Oxford Street for traffic would potentially provide opportunity for satellite compounds, if needed.

#### 2.2.2 Construction workforce

The assumed construction workforce for this Proposal would include an average workforce of 20 workers and at its peak 35 workers over the 15-month construction phase.

As with most works undertaken in the CBD, workers would be sourced locally subject to availability. Workers would be encouraged to use public and active transport to travel to/from the construction site due to the high accessibility of the project area to public and active transport infrastructure. No parking for workers will be provided on site, although some work vehicles would be needed on-site to access working tools and equipment.

#### 2.2.3 Construction hours and Duration

TfNSW have provided guidance on expected construction hours, which are as follows:

- 10am to 3pm on weekdays
- 8pm to 5am Sunday to Thursday
- 8pm Friday to 5am Monday (full weekend)

Certain works may need to occur outside recommended standard hours to minimise impact to the operation of the road network and reliability of public transport services and active transport.

Approval from Transport for NSW and City of Sydney would be required for any out of hours work and the impacted community would be notified with at least 7 days' notice, as outlined in Transport for NSW's *Construction Noise and Vibration Strategy* 

#### 2.2.4 Ancillary facilities

A temporary satellite construction compound would be required to accommodate a site office, amenities, laydown and storage area for materials. The closure of Liverpool Street (east of Oxford Street) and/or the inbound lane of Palmer Street from Oxford Street for traffic would provide the opportunity to create the satellite construction compound/s.

Ancillary facilities would be coordinated by the City of Sydney and selected principal contractors during construction. Where it is not feasible to achieve all the principles, environmental mitigations and safeguards would be implemented as noted in Section 6.

#### 2.2.5 Plant and equipment

An indicative list of plant and equipment that would be required to construct the Proposal are listed below. Additional plant and equipment likely to be used would be identified during detailed design by the nominated Contractor. The plant and equipment required for the works will vary throughout the ongoing stages of construction activities.

—	utility vehicles, rigid trucks, bob cats	—	handheld spray-painting gun for p
—	pavement milling, grader and compactor	—	pedestrian and traffic barriers
—	variable messaging signs	—	environmental control
—	traffic control vehicles		— silt socks
—	concrete drills		— rubbish skips
—	pavement grinding machine		— temporary fencing
	quick-cut saw / road saw / block cutter		— safety cones
	generators		— traffic signs
	various powered and unpowered hand tools		— bollards

#### 2.2.6 Earthworks

Minimal earthworks are expected on this project, with activities such as demolition and excavation associated with replacement of the existing road pavement and/or kerb and gutter and medians. Earthworks and estimated quantities would be further refined prior to the start of construction during detailed design.

#### 2.2.7 Source and quantity of materials

Materials needed for the construction of the Proposal would be sourced locally where practicable. Materials will also be assessed by the contractor if they are fit for re-use on-site or another project. For transporting purposes, re-using existing materials on-site would reduce the need to transport materials and waste into/ out of the construction site respectively, however additional storage area on-site may be required.

#### 2.2.8 Public utility adjustment

The proposed works associated with the cycleways are unlikely to require substantial adjustment of public utilities.

Localised relocation of smart poles and traffic signal infrastructure are proposed as part of the project.

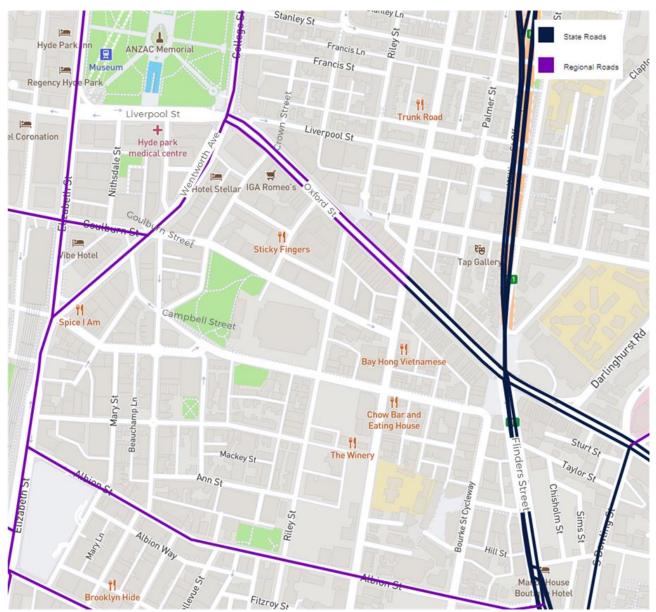
pavement markings

## 3 Existing conditions

## 3.1 Existing Facilities

#### 3.1.1 Road Classification

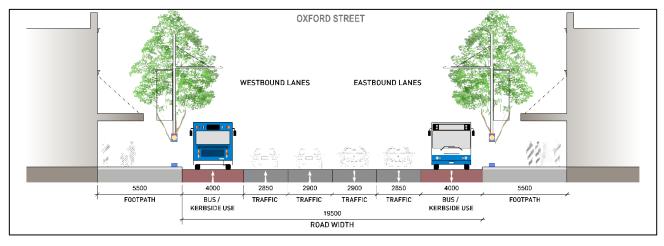
The classification of the road network in the study area is shown in Figure 3.1 depicting that Oxford Street is both a regional road (between Wentworth Avenue to Crown Street) and a State Road (east of Crown Street). Other State Roads in the study area include Flinders Street, the Eastern Distributor Tunnel and South Dowling Street.



Source:NSW Road Network Classifications (Transport for NSW, 2022)Figure 3.1Road Network Classifications in study area

#### 3.1.2 Oxford Street

Oxford Street is a direct east-west travel route between Bondi Junction and Sydney CBD. Within the study area, Oxford Street is predominantly a six-lane, two-way road which includes bus lanes running on both the eastbound and westbound kerbside lanes of the corridor (see Figure 3.2).



#### Figure 3.2 Oxford Street typical existing road width and features

Given its direct travel route to Sydney CBD, Oxford Street functions as a trunk public transport route and has high demand for pedestrians and cyclists. The existing transport demand on Oxford Street is further discussed in Section 3.1.

There are currently existing turning restrictions into and out of Oxford Street which includes:

- No right turn from College Street (north) to Liverpool Street (west). Liverpool Street is an extension of Oxford Street to the west of College Street–Wentworth Avenue.
- Oxford Street eastbound (i.e. west approach)–No right turn restrictions apply to abutting streets to the south, which
  includes Riley Street, Crown Street and South Dowling Street. Right turns from Oxford Street eastbound are
  currently allowed into Wentworth Avenue, Flinders Street and Greens Road. However, auxiliary (separated) right
  turn lanes are only available at turns into Wentworth Avenue and Flinders Street.
- Oxford Street westbound (i.e. east approach)–No right turn restrictions apply to abutting streets to the north, which includes Crown Street, Palmer Street, Barcom Avenue, Palmer Street and Crown Street. Right turns from Oxford Street westbound are currently permitted into Darlinghurst Road and College Street.
- The following turning restrictions out of the abutting side streets also apply:
  - right turn movement out of Crown Street north to Oxford Street west
  - right turn movement out of Palmer Street north to Oxford Street west
  - right turn movement out of Flinders Street south to Oxford Street east

In terms of **Movement and Place** function, the *South East Sydney Transport Strategy* (Transport for NSW, 2020) developed for the south-east Sydney region as part of Future Transport 2056 envisions Oxford Street as a Main Street corridor with significant movement and high place function – refer to Figure 3.3.

It is considered a corridor with significant movement as it is a trunk public transport route connecting metropolitan and strategic centre in Sydney CBD and Bondi Junction respectively. It is considered a high-place corridor due to the activity it creates for people, the physical form and its values to people. This includes the significant presence of heritage buildings on Oxford Street and the importance of the place to the local residents.



#### 3.1.3 Active transport

There are existing separated cycling infrastructure and low trafficked bicycle friendly streets within the vicinity of the study area.

As shown in Figure 3.4, separated cycleways are currently available on Bourke Street and Campbell Street. In addition there are numerous streets which incorporate either on-road line and pavement marking to indicate the presence of cyclists on the road network or bike lanes. The treatment are a mix of bicycle shoulder or mixed traffic condition. This is available on Liverpool Street (east of Oxford Street), Yurong Street, Riley Street, Crown Street, Palmer Street, Burton Street, Forbes Street, Brisbane Street and Greens Road.

In addition to the existing bicycle network and this proposal, committed separated cycleway works are being planned on College Street and Oxford Street east of Flinders Street. Currently, cyclists travel in mixed traffic conditions on either general traffic lanes or bus lanes.



Source:Sydney cycling map (City of Sydney, 2020)Figure 3.4Existing cycling infrastructure on Oxford Street and surrounds

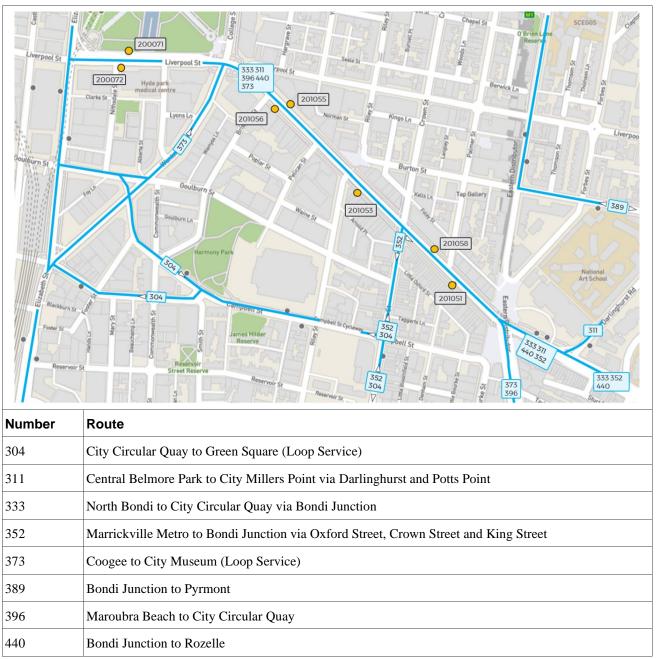
For people walking in the study area, paved footpaths, designated pedestrian crossing points and road narrowing at intersections are observed on the network to make the walking environment accessible, safe and convenient.

Anecdotal observations during a site visit however, indicate the need to consider increased activation and continuous footpath treatments at laneways to provide a more enjoyable walking environment that provides an experience for people.

#### 3.1.4 Bus operations

The study area is well serviced by public buses, particularly with Oxford Street being a trunk route, providing direct routes to/from the Sydney CBD and the eastern and south-eastern suburbs. The timetable of bus services along Oxford Street was reviewed by Transport for NSW in December 2021. As part of the review, Oxford Street was maintained as a high-frequency route albeit some reduction in overall bus volumes. Some routes however would see increased frequencies. According to Transport for NSW's timetables, bus stops located west of Flinders Street can expect buses to arrive every 2-3 minutes, and up to 5-7 minutes east of Flinders Street. The current services are listed and depicted in Table 3.1.





#### 3.1.5 Kerbside uses

Several parking restrictions exist along Oxford Street and serve a variety of purposes (e.g. taxi, bus, loading, and mail zones). The kerbside uses are shown in Figure 3.5. Additionally, the local roads in the study area generally serve as time-restricted parking, with allowances for residents to obtain permits to be exempt from these time restrictions in residential areas. Many of these parking areas are ticketed.

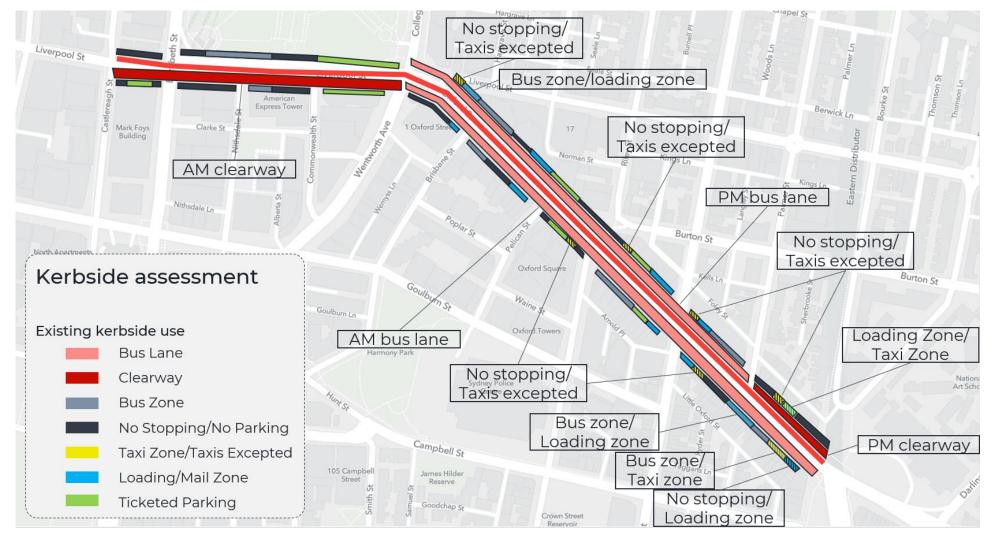


Figure 3.5 Existing parking restrictions on Oxford Street

# 3.1 Oxford Street travel demand

This section describes the existing travel demand along the Oxford Street corridor on a typical weekday and Saturday pre-COVID-19 pandemic which were based of intersection counts undertaken in 2019 and Opal ticketing data from September 2017 which were undertaken by the City of Sydney for the feasibility of the Oxford Street cycleway project.

### 3.1.1 Methodology overview

Figure 3.6 shows the approximate extent of the works involved in this proposed development, and the intersections from which traffic data was collected from.

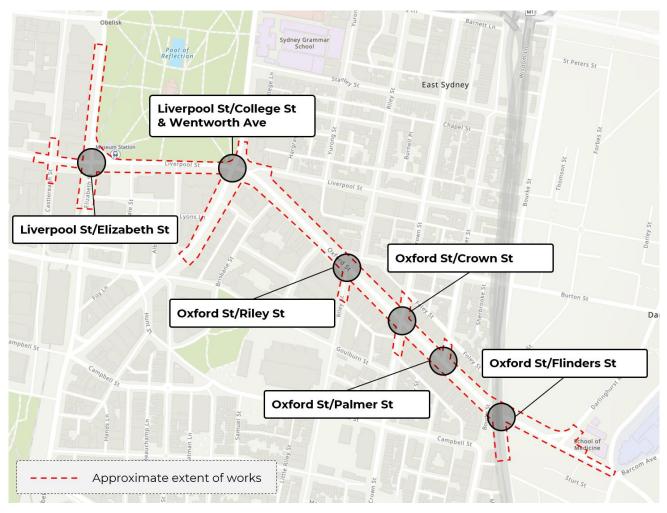


Figure 3.6 Map of approximate extent of works and intersections where data was collected.

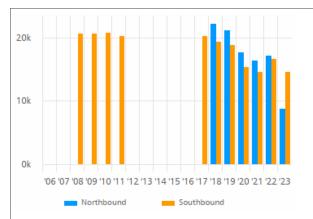
The data used for this study were obtained from intersection surveys undertaken in 2018 and 2019, and Opal ticketing data from September 2017. Table 3.2 shows the dates of data collection for each intersection. The differences in data collection dates for the intersections below is due to the different staging for this Oxford Street cycleway project.

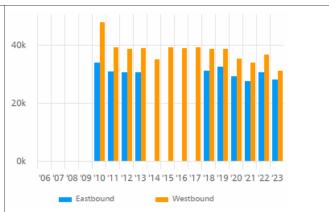
#### Table 3.2 Date of data collected

Intersection	Weekday data	Saturday data	
Liverpool Street–Elizabeth Street	9 May 2019	18 May 2019	
Liverpool Street–College Street & Wentworth Avenue	23 October 2018	N/A	
Oxford Street–Riley Street	9 May 2019	11 May 2019	
Oxford Street–Crown Street	9 May 2019	11 May 2019	
Oxford Street–Palmer Street	9 May 2019	18 May 2019	
Oxford Street–Flinders Street	5 November 2019	N/A	

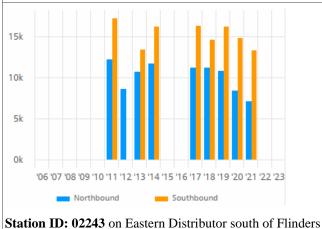
The peak periods of the road network include 8-9 AM (morning peak), 11:15-12:15 PM (mid-day peak) and 5:30-6:30 PM (afternoon peak).

This data was collected prior to the COVID-19 outbreak, thus representing the typical conditions pre-pandemic. No recent traffic counts were procured. However, changes in people's travel needs and behaviours to work and leisure have been observed during and post pandemic with work from home flexibility inherited from the pandemic generally result in reduced car traffic demand from the eastern suburbs to the CBD (observed in Figure 3.7) and increased cycling demand (refer to section 3.1.3).





**Station ID: 03018** on Eastern Distributor south of Anzac Parade, Moore Park



**Station ID: 10011** on New South Head Road east of Bayswater Road, Edgecliff

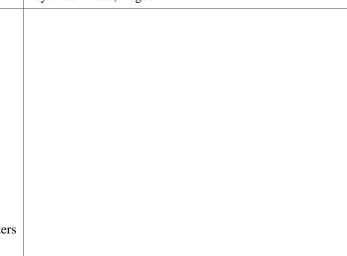


Figure 3.7 Traffic volumes at TfNSW traffic counters between the eastern suburbs and CBD

Street

# 3.1.2 Existing travel demand

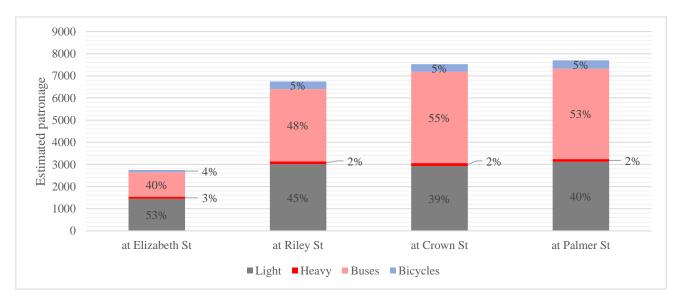
The following figures present the existing road network bidirectional demand at select intersections along the Liverpool Street and Oxford Street corridor on particular dates corresponding to Thursday and Saturday demand levels. The values presented are based on intersection counts undertaken in 2019 and 2017 Opal ticketing data.

A significant volume of traffic turning off Liverpool Street onto Elizabeth Street and heading in the northbound direction is not captured in these tables. An amount equivalent to approximately 30 per cent of the through traffic turns on a Thursday morning, and approximately 36 per cent do the same on Thursday afternoon. Similarly, approximately 37 per cent do so during the Saturday peak.

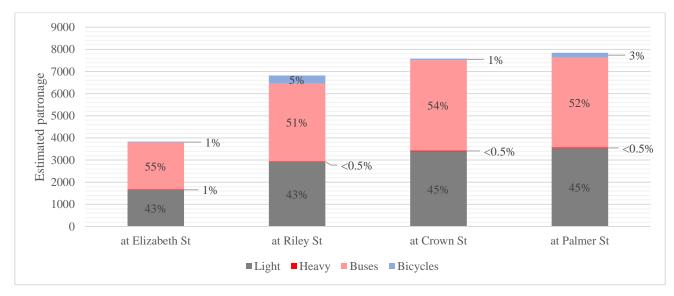
The following assumptions were made to estimate the number of people travelling on the corridor from the intersection counts undertaken:

- light vehicle occupancy: 1.26 people per vehicle based on the *TfNSW Household Travel Survey 2018/19*.
- heavy vehicles and bicycles consist of one person per vehicle
- bus patronage from Opal data collected in September 2017 increased based on the increase recorded in TfNSW public transport patronage data up to May 2019 by +23.1 per cent.

From the figures, it is clear that for the dates that the data was captured that light vehicles and buses were the primary modes of transport for commuters along this corridor.









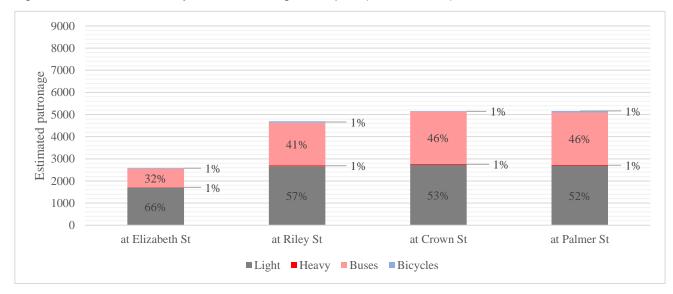


Figure 3.10 Mode share by intersection during the Saturday peak (1:15–2:15 PM)

# 3.1.3 Cyclist demand

The temporal demand for cyclists along Liverpool Street and Oxford Street, east of Elizabeth Street and west of Flinders Street, based on the intersection counts undertaken in 2019, are shown in Figure 3.11 and Figure 3.12. It should be noted that the data shown for the Oxford Street–Flinders Street intersection is for a different date than for the other intersections, and so may reflect different demands.

While the intersection of Liverpool Street–College Street –Wentworth Avenue was identified as a major intersection along the corridor, data was not available to use for analysis.

The Liverpool Street–Elizabeth Street intersection features a one-way road westbound of the intersection. Due to this, the demand shown for this intersection in Figure 3.11 and Figure 3.12 appears to be lower than for the other intersections shown in the figures, as it includes only westbound through traffic while the other intersections include both eastbound and westbound through traffic.

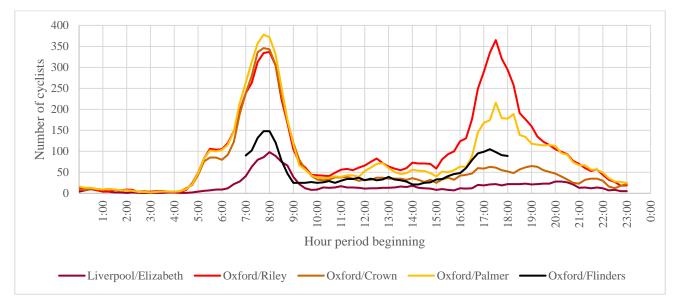


Figure 3.11 Weekday cyclist activities along Liverpool Street and Oxford Street

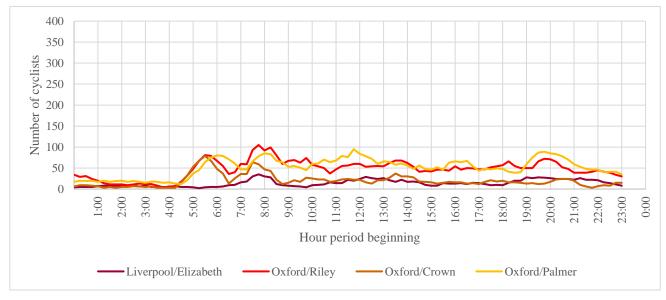


Figure 3.12 Saturday cyclist activities along Liverpool Street and Oxford Street

The weekday graph shows a number of peaks in cycling demand throughout a typical weekday, with sizeable peaks occurring in the AM and PM periods and a small peak occurring at midday. The weekend graph shows that demand is generally consistent between 9:00 AM–7:00 PM.

During the pandemic however, changes in people's travel needs and behaviours to work and leisure were observed including an increase in cycling activities in metropolitan areas.

A research paper titled "*Cycling Behaviour as a Result of COVID-19: A Survey of Users in Sydney, Australia*" (Lock, 2020) identified a key theme of the survey participants, observing more cyclists paired with a reduced amount of traffic than usual. This finding was also observed in the City of Sydney's average daily bicycle counts in the study area at the intersections of Oxford Street with College Street (Figure 3.13) and Flinders Street (Figure 3.14).



The above figures indicate an overall increase in daily bicycle activities along the length of the corridor in both March and October of 2020, the initial year of the COVID-19 pandemic. Sensitivity to people's place of work and commuting behaviour as the pandemic continued in 2021 may impact future cycling demand on Oxford Street.

# 3.1.4 Pedestrian demand

The temporal result of pedestrian counts along Liverpool Street and Oxford Street, east of Elizabeth Street and west of Flinders Street, based on the intersection counts are shown in Figure 3.15 (weekday survey) and Figure 3.16 (weekend survey). These locations indicate the difference in pedestrian activities at either end of the project area.

Limited peak-hour only data was available for the intersection of Liverpool Street–College Street–Wentworth Avenue, as such this intersection has been excluded from the graphs. Additionally, the intersections of Oxford Street–Palmer Street and Oxford Street–Flinders Street only have a pedestrian crossing on one side for travel along Oxford Street. This means that the data may not capture the full extent of the pedestrian demand at these intersections when viewed individually.

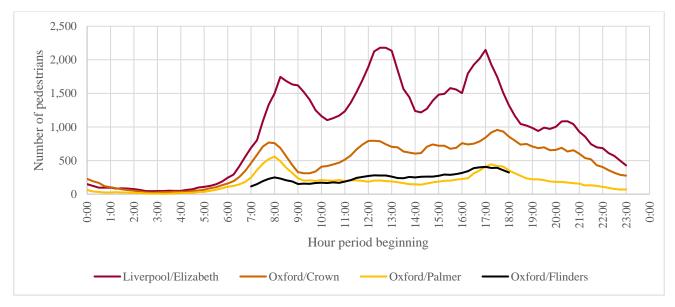


Figure 3.15 Weekday pedestrian activities along Liverpool Street and Oxford Street

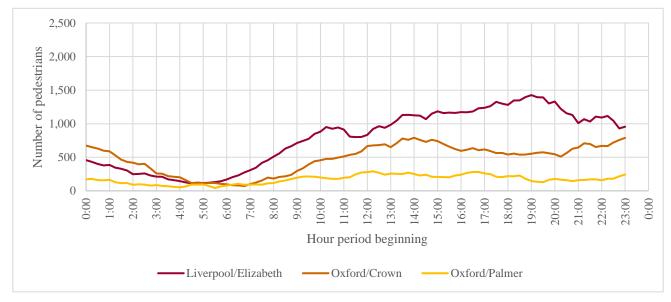


Figure 3.16 Saturday pedestrian activities along Liverpool Street and Oxford Street

The daily count of pedestrians crossing Oxford Street and Liverpool Street are shown in Figure 3.17 and Figure 3.18. This includes pedestrian crossing activities at the following intersections:

- Liverpool Street-Elizabeth Street
- Liverpool Street–College Street & Wentworth Avenue
- Oxford Street–Riley Street
- Oxford Street–Crown Street
- Oxford Street–Palmer Street
- Oxford Street–Flinders Street

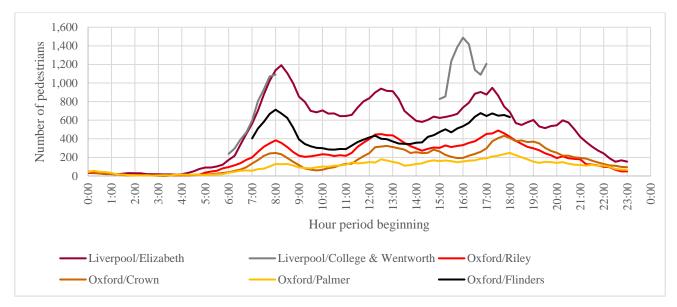
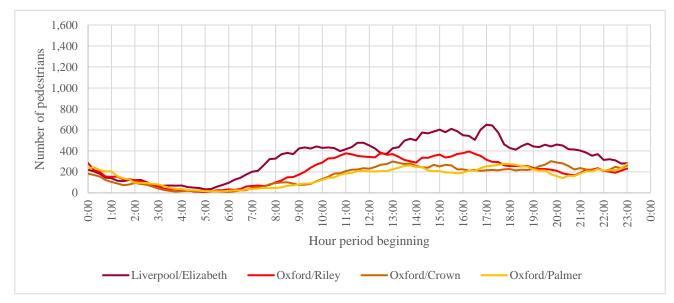


Figure 3.17 Weekday pedestrian activities across the Liverpool Street and Oxford Street corridor

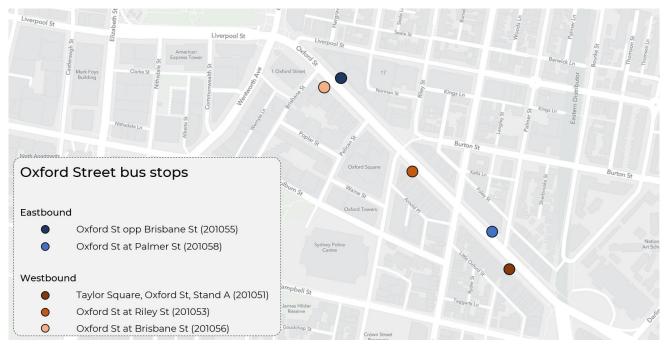




The data shows a large number of pedestrians move across and along Oxford Street, generally increasing with greater proximity to the CBD. There appear to be three distinct peaks occurring on a typical weekday (AM, PM, midday), with the AM and midday peaks occurring simultaneously at all intersections, but the PM peak occurring earlier closer to the CBD and progressively later with distance from the CBD. There does not appear to be any discernible peak during Saturdays, with relatively consistent demand from 11:00 AM–12:00 AM after increasing from 6:00 AM. This elevated activity well into the night is likely reflective of the night-time economy in this part of Sydney.

# 3.1.5 Buses

The temporal results of the bus boarding data collected between 10 September 2017 to 16 September 2017, inclusive, through the Opal ticketing system are shown below in Figure 3.20 through to Figure 3.23. These locations indicate the number of passengers travelling through the Oxford Street corridor on public buses. Figure 3.19 provides the location of the bus stops along the corridor where the Opal data was collected from. It is important to note that the time periods 0:00 - 7:00 and 21:00 - 0:00 were both represented by a single value each to cover the entire 7-hour and 3-hour period, respectively. In the figures, the values for these time periods were an average of this value across the entire period.





Location of bus stops along Oxford Street

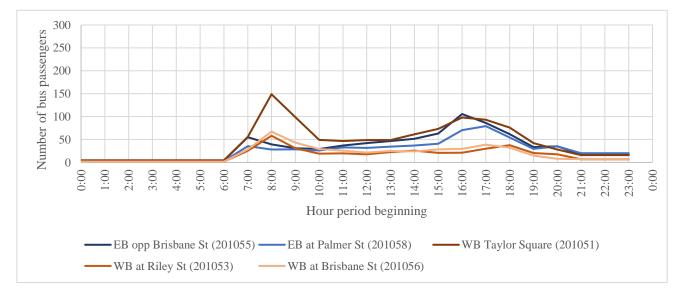
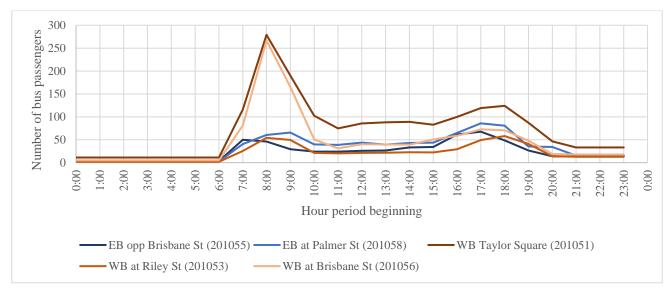
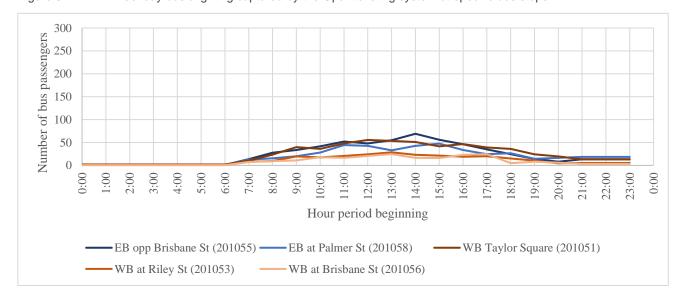


Figure 3.20 Weekday bus boarding captured by the Opal ticketing system at specific bus stops





Weekday bus alighting captured by the Opal ticketing system at specific bus stops





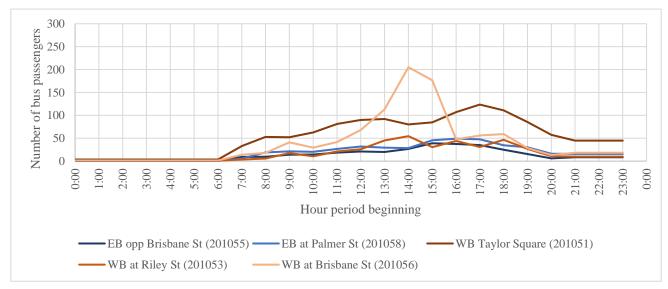
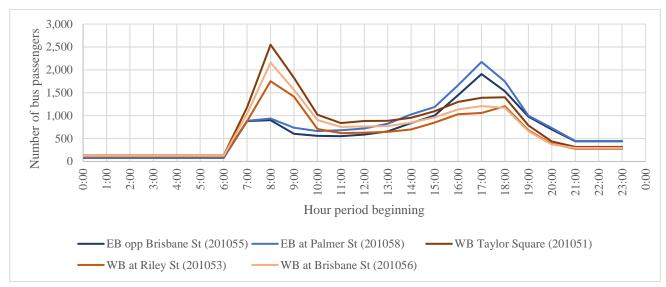
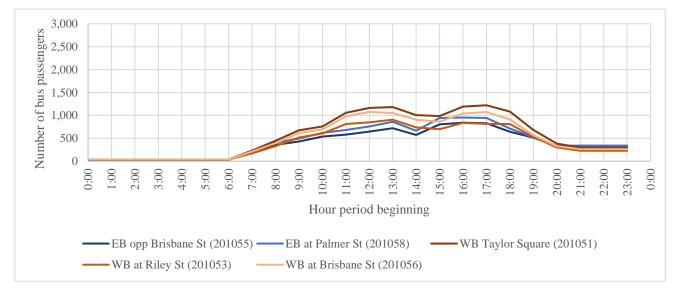


Figure 3.23 Weekend bus alighting captured by the Opal ticketing system at specific bus stops

The temporal results of bus onboard data are shown in Figure 3.24 and Figure 3.25. These show the number of passengers onboard at the time of arrival at each bus stop.









There appear to be two distinct peaks in the AM and PM on a typical weekday, and generally no peak on a typical weekend. This is reflected in both the tap-on and -off data as well as the onboard at arrival data. There appears to be a peak for passengers alighting at the bus stop on Oxford Street at Brisbane Street (201056) on a weekend. However, upon further investigation it appears to only occur on a Sunday and abruptly ends at 4 PM. Coupled with the fact that it appears to be inconsistent with the data at other bus stops along the westbound route, it is plausible there was an event held in the area causing a one-off increase in passengers alighting at that particular stop.

# 3.2 Road Safety Review

A review of the crash history on Liverpool Street and Oxford Street has been undertaken for the latest available five-year crash period of 2015 to 2019. During this period, there were 89 crashes recorded on Liverpool Street and Oxford Street between Elizabeth Street and Flinders Street. A high proportion of the crashes involved rear-end crashes and pedestrian crashes. The breakdown of crashes and location are shown in Table 3.3 and Figure 3.26 respectively.

Degree of crash	Pedestrians	Intersection	Head-on	Rear-end	U-turn and parking	Off-path /loss of control	Total
Fatality	0	0	0	0	0	0	0
Serious Injury	10	0	0	9	2	2	23
Moderate Injury	9	0	2	18	6	5	40
Minor/Other Injury	4	1	0	11	1	1	18
Non-casualty	0	1	0	4	1	2	8
Total	23	2	2	42	10	10	89

Table 3.3 Crash severity and type

Source: Centre for Road Safety, viewed in August 2021

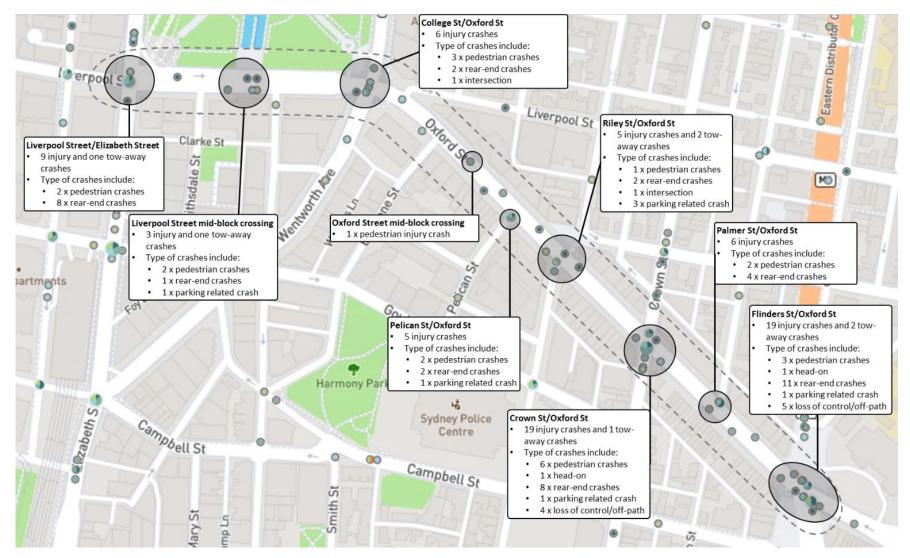


Figure 3.26 Crash type and degree of severity by location

# 4 Construction impact

This section discusses the traffic and transport impact due to the construction of the project with the activities described in Section 2.2.

With the proposal requiring modification to the existing road condition, it is envisaged that there will be partial road closure and interruption to the traffic operations, bus stops and footpaths on Oxford Street during the construction of the project.

To minimise these impacts, the project is envisaged to be undertaken with construction staging in place and for works requiring interruption to the road network taking place outside of the peak periods. During peak periods, the traffic lanes would be re-opened to traffic.

Traffic delays and access may occur as a result of the Proposal's construction and be managed in the Construction Traffic Management Plan (CTMP). The potential traffic and access impacts expected during the construction of the Proposal include:

- temporary increased traffic delays from the movement of construction vehicles and hauling of materials
- temporary partial road closure during construction of the cycleway
- temporary partial road closure to accommodate a staged approach to closing traffic lanes during resurfacing works
- public transport impacts on bus routes
  - delays due to lane closures and increased traffic.
  - routes 311 and 340 will be permanently rerouted to Wentworth Avenue with the right turn ban from Elizabeth Street south approach to Liverpool Street.
  - existing eastbound bus stops will have to be temporarily relocated along Oxford Street during construction. For
    example, during the construction of bus island platform for the stop opposite Brisbane Street, the stop may be
    temporarily relocated to the east of the adjacent mid-block crossing to maintain service.
  - sections of the footpath will be closed during construction. Pedestrians will be diverted around the closures.

# 4.1 Active transport

Pedestrian access would be maintained at all times during construction. However, should interruption to the footpath be needed, pedestrians are to be provided with alternative local detour around the construction area.

Cycling activities using Oxford Street traffic lanes would remain during construction with the low-speed limit environment on Oxford Street maintained at 40km/h or reduced further to minimise conflict with general traffic.

For safety, cyclist would be encouraged to utilise existing cycling facilities parallel to Oxford Street to travel in the eastwest direction when partial road closures are in place. This would minimise the probability of cyclists travelling on footpaths and the risk of a collision with pedestrians. Parallel local streets to Oxford Street with existing cycling route includes Campbell Street, Liverpool Street and Burton Street.

Pedestrian and traffic management measures and notifications will be put into place prior to the commencement of works in order to provide a safe environment for road users, cyclists, and pedestrians.

Variable messaging should be provided to warn cyclists and vehicles of changed traffic conditions.

# 4.2 Public transport

Temporary bus stop facilities would be required to enable the construction of the proposed bus boarding islands on Oxford Street (eastbound) at opposite Brisbane Street (201055) and east of Crown Street (201058). Approval from Transport for NSW and Sydney Buses would be required.

This could be managed by providing temporary bus stops at the locations listed below and depicted in Figure 4.1 while the two eastbound bus stops are being constructed:

Northern kerbside of Oxford Street west of Riley Street (Temporary bus stop #1). This would maintain passengers' accessibility to bus route 333, 311, 396, 440 and 373 currently serviced by both bus stops 201055 and 201058.

This location is approximately 125 metres walking distance from the existing bus stop opposite Brisbane Street and 200 metres from existing bus stop east of Crown Street. Currently the kerbside space is used as 1-hour parking between 8:30am-3pm on weekdays and 8:30am-6pm on weekends. Bus lane restriction applies between 3pm-7pm on weekdays. A temporary bus stop at this location could temporarily remove up to five on-street parking spaces to provide a bus stop for up to three buses.

Longer boarding time may be experienced during this temporary arrangement with the added passengers boarding/ alighting, however not likely to be significantly different from the current operation across two stops.

Western kerbside of Crown Street south of Oxford Street (Temporary bus stop #2). This would maintain passengers' accessibility to bus route 352 currently serviced by bus stop 201058 located west of Palmer Street. This location is approximately 160 metres walking distance from the bus stop 201058. The space is currently a "No Stopping" area for the traffic signal operation, as such, minor impact is expected to the queueing space on Crown Street.

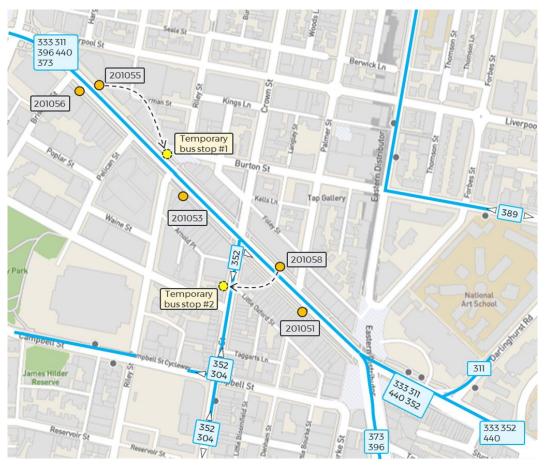


Figure 4.1 Temporary bus stop locations during construction

The project would not have any impact to the heavy rail network or accessibility to the nearby station (Museum station).

# 4.3 Road network impact

### 4.3.1 Vehicle Movements

Traffic generated by construction activities includes construction worker light vehicles, as well as heavy vehicles for periodic delivery and removal of materials, and construction plant and equipment.

Based on the number of workers proposed for the site, the traffic generated as part of the construction works is not expected to exceed 50 light vehicles and 30 heavy vehicles per day during peak construction periods.

The vehicle movements would be spread across the project area and throughout the proposed work hours, thus resulting in a minor impact to the road network, active transport facilities and public transport network.

### 4.3.2 Haulage Routes

Heavy vehicles will use the most direct routes to the arterial road network to access the site. From the westerly direction, this may include the use of College Street, Elizabeth Street and Wentworth Street. From the eastern direction this may include Flinders Street and Oxford Street east of Taylor Square.

The haulage route would avoid local streets and minimise impact to sensitive noise receivers, such as residential areas and schools.

#### 4.3.3 Road and Lane access/closures

Temporary partial road closure would be required during construction to provide workers with safe working area and ensure adequate space for the works to be undertaken. Work scenario where this is likely to be needed include:

- where works are required adjacent to live traffic which may be safer to be completed at night when the traffic
  activities are low. This may include adjustments to some services, installation of kerb, median islands and bus
  infrastructure
- pavement milling and resurfacing
- installation of line marking and some sign posts

An example of traffic management around a partial road closure is shown in Figure 4.2, depicting the placement of a work area including using the adjacent lane for workers and maintenance of two-lane traffic in both eastbound and westbound direction on Oxford Street in order to minimise impact of construction activities.

# 4.3.4 Traffic Management, control, and signage

Where possible, construction activities would be programmed to be undertaken outside of the road network's peak periods to minimise the impact on traffic using the local and regional road network.

Standard traffic management measures would be used to minimise the traffic impact expected during construction. These measures would be identified in a TMP for the Proposal and would be developed in accordance with the Transport for NSW's *Traffic Control at Work Sites Manual* (Transport for NSW, 2022). All changes to the existing traffic, cyclist and pedestrian conditions will need to be accompanied by appropriate signage to notify users of the temporary arrangements.

Detailed construction methods and associated management plans (such as Traffic Guidance Scheme [TGS]) and a CEMP would also be developed of the Proposal to manage potential traffic and access impacts.

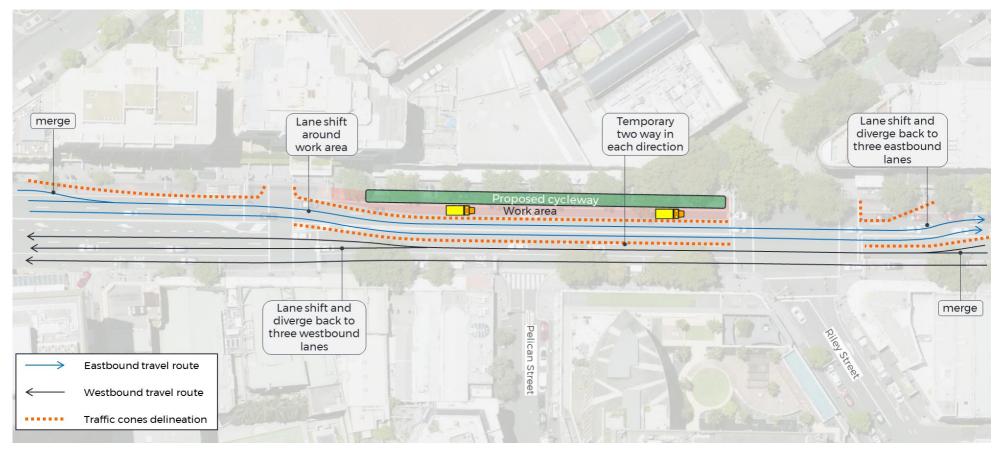


Figure 4.2 Example of traffic management during construction of cycleway

### 4.3.5 Capacity

As noted in Section 2.2.3: *Construction hours and Duration*, most of the construction works are planned to be undertaken outside of the peak periods, where traffic and transport demand are lower to minimise interruption to the road network, active transport facilities and public transport network.

As described in 4.3.3, the construction works would require temporary partial road closure which could be managed by lane diversion/ shifting to maintain two lanes of traffic in each direction on Oxford Street. This would minimise the impact to the road network capacity during construction. Localised intersection adjustments would also be necessary to accommodate the necessary work area during the construction.

Existing intersection operation and accessibility are to be maintained, however new turning movement restrictions proposed in the ultimate condition (refer to Section 2.1.3) are expected to be implemented throughout construction as physical features such as kerb buildouts and median islands would need to be constructed.

### 4.3.6 Road condition

The proposed construction work is not expected to result in deterioration of road condition to impact travel time or travel experience. Pavement works would generally be limited to the area around the proposed cycleway.

Temporary delineation may be required during works to manage traffic around the work sites. CTMP and associated Traffic Guidance Schemes would be developed to ensure appropriate traffic management are planned and implemented during construction.

# 4.4 Property accesses/access to loading and servicing

Access to loading and servicing for businesses and residents (including for emergency vehicle access and egress) would be maintained throughout the construction, unless permanently removed by the project (discussed in Section 5.4).

In some limited circumstances, short-term restrictions for a particular loading zone may need to be imposed with prior consultation with the affected party. This would be mitigated through establishing a communication process with property owners, keeping them informed of construction staging and work schedule.

# 4.5 Kerbside uses

Changes and impact to kerbside uses would depend on the staging of works and will be considered in more detail in the development of the CTMP. It is likely that during construction that availability of on-street parking restrictions would be temporarily affected, however essential kerbside uses are to be maintained or relocated as appropriate in the order of priority with the following objectives:

- consider the safety and convenience of all road users
- encourage the use of alternative transport modes such as walking, bus, train and walking
- promote equitable allocation of parking spaces across user groups
- facilitate consistent decision-making regarding parking infrastructure

In line with the *Road User Space Allocation Procedure* (TfNSW, 2021), essential kerbside uses on Oxford Street ranked from essential to least important include on-street public transport (bus zone, taxi zone), freight and services (loading zone) and private vehicles (timed on-street parking).

# 5 Proposed operational impact

An overview of the operational impact due to the proposed cycleway is depicted in Figure 5.1.

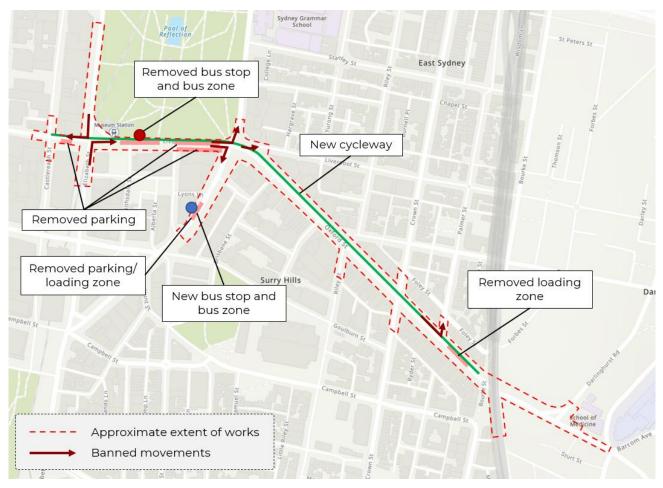


Figure 5.1 Overview of major changes to operation of Oxford Street and Liverpool Street

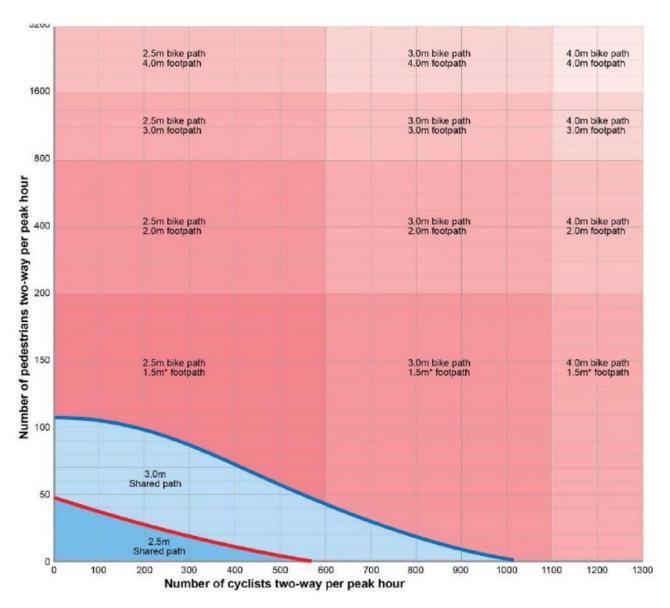
# 5.1 Active transport

Following the completion of this cycleway, active transport users will have a better experience when commuting along Liverpool Street and Oxford Street. This is a result of infrastructure upgrades which will benefit both cyclists and pedestrians.

# 5.1.1 Cyclists

The proposed Oxford Street and Liverpool Street cycleway will provide cyclists with an improved cycling experience. The separated cycleway will allow safer bicycle use, as cyclists will be able to move to the dedicated cycleway instead of riding on the existing route which is in shared bus lanes and traffic lanes.

From the data shown in Section 3.1.3, the existing demand for cyclists is no greater than 400 cyclists/hr at any point along the proposed cycleway. To understand whether the proposed cycleway will have capacity for these existing trips, Figure 5.2 from the *Austroads Guide to Road Design* has been included to show the capacity limits for dedicated cycleways of different widths. At its narrowest, the proposed cycleway will be 2.4 m wide, suitable for up to 600 cyclists/hour. The majority of the proposed cycleway will be 3.0 m wide, suitable for up to 1100 cyclists/hour. As such the cycleway would be able to accommodate existing demand.



Source:Figure 5.4 in Austroads Guide to Road Design Part 6A: Paths for Walking and CyclingFigure 5.2Path widths for 50/50 directional split of pedestrians and cyclists

Current bicycle mode share is four per cent for trips made through the study area, as shown in the figures in Section 3.1.2. The City of Sydney has a target for 10 per cent of total trips in the city to be made by bicycle in their *Sustainable Sydney 2030 plan*. Sensitivity capacity analysis of cycling mode share increasing up to six per cent and ten per cent were completed to understand the impact of growth of cycling up to the City's *Sustainable Sydney 2030* target.

The following analysis has been prepared with the assumption that the increase in bicycle activity is proportionate to the existing demand and the relative change is applied consistently through the whole corridor. The exception to this is the intersection of Liverpool Street–Elizabeth Street, where Liverpool Street to the west is currently a one-way road. Because of this, the intersection count has no through traffic travelling eastbound, but the proposed cycleway will be bidirectional while the road remains one-way. To compensate for this, it was assumed that cyclists that currently travel from the north and south from Elizabeth Street and turn eastwards to travel along Liverpool Street will add to the future eastbound through demand at this intersection, as well as the extra trips associated with the expected increase in mode share. Figure 5.3 and Figure 5.4 show the projected cyclist demand assuming the changes in mode share outlined above.

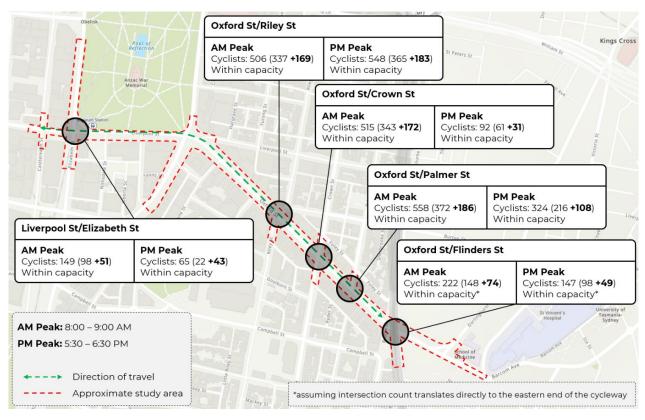


Figure 5.3 Cyclist demand assuming six per cent bicycle mode share

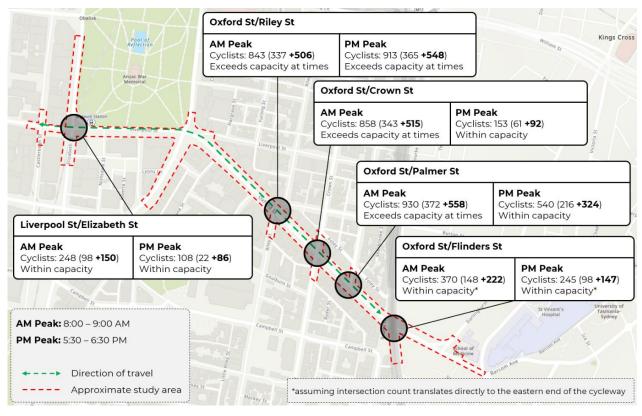


Figure 5.4 Cyclist demand assuming 10 per cent bicycle mode share

From the figures, it is likely that the cycleways will be able to comfortably accommodate growth to up to six per cent bicycle mode share demand. However, reduced capacity due to narrowing of cycleway design at bus stops may create pinch points which result in the capacity being exceeded for when the mode share reaches ten per cent.

#### 5.1.1.1 Access to and from the cycleway

Access to and from the cycleway is available mainly at traffic signals (signalised intersections and pedestrian crossings). The eastern end of the cycleway will rise onto the kerb outside where The Oxford Hotel is currently, and cyclists will have to continue riding on the road, or ride to connected cycle routes via Taylor Square north (to Foley Street) and south (to Bourke Street). Outside of these areas, access is restricted by medians which will limit bicycles from entering and exiting.

### 5.1.2 Pedestrians

Amenity for pedestrians will be improved following the construction of this cycleway, these include:

- Improve pedestrian priority and conflict with turning traffic through the closure of little Liverpool Street from Oxford Street and provision of continuous footpath along the north side of Oxford Street.
- Reduce crossing dwell time at Palmer Street–Oxford Street intersection through the closure of Palmer Street for inbound traffic. The signal phasing for pedestrian movements crossing Palmer Street runs concurrently with the eastwest phasing for traffic on Oxford Street.

Pedestrians are currently provided with minimum green time at the start of the phase to allow left-turn inbound traffic to proceed thereafter. The removal of the left turn movement into Palmer Street will ensure pedestrians are given the right of way for the entire phase time provided for the Oxford Street east-west movement.

- Remove pedestrian conflicts with turning vehicles at intersections associated with the proposed turning restrictions:
  - right turn movements from Elizabeth Street north and south approach into Liverpool Street westbound and eastbound respectively.
  - left turn from Liverpool Street (eastbound) onto College Street (northbound)
  - left turn from Oxford Street (eastbound) onto Palmer Street (northbound)
- Kerb realignment at certain locations along the cycleway will increase footpath space and queuing capacity for pedestrians. These locations are the intersections of Liverpool Street or Oxford Street with:
  - Elizabeth Street (north-east corner)
  - Wentworth Avenue (south-east corner)
  - Palmer Street (north-west corner)
  - Flinders Street (north side)

Raised pedestrian crossings, level with the existing footpath, will be provided to access the eastbound bus stops on Oxford Street to ensure pedestrians' right of way over cyclists.

Pedestrian management required during special events (i.e. Mardi Gras parade) would need to be managed separately by event coordinator. However, the design of the cycleway has considered float and pedestrian movements in consultation with the Mardi Gras committee.

# 5.2 Public transport

#### 5.2.1 Bus routes

There will be some changes to eastbound bus routes following the removal of the Museum Station, Liverpool Street, Stand A bus stop (stop ID: 200071), with westbound routes remaining unchanged. Currently, the bus routes of 311, 333, 392N, 396, and 440 use this bus stop. Figure 5.5 shows the new bus routes required because of the merging of this bus stop with Museum Station, Elizabeth Street, Stand C (stop ID: 200073).

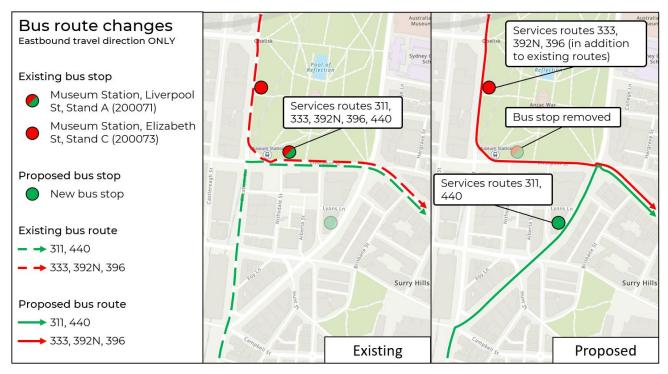


Figure 5.5 Proposed changes to bus routes and bus stops

The figure above shows the changes to bus stopping patterns and bus routes. As shown, there will be no change to the route taken by the 333, 392N, and 396 routes, but they will stop at Museum Station, Elizabeth Street, Stand C instead.

The bus route for the 311 and 440 routes will change, as there will no longer be a bus stop along Liverpool Street to load/offload passengers. These two services will now travel northwards along Wentworth Avenue rather than Elizabeth Street, and offload passengers at a new bus stop proposed for Wentworth Avenue between Lyons Lane and Commonwealth Street. It will then re-join Oxford Street and continue along its previous route.

### 5.2.2 Bus stops and bus zones

There will be several new bus stops as a part of this development. As mentioned in previous sections, there will be a new bus stop on the western side of Wentworth Avenue between Lyons Lane and Commonwealth Street. This bus stop will service some of the bus routes displaced from the removal of the Museum Station, Liverpool Street, Stand A bus stop. The associated bus zones will also be removed, with the bus zone adjacent to Hyde Park to be relocated to the new bus stop, as detailed in Sections 2.1.2.1 and 2.1.2.5.

The walking distance from the south-western Museum Station entry/exit point to the existing Stand A bus stop (to be removed) is approximately 50 m, compared to the walking distance to a new bus zone south of Stand C on Elizabeth Street from this entry/exit point being 65 m, which is where some Stand A buses will depart from following the bus route changes.

Shuttle buses which currently use the Liverpool Street Stand A bus stop, which services the Anzac Memorial would be encouraged to use the westbound bus stop east of Nithsdale Street, as this location provides direct access to the signalised mid-block pedestrian crossing to the memorial.

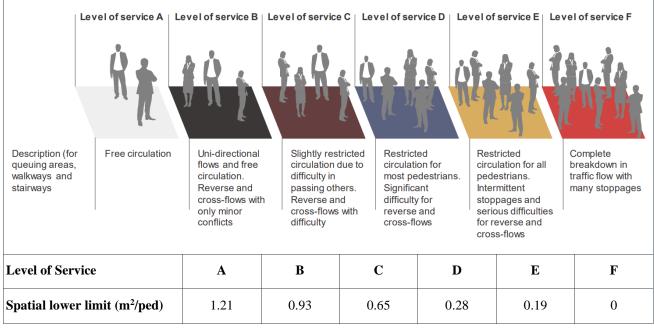
The existing kerbside bus stops along the northern kerbside of Oxford Street (opposite Brisbane Street and at Palmer Street) will be provided on a median island with a boarding platform separated from the cycleway. Pedestrians will have to cross the cycleway at the marked pedestrian crossings to access these two bus stops.

The new bus stop on Wentworth Avenue will potentially have new bus shelters installed. The Museum Station, Elizabeth Street, Stand C bus stop will also have new bus shelters installed.

## 5.2.3 Bus stop capacity

This section assesses and discuss the bus stop operation impacted by the proposed cycleway, particularly at the proposed bus boarders along Oxford Street. Due to space restrictions, the waiting area for the bus stops opposite Brisbane Street and west of Palmer Street is limited to only 2 m in width on the median. If these bus stops were to exceed capacity it may pose a safety risk to passengers, cyclists, and road vehicles.

To determine the level of service and capacity of these bus stops, the Opal ticketing data was used to estimate the number of passengers waiting and assessed against the Fruin Level of Service criteria shown in Figure 5.6, presented with a figure created by Transport for New South Wales.



Source:Pedestrian planning and design (Fruin, 1971)Figure 5.6Fruin level of service for queueing

Table 5.1 below presents the data used to estimate the level of service for the future bus stops. The following assumptions were considered in the assessment:

- Passenger demands were obtained from the tap-on and tap-off Opal card data. The worst-case scenario was assessed to include all passengers tapping on and off are present at the bus stop.
- A conservative bus arrival frequency assumption of buses arriving every 10 minutes was used in the assessment, instead of the timetabled service of every 2-3 minutes observed in peak hours on Oxford Street. This would account for some buses unable to stop as it has reached full capacity or for passengers at the bus stop aiming to board for a specific route. This would mean each passenger waits for 10 minutes to board and contributes to crowding in this time period.
- A 1.5 m width of each bus platform was used to calculate the bus waiting area, rather than the full 2–2.5 m clear space width of the median islands, presenting a more practical queueing arrangement at a bus stop.
- The Opal data from September 2017 was scaled to match predicted May 2019 patronage values as outlined in Section 3.1.2.

Given all the conservative assumptions made, this analysis can be considered a worst-case scenario.

Peak hour	Passengers (per hour)	Assumed frequency of platform clearing (per hour)	Bus waiting area (m²)	Individual passenger space (m²/person)	Level of Service
Oxford Street op	oposite Brisban	e Street (201055) – Eastbound	bus stop		
AM (7:00 - 8:00)	129	6	45	2.09	А
PM (16:00 - 17:00)	206	6	45	1.31	А
Oxford Street at	Palmer Street	(201058) – Eastbound bus stop			
AM (9:00 - 10:00)	116	6	65	3.36	А
PM (17:00 - 18:00)	203	6	65	1.92	А

Table 5.1Bus stop waiting area level of service

From this analysis, it can be seen that the level of service expected at the bus stops is level of service A. This indicates that there will likely be enough space for bus passengers at the proposed bus boarders to wait to board their bus, as well as for bus passengers alighting. The analysis also demonstrates that it is unlikely for waiting passengers to spill onto the cycleway or accidentally onto the road, which will reduce the likelihood of collisions between road vehicles and cyclists with passengers.

# 5.2.4 Train station

It is envisaged that there will be no impact to the Museum train station pedestrian access, its services or access for its maintenance vehicles.

# 5.3 Traffic network impact

The extent of the impact to the traffic network has been investigated by Transport for NSW separately. This has been done in the context of state and local policies for Sydney CBD, movement and place function of Oxford Street, road space allocation and the potential to extend the cycleway further east (known as the Oxford Street East Cycleway).

The summary of Transport for NSW's findings on the performances at key intersections are detailed in this chapter. The traffic model was developed in VISSIM which has a larger modelling study area than this project, encompassing Elizabeth Street, College Street, Oxford Street, Flinders Street and Moore Park Road. It also considered outputs from Transport for NSW's Strategic Traffic Forecasting Model (STFM). The full report can be found in Appendix B.

The overall impact to the traffic network would be continually monitored and reviewed by Transport for NSW. The City of Sydney will work collaboratively with Transport for NSW to address significant issues identified post opening of the cycleway. This includes during special events (Mardi Gras) where sections of Oxford Street are expected to be closed to host the parade.

# 5.3.1 Assessment Criteria

Average delay is commonly used to assess the operational performance of intersections, with level of service used as an index. A summary of the intersection level of service criteria is shown in Table 5.2.

Level of service	Average delay (seconds per vehicle)	Traffic signals, roundabout	Give-way and stop signs
А	Less than 14	Good operation	Good operation
В	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
С	29 to 42	Satisfactory	Satisfactory, but accident study required.
D	43 to 56	Operating near capacity	Near capacity and accident study required.
Е	57 to 70	At capacity. At signals, incidents would cause excessive delays. Roundabouts require other control mode.	At capacity, requires other control mode.
F	Greater than 70	Unsatisfactory with excessive queuing.	Unsatisfactory with excessive queuing; requires other control mode.

Table 5.2 Level of Service criteria for intersections

Source: Guide to Traffic Generating Developments (Transport for NSW, 2002)

#### 5.3.2 Intersection performance

The intersection performance impact summary is depicted in Table 5.3. This provides a road network performance comparison of the existing conditions and 'with cycleway' scenario on the road network in the study area.

Table 5.3	Peak intersection level of service
10010 0.0	

Intersection	AM Peak	AM Peak		PM Peak		Saturday Peak	
	Base	With cycleway	Base	With cycleway	Base	With cycleway	
Elizabeth Street/ Liverpool Street	С	C (-10 sec)	C	C (-4 sec)	С	B (-6 sec)	
Liverpool Street/ College Street/ Wentworth Avenue/ Oxford Street	D	D (-3 sec)	D	D (-14 sec)	D	C (-6 sec)	
Oxford Street/ Riley Street	В	B (+1 sec)	А	A (-2 sec)	В	A (-10 sec)	
Oxford Street/ Crown Street	В	C (+12 sec)	В	B (+6 sec)	А	B (+20 sec)	
Oxford Street/ Palmer Street	А	A (+0 sec)	А	B (+5 sec)	А	B (+9 sec)	
Oxford Street/ Flinders Street	В	E (+34 sec)	В	C (+12 sec)	В	B (+1 sec)	

The above outputs are further described individually in the sections below.

#### 5.3.2.1 Elizabeth Street/ Liverpool Street

The intersection performance of Elizabeth Street/Liverpool Street is forecast to improve compared with the base case. The average delay at this location is forecast to improve by 10 seconds, 4 seconds and 6 seconds in the AM, PM and Saturday peak periods respectively. The improvements at this location are due to the removal of right turn movements from Elizabeth Street north and south, which allows for greater green time for north-east movements between Elizabeth Street and Liverpool Street, even with the introduction of the cycle phase.

# 5.3.2.2 College Street/ Liverpool Street/ Wentworth Avenue

College Street / Liverpool Street / Wentworth Avenue / Oxford Street intersection LOS during the AM peak is forecast to operate at similar levels to base AM peak conditions. Analysis of the peak directional movement from Oxford Street east shows that the eastern approach delays are forecast to improve significantly, especially for the right turn movement from Oxford Street to College Street whereby the approach delay is forecast to reduce by more than 55 seconds for the AM Peak. The reason for this is with a reduction in capacity in the westbound direction, there is potentially more traffic upstream as well as a reduction in traffic along the corridor, resulting in less demands at the right turn bay and therefore a better performance at the intersection.

For the PM peak hour, the overall intersection delay is forecast to improve by 14 seconds. This is due to each approach showing an improved average delay. The northern and southern approaches show an increase in volume with the eastern and western approaches showing a decrease in volume. The peak direction during the PM is eastbound along Oxford Street and since the design shows minimal change in lane configuration downstream there is no significant improvement observed for the western approach. In addition, signal timings at this location were adjusted to satisfy the increased northbound demands under the reduced capacity of Wentworth Avenue.

Intersection performance improvements during the Saturday peak periods are forecast to be similar to the AM conditions, whereby the eastern approach to the intersection is forecast to improve by 21 seconds. Overall, the intersection is forecast to improve from LOS D to C with average delays reduced by 6 seconds.

### 5.3.2.3 Crown Street/ Oxford Street

The introduction of the cycle phase at the Crown Street / Oxford Street intersection is forecast to increase the average delay during the AM peak hour from 25 seconds to 37 seconds. This increase is attributable to the increased delay experienced by the eastbound left turn from Oxford Street onto Crown Street, where the delay for this movement increases from 22 seconds in the base conditions to over 83 seconds. This highlights a direct impact of the project by banning eastbound left turns on approach to College and Liverpool Street due to the cycleway and consolidating the impact at Crown Street.

During the PM peak hour, the average intersection delay is forecast to increase from 17 seconds to 24 seconds, which is categorised as continuing to operate at LOS B. Similarly, during the Saturday peak hour, the intersection is forecast to operate at LOS B with average intersection delay of approximately 22 seconds.

### 5.3.2.4 Flinders Street/ Oxford Street

During the AM peak hour, the intersection performance at Taylor Square (Oxford Street / Flinders Street) is forecast to decline from LOS B to LOS E with reported average delays of approximately 60 seconds. This is due to the reduced westbound capacity for general traffic along Flinders Street and Oxford Street east. The reduction from two lanes to a single lane on the Flinders Street approach to Taylor Square increases the approach delay from 53 seconds to over 190 seconds, with queues spilling back towards Short St (approximately 220m south maximum queue), thus impacting the intersection performance of Flinders Street / Short Street, which is forecast to operate at LOS F.

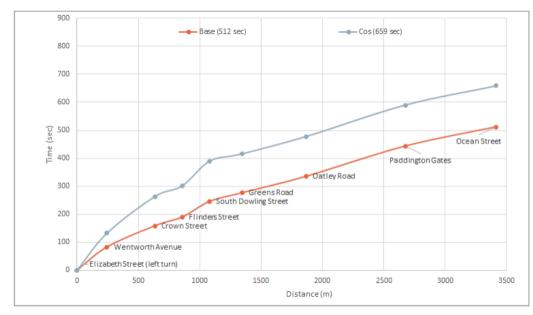
For the PM peak, the impact of the lane reduction on Flinders Street northbound is less pronounced since the peak movement is in the opposite direction. Regardless, the intersection is forecast to worsen from LOS B to LOS C, with average intersection delay increasing from 27 seconds to 41 seconds. The Flinders Street approach delay is forecast to increase from 34 seconds to 101 seconds. However, unlike the AM peak, the resultant queues on Flinders Street do not extend beyond the Short Street / Flinders Street intersection.

With lower traffic volumes at the intersection during the Saturday peak, when compared to the AM and PM peak periods, the intersection is forecast to continue to operate at LOS B, showing minor increases in the overall intersection delays.

# 5.3.3 General Travel Time Comparison

#### 5.3.3.1 AM Peak

The AM peak travel times on Oxford Street is depicted in Figure 5.7 and Figure 5.8 for the eastbound and westbound direction respectively. The base travel time are compared to the 'with cycleway' scenario in each.





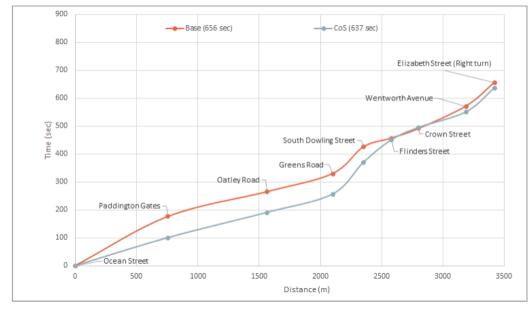


Figure 5.8 Westbound travel time comparison – AM Peak

The travel time results for the eastbound direction compared with the base conditions were observed to increase between Elizabeth Street and Wentworth Avenue. This is due to the signal optimisation of the intersection at Liverpool Street / Oxford Street / Wentworth Avenue / College Street catering for the peak westbound movement, whose capacity is reduced from three lanes to two lanes during the AM peak hour.

In the westbound direction, travel time savings are observed at the approach to Paddington Gates, when compared to the base conditions. This is due to the reduction in demand for Oxford Street through movement at the intersection with the implementation of the cycleway. Beyond Greens Road, westbound travel times are forecast to increase due to the reduced westbound capacity along Oxford Street west of Flinders Street.

#### 5.3.3.2 PM Peak

The PM peak travel times on Oxford Street is depicted in Figure 5.9 and Figure 5.10 for the eastbound and westbound direction respectively.

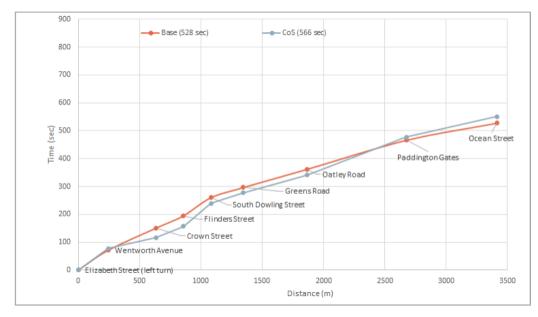


Figure 5.9 Eastbound travel time comparison – PM Peak

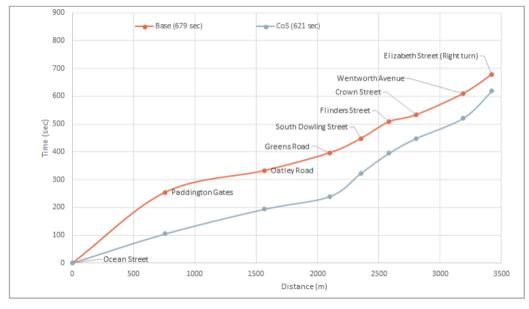


Figure 5.10 Westbound travel time comparison – PM Peak

As expected, the eastbound travel time shows minimal difference between Council design and base case during the PM peak as there are no differences in the eastbound capacity. Council design shows improved travel times through Crown Street during the PM peak hour. This is due to optimising the signals at the Crown Street intersection to improve the eastbound movements with the introduction of the cycle phase. As a result, eastbound throughput at the Crown Street intersection is improved. Furthermore, as no parking is permitted along the eastbound kerbside lanes during the PM peak, the cycle phase at Crown Street does not impact the eastbound general traffic throughput as much as during the AM peak hour.

Travel times on approach to South Dowling Street increase due to the increased vehicle demand on South Dowling Street. Further east, travel times increase on approach to Paddington Gates, due to increased demands and turning movements at this location.

For the PM Peak westbound direction, travel time savings are observed at the approach to Paddington Gates when compared to the base conditions. This is due to the reduction in demand for Oxford Street through movement at the intersection with the implementation of the cycleway. Beyond Greens Road, westbound travel times are forecast to increase due to reduced capacity along Oxford Street west of Flinders Street.

#### 5.3.3.3 Saturday Peak

The Saturday peak travel times on Oxford Street is depicted in Figure 5.11 and Figure 5.12 for the eastbound and westbound direction respectively.

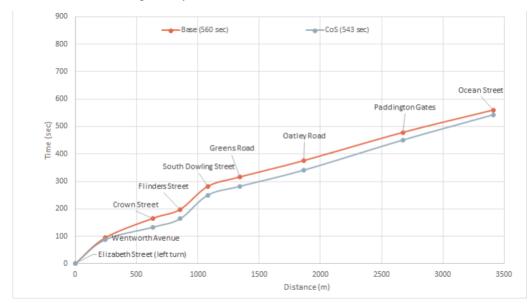


Figure 5.11 Eastbound travel time comparison – Saturday Peak

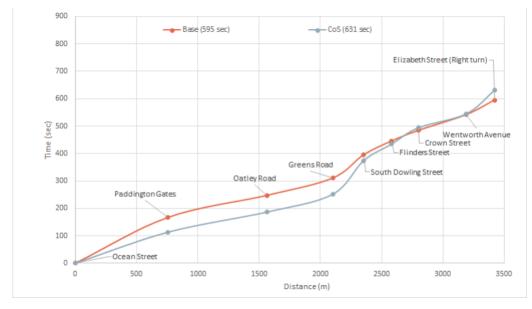


Figure 5.12 Westbound travel time comparison – Saturday Peak

Eastbound travel time analysis shows minimal difference between CoS design compared with the base. Travel times are forecast to improve on approach to Crown Street, due to the removal of the left turn movements onto Palmer Street improving the throughput of eastbound movements.

Furthermore, left turn demands onto Crown Street are relatively low when compared to the AM and PM peak hour. As a result, there are no significant delays associated with the cycle phase at Crown Street for the Saturday peak hour.

Like the AM and PM peak conditions, travel time savings are observed for the westbound direction from Paddington Gates for the Saturday peak. Beyond Greens Road, travel times appear to be similar to the base conditions. The westbound travel times are forecast to increase due to the reduced westbound capacity along Oxford Street west of Flinders Street.

# 5.3.4 Bus Travel Time Summary

The assessment comparing bus travel time on Oxford Street under existing conditions and with cycleway condition is summarised in Table 5.4 below. The route was verified using the bus route 333 which runs for the entire length of the study area.

DIRECTION	TIME OF ASSESSMENT	ORIGIN	DESTINATION	BASE CASE TRAVEL TIME	WITH CYCLEWAY TRAVEL TIME
Eastbound	AM	200073 – Museum	202511 – The Light	13.8	15.2
	PM	Station, Elizabeth Street, Stand C, Sydney	, , , , , , , , , , , , , , , , , , , ,	14.1	10.7
	Saturday			14.7	12.3
Westbound	AM	202148 – Oxford Street	200055 – Museum	21.8	17.3
	PM	opposite Moncur Street, Centennial Park	et, Station, Elizabeth Street, Stand D, Sydney	19.0	19.2
	Saturday			19.7	19.7

Table 5.4Bus travel time summary (minutes)

Source: Transport for NSW

The results for Oxford St show:

- Eastbound travel times
  - AM Peak travel times show a small increase compared to the base due to the introduction of a cycle phase at Crown St.
  - PM peak travel times show an improvement to travel times compared with the base due to the removal of the bus stop on Liverpool St, reducing dwell time for the overall journey.
  - Saturday peak travel time show an improvement compared with the base due to the removal of the bus stop on Liverpool St.
- Westbound travel times
  - AM peak travel times show an improvement compared to base due to improvements to signal operations at the western end.
  - PM peak travel times show an increase in travel time compared with the base due to the reduced westbound capacity and no bus lane during the PM Peak.
  - Saturday peak travel time show similar travel times compared with the base.

Transport for NSW has considered mitigation measures to improve the bus travel time, which includes the following targeted parking restriction modifications:

 Improve eastbound travel time in the AM peak by reviewing the allocation of four car parking and four loading zones between Riley Street and Crown Street on the northern kerbside.

This aims to alleviate the increased delay at Oxford Street/ Crown Street caused by increased left turn demand to accommodate left turning traffic impacted by the closure of little Liverpool Street and left turn ban at College Street. Additionally, TfNSW observed that right turn movements from Riley Street is also impacted by queues along Oxford Street at Crown Street.

The removal of parking spaces is expected to provide additional capacity to left turners and provide additional capacity to Riley Street users accessing Oxford Street and thus improving performance for buses.

 Improve westbound travel time in the PM peak by reviewing four unrestricted parking spaces between Crown Street and Palmer Street on the southern kerbside. This aims to improve capacity at this section and bring the bus travel time back to those observed in the existing conditions.

In terms of changes to parking signs on Oxford Street, ultimately the above findings result in the following changes:

- Eastbound direction between Riley St and Crown St during the AM peak. Proposed change to include:
  - Conversion of timing for 4 vehicle spaces signposted as '1P Ticket' zones between 8:30am and 3:00pm to 9:00am and 3:00pm
  - Conversion of 4 vehicles spaces signposted as loading zones between 7:00am and 3:00pm to 9:00am and 3:00pm
  - Inclusion of a 'No Stopping' zone between 7:00am and 9:00am (at the locations specified above).
- Westbound direction between Palmer St and Crown St during the PM peak, at the location of the existing 4 vehicle spaces signposted as loading zone:
  - Inclusion of a 'No Parking' zone between 4:30pm and 6:30pm where there is no current parking restriction.

# 5.4 Property accesses

#### 5.4.1 Turn bans

As summarised in Section 2.1.3, the proposed works will result in the following turn bans:

- no right turn from Elizabeth Street (northbound) onto Liverpool Street (eastbound)
- no right turn from Elizabeth Street (southbound) onto Liverpool Street (westbound)
- no left turn from Liverpool Street (eastbound) onto College Street (northbound)
- no right turn from Liverpool Street (eastbound) onto Wentworth Avenue (southbound)
- no left turn from Oxford Street (eastbound) onto Palmer Street (northbound)

#### 5.4.2 Route access/egress

There will also be the following access changes as outlined in Section 2.1.4:

- the closure of Little Liverpool Street from Oxford Street following installation of bollards
- no access to Palmer Street from Oxford Street following the change of Palmer Street to one-way traffic only between Foley Street and Oxford Street



Figure 5.13 Summary of banned movements resulting from required operational changes

### 5.4.3 Alternative routes

As a result of the changes to access outlined in Section 5.4.1 and 5.4.2, alternative routes will be sought by commuters. The following figures provide possible alternative routes for access to various surrounding areas of the development.

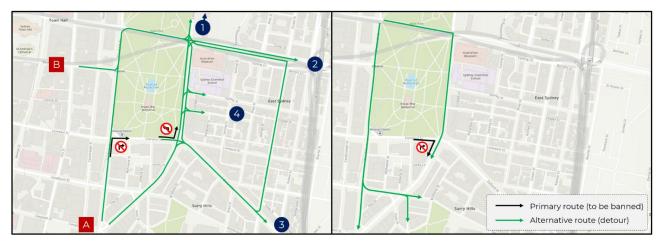


Figure 5.14 Possible alternative routes for Liverpool Street–Elizabeth Street, Liverpool Street–Oxford Street–College Street–Wentworth Avenue intersection turn bans

The left diagram in Figure 5.14 shows many possible routes from a number of origins and destinations. To aid in identifying alternative route choices, Table 5.5 has been prepared to be used in conjunction with Figure 5.14 to outline some possible alternative routes from different impacted origins and destinations.

Table 5.5	Alternative r	oute choice
-----------	---------------	-------------

Origin	Destination	Original route	Alternative route
	1	Elizabeth Street,  → Liverpool Street,  ← College Street.	Elizabeth Street,  → Park Street,  → College Street. Wentworth Avenue,  ↑ College Street.
А	2	Elizabeth Street, r→ Liverpool Street, ← College Street, r→ Park Street.	Elizabeth Street, r→ Park Street. Wentworth Avenue, ↑ College Street, r→ Park Street.
	3	Elizabeth Street, → Liverpool Street, ↑ Oxford Street.	Wentworth Avenue, → Liverpool Street, ↑ Oxford Street.
	4	Elizabeth Street,  → Liverpool Street,  → College Street,  → (Francis Street–Stanley Street).	Wentworth Avenue, ↑ College Street, → (Francis Street–Stanley Street).
В	4	Bathurst Street, ➡ Elizabeth Street, ➡ Liverpool Street, ➡ College Street, ➡ (Francis Street–Stanley Street).	Bathurst Street, ← Elizabeth Street, ← Park Street, ← College Street, ← (Francis Street–Stanley Street).

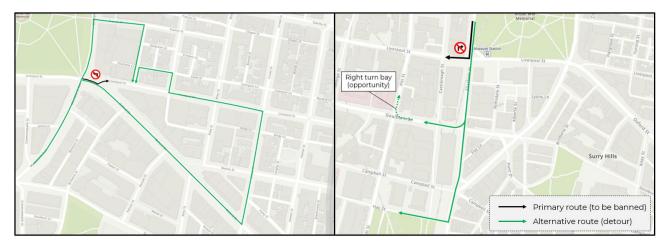


Figure 5.15 Possible alternative routes for Oxford Street–Little Liverpool Street and Liverpool Street–Elizabeth Street intersection turn/access turn bans

Figure 5.15 highlights an opportunity to explore the provision of a right turn bay on Goulburn Street to Pitt Street north given the possibility of increased traffic due to drivers detouring.

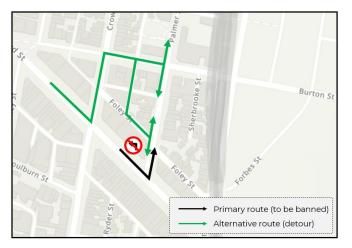


Figure 5.16 Possible alternative routes for Oxford Street–Palmer Street intersection turn ban

# 5.5 Kerbside uses

This section summarises the proposed changes to on-street parking/ kerbside use allocation due to the proposed cycleway.

# 5.5.1 Loading zones

As detailed in Section 2.1.2, changes to loading zones are required as part of the operation of the cycleway. The loading zone (3-4 spaces) will be removed along the northern side of Oxford Street between Palmer Street and Flinders Street. The shared loading and ticketed parking zone (3-4 spaces) will be removed along the western side of Wentworth Avenue between Commonwealth Street and Lyons Lane.

In addition to the above and based on Transport for NSW's modelling outcomes of bus travel time (refer to section 5.3.4), it is proposed to convert four vehicles spaces signposted as loading zones located on the northern side between Riley Street and Crown Street from 7:00am and 3:00pm to 9:00am and 3:00pm. The spaces are to be signposted as 'No Stopping' between 7:00am and 9:00am.

#### 5.5.2 Parking

- In the area of works, there will be 25 ticketed parking spots lost, 5 of which are shared loading zone/parking spots depending of the time of day. This mainly occurs along Liverpool Street between College Street and Elizabeth Street.
- The short section of Little Liverpool Street between Oxford Street and Hargrave Street will be converted as a twoway road. Existing parallel parking will be replaced by angled parking. The existing loading zone, car share spaces and car parking spaces will be provided. However the overall number of car parking spaces will be reduced from 6 spaces to 4 spaces and loading zone from 3 spaces to 2 spaces.

To manage this change, the spaces will be time restricted to correspond to the kerb side use demand (i.e. loading and short-term parking during the day and longer stay at night):

- 4 car parking spaces to be available as 1/4P during the day (8:30am-6pm Monday to Friday; 8:30am-12:30pm Saturday) and 2P at night (6pm-10pm Monday to Friday; 12:30pm-10pm Saturday; and 8am-10pm Sunday and public holiday). The 1P restriction currently apply to the three car parking spaces on the northern kerbside of Little Liverpool Street will be removed.
- Two loading zone will be available during the day (8am-6pm Monday to Friday and 8am-12:30pm Saturday), with the space to be used as 2P at night (6pm-10pm Monday to Friday; 12:30pm-10pm Saturday; and 8am-10pm Sunday and public holiday).
- The number of existing car share spaces (2 spaces) will be maintained.
- One car parking space on Oxford Street northern kerbside immediately east of Little Liverpool Street will also be removed to accommodate eastbound tracking of design vehicles on Oxford Street.

In addition to the above and based on Transport for NSW's modelling outcomes of bus travel time (refer to section 5.3.4), it is proposed to convert:

- Eastbound direction between Riley St and Crown St during the AM peak. Proposed change to include:
  - Conversion of timing for 4 vehicle spaces signposted as '1P Ticket' zones between 8:30am and 3:00pm to 9:00am and 3:00pm
  - Inclusion of a 'No Stopping' zone between 7:00am and 9:00am (at the locations specified above).
- Westbound direction between Palmer St and Crown St during the PM peak, at the location of the existing 4 vehicle spaces signposted as loading zone:
  - Inclusion of a 'No Parking' zone between 4:30pm and 6:30pm where there is no current parking restriction.

# 6 Mitigation measures

#### 6.1 Construction

The potential construction impacts, and mitigation measures are summarised in Table 6.1 below.

 Table 6.1
 Construction impact mitigation measures

Impact type	Measures	Applicable locations
Traffic management during construction	A Construction Traffic Management Plan (CTMP) is to be prepared by the appointed Construction Contractor in accordance to Transport for NSW <i>Traffic Control at Worksites</i> and relevant Austroads guidelines and in consultation with the road authority to identify the potential transport-related delays and disruptions that may arise during the works and plan for a suitable mitigation accordingly. The plan is to include (as a minimum):	All construction sites
	<ul> <li>Appropriate traffic management and signposting of access/egress points to minimise conflicts with vehicle movements on the road network.</li> </ul>	
	— Measures to minimise disruption to pedestrians, cyclists and motorists.	
	<ul> <li>Development of Traffic Guidance Scheme (TGS) to manage traffic around, past or through the construction sites as appropriate.</li> </ul>	
	<ul> <li>Inclusion of a Vehicle Movement Plan (VMP) to manage safe vehicle access/egress from construction compounds and other construction work areas.</li> </ul>	
	<ul> <li>Measures to maintain and ensure safe access for emergency vehicles and to existing properties during construction, or provision of suitable alternatives.</li> </ul>	
	<ul> <li>Active liaison with relevant road authority and stakeholders and informs road users of the proposed works on the road network.</li> </ul>	
Access changes due to proposed turn bans and associated notification	Several access changes are proposed as part of the cycleway and are detailed in Section 2.1.3 Access changes. These have been considered with available detour options on the road network as described in 5.4.3 Alternative routes applicable during construction and operation. The proposed turn bans are to be implemented during construction as the cycleway would include construction of traffic facilities required to physically restrict the proposed turn bans.	Affected locations as detailed in Section 2.1.3 Access changes.
	Affected residents and businesses would be notified of the access changes prior to construction.	
Temporary lane closures or temporary road closures	Temporary lane closures to accommodate proposed construction works on Oxford Street are to be undertaken at night time to minimise impact to the road network capacity during the peak operating hours. Road Occupancy Licence (ROL) are to be sought from the relevant road authority for all temporary partial or full closures and its conditions complied with., including the hours of operations.	All construction works interacting with road network

Impact type	Measures	Applicable locations
Property access during construction	Accesses to properties are proposed to be maintained during construction, however where short-term interruption is required, the Construction Contractor are to liaise with the relevant property owners and business owners as appropriate.	Access to properties affected by the construction
Public transport services	Temporary relocation of bus stops on the northern kerbside of Oxford Street would be required to construct the proposed median island for the bus stop. The project will require appropriate liaison with bus service providers and notification at existing bus stops prior and during construction.	Oxford Street eastbound bus stops at Brisbane Street and Palmer Street
Emergency access	Emergency vehicle accesses – Access for emergency vehicles must be maintained at all times.	All construction sites

#### 6.2 Operational

The potential operational impacts, and mitigation measures are summarised in Table 6.2 below.

Table 6.2 Construction impact mitigation measur	es
---	----

Impact type	Measures	Applicable locations
Access changes due to proposed turn bans and associated notification	Several access changes are proposed as part of the cycleway and are detailed in Section 2.1.3 Access changes. These have been considered with available detour options on the road network as described in 5.4.3 Alternative routes. The impacts are considered minor to moderate, given that the majority of the turn bans would mainly impact local access and not a network-wide detour.	Affected locations as detailed in Section 2.1.3 Access changes.
	The proposed turn bans are to be implemented during construction as the cycleway would include construction of traffic facilities required to physically restrict the proposed turn bans.	
	To manage the impact, affected residents and businesses would be notified of the access changes prior to construction.	
Bus stop capacity	As part of the proposed cycleway design, existing kerbside eastbound bus stops on Oxford Street at Brisbane Street and Palmer Street will be provided with median islands to be used as bus boarders to manage operational conflict between passenger boarding/alighting and the cycleway.	Bus stops on Oxford Street
	The Oxford Street road width limits the width of the bus platform to 2 m. The capacity of the proposed bus platforms has been assessed in Section 5.2.3. LoS A was found for both the eastbound bus stops at Brisbane Street and Palmer Street, based on bus passenger data available, indicating sufficient operating space available.	
	However, changes to the operating bus frequency and land use which are out of the scope of this study may increase the number of passengers per bus and people using the bus stop. The condition is to be monitored to minimise bus passengers queueing into the cycleway.	

Impact type	Measures	Applicable locations
Loading zone and associated loading/ unloading area	For the most part the existing loading zones are proposed to be maintained throughout the corridor to ensure existing freight tasks can continue.	On-street parking on
	The loading zones at will be removed from:	Oxford Street
	— Oxford Street between Palmer Street and Flinders Street (5 spaces)	
	— Wentworth Avenue between Commonwealth Street and Lyons Lane (5 spaces)	
	Loading zones along the northern kerbside are proposed to be provided with a median island/platform so that loading/unloading activities do not encroach onto the cycleway.	
	In addition to the above and based on Transport for NSW's modelling outcomes of bus travel time (refer to section 5.3.4), it is proposed to convert four vehicles spaces signposted as loading zones located on the northern side between Riley Street and Crown Street from 7:00am and 3:00pm to 9:00am and 3:00pm. The spaces are to be signposted as 'No Stopping' between 7:00am and 9:00am, thus partially removing the availability of loading zones during this time.	
Traffic network capacity	The extent of the impact to the traffic network has been investigated by Transport for NSW separately, in line with the review of the state and local policies for Sydney CBD, movement and place function of Oxford Street, road space allocation and the potential to extend the cycleway further east (known as the Oxford Street East Cycleway).	Cycleway corridor and road/pedestrian network within the vicinity of
	Transport for NSW's modelling results showed a mixture of improvements along the corridor, where turn movements are proposed to be removed at intersections, and decreases in the performance, specifically at locations where capacity is reduced, or demands are forecast to increase. These are indicative of what would be expected on a corridor where capacity has been reduced to promote a multi-modal outcome.	the project
	The overall impact to the traffic network operations would be continually monitored and reviewed by Transport for NSW. The City of Sydney will work collaboratively with Transport for NSW to address unforeseen issues identified post opening of the cycleway.	
Loss of on-street	The loss of on-street car parking spaces include:	As described in
parking	<ul> <li>20 on-street parking spaces on Liverpool Street between Castlereagh Street and College Street are proposed to be removed as part of the proposal. These spaces are currently signposted as short-term parking ranging from 2P to 4P.</li> </ul>	description
	<ul> <li>5 on-street parking spaces are also proposed to be removed along Wentworth Avenue between Oxford Street and Goulburn Street and are currently signposted as 4P parking or loading zones.</li> </ul>	
	<ul> <li>1 on-street parking space on Oxford Street northern kerbside immediately east of Little Liverpool Street will also be removed to accommodate eastbound tracking of design vehicles on Oxford Street.</li> </ul>	
	Modification to the design of on-street car parking spaces on Little Liverpool Street to accommodate the proposed road closure. This results in a loss of two car parking spaces overall, to be managed through time restriction	

Impact type	Measures	Applicable locations
	corresponding to the kerb side use demand (i.e. loading and short-term parking during the day and longer stay at night).	
	In addition to the above and based on Transport for NSW's modelling outcomes of bus travel time (refer to section 5.3.4), it is proposed to partially (through time restrictions) remove parking at the following locations:	
	<ul> <li>Eastbound direction between Riley St and Crown St during the AM peak.</li> <li>Proposed change to include:</li> </ul>	
	<ul> <li>Conversion of timing for 4 vehicle spaces signposted as '1P Ticket' zones between 8:30am and 3:00pm to 9:00am and 3:00pm</li> </ul>	
	<ul> <li>Inclusion of a 'No Stopping' zone between 7:00am and 9:00am (at the locations specified above).</li> </ul>	
	<ul> <li>Westbound direction between Palmer St and Crown St during the PM peak, at the location of the existing 4 vehicle spaces signposted as loading zone:</li> </ul>	
	<ul> <li>Inclusion of a 'No Parking' zone between 4:30pm and 6:30pm where there is no current parking restriction.</li> </ul>	
	On-street car parking spaces can still be found in the adjacent side streets such as Elizabeth Street, Wentworth Avenue, and Crown Street and public off-street car parking facility nearby including Wilson Parking at 70 Riley Street.	
	There is no like-for-like replacement proposed for the loss of car parking spaces at this location. However the objectives of this project promoting a multi-modal outcome aligns with the objectives of the City's policies as reflected in <i>Sustainable Sydney 2030</i> and <i>Cycling Strategy and Action Plan</i> to make bicycle transport easier and safer, to make it an attractive and feasible option for more people.	
Cumulative impact	At the time of writing, changes to the land uses within the vicinity of the area were being proposed in parallel. This includes:	Road network within the
	<ul> <li>Oxford Street Cultural and Creative precinct has the potential to increase the floor space in developments surrounding Oxford Street. This would result in the increase of transport demand to/ from the precinct.</li> </ul>	vicinity of the cycleway
	The cycleway would benefit this project by providing a safe cycling facility to access this precinct.	
	This proposal may impact the capacity of bus services and bus stop, due to increased bus trips correlating to greater employment opportunities in the precinct.	

# 7 Conclusion

WSP has been engaged to undertake a Traffic and Transport Impact Assessment (TTIA) of the proposed bidirectional cycleway which would run along the northern kerbside of Liverpool Street and Oxford Street extending between Castlereagh Street to Flinders Street.

In summary, the report aims to describe the existing conditions of the road network and associated demand, assess the impacts of the project to the surrounding road network during construction and operational stage, and provide a list of mitigation measures for consideration by the City of Sydney to manage key impacts resulting from the project.

The cycleway objectives are to create safe bicycle network connections that would be comfortably used by a 12-year-old riding independently. It aims to support and balance the movement and place function of Oxford Street. It also aims to be designed as a 'light construction' cycleway, fitting the works within existing kerbs to the extent possible and minimising works such as kerb realignment or impacts on underground utilities.

The cycleway would be a separated facility from the adjacent traffic lane. Separation would be achieved through the use of medians, new bus boarding areas and garden beds. Pedestrian facilities along the route would be improved through widening of footpath area at several intersections and implementing several turn restrictions to prioritise movements on the corridor (pedestrians, cyclists, public bus and general car traffic).

The cycleway would be able to accommodate the current high cycling demand on this corridor and accommodate the growing cycling demand likely to be induced from this project and completing the cycling network in Sydney CBD as set out in the City's strategic and local action plan *Sustainable Sydney 2030* and *Cycling Strategy and Action Plan 2018*.

The impacts of the project to public transport operations are generally minor with existing westbound bus stops to be maintained, proposed change in bus routes able to be suitably accommodated and the proposed bus boarders included in the design have been assessed to maintain good serviceability for bus passengers. The travel time for buses has been assessed separately by Transport for NSW and several on-street parking modifications have been proposed to improve the running time performance for buses.

The impacts of the project to freight are also minor with truck accessibility and loading zones maintained in the design. Loading and unloading activities along the northern kerbside (adjacent to the cycleway) however, can be restricted because of the proposed median island width.

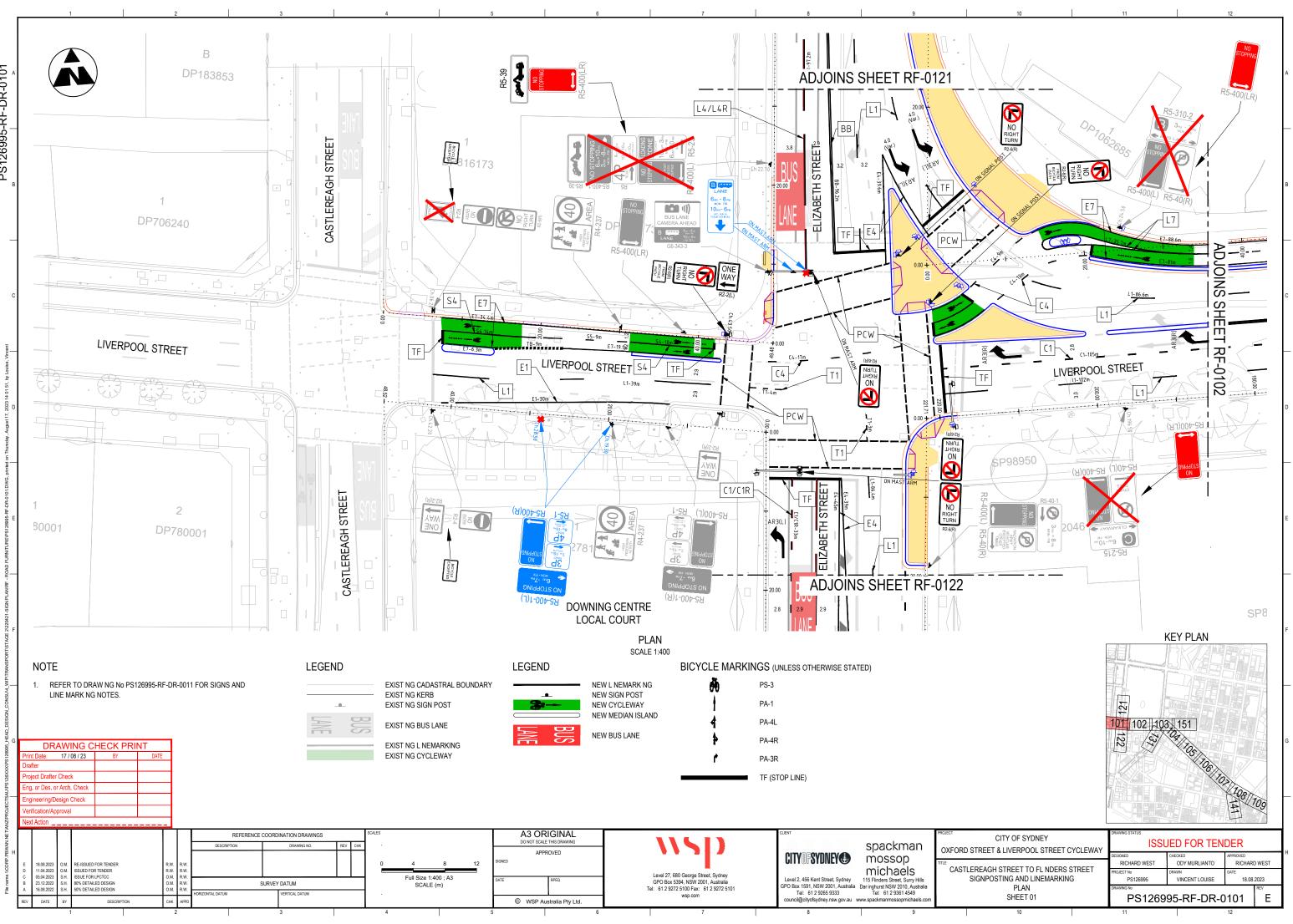
In terms of traffic operations, the cycleway would reduce the numbers of traffic lanes from three lanes in each direction (including a bus lane in each direction) to two lanes in each direction (including a bus lane in each direction). Auxiliary (turning) lanes would be maintained at key intersections. Transport for NSW's modelling results showed a mixture of improvements along the corridor, where turn movements are proposed to be removed at intersections, and decreases in the performance, specifically at locations where capacity is reduced, or demands are forecast to increase. These are indicative of what would be expected on a corridor where capacity has been reduced to promote a multi-modal outcome.

The impact to the traffic network operations would be continually monitored and reviewed by Transport for NSW. The City of Sydney will work collaboratively with Transport for NSW to address significant issues or implement further improvements identified post opening of the cycleway.

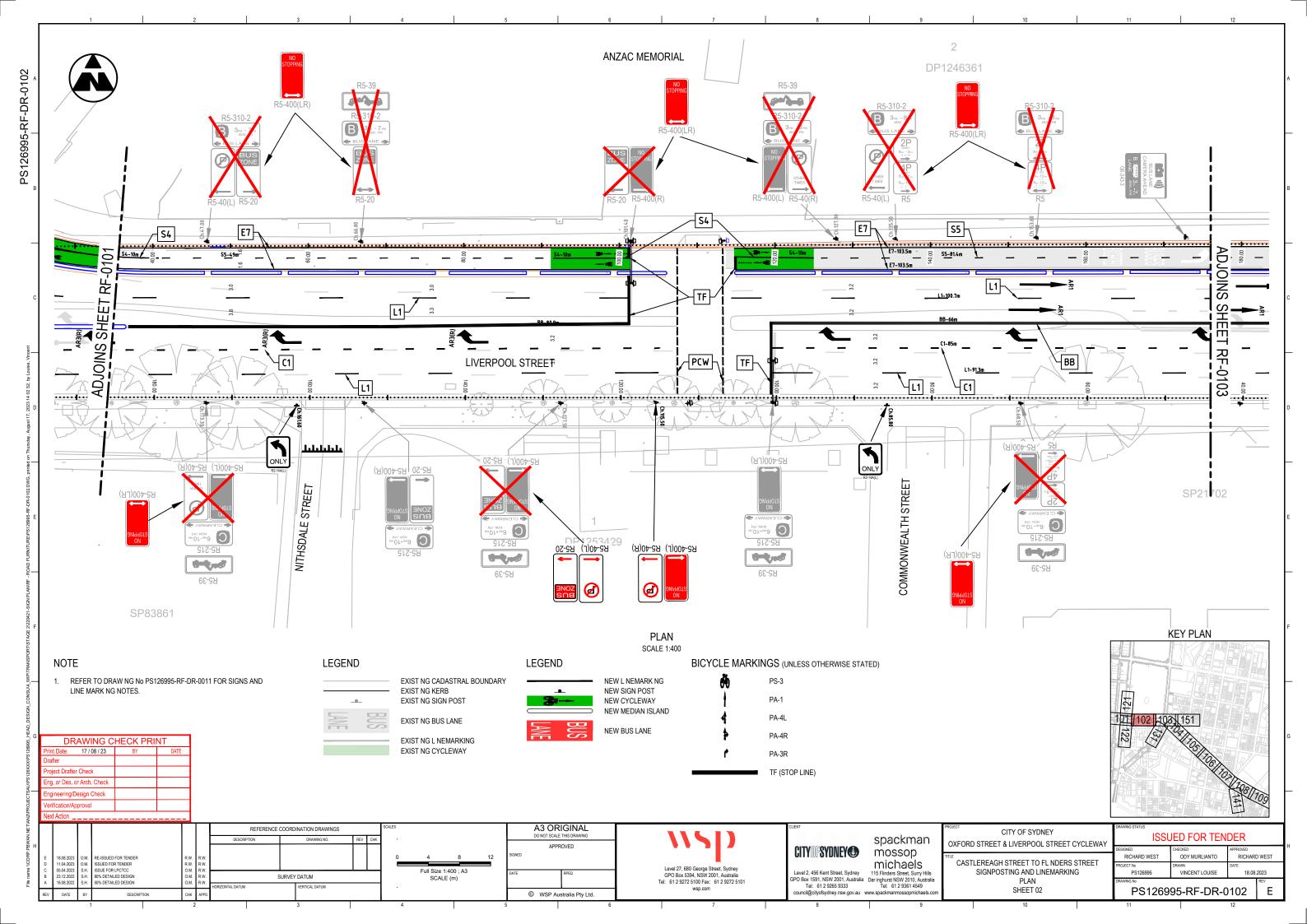
To construct the project, it is envisaged that the majority of construction works would be undertaken at night time to minimise disruption to the road network. The works would occupy two eastbound lanes and require traffic lanes to be diverted around the work sites. For most part, two lanes each way are expected to be operational during the undertaking of works. Construction Transport Management Plan is to be developed to consider construction staging and management strategies during works.

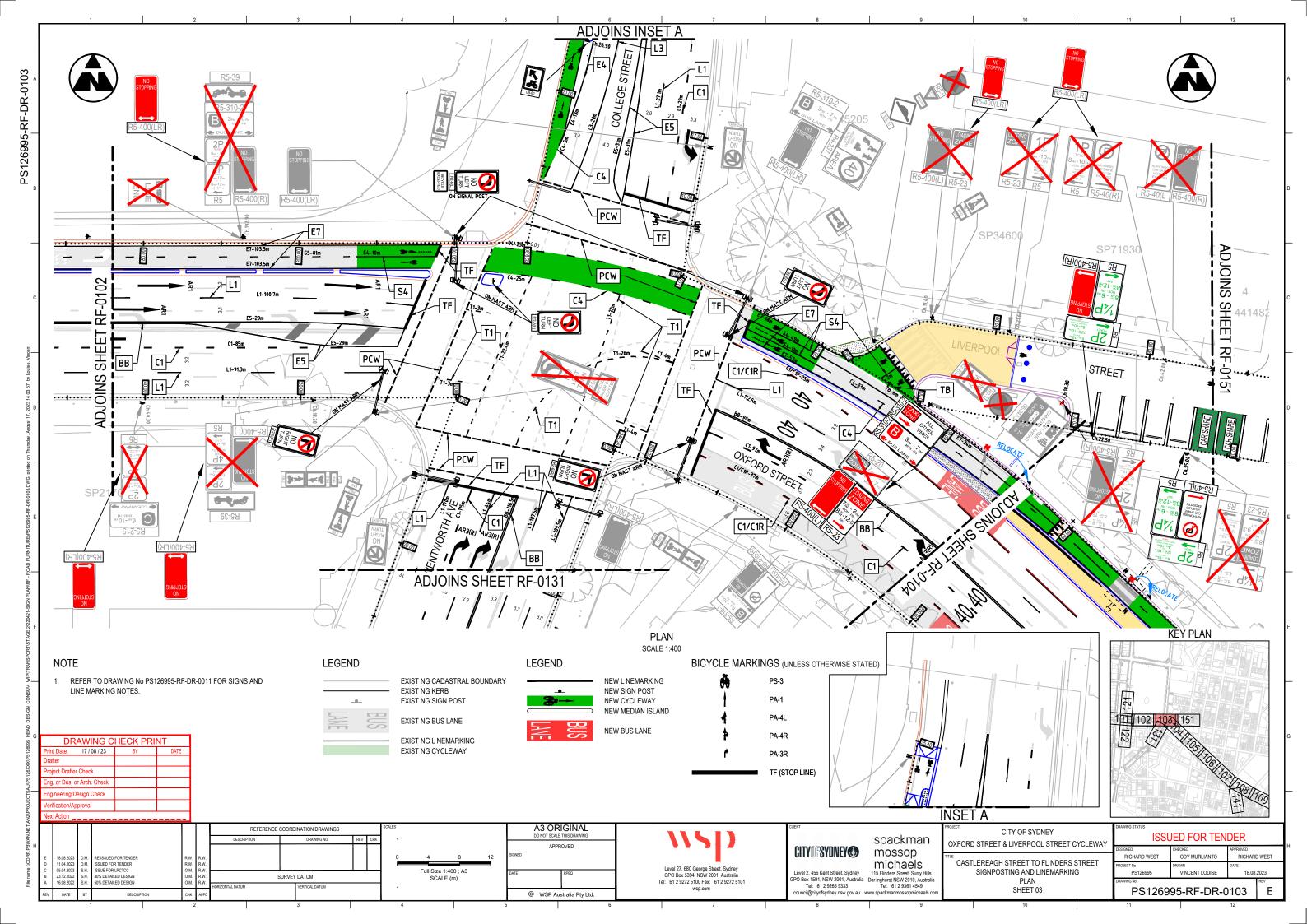
# Appendix A Concept Design

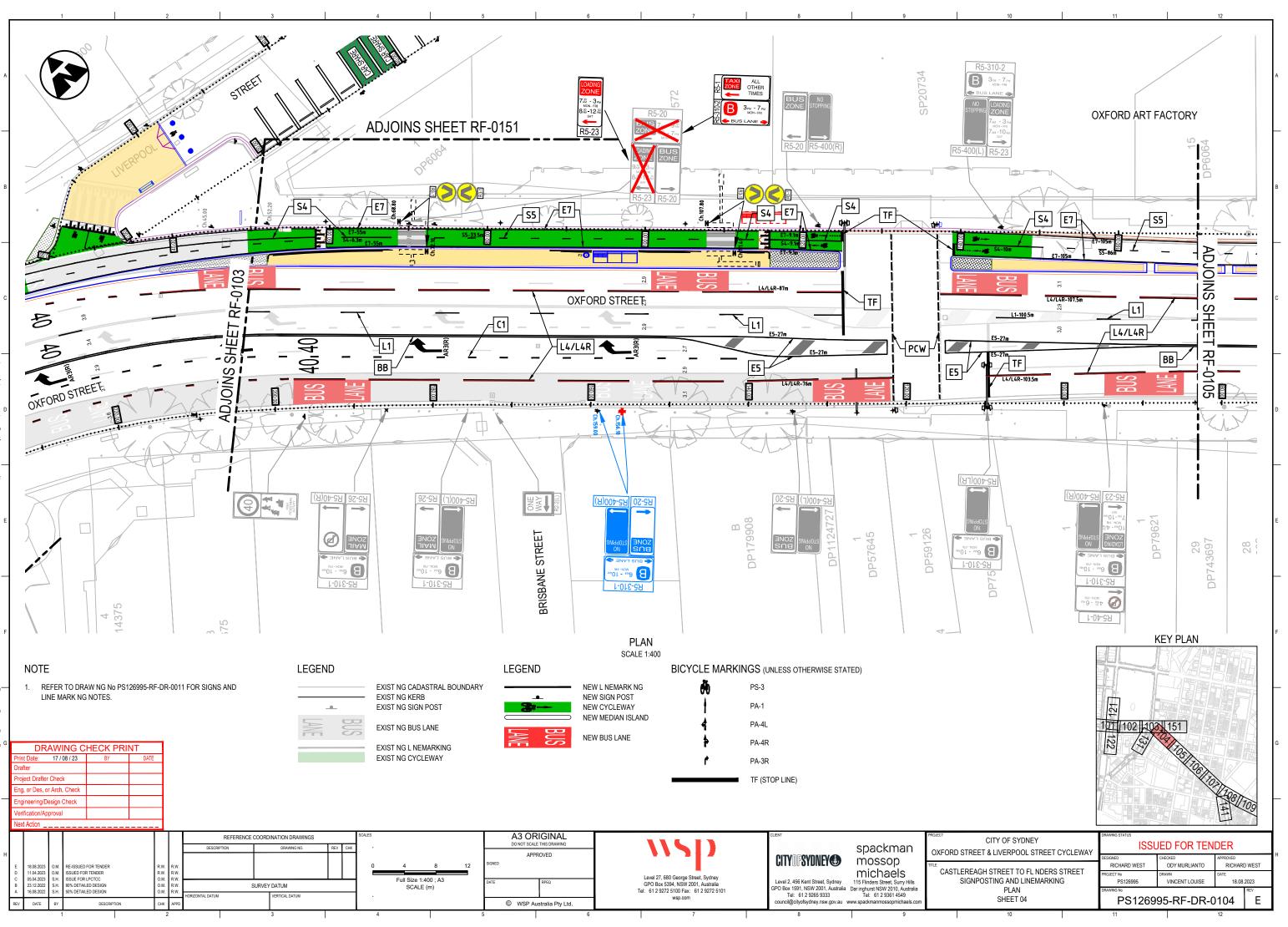


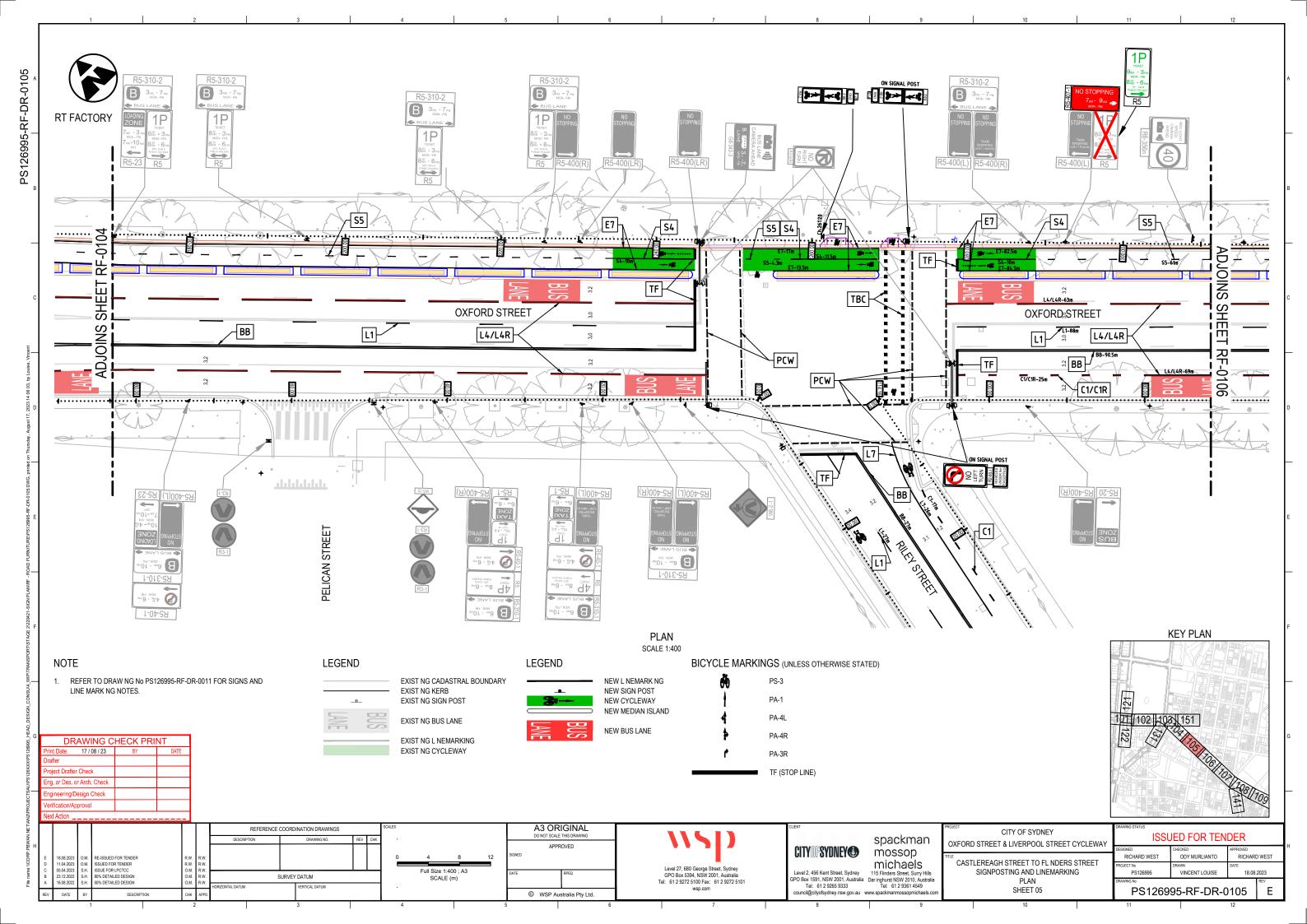


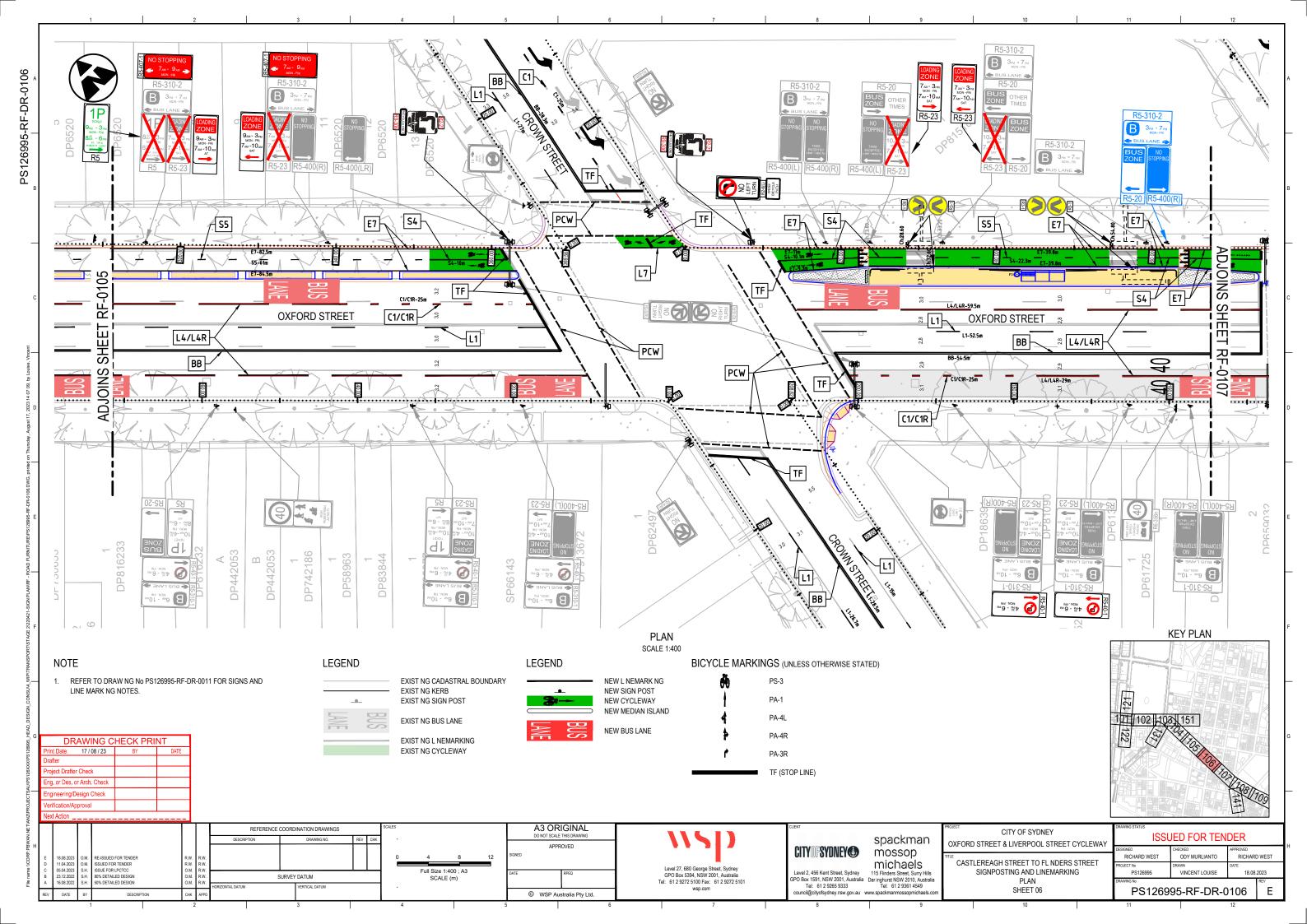
PS126995-RF-DR-0101

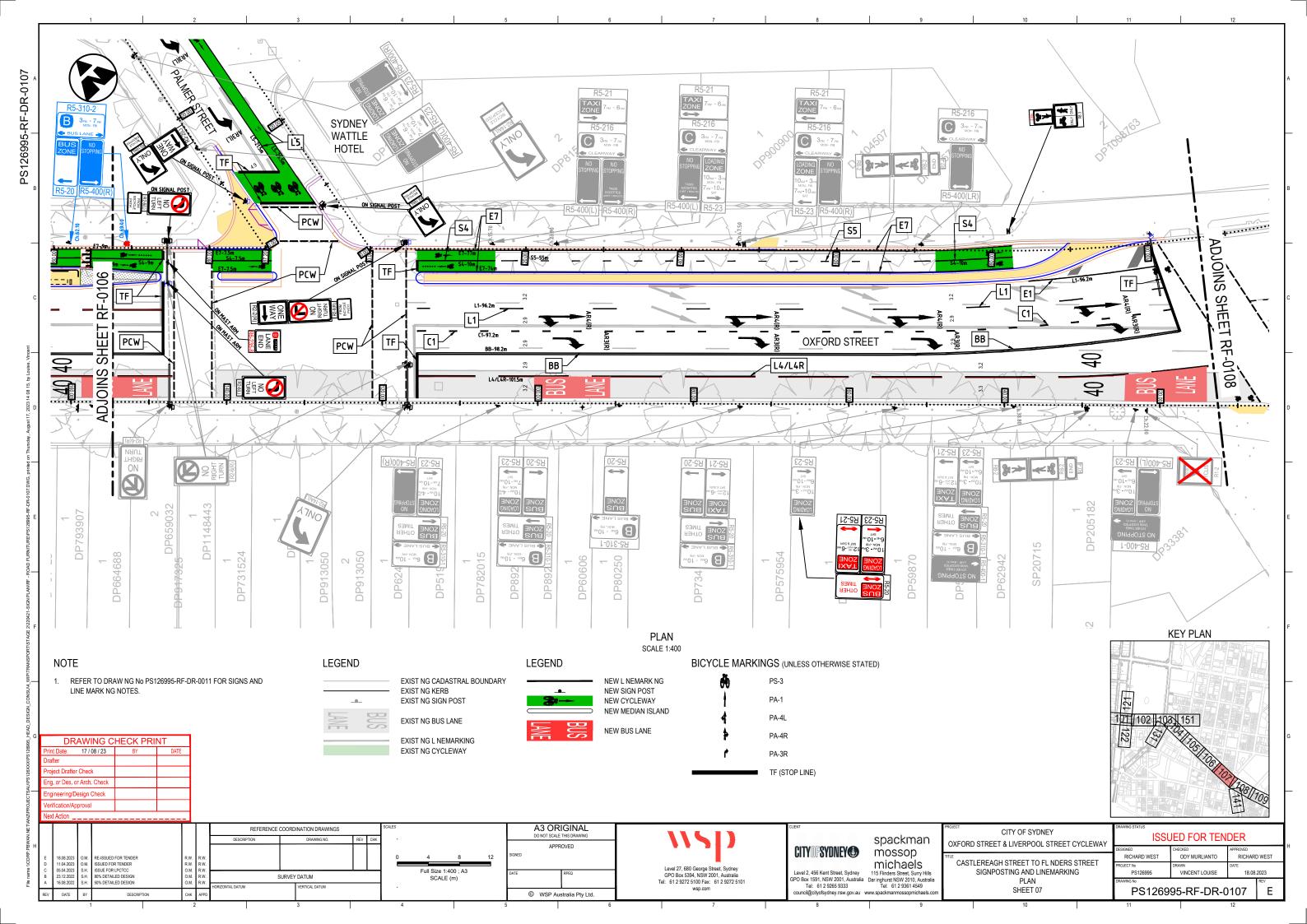


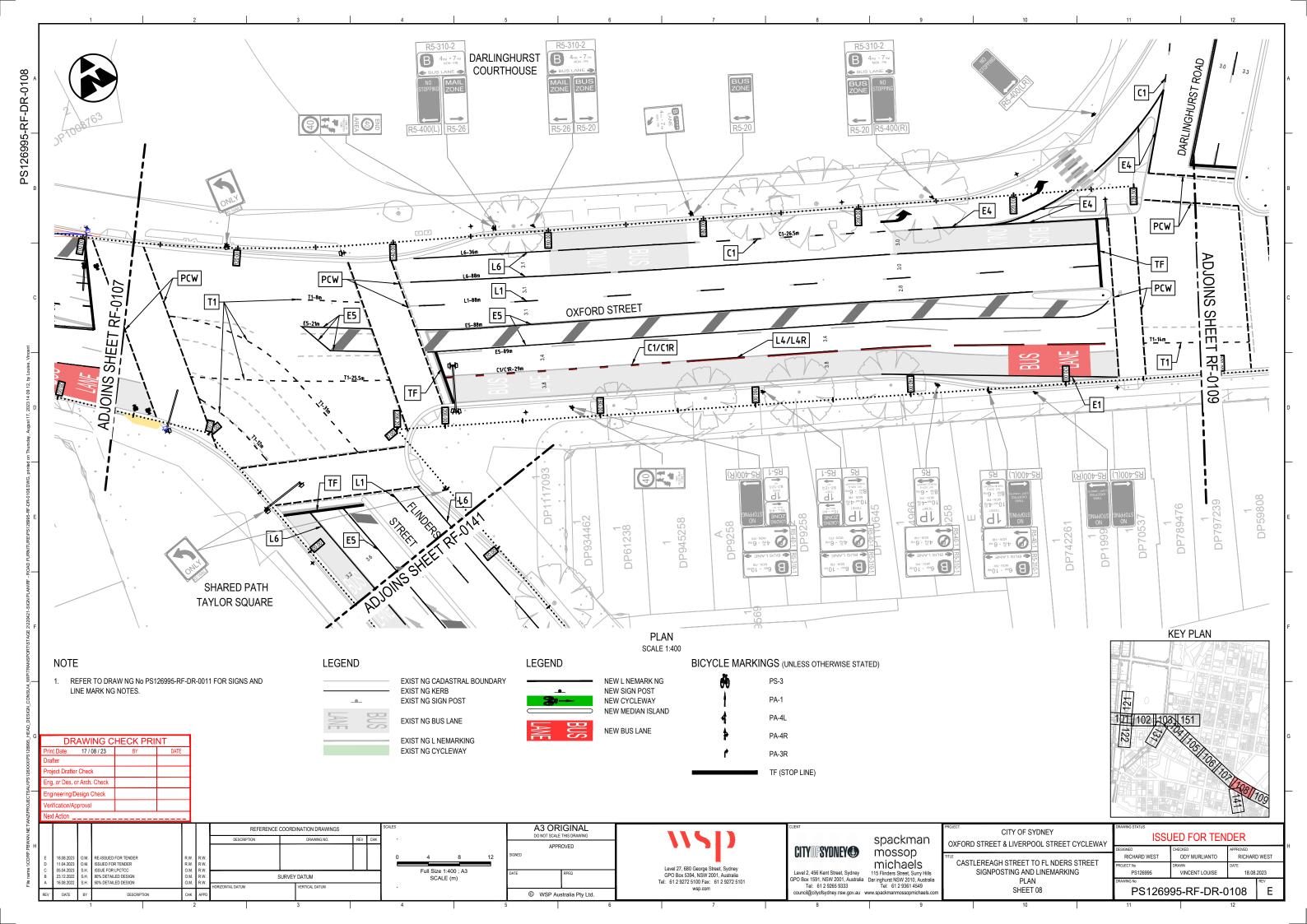


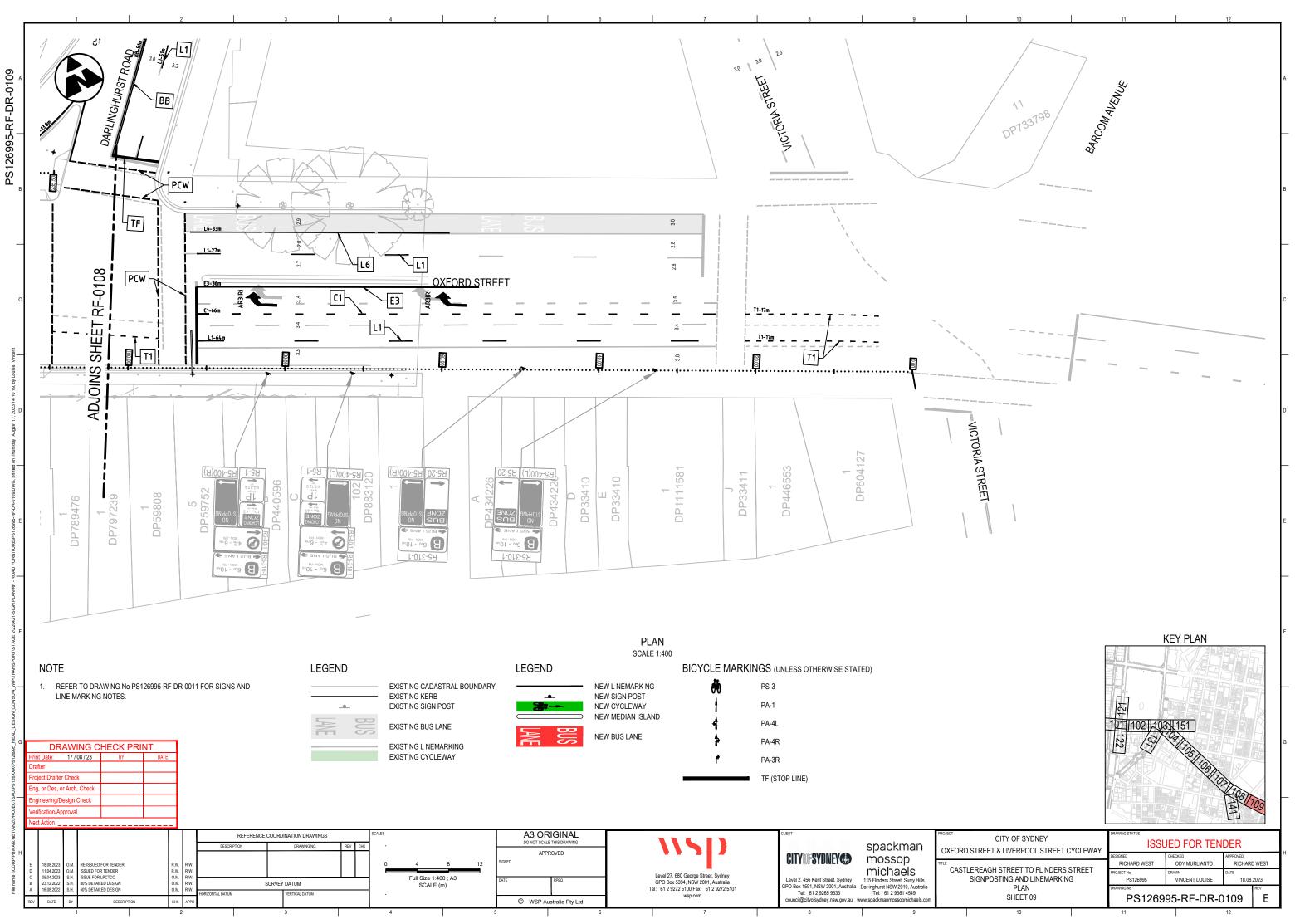


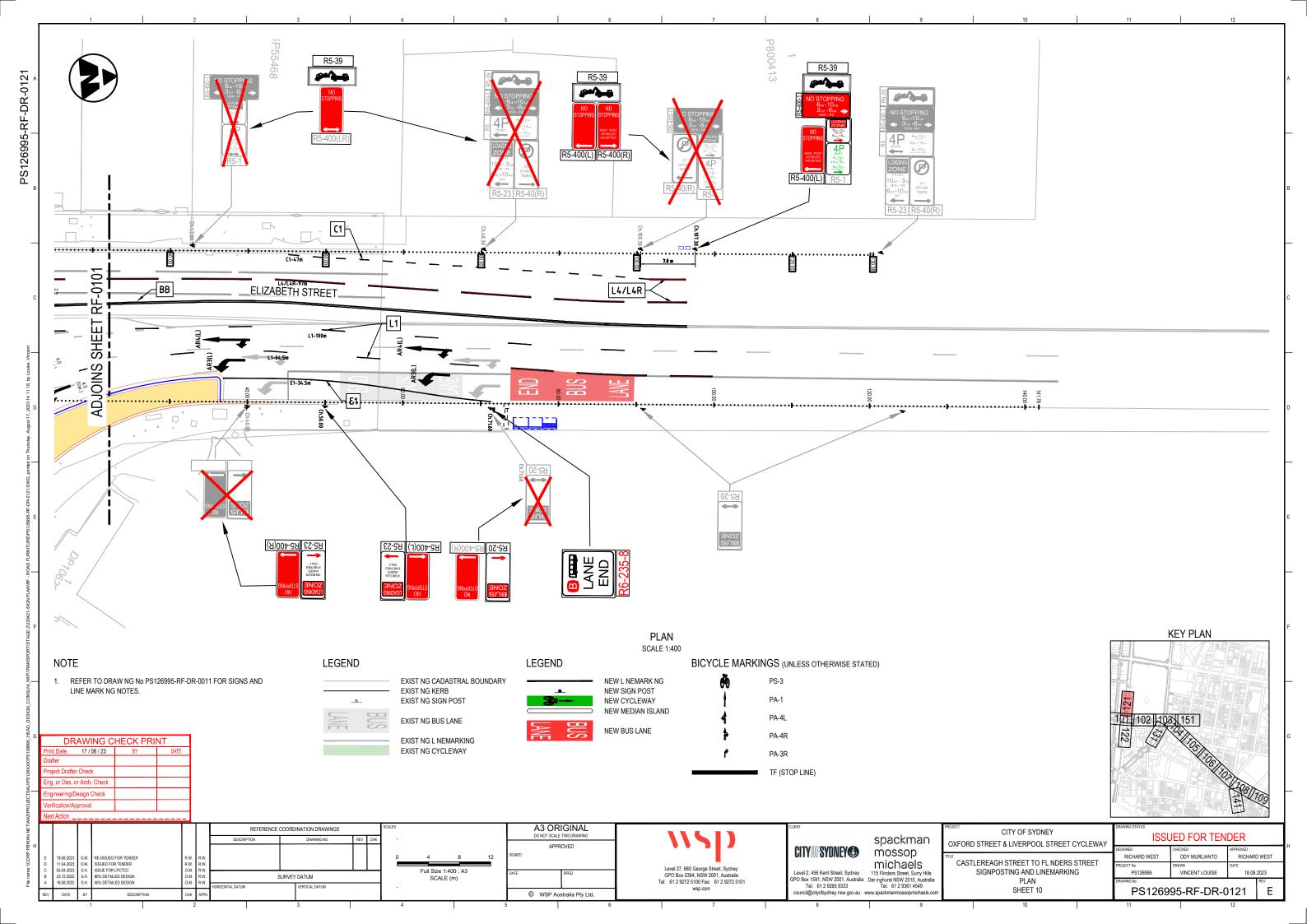


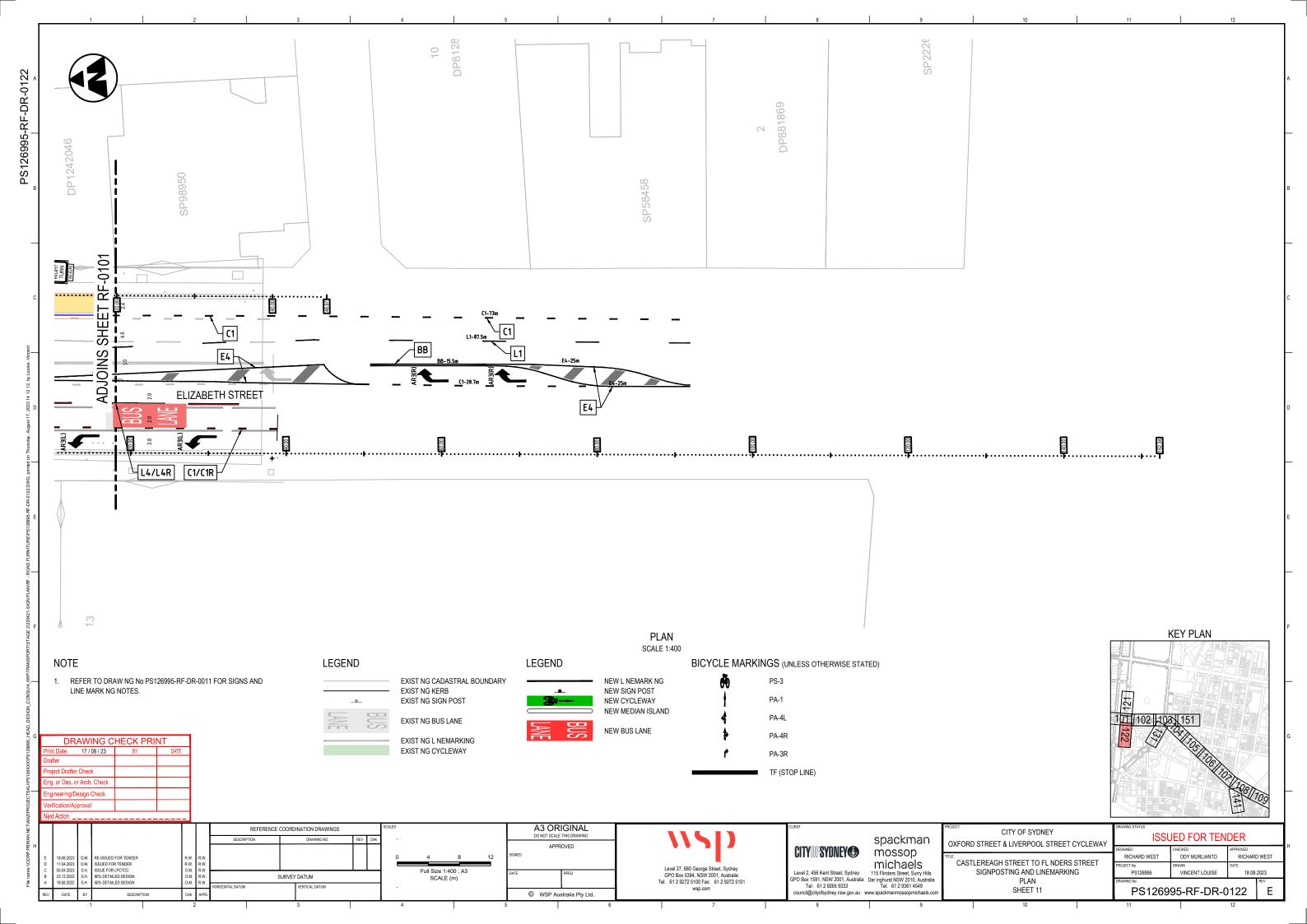


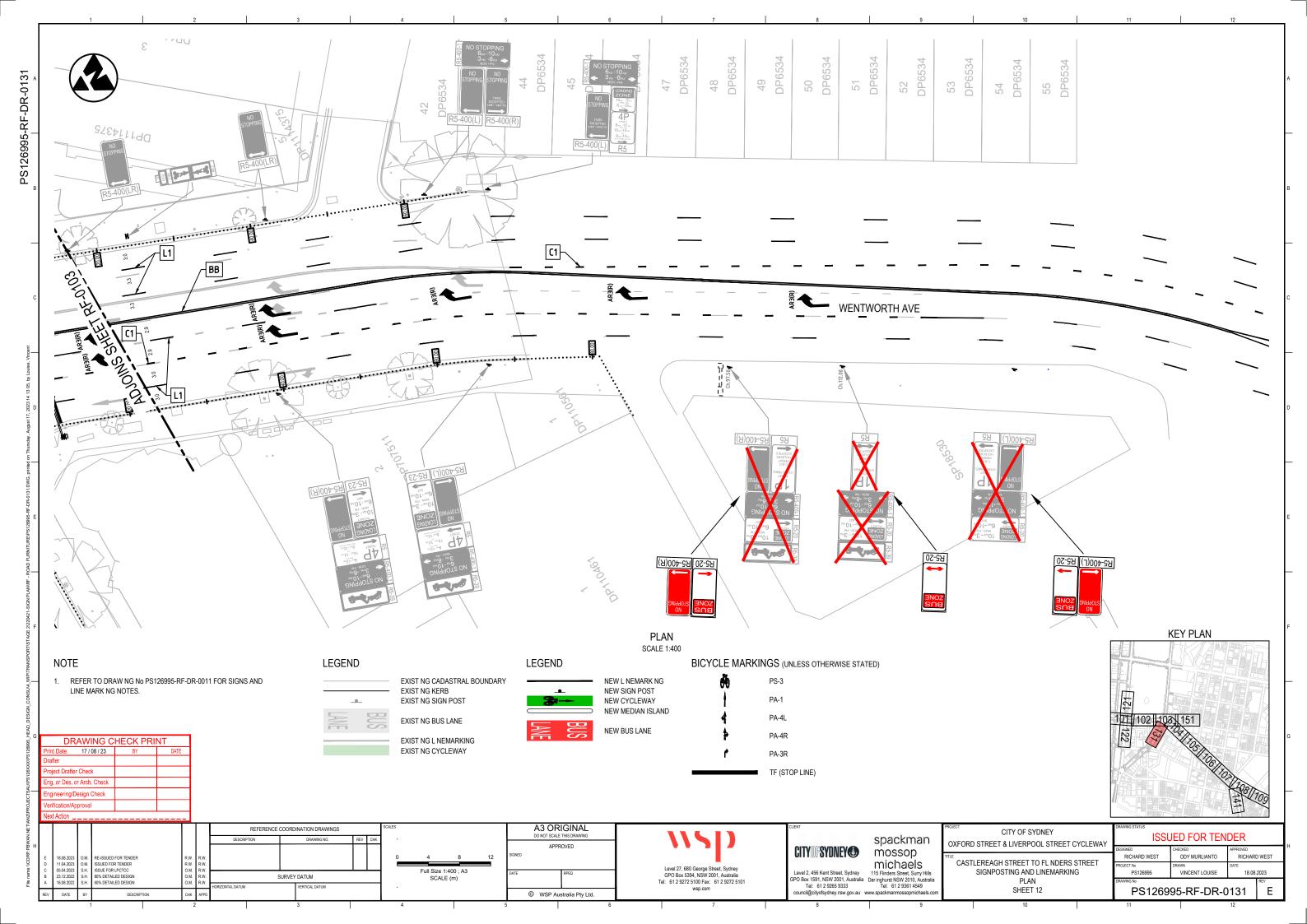


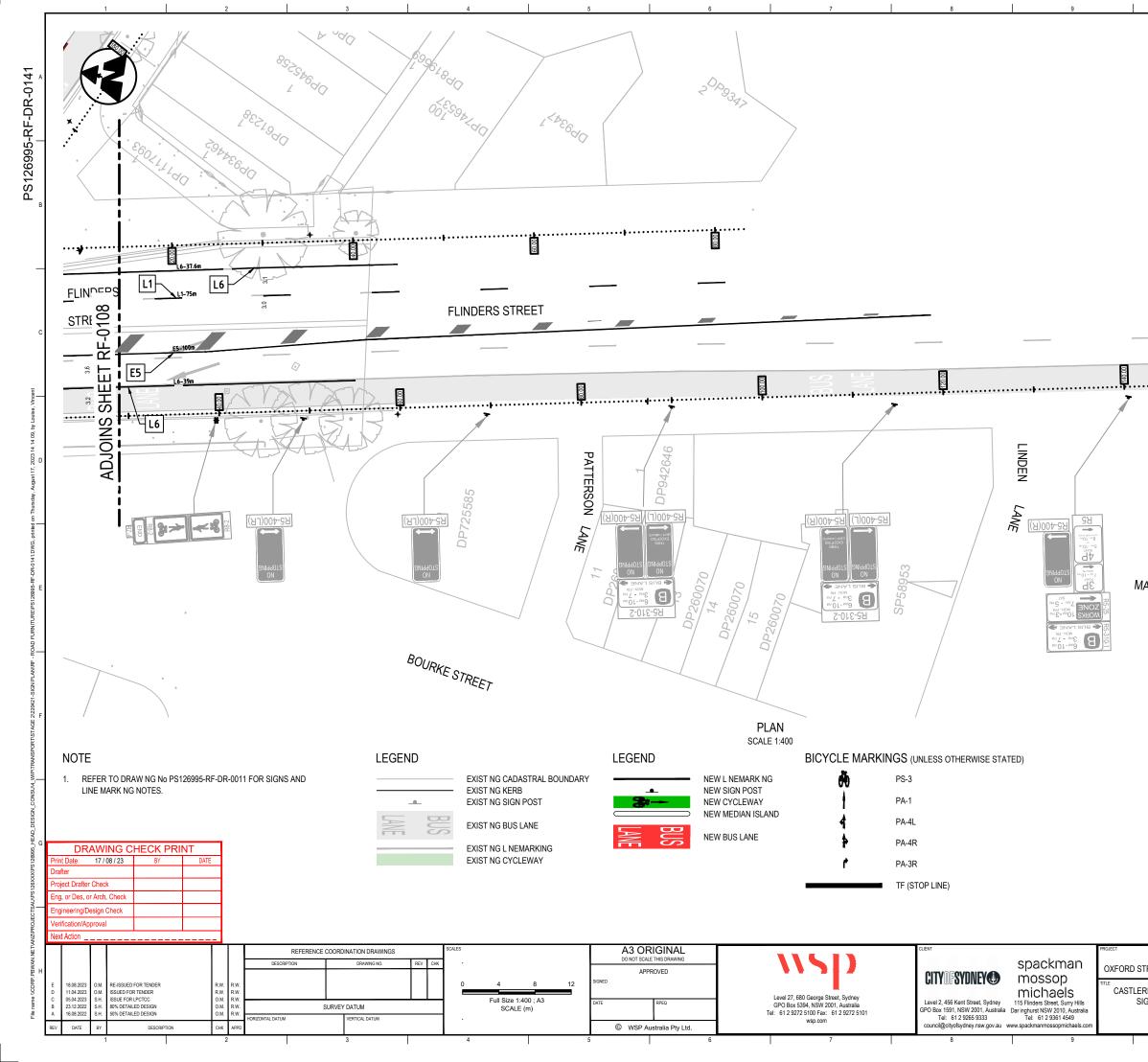


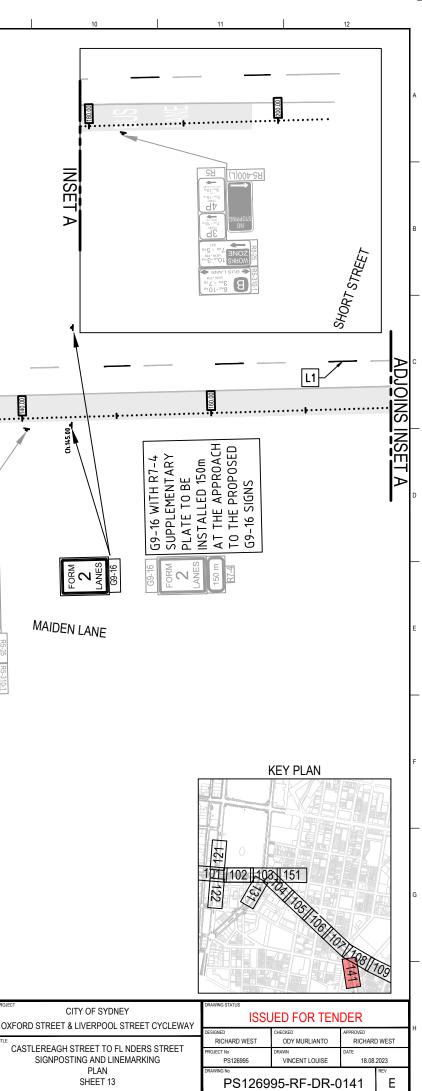


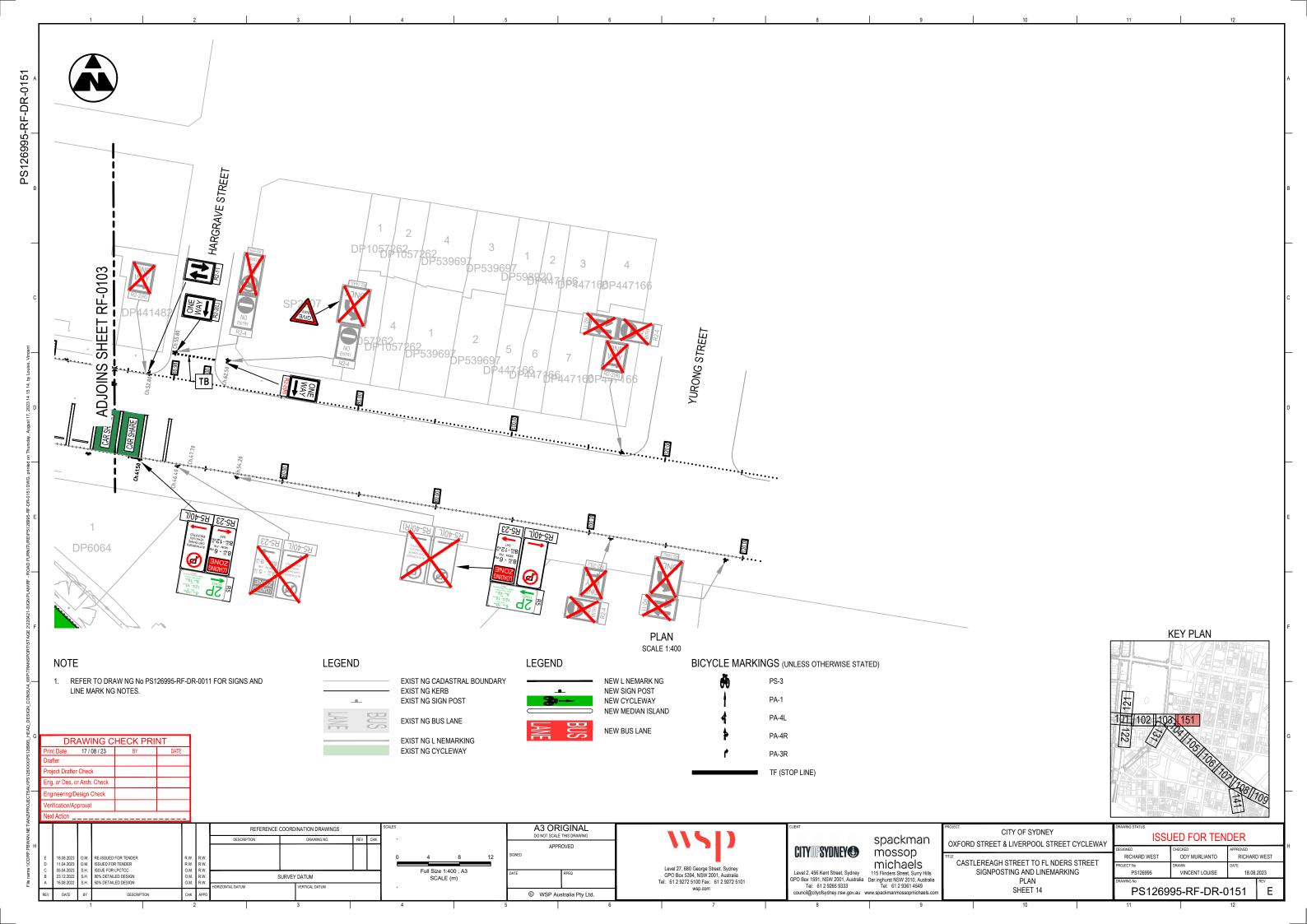












# Appendix B

Oxford Street West and Liverpool Street Cycleway – Traffic and Transport Impact Assessment by Transport for NSW



# Oxford Street West and Liverpool Street Cycleway

## Traffic and Transport Impact Assessment

July 2023

transport.nsw.gov.au



# **Table of Contents**

GLOSSARYi
Executive Summaryii
1. Introduction 1
1.1 Background
1.2 Objectives
1.3 Alignment with Future Transport 2056
1.4 Structure of document
2. The project
2.1 Overview
2.2 Traffic Modelling
2.2.1 Study Area
2.2.2 Scenario Assessment
3. Traffic Modelling Methodology7
3.1 Strategic Modelling forecasting and modelling process7
3.1.1 Traffic demand forecasting7
3.1.2 TfNSW Strategic Demand Modelling7
3.2 Operational traffic modelling assessment
3.2.1 Base year model development – operational8
3.2.2 Project model development – operational9
3.2.3 Methodology – assessment criteria9
3.2.4 Intersection levels of service9
4. Existing Conditions11
4.1 General Traffic

4.2 Public Transport	11
4.2.1 Rail Services	11
4.2.2 Bus Services	
4.3 Walking and Cycling	14
4.4 Parking	16
5. Traffic Model Scenario Assessment	18
5.1 Network Performance Assessment	
5.2 Key Intersection Assessment	22
5.3 General Travel Time Comparison	24
5.3.1 AM Peak Oxford Street corridor general traffic travel time	24
5.3.2 PM Peak Oxford Street corridor general traffic travel time	
5.3.3 Saturday Peak Oxford Street corridor general traffic travel time	27
5.4 Bus Travel Time Comparison	
5.4.1 Oxford Street Bus Performance	
5.4.2 Flinders Street Bus Performance	
5.5 Bus Travel Time Summary	
5.5.1 Monitoring bus performance reliability	
5.5.2 Bus Performance with Removal of Parking in Peak Conditions	41
6. Wider transport Usage and Impacts	43
6.1 Public Transport	43
6.1.1 Train Usage	
6.1.2 Bus Usage	
6.2 Walking and Cycling	50
6.2.1 Cycling	
6.2.2 Walking	
6.3 Parking	
6.4 Mode Shift	
6.5 Major Events	

7. Movement and Place	57
7.1 Road Network Plan 03	57
7.1.1 Vision for the road network	57
7.2 Built Environmental Factors	59
7.3 Healthy Streets	61
8. Parking Study	64
9. Conclusion	68
Appendix A - Council 50% design	70
Appendix B - Traffic Forecasting	71
Appendix C - Existing Road Network	76
Model Calibration and Validation	76
Calibration Results	76
Network Performance Assessment	77
Key Intersection Performance Assessment	
Validation Results	79
Bus Travel Times	79
General Traffic Travel Times and Speeds	80
Appendix D - Movement and Place and Built Environment Assessment	
Appendix E - Parking Arrangements for Existing and Council Design	
Appendix F - Parking Study	

# GLOSSARY

ACRONYM	NAME
EMME	Multimodal Transport Planning Transportation Forecasting Tool
STFM	Strategic Traffic Forecasting Model
GMA	Greater Metropolitan Area of Sydney
TfNSW	Transport for New South Wales
VISSIM	Microscopic multi-modal traffic flow simulation software
VHT	Vehicle Hours Travelled
REF	Review of Environmental Factors
Council	City of Sydney Council
AiP	Approval in Principle
Sydney CBD	Sydney central business district

Author:	Usha Jacome – Senior Traffic and Transport Manager
Project Manager	John Posthoorn – Active Transport
Date:	July 2023
Version:	01
Reference:	P.0057032
Division:	Cities and Active Transport
Approver:	Anna Bradley – Executive Director Active Transport
Approved date:	24 July 2023



## **Executive Summary**

Oxford Street is one of the city's busiest bike routes. The Oxford Street and Liverpool Street Cycleway (The Project) is a 900-metre-long separated cycleway which is a critical link supporting the connection of Bourke Street cycleway to Sydney CBD. This project is part of the Eastern Harbour Strategic Cycleway Corridor Program to connect key centres and major points of interest. This project is to help make Sydney a safer place for people to walk and ride and diversify their options for travel to and from the city.

The cycleway has been designed on the northern kerb of Oxford Street, removing one westbound general traffic lane to accommodate the cycleway. In addition to this, some parking and loading zones will be removed and the northern side bus stop on Liverpool Street between Elizabeth Street and College Street removed and be replaced with two new bus stops on Elizabeth Street. Customers who were accessing this bus stop will now access the same bus service on Elizabeth Street.

The cycleway will still allow for loading and bus operations on Oxford Street and upon opening the westbound loading and carparking locations will be monitored for performance and reliability. Construction is planned to commence in Q4 of 2023 and take 18 months to complete.

This report has been developed to support the City of Sydney Council (Council) Review of Environmental Factors (REF) for this project. This report assesses the City of Sydney's detailed design and highlights critical points along the corridor that impacts bus performance and reliability. The report methodology includes traffic modelling and analysis, a built environment indicator assessment and healthy streets evaluation. This report also highlights wider impacts and the potential forecast changes to other modes.

This report addresses the improvement of bus travel times that are impacted by the City of Sydney design in the off-peak direction with targeted removal of parking and loading zones. This includes:

- Eastbound direction between Riley St and Crown St during the AM peak. Proposed change to include:
  - Conversion of timing for four vehicle spaces signposted as '1P Ticket' zones between 8:30am and 3:00pm to 9:00am and 3:00pm
  - Conversion of four vehicles spaces signposted as loading zones between 7:00am and 3:00pm to 9:00am and 3:00pm
  - Inclusion of a 'No Stopping' zone between 7:00am and 9:00am (at the locations specified above).
- Westbound direction between Palmer St and Crown St during the PM peak, at the location of the existing four vehicle spaces signposted as loading zone:
  - Inclusion of a 'No Parking' zone between 4:30pm and 6:30pm where there is no current parking restriction.

These changes will improve the bus travel times that are impacted by the City of Sydney design.

# 1. Introduction

#### 1.1 Background

Oxford Street and Liverpool Street, between Castlereagh Street and Flinders Street (Taylor Square) is currently utilised by approximately 720<sup>1</sup> cyclists per weekday, at Liverpool Street, west of College Street. The Oxford Street corridor is a mixed-use environment comprising of numerous bus services stopping frequently, with high volumes of frequent stop/go general traffic as well as kerbside parking and loading zones during peak and off-peak periods, which cyclists must navigate daily. The Oxford Street and Liverpool Street corridor also serves as a key route for the numerous bus service connections between the CBD and eastern suburbs, with high frequency services during weekday and Saturday peak hours.

Council has identified the need to increase priority, efficiency, and safety for cyclists on Oxford Street and has proposed to provide a dedicated facility for cyclists on the northern side of Oxford Street and Liverpool Street in the form of a separated bi-directional cycleway along Oxford Street from Flinders Street to Castlereagh Street.

The cycleway is proposed to be implemented along the Oxford Street / Liverpool Street corridor by reducing the westbound lane capacity by one lane. As such, the purpose of this study is to review the impact of The Project.

VISSIM microsimulation models of the corridor were developed to understand the existing and future performance of public transport and general traffic with the introduction of the cycleway. The models were considered along with assessments of TfNSW's built environment indicators for a healthy streets evaluation.

#### 1.2 Objectives

The objective of this traffic and transport impact assessment is to:

- Assess micro-simulation traffic models capable of reflecting the existing traffic and bus performance along The Project corridor;
- Quantify impacts of The Project on general traffic and bus performances under existing demand assumptions whilst considering TfNSW's built environment indicators and healthy streets;
- Assess the design to understand the effects of potential traffic redistribution on performance of the network and transport modes;
- Identify critical points of congestion along the corridor and mitigations to minimise the impact to existing bus journey time; and
- Document the predicted implications of the proposed scheme including benchmarking metrics for bus reliability monitoring.

<sup>&</sup>lt;sup>1</sup> https://www.transport.nsw.gov.au/projects/programs/walking-and-cycling-program/walking-and-cycling-counts

#### 1.3 Alignment with Future Transport 2056

In alignment with Future Transport 2056 walking and cycling are efficient and communitycentred ways to travel that help to manage network performance and congestion, which helps to activate places, and provides attractive, cost-effective and healthy journey choices for our customers.

Increased investment into Active Transport over the next five years is directly aligned with Future Transport's six state-wide customer outcomes as well as the metropolis of three cities' and the '30-minute city' which are key business goals for TfNSW. The 30-minute city is required to be supported through the creation of a network of connected cycleways to help improve accessibility and access to centres and public transport catchments, and choices that offer improved sustainability and health outcomes.

Oxford Street and Liverpool Street are also identified as part of the 250-kilometre Strategic Cycleway Corridor in TfNSW Eastern Harbour City, shown in Figure 1-3 below. The alignment highlighted in red is the route from Bondi Junction to Sydney CBD in which Oxford Street will be the critical connection between these two key centres and major points of interest.

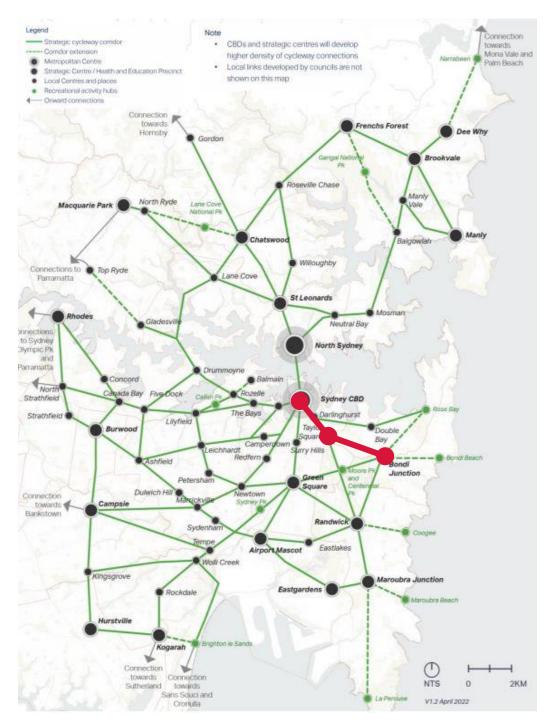


Figure 1-3 Strategic Cycleway Corridor Network<sup>2</sup>

<sup>&</sup>lt;sup>2</sup> April\_2022\_Strategic\_Cycleway\_Corridors\_Eastern\_Harbour\_City\_Overview.pdf

#### 1.4 Structure of document

This report contains the following sections:

- **Introduction:** An overview of the purpose and context of the traffic model and transport impact assessment.
- **The Project:** An overview of the proposed Oxford Street and Liverpool Street cycleway project and its strategic context.
- **Assessment Methodology:** An overview of the methodology used to develop operational models to determine the outcomes for the report.
- **Existing traffic and transport environment:** An overview of the study area, the surrounding road network context and public transport networks in the area.
- Scenario assessment: An overview of the modelled option and modelling results.
- **Wider transport impacts:** An interpretation of modelling results and their implications on transport elements not directly assessed by the model.
- **Conclusion, summary, and next steps:** A summary of traffic modelling findings and associated recommendations. Oxford Street and Liverpool Street carparking monitoring metrics.

# 2. The project

#### 2.1 Overview

Council has proposed a separated bi-directional cycleway along Oxford Street from Flinders Street to the intersection of Liverpool Street and Castlereagh Street. The Project is part of a network of cycleways serving the Sydney CBD and connects to the existing Liverpool Street cycleway (west of Castlereagh Street) carrying around 1,600 bike trips daily<sup>3</sup> with around 1,500 bikes trips daily along Bourke Street. Providing a safe link between Oxford Street and the Liverpool Street cycleway is important given the large number of bike riders using these routes and the absence of any separated connection at present.

Both current and future users require a direct and fast route to ride to the Sydney CBD and surrounds along Oxford Street. More than 2,000 riders<sup>4</sup> are currently using the mixed traffic environment of the Oxford Street corridor each weekday. The number of riders using this route without a dedicated facility indicates riders have a strong preference for a direct route, with strong priority along the corridor. A safe separated cycleway on Oxford Street will address the missing link between the Bourke Street cycleway and the Sydney CBD, encouraging more people to ride. This will help communities to return to work and local businesses safely, supporting NSW's economic recovery post the COVID 19 pandemic.

#### 2.2 Traffic Modelling

#### 2.2.1 Study Area

The modelling extent captured by the VISSIM model is shown in Figure 2-2.

<sup>&</sup>lt;sup>3</sup> https://www.transport nsw.gov.au/projects/programs/walking-and-cycling-program/walking-and-cycling-counts

<sup>&</sup>lt;sup>4</sup> https://news.cityofsydney nsw.gov.au/articles/a-new-cycleway-for-oxford-and-liverpool-streets

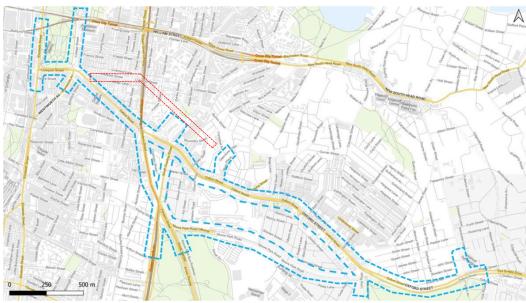


Figure 2-2 VISSIM Model Study Area

The microsimulation model assesses the impacts of the proposed Oxford Street cycleway extending from Flinders Street to the intersection of Liverpool Street and Castlereagh Street, marked on the corridor by the red dashed outline. The modelling study area extent is marked on the figure by the blue dashed outline.

#### 2.2.2 Scenario Assessment

The scenario to be tested has been based on City of Sydney's General Arrangement Plan dated 24/05/2022 shown in Appendix A. This comprises of a northern kerbside aligned cycleway which was assessed for the weekday AM and PM peak periods and Saturday peak periods. The Oxford Street West cycleway design, between Castlereagh Street and Flinders Street was tested using the VISSIM microsimulation tool for the 2020 assessment year.

# 3. Traffic Modelling Methodology

This section provides an overview of the strategic and operational modelling that was undertaken for the purposes of this assessment. The objective was to make best use of available traffic count data and modelling software to determine base and project traffic conditions for Oxford Street and Liverpool Street and surrounding road network in terms of estimating travel demand and traffic volumes. These traffic conditions were then used to assess the operational performance of the network, with and without the project.

#### 3.1 Strategic Modelling forecasting and modelling process

#### 3.1.1 Traffic demand forecasting

The TfNSW Multimodal Transport Planning Transportation Forecasting Tool (EMME) and Strategic Traffic Forecasting Model (STFM), which are developed and operated by TfNSW, provide a platform to understand changes in future weekday travel patterns. The STFM has been developed for average weekday 2-hour AM (7am-9am) and PM peak (4pm-6pm) periods only and covers the road network within the Greater Metropolitan Area of Sydney (GMA) shown in Figure 3-1. The model represents the whole of the GMA, which encompasses the area between the Pacific Ocean in the east, Nelson Bay in the north, Mount Victoria in the west and North Durras in the south.

The EMME and STFM are suitable for the traffic modelling and forecasting of road schemes with wide-reaching network impact, and to examine the effect of significant new residential or employment land releases, major incident, tolling or other strategies.

For further details on strategic traffic demand forecasting, please refer to Appendix B.

#### 3.1.2 TfNSW Strategic Demand Modelling

A forecast 2021 STFM model was used to develop the demands required to undertake operational traffic modelling for the base and scenario case. An audit check of the strategic model was completed for the study area to ensure all the turns bans, lanes and intersections were updated for the current conditions. The scenario case network changes were then applied to the 2021 demands. Once completed, the demands were produced for the area shown in Figure 2-2 for both the base case and scenario case for the weekday AM and PM Peaks for application into the operational modelling.

The differences between these demands would be applied to the turning counts derived from the traffic surveys undertaken on the road network and used to create the traffic flows for the scenario case operational modelling. Details on operational modelling methodology are provided below.



Figure 3-1 The EMME Network Greater Metropolitan Area (GMA), (TfNSW TPA)

#### 3.2 Operational traffic modelling assessment

#### 3.2.1 Base year model development – operational

It is standard modelling practice to create base year models that replicate existing traffic conditions before developing the project scenario. A base model of the road network along Oxford Street / Liverpool Street / Moore Park Road was developed for a weekday AM and PM peak as well as a Saturday peak. These models were calibrated and validated to simulate the operation of the existing road network under present day traffic demands.

The base year model extents are indicated in Figure 2-2 above. To ensure an accurate representation of existing traffic conditions, the base simulation models were calibrated and validated as per TfNSW modelling guidelines (RMS 13.184) to align with existing traffic conditions. Further details of the modelling process can be found in Appendix B.

The traffic model was constructed to reflect the behaviors of a typical weekday peak, with the details of time periods specified in Table 3-1.

Table 3-1 Modelled Time Periods

Model Warm Up		Core Time	Cool down
AM Peak	7:30 – 8:00 am	8:00 – 9:00 am	9:00 – 9:30 am
Saturday Peak	11:30 – 12:00 pm	12:00 – 1:00pm	1:00 – 1:30 pm
PM Peak	4:30 – 5:00 pm	5:00 – 6:00pm	6:00 – 6:30 pm

#### 3.2.2 Project model development – operational

Following the calibration and validation 2020 base year simulation models, 2020 project networks and traffic demands were developed to assess the performance of the study area. The network changes for Oxford Street and Liverpool Street were run in STFM and the demands were applied to the project models based on the methodology used for the base model.

#### 3.2.3 Methodology – assessment criteria

Generally, traffic operational performance can be assessed in several ways, including:

- At a network level, in terms of total distance travelled and total time travelled;
- For single-point assessment at a mid-block level, showing changed travel routes and impacts; and
- At an intersection level, showing changed performance of these typically constraining elements of urban road networks.

Traditionally, less total time travelled through a network implies increased network efficiency. However, because demands and networks may be different, higher values may well be indicative of a better performing network because more vehicles are able to travel through the network to reach their destinations.

### 3.2.4 Intersection levels of service

Average delay is commonly used to assess the operational performance of intersections, with level of service used as an index. A summary of the intersection level of service criteria is shown in Table 3-2.

LOS	Av delay per veh (sec/veh)	Traffic signals/roundabouts	Give way and stop signs
Α	<15	Good operation	Good operation
В	15 to 28	Good with acceptable delays and spare capacity	Good with acceptable delays and spare capacity
С	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity, at signals incidents would cause excessive delays	At capacity, requires other control mode
F	>70	Roundabouts require other control mode	Roundabouts require other control mode

Table 3-2 Level of Service Criteria for Intersections.

For analysing intersection performance in this assessment, it is suggested that when intersection performance falls to LoS D, investigations should be initiated to determine if suitable remediation can be provided. However, limited road capacity and high demand mean that LoS E and LoS F are regularly experienced by motorists at pinch points on the existing strategic road network in Sydney, generally during peak periods.

# 4. Existing Conditions

## 4.1 General Traffic

Based on the Oxford Street Road Network Plan (RNP03) – Technical Report March 2018, the daily volumes along Oxford Street between College Street and Taylor Square are 50,700 vehicles AADT.

Table 4-1 provides the existing weekday AM and PM peak hour and Saturday flows along the Oxford Street and Liverpool Street corridor. The table presents the total vehicles during a peak hour. A proportion of these trips will be made up of buses which makes up approximately 8-12% of the total vehicles.

The volumes along Liverpool Street segment during the AM and PM Peak hours are consistent between peaks and directions with Saturday volumes approximately 16% lower than on the weekdays.

Oxford Street west of Crown Street and west of Flinders Street show higher volumes in the peak directions with Saturday volumes similar to the counter peak weekday volumes.

Table 4-1 Existing Peak hour traffic volumes (2020)

	Direction	AM Peak (veh/hr)	PM Peak (veh/hr)	Saturday (veh/hr)	
Liverpool Street b/w	Eastbound	650	615	525	
Elizabeth Street and	Westbound	670	660	540	
College Street	westbound	070	000	540	
Oxford Street, West of	Eastbound	860	1,240	870	
Crown Street	Westbound	1,275	1,215	1,170	
Oxford St, West of Flinders	Eastbound	950	1,485	1,040	
Street	Westbound	1,315	1,160	1,125	

Note: Volumes are based on surveys undertaken in November 2020 rounded to the nearest 5 or 10. These volumes correlate with the base calibration and validation report.

# 4.2 Public Transport

### 4.2.1 Rail Services

The area around Liverpool Street / Oxford Street is serviced by the Sydney Trains network with access mostly via Museum Station followed by St James Station which both are accessible via Elizabeth Street. Both stations are accessible by passengers who travel into the city (Figure 4-2) via:

- Inner West and Leppington Line (light blue)
- Bankstown Line (orange)
- Airport and South line (green)



Figure 4-2 Sydney Rail Network

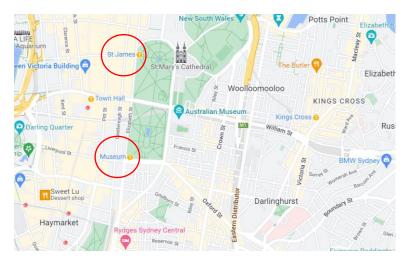


Figure 4-3 Location of Museum Station and St James Station

Figure 4-3 shows Museum Station is located on the corner of Liverpool Street and Elizbeth Street with St James Station located near Elizabeth Street and Market Street.

The number of services running during peak times is shown below in Table 4-2. AM inbound and PM outbound frequency for each service line run approximately every 3 to 6 minutes with counter peak direction services running approximately every 5 to 10 minutes. Saturday services run at a slightly lower frequency.

Table 4-2 Number of train services per hour<sup>5</sup>

Service Frequency	AM (7 to 9am)		PM (4 to 6 pm)		SAT (12 to 2pm)	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Inner West and	15-20	14	10-12	15-16	10	9
Leppington Line						
Bankstown Line	10-14	7-10	6-8	10-12	4	4
Airport and South line	11-14	8-10	8	11-14	8	8

### 4.2.2 Bus Services

There are several services that operate along Oxford Street east. The 2022 bus routes include:

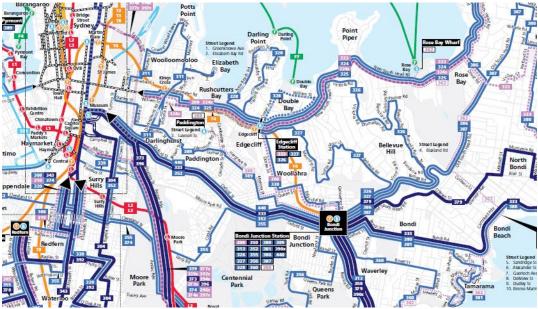
Route 440 – Bondi Junction to Rozelle

Route 333 - North Bondi to City Circular Quay

Route 352 – Bondi Junction to Marrickville Metro

Route 373 - Coogee to City Museum (Loop)

Route 396 - Maroubra to City Circular Quay



Note: Route 355 no longer travels via Oxford Street

Bus Route	AM (7 to 9am)		PM (4 to 6 pm)		SAT (12 to 2pm)	
	IB	OB	IB	OB	IB	OB
440	5-8	7-9	6	6-7	4	4
333	11-19	7-8	11-12	12-15	11-13	12
352	3-4	3	3	3	2	2
373	6-7	6-7	6-7	6-7	6	6
396	6-7	6	6	6	6	6

Table 4-3 Number of bus services per hour<sup>6</sup>

The modelling work undertaken for this project was based on 2019 bus frequency and services data. 2022 data was not available at the time of modelling and therefore 2019 data was used, precovid. The impact of utilising the 2019 data compared with the 2022 data would potentially have minimal change to the results of the assessment.

Bus stop locations are shown below in Figure 4-4.

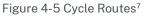


Figure 4-4 Existing Bus Stop Locations

## 4.3 Walking and Cycling

The current walking and cycling environment in the surrounding The Project area is suggested to have a varying number of cycle routes with low to moderate difficulty. However, the key route of this project – Oxford Street is considered to have a 'hard difficulty' rating shown in Figure 4-5 below.





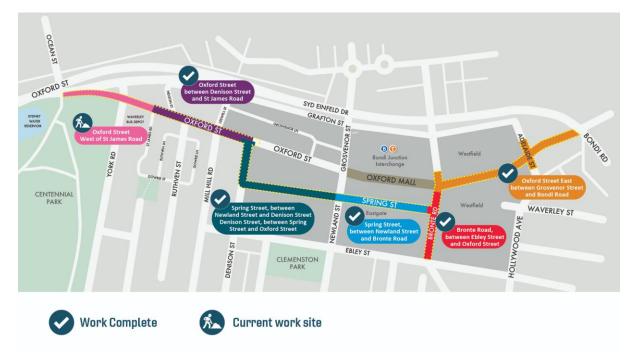


Figure 4-6 Bondi Junction Cycleway

To help improve connectivity, the Bondi Junction Cycleway shown in Figure 4-6 connects at Bondi Road, Bondi Junction to Oxford Street near Ocean Street. This will connect into an existing cycleway that runs along Centennial Park parallel to Oxford Street as shown in Figure 4-7. The Project (highlighted in red in Figure 4-7) will be the first stage of the Oxford Street cycleway project providing a direct connection into the city from the east. The future Oxford Street east (highlighted in blue) will potentially provide the missing link between The Project and Centennial Park.

<sup>&</sup>lt;sup>7</sup> Cycleway Finder (nsw.gov.au)

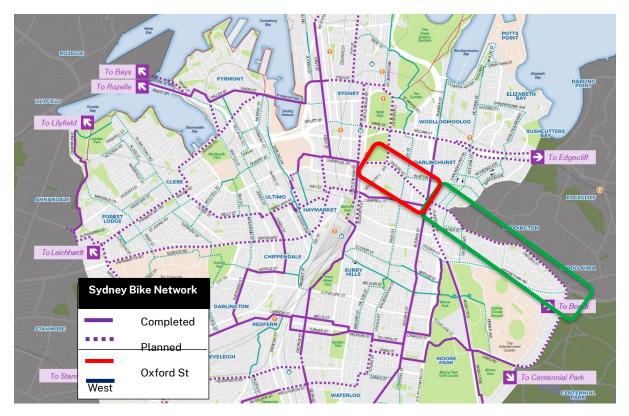


Figure 4-7 Current Status of cycle projects

# 4.4 Parking

A review of the parking arrangement is shown below in Table 4-4. The parking arrangement has been segmented into 5 parts as shown below in Figure 5-1.

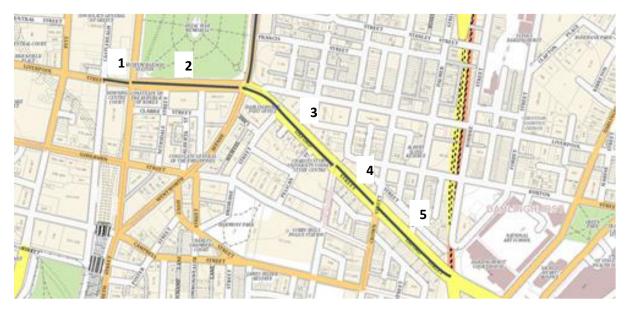


Figure 5-1 Existing Parking Arrangements

The number of parking spaces have been calculated based on the distance of kerb side parking available divided by approximately 5–6m on average as the types of vehicles ranged from small light vehicles to light goods vehicles (LGV).

The parking available is comprised of metered parking and loading zones. Location 1 and 2 is comprised of metered parking, however the other 3 sections have a combination of metered parking and loading zones. There is a small section west of Flinders Street that has a taxi area which has not been included in the numbers shown in the table below.

Location	North Side Kerb	South Side Kerb
1	No Stopping	3
2	9	8
3	15	8
4	9	7
5	7	11

Table 4-4 Number of Parking Spots along the OSW corridor

# 5. Traffic Model Scenario Assessment

Modelling of City of Sydney's General Arrangement Plan dated 24/05/2022 was tested and compared against the base results presented above.

Prior to testing the scenario, a base model was developed to represent the existing road network performance within the Project study area. The assessment of the existing (and scenario) operational performance of the road network considered the following aspects of performance:

- Network performance
- Intersection performance
- Travel times and speeds

Firstly, the models developed for the Oxford Street West project have been calibrated and validated based on TfNSW Modelling Guidelines 2013. A calibration process was undertaken comparing the surveyed November 2020 counts against modelled volumes and then validated using travel time information.

A summary of results is shown in Appendix C highlighting the outcomes based on this process.

### 5.1 Network Performance Assessment

The results for Council's design are presented below in Table 5-1. It is observed that during the AM peak, where there is a small increase in vehicle volumes within the network and the Vehicle Hours Travelled (VHT) increases compared with the base. VHT for Council design is forecast to increase by approximately 120 hours.

The VHT increase for the AM peak scenario corresponds with the reduction in average network travel speeds reporting a reduction of approximately 2km/h, when compared to the base.

The peak directional flow along Oxford Street during the AM peak is westbound towards the CBD. With the cycleway reducing westbound capacity along Oxford Street, between College Street and Flinders Street, from three lanes to two lanes, the network performance is forecast to worsen during the AM peak hour. For the eastbound direction however, Council design compared with the base show similar performances.

During the PM peak hour, the VHT is forecast to reduce by approximately 256 hours. This is due to the reduced demand entering the network during the PM peak hour when compared to the base PM peak. The reduced demands are attributed to both reduced input demand on the network, of approximately 500 vehicles, as well as unreleased demands along Moore Park Road, adjacent to Paddington Gates. The unreleased demands are mostly traffic destined towards Syd Einfeld Drive from Moore Park Road eastbound which do not impact the traffic demands along Oxford Street, west of Paddington Gates.

The reduced vehicles on the network as well as the removal of turn movements at key intersections result in an increased average travel speed of 2.5km/hr.

For the Saturday peak hour, VHT is forecast to reduce with the implementation of the cycleway. Like the PM Peak assessment, there are reduced demands released onto the network as well as a reduction of overall input demand of approximately 800 vehicles during the Saturday peak hour. These reductions result in reduced VHT of 283 hours. Table 5-1 Peak Hour network performance summary

Network Performance	AM Base	AM CoS	PM Base	PM CoS	Saturday Base	Saturday CoS
Total demand released onto the network	24,044	23,763	24,961	24,242	22,323	21,538
Vehicle hours travelled (VHT) (hrs)	1,322	1,442	1,451	1,191	1,606	1,323
Vehicle kilometres travelled (VKT) (km)	22,297	21,828	23,095	22,099	20,997	20,438
Average network speed (km/h)	16.9	15.0	15.9	18.6	13.1	15.4
Total number of stops	57,660	71,410	72,240	63,533	56,777	54,656
Latent demand (unreleased vehicles)	8	269	47	251	63	179

Table 5-2 Peak Intersection Level of Service

Intersection	AM	peak	PM peak		Saturday peak	
Intersection	Base	CoS	Base	CoS	Base	CoS
Elizabeth Street / Liverpool Street	С	C (-10)	С	C (-4)	С	B (-6)
Liverpool Street / College Street / Wentworth Avenue / Oxford Street	D	D (-3)	D	D (-14)	D	C (-6)
Oxford Street / Riley Street	В	B (+1)	A	A (-2)	В	A (-10)
Oxford Street / Crown Street	В	C (+12)	В	B (+6)	A	B (+20)
Oxford Street / Palmer Street	A	A (+0)	A	B (+5)	A	B (+9)
Oxford Street / Flinders Street	В	E (+34)	В	C (+12)	В	B (+1)
Flinders Street / Short Street	А	F (+75)	А	A (-5)	А	A (-5)
Flinders Street / Albion Street	В	C (+11)	С	B (-17)	В	B (-5)
Oxford Street / Darlinghurst Road	В	B (+5)	с	B (-2)	В	B (+3)
Oxford Street / Victoria Street / South Dowling Street	E	D (-12)	D	C (-16)	F	E (-6)
Oxford Street / Green Street	А	A (-2)	В	B (-1)	В	A (-6)
Oxford Street / Glenmore Road	В	B (-1)	В	A (-1)	А	A (-2)
Oxford Street / Young Street	А	A (-1)	A	A (-2)	А	A (-5)
Oxford Street / Oatley Street	В	B (-1)	В	B (+5)	В	B (-6)

Intersection	AM peak		PM peak		Saturday peak	
Intersection	Base	CoS	Base	CoS	Base	CoS
Oxford Street / Jersey Road	В	C (+7)	С	C (+10)	В	A (-12)
Oxford Street / Queen Street / Moore Park Road / Lang Road	E	D (-7)	E	D (-16)	E	D (-17)
Moore Park Road / Gordon Street / Cook Road	F	F (+56)	F	F (+21)	F	F (+8)
Flinders Street / South Dowling Street	В	B (+9)	D	B (-26)	С	C (-2)
South Dowling Street / Fitzroy Street	В	C (+5)	В	В (-4)	С	F (+39)
Anzac Parade / Moore Park Road / Flinders Street	D	C (-6)	С	C (-9)	С	B (-4)

### 5.2 Key Intersection Assessment

A summary of key intersection impacts is presented below. Further details are provided in 'SCT\_00212\_Oxford Street Reference Case Report v1.0'.

### 5.2.1 Elizabeth Street / Liverpool Street intersection performance

The intersection performance of Elizabeth Street / Liverpool Street is forecast to improve compared with the base case. The average delay at this location is forecast to improve by 10 seconds, 4 seconds and 6 seconds during the AM, PM, and Saturday peak periods respectively. The improvement at this location is due to the removal of right turn movements from Elizabeth Street north and south, which allows for greater green time for north-east movements between Elizabeth Street and Liverpool Street, even with the introduction of the cycle phase.

### 5.2.2 College Street / Liverpool Street / Wentworth Avenue intersection performance

College Street / Liverpool Street / Wentworth Avenue / Oxford Street intersection LOS during the AM peak is forecast to operate at similar levels to base AM peak conditions. Analysis of the peak directional movement from Oxford Street east shows that the eastern approach delays are forecast to improve significantly, especially for the right turn movement from Oxford Street to College Street whereby the approach delay is forecast to reduce by more than 55 seconds for the AM Peak. The reason for this is with a reduction in capacity in the westbound direction, there is potentially more traffic upstream as well as a reduction in traffic along the corridor, resulting in less demands at the right turn bay and therefore a better performance at the intersection.

For the PM peak hour, the overall intersection delay is forecast to improve by 14 seconds. This is due to each approach showing an improved average delay. The northern and southern approaches show an increase in volume with the eastern and western approaches showing a decrease in volume. The peak direction during the PM is eastbound along Oxford Street and since the design shows minimal change in lane configuration downstream there is no significant improvement observed for the western approach. In addition, signal timings at this location were adjusted to satisfy the increased northbound demands under the reduced capacity of Wentworth Avenue.

Intersection performance improvements during the Saturday peak periods are forecast to be similar to the AM conditions, whereby the eastern approach to the intersection is forecast to improve by 21 seconds. Overall, the intersection is forecast to improve from LOS D to C with average delays reduced by 6 seconds.

### 5.2.3 Crown Street / Oxford Street intersection performance

The introduction of the cycle phase at the Crown Street / Oxford Street intersection is forecast to increase the average delay during the AM peak hour from 25 seconds to 37 seconds. This increase is attributable to the increased delay experienced by the eastbound left turn from Oxford Street onto Crown Street, where the delay for this movement increases from 22 seconds in the base conditions to over 83 seconds. This highlights a direct impact of the project by banning eastbound left turns on approach to College and Liverpool Street due to the cycleway and consolidating the impact at Crown Street.

During the PM peak hour, the average intersection delay is forecast to increase from 17 seconds to 24 seconds, which is categorised as continuing to operate at LOS B. Similarly, during the

Saturday peak hour, the intersection is forecast to operate at LOS B with average intersection delay of approximately 22 seconds.

#### 5.2.4 Flinders Street / Oxford Street intersection performance

During the AM peak hour, the intersection performance at Taylor Square (Oxford Street / Flinders Street) is forecast to decline from LOS B to LOS E with reported average delays of approximately 60 seconds. This is due to the reduced westbound capacity for general traffic along Flinders Street and Oxford Street east. The reduction from two lanes to a single lane on the Flinders Street approach to Taylor Square increases the approach delay from 53 seconds to over 190 seconds, with queues spilling back towards Short St (approximately 220m south maximum queue), thus impacting the intersection performance of Flinders Street / Short Street, which is forecast to operate at LOS F.

For the PM peak, the impact of the lane reduction on Flinders Street northbound is less pronounced since the peak movement is in the opposite direction. Regardless, the intersection is forecast to worsen from LOS B to LOS C, with average intersection delay increasing from 27 seconds to 41 seconds. The Flinders Street approach delay is forecast to increase from 34 seconds to 101 seconds. However, unlike the AM peak, the resultant queues on Flinders Street do not extend beyond the Short Street / Flinders Street intersection.

With lower traffic volumes at the intersection during the Saturday peak, when compared to the AM and PM peak periods, the intersection is forecast to continue to operate at LOS B, showing minor increases in the overall intersection delays.

#### 5.2.5 Paddington Gates intersection performance

The intersection of Oxford Street / Queen Street / Moore Park Road / Lang Road (Paddington Gates) is forecast to improve from LOS E in the base conditions to LOS D with the Oxford St west cycleway implementation. Although this would suggest an improvement of the intersection, the delay is transferred to the nearby intersection of Moore Park Road / Gordon Street / Cook Road (80m west) whereby the western approach delay of Moore Park Road is forecast to worsen from approximately 120 seconds (base) to over 240 seconds for the AM peak scenario.

With the implementation of the cycleway, some drivers are rerouting their trip via Moore Park Road decreasing volume along Oxford Street east therefore improving the performance of these intersections.

Similarly, the PM peak western approach delays are forecast to increase from 109 seconds to 227 seconds and the Saturday peak western approach delay would increase from 176 seconds to 228 seconds. The signal timings at the Paddington Gates intersection were retained from the base model to assess the impact of the cycleway on the Oxford Street corridor. It is forecast that signal optimisation at this location would result in similar operational performance to the base conditions. However, this would likely increase the delay of Oxford Street's western approach traffic.

#### 5.2.6 South Dowling Street and Oxford Street intersection performance

The STFM suggests increased travel demands for South Dowling Street northbound between Flinders Street and Oxford Street. To cater for this increased demand, the signal operation at the intersection of South Dowling Street and Oxford Street was optimised, whilst maintaining the operation of the Oxford Street throughput between Flinders Street and South Dowling Street. The resultant outcome of optimising the signals is the improvement of the intersection for all peak periods, as greater phase time is allocated to the South Dowling Street approach of the intersection. During the AM peak, the intersection is forecast to improve from LOS E to LOS D.

Similarly, PM peak conditions are forecast to improve from LOS D to LOS C, however, during the Saturday peak, the intersection currently operates at LOS F with queues extending along South Dowling Street towards Flinders Street. Efforts to cater for the increased South Dowling Street approach demands at the intersection negatively impact the Oxford Street corridor. As such, the increased northbound demands result in extensive queuing toward Fitzroy Street for the Saturday peak.

### 5.3 General Travel Time Comparison

General traffic travel times were extracted from VISSIM for the following three corridors:

- Oxford Street, between Elizabeth Street and Ocean Street
- Flinders Street, between Moore Park Road and Oxford Street
- Moore Park Road, between Fitzroy Street and Oxford Street

#### 5.3.1 AM Peak Oxford Street corridor general traffic travel time

The AM Peak Oxford Street travel time comparisons are displayed in Figure 5-1 AM peak Oxford Street eastbound and Figure 5-2 for the eastbound and westbound directions of travel, respectively.

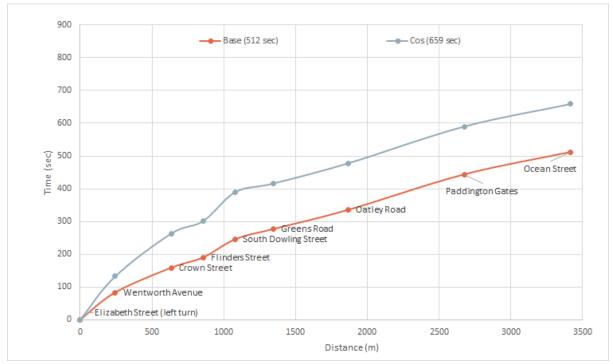


Figure 5-1 AM peak Oxford Street eastbound

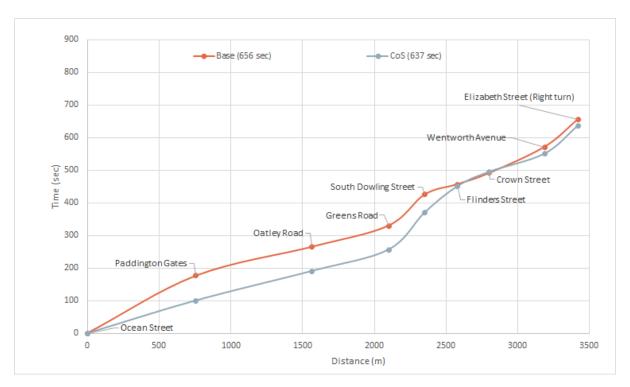


Figure 5-2 AM peak Oxford Street westbound

The travel time results for the eastbound direction compared with the base conditions were observed to increase between Elizabeth Street and Wentworth Avenue. This is due to the signal optimisation of the intersection at Liverpool Street / Oxford Street / Wentworth Avenue / College Street catering for the peak westbound movement, whose capacity is reduced from three lanes to two lanes during the AM peak hour.

In the westbound direction, travel time savings are observed at the approach to Paddington Gates, when compared to the base conditions. This is due to the reduction in demand for Oxford Street through movement at the intersection with the implementation of the cycleway. Beyond Greens Road, westbound travel times are forecast to increase due to the reduced westbound capacity along Oxford Street west of Flinders Street.

### 5.3.2 PM Peak Oxford Street corridor general traffic travel time

The PM peak Oxford Street travel time comparisons are displayed in Figure 5-3 and Figure 5-4 for the eastbound and westbound directions of travel, respectively.

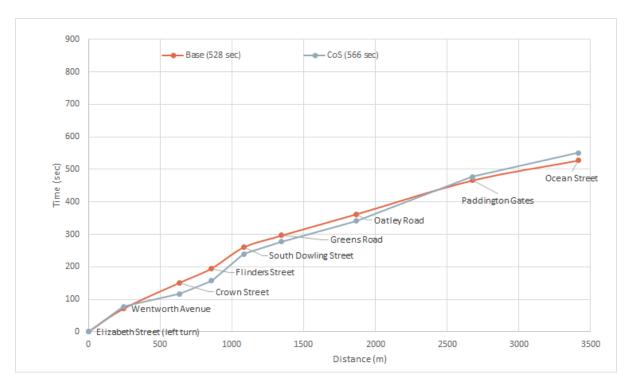
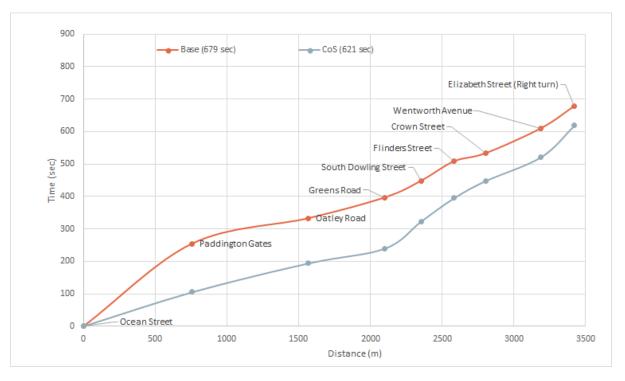


Figure 5-3 PM Peak Oxford Street eastbound



#### Figure 5-4 PM Peak Oxford Street westbound

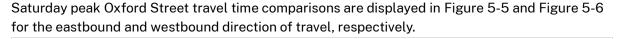
As expected, the eastbound travel time shows minimal difference between Council design and base case during the PM peak as there are no differences in the eastbound capacity. Council design shows improved travel times through Crown Street during the PM peak hour. This is due to optimising the signals at the Crown Street intersection to improve the eastbound movements with the introduction of the cycle phase. As a result, eastbound throughput at the Crown Street

intersection is improved. Furthermore, as no parking is permitted along the eastbound kerbside lanes during the PM peak, the cycle phase at Crown Street does not impact the eastbound general traffic throughput as much as during the AM peak hour.

Travel times on approach to South Dowling Street increase due to the increased vehicle demand on South Dowling Street. Further east, travel times increase on approach to Paddington Gates, due to increased demands and turning movements at this location.

For the PM Peak westbound direction, travel time savings are observed at the approach to Paddington Gates when compared to the base conditions. This is due to the reduction in demand for Oxford Street through movement at the intersection with the implementation of the cycleway. Beyond Greens Road, westbound travel times are forecast to increase due to reduced capacity along Oxford Street west of Flinders Street.

#### 5.3.3 Saturday Peak Oxford Street corridor general traffic travel time



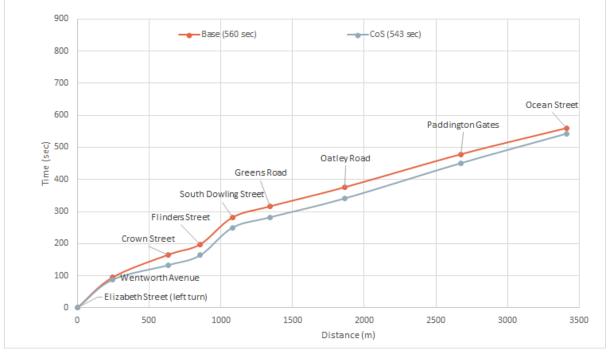


Figure 5-5 Saturday peak oxford Street eastbound

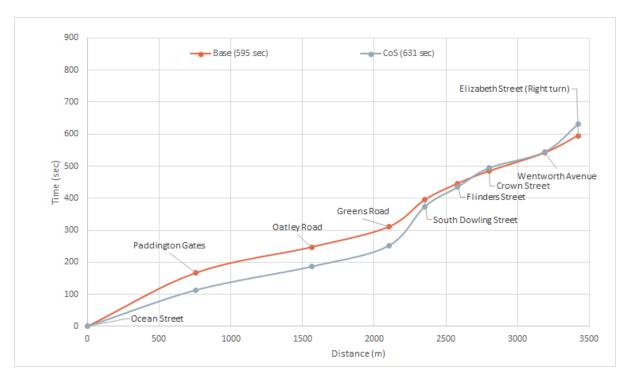


Figure 5-6 Saturday peak oxford Street westbound

Eastbound travel time analysis shows minimal difference between CoS design compared with the base. Travel times are forecast to improve on approach to Crown Street, due to the removal of the left turn movements onto Palmer Street improving the throughput of eastbound movements. Furthermore, left turn demands onto Crown Street are relatively low when compared to the AM and PM peak hour. As a result, there are no significant delays associated with the cycle phase at Crown Street for the Saturday peak hour.

Like the AM and PM peak conditions, travel time savings are observed for the westbound direction from Paddington Gates for the Saturday peak. Beyond Greens Road, travel times appear to be similar to the base conditions. The westbound travel times are forecast to increase due to the reduced westbound capacity along Oxford Street west of Flinders Street.

### 5.4 Bus Travel Time Comparison

### 5.4.1 Oxford Street Bus Performance

The performance of bus route 333 was assessed for the peak hours to identify the impacts of the cycleway on public transport. There are additional services that operate along the same route; however, this service was chosen as this bus route services the entirety of the Oxford Street study corridor at regular intervals.

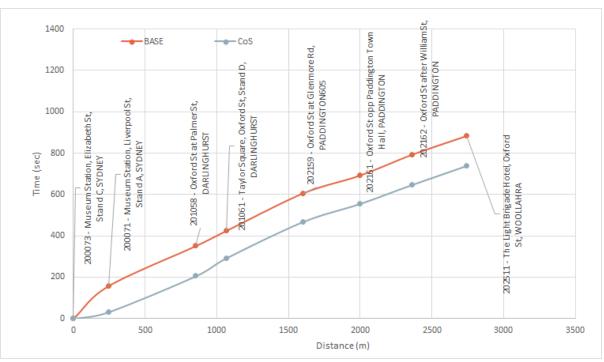


Figure 5-7 Bus travel time plot comparisons

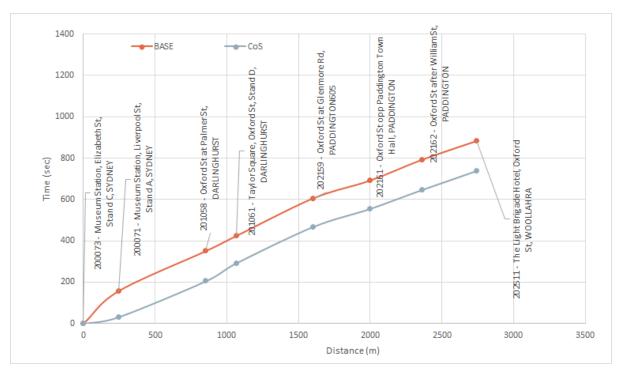


Figure 5-7 for bus route 333. Further details are provided in 'SCT\_00212\_Oxford Street Reference Case Report v1.0'.

These travel times are based on travel times between bus stops inclusive of the dwell times reported for the service at individual bus stops during October 2019, as such the travel times between bus stops are not the same across different bus services.

Inbound bus travel times during the AM peak hour are not expected to be impacted as the bus lane remains unaffected by the implementation of the cycleway. Bus route 333, with 12 services

during the AM peak, shows that the travel time inbound improves after Bus Stop ID 202155 (opposite Hopewell Street) with a marked improvement after Taylor Square. This improvement is mainly due to the reduction of the number of phases at the intersections of Oxford Street with Liverpool Street and Elizabeth Street, which improves the westbound throughput along Oxford Street. Given the reported travel times of routes 333, it is determined that bus services in the inbound direction during the AM peak would not be negatively impacted by the cycleway.

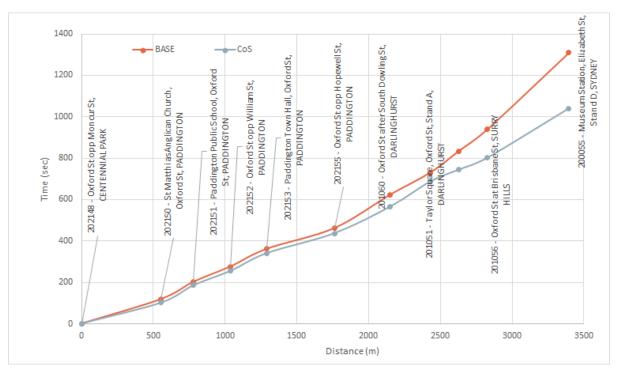


Figure 5-8 Bus route 333 inbound (westbound) AM peak scenario travel times (12 services)

Analysis of the AM peak outbound travel time for route 333 shows an initial improvement in travel time due to the removal of the bus stop adjacent to Museum Rail Station (Bus Stop ID 200071).

However, travel times are forecast to increase on approach to Palmer Street bus stop (Bus Stop ID 201058). This increase is due to the delays caused by vehicles waiting to turn left onto Crown Street that are held back by the cycle phase at the Crown Street intersection.

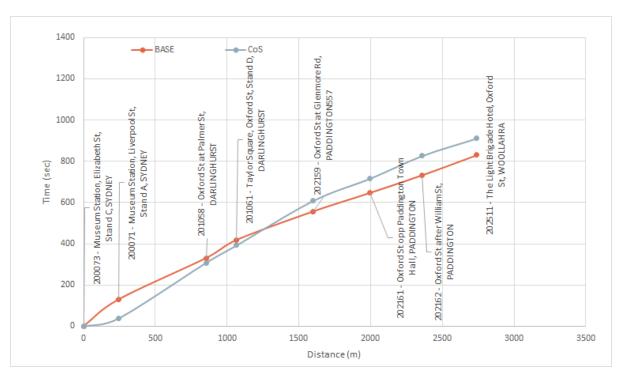


Figure 5-9 Bus route 333 outbound (eastbound) AM peak scenario travel times (7 services)

During the PM peak hour, inbound bus travel times for routes 333 are forecast to increase on the approach to the cycleway's introduction on Oxford Street, as evidenced by the sharp rise in bus travel time on the approach to the bus stop after South Dowling Street (Bus Stop ID 201060). The increase in westbound bus travel times during the PM peak is due to 4 car park spots maintained between Palmer Street and Crown Street.

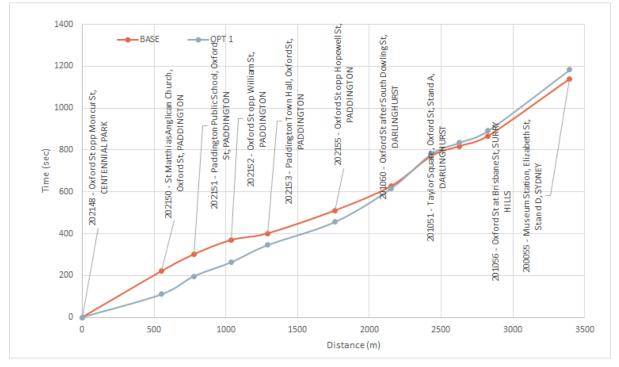


Figure 5-10 Bus route 333 inbound (westbound) PM peak scenario travel times (8 services)

PM peak travel time for route 333 in the eastbound (outbound) direction is forecast to decrease initially due to the removal of the Museum Station bus stop (Bus Stop ID 200071) with the lane

configuration in the eastbound direction remaining the same as existing. Note: that no additional dwell time at Elizabeth Street has been included as part of the modelling analysis due to the removal of the Liverpool Street bus stop.

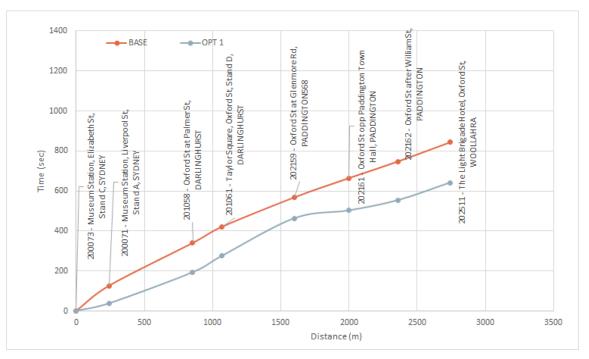


Figure 5-11 Bus route 333 outbound (eastbound) PM peak scenario travel times (12 services)

Saturday peak hour bus travel times are forecast to follow the same pattern as the Saturday base conditions however, with an improved travel time for buses. This is due to the reduced westbound demands along Oxford Street from Paddington Gates. On approach to South Dowling Street, the travel times appear to increase back to existing conditions due to the reduced westbound capacity along Oxford Street with no bus priority lane.

Outbound bus travel time comparison shows initial travel time savings due to the removal of the Museum Rail Station bus stop, however beyond this location, travel patterns remain same as per the base conditions for route 333.

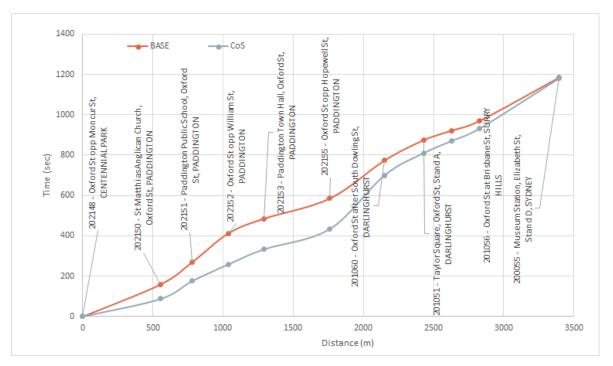


Figure 5-12 Bus route 333 inbound (westbound) Saturday peak scenario travel times (9 services)

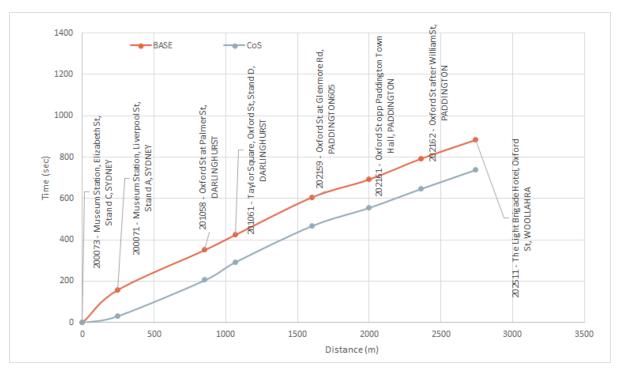


Figure 5-13 Bus route 333 outbound (eastbound) Saturday peak scenario travel times (11 services)

When provided as a numerical comparison across the entire Oxford Street corridor, between Paddington Gates and Elizabeth Street, for the most frequent bus route 333, modelling indicates that the travel time:

Improved, during the westbound AM peak, by 270 seconds. This is due to improvements to signal operations at the western end of the corridor, with the retention of the westbound bus lane.

Increase during the AM peak by 80 seconds for the eastbound service due to the introduction of a cycle phase at Crown Street holding back traffic turning into Crown Street, which affects the eastbound throughput.

The PM peak indicates an increase in the westbound (inbound) service travel time by 80 seconds due to the reduced westbound capacity of Oxford Street without a dedicated bus lane. In the eastbound (outbound) direction, the service would experience a decrease of 200 seconds due to the removal of the Museum Station bus stop and signal optimisation for the peak outbound movement.

Modelling indicates no difference of the overall inbound travel time in the Saturday peak period, however on approach to South Dowling Street, increased travel times are forecast due to the reduced westbound capacity of Oxford Street. Outbound travel times are forecast to reduce by 145 seconds due to the removal of the Museum Station bus stop.

### 5.4.2 Flinders Street Bus Performance

Average bus travel time graphs for bus services accessing Flinders Street are difficult to produce as there is no one service that operates at regular intervals. In addition, the majority of the buses bypass the bus stops located along Flinders Street. As such there is no direct bus stop to bus stop data to compare. However, for comparison purposes, the segmental average travel time data was extracted for all buses travelling along Flinders Street between Taylor Square and Moore Park Road by intersection were extracted and shown in Figure 5-4 to Figure 5-9.

The figures show average increases in travel time for buses in the AM and PM Peak along Flinders Street in the northbound direction of less than 20 seconds for peak periods. The reason for this is due to the signal timing changes applied to the models along Flinders Street. In the southbound direction no change is forecast for the AM peak hour. Whereas for the PM peak, similar improvements as general traffic is forecast with a travel time reduction of approximately 60 seconds due to the reduced traffic flow southbound and optimisation of traffic signals on Flinders Street. Southbound bus travel times along Flinders Street are forecast to increase by approximately 20 seconds during the Saturday peak due to the increased vehicle demand on Flinders Street.

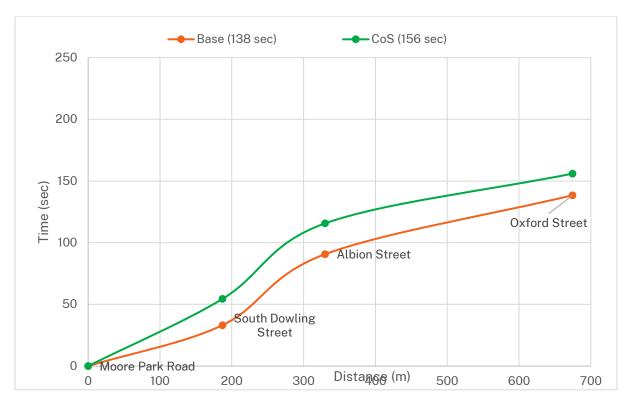


Figure 5-14 AM peak Flinders Street buses northbound

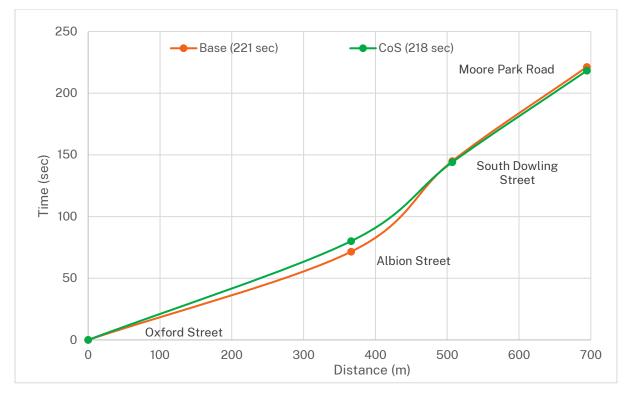


Figure 5-15 AM peak Flinders Street buses southbound

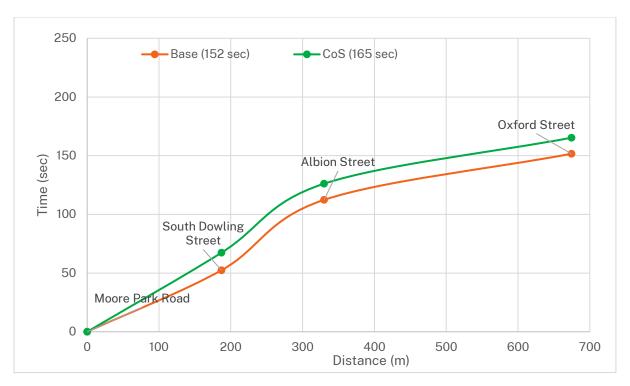


Figure 5-16 PM peak Flinders Street buses northbound

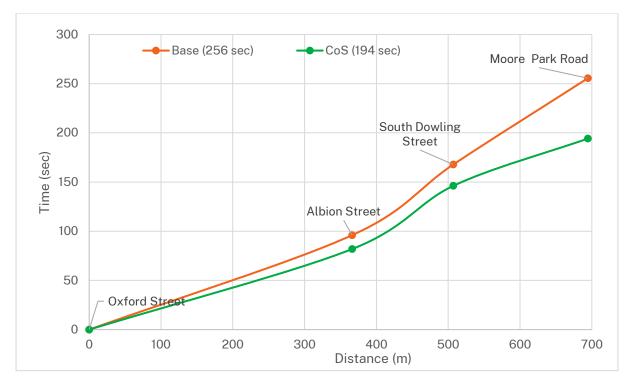


Figure 5-17 PM peak Flinders Street buses southbound

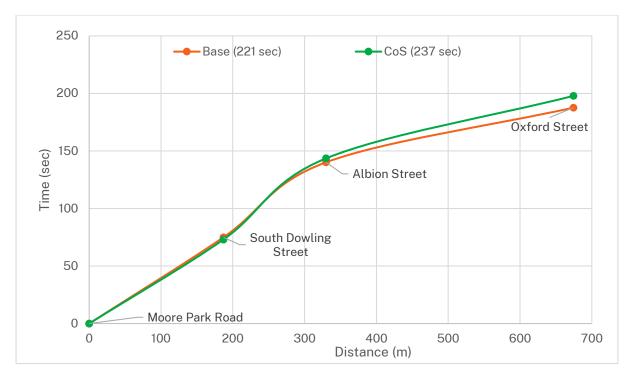


Figure 5-18 Saturday peak Flinders Street buses northbound

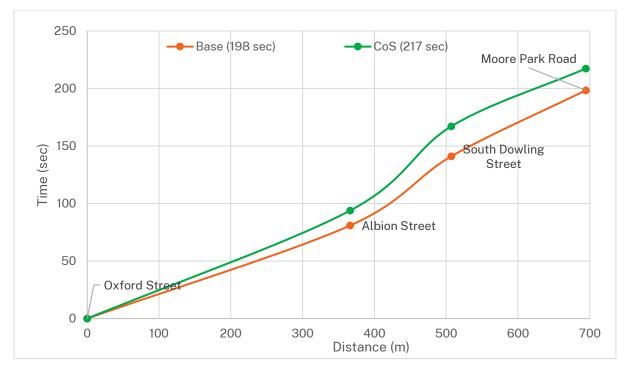


Figure 5-19 Saturday peak Flinders Street buses southbound

## 5.5 Bus Travel Time Summary

Below is a summary of bus travel times for Route 333 along Oxford St and for the inbound and outbound directions.

Direction	Route	From	То	Base	CoS					
AM PEAK TRAVEL TIMES										
		202148 - Oxford St opp	200055 - Museum							
		Moncur St,	Station, Elizabeth St,							
IB	333	CENTENNIAL PARK	Stand D, SYDNEY	21.8	17.3					
		200073 - Museum	202511 - The Light							
		Station, Elizabeth St,	Brigade Hotel, Oxford St,							
OB	333	Stand C, SYDNEY	WOOLLAHRA	13.8	15.2					
		PM PEAP	(TRAVEL TIMES							
		202148 - Oxford St opp	200055 - Museum							
		Moncur St,	Station, Elizabeth St,							
IB	333	CENTENNIAL PARK	Stand D, SYDNEY	19.0	19.2					
		200073 - Museum	202511 - The Light							
		Station, Elizabeth St,	Brigade Hotel, Oxford St,							
OB	333	Stand C, SYDNEY	WOOLLAHRA	14.1	10.7					
		SATURDA	Y TRAVEL TIMES							
		202148 - Oxford St opp	200055 - Museum							
		Moncur St,	Station, Elizabeth St,							
IB	333	CENTENNIAL PARK	Stand D, SYDNEY	19.7	19.7					
		200073 - Museum	202511 - The Light							
		Station, Elizabeth St,	Brigade Hotel, Oxford St,							
OB	333	Stand C, SYDNEY	WOOLLAHRA	14.7	12.3					

Table 5-3 Bus Travel Time Summary (minutes)

The results for Oxford St show:

• For the AM Peak

Inbound travel times show an improvement compared to base due to improvements to signal operations at the western end.

Outbound travel times show a small increase compared to the base due to the introduction of a cycle phase at Crown St.

• For the PM Peak

Inbound travel times show an increase in travel time compared with the base due to the reduced westbound capacity and no bus lane during the PM Peak.

Outbound travel times show an improvement to travel times compared with the base due to the removal of the bus stop on Liverpool St, reducing dwell time for the overall journey.

• For Saturday Peak

Inbound travel time show similar travel times compared with the base.

Outbound show an improvement compared with the base due to the removal of the bus stop on Liverpool St.

#### 5.5.1 Monitoring bus performance reliability

For six months under normal operating conditions after the cycleway opens TfNSW will monitor the performance of the corridor, particularly bus operations, the westbound kerbside lane and use of off-peak parking and loading spaces. Further measures to improve bus journey times and reliability may be required. This could include changing hours of bus lane operation and off-peak parking and loading hours, in consultation with City of Sydney and bus operators.

The monitoring period must include the summer months (December, January and February) under normal operating conditions i.e. no major works or extended events. The monitored area will include, but not be limited to, the relevant sections of Elizabeth St, Liverpool St, Oxford St and Flinders St.

Performance for buses is measured by considering both the mean travel speed (travel time) and journey time reliability.

To analyse the performance, the observed average travel speed along a road corridor on a certain day over a certain time period must be collected. The travel speed and travel time data are available from Public Transport Information and Priority System (PTIPS) and/or Opal data.

Travel speed can be derived from the travel time. A comparison of existing data compared with the travel time with the implementation of the cycleway can be compared and graphed to understand the changes in dwell time, travel times and therefore travel speeds at certain locations. The mapping from actual score to scaled score is shown in Table 5-3.

To determine the journey time reliability, measure the daily travel time consistency in different time periods, such as AM, PM and inter-peak time periods over a certain period of time (e.g., in ninetyday or quarterly period). It determines the percentage of on-time running of vehicles along road corridors during AM, PM and inter-peak durations over a certain time period.

The nominal daily average travel time is defined as 17% above the average of average daily travel times over a period of time (e.g., quarterly, annually or two-year period). This means that the "on-time" measurement is defined as having a travel time deviation of less than or equal to 5 minutes on 30 minutes of travel during both AM and PM peak periods as well as inter-peak period.

The scores of each roadside are combined to give a single, scaled, scored by applying 40% weighting to Travel Speed score and 60% weighting to Journey Time Reliability score. The overall indicator result is the lowest score of the two sides of road. The level of service and its corresponding total score is shown in Table 5-4.

The intent for these metrics would be for TfNSW to monitor post-implementation of Oxford Street west project against the current performance. This would include monitoring the travel times and speeds for buses pre and post opening of Oxford Street west and undertaking a comparison. Should the performance levels deteriorate, additional measures would be required. This may include further refinement to parking / loading removals and increase in bus lane hours. See Section 6.5.2 for bus performance changes due to the removal of parking.

#### Table 5-3 Travel Time Indicator Scale Scores

Attribute	Weight	Unit	Scaled score					
Attribute	Weight		1	2	3	4	5	6
Travel speed	0.4	km/hr	TS < 10	10 ≤ TS < 12	12 ≤TS < 15	15 ≤TS < 20	20 ≤ TS < 30	TS ≥ 30
Attribute	Weight	Unit	Scaled score					
Attibute	Weight	Onic	1	2	3	4	5	6
Journey Time Reliability	0.6	%	JTR < 60	60≤ JTR <70	70≤ JTR <80	80≤ JTR <85	85≤ JTR <90	JTR ≥ 90

Table 5-4 - Vehicle Speed Ratio and Journey Time Reliability Indicator Scale Scores and Level of Service

Attribute	Total score (X)								
Attribute	0 < X ≤ 1	1 < X ≤ 2	2 < X ≤ 3	3 < X ≤ 4	4< X ≤ 5	X > 5			
Level of Service	F	E	D	С	В	A			
X = TOTAL SCORES									

### 5.5.2 Bus Performance with Removal of Parking in Peak Conditions

Further analysis has been undertaken to understand the impact to bus performance with the removal of parking spaces during peak times. The modelling-maintained Council design, however looked at targeted removal of parking/loading zones during peak times including:

- 4 x Car parking, 4xLoading zone at AM Eastbound between Riley St and Crown St on the northern kerb
- 4 x untimed parking zones at PM Westbound between Crown St and Palmer St on the southern kerb

Appendix E highlights the existing and CoS design parking arrangement for the AM Peak, PM Peak and Saturday / Interpeak periods.

The results shown in Figure 5-2020 that with the removal of parking on the northern kerbside between Riley Street and Crown Street in the AM eastbound direction, the travel times for buses improves compared with existing conditions. The cycle phase at the Crown Street / Oxford Street intersection is forecast to increase delays and impact traffic turning left from Oxford Street onto Crown Street. In addition to this right turn Riley Street users struggle to access Oxford Street due to the queues along Oxford Street at Crown Street. By removing the parking, the additional capacity gives access to left turners and provides additional capacity to Riley Street users accessing Oxford Street, improving performance for buses.

Therefore, similarly to 'No Parking' restrictions allocated in the PM Peak westbound direction, **'No Stopping' AM Peak (7:00am to 9:00am)** between Riley Street and Crown Street should be considered to ensure operation for buses and traffic efficiency.

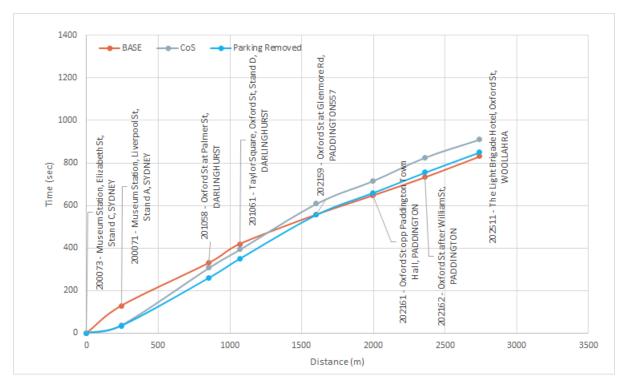


Figure 5-20 AM Peak Oxford St buses eastbound

Figure 5-81 shows with the removal of PM Peak parking on the southern kerbside in the westbound direction between Palmer Street and Crown Street. The bus travel times also improve back to existing conditions. Based on the parking arrangements shown in Appendix E, the change in parking arrangements in the PM Peak would include the removal of around 4 parking spaces between Crown Street and Palmer Street in the westbound direction. These could be converted to a **'No Parking 4:30pm to 6:30pm'** arrangement like other sections along the length of this corridor for example, near Pelican Street. This change to CoS design would be a small change to the parking arrangement but a customer's journey would greatly improve.

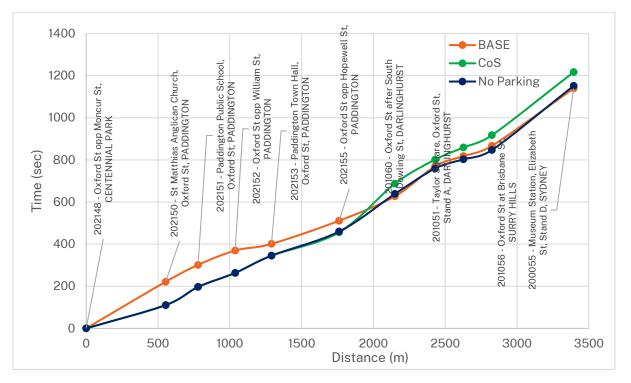


Figure 5-81 PM Peak Oxford St buses westbound

# 6. Wider transport Usage and Impacts

Oxford Street is accessible by all modes of transport i.e., bus, train, walking, cycling and car users.

The usage by all modes varies depending on one's journey purpose. Below is a summary of passenger use by mode. The information below is summarised for years 2017 to 2022. (Note the change in use between 2020 and 2021 during covid)

### 6.1 Public Transport

### 6.1.1 Train Usage

The main train station near Oxford Street is Museum Station located on the corner of Elizabeth Street and Liverpool Street. Below is a summary of the weekday and weekend usage, both tap ons and tap offs for a peak hour and daily use. Data provided was based on a monthly average per year and then summarised to highlight the peak hour use for each year.

Table 6-1 shows peak hourly volume for the following hours specified for each period:

- AM Peak (6am to 10am)
- Inter Peak (10am to 3pm)
- PM Peak (3pm to 7pm)

Table 6-1 Passenger use at Museum Station

	АМ	IP	РМ	Daily		
Weekday Tap Off's						
2017	3807	728	740	14331		
2018	3829	792	777	14680		
2019	3921	802	819	15587		
2020	2583	526	506	9974		
2021	1316	287	276	5280		
2022	1509	340	356	6475		
Weekday Tap On's						
2017	509	691	2826	13614		
2018	492	750	2795	13883		
2019	480	761	2841	14114		
2020	208	398	1209	6418		
2021	175	316	964	5005		
2022	212	384	1081	6075		
Weekend Tap Off's Figure 5-1 AM Peak Oxford St buses eastbound						
2017	382	498	505	5995		
2018	325	418	445	5169		
2019	340	454	499	5724		
2020	346	323	326	3877		

2021	122	188	169	2140		
2022	201	300	291	3669		
Weekend Tap On's						
2017	263	343	417	4695		
2018	228	318	386	4421		
2019	241	340	422	4808		
2020	136	145	174	1839		
2021	77	140	166	1936		
2022	130	217	280	3077		

Note: 2022 data is based on January to September

The results show between 2017 and 2019 the daily usage of passenger tap-ons and tap-offs was around 30,000 passengers for a weekday. This estimated about 3,400 passengers accessing Museum Station in the AM Peak during the week. However, in 2020-21 the daily volumes halved both during the weekday peak and daily volume.

This year, 2022 the volumes are starting to increase again due to a number of covid restrictions that have lifted and more people working back in the office. The current daily volumes are estimated at 12,500 passengers during a weekday with weekday AM Peak hour volumes estimated at 1,700 passengers.

Weekend volumes are generally lower and are estimated to be less than half the daily weekday volume of approximately 11,000 passengers. This equates to approximately 650 passengers in the AM Peak. Assuming the rate of use would be similar to what was seen between 2017 and 2019, the estimate use when Oxford Street west opens would be around 13,000 to 14,000 passengers per day.

### 6.1.2 Bus Usage

A similar process was undertaken to estimate the bus use by peak and day. There are 8 bus stops along the corridor that access Oxford Street / Liverpool Street as shown in Figure 6-2.

As part of this project, the bus stop on Liverpool Street, on the northern side near Hyde Park is being removed. The passengers that currently access this bus stop will need to shift across to the bus stop shown along Elizabeth Street.

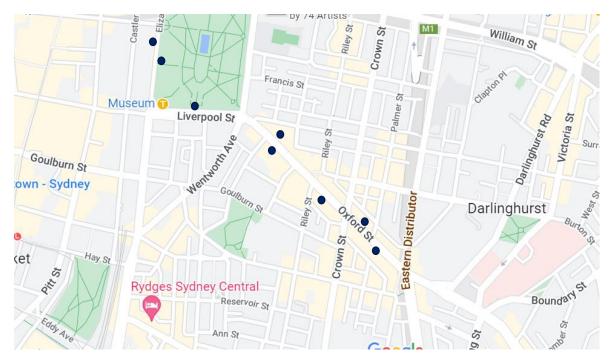


Figure 6-2 Bus Stop on Oxford Street west corridor

The tables below are the passenger tap ons and offs for the AM Peak Hour and daily volumes. The busiest stop is at Museum Station Elizabeth St Stand D. This is located on the western side of Elizabeth Street as shown in Figure 6-2. The number of AM Peak weekday tap offs was around 1300 passengers in 2017. By 2019 the volumes had reduced to approximately 1200 passengers. It was seen across all bus stops (pre covid) that bus passenger volumes were reducing.

One potential reason could be bus passengers are shifting mode to train, noting the train volumes were increasing in that 2-year period. During covid 2020-21 the weekday AM Peak tap off volumes reduced considerably, initially to around 800 passengers in 2020 and then further halved by 2021. All other bus stops operate with lower passenger numbers compared with Stand D on Elizabeth Street. Noting the general reduction in passengers from 2017 to 2021.

Weekend volumes are considerably lower than compared with weekday volumes.

Table 6-2 AM Peak Hour Passenger volumes by bus stop.

Year	Taylor Square, Oxford Street, Stand A	Oxford Street at Riley Street	Oxford Street at Brisbane Street	Museum Station, Elizabeth Street, Stand D	Museum Station, Elizabeth Street, Stand C	Museum Station, Liverpool Street, Stand A	Oxford Street opp Brisbane Street	Oxford St at Palmer St
		tops on South	or West side		Bus S	tops on North	or East side	-
Weekday Ta	ap Off's		_	-				
2017	282	92	285	1339	150	70	67	95
2018	273	73	264	1246	159	65	69	86
2019	259	65	256	1191	167	71	72	92
2020	213	49	198	860	110	49	50	66
2021	118	26	85	351	55	18	16	40
2022	102	121	19	310	52	19	19	88
Weekday Ta	ap On's							
2017	92	183	80	32	92	262	54	43
2018	88	170	75	31	88	254	49	41
2019	99	155	72	28	99	264	41	55
2020	48	65	30	12	48	134	22	31
2021	50	51	26	10	50	116	18	24
2022	5	46	30	11	5	148	7	31
Weekend T	ap Off's							
2017	61	22	45	347	3	18	14	25
2018	69	19	44	345	3	20	17	27
2019	74	13	40	355	3	19	15	27
2020	63	20	55	331	3	18	15	28
2021	32	8	15	120	5	6	6	15
2022	2	44	10	126	19	11	7	21
Weekend Ta	ap On's							

2017	41	20	23	24	64	192	42	29
2018	42	21	23	28	68	180	37	35
2019	42	18	24	24	78	199	29	47
2020	27	15	14	14	42	123	23	31
2021	18	6	10	4	32	77	17	19
2022	31	23	31	7	4	96	4	12

Note: 2022 data is based on January to September

Table 6-3 Weekday Daily Passenger volumes by bus stop.

Year	Taylor Square, Oxford Street, Stand A	Oxford Street at Riley Street	Oxford Street at Brisbane Street	Museum Station, Elizabeth Street, Stand D	Museum Station, Elizabeth Street, Stand C	Museum Station, Liverpool Street, Stand A	Oxford Street opp Brisbane Street	Oxford St at Palmer St
	Bus	Stops on South	or West side		Bus S	Stops on North o	r East side	
Weekday <sup>-</sup>	Tap Off's							
2017	1806	657	1253	9320	382	542	647	875
2018	1780	494	1195	8839	412	525	639	870
2019	1749	426	1180	8914	410	532	619	948
2020	1427	363	868	5874	258	354	455	657
2021	866	223	494	3029	171	168	217	424
2022	244	987	260	2864	541	205	166	563
Weekday <sup>-</sup>	Tap On's	•						
2017	1191	452	529	396	2839	3757	895	722
2018	1102	446	491	368	2679	3588	799	735
2019	1116	418	492	357	2944	3748	687	968
2020	590	224	245	148	1184	1752	360	597
2021	516	158	227	98	885	1358	340	454
2022	948	605	524	111	81	1681	106	246
Weekend <sup>•</sup>	Tap Off's	1						
2017	1246	466	656	6445	150	372	353	559
2018	1334	365	725	6589	201	397	364	596
2019	1290	292	704	6593	169	385	348	663
2020	1028	267	490	4271	94	242	261	459
2021	608	177	343	2271	79	120	153	318
2022	44	856	238	2447	426	206	140	454
Weekend	Tap On's			•				

2017	633	297	285	320	1922	2943	570	578
2018	632	311	301	395	1998	2954	548	653
2019	633	272	298	348	2009	2995	425	804
2020	325	153	146	114	716	1180	226	450
2021	332	125	163	75	582	1007	256	382
2022	800	436	449	102	93	1456	108	198

Note: 2022 data is based on January to September

The weekday daily volumes show a similar pattern to that seen for the AM Peak passenger numbers. Museum Station Elizabeth Street Stand D was seen to have around 9,300 passengers tap off in 2017. Today, the estimated volume is around 2,900 passengers per weekday.

Weekend tap off volumes at Stand D was around 6,500 passengers per day in 2017 and has dropped to 2,500 passengers in 2020.

The data suggests that passenger numbers are dropping, however further analysis of future years as they become available would be the best way forward to understand the change moving forward.

## 6.2 Walking and Cycling

### 6.2.1 Cycling

To determine the future use of cyclist a number of assumptions have been used based on previous analysis.

Firstly, the number of weekday daily trips were determined at different locations along the corridor. The information has been utilised from the following link <a href="https://www.transport.nsw.gov.au/projects/programs/walking-and-cycling-program/walking-and-cycling-counts">https://www.transport.nsw.gov.au/projects/programs/walking-and-cycling-program/walking-and-cycling-counts</a>

This is a dashboard created by TfNSW which contains Active Transport data for walking and cycling.

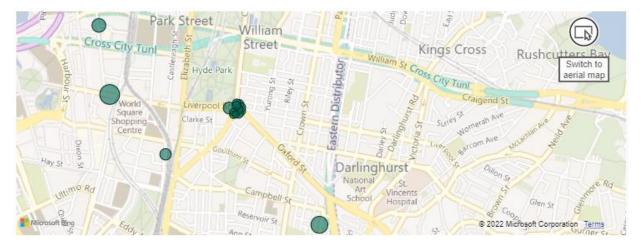


Figure 6-3 Cycling Count Locations within the Dashboard.

Figure 6-3 highlights the location of count data available along the corridor. Most data available is at the intersection of Liverpool Street / Oxford Street / College Street / Wentworth Avenue. Therefore, this location has been the basis of the analysis.

Yearly average weekly data was utilised between 30/11/21 to 29/11/22, excluding school holidays for Liverpool Street, west of College Street.

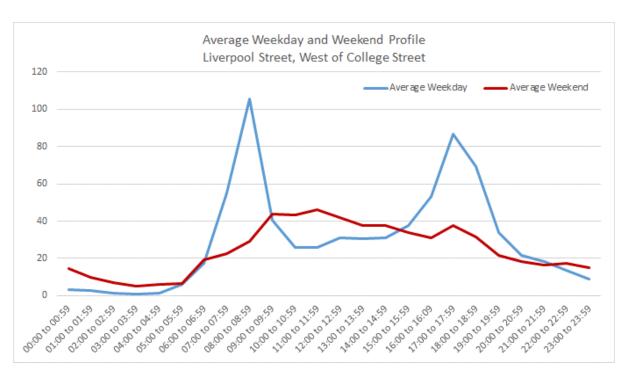


Figure 6-4 Yearly Average Weekday and Weekend Trips by Hour (Liverpool Street, West of College Street)

Figure 6-4 shows the daily profile for both weekday and weekend travel. The highest usage at this location is during the weekday at 8:00am in the morning and 5pm in the afternoon. The total daily weekday usage is 722 trips per day.

The yearly trips were calculated based on a rate determine by an average of yearly trips at the following locations:

- Bourke Street cycleway
- Moore Park cycleway
- Oxford Street cycleway

Therefore, the yearly trips calculated along Liverpool Street, west of College Street was around 226,000 trips per year. This was the basis of calculating the forecast volumes.

To determine the future use based on the introduction of Oxford Street west, the following assumptions have been used based on what was developed for the Eastern Suburbs Cycleway Final Business Case (December 2019). Mode shift assumptions and usage in the first 3 years of opening within the document state the following:

Mode shift assumptions have been created based on cyclist travelling between the city and Bondi Junction as well as cyclists using centennial park. Combining the two sets of parameters the final mode shift allocations used in the modelling are as follows:

- Reassigned cyclists: 9%
- Induced demand from existing cyclists: 11%
- Diverted from Car: 22%
- Diverted from Bus: 32%

- Diverted from Train: 21%
- Diverted from Walking: 5%

Forecast demand was forecasted by analysis the demand response seen to previous separated cycleway infrastructure providing improved access to the City of Sydney. It has been assumed that within 6 months of opening the cycleway demand is assumed to increase by 50%. Within 3 years of opening, the uplift is suggested to double to 200%. However, a conservative estimate assumes 125% demand increase after 3 years

The population growth rate is assumed to be 1.35% p.a. based on average growth in ERP (Estimated Resident Population) for Waverley, City of Sydney, and Randwick LGA's

These assumptions have been the basis of the forecast (100% uplift). Lower (75%) and higher (125%) uplift projection calculations have also been undertaken. Figure 6-5 highlights the projection out to 2060.

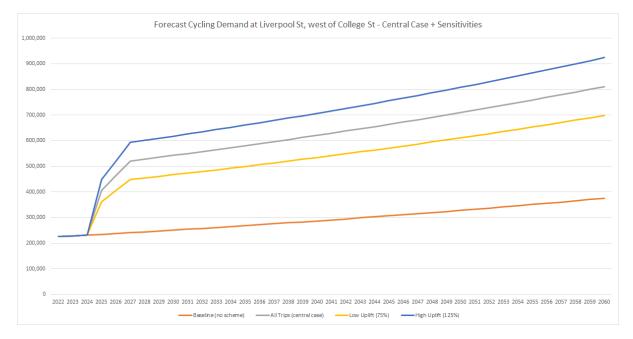


Figure 6-5 Cycling Demand Forecast

Figure 6-5 shows that by 2060 the forecast demand would be just over 800,000 cycling trips a year. Note: this is based on one location and not all origin-destination trips across the length of the Oxford Street West corridor. This suggests the number of forecast trips would potentially be higher.

Note: If methodologies change and trends change in the future, this forecast value is subject to change.

### 6.2.2 Walking

D-spark data has been used to understand the number of walking users along the length of the corridor. D-spark data assumes that if trips are made with a 15minute gap then they are considered 2 trips in the analysis. Figure 6-6 below shows the peak hourly walking trips for AM, Off-peak and PM Peak.

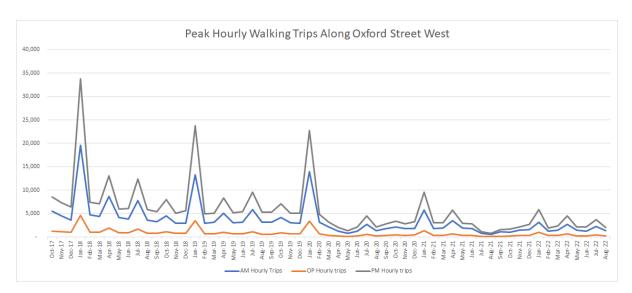


Figure 6-6 Peak Hourly Walking Trips Along the Oxford Street West Corridor

The average peak hour is considered within the following peak periods:

- AM Peak between 6am to 10am
- Off peak between 10am to 3pm
- PM Peak between 3pm to 7pm

The PM Peak highlights the highest number of walkers along the corridor compared with the AM Peak and Off-peak times. January is shown to have the highest number of walkers most likely due to it being a holiday period with the numbers dropping considerable by February and March. The smaller spikes throughout the year indicate school holiday period.

Figure 6-6 shows the number of walkers is shown to decrease over time between 2017 and 2019 with a considerable drop during covid. The numbers are seen to pick up again. The number of walkers currently between Liverpool Street and Taylor Square are seen to be under 5000 trips.

The data suggests that passenger numbers are dropping, however further analysis of future years as they become available would be the best way forward to understand the change moving forward.

### 6.3 Parking

Parking arrangements based on City of Sydney's design are shown below.

Location	North Side	Kerb	South Side Kerb			
	Existing	CoS Design	Existing	CoS Design		
1	No Stopping	No Stopping	3	3		
2	9	No Parking	8	No Parking		
3	15	15	8	8		
4	9	9	7	7		
5	7	2	11	11		

Table 6-4 Number of Parking Spots along the OSW corridor

All parking along Liverpool Street between Elizabeth Street and College Street have been removed to cater for the reduced lane in the westbound direction along with the introduction of the cycleway. In addition to this there is removal of parking between Palmer Street and Flinders Street.

The removal of parking would provide a benefit to maintain bus performance, however on approach to College Street, westbound as shown in Figure 5-1 bus travel times have reduced compared to existing. This is due to the PM Peak westbound direction allowing parking with no bus lane. This means all buses must travel in the general traffic lane during this time.

## 6.4 Mode Shift

To determine the mode shift of car driver and car passengers, analysis was undertaken using Public Transport Project Model (PTPM). PTPM is a multi-modal transport model underpinned by observed demand in the base year. Base year demand is factored by mechanised mode growth from STM and then a separate mode choice model is applied with PTPM. Initially developed for the Northwest Rail Link and CBD & Southeast Light Rail projects, it has now been used on all Sydney Metro business cases and many other major public transport projects. The model can be calibrated and tailored to each project including travel zone refinement and validation against counts in a particular corridor.

#### Features of PTPM include:

Table 6-5 PTPM Features

Geographical extent	Sydney Greater Metropolitan Area (GMA)					
Zoning	TZ16 with project-specific zone disaggregation					
	Car, Truck – vehicle types aligned to toll classifications					
Modes Car, Truck (fixed), Train, Ferry, Light Rail, Bus – collectively known as mechanised modes						
Time Periods	Weekday AM Only (Other peaks under development)					
Strengths	<ul> <li>Underpinned by Opal data for each public transport mode</li> </ul>					
Limitations	<ul> <li>Excludes cycling and walking (Under development)</li> <li>Only AM Peak (Other peaks under development)</li> <li>Not fully capacity constrained (i.e. uses speed/flow curves)</li> </ul>					
Applications         Major public transport business cases						
Software	EMME					

The model was run for:

- 2019 Base Case
- 2026 Future Base
- 2026 With Project includes Oxford Street east and west changes
- 2036 Future Base
- 2036 With Project includes Oxford Street east and west changes

The analysis was undertaken with both projects in place to understand the maximum shift of car users. The results are presented in Table 6-6. The results presented are for the weekday AM Peak only. The results for 2026 and 2036 show a very small shift in mode to train, LRT and bus. The percentage change is less than 0.1%. This indicates that users would continue their journey via car but shift their trip pattern to alternate roads.

## 6.5 Major Events

Noting construction will commence from Q3 2023 there are 3 events that could be impacted during this time:

**New Year's Eve**: Significant increase the public transport network to provide transport to and from Sydney CBD for NYE event. We provide approximately 1,000 additional bus trips arriving into Sydney CBD, out of which 300 are from east. Council would be required to consult TfNSW's Major Events Team prior to and during the construction phases of the project to discuss event requirements.

**Mardi Gras**: Mardi Gras 2024 will need to be reviewed with the event organiser as their parade route will be impacted. Council / Mardi Gras team would be required to consult TfNSW's Major Events Team prior to and during the construction phases of the project to discuss event requirements

**City 2 Surf**: City 2 Surf team close the corridor of Park Street, William Street and New South Head Road on the 2<sup>nd</sup> Sunday in August every year for the City 2 Surf. This event has a significant impact for the residents of Eastern Suburbs and Oxford Street corridor is a vital detour route. With the westbound capacity reduced on Oxford Street, there will be significant impact for the community during this event. Council / City 2 Surf team would be required to consult TfNSW's Major Events Team prior to and during the construction phases of the project to discuss event requirements.

Mode	2019 Base	2026 Base	2026 Project	2026 Absolute Diffs	2026 % Differences	2036 Base	2036 Project	2036 Absolute Diffs	2036 % Differences
Train	410,134	478,409	478,520	111	0.02%	583,683	583,769	86	0.01%
LRT	3,831	33,156	33,188	32	0.10%	38,871	38,888	17	0.04%
Ferry	10,893	14,294	14,294	0	0.00%	12,701	12,701	0	0.00%
Bus only	207,462	237,932	237,996	63	0.03%	295,871	295,948	77	0.03%
Car driver	2,253,905	2,476,659	2,476,471	-187	-0.01%	2,817,930	2,817,769	-161	-0.01%
Car	623,725	698,460	698,437	-22	0.00%	781,714	781,694	-19	0.00%
passenger									
LCV	170,036	187,482	187,482	0	0.00%	213,862	213,862	0	0.00%
TOTAL	79,197	76,055	76,055	0	0.00%	88,820	88,820	0	0.00%

Table 6-6 Outcomes of Mode Shift from PTPM with and without the Project in the AM Peak

# 7. Movement and Place

## 7.1 Road Network Plan 03

Oxford Street West was investigated as part of the Movement and Place Framework in March 2018. Oxford Street west segment was examined as part of multiple segments along and around Oxford Street. Oxford Street west is Segment 1 of 6 segments that were considered, shown in Figure 7-1.

This RNP provides a framework for improving the operation and management of the Oxford Street Road network based on the road network's function and customer needs.

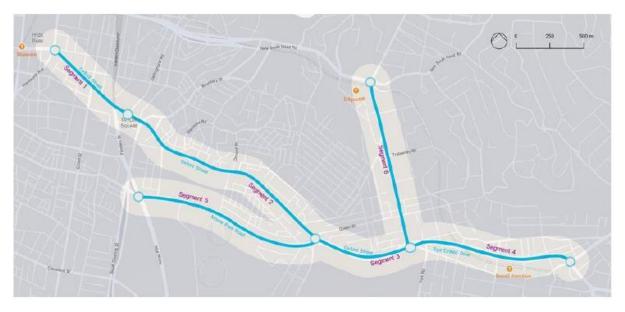


Figure 7-1 Extent of Road Network Plan Investigated.

### 7.1.1 Vision for the road network

The strategic vision for the overall Oxford Street Road network comprises:

- A well-balanced east-west movement corridor linking the Eastern Suburbs and Sydney CBD
- A high frequency and reliable public transport route with pedestrian and bicycle priority encouraging the use of sustainable modes of travel
- A popular commercial, entertainment and recreational destination with a diversity of mixed uses, offering high quality inner urban living opportunities
- A safe road network for all road users.

Vision statements have been developed for each segment. The vision for Segment 1 is to develop: A vibrant mixed-use city edge strip and gateway into the City, with outstanding pedestrian, cycle and bus accessibility provided in a safe manner.

The objectives within the RNP process for Segment 1 have been developed and include:

- Improve safety for all users
- Discourage cross-regional traffic from travelling into and through Sydney CBD
- Keep traffic moving
- Decrease private vehicle volumes
- Preserve and enhance bus route reliability
- Improve pedestrian priority
- Improve facilities for cyclists to increase the rate of cycling
- Maintain the distinctive village character
- Facilitate an environment for the night economy to thrive
- Facilitate future technological advances.

Based on the vision and objectives for Segment 1 it is suggested that the movement and place classification move from 4D to 3D (shown in Table 7-1).

Segment 1 currently experiences FSI crashes at almost ten times the class average, casualty crashes at more than six times the class average and all crashes at more than four times the class average. Almost 70% of crashes occurred at an intersection in Segment 1, indicating conflict between movements at intersections, which are more closely spaced than in other segments. In addition, over 50% of all crashes involved either a pedestrian or a cyclist. This suggests a correlation between the high place function of Segment 1 and its role as a movement corridor. As a result, there is potential for Segment 1 to shift from Movement status "4" to "3" for all customer groups. This would reduce the dominance of cars along Segment 1 and seek to make it safer for pedestrians and cyclists, reducing the very high incidence of crashes.

Segment	Existing Movement Status	Existing Place Status	Potential Future Movement Status	Potential Future Place Status	Existing Road Type	Potential Future Road Type
Segment 1 Oxford Street 1	↑↑↑↑ Movement 4	Place D	↑↑↑ Movement 3	🛉 🏟 🏟 🏟 Place D	Vibrant Street	Place for People
Segment 2 Oxford Street 2	↑↑↑ Movement 3	🛉 🏟 🛉 Place C	↑↑↑ Movement 3	Place D	Local Street	Place for People
Segment 3 Oxford Street 3	↑↑↑↑↑ Movement 5	🛉 🏟 Place B	↑↑↑↑↑ Movement 5	Place B	Movement Corridor	Movement Corridor
Segment 4 Syd Einfeld Drive	↑↑↑↑↑↑ Movement 6	-	↑↑↑↑↑↑ Movement 6	-	Motorway	Motorway
Segment 5 Moore Park Road	↑↑↑ Movement 3	i i Place A to Place C	↑↑↑↑ Movement 4	Place A to Place C	Local Street	Movement Corridor
Segment 6 Ocean Street	↑↑↑ Movement 3	Place A to Place B	↑↑↑ Movement 3	Place A to Place B	Local Street	Local Street

Table 7-1 Potential Future Movement and Place Classification

The Oxford Street West project does provide for the change in classification based on the following design changes for this segment:

- Introduction of a cycleway on the northern side of Liverpool Street / Oxford Street
- A decrease in general traffic volumes for the westbound direction by the removal of one general traffic lanes.
- The introduction of turn bans to help improve general traffic and bus travel time performance

## 7.2 Built Environmental Factors

The NSW Movement and Place Framework has established a set of 36 built environment performance indicators for evaluating Movement and Place projects. The indicators are based on qualities that contribute to a well-designed built environment and are grouped under five themes relating to user outcomes. The user outcomes reflect what a person may reasonably expect as an outcome of good performance related to that theme.

The Built Environment Indicator Movement & Place Performance Assessment Tool is used to visually display the performance gap between the existing built environment and desired future vision for a study area.

Access and Connection: transport choice, reliable transport and equity (of access)

Amenity and Use: convenient facilities and local opportunities

Green and Blue: a link to nature

Comfort and Safety: a comfortable environment, that is low risk

**Character and Form:** a place that is human-scaled, that celebrates its distinct features.



Figure 7-2 Built Environmental Factors

			St Peak	Oxford St	Interpeak	Liverpoo	l St Peak	Liverpool S	t Interpeak
Theme	Outcome	Existing study area	Vision study area						
	Transport Choice	2.00	3.00	2.00	3.00	2.00	3.00	2.00	3.00
Access and Connection	Reliable Transport	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Equity	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	Convenient Facilities	3.00	3.00	3.00	3.00	2.00	1.00	2.00	1.00
Amenity and Use	Local Opportunities	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Green and Blue	Link to Nature	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Comfact and Cafaty	Low Risk	1.00	2.00	1.00	2.00	1.00	2.00	1.00	2.00
Comfort and Safety	Comfortable	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Character and Farm	Human Scale	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00
Character and Form	Distinct	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00
Total (/30)		19.00	21.00	19.00	19.00	20.00	21.00	20.00	21.00
Equivalent Total		19.00	21.00	19.00	19.00	20.00	21.00	20.00	21.00
Eqv % of Vision		90%	100%	90%	90%	95%	100%	95%	100%

The results show an improvement to access and connection along Liverpool Street and Oxford Street due to the dedicated space allocated to cycleway, providing separation of cyclists from general traffic. This makes it safer for cyclists and reduces conflict between cars and cyclist.

However, there is small change in the convenient facilities category, and this is due to bus stops along the northern side of Liverpool Street have been relocated away from Liverpool Street. Multiple on-street carparking have been removed along Liverpool Street to allow space for the Liverpool Street cycleway.

These are the changes that have been reflected based on the Built Environment Factors.

### 7.3 Healthy Streets

The Healthy Streets Approach and the NSW Movement and Place Framework share a common intent to create healthier streets and healthier movement options. They both support initiatives and options that are vision-led and place specific.

Healthy Streets includes 10 indicators that are simple to understand for all stakeholders including non-technical transport professionals. Each indicator is shown in the adjacent figure and can be used by project teams to prompt questions when investigating site conditions. The prompts can help professionals explore and consider the wide spectrum of street functions and users.

The Healthy Street Approach directly aligns to current political values in the application of design principles as well as offering an evidence-based tool (e.g., Healthy Streets Check for Designers) which will measure the impact a design will have on what makes streets appealing, healthy and inclusive places.



#### 10 HEALTHY STREETS INDICATORS

#### Streets Approach.

Figure 7-3 10 Healthy Street Indicators

There are 19 metrics considered when assessing the health of a street which all affect different indicators within the Healthy Streets Approach. They are:

- Traffic Speed
- Volume of motorised traffic
- Mix of vehicles
- Conflict between cycles and turning vehicles
- Turning speeds at side-street intersections
- Ease of crossing mid-block
- Priority of crossing at intersections
- Quality of the footpath
- Space for walking
- Appropriate separation of people walking from traffic
- Space for cycling
- Lighting
- Availability of drinking water
- Public seating
- Cycle parking
- Shade for walking
- Shade for cycling
- Reducing through traffic
- Bus stops

These elements were analysed for Liverpool Street and Oxford Street for both the peak and offpeak conditions and a comparison of the existing conditions compared with the City of Sydney design were assessed and the results are presented in Table 7-2. The results show that the City of Sydney design is an improvement compared to the existing conditions. The changes with respect to:

- reduction in traffic volume,
- conflicts between cyclist and turning vehicles
- appropriate separation of people walking from traffic
- space for cycling
- shading
- are the main contributors for improvement into healthy streets.

Full reports are provided in Appendix D - Movement and Place and Built Environment Assessment.

Table 7-2 Assessment of Healthy Streets for Liverpool St – Oxford St (OSW)

	Oxford Str	eet Peak	Oxford Stre	eet Interpeak	Liverpool S	treet Peak	Liverpool S Interpeak	Street
	Existing Layout Score	Proposed Layout Score	Existing Layout Score	Proposed Layout Score	Existing Layout Score	Proposed Layout Score	Existing Layout Score	Proposed Layout Score
Healthy Streets Score	30	38	30	41	40	49	40	52
Everyone feels welcome	26	37	26	40	37	49	37	51
Easy to cross	19	19	19	19	43	43	43	48
Shade and shelter	44	56	44	56	33	44	33	44
Places to stop and rest	33	39	33	39	44	50	44	50
Not too noisy	13	20	13	33	20	33	20	40
People choose to walk and cycle	26	37	26	40	37	49	37	51
People feel safe	22	36	22	42	36	53	36	56
Things to see and do	67	75	67	75	75	83	75	83
People feel relaxed	26	37	26	40	37	49	37	51
Clean air	22	22	22	22	33	33	33	44

## 8. Parking Study

Transport for NSW undertook a parking investigation and report with data and analysis including assessments on the capacity of car parking spaces and their use at different times during the day and week. The study covers Liverpool Street between Castlereagh Street and College Street and Oxford Street between College Street and Taylors Square (Flinders Street). It also includes covering side streets in the vicinity to the study corridor. The corridor is to be divided into sections per block / per direction.

Deliverables include:

- Parking Inventory Survey
- Parking Demand and Duration of Stay Survey
- Parking data reports

The key objective of this study was to assess the impact of the removal/adjustments to on-street car parking and loading on the south side of Oxford Street and to identify specifically if this parking/loading can be accommodated in the existing on-street parking in the immediate vicinity of these parking spaces.

This includes consideration of the following:

- The existing on street car parking restrictions
- The existing land uses (retail, commercial and residential) adjacent to where parking is proposed to be removed or adjusted.
- The existing on street public car parking supply and demand.
- The destinations of parkers on Oxford Street (Between Pelican Street and Crown Street) using Origin-Destination (OD) surveys.

This report provides key parking information to make decisions around parking and loading in advance of the implementation of the cycleway.

The study area in the image below shows the area of focus for this study.



Figure 8-1 Parking Area of Focus

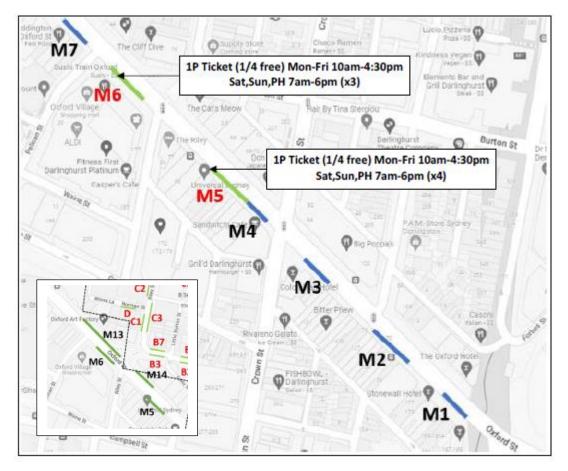


Figure 8-2 Parking Zone Analysis

Figure 8-2 shows the locations of the parking and loading zones that were assessed. M5, M6, M13 and M14 are the parking zone locations on the north and south side of Oxford Street between Flinders Avenue and Wentworth Avenue. M1 to M4 and M7 are the loading zones that were assessed within this parking study. These were assessed to determine if the loading could be either removed, relocated or rationalised from Oxford Street.

The report has been completed by PeopleTrans Pty Ltd and can be found in Appendix F. The report summarises the following the following results for on-street parking and loading zones.

Date	Maximum Main Corridor (Oxford Street) Demand	Maximum Deficit	Notes
Monday	8 vehicles at	No deficit	Sufficient vacancies throughout the survey period with a
13/02/2023	12:00pm		minimum of 23 vacancies at 1:00pm.
Tuesday	9 vehicles at	No deficit	Sufficient vacancies throughout the survey period with a
14/02/2023	12:00pm		minimum of 17 vacancies at 12:00pm.
Wednesday	7 vehicles at	No deficit	Sufficient vacancies throughout the survey period with a
15/02/2023	1:00pm & 3:00pm		minimum of 13 vacancies at 1:00pm.
Thursday	7 vehicles at	No deficit	Sufficient vacancies throughout the survey period with a
16/02/2023	1:00pm & 3:00pm		minimum of 24 vacancies at 1:00pm.
Friday	7 vehicles at	No deficit	Sufficient vacancies throughout the survey period with a
17/02/2023	1:00pm & 2:00pm		minimum of 18 vacancies at 1:00pm.

Table 3 Summary of Weekday Parking on Oxford Street South at M5 & M6 (Areas A/B, M13 & M14)

Table 3 indicates that on all surveyed days there were sufficient vacancies in the identified side streets in Area A and Area B and including parking area M13 and M14 to cater for the observed demand on Oxford Street south at M5 & M6. Although there were vacancies in the nearby side streets to cater for the loss of weekday parking at M5 and M6 the demand for parking in Area A ranged, on average, between 82% to 85% capacity. 85% capacity is often referred to as "Theoretical Capacity" a point where there are some car parking spaces available, but they are spread out sporadically and as such are difficult to find.

Based on a review of the loading zones the results show:

• M1 Loading Zone;

Friday showed the highest use with 17 vehicles using the loading zone between 10am and 4:30pm. No vehicles on Saturday

The highest vehicle type using the loading zones are Hiace Van

• M2 Loading Zone;

Tuesday showed the highest use with 21 vehicles using the loading zone between 10am and 3:00pm. No vehicles on Saturday

The highest vehicle type using the loading zones are Hiace Van

• M3 Loading Zone;

Thursday showed the highest use with 25 vehicles using the loading zone between 10am and 4:30pm. No vehicles on Saturday

The highest vehicle type using the loading zones are Hiace Van

• M4 Loading Zone;

Friday showed the highest use with 25 vehicles using the loading zone between 10am and 4:30pm. 5 vehicles on Saturday

The highest vehicle type using the loading zones are Hiace Van

• M7 Loading Zone;

Wednesday showed the highest use with 26 vehicles using the loading zone between 10am and 4:30pm. 8 vehicles on Saturday

The highest vehicle type using the loading zones are Hiace Van

# 9. Conclusion

This report has provided an overview of the current conditions, the results of introducing a cycleway on Oxford Street and Liverpool Street between the Castlereagh Street intersection and Taylor Square and the potential wider impacts due to the project.

This project complements the TfNSW's Movement and Place Framework and Road Space User Allocation Policy (2021) which aims to reallocate road space within built-up areas to reduce private motor vehicle trips, support efficient movement of people and enhance place amenity.

The Framework's strategic vision for Oxford Street Road network, specifically between Taylor Square and Hyde Park, is to convert the existing arrangement into a "high frequency and reliable public transport route with pedestrian and bicycle priority encouraging the use of sustainable modes of travel". Strongly supported by quantitative assessment utilising the Built Environment Indicator M&P Performance Assessment Tool, which shows significant improvement to access and connectivity along Oxford Street due to the dedicated space allocated to cycleway. In addition, analysis conducted through the Healthy Streets Approach, has showed significant improvements in traffic volumes, conflicts between vehicles and cyclists, pedestrian safety and shading as a biproduct of the project.

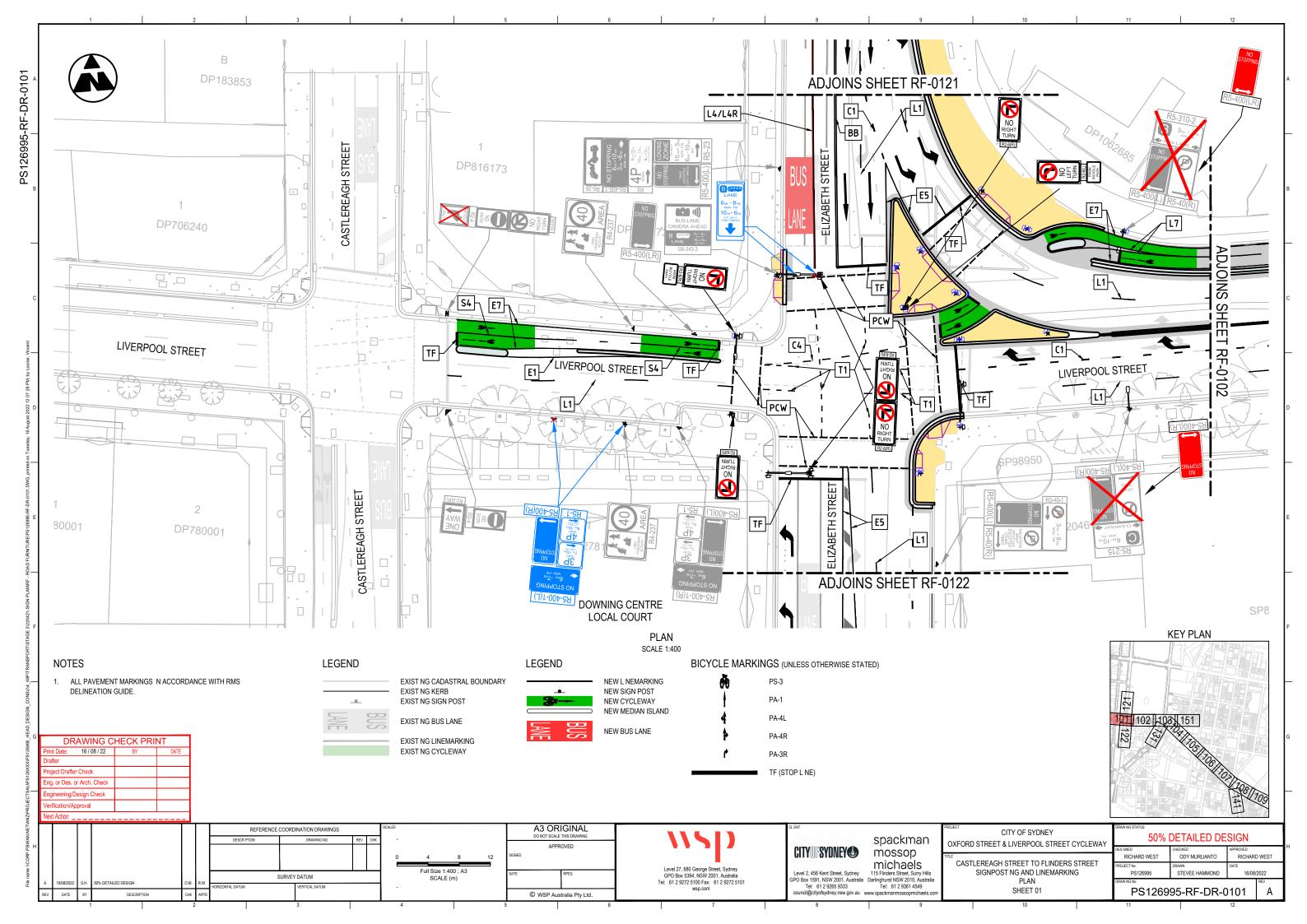
The City of Sydney design was tested for the AM, PM and Saturday peak periods which includes the cycleway and parking arrangements as identified in the City of Sydney's General Arrangement Plan dated 24/05/22.

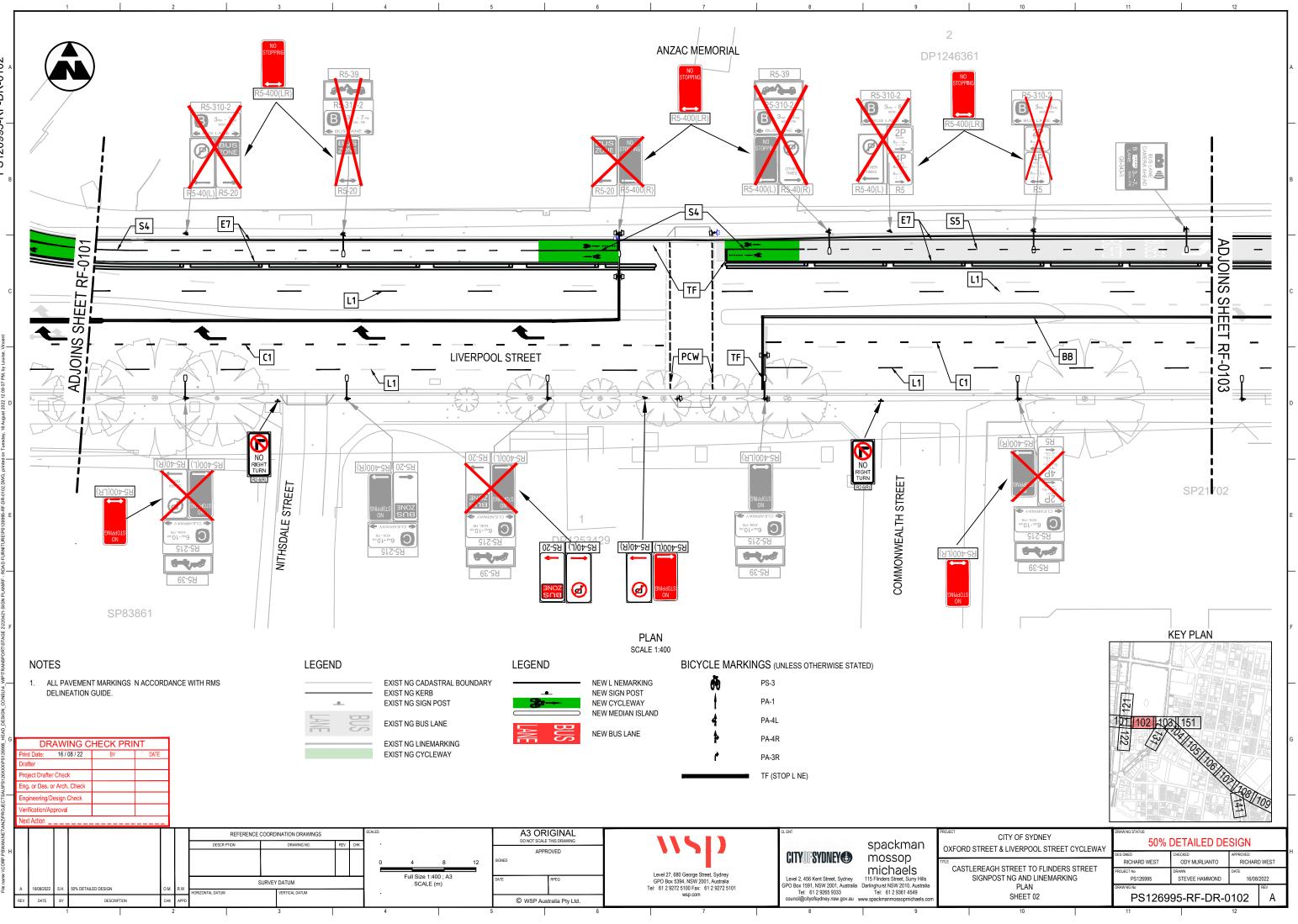
The modelling results showed a mixture of improvements along the corridor, where turn movements are proposed to be removed at intersections, and decreases in the performance, specifically at locations where capacity is reduced or demands are forecast to increase. These are indicative of what would be expected on a corridor where capacity has been reduced to promote a multi-modal outcome. As a result, bus travel times have increased in the off-peak directions, and as a mitigation measure TfNSW are proposing the following refinements to the Council design:

- Eastbound direction between Riley St and Crown St during the AM peak. Proposed change to include:
  - Conversion of timing for 4 vehicle spaces signposted as '1P Ticket' zones between
     8:30am and 3:00pm to 9:00am and 3:00pm
  - Conversion of 4 vehicles spaces signposted as loading zones between 7:00am and 3:00pm to 9:00am and 3:00pm
  - Inclusion of a 'No Stopping' zone between 7:00am and 9:00am (at the locations specified above).
- Westbound direction between Palmer St and Crown St during the PM peak, at the location of the existing 4 vehicle spaces signposted as loading zone:
  - Inclusion of a 'No Parking' zone between 4:30pm and 6:30pm where there is no current parking restriction.

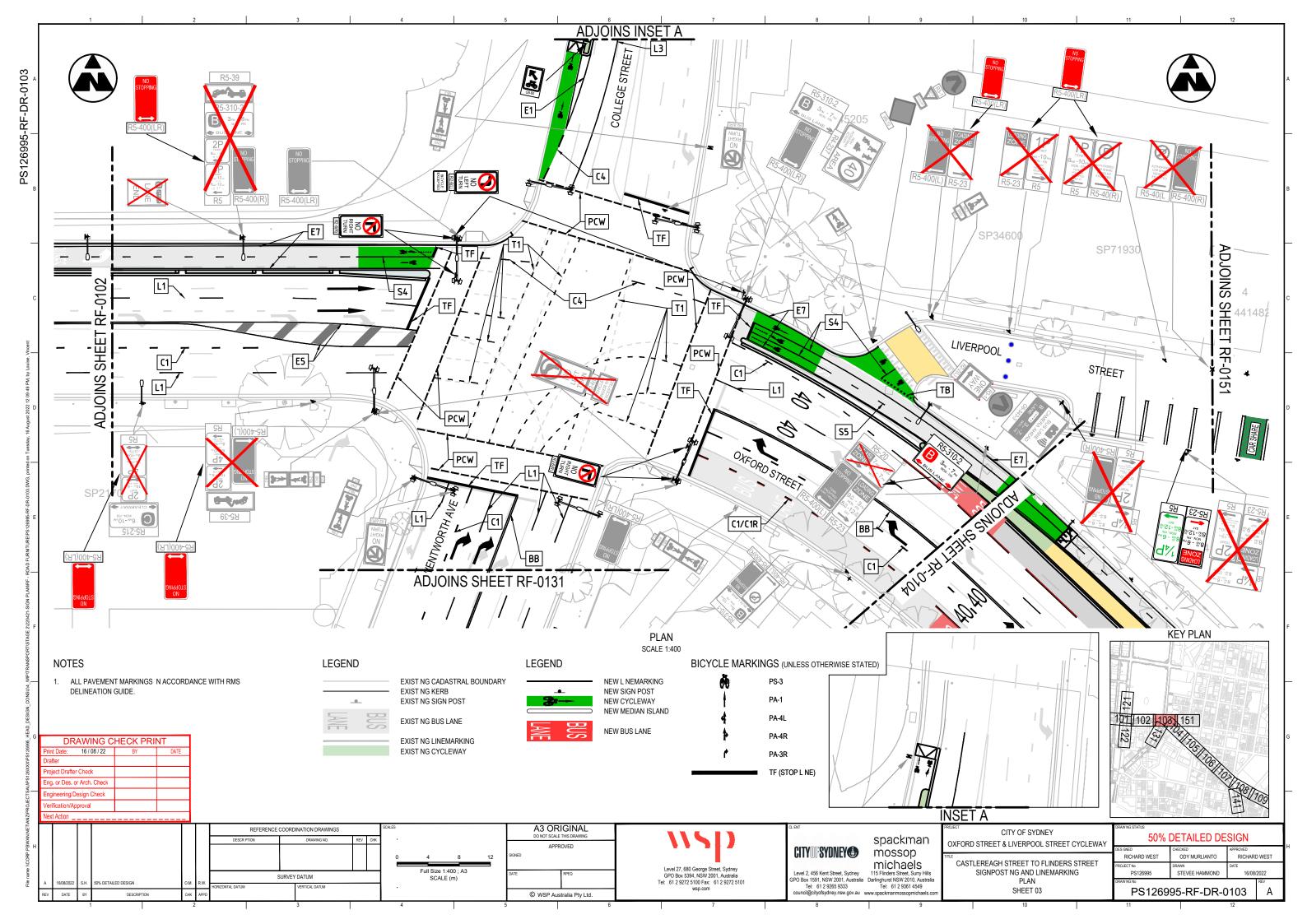
TfNSW will monitor the performance of the westbound kerbside lane and use of off-peak parking and loading spaces for six months after the cycleway opens, to identify and consider potential improvements. This will include evaluating bus reliability and potentially changing off-peak parking and loading hours, in consultation with City of Sydney in accordance with metrics provided in section 5.5.1.

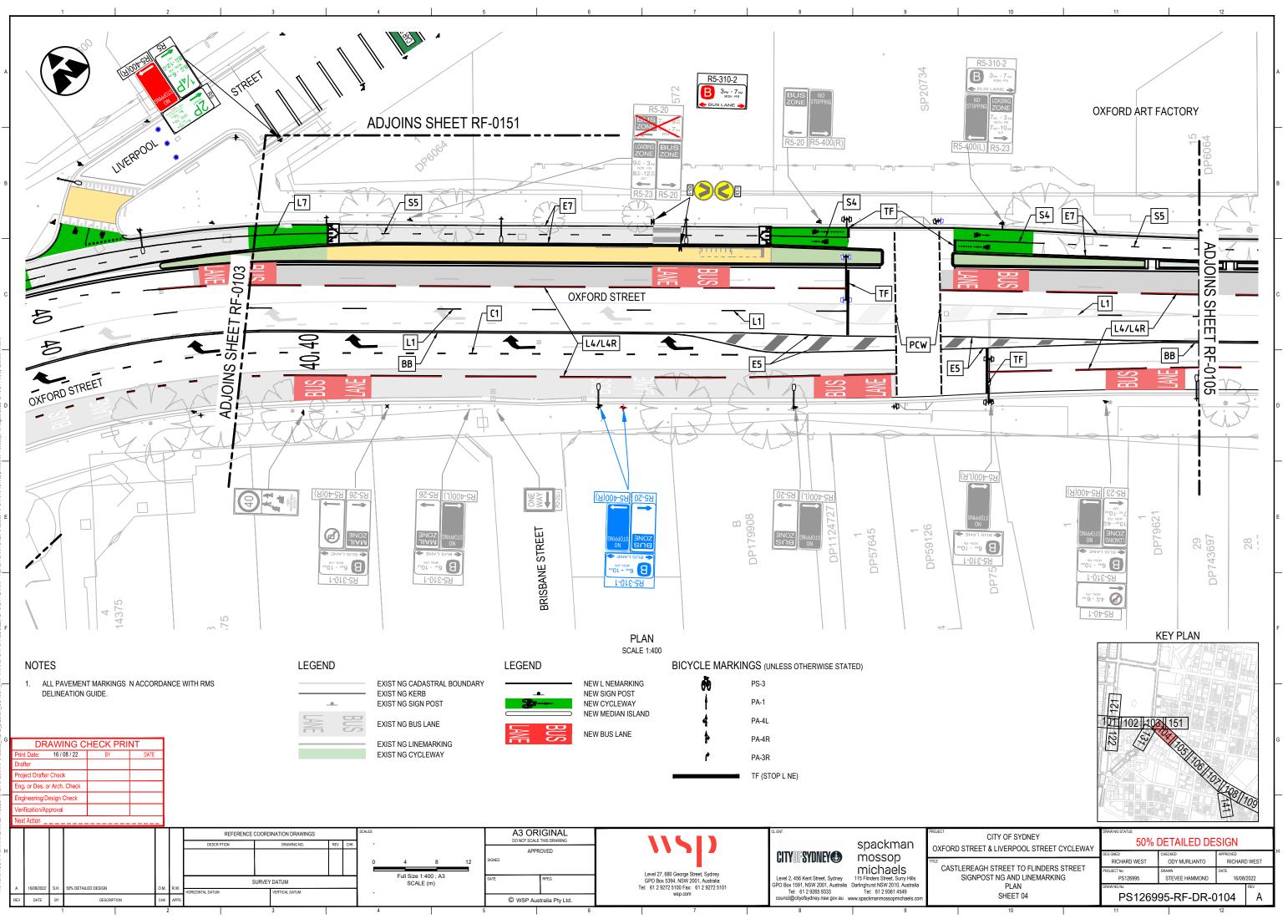
# Appendix A - Council 50% design

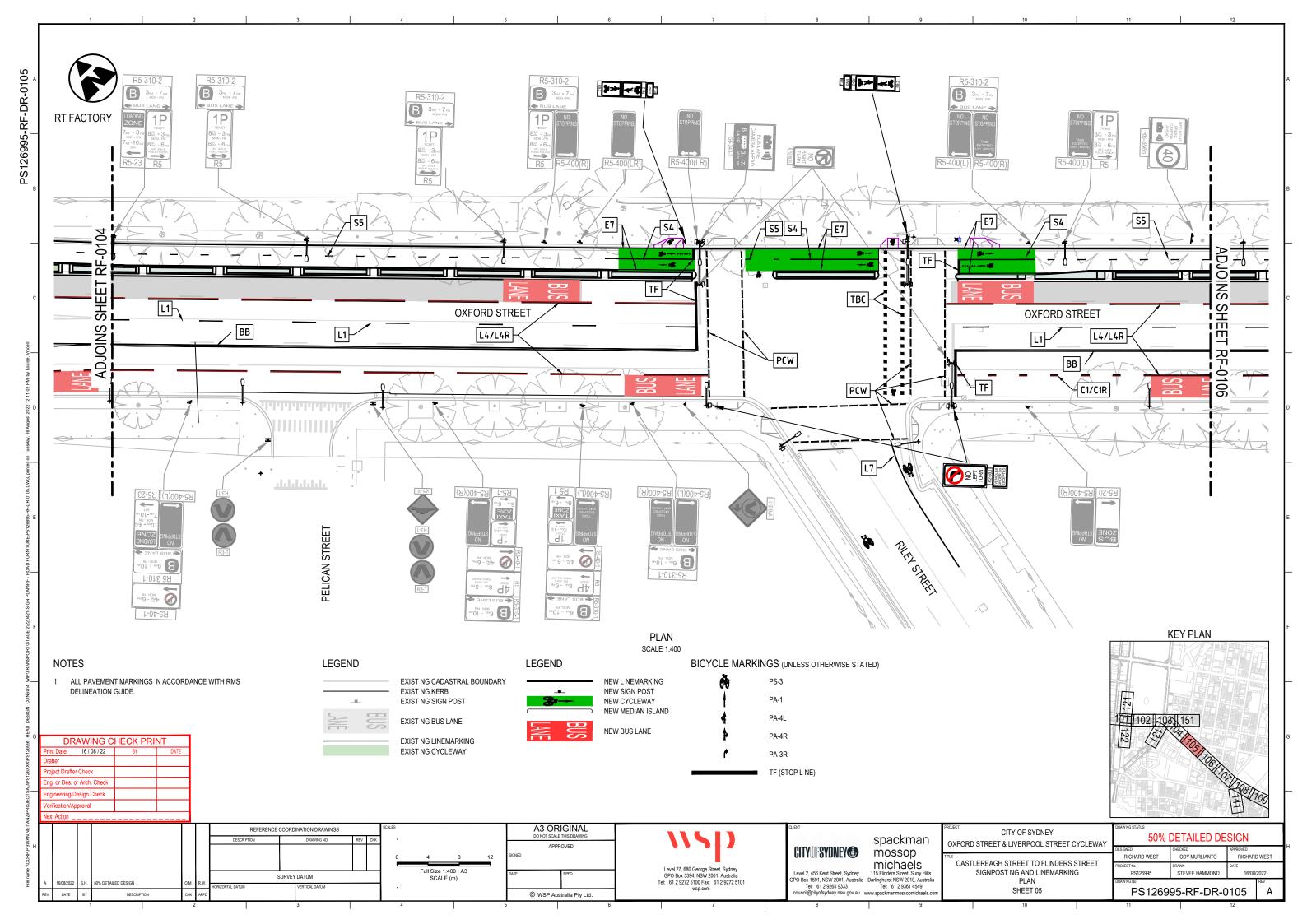


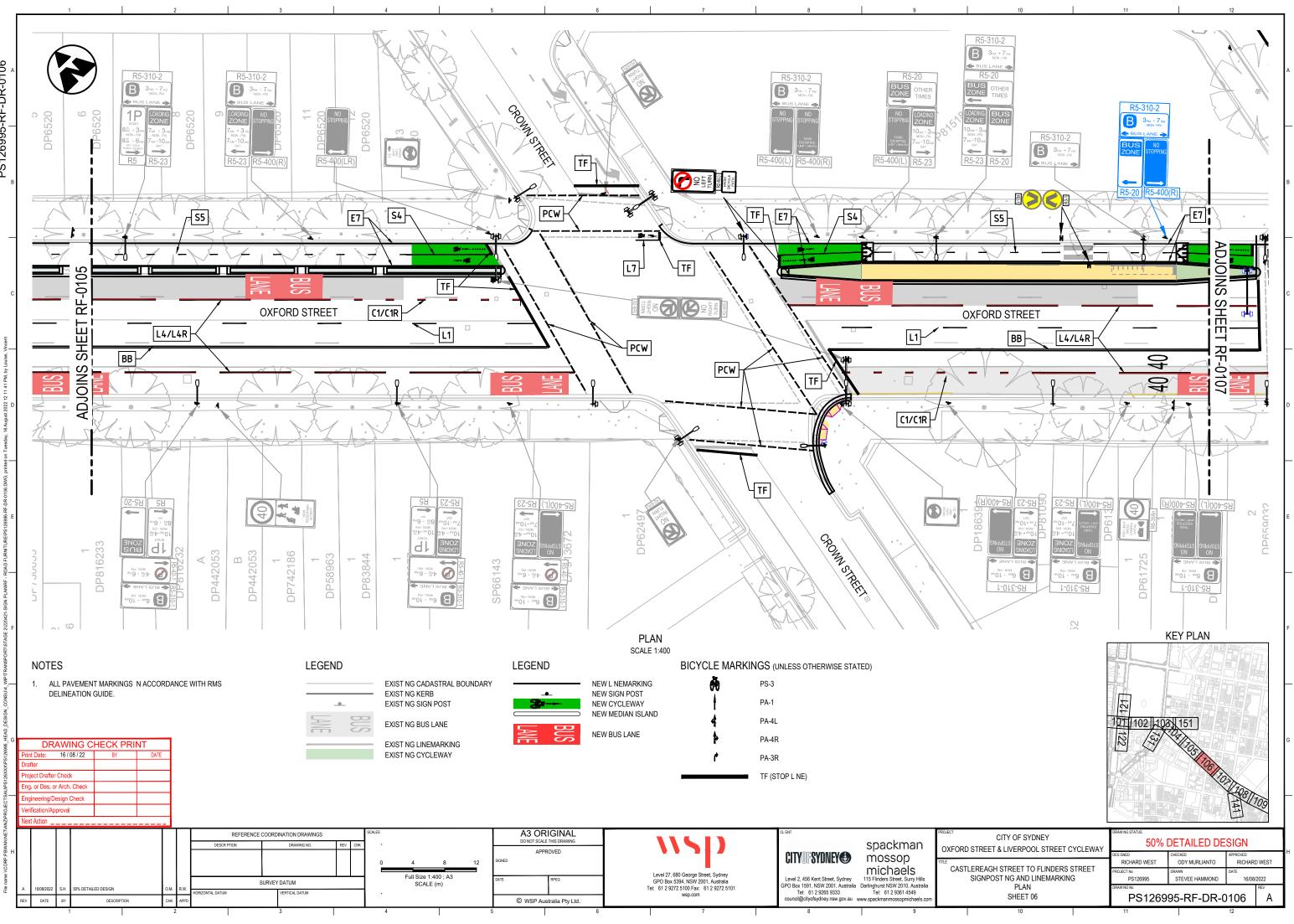


PS126995-RF-DR-0102

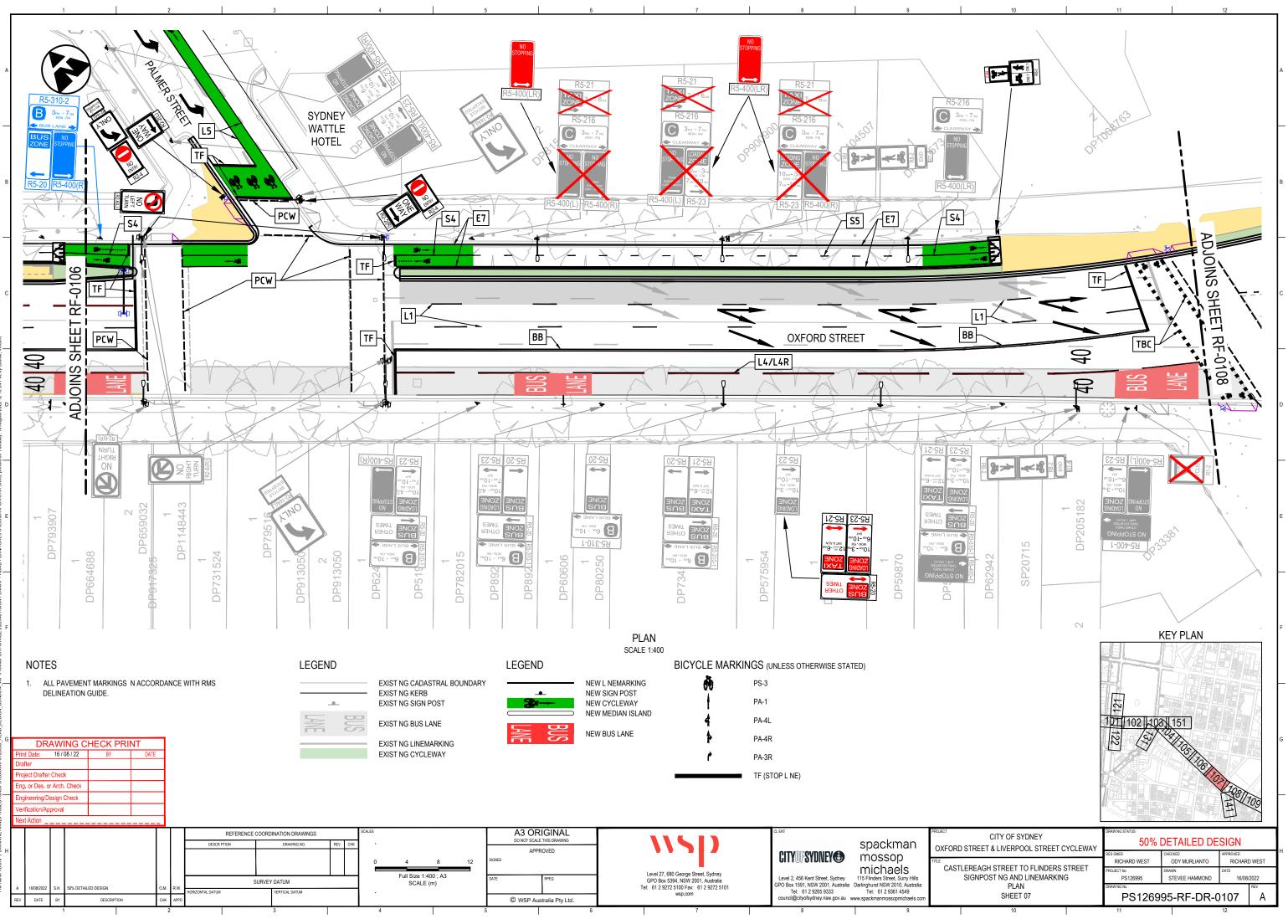






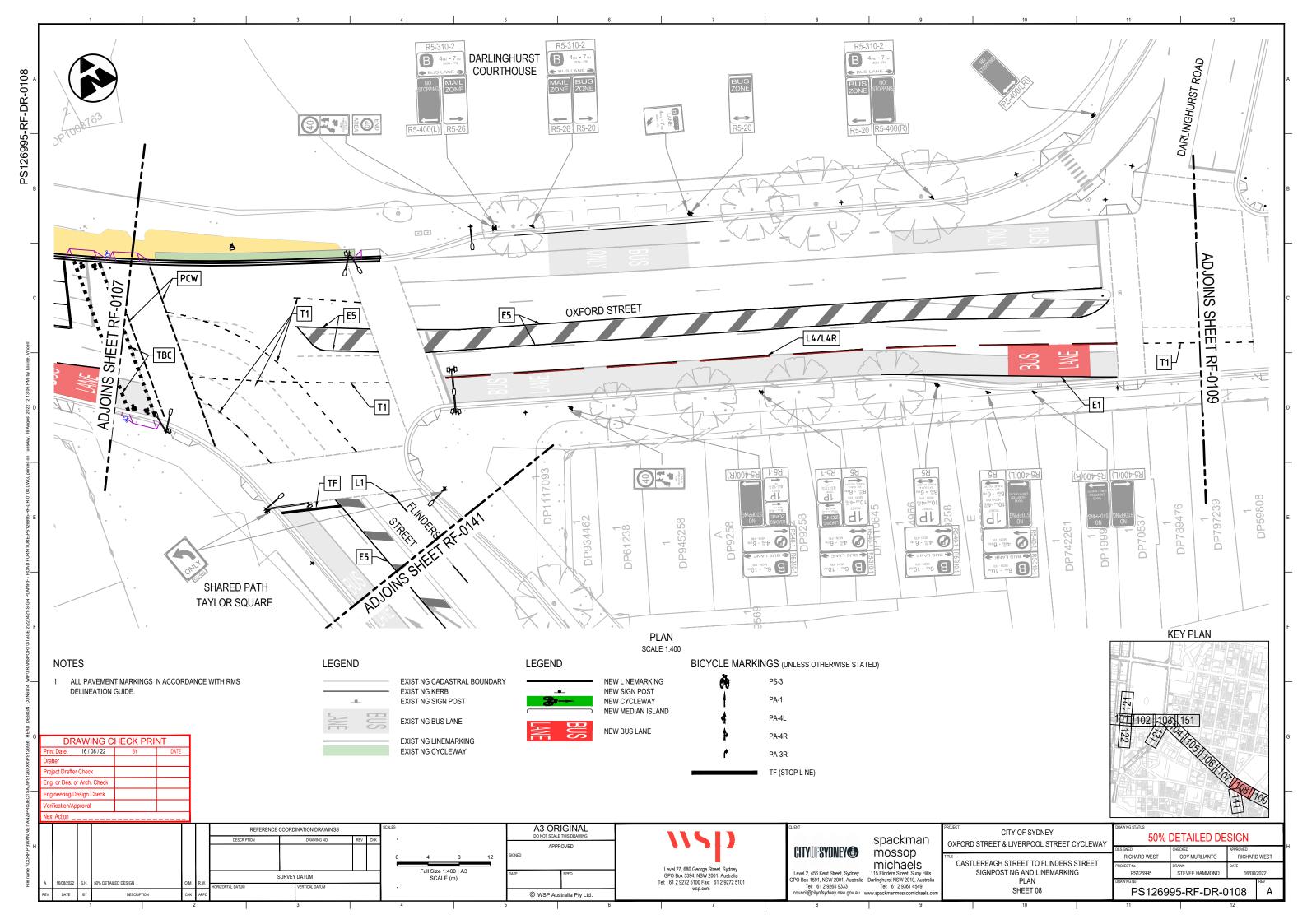


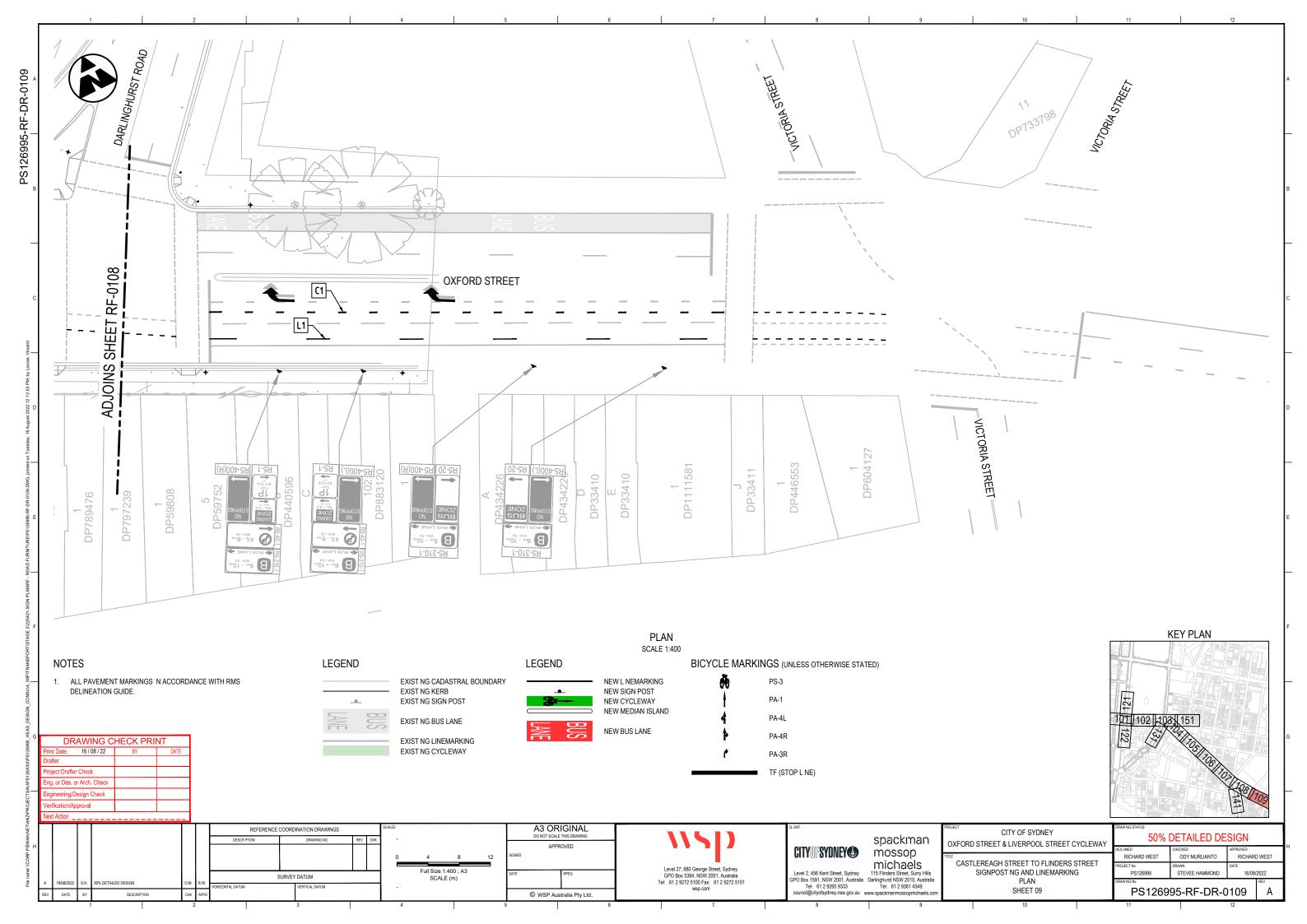
PS126995-RF-DR-0106

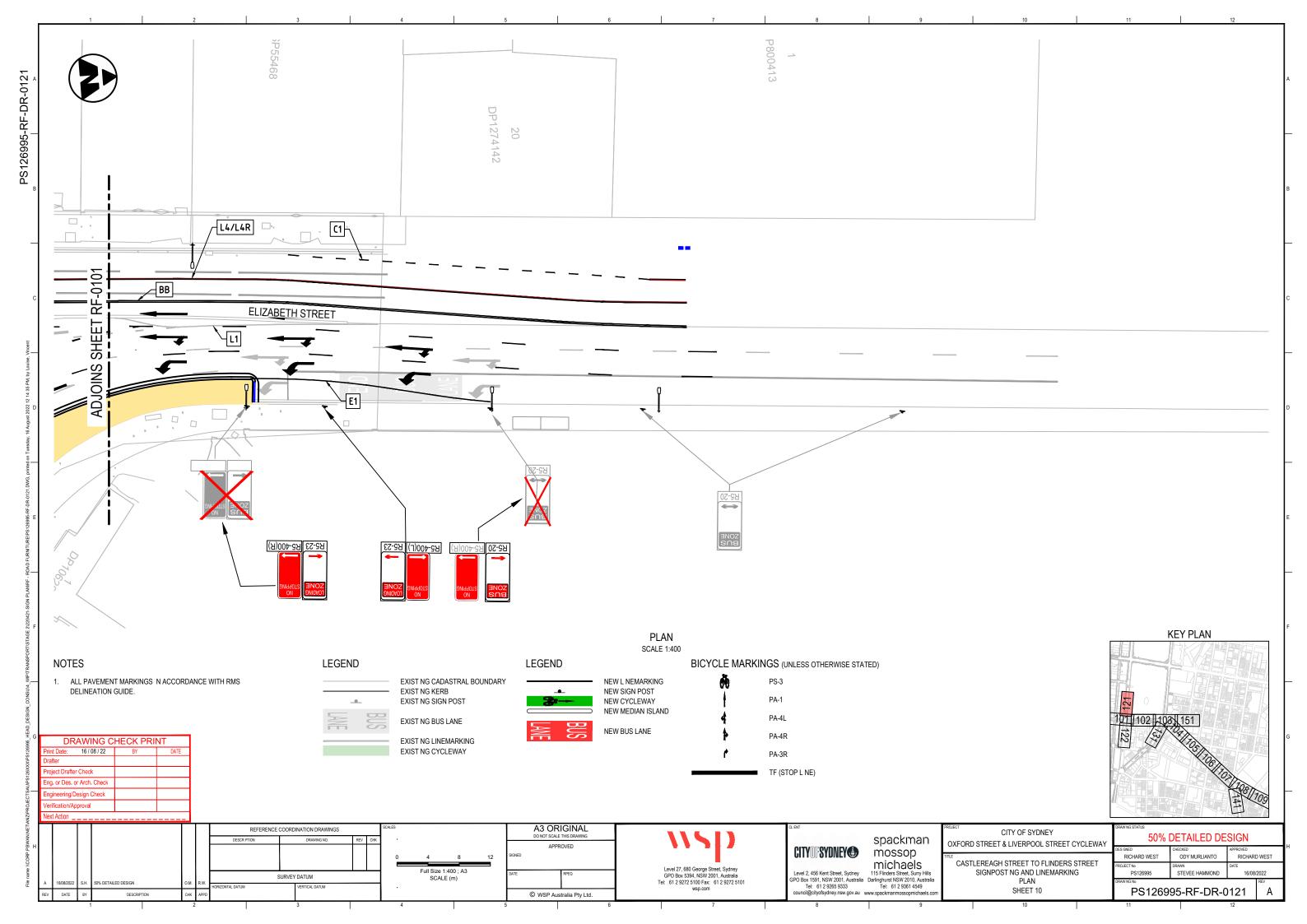


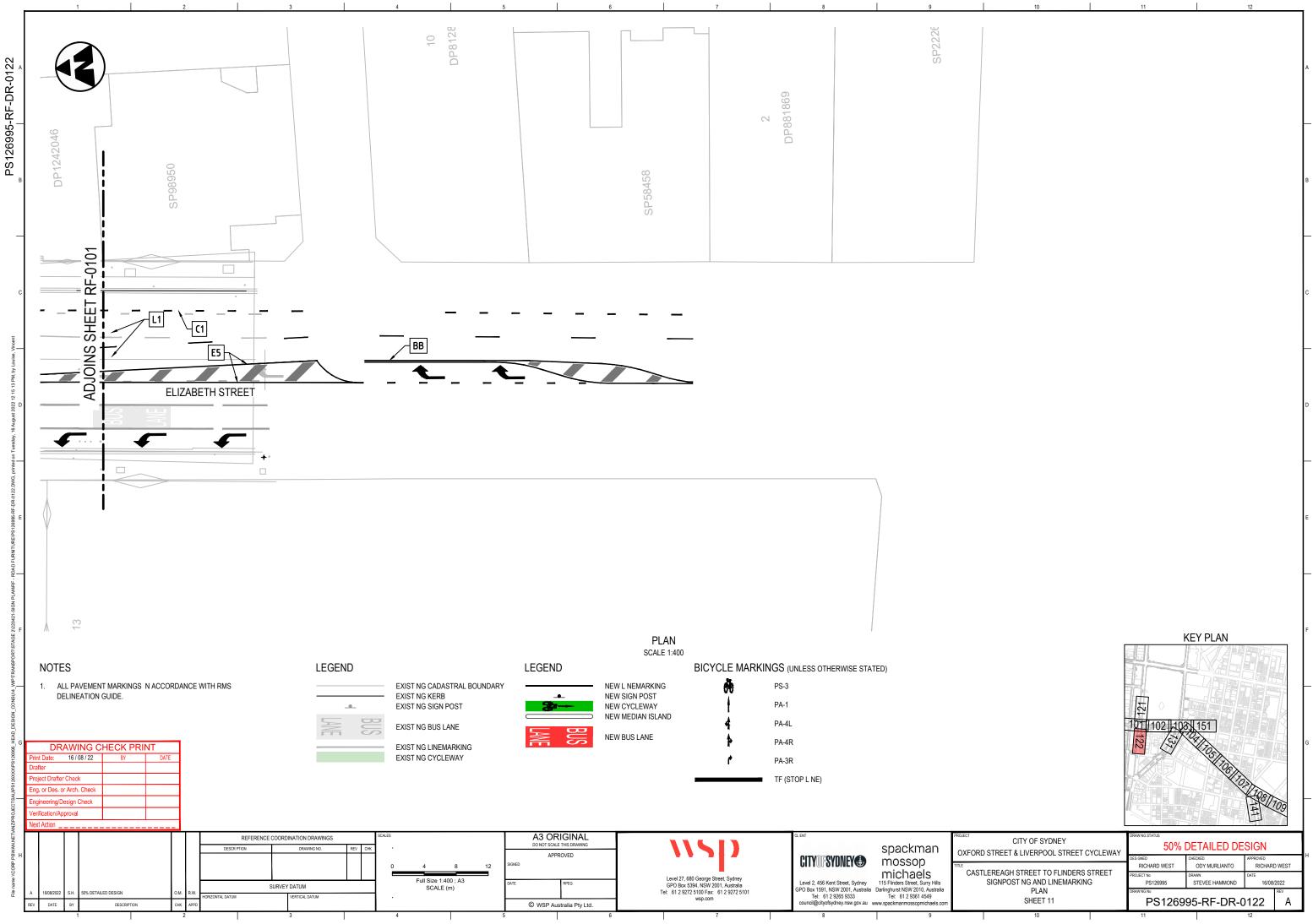
PS126995-RF-DR-0107

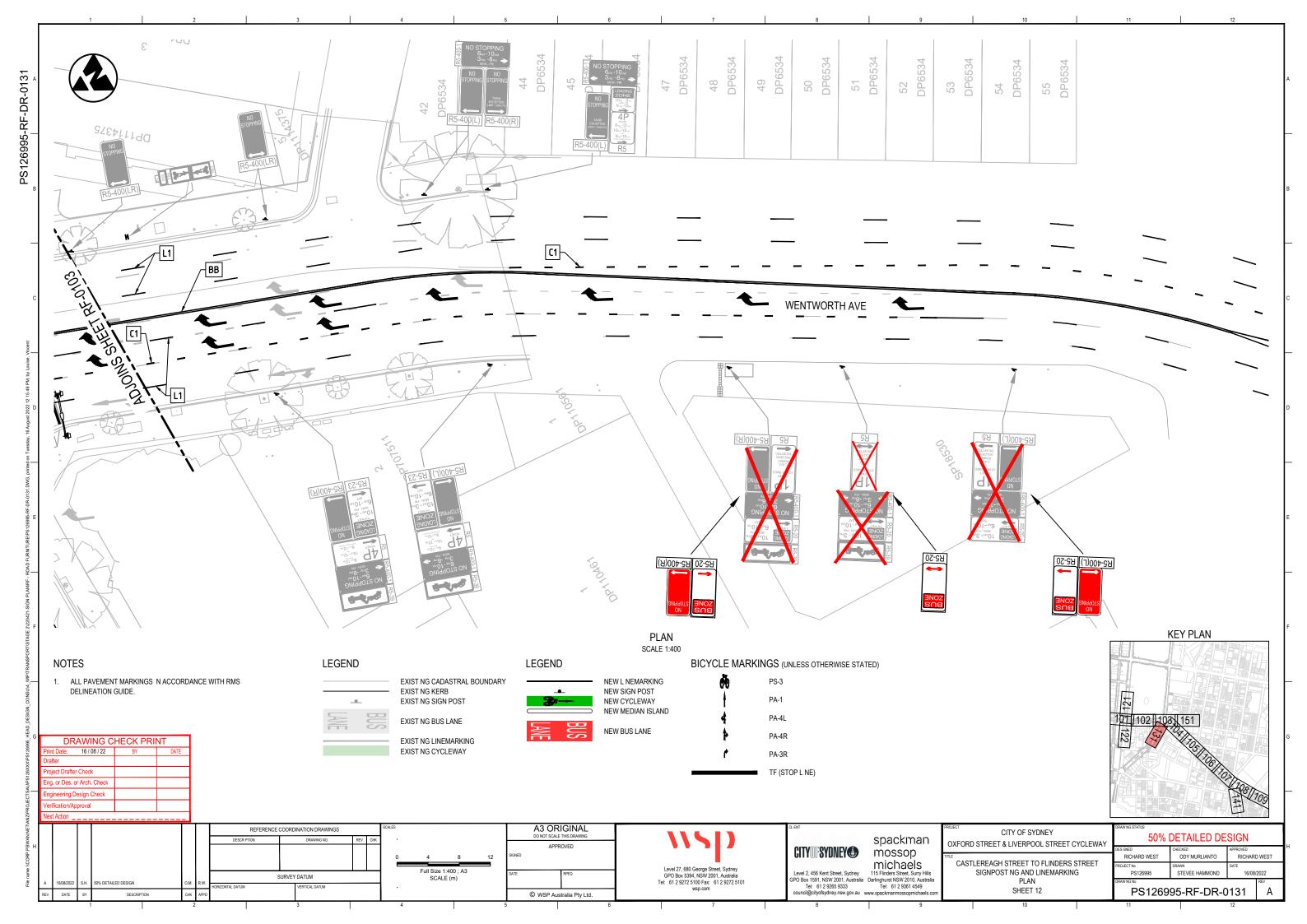
NETAA7PROJECTSAAUPS1728XXX195178486 HEAD DESIGN OONSUJA WIPTTRANSPORTISTAGE 2/220421-SIGN PLANRF - ROAD FUNITUREPS128886-8F-DR-107/DWG, prined on Tuessiay, 16 Aug

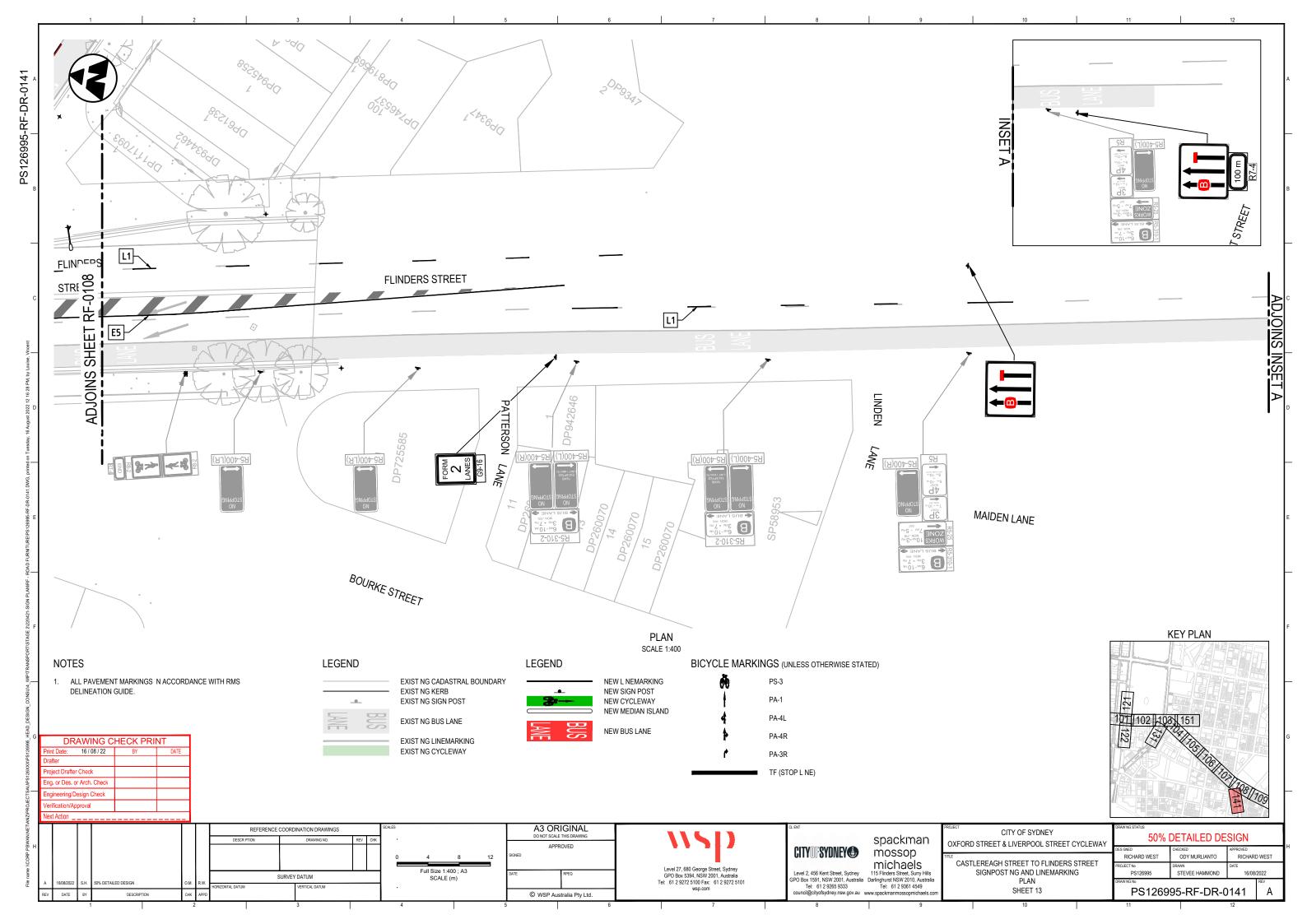


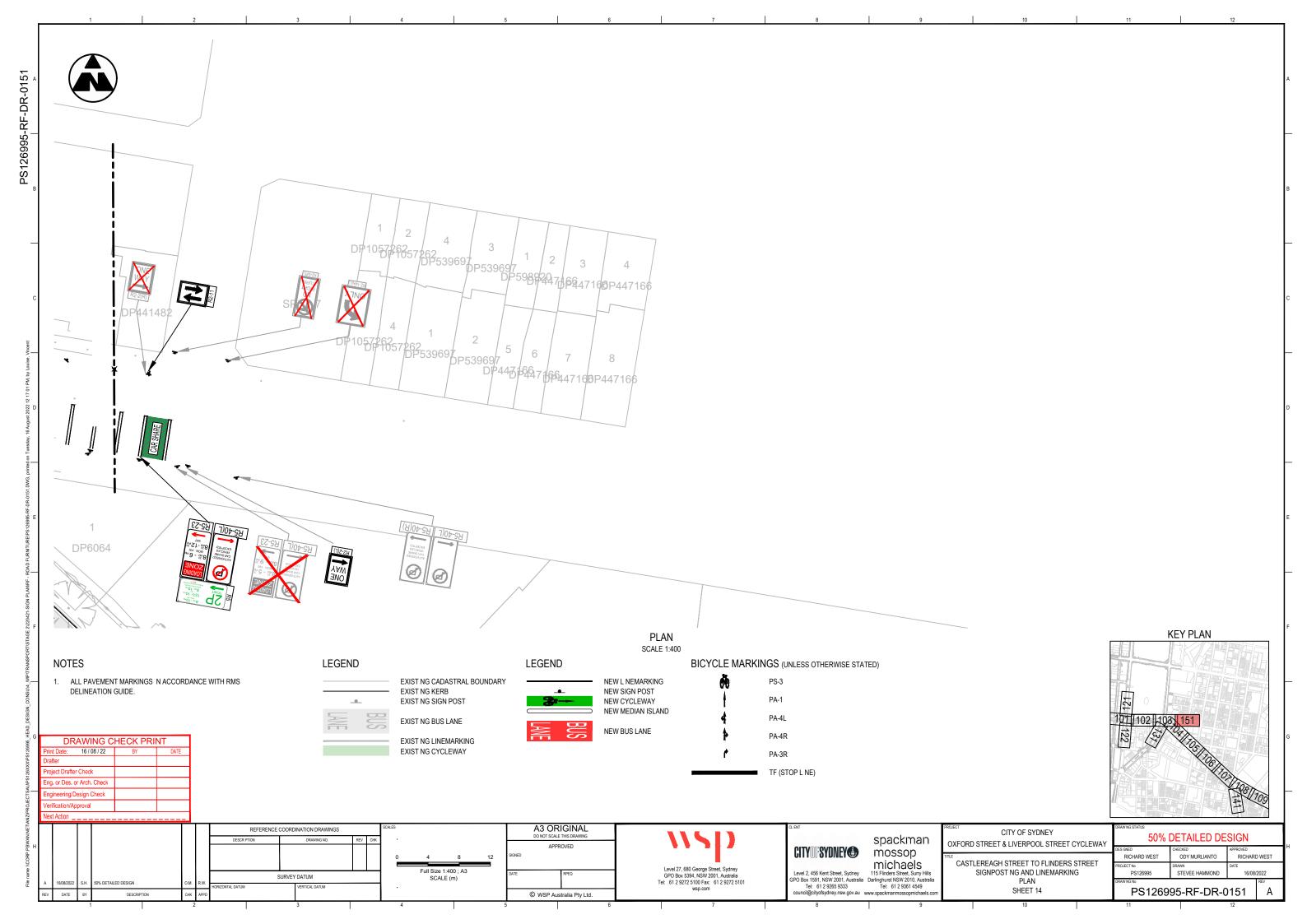












# **Appendix B-Traffic Forecasting**

The TfNSW EMME Strategic Traffic Forecasting Model (STFM), which is developed and operated by TfNSW, provides a platform to understand changes in future weekday travel patterns. The STFM has been developed for an average weekday 2-hour AM (7-9am) and PM peak (4-6pm) periods only and covers the road network within the Greater Metropolitan Area of Sydney (GMA) shown in Figure 3-1. The model represents the whole of the GMA, which encompasses the area between the Pacific Ocean in the east, Nelson Bay in the north, Mount Victoria in the west and North Durras in the south.

For further detail on strategic traffic demand forecasting, please refer to Appendix B.

The EMME Strategic Traffic Forecasting Model (STFM) is suitable for the traffic modelling and forecasting of road schemes with wide-reaching network impact, and to examine the effect of significant new residential or employment land releases, major incident, tolling or other strategies. It also provides the Road Network Performance Measures Statistics used in the economic and financial analysis to evaluate the impact of proposed road projects on the road network.

STFM is a link based Macro-Analytical model, reflecting the average all-vehicle traffic demand for the average AM and PM peak two hours, for a typical weekday on GMA roads. Key inputs to the model include Road types and characteristics, Road speeds and lane capacities, delay at intersections, turn bans and penalties, and tolls. It uses a set of algorithms and macros and detailed coding to reflect traffic behaviour on the road network. The model does not include all roads but does include all arterials and important local roads that connect travel zones.

STFM uses the 2019 road network and All Vehicle Fixed Trip Matrix for its base year scenario. The all-vehicle trip matrix is based on the TPA combined Car and Commercial vehicles matrices (Private and Business cars, Light and Rigid and Articulated Commercial vehicles). The base road network and trip matrix are continuously being updated and adjusted where necessary. The model is also calibrated against major Screen lines and individual counts and major roads travel times, to reflect up to date average weekday traffic flows and travel time conditions and land use and road changes.

The model uses the 2021, 2026, 2031, 2036, 2041, 2046 road networks and the TPA all vehicle Fixed (Unconstrained, VCR could be >1) Demand Trip Matrices for its traffic forecasts. TNSW Transport Modelling and Planning Teams and TPA work jointly to develop current and future year GMA road networks in the STM, using the "most likely" infrastructure assumptions available at the time for future years. The model includes Future Road infrastructure projects which do not have any government commitment or funding but are input assumptions within the medium-and long-term future strategic models. They are for modelling purposes only and to support future growth and development areas.

The STM standard runs of future auto field Trip Tables are based on the official NSW Government plans, policies, population, and employment projections and "most likely" infrastructure assumptions available at the time for future years (STMV3.8, TZ2016, Land use TZP19, and Freight Forecast FFMV7.1), and the 2020 most likely list of future projects.

The STFM is compatible with both the 2011 and the 2016 STM Travel Zone Systems for its Travel Forecasts of the GMA. The STM vehicle travel demand matrices are used to produce

estimates of travel to and from each zone to every other travel zone, as well as travel within zones, during the AM and PM Peak two hours Periods.

The EMME equilibrium assignment assumes that each traveller chooses the path (or route) perceived as being the best, if there is a shorter path than the one being used, the traveller will choose it. At the equilibrium, no one can improve their travel time by changing paths. The equilibrium assignment is best suitable for urban congested road network such as the Strategic Traffic Forecasting Model (STFM).

The traffic volumes resulting from an equilibrium assignment are thus such that all paths used between an origin-destination pair are of equal time. The expected run time per scenario in the STFM is around 15 minutes.

Finally, and as, it is mentioned before, The STFM is most suitable for the modelling and evaluating of wide impact large Road projects. Other modelling tools can use outputs from the STFM for more detailed and complex analysis of road network components.

The STFM model is very well documented with built in tools and macros for its easy use by both the Public and Private Sectors working on Road projects and proposals (through a signed agreement). The model has been used since the 1990s. Estimated Model run Time (up to 15 Minutes per Scenario)

### References

More details about the Models, their technical documentations and the INRO Emme transportation software can be found by visiting or contacting the relevant web sites or officers.

INRO EMME Transportation software https://www.inrosoftware.com/en/products/emme/

Contact details for STFM model development and technical documentation **Malcolm Bradley** Manager Transport Forecasting Customer Strategy and Forecasting <u>Malcolm.bradley@transport.nsw.gov.au</u>

# **TfNSW Strategic Demand Modelling**

A forecast 2021 STFM model was used to develop the demands required to undertake operational traffic modelling for the base and scenario option case. An audit check of the strategic model was completed for the study area to ensure all the turns bans, lanes and intersections were updated for the current conditions. The scenario option case network changes were then applied to the 2021 demands. Once completed, the demands were produced for the area shown in Figure below for both the base case and scenario option case for the weekday AM and PM Peaks for application into the operational modelling.

The differences between these demands would be applied to the turning counts derived from the traffic surveys undertaken on the road network and used to create the traffic flows for the scenario option case operational modelling. Details on operational modelling methodology is provided below.



The EMME Network Greater Metropolitan Area (GMA), (TfNSW TPA)

# **Operational traffic modelling assessment**

# Base year model development - operational

It is standard modelling practice to create base year models that replicate existing traffic conditions before developing any project scenarios. A base model of the road network along Oxford Street / Moore Park Road was developed for a weekday AM and PM peak as well as a Saturday peak. These models were calibrated and validated to simulate the operation of the existing road network under present day traffic demands.

The base year model extents are indicated in Figure 2-above. To ensure an accurate representation of existing traffic conditions, the base simulation models were calibrated and validated as per Roads and Maritime modelling guidelines to align with existing traffic conditions. The following data sources were used in the calibration and validation process:

Classified intersection turning count surveys were conducted along Oxford Street / Liverpool Street between Castlereagh Street and Moore Park Road / Lang Road / Queen Street from Monday 23 to Sunday 29 November 2020 (6:00AM to 8:00PM).

System (SCATS) traffic count data was used to derive turning volumes for intersections where no survey data was available

SCATS phase time summaries and TCS diagrams were provided by TfNSW from Saturday 21 to Sunday 29 November 2020 for all signalised intersections. Signal timings corresponding to the modelled periods were utilised in the microsimulation models for the base year models, at 15-minute increments.

Bus timetable information was provided for the two-week period of 14 to 27 October 2019. Travel time and dwell time data was provided aggregated into hourly intervals for each stop by route. It was noted that not all buses stopped at the bus stops along the route as stops are dependent on passenger demand. However, for purposes of modelling, it was assumed that each bus route stopped at every bus stop associated with its service, for an averaged dwell time. This was done as PTV Vissim is unable to simulate buses skipping bus stops due to passenger behaviour. The selected bus time frame is reflective of the pre-COVID-19 conditions, where the passenger demands were at their peak, whilst vehicle traffic counts and phase timing information are reflective of the late 2020 COVID-19 conditions (non-lockdown period).

General traffic travel time was provided in the form of HERE travel time for Thursday 26 and Saturday 28 November 2020

The speed limit on Oxford Street between Flinders Street and College Street was reduced from 50 km/hr to 40 km/hr in May 20201. As a result, bus travel time data reflected conditions where Oxford Street operated at a faster speed than the general traffic data and therefore a speed limit of 50 km/hr was adopted for this section to align with provided data.

Site observations were undertaken as part of the development of the base model including:

- General traffic and taxi behaviour utilising bus and general traffic lanes
- Driver behaviour at congested segments
- Additional travel time runs were undertaken to compare with the HERE data provided.

CAD drawings were used to develop the base and project case to ensure the correct intersection geometry, bus stop locations and parking

Strategic model cordon matrices (STFM) i.e. volume of traffic going in and out of the boundary of the modelled road network from specified origins to specified destinations.

The operational model demand matrices (for base and scenario option) were developed:

Using a turn count volume weighted methodology. This methodology was applied to the 15minute surveys intervals to develop 15minute origin – destination demand matrices for each period. This process would include the profiles for the 2-hour model

STFM 2-hour demands were used to develop 1-hour operational model demands. It was determined based on the traffic surveys that a one-hour peak represented 55% of the total 2-hour flows.

STFM does not consider Saturday periods and therefore a hybrid of the AM and PM travel pattern changes was applied to develop the base Saturday flows. The Saturday flows closely correlated with the peak direction AM and PM movements i.e. AM westbound (inbound) flows and PM eastbound (outbound) flows.

Signalised pedestrian movements were also included in the development of the model.

The traffic model was constructed to reflect the behaviours of a typical weekday peak, with the details of time periods specified in Table 3-1.

Model	Warm Up	Core Time	Cool down		
AM Peak	7:30 – 8:00 am	8:00 – 9:00 am	9:00 – 9:30 am		
Saturday Peak	11:30 – 12:00 pm	12:00 – 1:00pm	1:00 – 1:30 pm		
PM Peak	4:30 – 5:00 pm	5:00 – 6:00pm	6:00 – 6:30 pm		

### Project model development - operational

Following the calibration and validation 2020 base year simulation models, 2020 project networks and traffic demands were developed to assess the performance of the study area. The network changes for Oxford Street west were run in STFM and the demands were applied to the project models based on the methodology used for the base model.

# Appendix C-Existing Road Network

This section outlines the existing road network performance within the Project study area. The assessment of the existing operational performance of the road network considered the following aspects of performance:

- Network performance
- Intersection performance
- Travel times and speeds

# Model Calibration and Validation

The models developed for the Oxford Street West project have been calibrated and validated based on TfNSW Modelling Guidelines 2013. A calibration process was undertaken comparing the surveyed November 2020 counts against modelled volumes and then validated using travel time information.

The following information below will highlight the outcomes based on this process. For further detail of this process, please refer to the document 'SCT\_00212\_Oxford Street Reference Case Report v1.0'.

# **Calibration Results**

A comparison of the turning counts between the 2020 traffic surveys and the modelled vehicles are provided in 'SCT\_00212\_Oxford Street East Base Model Tech Note v6.0'. The R2 values for all periods exceed the requirement of 0.95 in the guideline, indicating a good correlation between entire count data set and the modelled flows. The turn count criteria from the guideline's states that the GEH <5 minimum 85% of observations to be within tolerance limits.

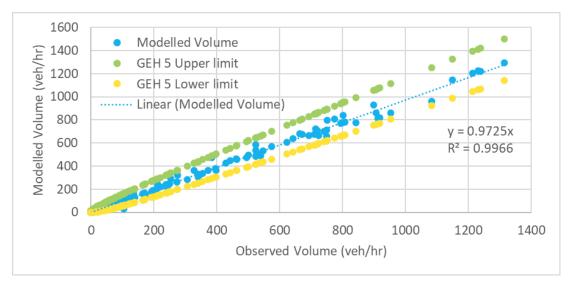
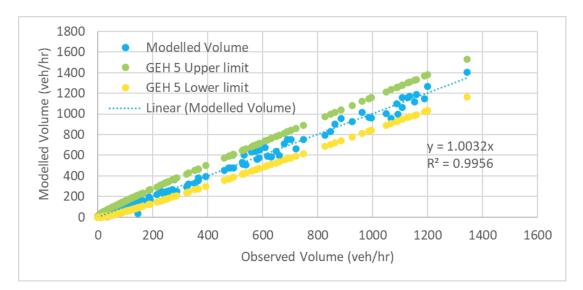


Figure C-1 R<sup>2</sup> modelled versus count data, core area, 8:00AM to 9:00AM peak

Source: SCT Consulting, 2022

Figure C-2 R<sup>2</sup> modelled versus count data, core area, 5:00PM to 6:00PM peak



Source: SCT Consulting, 2022

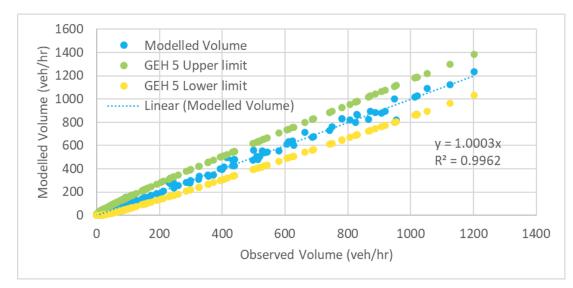


Figure C-3 R<sup>2</sup> modelled versus count data, core area, Saturday 12:00PM to 1:00PM peak

Source: SCT Consulting, 2022

As indicated from the figures the model satisfies network wide criteria for all modelled periods, when comparing modelled flows against surveyed data for all three AM, PM and Saturday peak hours. Based on these results, it is possible to present the network performance results of the corridor in the following sections below.

# **Network Performance Assessment**

Network results comparison should be considered in terms of two key statistics: average speed and vehicle hours travelled (VHT). The VHT metric reflects a key component of the economic cost of travel and average speed captures the total level of congestion in the network.

Table C-1 presents the 2020 base case performance of the VISSIM modelled road network for Oxford Street intersections and surrounds study area for the AM, PM and Saturday peak hour. The VISSIM modelling results have been produced by SCT Consulting and results have been extracted from the following document, 'SCT\_00212\_Oxford Street Reference Case Report v1.0'.

The results show:

- All models have similar demands
- The Saturday model has higher Vehicle Hours Travelled compared with the AM and PM Peak models
- The Saturday model has the lowest Vehicle Kilometres Travelled compared with the AM and PM Peak models
- The AM Peak model has a higher average network speed compared with the PM Peak model, and the Saturday model

Table C-1 Oxford Street intersection and surrounds: VISSIM modelled network performance – 2020 peak hour

Network Measure	AM Peak hour	PM Peak hour	Saturday Peak hour	
Total traffic demand (veh)	23,044	24,961	22,323	
Total time travelled approaching	1,322	1,451	1,606	
and in network (VHT)				
Total vehicle kilometres	22,297	23,095	20,997	
travelled in network (VKT)				
Average network speed (km/h)	16.9	15.9	13.1	
Total number of stops	57,660	72,240	56,777	
Unreleased demand (veh)	8	47	63	

# **Key Intersection Performance Assessment**

Table C-2 presents the VISSIM modelled intersection performance for the AM, PM and Saturday peaks for key intersection in and around the study area for the existing conditions. The intersection performance results indicate that most intersections with the study area are operating at a LOS D or better except for:

- Oxford Street / South Dowling Street
- Oxford Street / Queen Street / Moore Park Road
- Moore Park Rd / Gordon Street / Cook Rd

These 3 intersections are operating at a LOS E or F based on the modelling outcomes. This is reflective of existing conditions.

Table C-2 Oxford Street peak intersection performance - 2020 peak hour

Intersection	AM Peak hour	PM Peak hour	Saturday Peak hour
Elizabeth Street / Liverpool	С	С	С
Street			
Liverpool Street / College Street	D	D	D
/ Wentworth Ave / Oxford Street			
Oxford Street / Riley Street	В	А	В
Oxford Street / Crown Street	В	В	А
Oxford Street / Palmer Street	А	А	А
Oxford St / Flinders Street	В	В	В

Flinders Street / Short Street	А	А	А
Flinders Street / Albion Street	С	С	В
Oxford Street / Darlinghurst	С	С	В
Road			
Oxford Street / Victoria Street /	E	D	F
South Dowling Street			
Oxford Street / Green Street	А	В	В
Oxford Street / Glenmore Road	С	В	А
Oxford Street / Young Street	А	А	А
Oxford Street / Oatley Street	С	В	В
Oxford Street / Jersey Road	С	С	В
Oxford Street / Queen Street /	E	E	E
Moore Park Road			
Moore Park Road / Gordon	F	F	F
Street / Cook Road			
Flinders Street / South Dowling	В	D	С
Street			
South Dowling Street / Fitzroy	В	В	С
Street			
Anzac Parade / Moore Park Road	D	С	С
/ Flinders Street			

# **Validation Results**

# **Bus Travel Times**

Due to the importance of Oxford Street for the operation of the bus network, the travel times of buses were validated against pre-covid bus patronage conditions from October 2019. However, the traffic signal data and traffic volumes are reflective of November 2020. The reason for this is, during covid the bus frequencies were reduced and not a true indication of the bus services along the route. As such, a consistent validation of both bus and general traffic travel times was difficult to achieve. In addition, it was determined from the supplied bus data that not all bus stops associated with a bus route are serviced by each service during peak hours, as there were no passenger demands at some stops.

For modelling purposes, all bus stops associated with a bus service would be modelled for the average dwell time associated with the service and stop. As such, most of the modelled bus travel times are greater when compared to the reported average travel times. The bus travel times (2019) were calibrated in conjunction with the general traffic travel times, which as noted previously, were referenced from a different period (2020). As such, calibrating the bus travel times to match the observed skewed the validation of the general traffic travel times, and vice versa. Detailed bus travel time comparisons of each bus route modelled are contained in the base model report and are deemed similar to the reported travel times and lie within the reported minimum and maximum travel times.

# **General Traffic Travel Times and Speeds**

HERE data was utilised to determine travel time validation. However, the data provided was difficult to ensure all modelled travel times fall within the 15% target identified by the TfNSW Modelling Guidelines. The HERE travel time data appeared to be too fast. The reason for this is HERE data is based on speeds on links in which travel times are calculated and therefore does not consider stationary vehicles or vehicles stopping on red. Therefore, a combination of HERE data, HERE data for adjacent hours or corresponding hours of the adjacent days and manual travel time observations were used. Further detail can be found in the following document 'SCT\_00212\_Oxford Street East Base Model Tech Note v6.0'.

Table C-3 and Table C-4 below show a comparison of the modelled travel times verses observed travel times for Oxford Street.

Segment	Thurs 26/11/2	0		Mon 23/11/2 0	Tue 24/11/2 0	Wed 25/11/2 0	Fri 27/11/2 0
	7-8AM	8-9AM	9-10AM	8-9AM	8-9AM	8-9AM	8-9AM
Castlereagh Street to Taylor Square	3%	9%	7%	-50%	5%	4%	-7%
Taylor Square to Castlereagh Street	19%	-12%	32%	-17%	-13%	-16%	-12%
Taylor Square to Paddington Gates	32%	12%	0%	12%	4%	10%	-2%
Paddington Gates to Taylor Square	2%	-2%	-4%	-14%	-8%	-7%	-8%

Table C-3 AM peak travel time comparison

Source: SCT Consulting, 2022

Table C-4 PM peak travel time comparison

Segment	Thurs 26/11/20			Mon 23/11/20	Tue 24/11/20	Wed 25/11/20	Fri 27/11/2 0
	4-5PM	5-6PM	6-7PM	5-6PM	5-6PM	5-6PM	5-6PM
Castlereagh Street to Taylor Square	16%	-19%	42%	22%	11%	16%	1%
Taylor Square to Castlereagh Street	-6%	-6%	10%	17%	24%	7%	-8%
Taylor Square to Paddington Gates	-21%	-5%	-9%	10%	5%	-20%	-3%
Paddington Gates to Taylor Square	1%	11%	21%	-22%	16%	24%	-30%

Source: SCT Consulting, 2022

Table C-5 Saturday midday peak travel time comparison

#### OFFICIAL: Sensitive - NSW Government

Segment	Saturday 28/11/20					
	11AM-12PM	12-1PM	1-2PM			
Castlereagh Street to Taylor Square	11%	8%	15%			
Taylor Square to Castlereagh Street	-7%	4%	-7%			
Taylor Square to Paddington Gates	12%	8%	12%			
Paddington Gates to Taylor Square	10%	-9%	12%			

Source: SCT Consulting, 2022

# Appendix D - Movement and Place and Built Environment Assessment



# Oxford and Liverpool Street Cycleway

Healthy Street and Built Environment Indicators Assessment

Version A. 21<sup>st</sup> December 2022





# Quality Assurance

# **Project Details**

Project	Dxford Street and Liverpool Street Cycleway Assessment						
Project Reference	P.2217	Contract Number					
Client	Transport for NSW (TfNSW)	ABN	18 804 239 602				
Prepared By	Crossley Transport Planning	ABN	18 632 881 602				

### **Document Revision Register**

Revision	Status	Prepared By	Checked By	Approved by	
А	Final	Adrian Vuong Jennifer Chen	Stephanie Crossley	Stephanie Crossley	
		AL	Jehn Stephanie Crossley	Stephanie Crossley	
		21/12/2022	21/12/2022	21/12/2022	

#### Disclaimer

This report (including any enclosures and attachments) has been prepared by Crossley Transport Planning Pty Ltd on the request of Transport for NSW (TfNSW). The report is for the exclusive use and benefit of Transport for NSW (TfNSW) and solely for the purpose set out in the engagement documentation. Unless we provide express prior written consent, no part of this report should be reproduced, distributed or communicated to any third party. We do not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report.

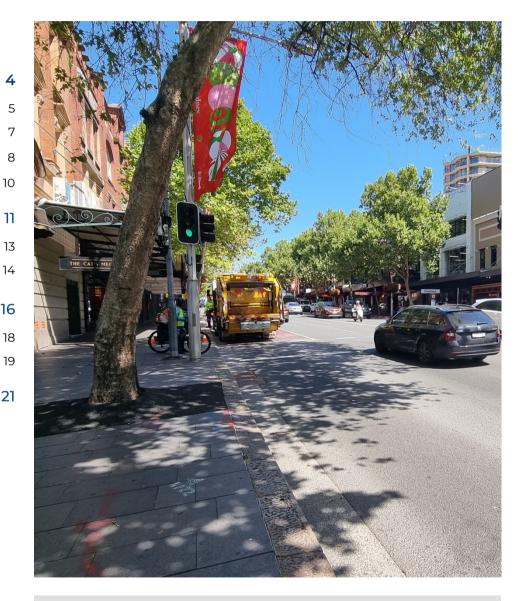
The information, statements, statistics and commentary (together the 'Information') contained in this Report have been prepared by Crossley Transport Planning from publicly available material, from discussions with Stakeholders and data provided by the client. Crossley Transport Planning does not express an opinion on the accuracy or completeness of the information provided, the assumptions made by the parties that provided the information or any conclusions reached by those parties.

Crossley have based this Report on information received or obtained on the basis that such information is accurate and complete. The information contained in this Report has not been subject to an audit.

# E

# Table of Contents

1.	Introduction	
	Project Overview	
	Movement and Place Framework	
	Healthy Streets Framework	
	Cycling stress methodology	٦
2.	Oxford Street Assessment	
	Built Environment Indicators Assessment	•
	Healthy Streets Assessment	-
3.	Liverpool Street Assessment	1
	Built Environment Indicators Assessment	-
	Healthy Streets Assessment	-
4.	Cycling Stress Level Assessment	



Oxford Street, CrossleyTP 2022.

# 1. Introduction





# **Project Overview**

# Introduction

Liverpool Street and Oxford Street are major roads located east of Sydney's CBD connecting Sydney's east to the city.

A separated two way cycleway along the northern side of Liverpool Street and Oxford Street between Castlereagh Street and the Eastern Distributor is being considered to connect cyclists from the existing cycleway along Liverpool Street to the Bourke Street Cycleway.

# Purpose

The purpose of this report is to document the benefits of the cycleway to people and place. The methodology adopts the Movement and Place BEI spreadsheet calculator tool, and the Healthy Streets Check for Designers Tool.

# Scope

The geographical extent of the study is Liverpool Street from Castlereagh Street to Oxford Street; and Oxford Street from Liverpool Street to Flinders Street.

The assessment has been completed for two time periods representing a variation in the street layout – peak period and an interpeak period.



Figure 1. Proposed bi-directional cycleway outside Museum Station. Source: City of Sydney



# How does place relate to the layout and operation of streets and roads?

The interrelationship between the layout, activity and experience of places can be transcribed directly to the street and road environment.

This interrelationship between the allocation of road space, activity and customer experience is evidenced and measured by metrics adopted in the Movement and Place toolkits and Healthy Streets tools.

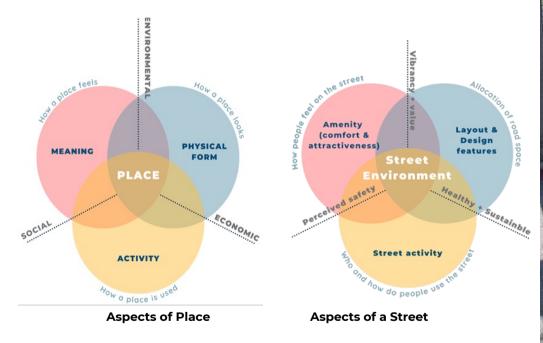




Figure 2: Aspects of good design for place and street environment (Source: CrossleyTP, 2022)

Figure 3. Public spaces on Oxford Street.



# Movement and Place – Built Environment Indicators

The NSW Movement and Place Framework has established a set of 36 built environment performance indicators for evaluating Movement and Place projects. The indicators are based on qualities that contribute to a welldesigned built environment and are grouped under five themes relating to user outcomes. The user outcomes reflect what a person may reasonably expect as an outcome of good design related to that theme.

The Built Environment Indicator Movement & Place Performance Assessment Tool is used to visually display the performance gap between the existing built environment and desired future vision for a study area.

For this study, The following user outcomes were assessed in the BEI indicator tools:



For the purpose of this study, we have taken the "vision" of the study area as the proposed cycleway design for Liverpool Street and Oxford Street to measure the benefits and step change towards good design outcomes for people and place.

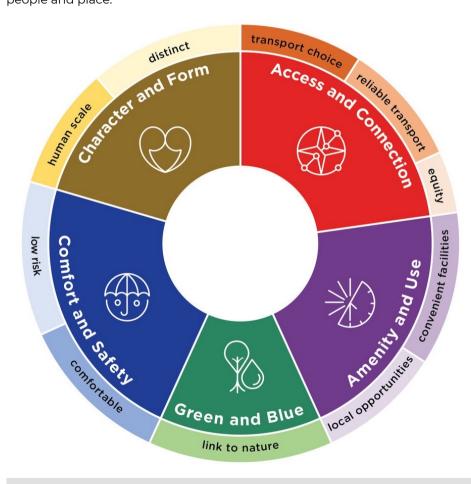


Figure 4. Built Environmental Indicators five themes and user outcomes



# The Healthy Streets Approach

The Healthy Streets Approach and the NSW Movement and Place Framework share a common intent to create healthier streets and healthier movement options. They both support initiatives and options that are visionled and place-specific.

Healthy Streets includes 10 indicators that are simple to understand for all stakeholders including non-technical transport professionals. Each indicator is shown in the adjacent figure, and can be used by project teams to prompt questions when investigating site conditions. The prompts can help professionals explore and consider the wide spectrum of street functions and users.

The Healthy Street Approach directly aligns to current political values in the application of design principles as well as offering an evidence-based tool (e.g. Healthy Streets Check for Designers) which will measure the impact a design will have on what makes streets appealing, healthy and inclusive places.

The table overleaf shows the 19 metrics considered when assessing the health of a street which all affect different indicators within the Healthy Streets Approach.



Source: Lucy Saunders

Figure 5 Healthy Streets Indicators (Source: Lucy Saunders, 2021)

Me	tric	Everyone feels welcome	Easy to cross	Shade and shelter	Places to stop and rest	Not too noisy	People choose to walk & cycle	People feel safe	Things to see and do	People feel relaxed	Clean air
1	Traffic speed	•	•			•	•	•		•	•
2	Volume of motorised traffic	•	•			•	•	•		•	•
3	Mix of vehicles	•	•			•	•	•		•	•
4	Conflict between cycles and turning vehicles	•					•	•		•	
5	Turning speeds at side- street intersections	•	•				•	•		•	
6	Ease of crossing mid block	•	•				•	•		•	
7	Priority of crossing at intersections	•	•				•	•		•	
8	Quality of the footpath	•					•			•	
9	Space for walking	•			•		•	•		•	
10	Appropriate separation of people walking from traffic	•				•	•	•		•	
11	Space for cycling	•			•		•	•		•	
12	Lighting	•					•	•		•	
13	Availability of drinking water	•			•		•	•	•	•	
14	Public seating	•			•		•		•	•	
15	Cycle parking	•			•		•			•	
16	Shade for walking	•		•			•		•	•	
17	Shade for cycling	•		•			•		•	•	
18	Reducing through traffic	•	•			•	•			•	
19	Bus stops	•		•	•		•			•	

# Cycling Stress Level Approach

In December 2020, Transport for NSW released the Cycleway Design Toolbox. The toolbox provides a methodology to assess the level of cycling comfort.

The aim is to provide cycling facilities which are suitable and accessible for all ages and abilities (8-80).

This translates to designing for the '**interested but concerned**' rider type who represent around 48% of the population which sets the **minimum performance benchmark** at **Stress Level 2**. The level of stress for people riding is calculated as per Table 1 and applied to the existing conditions on Liverpool Street and Oxford Street; and with the proposed cycleway.

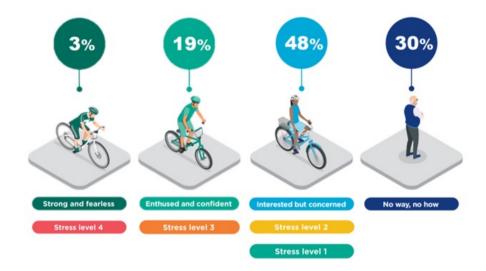


Table 1 Cycling stress levels and associated environmental conditions

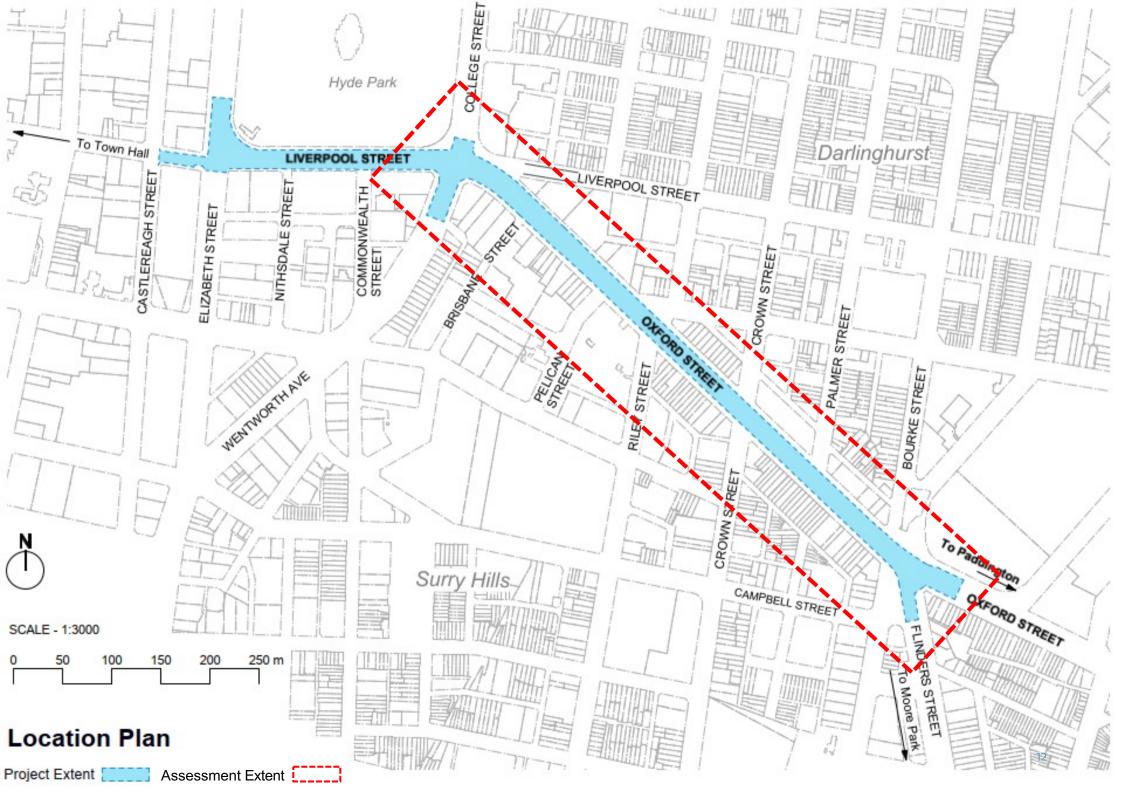
	Stress Level 4	Stress Level 3	Stress Level 2	Stress Level 1
Separation from traffic (Toolbox)	Mixed traffic Multiple lanes High volumes High Speed	Mixed traffic Busy road	Buffered from traffic Or Mixed traffic low speed (<50), low volume	Fully separated on low trafficked streets

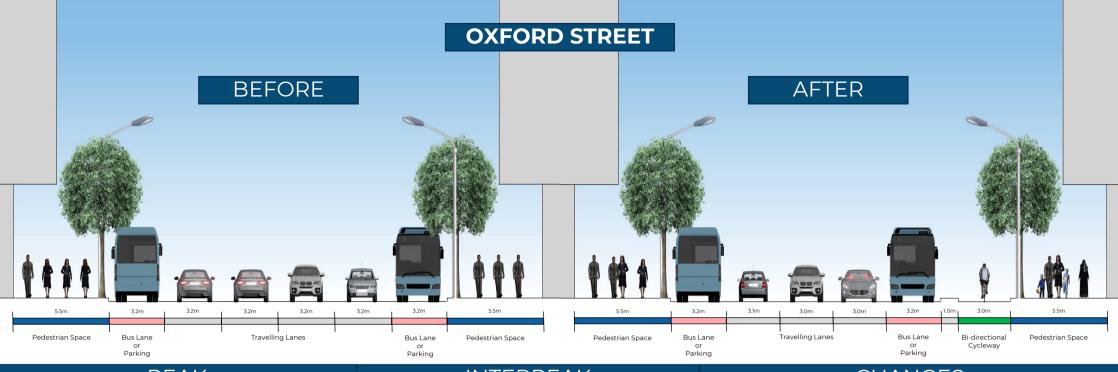
Figure 6. Cycling stress levels associated with each rider group in the Cycleway Design Toolbox (2020).



BEI and Healthy Streets Assessment



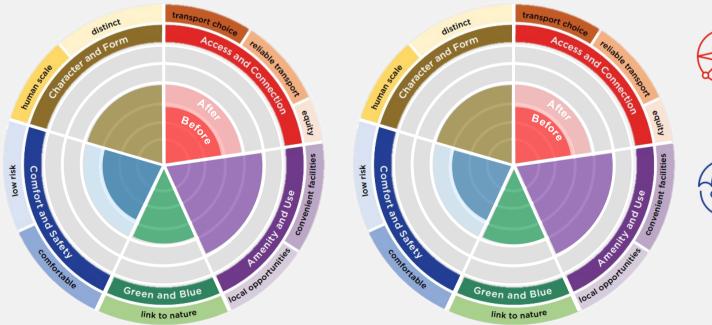




PEAK

INTERPEAK

# CHANGES



# Access and Connection

Reallocating road space from a travelling lane to a bi-directional cycleway will provide an additional sustainable mode of transport and improve the connectivity and accessibility of the existing cycling network.



# **Comfort and Safety**

Removing a travelling lane will decrease the volume of traffic resulting in a reduced risk of crashes and noise impacts. Cyclists no longer need to mix with general traffic or people walking leading to a greater sense of comfort and safety.

# **OXFORD STREET – PEAK PERIOD**



	Existing Layout Score	Proposed Layout Score
Healthy Streets Score	30	38
Everyone feels welcome	26	37
Easy to cross	19	19
Shade and shelter	44	56
Places to stop and rest	33	39
Not too noisy	13	20
People choose to walk and cycle	26	37
People feel safe	22	36
Things to see and do	67	75
People feel relaxed	26	37
Clean air	22	22

The Project positively influences the following metrics and indicators					Influer	nce on Healt	hy Streets S	Scoring				
	Metric	How the project influences the metric	Everyone feels welcome	Easy to cross	Shade and shelter	Places to stop and rest	Not too noisy	People choose to walk & cycle	People feel safe	Things to see and do	People feel relaxed	Clean air
4	Conflict between cycles and turning vehicles	With the added cycleway along Oxford Street, traffic along Oxford Street is reduced from 2489 to 2219. At traffic signals, people riding will receive their own phase, separating turning movement from traffic movements.	•					•	•		•	
10	Appropriate separation of people walking from traffic	The proposed design has a separated cycleway on the northern side which is 3.0m wide and acts as a buffer from traffic. The southern side has a bus lane which remains operational during AM peak hours hence the minimum buffer occurs near the intersection at Oxford St / College St at 0.9m. Therefore, separation for people walking and general traffic receives a LOS C.	•				•	•	•		•	
11	Space for cycling	The added cycleway physically separates cyclists from general traffic and provides a bi directional cycleway that is 3m wide.	•			•		•	•		•	
17	Shade for cycling	Following the construction of the cycleway, people ridings are positioned along the eastern kerbside. Although additional tree planting is not proposed, the location of the cycleway leverages the location of existing shade from 25-49% shading to greater than 50% linear coverage.	•		•			•		•	•	

# **OXFORD STREET – INTERPEAK PERIOD**

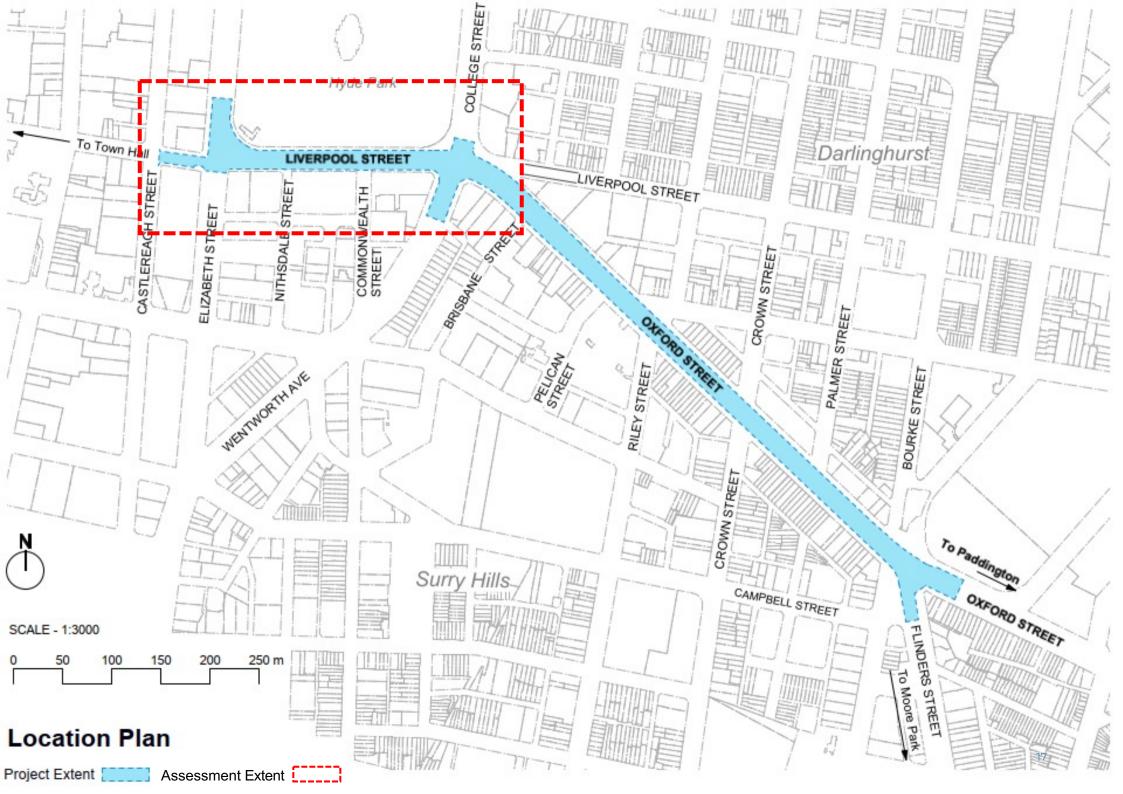


	Existing Layout Score	Proposed Layout Score
Healthy Streets Score	30	41
Everyone feels welcome	26	40
Easy to cross	19	19
Shade and shelter	44	56
Places to stop and rest	33	39
Not too noisy	13	33
People choose to walk and cycle	26	40
People feel safe	22	42
Things to see and do	67	75
People feel relaxed	26	40
Clean air	22	22

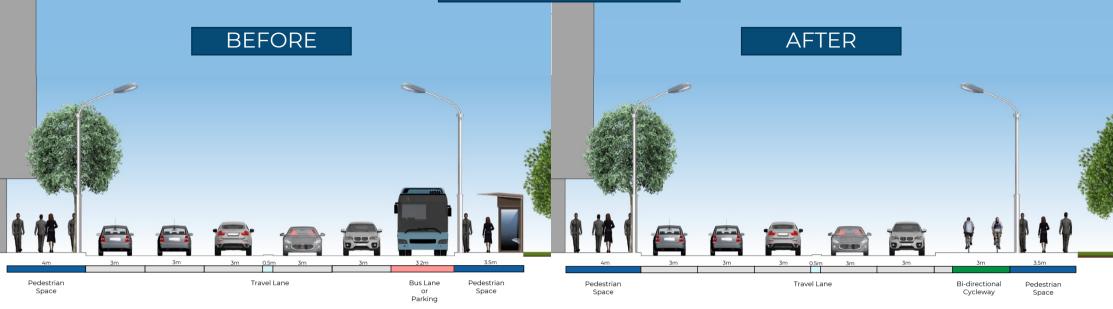
The Project positively influences the following metrics and indicators					Influer	nce on Healt	hy Streets S	coring				
	Metric	How the project influences the metric	Everyone feels welcome	Easy to cross	Shade and shelter	Places to stop and rest	Not too noisy	People choose to walk & cycle	People feel safe	Things to see and do	People feel relaxed	Clean air
4	Conflict between cycles and turning vehicles	With the added cycleway along Oxford Street, traffic along Oxford Street is reduced from 2041 to 1756. At traffic signals, people riding will receive their own phase, separating turning movement from traffic movements.	•					•	•		•	
10	Appropriate separation of people walking from traffic	The proposed design has a separated cycleway on the northern side which is 3.0m wide and acts as a buffer from traffic. The southern side has a bus lane which remains operational during AM peak hours hence the minimum buffer occurs near the intersection at Oxford St / College St at 0.9m wide. Therefore, separation for people walking and general traffic receives a LOS C.	•				•	•	•		•	
11	Space for cycling	The added cycleway physically separates cyclists with general traffic and provides a bi directional cycleway that is 3m wide.	•			•		•	•		•	
17	Shade for cycling	Following the construction of the cycleway, people ridings are positioned along the eastern kerbside. Although additional tree planting is not proposed, the location of the cycleway leverages the location of existing shade from 25-49% shading to greater than 50% linear coverage.	•		•			•		•	•	

# 3. Liverpool Street

BEI and Healthy Streets Assessment

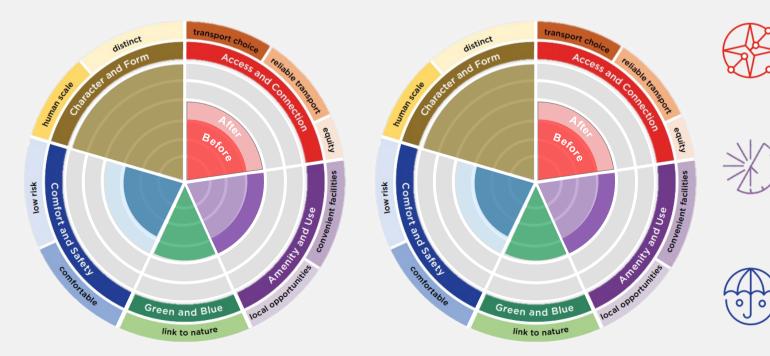


# LIVERPOOL STREET



# PEAK

# INTERPEAK



# Access and Connection

Changes

Adding a bi-directional cycleway will provide an additional sustainable mode of transport and improve the connectivity and accessibility of the existing cycling network.

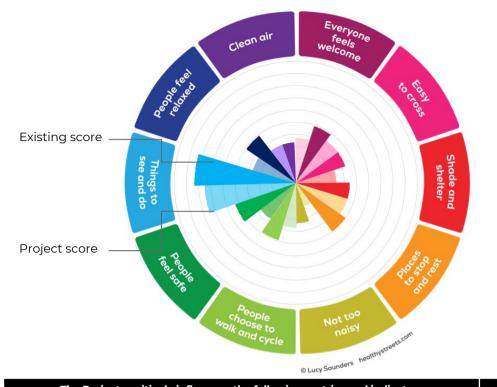
# Amenity and Use

Reallocating bus stops away from Liverpool Street and the removal of the majority of existing on-street carparking lowers the number of convenient end of trip facilities available along the road corridor.

# **Comfort and Safety**

The separation of cyclists and general traffic along the road corridor lowers the risk of crashes between cyclists and motor vehicles.

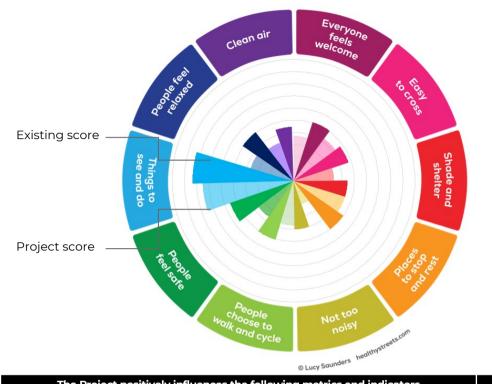
# LIVERPOOL STREET – PEAK PERIOD



	Existing Layout Score	Proposed Layout Score
Healthy Streets Score	40	49
Everyone feels welcome	37	49
Easy to cross	43	43
Shade and shelter	33	44
Places to stop and rest	44	50
Not too noisy	20	33
People choose to walk and cycle	37	49
People feel safe	36	53
Things to see and do	75	83
People feel relaxed	37	49
Clean air	33	33

	The Project positively influences the following metrics and indicators					Influen	ice on Healt	hy Streets S	Scoring			
	Metric	How the project influences the metric	Everyone feels welcome	Easy to cross	Shade and shelter	Places to stop and rest	Not too noisy	People choose to walk & cycle	People feel safe	Things to see and do	People feel relaxed	Clean air
4	Conflict between cycles and turning vehicles	With the added cycleway along Liverpool Street, traffic along Liverpool Street is reduced from 1321 to 1182. At traffic signals, people riding will receive their own phase, separating turning movement from traffic movements.	•					•	•		•	
10	Appropriate separation of people walking from traffic	In the existing layout, the weakest separation between pedestrians and traffic was along the northern section of Liverpool Street. With the added cycleway along the northern side of Liverpool Street, the separation between pedestrians and cars is 3m and the weakest point along the corridor shifts to the southern side of the road corridor.	•				•	•	•		•	
11	Space for cycling	The added cycleway physically separates cyclists with general traffic and provides a bi directional cycleway that is 3m wide.	•			•		•	•		•	
17	Shade for cycling	Following the construction of the cycleway, where cyclists will travel along the northern side of Liverpool Street there is more shading. This increases shade for people riding from approximately 25% to greater than 50% linear coverage.	•		•			•		•	•	

# LIVERPOOL STREET – INTERPEAK PERIOD



	Existing Layout Score	Proposed Layout Score
Healthy Streets Score	40	52
Everyone feels welcome	37	51
Easy to cross	43	48
Shade and shelter	33	44
Places to stop and rest	44	50
Not too noisy	20	40
People choose to walk and cycle	37	51
People feel safe	36	56
Things to see and do	75	83
People feel relaxed	37	51
Clean air	33	44

	The Project positively influences the following metrics and indicators					Influer	ice on Healt	thy Streets S	Scoring			
	Metric	How the project influences the metric	Everyone feels welcome	Easy to cross	Shade and shelter	Places to stop and rest	Not too noisy	People choose to walk & cycle	People feel safe	Things to see and do	People feel relaxed	Clean air
2	Volume of motorised traffic	During the interpeak period (Saturday), it is expected that there are 987 vehicles travelling along Liverpool Street, and therefore improves the scoring for volume of motorised traffic. This is slightly lower than the existing traffic volume of 1186 vehicles.	•	•			•	•	•		•	•
4	Conflict between cycles and turning vehicles	With the added cycleway along Liverpool Street, traffic along Liverpool Street is reduced. At traffic signals, people riding will receive their own phase, separating turning movement from traffic movements.	•					•	•		•	
1(	Appropriate separation of people walking from traffic	In the existing layout, the weakest separation between pedestrians and traffic was along the northern section of Liverpool Street. With the added cycleway along the northern side of Liverpool Street, the separation between pedestrians and cars is 3m and the weakest point along the corridor shifts to the southern side of the road corridor.	•				•	•	•		•	
1	Space for cycling	The added cycleway physically separates cyclists with general traffic and provides a bi directional cycleway that is 3m wide.	•			•		•	•		•	
17	7 Shade for cycling	Following the construction of the cycleway, where cyclists will travel along the northern side of Liverpool Street there is more shading. This increases shade for people riding from approximately 25% to greater than 50% linear coverage.	•		•			•		•	•	



Assessment and Comparison



## Cycling Stress Levels

#### Existing

Today, people riding are presented with mixed traffic conditions. Operating speeds are 40km/h and they share the general travel lanes with high volumes of traffic. This creates a high stress environment measured as **Level 3**.

#### **Cycleway Proposal**

The proposed project recommends a separated bi-directional facility along the northern side of Oxford Street and Liverpool Street.

This facility separates people riding from general traffic and trucks. The buffer between the cycleway and the travel lane is 1.0 meter and the traffic signals include a separate phase for people riding.

This creates a much lower level of traffic stress, calculated to be **Level 1**. As shown in Figure 8 'after' map, this bridges a gap to form a continuous lowstress level bicycle network connecting Castlereagh Street to Bourke Street and Hyde Park.

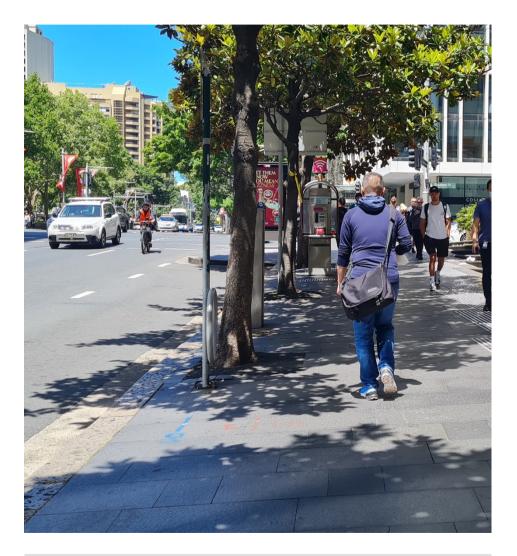
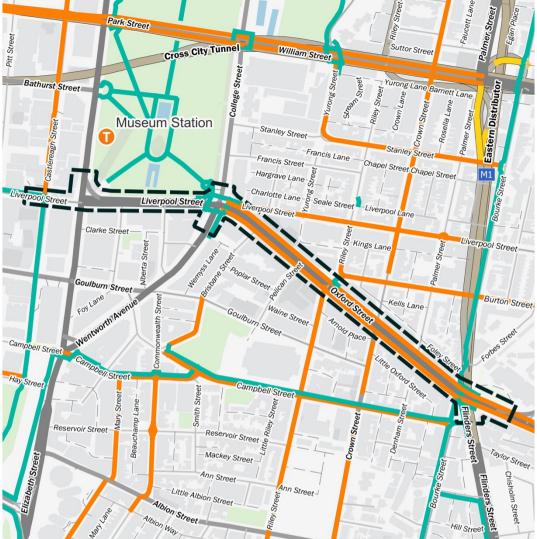
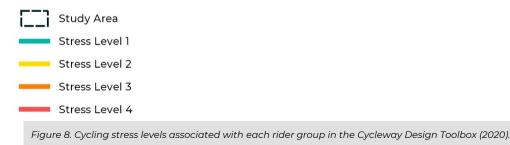
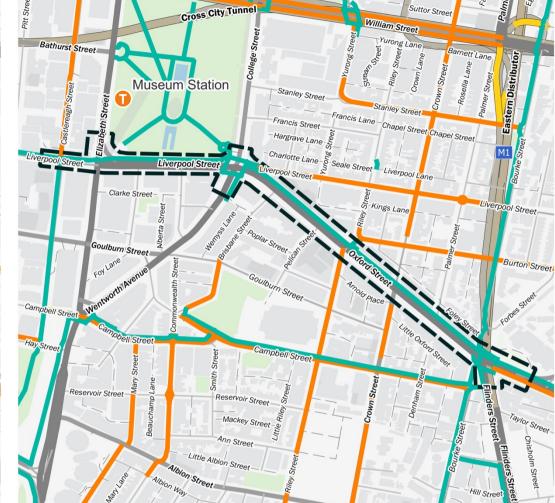


Figure 7 People riding in mixed traffic conditions on Liverpool Street. CrossleyTP 2022









#### Cycling Stress Levels - After

Park Street

Disclaimer

While all care is taken in producing and publishing this work, no responsibility is taken or warranty made with respect to the accuracy of any information, data or representation. The authors (including copyright owners) and publishers expressly disclaim all liability in respect of anything done or omitted to be done and the consequences upon reliance of the contents of this information.

(C) Map Produced for TfNSW





Oxford and Liverpool Street Cycleway · Transport for NSW · 21 December 2022





Stephanie Crossley executive director

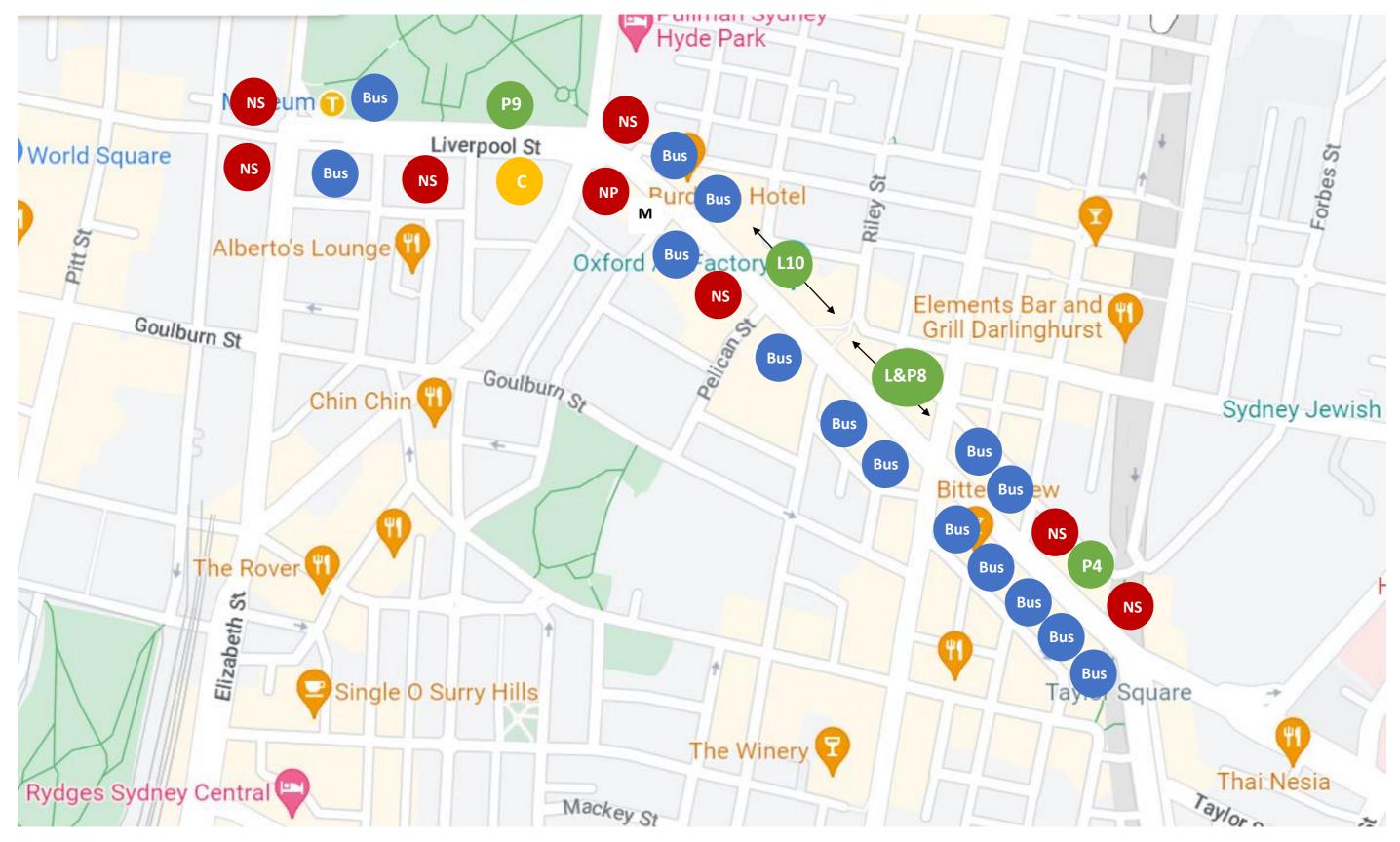
m+61 498 641 687 e stephanie@crossleytp.com.au

crossleytp.com.au

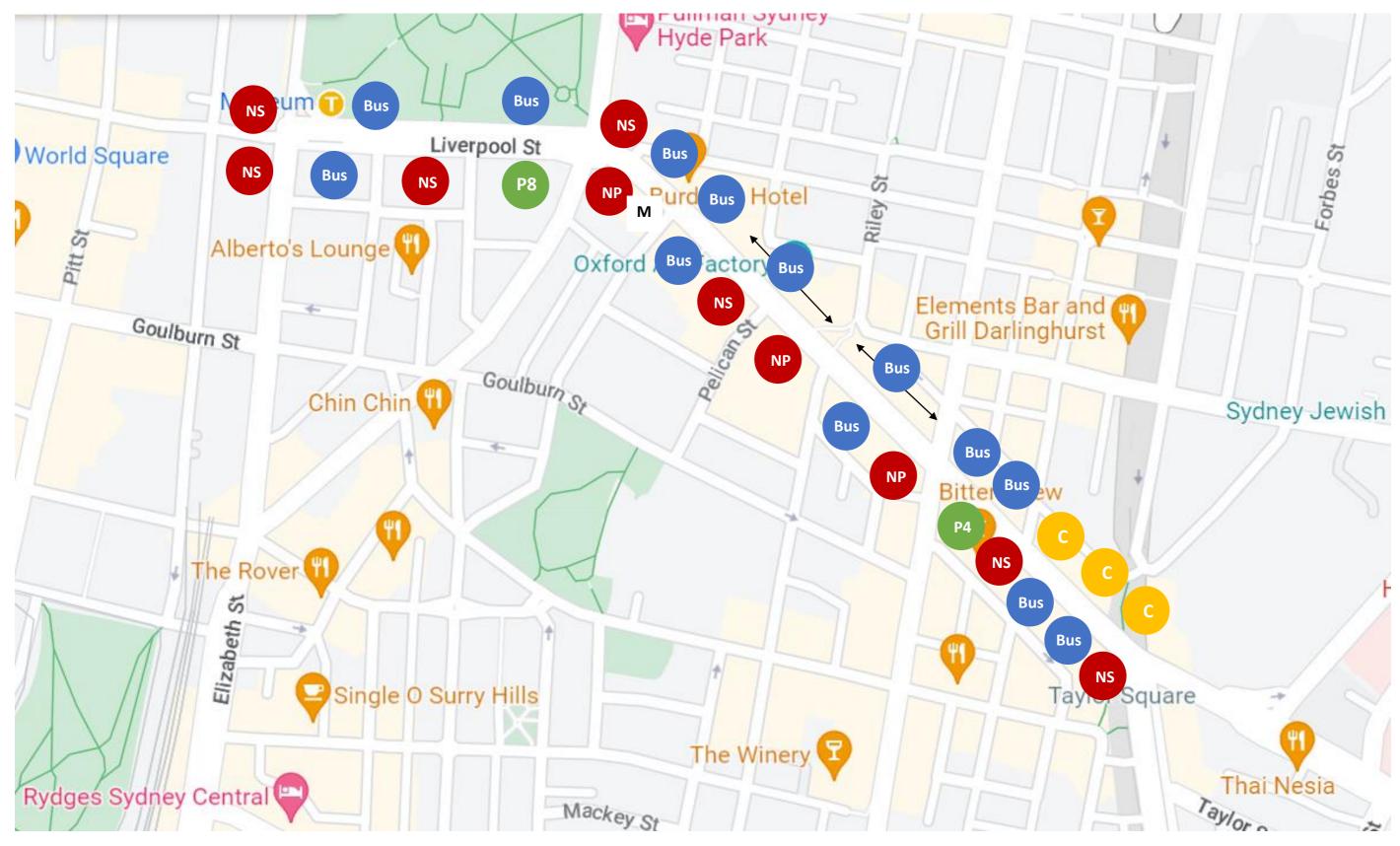


# Appendix E - Parking Arrangements for Existing and Council Design

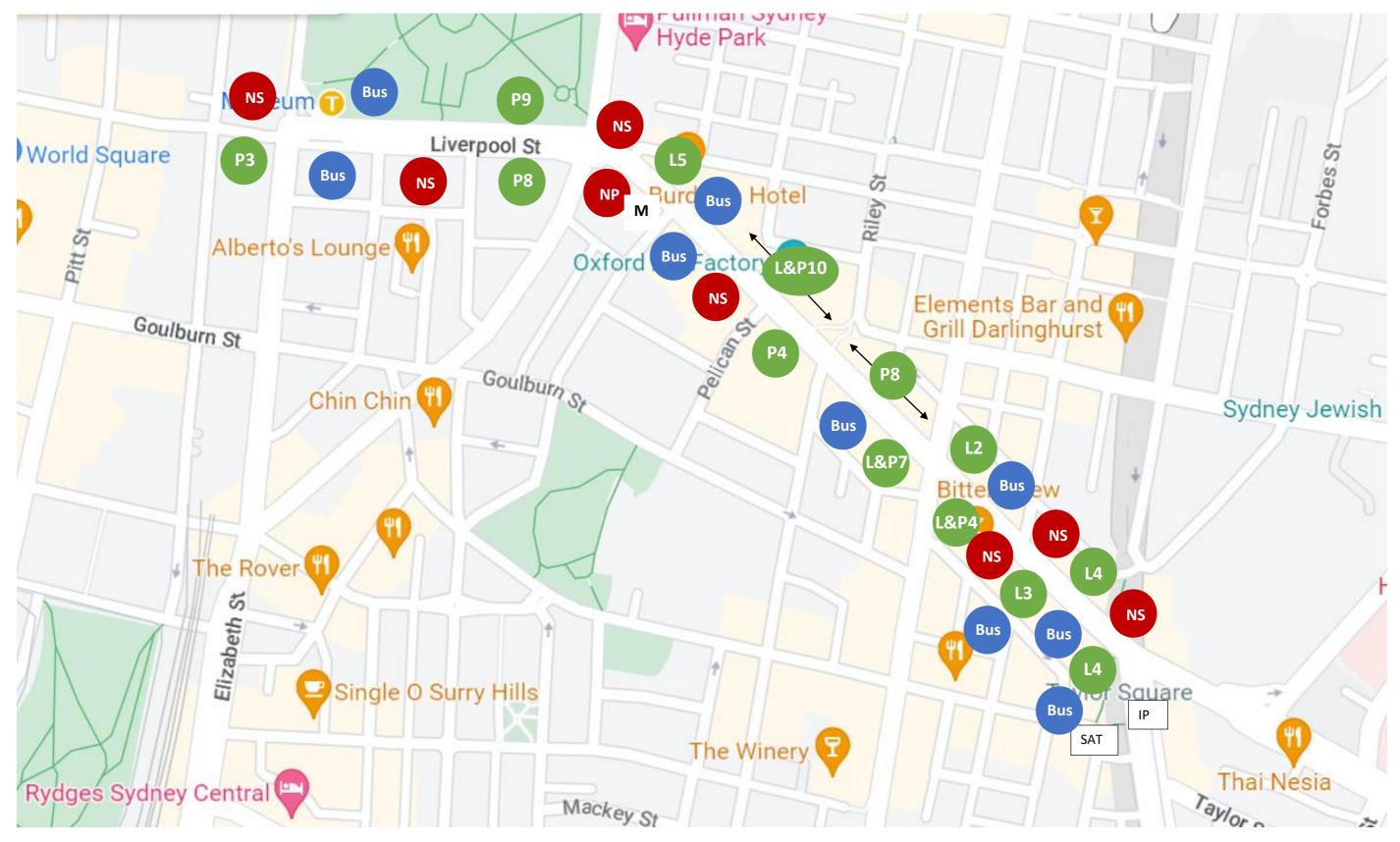
## **Existing AM Peak Parking**



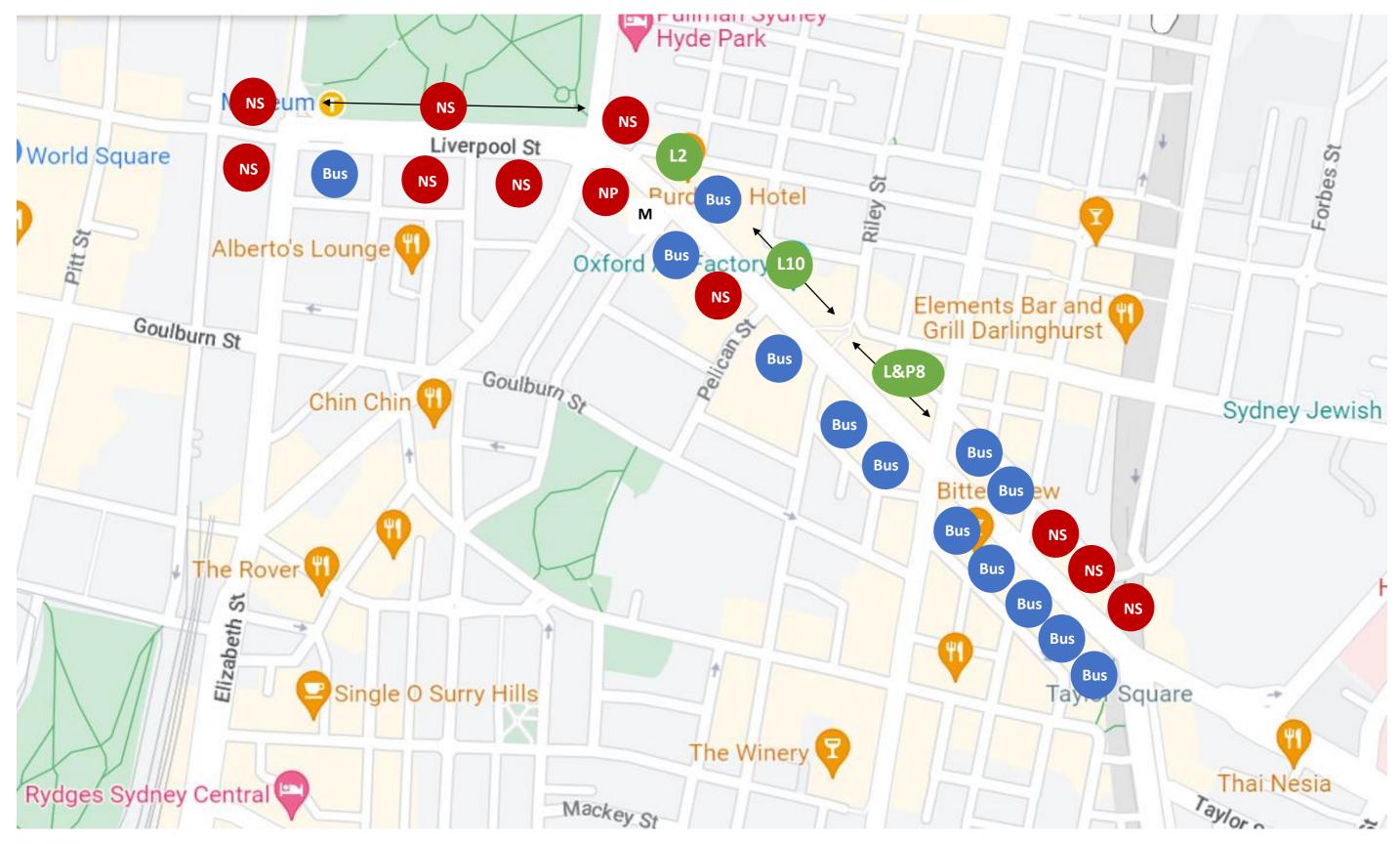
## **Existing PM Peak Parking**



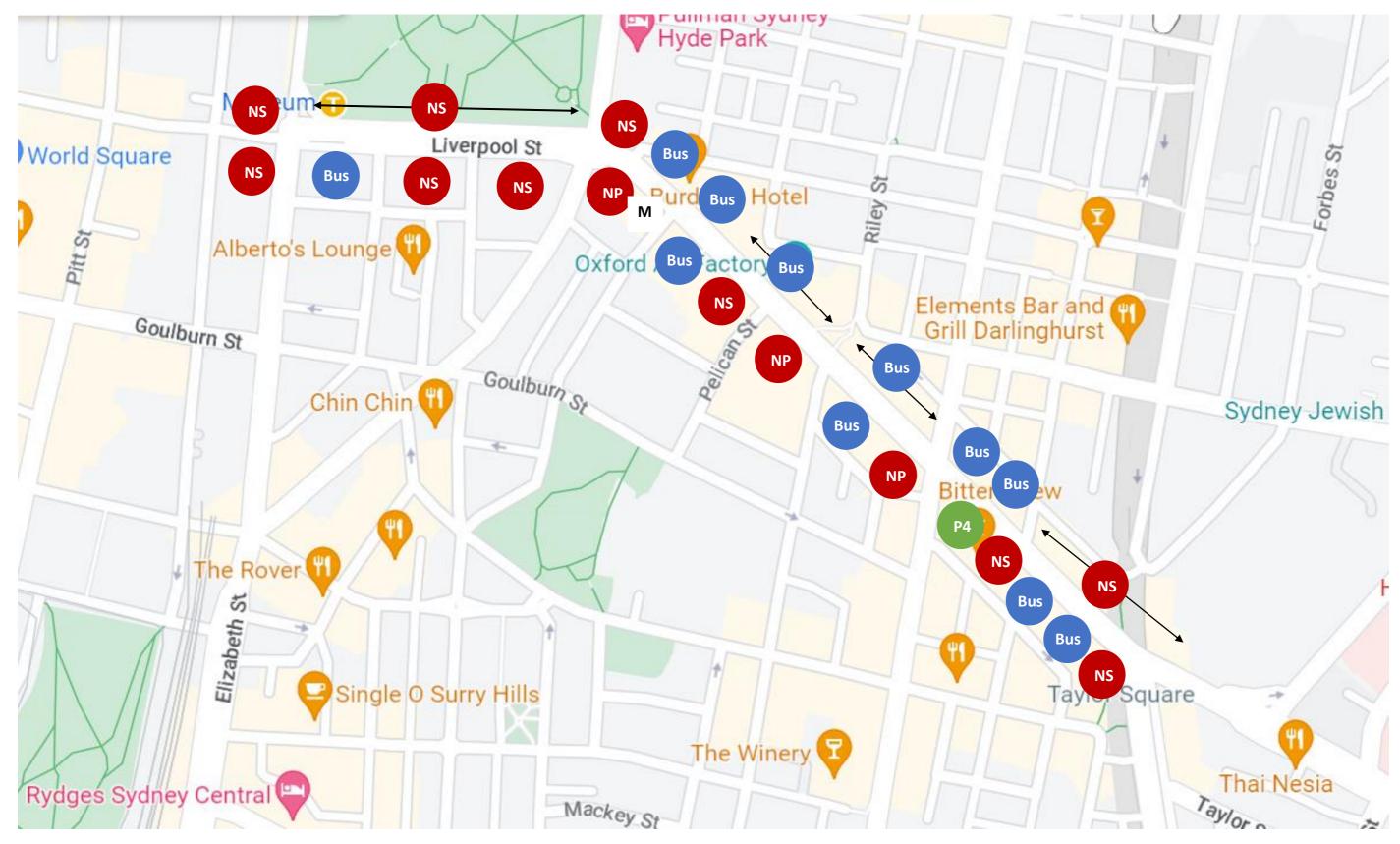
## Existing Saturday / InterPeak Parking



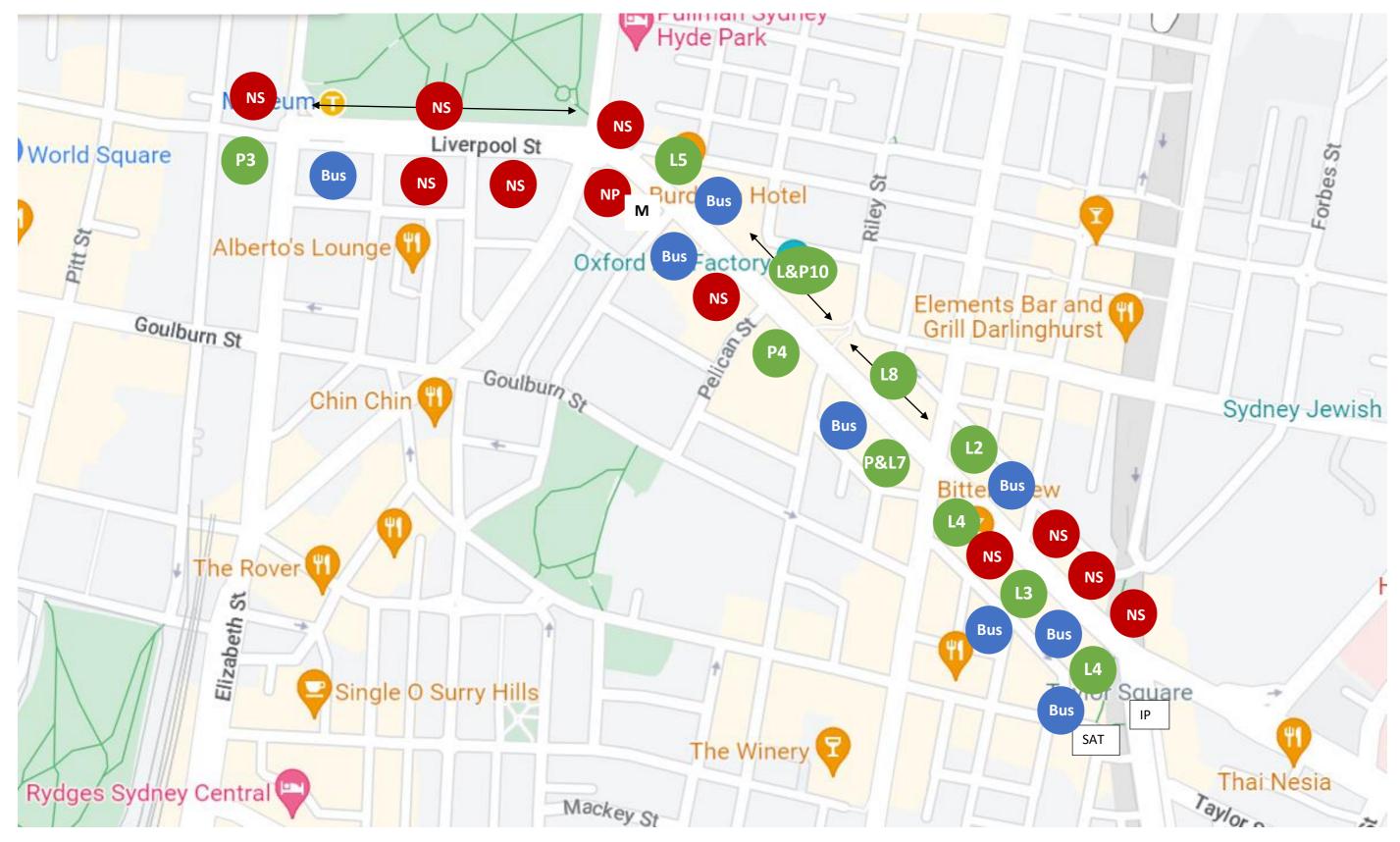
## **CoS AM Peak Parking**



## **CoS PM Peak Parking**



## CoS Saturday / InterPeak Parking



## Appendix F - Parking Study

## Liverpool Street & Oxford Street, City

Parking & Loading Study, June 2023



## Liverpool Street & Oxford Street, City

Parking & Loading Study, June 2023

Document Quality Information		
Client	Transport for New South Wales	
Job Number	2250013	
Issue	А	
Date	27/06/2023	
Details	Final	
Prepared By	PeopleTrans	
Reviewed By	PeopleTrans	
Approved By	Alan Stewart	
Signature	Altur .	

© PeopleTrans Pty Ltd 2023

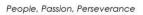
The information and intellectual property contained in this document is the property of PeopleTrans Pty Ltd. Use or copying of this document in whole or in part without the written permission of PeopleTrans Pty Ltd constitutes an infringement of copyright. This document has been prepared for the exclusive use of the Client and PeopleTrans Pty Ltd accepts no liability or responsibility whatsoever for any use or reliance upon this document by any third party.

## Table of Contents

1.	Introduction			
	1.1	Background	1	
	1.2	Scope & Objectives of this Report	3	
	1.3	Overall Study Area	4	
2.	Parl	king Analysis	5	
	2.1	Parking Inventory	5	
	2.2	Parking Surveys	10	
	2.3	How Far Should Parkers Walk?	11	
	2.4	Parking Offset Assessment	12	
	2.5	Oxford Street Pedestrian Origin/Destination (O/D) Parking Analysis	24	
3.	Loa	ding Assessment	37	
	3.1	Loading Zone M1	37	
	3.2	Loading Zone M2	39	
	3.3	Loading Zone M3	41	
	3.4	Loading Zone M4	43	
	3.5	Loading Zone M7	45	
	3.6	Loading Zone Options	50	
	3.7	Options for Relocating Loading Zones	52	
4.	Parl	king Analysis Key Conclusions	57	
	4.1	Oxford Street South Parking - Conclusions	57	
	4.2	Oxford Street South Loading - Conclusions	57	
5.	Refe	erences	58	

#### Appendices

Loading Zone Detailed Analysis (M1-M4 & M7) Oxford Street weekday "PM peak hour" Extension Proposals



rabies
--------

Table 2-1: Summary of Surveys and Data Analysed	10
Table 2-2: Walking Level of Service Conditions (adapted from Smith and Butcher, 1994)	11
Table 2-3: Adjacent Land Uses Belmore Road	11
Table 2-4: Area B Offset Car Parking Supply Summary	15
Table 2-5: Summary of Weekday Parking on Oxford Street South at M5 & M6	18
Table 2-6: Area A, B & M13/M14 Offset Car Parking Supply Summary	19
Table 2-7: Summary of Weekday Parking on Oxford Street South at M5 & M6 (Areas A/B, M13 & N	114)
	22
Table 2-8: Zone C Shop Details	27
Table 2-9: Zone B Shop Details	32
Table 2-10: Summary of On-Street Parking Availability – Zone M5 & M6 (Area B)	34
Table 2-11: Summary of On-Street Parking Availability – Zone M5 & M6 (Area A, B & M13/M14)	34
Figures	
Figure 1-1: Oxford Street West Parking Study Scope	1
Figure 1-2: Oxford Street West Parking Study Scope	2
Figure 1-3:- Oxford Street West Road Classification	2
Figure 1-4:- Oxford Street West Cycleway Parking Amendments	3
Figure 1-5:- Oxford Street West Study Extents	4
Figure 2-1: Main Corridor Parking Inventory	6
Figure 2-2: Area A Parking Inventory	7
Figure 2-3: Area B Parking Inventory (Sheet 1 of 2)	8
Figure 2-4: Area B Parking Inventory (Sheet 2 of 2)	9
Figure 2-5:- Oxford Street South Side Parking References – Section 1 & Section 2	12
Figure 2-6:- Area A Side Road On-Street Car Parking (Extents)	13
Figure 2-7:- Area B1 Side Road On-Street Car Parking (Extents)	14
Figure 2-8:- Area B2 Side Road On-Street Car Parking (Extents)	14
Figure 2-9: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area B – Mor 13/02/2023	nday 16
Figure 2-10: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area B – Tues 14/02/2023	sday 16
Figure 2-11: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area Wednesday 15/02/2023	В — 17
Figure 2-12: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area B – Thurs 16/02/2023	sday 17

Figure 2-13: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area B – Fri 17/02/2023	iday 18
Figure 2-14: Area B Parking Demand Summary (Saturday 11/03/23 to Sunday 19/03/23)	19
Figure 2-15: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area A & M13/M14 – Monday 13/02/2023	В& 20
Figure 2-16: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area A & M13/M14 – Tuesday 14/02/2023	B& 20
Figure 2-17:Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area A & I M13/M14 –Wednesday 15/02/2023	B& 21
Figure 2-18: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area A & M13/M14 – Thursday 16/02/2023	B& 21
Figure 2-19: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area A & M13/M14 – Friday 17/02/2023	B& 22
Figure 2-20: Area A Parking Demand Summary (Saturday 11/03/23 to Sunday 19/03/23)	23
Figure 2-21: M5 Parking Location Photo	24
Figure 2-22: M5-Origin/Destination Survey Camera Locations	25
Figure 2-23: Oxford Street M5 Weekday Shopper Origin/Destination	26
Figure 2-24: Oxford Street Zone C Shops Weekday Shopper Origin/Destination	27
Figure 2-25: Oxford Street South Parking M5 – Weekdays 13/02/23 to 17/02/23 Parking Demand	28
Figure 2-26: Oxford Street South Parking M5 – Weekdays 13/02/23 to 17/02/23 Parking Duration Stay	n of 28
Figure 2-27: M6-Parking Location Photo	29
Figure 2-28: M6-Origin/Destination Survey Camera Locations	30
Figure 2-29: Oxford Street M5 Weekday Shopper Origin/Destination	31
Figure 2-30: Oxford Street Zone B Shops Weekday Shopper Origin/Destination	32
Figure 2-31: Oxford Street South Parking M5 – Weekdays 13/02/23 to 17/02/23 Parking Demand	33
Figure 2-32: Oxford Street South Parking M6 – Weekdays 13/02/23 to 17/02/23 Parking Duration Stay	n of 33
Figure 2-33: Oxford Street M14 Parking Reference	35
Figure 2-34: Oxford Street West M14 Weekday Parking Demand Analysis	35
Figure 2-35: Oxford Street West M14 Saturday Parking Demand Analysis	36
Figure 3-1:- Oxford Street South Side Loading References – Section 1 & Section 2	37
Figure 3-2: Loading Zone M1 Location Photo	38
Figure 3-3: Loading Zone M1 Demand Analysis (Mon-Fri 10am-3pm & Sat 6am-10am)	38
Figure 3-4: Loading Zone M1 Vehicle Composition	39
Figure 3-5: Loading Zone M2 Location Photo	40

Figure 3-6: Loading Zone M2 Demand Analysis (Mon-Fri 10am-3pm & Sat 6am-10am)	40
Figure 3-7: Loading Zone M2 Vehicle Composition	41
Figure 3-8: Loading Zone M3 Location Photo	41
Figure 3-9: Loading Zone M3 Demand Analysis (Mon-Fri 10am-3pm & Sat 6am-10am)	42
Figure 3-10: Loading Zone M3 Weekday Utilisation	42
Figure 3-11: Loading Zone M3 Vehicle Composition	43
Figure 3-12: Loading Zone M4 Location Photo	43
Figure 3-13: Loading Zone M4 Demand Analysis (Mon-Fri 10am-3pm & Sat 6am-10am)	44
Figure 3-14: Loading Zone M4 Vehicle Composition	45
Figure 3-15: Loading Zone M7 Location Photo	45
Figure 3-16: Loading Zone M7 Demand Analysis (Mon-Fri 10am-3pm & Sat 6am-10am)	46
Figure 3-17: Loading Zone M7 Vehicle Composition	46
Figure 3-18: Oxford Street M15 & M16 Loading Zone References	47
Figure 3-19: Oxford Street West M15 Weekday Loading Analysis	48
Figure 3-20: Oxford Street West M15 Saturday Loading Demand Analysis	48
Figure 3-21: Oxford Street West M16 Weekday Loading Analysis	49
Figure 3-22: Oxford Street West M16 Saturday Loading Demand Analysis	49
Figure 3-23: Loading Zone M1/M2 Combined Analysis - Total Loading Vehicles	50
Figure 3-24: Loading Zone M1/M2 Combined Analysis - Total Loading Zone Length	51
Figure 3-25: Loading Zone M3/M4 Combined Analysis - Total Loading Vehicles	51
Figure 3-26: Loading Zone M3/M4 Combined Analysis - Total Loading Zone Length	52
Figure 3-27: Crown Street (M3 & M4) Loading Options	53
Figure 3-28: Crown Street B3 Weekday Parking Demand	54
Figure 3-29: Crown Street (M7) Loading Option	55
Figure 3-30: Pelican Street E7 Weekday Parking Demand	56



## 1. Introduction

#### 1.1 Background

The City of Sydney is proposing to construct a two-way cycleway on the north side of Oxford Street West between Castlereagh Street and Flinders Street. This two-way cycleway <u>reduces the westbound</u> <u>carriageway to two lanes</u>, with the kerbside lane currently including an AM peak hour bus lane with this lane also accommodating parking, loading, bus stops and taxis during the weekday inter-peak periods.

This cycleway proposal would reduce the operational capacity of Oxford Street in the westbound direction potentially resulting in higher levels of traffic congestion along this important corridor in the City as indicated graphically in Figure 1-1.

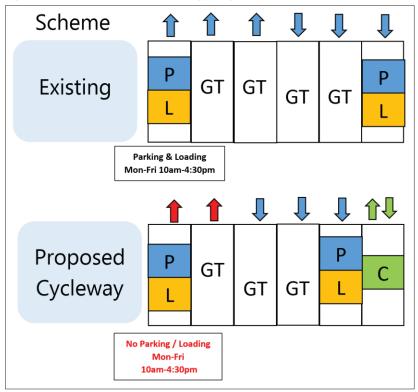


Figure 1-1: Oxford Street West Parking Study Scope

Transport for New South Wales commissioned PeopleTrans in late December 2022 to undertake a parking and loading study to determine the feasibility of removing or reconfiguring some of the parking and loading within the westbound kerbside lane of Oxford Street to minimise the traffic congestion impacts of the cycleway <u>during the inter-peak periods</u>.

The corridor was divided into three sections as follows:

- Section 1: Oxford Street between Flinders Avenue and Crown Street
- Section 2: Oxford Street between Crown Street and Wentworth Avenue
- Section 3: Liverpool Street between Wentworth Avenue and Castlereagh Street

The scope of this study, including the three main study sections, are indicated in Figure 1-2.



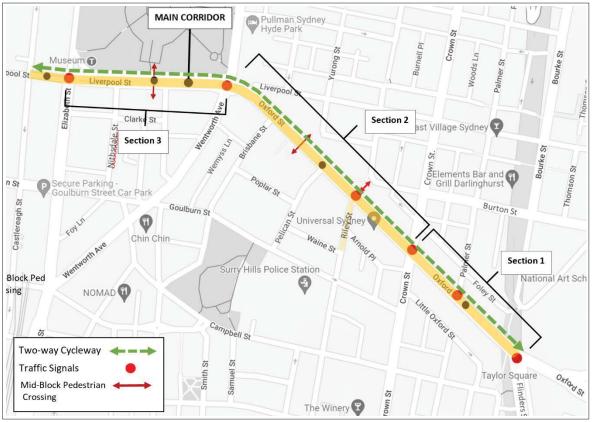


Figure 1-2: Oxford Street West Parking Study Scope

Oxford Street is a combination of a NSW State Road 172 (between Flinders Avenue and Crown Street) and a Regional Road (between Crown Street and Wentworth Avenue as indicated in Figure 1-3.

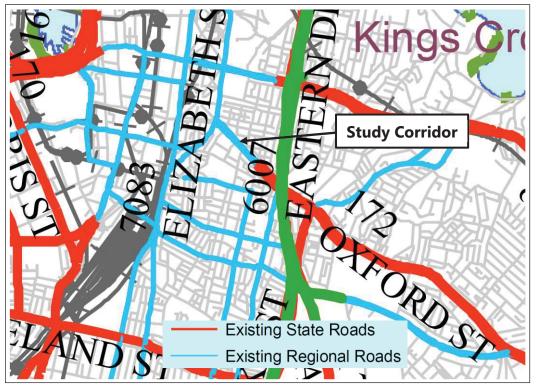
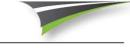


Figure 1-3:- Oxford Street West Road Classification

These proposals are contained fully within the City of Sydney local government area (LGA).



#### 1.2 Scope & Objectives of this Report

The key objective of this study is to assess the impact of the removal/adjustments to on-street car parking and loading on the south side of Oxford Street West and to identify specifically if this parking/loading can be accommodated in the existing on-street parking in the immediate vicinity of these parking spaces.

This includes consideration of the following:

- The existing on street car parking restrictions
- The existing land uses (retail, commercial and residential) adjacent to where parking is proposed to be removed or adjusted.
- The existing on street public car parking supply and demand.
- The destinations of parkers on Oxford Street (Between Pelican Street and Crown Street) using Origin-Destination (OD) surveys.

This report provides key parking information required by TfNSW to make decisions around parking and loading in advance of the implementation of the cycleway.

It is also important to note that this work has been informed by a review of 50% detailed design signs & lines plans of the proposed two way cycleway on Oxford Street which were provided to PeopleTrans by TfNSW in late December 2022 and which proposes to remove some parking and loading on Oxford Street West as shown indicatively in Figure 1-4.

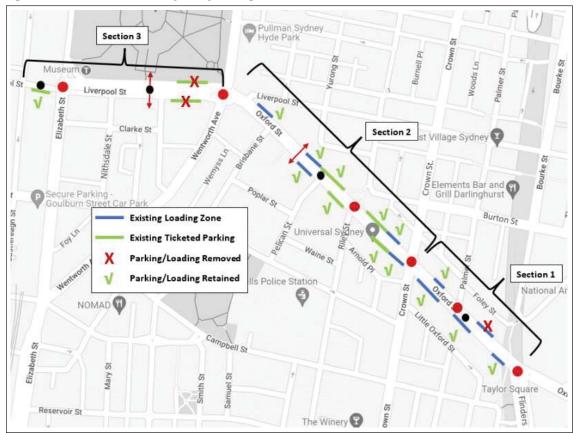


Figure 1-4:- Oxford Street West Cycleway Parking Amendments



### 1.3 Overall Study Area

The local road study areas (Referred to as Parking Area A and Parking Area B within this report) have been determined based on suitable walking distances associated with a 250m walking catchment which is aligned with the 1P short term parking restrictions as indicated in Figure 1-5.

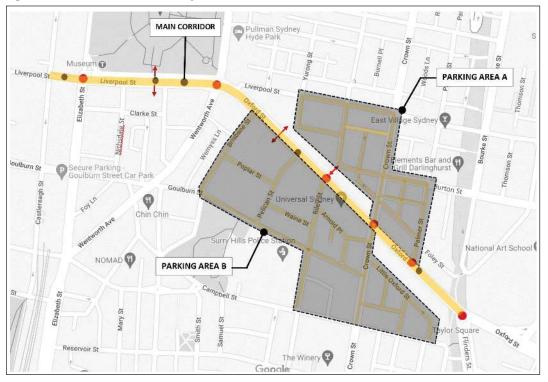


Figure 1-5:- Oxford Street West Study Extents



## 2. Parking Analysis

The following sections provide details of the parking assessment undertaken to determine the impacts of the removal of parking on the south side of Oxford Street and the work undertaken in support of this assessment.

## 2.1 Parking Inventory

In January 2023, an inventory of the on and off-street parking within the study area was recorded by PeopleTrans. Details of the parking inventory (parking supply and restrictions) are provided in Figure 2-1 to Figure 2-4.

Where, on occasion, signs were missing or inconsistent with the Australian Standards, the intended parking restriction was recorded. That is for example, where a "No Stopping" sign was missing but the section of road was intended to be "No Stopping", that restriction was adopted.

The methodology and assumptions used in calculating the parking supply for the proposed corridor was as follows:

- PeopleTrans walked the entire area and measured the available parking spaces.
- Where cars were parked, these were used as the basis for calculating the car parking supply.
- Where no cars were parked, the car parking supply was calculated using on site measurements with reference to the Australian and NSW Road Rules and AS2890.5-2015 On-street parking as follows:
  - 0 10m No Stopping restrictions at uncontrolled side street intersections
  - 20m No Stopping restrictions on the approach and exit to traffic signals.
  - ◊ 30m Bus Zones
  - Assumed car parking space lengths of 5.4m for end spaces and **6.0m** for midblock spaces.



- NO PARKING OTHER TIMES
- 1P TICKET (1/4P FREE) 8:30AM-3PM MON-FRI 8:30AM-6PM SAT-SUN & PUBLIC HOLIDAYS
- 1P TICKET (1/4P FREE) 10AM-4:30PM MON-FRI 7AM-6PM SAT SUN & PUBLIC HOLIDAYS NO PARKING 4:30PM-6PM MON-FRI
- 1P TICKET (1/4P FREE) 10AM-4:30PM MON-FRI NO PARKING 4:30PM-6PM MON-FRI
- TAXI ZONE 6PM-6AM 4P TICKET (1/4P FREE) 8AM-6PM SAT - SUN & PUBLIC HOLIDAYS
- 2P TICKET 10AM-6PM MON-FRI 4P TICKET 6PM-10PM MON-FRI 8AM-10PM SAT-SUN & PUBLIC HOLIDAYS
- 2P TICKET 8AM-3PM MON-FRI 4P TICKET 8AM-12AM MON-FRI 8AM-12AM SAT-SUN & PUBLIC HOLIDAYS
- BUS ZONE

- BUS ZONE 7AM-9:30AM 4:30PM-7PM MON-FRI LOADING ZONE 9:30AM-3pm MON-FRI 8:30AM-12:30PM SAT
- LOADING ZONE 10AM-4:30PM MON-FRI 7AM-10AM SAT NO PARKING 4:30-6PM MON-FRI
- \_ LOADING ZONE 10AM-3PM MON-FRI 6AM-10AM SAT NO STOPPING OTHER TIMES TAXIS EXCEPTED 1 MINUTE LIMIT
- LOADING ZONE 10AM-3PM MON-FRI 7AM-10AM SAT BUS ZONE OTHER TIMES
- LOADING ZONE 10AM-4:30PM MON-FRI 7AM-10AM SAT \_\_\_\_ BUS ZONE OTHER TIMES
- LOADING ZONE 10AM-3PM MON-FRI 7AM-10AM SAT TAXI ZONE 7PM-6AM
- LOADING ZONE 10AM-3PM MON-FRI 6AM-10AM SAT TAXI ZINE 12MIDNIGHT-6AM SAT&SUN BUS ZONE OTHER TIMES
- MAIL ZONE \_
- TAXI ZONE 12MID NIGHT -6AM SAT & SUN \_ BUS ZONE OTHER TIMES



Figure 2-1 Parking Inventory Part 1 of 4

**Oxford Street and Livepool Street** Surry Hills, NSW

> PREPARED BY: B. LI MAP REF: 22S0013 13/04/2023

(NOT TO SCALE) PROJECTION: MGA ZONE 56 (GDA94)



- LOADING ZONE 7AM-10AM MON-FRI
- 1P TICKET 8AM-10PM MON-FRI PERMIT HOLDERS EXCEPTED AREA 21
- 1P TICKET 8AM-10PM MON-SAT PERMIT HOLDERS EXCEPTED AREA 21
- 2P TICKET 8AM-10PM PERMIT HOLDERS EXCEPTED AREA 21
- 2P TICKET 8AM-10PM MON-SAT PERMIT HOLDERS EXCEPTED AREA 21
- 2P TICKET 8AM-6PM MON-FRI PERMIT HOLDERS EXCEPTED AREA 21
- 4P TICKET 6-10PM MON-FRI 8AM-10PM SAT-SUN & PUBLIC HOLIDAYS PERMIT HOLDERS EXCEPTED AREA 21
- 4P DISABLED PARKING ONLY 8AM -10PM
- LOADING ZONE
- LOADING ZONE 7AM-6PM MON-FRI 7AM-10AM SAT
- LOADING ZONE 9AM-3PM MON-FRI 1P TICKET 3PM-10PM MON-FRI 8AM-10PM SAT PERMIT HOLDERS EXCEPTED AREA 21

MAIL ZONE



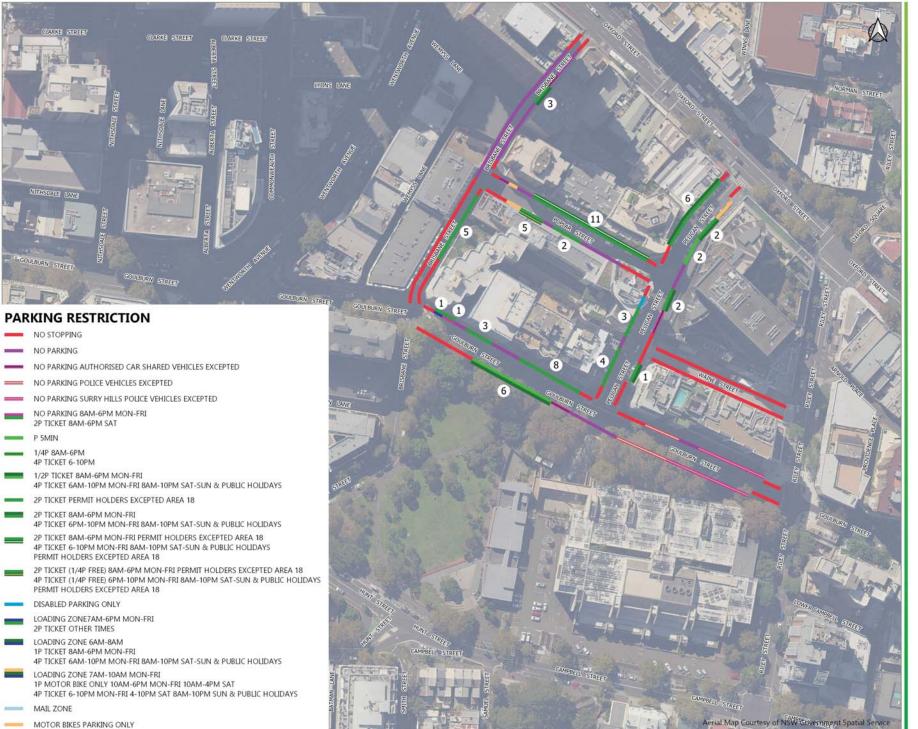
Figure 2-2 Parking Inventory Part 2 of 4

> North of Oxford Street Surry Hills, NSW

> > PREPARED BY: B. LI MAP REF: 22S0013 13/04/2023

(NOT TO SCALE) PROJECTION: MGA ZONE 56 (GDA94)

Aerial Map Courtesy of NSW Government Spatial Service



\_

-

peopletrans

Figure 2-3 Parking Inventory Part 3 of 4

> South of Oxford Street Surry Hills, NSW

> > PREPARED BY: B. LI MAP REF: 22S0013 13/04/2023

(NOT TO SCALE) PROJECTION: MGA ZONE 56 (GDA94)



#### **Figure 2-4 Parking Inventory** Part 4 of 4

South of Oxford Street Surry Hills, NSW

> PREPARED BY: B. LI MAP REF: 22S0013 13/04/2023

(NOT TO SCALE) PROJECTION: MGA ZONE 56 (GDA94)

Aerial Map Courtesy of NSW Government Spatial Service

#### PARKING RESTRICTION

- NO STOPPING
- NO PARKING
- NO PARKING 8:30AM-6PM MON-FRI 8:30AM-12:30PM SAT
- NO PARKING COACHES EXCEPTED 30 MINUTE LIMIT
- NO PARKING AUTHORISED CAR SHARED VEHICLES EXCEPTED
- NO PARKING POLICE VEHICLES EXCEPTED
- 1/4P
  - 1/4P 8AM-6PM 4P TICKET 6-10PM

1/2P TICKET 8AM-6PM MON-FRI 4P TICKET 6AM-10PM MON-FRI 8AM-10PM SAT-SUN & PUBLIC HOLIDAYS

- 1P 8AM-10PM MON-SAT PERMIT HOLDERS EXCEPTED AREA 18
- 1P TICKET 8AM-6PM MON-FRI PERMIT HOLDERS EXCEPTED AREA 18 4P TICKET 6PM-10PM MON-FRI 8AM-10PM SAT-SUN & PUBLIC HOLIDAYS PERMIT HOLDERS EXCEPTED AREA 18
- 2P TICKET (1/4P FREE) 8AM-6PM MON-FRI 4P TICKET (1/4P FREE) 6PM-10PM MON-FRI 8AM-10PM SAT-SUN & PUBLIC HOLIDAYS
- 2P TICKET (1/4P FREE) 8AM-6PM MON-FRI PERMIT HOLDERS EXCEPTED AREA 18 4P TICKET (1/4P FREE) 6PM-10PM MON-FRI 8AM-10PM SAT-SUN & PUBLIC HOLIDAYS PERMIT HOLDERS EXCEPTED AREA 18
- 2P TICKET (1/4P FREE) 8AM-6PM MON-FRI 4P TICKET (1/4P FREE) 8AM-6PM SAT-SUN & PUBLIC HOLIDAYS TAXI ZONE OTHER TIMES
- 2P TICKET 8AM-6PM MON-FRI PERMIT HOLDERS EXCEPTED AREA 18 4P TICKET 6-10PM MON-FRI 8AM-10PM SAT-SUN & PUBLIC HOLIDAYS PERMIT HOLDERS EXCEPTED AREA 18
- \_ 2P TICKET (1/4P FREE) 8AM-12PM 8PM-10PM MON-FRI 4P TICKET (1/4P FREE) 8AM-10PM SAT-SUN & PUBLIC HOLIDAYS MAIL ZONE 12PM-8PM MON-FRI
- LOADING ZONE 7AM-6PM MON-FRI
- LOADING ZONE 7AM-6PM MON-FRI 7AM-12:30PM SAT
- LOADING ZONE 8AM-6PM MON-FRI 4P TICKET (1/4P FREE) 6PM-10PM MON-FRI 8AM-10PM SAT-SUN & PUBLIC HOLIDAYS
- LOADING ZONE 6AM-8AM 1P TICKET 8AM-6PM MON-FRI
- 4P TICKET 6AM-10PM MON-FRI 8AM-10PM SAT-SUN & PUBLIC HOLIDAYS
- LOADING ZONE 7AM-10AM MON-FRI 1P MOTOR BIKE ONLY 10AM-6PM MON-FRI 10AM-4PM SAT 4P TICKET 6-10PM MON-FRI 4-10PM SAT 8AM-10PM SUN & PUBLIC HOLIDAYS

MAIL ZONE



### 2.2 Parking Surveys

The parking surveys and data collected for the study area are summarised in Table 2-1.

Table 2-1: Summary of Surveys and Data Analysed

Type & Method of Surveys	Location Dates/Time Periods of	
Parking Demand Surveys – Dashcam Driving Surveys (9 Days)	Liverpool Street/Oxford Street West (Between Castlereagh Street & Flinders Street)	Saturday/Sunday 11/02/23 & 12/02/23 (7am-7pm) Monday to Friday 13/02/23 to 17/02/23 (6am-7pm) Saturday/Sunday 18/02/23 & 19/02/23 (7am-7pm)
Parking Demand Surveys – Manual Walking Surveys (9 Days)	Local Roads - Parking Area A & Parking Area B (250m walking catchment)	Saturday/Sunday 11/02/23 & 12/02/23 (7am-7pm) Monday to Friday 13/02/23 to 17/02/23 (6am-7pm) Saturday/Sunday 18/02/23 & 19/02/23 (7am-7pm)
Pedestrian Origin/Destination Surveys (Static Video Cameras)	Oxford Street South Side (Between Pelican Street & Riley Street) – Referred to as Parking Zone M6	Monday to Friday 13/02/23 to 17/02/23 & 24/02/23 (7am-7pm)
Pedestrian Origin/Destination Surveys (Static Video Cameras)	Oxford Street South Side (Between Riley Street & Crown Street) – Referred to as Parking Zone M5	Monday to Friday 13/02/23 & 17/02/23 (7am-7pm)
Loading Zone Surveys (Static Video Cameras)	Oxford Street South Side Loading Zones 1-5	Monday to Saturday 13/02/23 to 18/02/23 (Loading Zone Times)

PeopleTrans undertook detailed parking and loading zone surveys within the study area as detailed in Table 2-1, the results of which are summarised in the following sections.

The intended purpose of these surveys was as follows:

- The parking demand surveys identified what level of parking availability there was on the main study corridor and on the surrounding on-street local roads within Area A and Area B.
- The origin/destination surveys identified where people were going after parking on Oxford Street in parking zones M5 and M6.
- The loading surveys identified the demand for loading and, where possible, which specific shops loading vehicles were servicing (M1-M4 & M7).



#### 2.3 How Far Should Parkers Walk?

To understand the extents of the zone of influence from the loss of car parking on the south side of Oxford Street it is important to understand how far people would be willing to park from their destination if the parking which they used regularly was no longer available.

There are several factors affecting what is considered an 'appropriate' distance to walk to a destination from a car parking space. These include the footpath environment, weather, roads to cross or other delays and even whether the end destination is visible.

As documented in *Pedestrian Planning and Design* (Fruin, 1971), the distance someone is willing to walk is often activity-based rather than energy-based. Variables such as <u>how long someone is planning to spend</u> <u>at their destination and how often they undertake that activity play an important part in determining the distance someone is willing to walk</u>.

In *How Far Should Parkers Walk?* (Smith and Butcher, 1994), walking Level of Service values were investigated in detail. The results from this study are reproduced in Table 2-2 with walking levels of service adapted to metric distances.

Level of Service Conditions	A	В	С	D
Climate Controlled	300m	730m	1,150m	1,575m
Outdoor / Covered	150m	300m	450m	600m
Outdoor / Uncovered	120m	240m	360m	480m
Through Surface Car Park	100m	210m	320m	420m
Inside Parking Facility	90m	180m	270m	360m

Table 2-2: Walking Level of Service Conditions (adapted from Smith and Butcher, 1994)

With regards to appropriate walking distances for Oxford Street South, consideration needs to be given to the intended purpose of people currently parking on the south side of Oxford Street.

Details of the assessment of key land uses corresponding to Oxford Street South likely to be impacted by these proposals are listed in Table 2-3.

Table 2-3: Adjacent Land Uses Belmore Road

Street	Adjacent Land Use
Oxford Street South (Parking Zone M6)	Discount Chemist, Mobile Phone Repairer, Betting Agency, Oxford Village Shopping Centre (Supermarket, Specialty Retail, Cafes, Restaurants), Bank
Oxford Street South (Parking Zone M5)	Cafés, Coffee Shop, Restaurants, Money Lender, Bottle Shop, Massage Parlour, Nightclub, Convenience Store, Hotel/Bar

Table 2-3 indicates that the land uses adjacent to Oxford Street South (Parking Zone M6), where 3 parking spaces are proposed to be removed, is dominated by the Oxford Village shopping centre which is bordered by other specialty shops, a betting agency and the National Australia Bank.

Table 2-3 also indicates that the land uses adjacent to Oxford Street South (Parking Zone M5), where 4 parking spaces are proposed to be removed, is dominated by hotels & bars, a nightclub, bottle shop, convenience store and a café/coffee shop.

In this regard, it is considered that walking Levels of Service B to C would be reasonable walking distances for replacement parking associated with parking relocated from Oxford Street South.

This equates to up to a 3 to 5-minute walk (240m to 360m). All distances should be considered averages.



For the purposes of this assessment however PeopleTrans has adopted a walking distance of 250m for parking zones M5 & M6 which have predominantly retail and commercial land uses with short stay/high turnover car parking requirements.

#### 2.4 Parking Offset Assessment

## **2.4.1** Oxford Street South Side – Between Crown Street & Pelican Street - Parking Analysis Parking Zones M5 & M6.

There are only two parking zones on the south side of Oxford Street between Flinders Avenue and Wentworth Avenue referenced as M5 and M6 which are located within Section 1 and Section 2 of the main corridor as indicated in Figure 2-5.

Parking zone M5, between Riley Street and Pelican Street, has a parking supply of 4 spaces and operates as 1P parking Monday to Friday between 10am & 4:30pm with Parking zone M6, between Crown Street and Riley Street, having a parking supply of 3 spaces also operating as 1P parking Monday to Friday between 10am and 4:30pm.



Figure 2-5:- Oxford Street South Side Parking References – Section 1 & Section 2

Parking available in the nearby side streets operates typically as 1P or 2P parking.

The average walking distance from the centre of parking in zones M5 & M6 on Oxford Street to the parking in the surrounds of Parking Area A and Parking Area B is 250m and these streets would be considered a suitable replacement for the parking that would be affected by the potential removal of parking zones M5 & M6. Details of the parking in Area A and Area B are provided in Figure 2-6, Figure 2-7 and Figure 2-8.



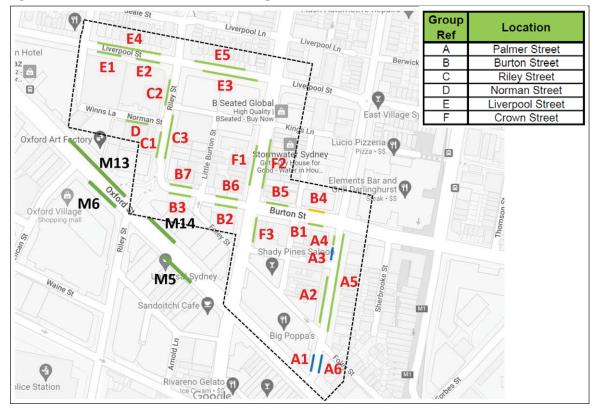


Figure 2-6:- Area A Side Road On-Street Car Parking (Extents)

There was a total of **6 streets** included in **Area A** with a total maximum supply of **<u>117 car parking spaces</u>**.

It should be noted importantly that not all the 117 car parking spaces available in Area A can be considered as offset parking for M5 and M6 as some of these spaces operate outside of the operating times of M5 and M6 or have restrictions which do not allow 1P parking.

The were only **107 or 110 spaces of the 117 spaces considered to be suitable as offset parking in Area** <u>**A**</u>.



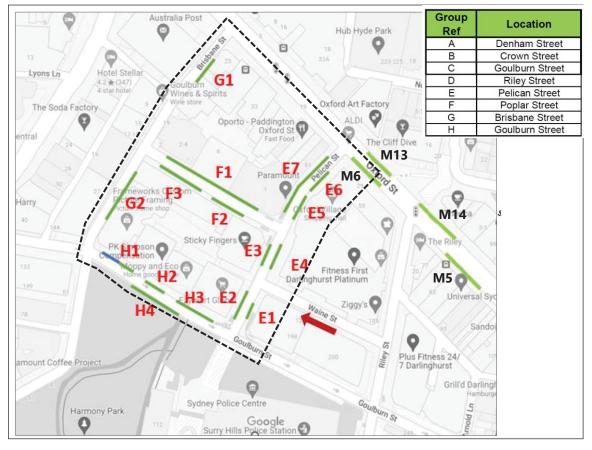
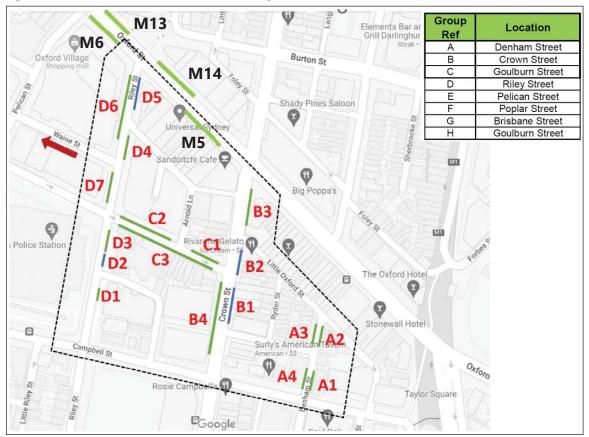


Figure 2-7:- Area B1 Side Road On-Street Car Parking (Extents)

Figure 2-8:- Area B2 Side Road On-Street Car Parking (Extents)



22S0013 Liverpool Street & Oxford Street, City **Parking & Loading** Study, June 2023

Issue: A - 27/06/2023



There was a total of 8 streets included in Area B with a total maximum supply of 142 car parking spaces.

It should be noted importantly that not all the 142 car parking spaces available in Area B can be considered as offset parking for M5 and M6 as some of these spaces operate outside of the operating times of M5 and M6 or have restrictions which do not allow 1P parking.

The were only **<u>118 spaces of the 142 spaces considered to be suitable as offset parking in Area B</u> as indicated in Table 2-4.** 

	Area B
Between 10am-5pm	Weekdays
Loading Zone	14
Accessible Parking	
5min Parking	3
1/4P Parking	1
½P Parking	6
1P/2P/4P Parking	118
Total No of Parking Spaces	142
No of Parking Spaces Included in Offset Calculations (1P,2P & 4P)	(142-24)=118

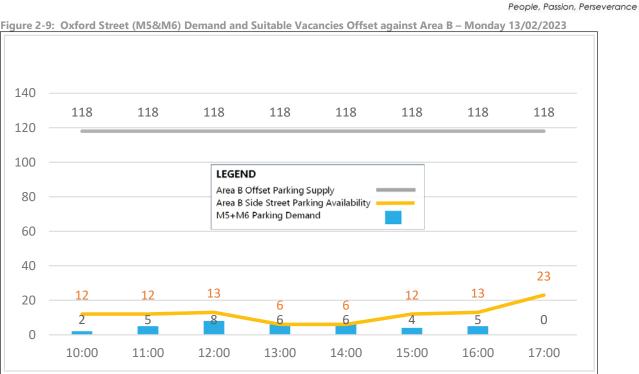
 Table 2-4: Area B Offset Car Parking Supply Summary

#### 2.4.2 Area B Parking Offset Analysis

The demand for parking on the south side of Oxford Street in parking zones M5 and M6 as well as the vacancies in the nearby side streets corresponding with Area B, which are the local streets directly adjacent to M5 and M6 parking, are summarised in Figure 2-9 to Figure 2-13.

Interpretation of these graphs are as follows:

- The grey line is the parking supply (i.e. available parking that is considered suitable to be used as offset parking)
- Blue bars are the total car parking demand in parking areas M5 and M6. This should not exceed the parking supply in M5 and M6 i.e. 7 spaces. Where this number is exceeded, this represents illegal car parking.
- The yellow line is the available/free car parking spaces in Area B also taking account of the available car parking spaces in M5 and M6. The difference between the yellow line number and the blue bar number is the surplus number of car parking spaces available.





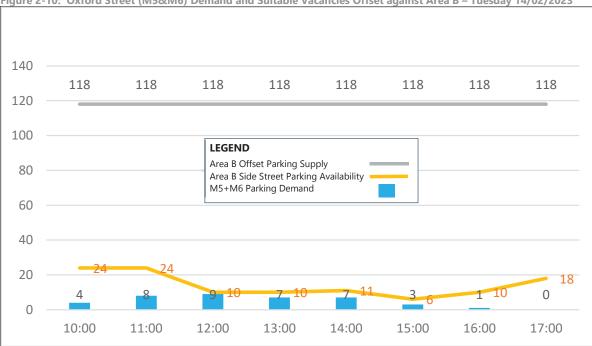
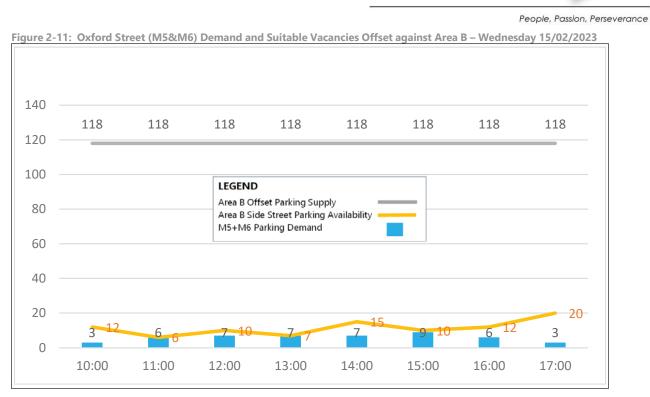


Figure 2-10: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area B – Tuesday 14/02/2023



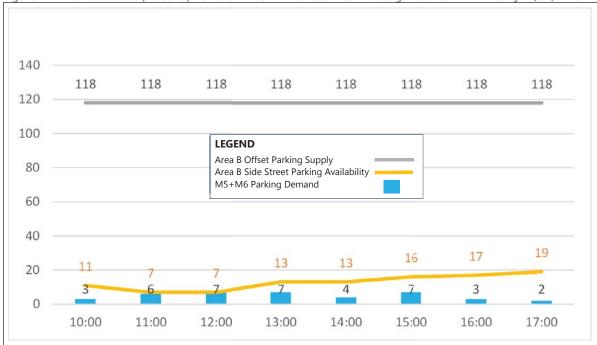
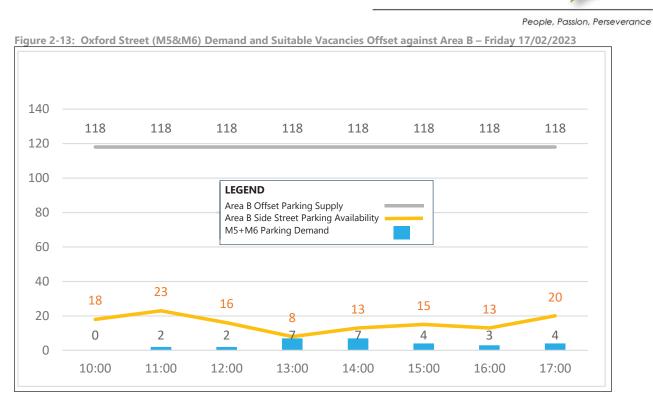


Figure 2-12: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area B – Thursday 16/02/2023



### 2.4.3 Parking M5 & M6 – Summary of Parking Availability in Area B.

Table 2-5 provides a summary of whether there were suitable vacancies in the nearby side streets to cater for the loss of parking in M5 and M6 over the course of the 5 surveyed weekdays.

Date	Maximum Main Corridor (Oxford Street) Demand	Maximum Deficit	Notes
Monday 13/02/2023	8 vehicles at 12:00pm	No deficit	Sufficient vacancies throughout the survey period with a minimum of 6 vacancies at 1:00pm and 2:00pm.
Tuesday 14/02/2023	9 vehicles at 12:00pm	No deficit	Sufficient vacancies throughout the survey period with a minimum of 6 vacancies at 3:00pm.
Wednesday 15/02/2023	9 vehicles at 3:00pm	No deficit	Sufficient vacancies throughout the survey period with a minimum of 6 vacancies at 11:00am.
Thursday 16/02/2023	7 vehicles at 1:00pm & 3:00pm	No deficit	Sufficient vacancies throughout the survey period with a minimum of 7 vacancies at 11:00am and 12:00pm.
Friday 17/02/2023	7 vehicles at 1:00pm & 2:00pm	No deficit	Sufficient vacancies throughout the survey period with a minimum of 8 vacancies at 1:00pm.

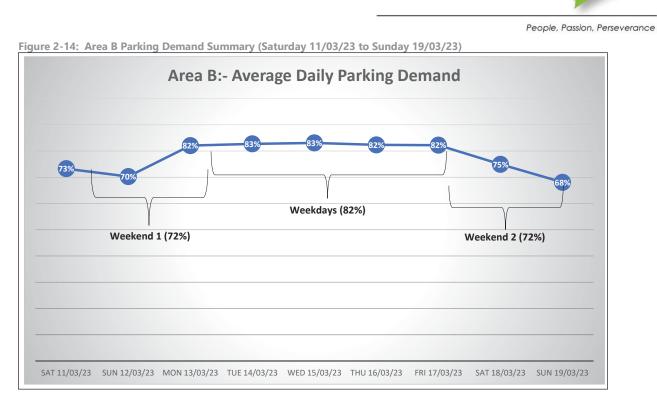
Table 2-5: Summary of Weekday Parking on Oxford Street South at M5 & M6

Table 2-5 indicates that on all surveyed days there were sufficient vacancies in the identified side streets in Area B to cater for the observed demand on Oxford Street south at M5 & M6.

Although there were vacancies in the nearby side streets to cater for the loss of weekday parking at M5 and M6 the demand for parking in Area B was, on average, just below 85% capacity as indicated in Figure 2-14.

This is often referred to as "Theoretical Capacity" a point where there are some car parking spaces available, but they are spread out sporadically and as such are difficult to find.

peopletrans



# 2.4.4 Area A, B & M13/M14 Parking Offset Analysis

There was a total of **14 streets** included in **Area A & B** with a total maximum supply of <u>**259 car parking**</u> <u>**spaces**</u> and a total of <u>**13 car parking spaces**</u> in parking areas M13 and M14.

It should be noted importantly that not all of the 272 car parking spaces available in Area A, B and M13 and M14 can be considered as offset parking for M5 and M6 as some of these spaces operate outside of the operating times of M5 and M6 or have restrictions which do not allow 1P parking.

There were only 238 (between 10am & 2pm) & 241 spaces (between 2pm & 5pm) of the 272 spaces considered to be suitable as offset parking in Area A, B and M13/M14 as indicated in Table 2-6.

	_				
	Area A		Area B	M13 & M14	
Between 10am-5pm	Weekdays		Weekdays	Weekdays	
	Before 3pm	After 3pm			
Loading Zone	6	4	14		
Accessible Parking	4	4			
5min Parking			3		
1/4P Parking			1		
1/2P Parking			6		
1P/2P/4P Parking	107	110		13	
Total No of Parking Spaces	117		142	13	Tota
No of Parking Spaces Included in Offset Calculations (1P,2P & 4P)	107	110	118	13	238 241

Table 2-6: Area A, B & M13/M14 Offset Car Parking Supply Summary

peopletrans



The demand for parking on the south side of Oxford Street in parking zones M5 and M6 as well as the vacancies in the nearby side streets corresponding with Area A and Area B, which are the streets on either side of M5 and M6 parking, and also corresponding with parking zones M13 and M14, which is the on-street parking on Oxford Street opposite parking M5 and M6. are summarised in Figure 2-15 to Figure 2-19.

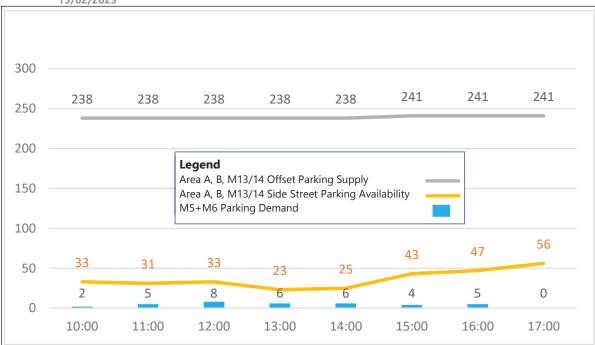
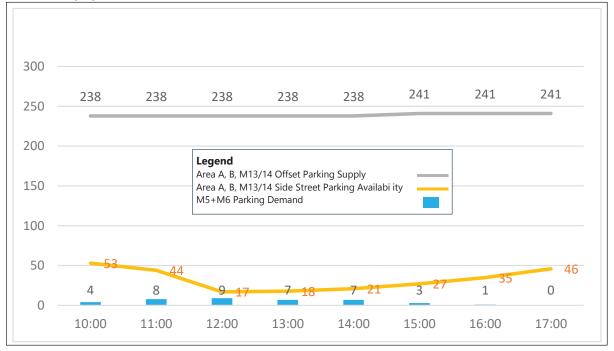


Figure 2-15: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area A & B & M13/M14 – Monday 13/02/2023

Figure 2-16: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area A & B & M13/M14 – Tuesday 14/02/2023



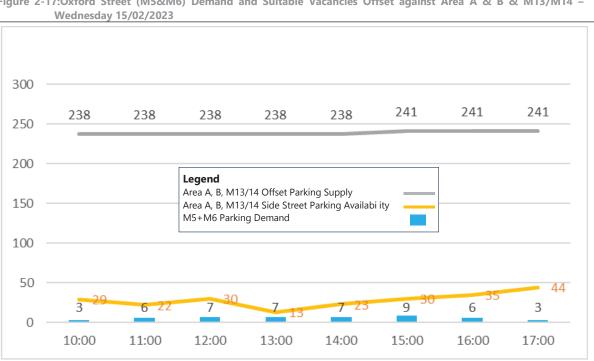
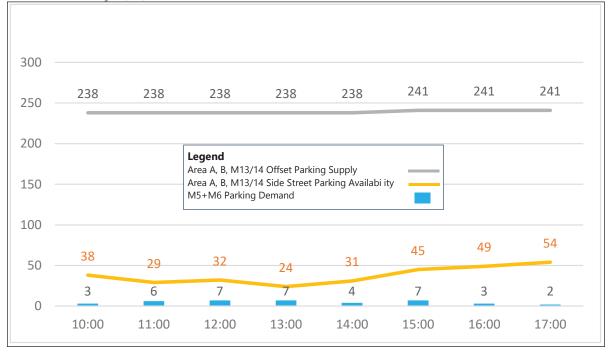


Figure 2-17:Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area A & B & M13/M14 -

Figure 2-18: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area A & B & M13/M14 -Thursday 16/02/2023



peopletrans

People, Passion, Perseverance



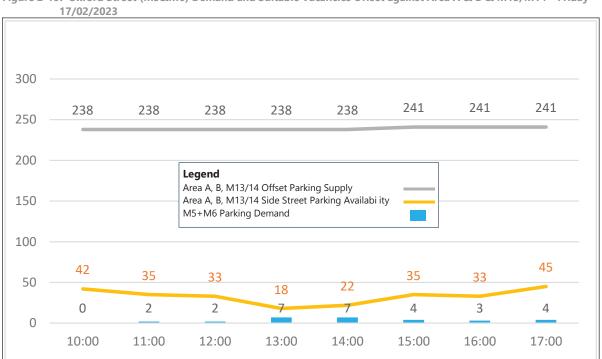


Figure 2-19: Oxford Street (M5&M6) Demand and Suitable Vacancies Offset against Area A & B & M13/M14 – Friday

**2.4.5** Parking M5 & M6 - Summary of Parking Availability in Area A , Area B & M13/M14.

Table 2-7 provides a summary of whether there were suitable vacancies in the nearby side streets to cater for the loss of parking in M5 and M6 over the course of the 5 surveyed weekdays.

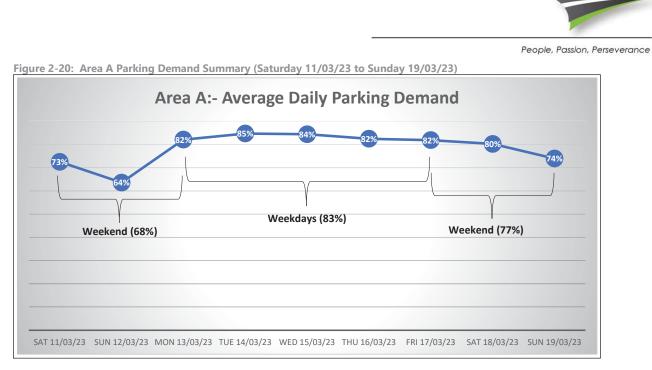
Date	Maximum Main Corridor (Oxford Street) Demand	Maximum Deficit	Notes
Monday 13/02/2023	8 vehicles at 12:00pm	No deficit	Sufficient vacancies throughout the survey period with a minimum of 23 vacancies at 1:00pm.
Tuesday 14/02/2023	9 vehicles at 12:00pm	No deficit	Sufficient vacancies throughout the survey period with a minimum of 17 vacancies at 12:00pm.
Wednesday 15/02/2023	7 vehicles at 1:00pm & 3:00pm	No deficit	Sufficient vacancies throughout the survey period with a minimum of 13 vacancies at 1:00pm.
Thursday 16/02/2023	7 vehicles at 1:00pm & 3:00pm	No deficit	Sufficient vacancies throughout the survey period with a minimum of 24 vacancies at 1:00pm.
Friday 17/02/2023	7 vehicles at 1:00pm & 2:00pm	No deficit	Sufficient vacancies throughout the survey period with a minimum of 18 vacancies at 1:00pm.

Table 2-7: Summary of Weekday Parking on Oxford Street South at M5 & M6 (Areas A/B, M13 & M14)

Table 2-7 indicates that on all surveyed days there were sufficient vacancies in the identified side streets in Area A and Area B and including parking area M13 and M14 to cater for the observed demand on Oxford Street south at M5 & M6.

Although there were vacancies in the nearby side streets to cater for the loss of weekday parking at M5 and M6 the demand for parking in Area A ranged, on average, between 82% to 85% capacity as indicated in Figure 2-20.

85% capacity is often referred to as "Theoretical Capacity" a point where there are some car parking spaces available, but they are spread out sporadically and as such are difficult to find.



There would also be an expectation that people would need to or be prepared to park on the opposite (North) side of Oxford Street in Area A to access shops on the south side of Oxford Street.

peopletrans



# 2.5 Oxford Street Pedestrian Origin/Destination (O/D) Parking Analysis

# 2.5.1 Oxford Street South O/D Survey Analysis

To understand which shops were being serviced by the people parking on Oxford Street at parking zones M5 and M6 PeopleTrans undertook detailed origin/destination surveys over five weekdays (Monday to Friday, 10am-4:30pm) and a Saturday, 7am-10am in February 2023.

These surveys were undertaken through video cameras strategically positioned opposite or adjacent to the parking zones on Oxford Street.

#### Parking Zone M5 Pedestrian O/D Analysis

Parking Zone M5 is located between Crown Street and Riley Street and has a supply of 4 car parking spaces as indicated in Figure 2-21.



Figure 2-21: M5 Parking Location Photo

The video camera locations for capturing the origin and destination of people parking in zone M5 are indicated in Figure 2-22.







For the purposes of the analysis the shops directly adjacent to parking Zone M5 on Oxford Street were categorised as Zone C and the shops adjacent to and opposite Zone C were categorised as Zones B, F & E respectively as also indicated in Figure 2-22.

### Oxford Street Parking Zone M5 Weekday Analysis Summary

A summary of the weekday Monday to Friday pedestrian origin/destination survey analysis is provided in Figure 2-23





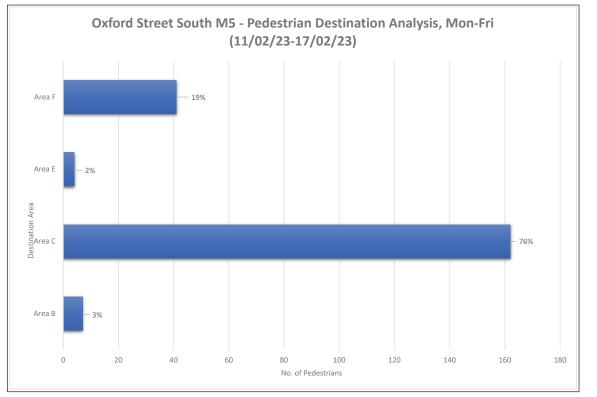


Figure 2-23 indicates that between Monday to Friday in February 2023 from 7am-7pm a total of 70 cars were observed parking on Oxford Street at M5 with a total of 214 people observed exiting their vehicles and visiting the nearby shops.

Importantly of the 214 people who exited their vehicles, 76% (162) visited the shops directly adjacent to the parking on Oxford Street south (Zone B) with 19% (41) visiting the shops to the north of M5 (Zone F) with only 2% (4) and 3% (7) respectively visiting zones E and B.

PeopleTrans also undertook more fine-grained analysis of which shops were being used in Zone C by people parking in M5 as indicated in Figure 2-21.

Details of the specific shops are included in Table 2-8.

Table 2-8 indicates the top three shops visited by people parking in M5 were as follows:

- ◆ Shop 11 The Den 21%
- Shop 13 Universal 15%
- ◆ Shop 3 Planet Dwellers 10%

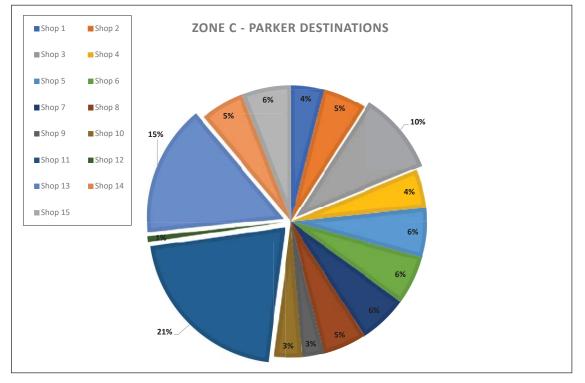


people**trans** 

Table 2-8: Zone C	Shop Details	
Ref. No,	Business Name	Business Type
1	Sando Itchi	Café/Food Outlet
2	Nrovocator	Retail/Clothes Outlet
3	Planet Dwellers	Travel Agency
4	Zambrerro Mexican	Restaurant
5	Money \$ Lent	Second Hand Goods Store
6	247 Baby	Convenience Store
7	Silk Massage	Body & Mind/Health
8	Swiss Bakery/Coffee Shop	Café/Food Outlet
9	Liquor on Oxford	Bottle Shop
10	Archie Rose Distillery Co.	Gin Distillery
11	The Den	Adult Entertainment
12	Vacant	N/A
13	Universal - VIP Lounge	Bar/Nightclub
14	Throwback	Sports Clothes/Shoe Store
15	The Riley	Hotel

Table 2-8: Zone C Shop Details

Figure 2-24: Oxford Street Zone C Shops Weekday Shopper Origin/Destination



## Oxford Street M5 Weekday Parking Demand & Duration of Stay Analysis

PeopleTrans also undertook parking demand and duration of stay surveys for Oxford Street south at M5 between Monday 13/02/23 and Friday 17/02/23, details of which are included in Figure 2-25 and Figure 2-26.

peopletrans

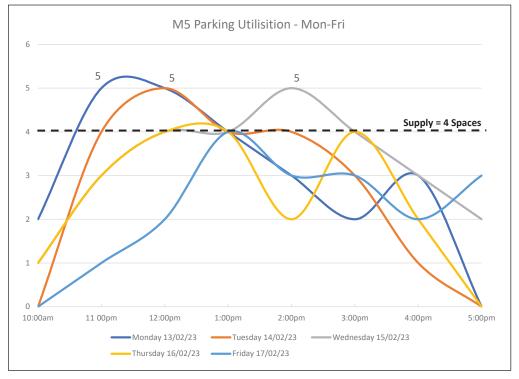


Figure 2-25: Oxford Street South Parking M5 – Weekdays 13/02/23 to 17/02/23 Parking Demand

Figure 2-25 indicates that parking demand exceeds the parking supply on a Monday, Tuesday and Wednesday indicating that illegal parking occurs at this location and the demand for these 4 short term car parking spaces is likely to be high across most weekdays.

Figure 2-26: Oxford Street South Parking M5 – Weekdays 13/02/23 to 17/02/23 Parking Duration of Stay

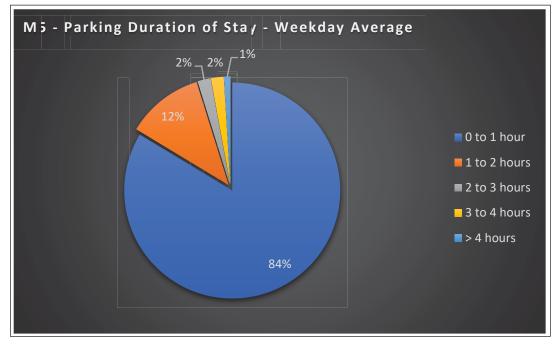


Figure 2-26 indicates that 84% of people parking at M5 on a weekday stayed for up to 1 hour, which shows general compliance with the 1P parking restrictions, with the remaining 16% staying for longer than 1 hour.



## Parking Zone M6 O/D Analysis

Parking Zone M6 is located between Riley Street and Pelican Street and has a supply of 3 car parking spaces as indicated in Figure 2-27.



Figure 2-27: M6-Parking Location Photo

The video camera locations for capturing the origin and destination of people parking in zone M6 are indicated in Figure 2-28.





For the purposes of the analysis the shops directly adjacent to parking Zone M6 on Oxford Street were categorised as Zone B and the shops adjacent to and opposite Zone B were categorised as Zones A, C & D respectively as indicated in Figure 2-28.

# Oxford Street Parking Zone M6 Weekday Analysis Summary

A summary of the weekday Monday to Friday origin/destination survey analysis is provided in Figure 2-29 and Figure 2-30.



Figure 2-29: Oxford Street M5 Weekday Shopper Origin/Destination

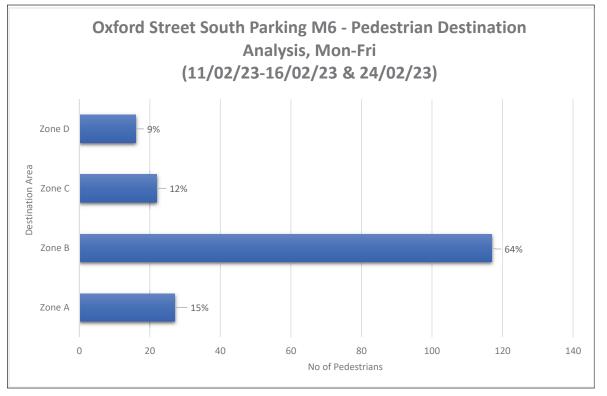


Figure 2-29 indicates that between Monday to Friday in February 2023 from 7am-7pm a total of 90 cars were observed parking on Oxford Street at M6 with a total of 182 people observed exiting their vehicles and visiting the nearby shops.

Importantly of the 182 people who exited their vehicles, 64% (117) visited the shops directly adjacent to the parking on Oxford Street south (Zone B) with 15% (27) crossing Pelican Street and heading to the north (Zone A) and 12% (22) crossing Riley Street heading to the south (Zone C). There were only 9% (16) parkers at M6 that crossed Oxford Street towards Zone D.

PeopleTrans also undertook more fine-grained analysis of which shops were being used in Zone B by people parking in M6 as indicated in Figure 2-30.

Details of the specific shops are included in Table 2-9.

Table 2-9 indicates the top three shops visited by people parking in M6 were as follows:

- Shop 3 TAB 58%
- Shop 13 Oz Phone Repairs 18%
- ♦ Shop 4 Oxford Village 17%

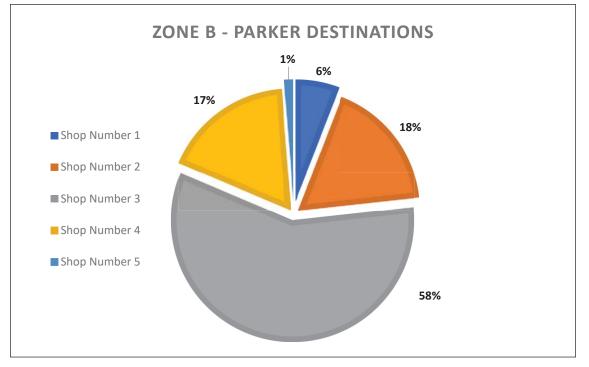


peopletrans

Table 2-9: Zone	B Shop Details	
Ref. No,	Business Name	Business Type
1	Discount Chemist	Medical/Health
2	Oz Phone Repair	Technology
3	ТАВ	Betting Agency
4	Oxford Village (Includes Aldi/Fitness First/Ziggy's Barber/Various Cafes & Food Outlets)	Shopping Centre
5	NAB	Bank

Table 2-9: Zone B Shop Details

Figure 2-30: Oxford Street Zone B Shops Weekday Shopper Origin/Destination



## Oxford Street M6 Weekday Parking Demand and Duration of Stay Analysis

PeopleTrans also undertook parking demand surveys for Oxford Street south at M6 between Monday 13/02/23 and Friday 17/02/23, details of which are included in Figure 2-31 and Figure 2-32.



peopletrans



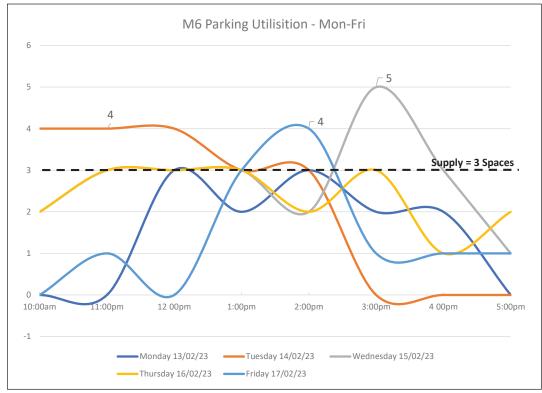


Figure 2-31 indicates that parking demand also exceeds the parking supply on a Monday, Tuesday and Wednesday indicating that illegal parking occurs at this location and the demand for these 3 short term car parking spaces is likely to be high across most weekdays.

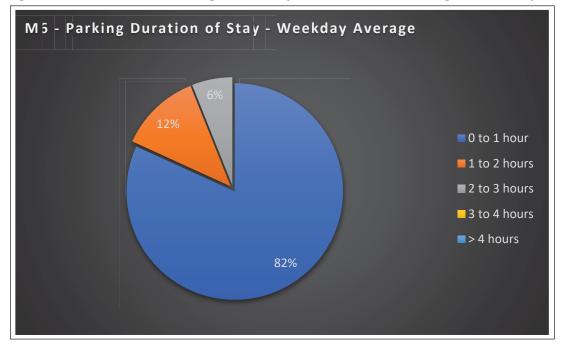


Figure 2-32: Oxford Street South Parking M6 – Weekdays 13/02/23 to 17/02/23 Parking Duration of Stay

Figure 2-32 indicates that 82% of people parking at M6 on a weekday stay for up to 1 hour, which again shows general compliance with the 1P parking restrictions, with the remaining 18% staying for longer than 1 hour.



## Parking Zone M5 & M6 - Summary of On-Street Parking Availability

Table 2-10 provides a summary of whether there were suitable vacancies in the nearby side streets of related to parking zone M5 & M6 to cater for the loss of parking on Oxford Street South over the course of the five surveyed weekdays.

Date	Available Side Street Parking?	Maximum Deficit	Notes
Monday 13/02/2023	Yes	0	There were sufficient on-street car parking vacancies from Monday to Friday, 6am-7pm
Tuesday 14/02/2023	Yes	0	There were sufficient on-street car parking vacancies from Monday to Friday, 6am-7pm
Wednesday 15/02/2023	Yes	0	There were sufficient on-street car parking vacancies from Monday to Friday, 6am-7pm
Thursday 16/02/2023	Yes	0	There were sufficient on-street car parking vacancies from Monday to Friday, 6am-7pm
Friday 17/02/2023	Yes	0	There were sufficient on-street car parking vacancies from 6am-7pm

 Table 2-10: Summary of On-Street Parking Availability – Zone M5 & M6 (Area B)

Table 2-10 indicates that on all five surveyed weekdays there were sufficient vacancies in the identified side streets in Area B to cater for the observed demand for parking at M5 and M6 on Oxford Street South.

able 1 ft. Summary of on Succertaining Availability 25the m5 & m6 (Alea A, 5 & m15) m14)			
Date	Available Side Street Parking?	Maximum Deficit	Notes
Monday 13/02/2023	Yes	0	There were sufficient on-street car parking vacancies from Monday to Friday, 6am-7pm
Tuesday 14/02/2023	Yes	0	There were sufficient on-street car parking vacancies from Monday to Friday, 6am-7pm
Wednesday 15/02/2023	Yes	0	There were sufficient on-street car parking vacancies from Monday to Friday, 6am-7pm
Thursday 16/02/2023	Yes	0	There were sufficient on-street car parking vacancies from Monday to Friday, 6am-7pm
Friday 17/02/2023	Yes	0	There were sufficient on-street car parking vacancies from 6am-7pm

Table 2-11: Summary of On-Street Parking Availability – Zone M5 & M6 (Area A, B & M13/M14)

Table 2-11 indicates that on all five surveyed weekdays there were sufficient vacancies in the identified side streets in Area A, Area B and M13 & M14 to cater for the observed demand for parking at M5 and M6 on Oxford Street South.



#### Oxford Street M14 Weekday & Saturday Parking Demand

PeopleTrans also analysed the parking demand for Oxford Street north, between Riley Street and Crown Street, referenced as M14 in the overall study, as indicated in Figure 2-33. As with other restrictions on the main corridor survey were undertaken over a 1-week period from Monday 13/02/23 to Friday 17/02/23 including Saturday 18/02/23.

This was a separate request from TfNSW in support of the traffic modelling for this section of the corridor.

Details of the parking demand analysis at M14 are included in Figure 2-34 and Figure 2-35.

Figure 2-33: Oxford Street M14 Parking Reference

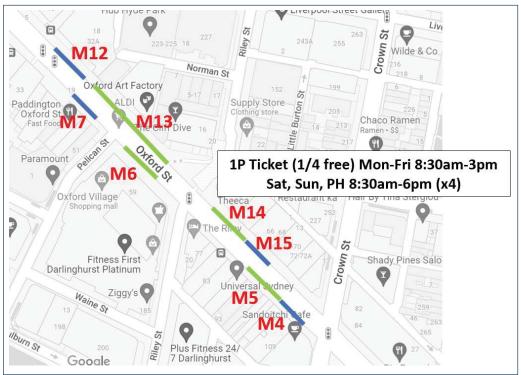
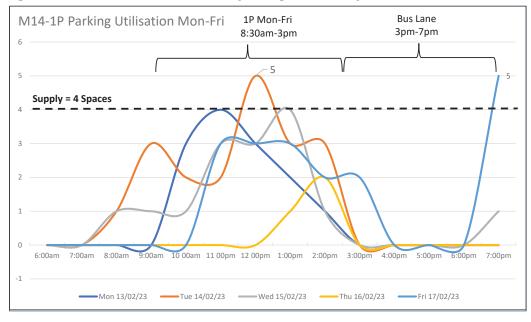


Figure 2-34: Oxford Street West M14 Weekday Parking Demand Analysis



22S0013 Liverpool Street & Oxford Street, City Parking & Loading Study, June 2023



Figure 2-34 indicates that in the eastbound direction during the 3pm-7pm period a bus lane is in operation so there are no parked cars in M14 but there is a level of parking demand at this location on weekdays after 7pm where on a Wednesday (1 car) and Friday (5 cars) were recorded parked at 7pm.

Figure 2-35: Oxford Street West M14 Saturday Parking Demand Analysis

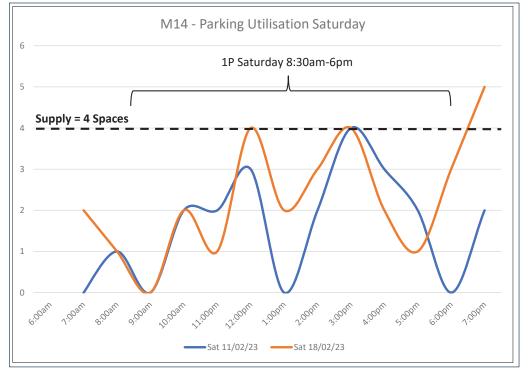


Figure 2-35 indicates that the parking demand at M14 on a Saturday peaks between 11am and 12pm and 2pm and 3pm. The parking demand tails off after 3pm on a Saturday at M14 but then increases again at 7pm when the 1P parking restrictions end.

# 3. Loading Assessment

The following sections provide details of the assessment undertaken to determine if the loading could be either removed, relocated or rationalised from Oxford Street South between Flinders Street and Wentworth Avenue relating specifically to loading zones M1-M4 and M7 as indicated in Figure 3-1.

S Q Oporto - P 0 G Chaco Rame M7 The Cliff Dive LZ Mon-Fri 10am-4:30pm M (indriess Vega 0 Sat 7am-10am Sushi Train Oxf nte R 0 works Custor Framing Paramon Q 9 Bun n St Hair By Tina St The Cat's Meo 9 0 0 Darlinghurst Theatre Company Burton St pson 💡 5 Θ Don Dr Deft Dem Fit Darlinghurst Plat G Q Shady Pines Saloon Casper's Cafe 0.9 P.A.M. Store Sy M4 LZ Mon-Fri 10am-4:30pm Big Poppa's 0 Sat 7am-10am Q ighu 0 Grill Sydney Police Centre E **M3** LZ Mon-Fri 10am-4:30pm Sat 7am-10am Surry Hills Police Statio C Cason Ø Q Rivare 0 e Riley Colle M2 🖻 LZ Mon-Fri 10am-4:30pm EHote 0 Sat 7am-10am 9 LEGEND Stonewall H **M1** LZ Mon-Fri 10am-3pm **Loading Zones** Oxford St Sat 6am-10am Q Crown St Campbell St **Timed Parking** 0 Goode Kinselas Hotel 5

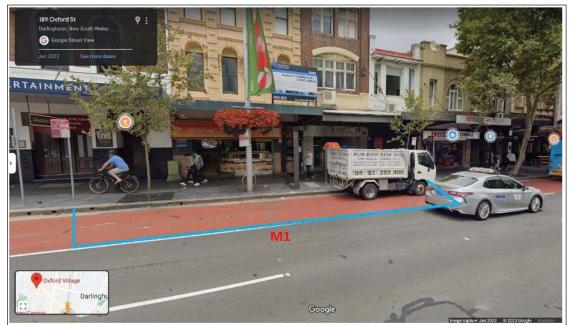
Figure 3-1:- Oxford Street South Side Loading References – Section 1 & Section 2

# 3.1 Loading Zone M1

Loading Zone M1 is the first loading zone to the north of Flinders Street on the south side of Oxford Street in the block between Flinders Street and Crown Street as indicated in Figure 3-2 and has a measured length of approximately 10m.



Figure 3-2: Loading Zone M1 Location Photo



Loading Zone M1 was surveyed over a 6-day period from Monday, 13/03/23 to Saturday, 18/03/23 for the operational times of the loading zone collecting key usage information such as parking demand, vehicle composition, arrival and departure times and, where possible, which shops were being serviced by the loading zone.

The parking demand and vehicle composition of loading zone M1 is indicated in Figure 3-3 and Figure 3-4.

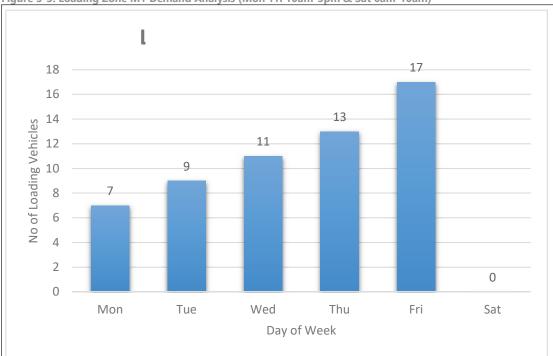


Figure 3-3: Loading Zone M1 Demand Analysis (Mon-Fri 10am-3pm & Sat 6am-10am)



Figure 3-3 indicates that the demand for loading zone M1 is highest on a Friday with 17 vehicles using the loading zone between 10am and 3:00pm. There were no vehicles recorded on the surveyed Saturday using loading zone M1.

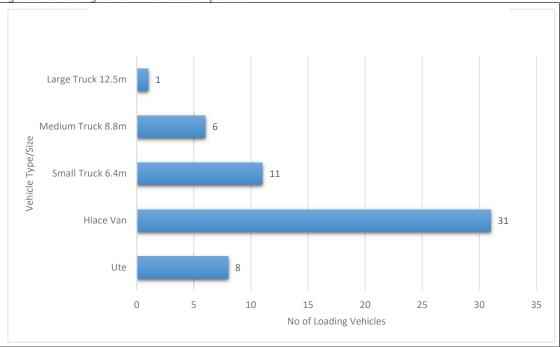


Figure 3-4: Loading Zone M1 Vehicle Composition

Figure 3-4 indicates that the majority (68%) of loading vehicles using M1 are of the smaller "Hiace Van" or "Ute" type vehicles.

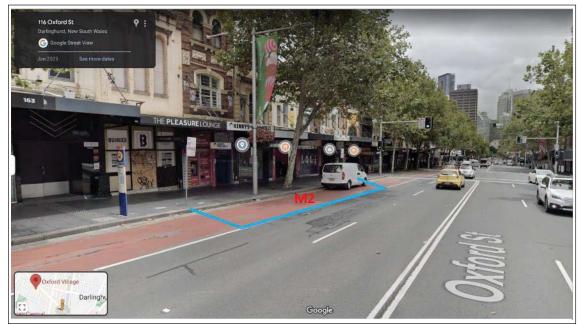
Further analysis of Loading Zone M1 is included in Appendix A.

## 3.2 Loading Zone M2

Loading Zone M2 is the second loading zone to the north of Flinders Street on the south side of Oxford Street in the block between Flinders Avenue and Crown Street as indicated in Figure 3-5 and has a measured length of approximately 17m.



Figure 3-5: Loading Zone M2 Location Photo



Loading Zone M2 was surveyed over a 6-day period from Monday, 13/03/23 to Saturday, 18/03/23 for the operational times of the loading zone collecting key usage information such as parking demand, vehicle composition, arrival and departure times and, where possible, which shops were being serviced by the loading zone.

The parking demand and vehicle composition of loading zone M2 is indicated in Figure 3-6 and Figure 3-7.

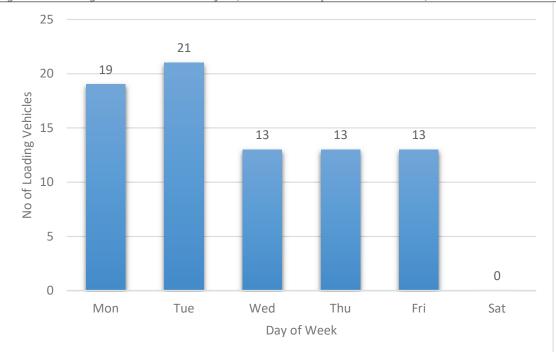


Figure 3-6: Loading Zone M2 Demand Analysis (Mon-Fri 10am-3pm & Sat 6am-10am)

Figure 3-6 indicates that the demand for loading zone M2 is highest on a Monday and Tuesday with 17 vehicles using the loading zone between 10am and 4:30pm.

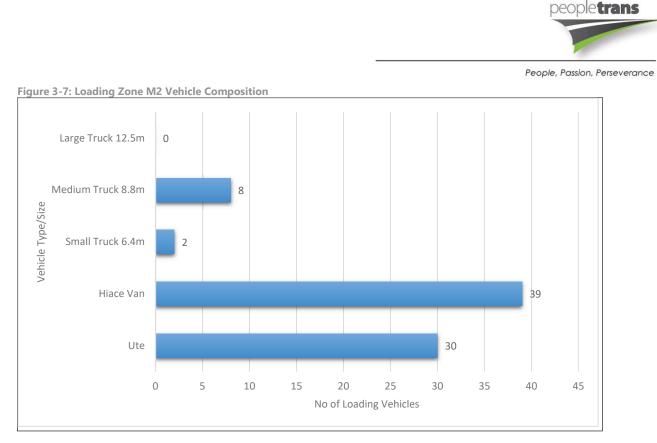


Figure 3-4Figure 3-7 indicates that the majority (87%) of loading vehicles using M2 are of the smaller "Hiace Van" or "Ute" type vehicles.

Further analysis of Loading Zone M2 is included in Appendix A.

## 3.3 Loading Zone M3

Loading Zone M3 is located south of Crown Street between Crown Street and Palmer Street on the south side of Oxford Street as indicated in Figure 3-8 and has a measured length of approximately 23m.



Figure 3-8: Loading Zone M3 Location Photo

Loading Zone M3 was surveyed over a 6-day period from Monday, 13/03/23 to Saturday, 18/03/23 for the operational times of the loading zone collecting key usage information such as parking demand, vehicle



People, Passion, Perseverance

composition, arrival and departure times and, where possible, which shops were being serviced by the loading zone.

The parking demand and vehicle composition of loading zone M3 is indicated in Figure 3-9 and Figure 3-11.

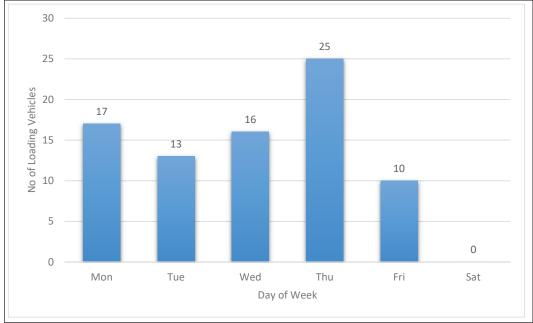


Figure 3-9: Loading Zone M3 Demand Analysis (Mon-Fri 10am-3pm & Sat 6am-10am)

Figure 3-9 indicates that the demand for loading zone M3 is highest on a Thursday with 25 vehicles using the loading zone between 10am and 4:30pm.

At the request of TfNSW PeopleTrans also analysed the weekday utilisation of M3 between 4:30pm and 6:30pm, the results of which are included in Figure 3-10.

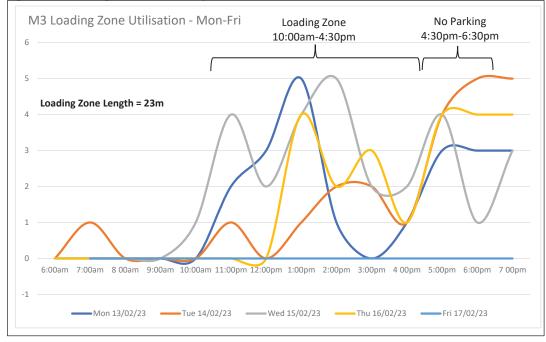


Figure 3-10: Loading Zone M3 Weekday Utilisation



Figure 3-10 indicates that there was illegal parking occurring at M3 between 4:30pm and 6:30pm during weekdays.

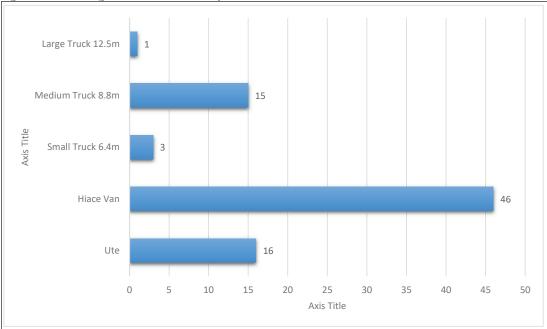


Figure 3-11: Loading Zone M3 Vehicle Composition

Figure 3-11 indicates that the majority (77%) of loading vehicles using M3 are of the smaller "Hiace Van" or "Ute" type vehicles. There was however one 12.5m Heavy Rigid Vehicle using loading zone M3.

Further analysis of Loading Zone M3 is included in Appendix A.

### 3.4 Loading Zone M4

Loading Zone M4 is located north of Crown Street between Riley Street and Crown Street on the south side of Oxford Street as indicated in Figure 3-12 and has a measured length of approximately 15m.



Figure 3-12: Loading Zone M4 Location Photo



Loading Zone M4 was surveyed over a 6-day period from Monday, 13/03/23 to Saturday, 18/03/23 for the operational times of the loading zone collecting key usage information such as parking demand, vehicle composition, arrival and departure times and, where possible, which shops were being serviced by the loading zone.

The parking demand and vehicle composition of loading zone M4 is indicated in Figure 3-13 and Figure 3-14.

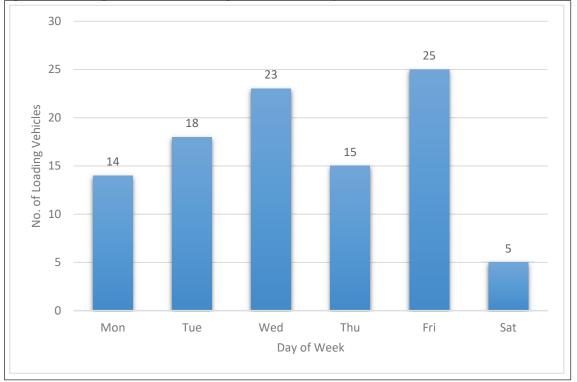


Figure 3-13: Loading Zone M4 Demand Analysis (Mon-Fri 10am-3pm & Sat 6am-10am)

Figure 3-13 indicates that the demand for loading zone M4 is highest on a Friday with 25 vehicles using the loading zone between 10am and 4:30pm. There was also loading which occurred on a Saturday at loading zone M4.

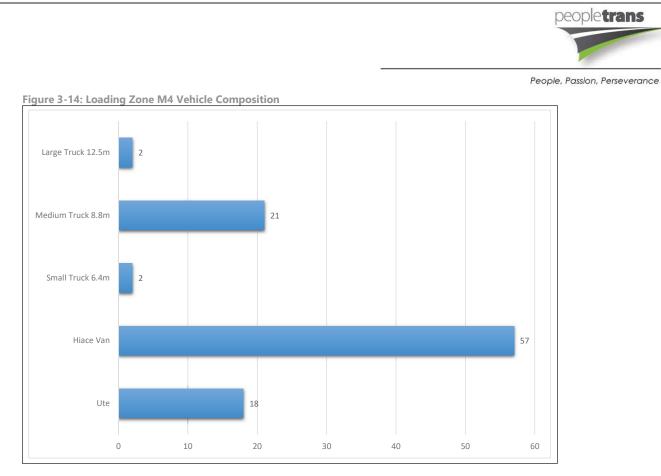


Figure 3-14 indicates that the majority (75%) of loading vehicles using M4 are of the smaller "Hiace Van" or "Ute" type vehicles. There were also however two 12.5m heavy rigid vehicles and twenty-one 8,8m medium rigid vehicles using loading zone M4.

Further analysis of Loading Zone M4 is included in Appendix A.

## 3.5 Loading Zone M7

Loading Zone M7 is located north of Crown Street between Riley Street and Crown Street on the south side of Oxford Street as indicated in Figure 3-15 and has a measured length of approximately 10m.



Figure 3-15: Loading Zone M7 Location Photo



Loading Zone M7 was surveyed over a 6-day period from Monday, 13/03/23 to Saturday, 18/03/23 for the operational times of the loading zone collecting key usage information such as parking demand, vehicle composition, arrival and departure times and, where possible, which shops were being serviced by the loading zone.

The parking demand and vehicle composition of loading zone M7 is indicated in Figure 3-16 and Figure 3-17.

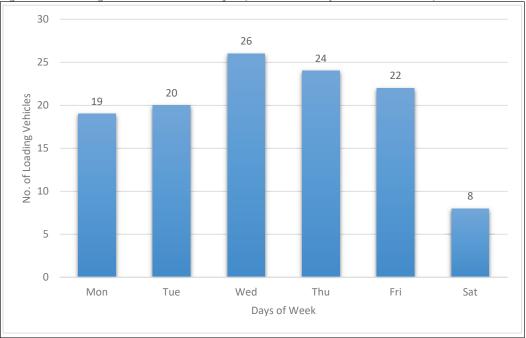




Figure 3-16 indicates that the demand for loading zone M7 is highest on a Wednesday with 26 vehicles using the loading zone between 10am and 4:30pm. There were also 8 loading vehicles which used loading zone M7 on a Saturday.

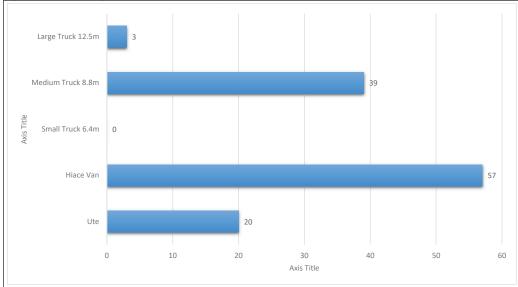


Figure 3-17: Loading Zone M7 Vehicle Composition



Figure 3-17 indicates that the majority (65%) of loading vehicles using M7 are of the smaller "Hiace Van" or "Ute" type vehicles. There were also however three 12.5m heavy rigid vehicles and thirty-nine (39) 8.8m medium rigid vehicles using loading zone M7 including those vehicles loading on a Saturday.

Further analysis of Loading Zone M7 is included in Appendix A.

#### Oxford Street M15 & M16 Weekday & Saturday Loading Demand

PeopleTrans also analysed the demand in loading zones M15 and M16 for Oxford Street north, to the east and west of Crown Street, as indicated in Figure 3-18. As with other restrictions on the main corridor survey were undertaken over a 1-week period from Monday 13/02/23 to Friday 17/02/23 including Saturday 18/02/23. This was also a separate request from TfNSW.

Details of the demand in loading zone M15 are included in Figure 3-19 and Figure 3-20 with details of the demand in loading zone M16 included in Figure 3-23 and Figure 3-24.

purton St æ 5 Mon-Fri 7am-3pm Crown ; 0 M15 Sat 7am-10am Universal Sydney Sandoitchi Cafe P.A.M. Store Sydney Y . Plus Fitness 24/ Mon-Fri 10am-3pm 7 Darlinghurst Grill'd Darlinghurst Sat 7am-10am Hamburger · \$\$ Θ 2 ColoM3 Hotel Arnold Bitter Phew M1 . Ч Ø Forb Casoni 🖷 Rivareno Gelato 9 an · SS Ice Cream · SS e xford Hotel llective MI2ckles ments. ast Food · \$\$ FISHBOWL -Darlinghurst Salad · \$\$ Stonewall Hotel oda Kitchen

Figure 3-18: Oxford Street M15 & M16 Loading Zone References



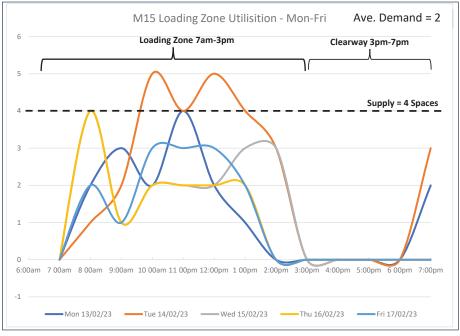


Figure 3-19: Oxford Street West M15 Weekday Loading Analysis

Figure 3-19 indicates that in the eastbound direction at M15 during the 7am-3pm loading period the weekday peak demand occurred between 10am and 12pm. The average loading demand during weekdays was recorded as 2 vehicles.

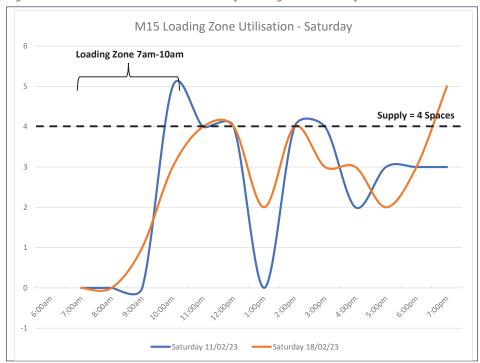


Figure 3-20: Oxford Street West M15 Saturday Loading Demand Analysis

Figure 3-20 indicates that the demand for loading at M15 on a Saturday was low between 7am and 9am but between 9am and 10am it was at capacity.





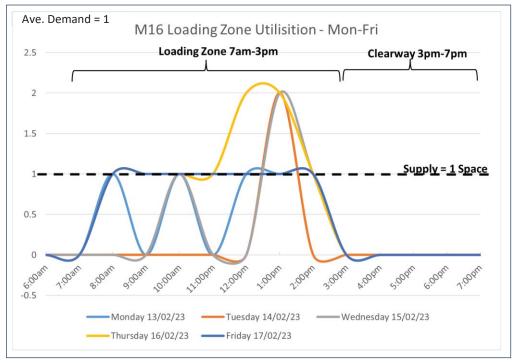
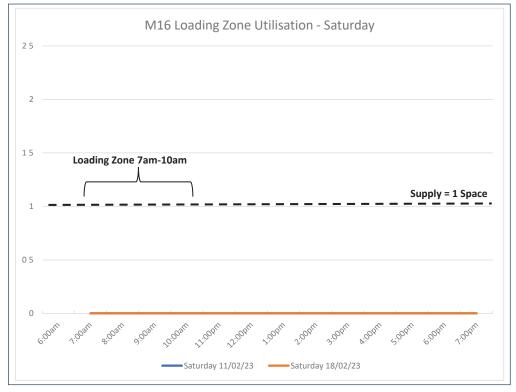
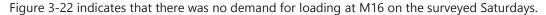


Figure 3-21 indicates that in the eastbound direction at M16 during the 7am-3pm weekday loading period there are occasions where more vehicles park in the loading zone than the available space allows given that the loading zone only measures 9.5m. M16 also operates as a bus lane outside of the loading zone operational times. The average loading demand during weekdays was recorded as 2 vehicles.









# 3.6 Loading Zone Options

As part of the overall strategy to free up the kerbside lane during the weekday interpeak period relating to loading there were three potential options that were considered as follows:

- Remove the loading zones (no replacement)
- Relocate the loading zones (into side roads)
- Rationalise the loading zones (i.e. reduce the length or combine loading zones)

It was determined by PeopleTrans based on the current levels of demand for loading that it would not be possible to simply remove the loading zones but there were options for relocating the loading zones or rationalising them.

As such PeopleTrans analysed loading zones M1 & M2 and M3 & M4 to determine if these loading zones were to be combined what length they needed to be to meet the current levels of demand as indicated in the following sections.

#### 3.6.1 Combined Analysis Loading Zones M1 & M2

The worst-case combined analysis of loading zones M1 & M2 occurred on a weekday Tuesday as indicated in Figure 3-23 and Figure 3-24.

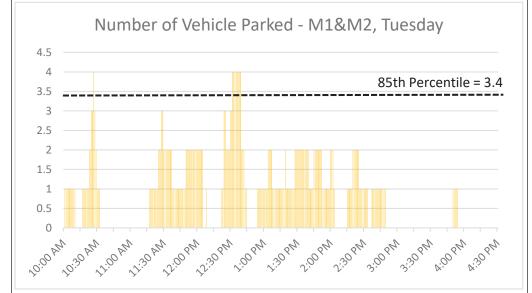


Figure 3-23: Loading Zone M1/M2 Combined Analysis - Total Loading Vehicles

Total Length Used - M1&M2, Tuesday 30 25.6 25 85th Percentile = 22m 20 15 10 5 0 12:30 AM 12:00 PM 22:30 PM 10:30 AM 12:00 AM 1:00 PM 1:30 PM 3:30 PM 2:00 PM 2:30 PM 10:00 AM 3:00 PM A:00 PM A:30 PM

Figure 3-24: Loading Zone M1/M2 Combined Analysis - Total Loading Zone Length

Figure 3-23 and Figure 3-24 indicate that based on the current demand of loading zones M1 and M2 if these loading zone were to be combined they would need to be able to accommodate 3 loading vehicles simultaneously with a length of some 22m noting that the current combined length of loading zones M1 and M2 is approximately 27m.

#### 3.6.2 Combined Analysis Loading Zones M3 & M4

The worst-case combined analysis of loading zones M3 & M4 occurred on a weekday Thursday as indicated in Figure 3-25 and Figure 3-26.

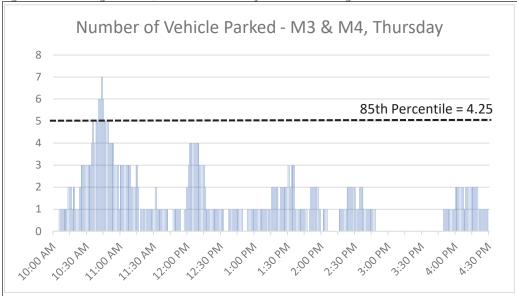


Figure 3-25: Loading Zone M3/M4 Combined Analysis - Total Loading Vehicles

peopletrans

People, Passion, Perseverance

Total Length Used - M3 & M4, Thursday 40 36.4 35 31.6 85th Percentile = 27 30 25 20 15 10 5 0 12:30 AM 22:00 PM 10:30 AM 1.1:00 AM 2:00 PM 3:00 PM 3:30 PM 10:00 AM 12:30 PM 1:30 PM 1:00 PM 2:30 PM A:00 PM A:30

Figure 3-26: Loading Zone M3/M4 Combined Analysis - Total Loading Zone Length

Figure 3-25 and Figure 3-26 indicate that based on the current demand of loading zones M3 and M4 if these loading zone were to be combined they would need to be able to accommodate 4 loading vehicles simultaneously with a length of some 27m noting that the current combined length of loading zones M3 and M4 is approximately 38m.

# 3.7 Options for Relocating Loading Zones

PeopleTrans identified that there were two potential opportunities for relocating loading zones into the side streets off Oxford Street being Crown Street and Pelican Street as indicated in Figure 3-27 and Figure 3-29.

Initially PeopleTrans investigated providing one combined loading zone on the western side of Crown Street within the long area of no stopping which would not have impacted parking, but it was not considered reasonable to expect goods to be trolleyed across Crown Street to service businesses on the east side of Crown Street, particularly related to the Columbian Hotel.

As such two loading zone locations were proposed on Crown Street resulting in a total loss of 2 x 1P parking spaces as indicated in Figure 3-27.

peopletrans

People, Passion, Perseverance



Figure 3-27: Crown Street (M3 & M4) Loading Options

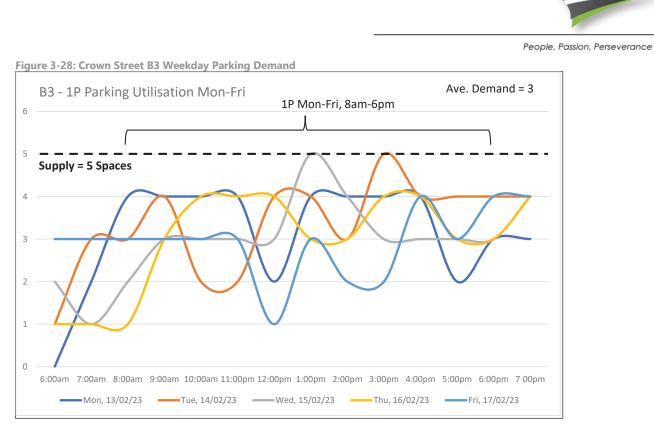


#### 3.7.1 Parking Demand B3 Crown Street

To determine the impact of losing 2 x 1P parking spaces on the east side of Crown Street between Oxford Street and Little Oxford Street PeopleTrans also analysed the demand for parking at this location over the 9 surveyed days (Referenced as B3 within this study) where there is a current supply of 5 parking spaces.

The results of the weekday analysis<sup>1</sup> indicated that the average demand for parking across the 5 surveyed weekdays was 3 vehicles indicating that a loss of 2 x 1P parking spaces would have minimal impact on parking at this location as indicated in Figure 3-28.

<sup>&</sup>lt;sup>1</sup> Loading is only proposed here on weekdays between Monday to Friday. Saturday loading would continue from the existing location on Oxford Street.



The relocation of loading zone M7 into Pelican Street would result in the loss of 2 x 2P parking spaces during weekdays as indicated in Figure 3-29.

peopletrans



Figure 3-29: Crown Street (M7) Loading Option



# 3.7.2 Parking Demand E7 Pelican Street

To determine the impact of losing 2 x 2P parking spaces on the west side of Pelican Street between Oxford Street and Poplar Street PeopleTrans also analysed the demand for parking at this location over the 9 surveyed days (Referenced as E7 within this study) where there is a current supply of 7 parking spaces.

The results of this analysis indicated that on weekdays the average demand for parking was 6 vehicles indicating a theoretical loss of only  $1 \times 2P$  parking space at this location as indicated in Figure 3-30.



peopletrans



# 4. Parking Analysis Key Conclusions

# 4.1 Oxford Street South Parking - Conclusions

Based on the analysis and key findings within this report for parking the following conclusions are made:

- There are vacancies in the nearby surrounding side streets to cater for the loss of the seven (7) parking spaces on Oxford Street at M5 and M6.
- The demand and reliance by the businesses on the seven (7) parking spaces on Oxford Street at M5 & M6 is high during the weekdays.
- Although there are nearby vacancies in Area A and Area B to compensate for the loss of the seven (7) spaces, the parking demand in Area A and Area B is at its theoretical capacity where spaces are spread out and as a result can be difficult to locate.
- If necessary, there are potential offset options where additional car parking spaces could be provided to cater for the loss of parking at M5 and M6 but this would require further investigation.

# 4.2 Oxford Street South Loading - Conclusions

Based on the analysis and key findings within this report for loading the following conclusions are made:

- The demand for loading increases steadily from south to north at loading zones M1-M4 & M7 on Oxford Street ranging from a total of 57 loading vehicles at M1 to 111 loading vehicles at M7 across the 5 surveyed weekdays and Saturday.
- There were no opportunities identified to relocate loading zones M1 and M2 into the side streets and consolidation of these two loading zones into one provides little benefit as far as reduced length or traffic operation in the kerbside lane goes.
- Loading zones M3 and M4 could be relocated into Crown Street but would result in the loss of 2 x 1P parking spaces on the eastern side of Crown Street as indicated in Figure 3-27. There is some spare parking capacity at this location to accommodate the loss of two parking spaces.
- Loading zone M7 could be relocated into Pelican Street as indicated in Figure 3-29 although access to a loading zone in Pelican Street would be more inconvenient than currently on Oxford Street and would also result in the loss of 2 x 2P parking spaces. There is some spare parking capacity at this location to accommodate the loss of one parking space.

In undertaking this analysis more generally PeopleTrans also identified that there was an opportunity to extend the weekday PM peak hour in the westbound direction by some 2 hrs through some simple signage changes which would provide further operational improvements to westbound traffic on Oxford Street as indicated in **Appendix B**.

In summary this report provides TfNSW with a strong evidence base on which to progress further investigations and discussions with key stakeholders about the impacts of potentially changing parking and loading on the south side of Oxford Street between Flinders Street and Wentworth Avenue.



# 5. References

In preparing this report reference has been made to the following:

- inspections of the site and its surrounds
- detailed car parking, origin & destination and loading surveys undertaken by PeopleTrans as referenced in this report.
- Research report "How Far Should Parkers Walk?" (Smith and Butcher, 1994)
- 50% Detailed Design Drawings Oxford Street Cycleway (Drawing No. PS126995-RF-DR-0101 to PS126995-RF-DR-0151) – 14 x Plans
- Australian Standard/ New Zealand Standard, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 5: On-Street Car Parking AS 2890.5:2020
- Other documents as nominated in the report.



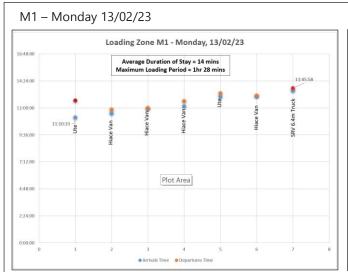
# Appendix A

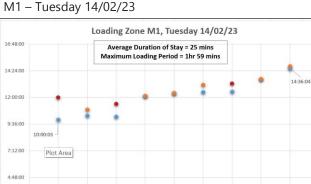
Loading Zone Detailed Analysis (M1-M4 & M7)

# OXFORD STREET WEST - M1 LOADING ZONE DETAILED DAY BY DAY ARRIVAL & DEPARTURE ANALYSIS









4

5

Arrivals Time
 Departures Time

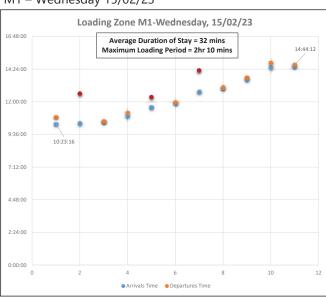
6

8

9

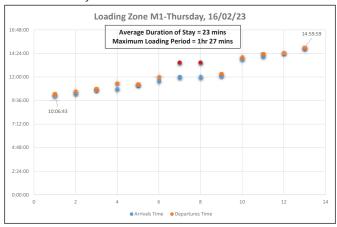
10

# M1 - Wednesday 15/02/23

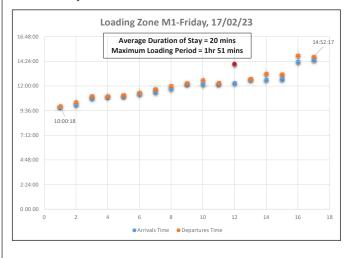


# M1 - Thursday 16/02/23

2:24:00 0:00:00



#### M1 - Friday 17/02/23

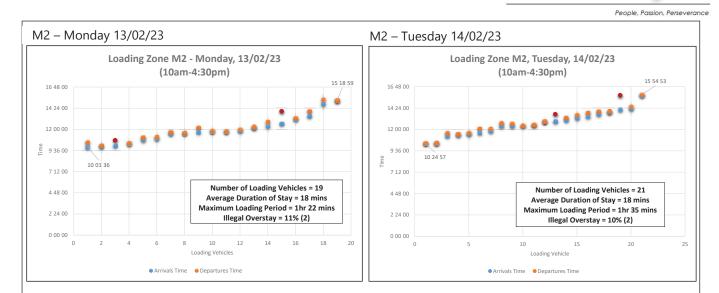


M1 Saturday 18/02/23

www.peopletrans.com.au

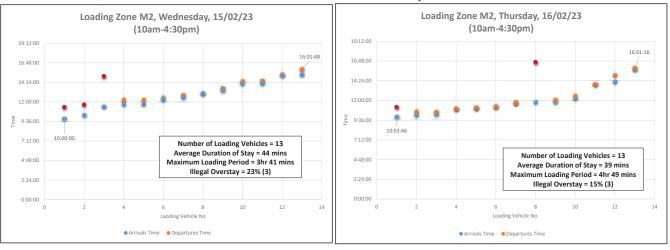
## OXFORD STREET WEST - M2 LOADING ZONE DETAILED DAY BY DAY ARRIVAL & DEPARTURE ANALYSIS

peopletrans

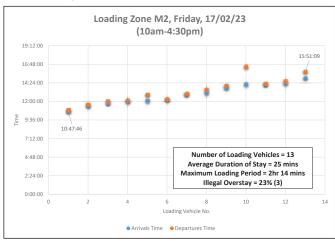


#### M2 – Wednesday 15/02/23

#### M2 – Thursday 16/02/23



#### M2 – Friday 17/02/23



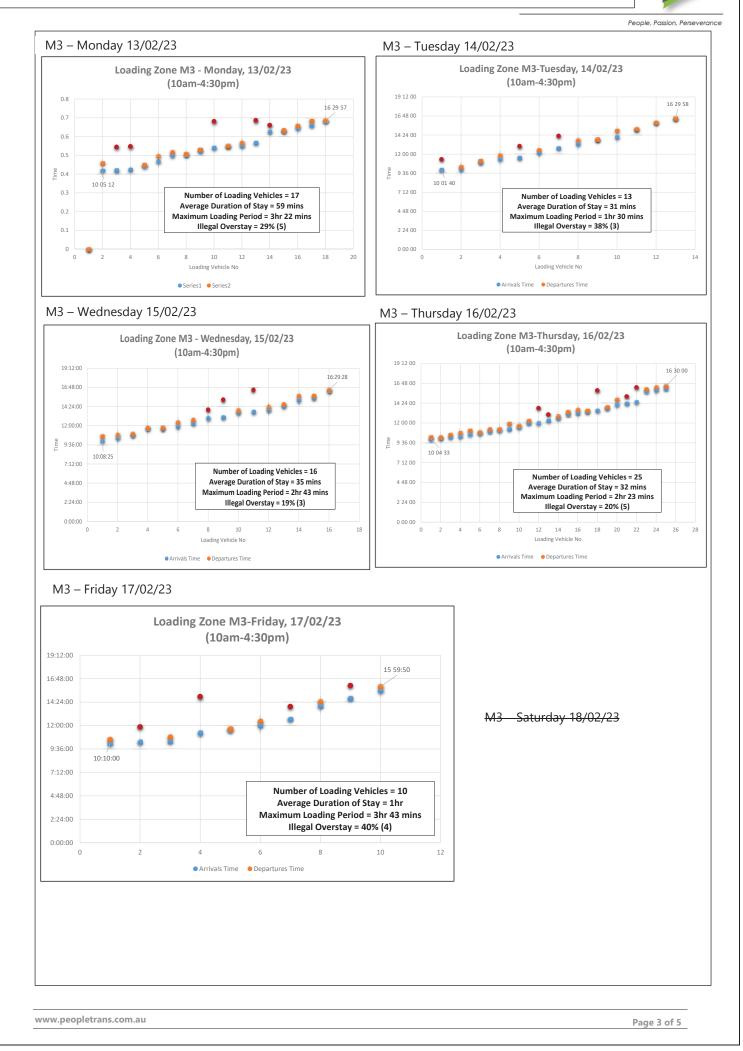
### M2 Saturday 18/02/23

www.peopletrans.com.au

Page 2 of 5

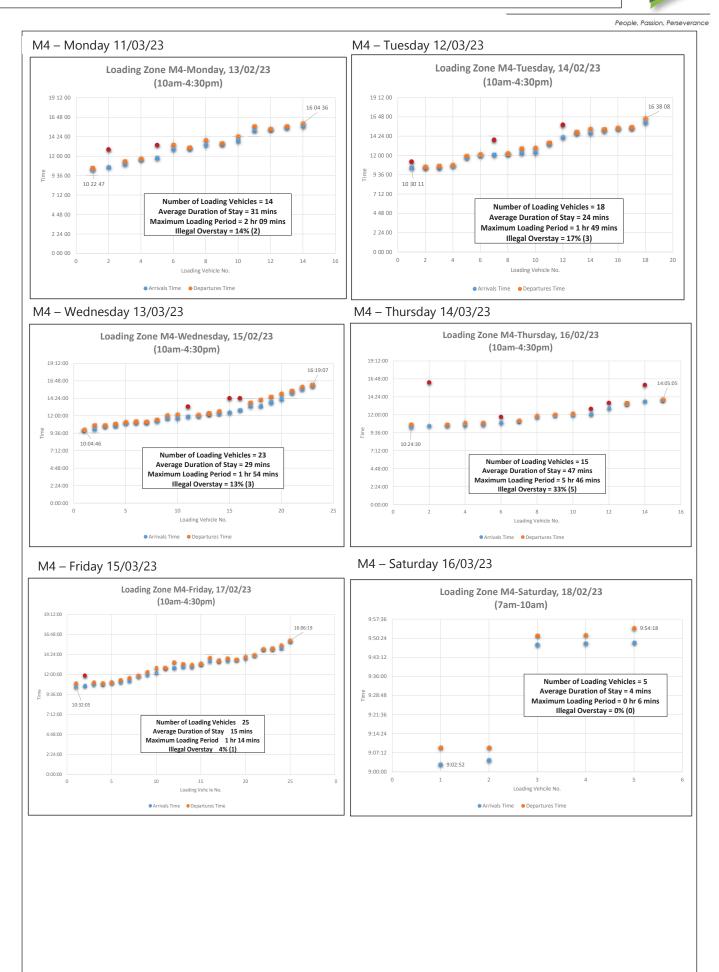
# OXFORD STREET WEST - M7 LOADING ZONE DETAILED DAY BY DAY ARRIVAL & DEPARTURE ANALYSIS

peopletrans



# OXFORD STREET WEST - M7 LOADING ZONE DETAILED DAY BY DAY ARRIVAL & DEPARTURE ANALYSIS

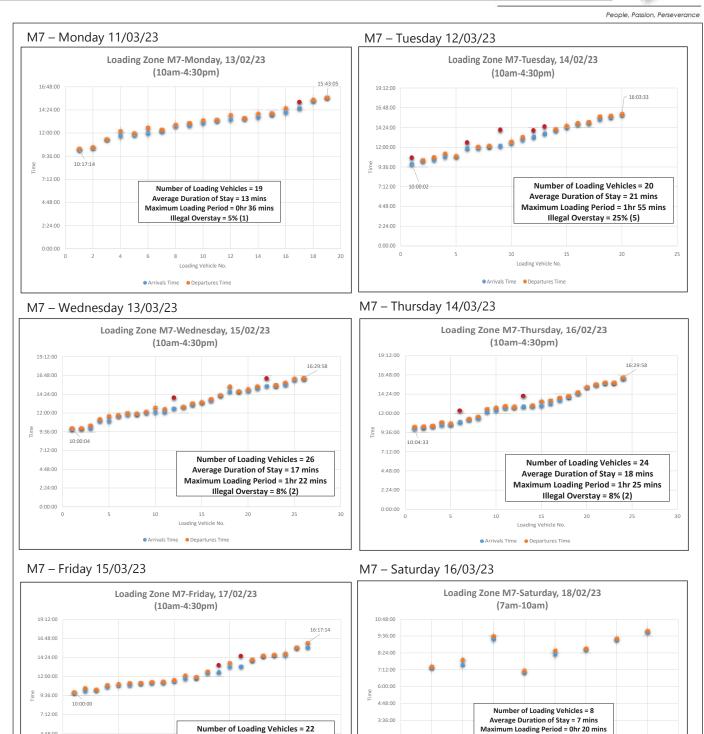
peopletrans

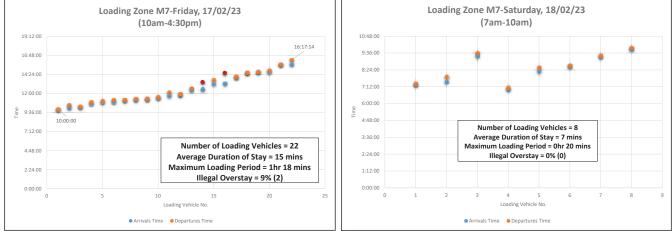


www.peopletrans.com.au

# OXFORD STREET WEST – M7 LOADING ZONE DETAILED DAY BY DAY ARRIVAL & DEPARTURE ANALYSIS

peopletrans







# Appendix B

Oxford Street weekday "PM peak hour" Extension Proposals

03/04/23

#### OXFORD STREET WEST- SECTION 1&2 FLINDERS AVENUE TO WENTWORTH AVENUE - (TRAFFIC STRATEGY 1- EXTEND REMAINING W/B TRAFFIC LANE PEAK HOURS) S 6 44 Lucio Pizzeria Pizza · \$\$ LZ Mon-Fri 9 0 Θ 10am 4:30pm 10am - 3pm Chaco Ramen Supply Store M7 The Cliff Dive Best Removalists sydney Ramen · \$\$ Kindness Vegan 🕤 lothing store Sat 7am-10am M1 Vegan • \$\$. 262 264 Sushi Train Oxfo No Parking 3pm-7pm Sushi • \$ Elements Bar and Grill Darlinghurst ۸ **M**6 64 ieworks Custo **1P Ticket Mon-Fri** Burton St Ξ Steak · SS ire Framing 5 10am 4:30pm 10am - 3pm e frame shop Hair By Tina Stergiou The Cat's Meow Son Sat/Sun/PH 7am-6pm 6 5 76A 78 73B No Parking 3pm-7pm Burton St npson 💡 he Riley Darlinghurst Š • Theatre Company Crown Dr Natasha Cook Don Don Dermatologist **1P Ticket Mon-Fri** Deft Demo 🖸 Japanese • \$ 0 O 10am 4:30pm 10am - 3pm D. 0 0 Shady Pines Saloon Ð Sat/Sun/PH 7am-6pm Iniversal M5 No Parking 3pm-7pm Prof Richard Harvey Goulburn St M4 LZ Mon-Fri P.A.M. Store Sydney Clothing store 10am 4:30pm 10am - 3pm Auditoria Pty 🗊 Big Poppa's 0 Sat 7am-10am No Parking 3pm-7pm inghurst 위 299B mer + SS Goulburn St Sydney Police Centre Θ M3 Hotel LZ Mon-Fri 10am 4:30pm 10am - 3pm Q Surry Hills Police Station 😨 Bitter Phew Sat 7am-10am Flexicar Car Share Casoni Q S. Italian • \$\$ No Parking 3pm-7pm 151-241 0 M2 0 LZ Mon-Fri The Riley Collective The Oxford Hotel ADGE Hotel 10am 4:30pm 10am - 3pm 8 & Residences 4.6 ★ (78) Sat 7am-10am 26 GoGet CarShare Pod 5-star hote Stonewall Hotel St No Parking 3pm-7pm O **M1** Θ 275a Oxford St Q LZ Mon-Fri Campbell St Sydney Estonian House 🖬 ۲ S -312 Crown 10am-3pm 55 0 Θ Sat 6am-10am Samuel Θ 14

Google

No Parking 3pm-7pm

Távlor Square

people**trans** 

# people**trans**

sydney@peopletrans.com.au melbourne@peopletrans.com.au

People, Passion, Perseverance

in f y peopletrans.com.au



© Transport for NSW



OFFICIAL: Sensitive - NSW Government

# APPENDIX G HERITAGE IMPACT STATEMENT







Permanent Cycleway

# Oxford Street and Liverpool Street, Sydney

Submitted to the City of Sydney Council

SEPTEMBER 2023



# **REPORT REVISION HISTORY**

Revision	Date Issued	Revision Description			
01	25/04/2022	DRAFT			
		Prepared by	Reviewed by	Verified by	
		Asmita Bhasin Heritage Consultant	Kerime Danis Director - Heritage	4+0	
				Kerime Danis	
				Director - Heritage	
02	29/08/2023	FINAL 29.08.2023			
		Prepared by	Reviewed by	Verified by	
		Asmita Bhasin Heritage Consultant	Kerime Danis Director - Heritage	Kerime Danis Director - Heritage	
03	07/09/2023	FINAL 07.09.2023	Director Hemage	Director Hemage	
		Prepared by	Reviewed by	Verified by	
		Kurt Dixon	Kerime Danis	Kerime Danis	
		Heritage Consultant	Director - Heritage	Director - Heritage	
04	12/09/2023	FINAL 12.09.2023			
		Prepared by	Reviewed by	Verified by	
		Kurt Dixon	Kerime Danis	Kerime Danis	
		Heritage Consultant	Director - Heritage	Director - Heritage	

#### Acknowledgement of Country

City Plan acknowledges the First Nations Peoples upon whose lands and waters we live and work, we respect their cultural heritage and continuing connection to Country and thank them for protecting the coastline and its ecosystems through time. We acknowledge that sovereignty over these lands and waters has never been ceded and extend our respect to Elders past, present and emerging. We proudly operate from the lands of the Gadigal, Darkinyung, Danggan Balun and Turrbal Peoples.

#### Copyright

Historical sources and reference material used in the preparation of this report are acknowledged and referenced at the end of each section and/or in figure captions. Reasonable effort has been made to identify, contact, acknowledge and obtain permission to use material from the relevant copyright owners.

Unless otherwise specified or agreed, copyright is this report vests in City Plan Heritage P/L and in the owners of any pre-existing historic sources or reference material.

#### Disclaimer

This report has been prepared by City Plan Heritage P/L with input from a number of other expert consultants (if relevant). To the best of our knowledge, the information contained herein is neither false nor misleading and the contents are based on information and facts that were correct at the time of writing. City Plan Heritage P/L accepts no responsibility or liability for any errors, omissions or resultant consequences including any loss or damage arising from reliance in information in this publication.

#### Right to use

City Plan grants to the client for this project (and the client's successors in title) a perpetual royalty-free right to reproduce or use the material from this report, except where such use infringes the copyright of City Plan Heritage P/L or third parties. Copyright © City Plan Heritage P/L

ABN 46 103 185 413



# TABLE OF CONTENTS

1.	Bac	kground	5
	1.1.	Introduction	5
	1.2.	The Site	5
	1.3.	Heritage listing	7
	1.4.	Proposal	10
	1.5.	Methodology	18
	1.6.	Constraints and limitations	18
	1.7.	Author Identification	18
2.	Site	Context and Description	19
	2.1.	Site Context	19
	2.2.	Site Description	22
3.	Hist	orical overview	25
	3.1.	Aboriginal History	25
	3.2.	Brief History of the 'Governor's Domain and Civic Precinct'	25
		3.2.1. Establishment of a Colony: 17881810	25
		3.2.2. Shaping the City	28
4.	Esta	ablished Statements of Significance	32
	4.1.	Governor's Domain and Civic Precinct	32
	4.2.	Sydney Mardi Gras Parade Route	32
	4.3.	Oxford Street Heritage Conservation Area	33
	4.4.	Paddington Urban Heritage Conservation Area	34
		Bourke Street North Heritage Conservation Area	
5.	Heri	itage Impact Assessment	36
	5.1.	Statutory Controls	36
		5.1.1. Governor's Domain and Civic Precinct: Heritage Place Environment Protection a Biodiversity Conservation Act (1999): Referral Guidelines 2021	
		5.1.2. Heritage Act 1977 (NSW)	38
		5.1.3. Sydney Local Environment Plan (LEP) 2012	40
		5.1.4. Sydney Development Control Plan (DCP) 2012	40
5.1.	4.1.	Locality Statements	40
5.1.	4.2.	Sydney DCP 2012 - General Provisions	44
	5.2.	Heritage NSW Guidelines	45
6.	Con	clusion and Recommendations	48



# **FIGURES**

Figure 1: Aerial Image showing the approximate extent of the subject site
Figure 2: Cadastral map showing the approximate extent of the larger cycleway network along Oxford, Elizabeth, Castlereagh and Flinders Streets
Figure 3: Approximate location of the subject site within the current state heritage curtilage of the 'Sydney Mardi Gras Parade Route' listed on the State Heritage Register, SHR no. 02068
Figure 4: Approximate location of the subject site within its current heritage curtilage of the "Governor's Domain and Civic Precinct' listed on the Australian National Heritage List, item no. 106103
Figure 5: Approximate location of the subject site within its current heritage context
Figure 6: Cadastral map showing the approximate location of the subject site in relation to the contributory building rankings of the HCAs in proximity
Figure 7: Extract from Oxford Street and Liverpool Street Cycleway Cover - Sheet L.001
Figure 8: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.101 12
Figure 9: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.102 13
Figure 10: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.103 13
Figure 11: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.104 14
Figure 12: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.105 14
Figure 13: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.106 15
Figure 14: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.107 15
Figure 15: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.108 16
Figure 16: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.109 16
Figure 17: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.110 17
Figure 18: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.111 17
Figure 19: Approximate location of the subject site (indicated in red) showing its relationship to Hyde Park and the City Centre
Figure 20: View south-west from the corner of Liverpool and Elizabeth Streets toward the Downing Centre Local & District Court (Formerly 'Mark Foy's Emporium' heritage item no. 11854)
Figure 21: Museum Station located at the northeast corner of Liverpool and Elizabeth Street (heritage item no. 11743)
Figure 22: View of Hyde Park west entrance from Elizabeth Street
Figure 23: Pedestrian Entrance at the west of the Hyde Park from Elizabeth Street footpath, view looking southeast (heritage item no. 11654)
Figure 24:View of Liverpool Street leading to Castlereagh Street junction with sandstone kerb, view looking southwest
Figure 25: Elizabeth Street, view looking southwest
Figure 26: Liverpool Street from Liverpool Street existing bus shelter, view looking south
Figure 27: Corner of Oxford Street and Crown Street, view looking southwest
Figure 28: Oxford Street with painted markers for bus lanes, view looking northeast



Figure 29: Map showing the extent of the College Street/Hyde Park Special Character Area and t subject site	
Figure 30: Map showing the extent of the Oxford Street, Darlinghurst and the subject site	43
Figure 31: Location for proposed new bus shelter at Elizabeth Street, adjacent to Hyde Park	44
Figure 32: Location of proposed new bus shelter at Wentworth Avenue, adjacent to Lyons Lane	45



# 1. BACKGROUND

# 1.1. Introduction

The City of Sydney are proposing to develop a series of bi-directional cycleways along Liverpool and Oxford Streets (subject site) along with a few new bus shelters in the Sydney Central Business District (CBD). The purpose of the cycleways is to create a new, safe space for walking and cycling throughout the City of Sydney, and to in turn free up space on the roads and on public transport as Sydneysiders return to work during NSW's economic recovery.

Whilst previously this cycleway has been proposed as 'pop-up' and temporary, it is understood that the City of Sydney (CoS) is seeking to make the Liverpool and Oxford Street cycleway a permanent fixture.

City Plan Heritage (CPH) previously prepared a Heritage Impact Statement (HIS) for the CoS cycleways along Oxford, Liverpool and College Streets in November 2020 when the intention was that the cycleways would be temporary. Later, in 2021, CPH prepared another Heritage Impact Statement for CoS to make the College Street cycleway a permanent fixture. CPH has subsequently been re-engaged by the City of Sydney to assess the potential impact the proposed works may have on the known and additional National (in part) heritage values of the Liverpool and Oxford Streets section. The subject site, which encompasses the northern-most road lane of Liverpool Street and Oxford Street, is not comprised of heritage items listed under Part 1 Schedule 5 of the Sydney Local Environmental Plan (LEP) 2012; however, part of the route is located within a number of heritage conservation areas. Additionally, part of the subject site is situated within the State significant 'Sydney Mardi Gras Parade Route' heritage item on Oxford Street. Further details about the heritage context associated with the subject site are provided in Section 1.3.

It is noted that the Governors' Domain and Civic Precinct (which includes a part of Elizabeth Street and Liverpool Street) has been included in the National Heritage List on 9 February 2021 (as Gazetted) since the preparation of the previous report for the pop-up cycleways. Likewise, it is also noted that the Sydney Mardi Gras Parade Route heritage item (SHR 02068) has been included in the State Heritage Register on 2 February 2023 (as Gazetted) since the draft HIS was prepared. This updated Heritage Impact Statement (HIS) has been prepared as part of the Review of Environmental Factors (REF) under Part 5 of the *Environmental Planning and Assessment Act 1979*. All recommendations are made in accordance with statutory requirements and cultural heritage best practice.

## 1.2. The Site

The subject site is comprised of approximately 1 km of road from the corner of Castlereagh Street and Liverpool Streets in the Sydney CBD to the junction of Oxford and Flinders Streets in Darlinghurst. In addition, the subject site also encompasses small sections to Castlereagh, Elizabeth and Flinders Streets and Wentworth Avenue. For a more detailed description of the site and its context, see section 2.0 Site Description and Context.





Figure 1: Aerial Image showing the approximate extent of the subject site (indicated in red) along Liverpool, Oxford, Elizabeth, Castlereagh and Flinders Streets (Source: SIX Maps, accessed April 2022).

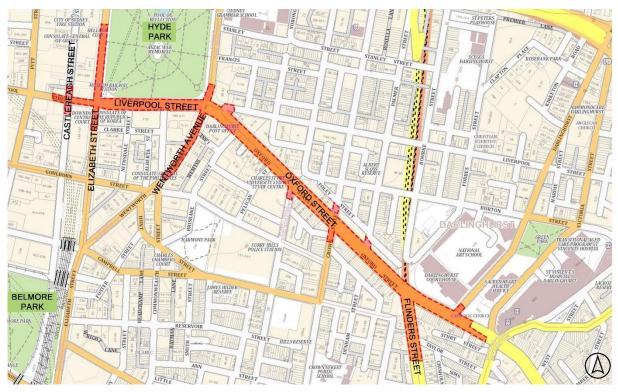


Figure 2: Cadastral map showing the approximate extent of the larger cycleway network (indicated in red) along Oxford, Elizabeth, Castlereagh and Flinders Streets (Source: SIX Maps, accessed April 2022).



# 1.3. Heritage listing

Parts of the subject site along Liverpool Street and Elizabeth Street fall within the 'Governor's Domain and Civic Precinct', which is listed as an item on the Australian National Heritage List, item no. 106103.

Part of the subject site is also located within the State Heritage Register Curtilage of 'Sydney Mardi Gras Parade Route', located along lower Oxford Street, Flinders Street and Anzac Parade within Moore Park (SHR no. 02068).

A part of the subject site along Oxford Street and Flinders Street is also listed within heritage conservation areas (HCA) as defined under Part 2 of Schedule 5 of the Sydney Local Environmental Plan (LEP) 2012, including 'Oxford Street' (C17) HCA, 'Paddington Urban' (C50) HCA and 'Bourke Street North' (C59) HCA.

In addition, the subject site is located in close proximity to several heritage items including, but not limited to, the following:

#### Environment Protection and Biodiversity Conservation Act, 1999

Australian National Heritage List

'Governor's Domain and Civic Precinct', Macquarie Street, Sydney, item no. 106103

### NSW Heritage Act, 1977

State Heritage Register

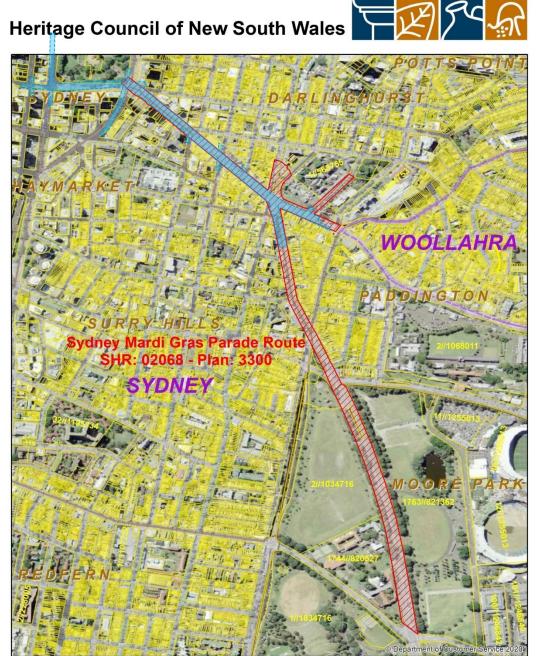
- 'Museum Railway Station including interiors', Elizabeth Street, SHR no. 01207
- 'Darlinghurst Court House group including interior, fencing and grounds', 138 Oxford Street, SHR no. 00792
- 'Busby's Bore', Centennial Park to College Street, SHR no. 00568
- Hyde Park, 110-120 Elizabeth, Park, Liverpool, College Streets, SHR no. 01871

#### Environmental Planning and Assessment Act, 1979

#### Sydney LEP 2012, Part 1 Heritage items

- 'Museum Railway Station including interiors', Elizabeth Street, item no. 11743
- 'Hyde Park including north and south park reserves, Archibald Memorial Fountain, Anzac Memorial, Pool of Remembrance, stone perimeter walls and steps, St James Station, Museum Station, Dalley Statue, Oddfellows Memorial, Captain Cook Statue, Frazer Fountain, Fort Macquarie Cannon, Emden Gun, Thornton Obelisk, Sundial, former public toilets, Busby's Bore Fountain, Sandringham Gardens including memorial gates/pergola, Nagoya Gardens, Chess Board, F J Walker Fountain, John Baptist Fountain, Busby's Bore and archaeology', 110-120 Elizabeth Street, item no. I1654
- 'Former "Mark Foy's Emporium" including interiors and forecourt', 143-147 Liverpool Street, item no. 11854
- 'Burdekin Hotel including interior', 2-4 Oxford Street, item no. I379
- 'Brighton Hotel including interior', 75-77 Oxford Street, item no. I390
- 'Former Oxford Street Municipal Chambers including interior', 82-106 Oxford Street, item no. I392
- 'Darlinghurst Court House group including interior, fencing and grounds', 138 Oxford Street, item no. I403





State Heritage Register - SHR 02068, Plan 3300 Legend Sydney Mardi Gras Parade Route SHR Curtilage Gazettal Date:2 February 2023 Land Parcels 125 250 375 500 Metres Roads Scale: 1:10,000 LGAs Datum/Projection: GCS GDA 1994 Suburbs

Figure 3: Approximate location of the subject site (indicated in blue) within the current state heritage curtilage of the 'Sydney Mardi Gras Parade Route' listed on the State Heritage Register, SHR no. 02068 (Source: <u>https://www</u>.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=5068034).



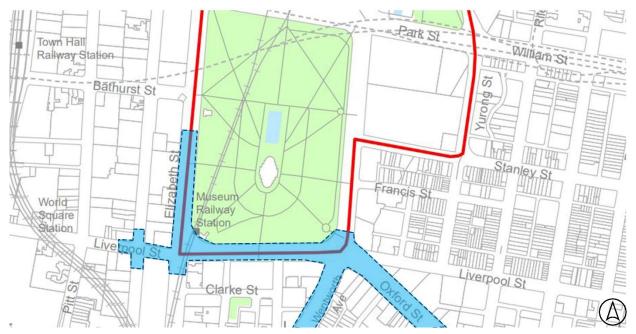


Figure 4: Approximate location of the subject site (indicated in blue) within its current heritage curtilage of the "Governor's Domain listed Australian National Heritage 106103 and Civic Precinct' on the List, item no. (Source: https //www.environment.gov.au/heritage/plac /national/governor -domain-civic-precinct).



Figure 5: Approximate location of the subject site (indicated in blue) within its current heritage context (Source: Sydney LEP 2012, Heritage Map - Sheet HER\_015).



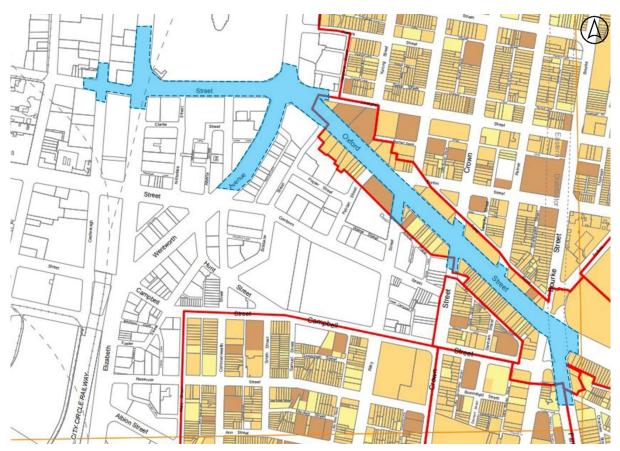


Figure 6: Cadastral map showing the approximate location of the subject site (indicated in blue) in relation to the contributory building rankings of the HCAs in proximity (Source: Sydney DCP 2012, Contributory buildings Map 15).

# 1.4. Proposal

The proposed works involve the addition of new cycleways along Liverpool and Oxford Streets in the City of Sydney CBD. In summary, the works will involve:

- (a) A bi-directional cycleway Oxford and Liverpool Street from Flinders Street to Castlereagh Street
- (b) Use of bluestone separator kerb elements
- (c) Asphalt re-sheeting works on section
- (d) Alterations of the existing kerb
- (e) Changes to road line marking and signage
- (f) Changes to bus stop locations

This HIS has assessed the following information provided by the City of Sydney. To aid an understanding of the proposal, relevant plans and photomontages have been included below. As per the provided architectural drawings by WSP Transport Engineers and Spackman Mossop Michaels Landscape Architects, the subject site is fragmented into 11 Sections (L.101 - L.111) for ease of understanding. However, no significant works are proposed alongside Section L.111. For more detailed information on the proposed works reference should be made to the submitted architectural drawings.



WSP Australia Pty Ltd				
Date	Title	Drawing No.	Revision No.	
21.02.2022	Cover Page	L.001	CD3	
21.02.2022	Concept Plan	L.101	CD3	
21.02.2022	Concept Plan	L.102	CD3	
21.02.2022	Concept Plan	L.103	CD3	
21.02.2022	Concept Plan	L.104	CD3	
21.02.2022	Concept Plan	L.105	CD3	
21.02.2022	Concept Plan	L.106	CD3	
21.02.2022	Concept Plan	L.107	CD3	
21.02.2022	Concept Plan	L.108	CD3	
21.02.2022	Concept Plan	L.109	CD3	
21.02.2022	Concept Plan	L.110	CD3	
21.02.2022	Concept Plan	L.111	CD3	



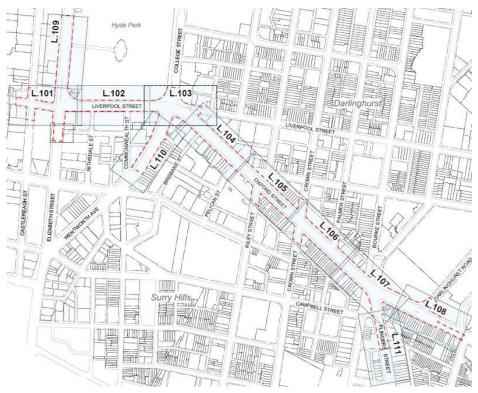


Figure 7: Extract from Oxford Street and Liverpool Street Cycleway Cover - Sheet L.001 (Source: WSP Australia and Spackman Mossop Michaels, Cover Page, Revision CD3, 21.02.2022).

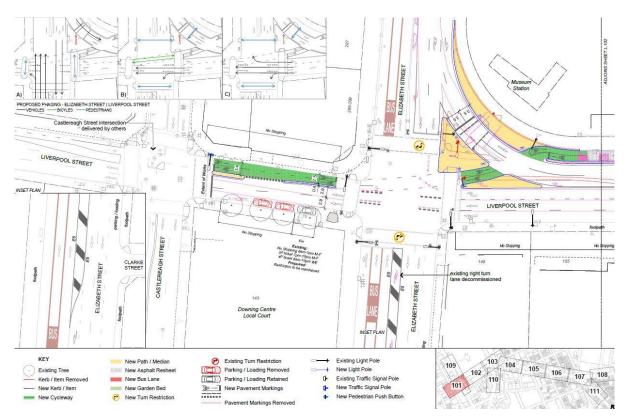


Figure 8: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.101 (Source: WSP Australia and Spackman Mossop Michaels, Cover Page, Revision CD3, 21.02.2022).



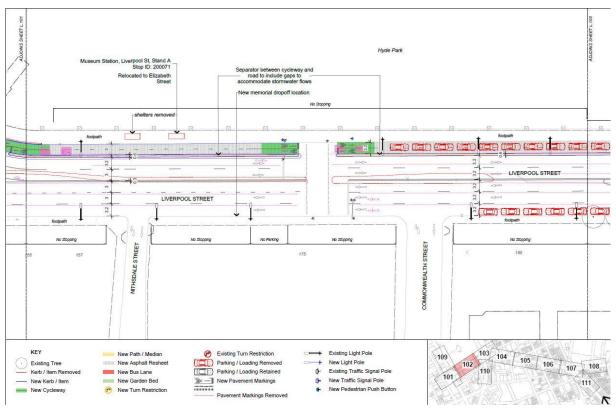


Figure 9: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.102 (Source: WSP Australia and Spackman Mossop Michaels, Cover Page, Revision CD3, 21.02.2022).

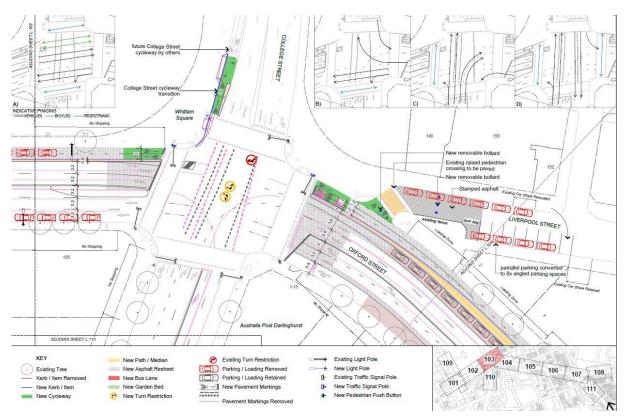


Figure 10: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.103 (Source: WSP Australia and Spackman Mossop Michaels, Cover Page, Revision CD3, 21.02.2022).



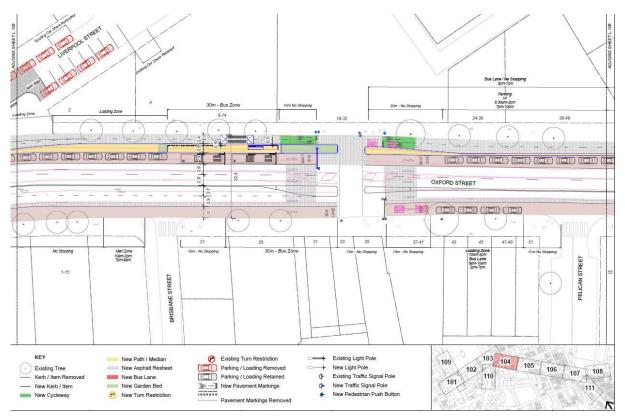


Figure 11: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.104 (Source: WSP Australia and Spackman Mossop Michaels, Cover Page, Revision CD3, 21.02.2022).

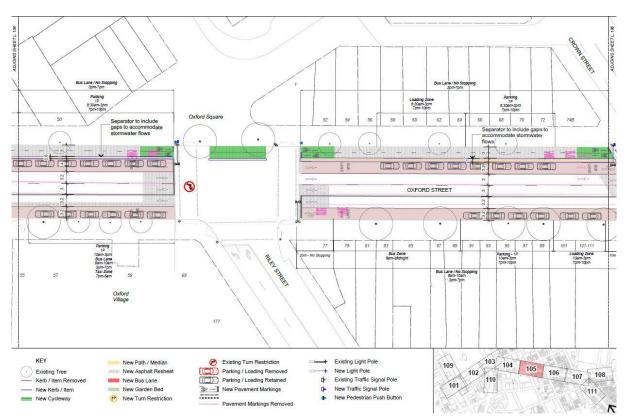


Figure 12: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.105 (Source: WSP Australia and Spackman Mossop Michaels, Cover Page, Revision CD3, 21.02.2022).



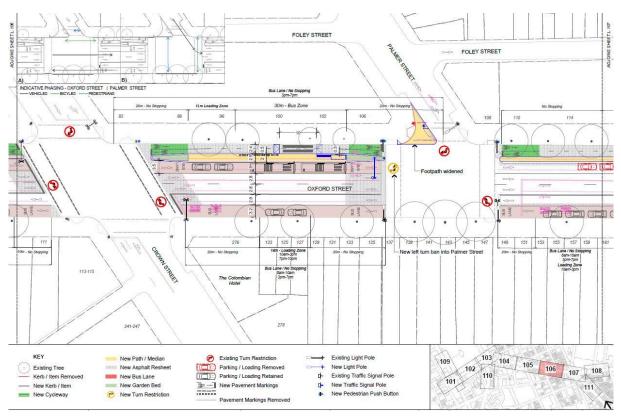


Figure 13: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.106 (Source: WSP Australia and Spackman Mossop Michaels, Cover Page, Revision CD3, 21.02.2022).

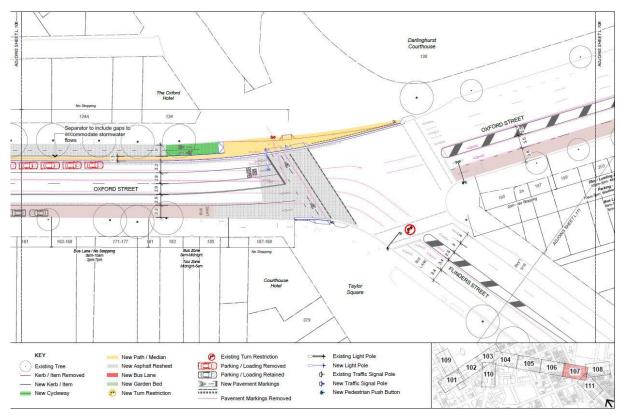


Figure 14: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.107 (Source: WSP Australia and Spackman Mossop Michaels, Cover Page, Revision CD3, 21.02.2022).



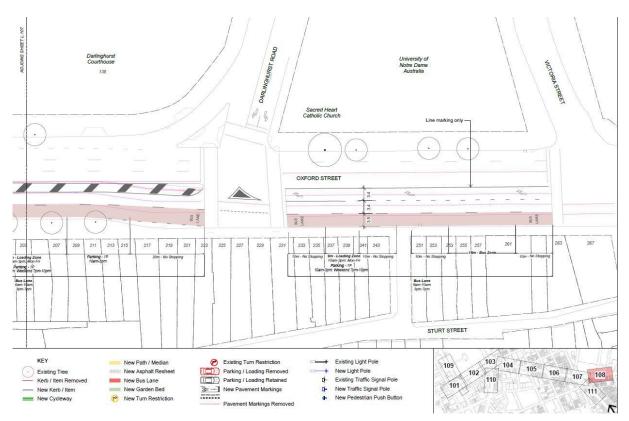


Figure 15: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.108 (Source: WSP Australia and Spackman Mossop Michaels, Cover Page, Revision CD3, 21.02.2022).

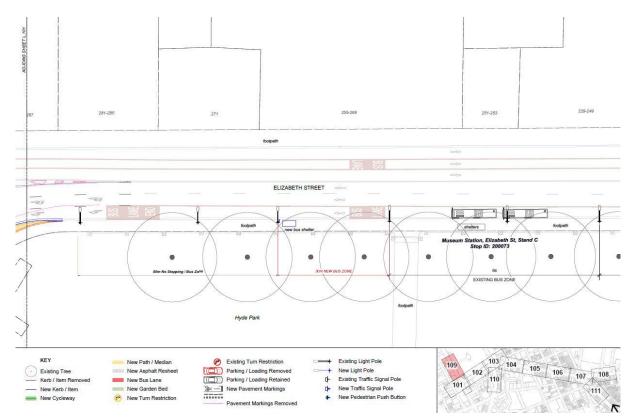


Figure 16: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.109 (Source: WSP Australia and Spackman Mossop Michaels, Cover Page, Revision CD3, 21.02.2022).



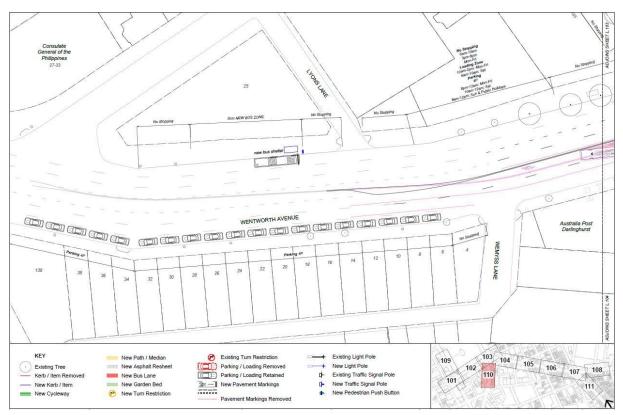


Figure 17: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.110 (Source: WSP Australia and Spackman Mossop Michaels, Cover Page, Revision CD3, 21.02.2022).

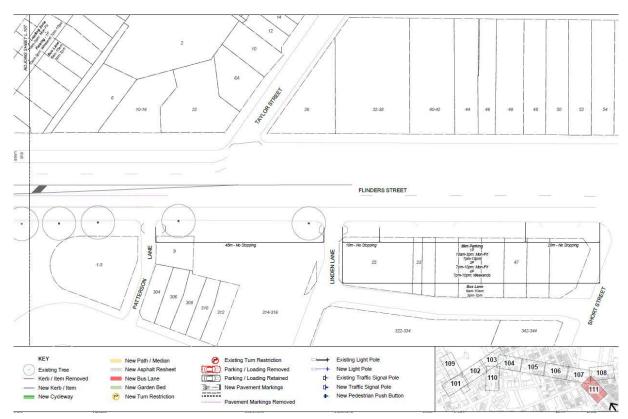


Figure 18: Extract from Oxford Street and Liverpool Street Cycleway Concept Plan - Sheet L.111 (Source: WSP Australia and Spackman Mossop Michaels, Cover Page, Revision CD3, 21.02.2022).



# 1.5. Methodology

This HIS relates to the development of new permanent cycleways along Liverpool and Oxford Streets, Sydney. It has been prepared in accordance with the Heritage NSW publications, *Statements of Heritage Impact, 2002* and *Assessing Heritage Significance, 2001*. It is also guided by the philosophy and processes included in *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, 2013* (Burra Charter).

The subject proposal has been assessed in relation to the relevant controls and provisions contained within the Sydney LEP 2012 and the Sydney DCP 2012. It forms one of a collection of specialist reports.

Research for this HIS has adopted a two-stepped approach. Step 1 comprised a desktop assessment and Step 2 was a site survey. This document provides the combined findings and recommendations resulting from this approach.

#### Step 1

Research into the early development of the site was undertaken to get a better understanding of the place. Further, the Sydney LEP 2012 and the SHR were examined to determine the known heritage values of the subject site.

#### Step 2

A site survey of Liverpool, Oxford, Elizabeth, Castlereagh, and Flinders Streets was carried out by CPH on 12 April 2022 with the purpose of photographing and understanding the place. All results are presented in *Section 2 - Site Context and Description*.

## **1.6.** Constraints and limitations

- Accurate measured drawings do not form part of this assessment.
- This report does not include a heritage landscape assessment.
- This report does not form part of the building consent process.
- The assessment in this report relates to the proposed works and documentation described in Section 1.4 - Proposal and Section 1.5 - Methodology. It does not relate to any additional or revised documentation by any party.
- This report does not include for an archaeological assessment or opinions regarding such matters; neither does it form part of a Section 140 Application for an Excavation Permit or Section 144 Application for an Excavation Variation Permit.
- This report does not include an assessment of Aboriginal values.
- CPH were not involved in the design process.
- Only a visual assessment of the subject site was carried out. Intrusive methods were not employed.
- This report does not include for the provision of a title search for the subject site.

## **1.7.** Author Identification

The following report has been prepared by Asmita Bhasin (Heritage Consultant). Kerime Danis (Director - Heritage) has provided input, reviewed, and endorsed its content.



# 2. SITE CONTEXT AND DESCRIPTION

# 2.1. Site Context

The subject site is located partially within both the Sydney central business district (CBD) and Sydney east into Darlinghurst (Figure 19 - Figure 23). Both the Sydney CBD and Darlinghurst are mixed commercial, retail, and residential inner-city suburbs.

The western-most section to the subject site is bounded to the west by Castlereagh Street, to the north by Elizabeth Street and to the east and southeast predominately by the confines of Liverpool and Oxford Streets with some exceptions (i.e., Flinders Streets and Wentworth Avenue).

Liverpool and Oxford Streets each comprise similar architecture consisting of a mixture of larger postwar office and hotel buildings and smaller scale multi-storey Victorian retail terraces. Some notable sites in proximity to the subject site include Hyde Park, the Downing Centre Local & District Court (formerly 'Mark Foy's'), the Australian Museum, St Mary's Cathedral and the Domain.Locally significant Belmore Park resides at the southwest of the subject site.

The area around Oxford Street comprises of low density commercial and residential buildings. Some notable buildings, including Darlinghurst Courthouse and National Art School resides at the junction of Oxford Street and Flinders Street.



Figure 19: Approximate location of the subject site (indicated in red) showing its relationship to Hyde Park and the City Centre. (Source: SIX Maps, accessed April 2022).



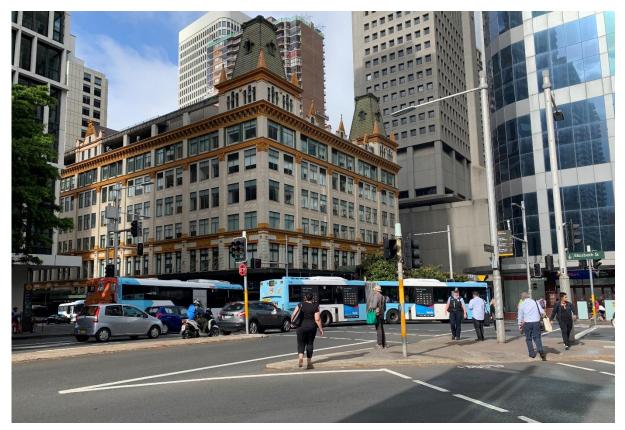


Figure 20: View south-west from the corner of Liverpool and Elizabeth Streets toward the Downing Centre Local & District Court (Formerly 'Mark Foy's Emporium' heritage item no. 11854).



Figure 21: Museum Station located at the northeast corner of Liverpool and Elizabeth Street (heritage item no. 11743).



Heritage Impact Statement Permanent Cycleway Oxford and Liverpool Streets, Sydney Project No: H-22042 September 2023



Figure 22: View of Hyde Park west entrance from Elizabeth Street, view looking east (heritage item no. 11654).



Figure 23: Pedestrian Entrance at the west of the Hyde Park from Elizabeth Street footpath, view looking southeast (heritage item no. 11654).



#### 2.2. Site Description

The subject site is comprised of approximately 1.5 km of road from the corner of Castlereagh and Liverpool Streets in the Sydney CBD to the junction of Oxford and Flinders Streets in Darlinghurst. In addition, the subject site also encompasses small sections into Castlereagh, Elizabeth, and Flinders Streets and Wentworth Avenue as indicated in Figure 2.

Liverpool Street is a two-way street, comprised of three lanes running in each direction from east-west from Castlereagh Street (west) to College Street (east). The street consists of Hyde Park which borders the street to the west and several properties on the eastern side including the Australian Museum, St Mary's Cathedral and the Pullman Sydney Hyde Park. The Domain and Hyde Park Barracks are also situated to the north of Liverpool Street.

Oxford Street is also a two-way street running southeast from Liverpool Street. Both Oxford and Liverpool Streets are constructed from concrete and asphalt with footpaths having sandstone kerbs, each comprising four lanes for traffic indicated with painted markers. Both streets have additional lanes for turning and bus use. Some street parking is available within the bus lanes during set timeframes.

Liverpool Street slopes upwards from Castlereagh Street through to the south-west corner of Hyde Park where the road somewhat plateaus. Oxford Street similarly inclines from the south-eastern corner of Hyde Park through to Taylor Square albeit more gradually in comparison.

Elizabeth Street, where the new bus shelter is proposed, runs parallel to Hyde Park along the northsouth and is perpendicular to Liverpool Street. The street has painted markers and have additional lanes for turning and bus use.



Figure 24: View of Liverpool Street leading to Castlereagh Street junction with sandstone kerb, view looking southwest.



Heritage Impact Statement Permanent Cycleway Oxford and Liverpool Streets, Sydney Project No: H-22042 September 2023



Figure 25: Elizabeth Street, view looking southwest.



Figure 26: Liverpool Street from Liverpool Street existing bus shelter, view looking south.



Heritage Impact Statement Permanent Cycleway Oxford and Liverpool Streets, Sydney Project No: H-22042 September 2023



Figure 27: Corner of Oxford Street and Crown Street, view looking southwest.



Figure 28: Oxford Street with painted markers for bus lanes, view looking northeast.



#### 3. HISTORICAL OVERVIEW

#### 3.1. Aboriginal History

While this history does not include an assessment of Aboriginal cultural heritage values, it is acknowledged that the Cadigal clan of the Eora Nation are traditionally recognised as the original occupants of the subject area.

It is also noted that Indigenous relations, technologies, and notable Indigenous figures are of significance to the Governor's Domain and Civic Precinct in general, though this has not been explored in detail at this time due to the minor nature of the works associated with the proposed cycleways.

#### 3.2. Brief History of the 'Governor's Domain and Civic Precinct'

The following history has been extracted from the Australian National Heritage List for the 'Governor's Domain and Civic Precinct'. Please note only parts that are relevant to the nature of the proposed permanent cycleway have been included here. Reference should be made to the National Heritage List form of the item for the complete history:<sup>1</sup>

#### 3.2.1. Establishment of a Colony: 1788--1810

#### **Contact and Settlement**

With the arrival of the First Fleet, it is estimated that '[t]he number of people drawing on the marine and land recourses of Port Jackson doubled' (Attenbrow, 2002). 'Six convict transports, three store ships and two warships carried 1057 people, 44 sheep, 32 pigs, seven horses, six cattle, dogs, cats, poultry and Australia's first house flies...' (Gammage, 2011) arrived with supplies for a year. The landing coincided with an El Nino event, 'in other parts of the world was described as the worst for 100 years' (Attenbrow, 2002) which would have impacted on the intermittently flowing Tank Stream and other Indigenous water sources (Gammage, 2011). The location of the first settlement '...excluded the Australians [Indigenous] from reliably accessible water and good hunting grounds' (Clendinnen, 2003).

Captain Arthur Phillip, Commander of the Fleet and first Governor, recorded his surprise at the numbers of Indigenous people in the vicinity of the camp, more numerous than the Europeans had expected (Clendinnen, 2003). Initial meetings bristled with mutual curiosity. Phillip approached the Indigenous population with a resolve to gain their trust and even friendship. He had been despatched with instructions from the British Colonial Office to open a dialogue with them, gain their affection, and endeavour to ensure British subjects, free and bonded, treated them with kindness and amity (Macintyre, 1999).

Phillip chose the landing place at Sydney Cove, or 'Warrane' as the local people called it, for its sheltered harbour and its run of fresh water. The Tank Stream also acted as a convenient boundary line for Phillip's camp layout, with the administrative and government functions primarily to the east and the military and convict functions mostly to the west (Flannery, 1996). This spatial order, set down on the first day of occupation and later transmuted into the government and commercial sectors, remains a discernible feature in the layout and function of modern Sydney (Ashton, 1995).

Imperial ideas about the placement of towns, the need for access to navigable waterways, and the siting of fortifications and public buildings were inferred in the orders given to Phillip and other early governors (Context, 2011). Phillip also came with first-hand experience of maritime cities he had visited as a naval officer, including Cape Town and Lisbon. However, he was given no explicit instructions on how to go about building a port or laying out a town. It has been suggested that Phillip's plan was 'quite at odds with the British government's view of Sydney as a primitive convict

<sup>&</sup>lt;sup>1</sup> 'Governor's Domain and Civic Precinct', Australian National Heritage List, Australia Government Department of Agriculture, Water and the Environment, accessed September 2021 via

http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=place\_detail;place\_id=106103



depot' (Marsden, 2000). The plan, first envisaged in April 1788, was a mix of imperial ideas about the orderly arrangement and defence of towns; the effects of the town environment on the physical and moral health of its citizens; Phillip's own observations from his travels; and a response to the topography and landscape of the place (Atkinson, 1988; City Futures, 2007). One of Phillip's first acts was to erect a small, temporary prefabricated structure to serve as his house and office on the eastern side of the cove facing the harbour. From here he planned the layout of the town as he saw it, with a 200 foot (61m) wide principal street running southwest (on the opposite side of the stream to the temporary house) from the head of the cove to a plaza on which a permanent Government House would eventually be built. The house would be sited to provide long views across the cove and its eastern arm, Bennelong Point, to the harbour.

Watkin Tench, a Captain of the Marines and one of the First Fleet diarists, wrote: '... the plan of the town was drawn and the ground on which it is hereafter to stand surveyed and marked out. To proceed on a narrow, confined scale, in a country of the extensive limits we possess, would be unpardonable. Extent of empire demands grandeur of design' (Flannery. 1996).

Phillip's vision was never to eventuate. The difficulties of sustaining the isolated colony and striving to be self-sufficient, not to mention the difficulties encountered by the new settlers in understanding the strange landscape and the properties of its resources, overcame any grand visions for its urban design (Proudfoot, 1988). Records of the early settlement indicate that among the stores ordered for the First Fleet were building materials including bricks, window glass and brick moulds; building hardware (nails, spikes, hinges, locks and bar iron); and tools including spades, shovels, hoes, felling axes, hatchets, saws, hammers, chisels and the like for preparing the ground, cutting timber and quarrying stone (Proudfoot, 1988). These materials and tools set up the fledgling colony to establish its first buildings and put the local resources to use. However, the local materials were mystifying to the colonists--the local timber, when cut, did not behave like European timber; and lime (that most essential of materials for masonry buildings) was hard to come by. The periodic heavy rains combined with the poorly understood materials meant that buildings easily collapsed or washed away in the earliest years of the colony. Phillip's term was also occupied by attempts to hold the colony back from the brink of starvation and establish some form of self-sufficiency.

Despite the difficulties of building and surviving, Phillip managed to reserve enough space around the public buildings to enable their expansion as the population grew. The positioning of what was meant to be the temporary Government House also influenced the evolving layout of the settlement. Within the first months, a garden had been planted running down to the waterline; and by April 1788 a bridge had been built across the Tank Stream with a track running up to the Governors' house. This track, the first east--west connection in the camp, would later be formalised as Bridge Street (Thalis & Cantrill, 2013). The foundations for a new brick house for the Governor were laid facing this track by May 1788. To the east, fronting the next cove from Sydney Cove, a government farm was established in the first weeks of settlement. Here Phillip planted the plants and seeds he had brought with the Fleet to help establish the colony. Coffee, cocoa, cotton, bananas, oranges, lemons, apples, figs, bamboo, sugar cane, wheat, maize and barley were among some of the plants included in the plots. The cove took on the name Farm Cove and represents the beginnings of European agricultural practices in Australia...

•••

#### Defining the Town Limits

In 1792 Phillip left the colony and returned to England. Encouraged by the British society's thirst for knowledge, kangaroos, dingoes, plants, specimens and drawings--natural curiosities that represented the new, strange colony--also travelled with Phillip and began the international exchange of ideas and imaginings of what Australia was (Macintyre, 1999). Nine days before he left, Phillip established a boundary line across the eastern side of the town, running from the estuary of a stream in the south at the head of Cockle Bay (Darling Harbour) diagonally across to Woolloomooloo Bay. Within this boundary the land was intended to remain as Crown land, with no grants or leases to be made. While some incursions were made inside this boundary, even by Phillip himself, it did serve to indirectly preserve the open space that was to later be incorporated into the Domain and Botanic Gardens (Atkinson, 1988). As an added measure Phillip also had a



ditch, or ha-ha, dug on the approximate alignment of current day Bent Street across the Domain to the head of Woolloomooloo Bay. This ditch served to define the inner zone of government land on which no building was to take place. It was with these marked out boundaries that Phillip attempted again to instil orderliness into the future expansion of the town.

Phillip's immediate successors--Francis Grose, Governor Hunter and Governor King--showed less interest in the future plan of the town's development, allowing leases to be made within the boundaries established by Phillip, though no permanent grants were made. Some of these leases faced Sydney Cove on the east banks of the Tank Stream estuary. Running parallel to the stream bank, the leases formed a diagonal to the straight streets that were forming on a north--south axis from the cove. These leases, made to merchants Shadrack Shaw (later purchased by Simeon Lord), Thomas and Mary Reibey, Thomas Randall and William Chapman, later formed the boundary of what became Macquarie Place. It was in the house of Mary Reibey, an ex-convict, that Australia's first bank, the Bank of NSW, opened for business in April 1817. Although Phillip's plans had been largely abandoned, substantial buildings such as the military barracks, the gaol and a large stone commissariat store were all started or planned during this period, each adding to the sense of permanence of the colony.

#### A Plan Emerges

In contrast to Hunter and King, Governor Bligh shared some of Phillip's vision for the town, and on his arrival set about re-establishing the exclusion zones Phillip had designated. It was Bligh's insistence on this matter that led indirectly to his overthrow in the rebellion of 1808. Bligh was critical of the way Governors Hunter and King had allowed private individuals to encroach on land reserved for government functions, especially allotments close to the Government House, around the Tank Stream and along the eastern edges of the town, in what would become the Domain. Bligh saw that these occupancies limited the scope of the government in making proper use of the land or establishing any civic improvements. His intention appeared to return the town to the lines as set down in Phillip's earlier vision, in terms of the delineation of government land, open public spaces and vistas of the civic buildings. Twelve months after his arrival, Bligh wrote: 'It is an infinite satisfaction to me to say that from the distressed situation in every respect, in which I found the colony, it is now rising its head to my utmost expectations ... and the town altogether is become what has not been seen before in this country' (Quoted in Bridges, 1995). As a tool in his attempts to wrest back control, Bligh had Assistant Surveyor James Meehan make a map of the town in October 1807. Meehan's map is the first accurate survey of the settlement and shows the embryonic street pattern, as well as Phillip's line and ditch. The map notes Bligh's instructions for the future of the open space to the east of Government House. Inscribed across the map, traversing some of the leases made by the previous administration, read the words 'ground absolutely necessary for use of Government House, but leases temporarily granted on it: it is now improving'. This area encompassed the ridge of land along the eastern arm of Sydney Cove, the head and the eastern arm of Farm Cove. The map shows twelve plots leased to seven individuals within this area; of these three were occupied by windmills, built in 1797 (John Boston's mill), 1802 (John Palmer's mill) and 1804 (Nathanial Lucas' mill). The mills, essential to the survival of the town, had been built to take full advantage of the north easterly sea breeze that swept up the harbour as well as the westerly winds that blew from the opposite direction (Wilson, 1992). Archaeological relics of these mills may remain within the Royal Botanic Garden.

Indigenous names are shown for some of the prominent features of the landscape, including 'Tobegully' for Bennelong Point, 'Woccanmagully' for Farm Cove, 'Yurong' for the eastern ridge of Farm Cove and 'Walloomooloo' Bay. These names (with variations in spelling) had been recorded by William Dawes in 1790, but Meehan's plan is the first significant plan of Sydney to include Indigenous place names. Meehan's use of the names suggests a familiarity of use in Sydney at this particular moment or at least some retention or transfer of Indigenous knowledge of place in the growing town. Indigenous people were still familiar in the streets of Sydney when this plan was produced, as they would be for the next thirty years with camps around the edges of the settlement, including in the Domain (Karskens, 2009). Indigenous names, except those that filtered into the European vocabulary, such as Woolloomooloo, did not appear on Sydney maps again until 1920 (Department of Lands, May 1920).



Bligh had made his intention clear to remove the offending leases and any structures on them. He gave notice to those he considered in breach, offering both the legal reasons behind his decision and the option of alternative land parcels elsewhere. He also made it clear he would not act until he had been given permission to do so from the British Secretary of State. The land to the east of Government House was particularly critical. He viewed this as an extension of the Government House curtilage, rather than a reserve for future government projects as his predecessors had. In July 1807 Bligh had referred to the area specifically as 'making part of the Domain of the Governors' residence' (Sydney Gazette, 26 July 1807). This represents the first time the name Domain had been used in any official capacity to describe the land to the east of the town. The word, derived from 'demesne' which in common usage at the time referred to land in possession of a lord or master, captured Bligh's intention of the area as a private vice-regal estate (Innes, 2013); and is a distinctly Australian concept (City Futures, 2007) begun in Sydney and replicated in other Australian cities. John Harris, Government Surgeon and opponent of Bligh, complained that the Governor had all but taken over the area around Bennelong Point and Farm Cove, initiating landscaping, putting in carriage roads around the point and the cove, and building a ditch to prevent any unauthorised thoroughfare.

#### 3.2.2. Shaping the City

#### **Commencing the Government Institutions**

Elizabeth Macquarie had as much interest in the formation of the town and its civic landscape as her husband. Amongst her belongings on arrival was a pattern book, Edward Gyfford's Designs for Elegant Cottages, which was soon put to use in the construction of the Judge-Advocate's house, the Colonial Secretary's house in Bridge Street and extensions to Government House (Broadbent, 1992). In 1811 work began on a new hospital to replace the original structure close to the harbour on the western edge of Sydney Cove. The choice of the site in Macquarie Street, prominent on the ridge line that defined the eastern boundary of the city, meant that the hospital was visible from anywhere in the growing city, and it represented the first of the major public institutional buildings erected under Macquarie's administration. The hospital was designed by Lieutenant John Watts, Macquarie's Aide-de-Camp who had been apprenticed to an architect in Dublin. Watts had served in the West Indies, which combined with Macquarie's experience in India, North America and Jamaica, and produced a building that reflected the combined styles of those colonial outposts.

#### Francis Greenway and Dignified Urbanity

The scale of Macquarie's ambitions and his building program necessitated a change in approach from the use of military engineers and designers. As early as March 1810, Macquarie had requested a government architect be sent to Sydney to assist in the planning and erection of public buildings. It was not until 1814 however, when the convict Francis Greenway arrived, that Australia got its first official architect. Greenway had practised as an architect in Bristol before being transported for forgery. He was trained in the Georgian style, infused with a mix of Palladio and Greek Revival architectural finishes popular in Britain at the time (Johnson, 1999). At first Macquarie employed him in small scale work and copying existing buildings. Greenway, asserting his own ability, complained to Macquarie while promoting the benefits of good public design: 'If your Excellency will grant me the power as an architect to design and conduct any public work, I will exert myself in every way to do your Excellency credit as a promoter and encourager of the most useful art to society which adds to the comforts of the Colony, as well as the dignity of the Mother Country' (Johnson. 1999).

Greenway was attuned to Macquarie's aspirations for the elevation of the status of Sydney within the wider empire through design. In 1816 he was appointed Acting Civil Architect and Assistant Engineer, 'instigating the role of custodian of public architecture maintained continuously in New South Wales since then' with the Colonial Architect and later Government Architect (Johnson, 1999). Among Greenway's work were additions to First Government House, the grand Gothick inspired castellated stables within the Government Domain (now the Conservatorium of Music), an obelisk in Macquarie Place from which to measure the distance via road to towns and



settlements, Hyde Park Barracks, St James Church and the first design for the Supreme Court, King Street. Greenway also built an ornamental sandstone fountain in Macquarie Place to supply fresh water to the town. The fountain was the first use of sandstone in a decorative structure (Cowan, 1998). Greenway also took advantage of the better quality of brick that was by then being produced in Sydney. Whereas earlier brick buildings had been rendered--for stability as much as for appearance--Greenway left the brick exposed on such buildings as the barracks, presenting a new style of architectural façade to the colonial streetscape (Cowan, 1998). The emergent cluster of official buildings along Macquarie Street and the northern edge of Hyde Park shifted the focus of civic authority from the western edge of Sydney Cove and around the waterfront to the ridge line and high ground. The military and commercial traders were left to shape the western areas of the city.

Macquarie's extensive use of stone and brick reflected the increasing availability of these materials as well as displaying an intention of civic permanency. This was reinforced further by the increasing scale of construction. The three wings of the two-storey hospital, the three-storey barracks and the two-storey Light Horse Barracks (adjacent to the hospital) aligned skilfully along the Macquarie Street ridge, dominated the skyline of the colonial town and captured a reassertion of public authority of the Governor after the destabilising years of Bligh's rule. Even the smallest things were imbued with intention--for example, the Macquarie Place obelisk mentioned above regulated the measurement of distances in the colony and a clock installed on the façade of Hyde Park Barracks was intended to impose orderliness on the colony's population. When Macquarie left in 1822, he had successfully, if controversially, extended the vision of Phillip and Bligh, added to their plans and foundations, transformed the town through his building program and set the direction for future development and open space. His program had civilised the embryonic town that he had inherited.

#### ... A Change of Scale

#### Sandstone Sydney

The demolition of the first Government House and the extension of Bridge Street created new building sites for growing government departments. Governor Phillip had originally set aside six allotments along Bridge Street for the government administrators and Macquarie had the Judge-Advocate and Commissary housed near the first Government House. When the land was cleared and Bridge Street extended, the opportunity for new administrative offices was quickly seized.

The first building to be erected on the new street was the Treasury office on the northwest corner of Bridge and Macquarie Streets in 1849. Designed by Colonial Architect Mortimer Lewis, the monumental two-storey sandstone building joined the recently completed Public Subscription Library (1845) on the corner of Macquarie and Bent Streets as the first of the major sandstone structures that would come to dominate and define the civic administrative precinct of Macquarie and Bridge Streets. The use of sandstone quarried from the cliffs of Pyrmont--also used in Lewis' Australian Museum, Darlinghurst Courthouse and Customs House--set the tone and materiality of public buildings in Sydney. This was emulated throughout much of the nineteenth century, reflecting the geological bounty of the colony through built form. So much sandstone was used in Sydney's public architecture that it has come to embody Sydney's civic presence and its nexus with the environment (Kingston, 2006).

Lewis' Australian Museum building (1857) gave a permanent home to the museum that had been founded 30 years earlier. It was the first public museum opened in Australia. Flanked by the Sydney Grammar School on College Street (so named for the school) and the William Street Superior Public School, opened in 1835 and 1851 respectively, together with the museum they comprise a core of colonial intellectual life and education. From 1851 the newly constituted University of Sydney, Australia's first university, occupied rooms in Sydney Grammar while its own site was prepared in Camperdown. These educational institutions joined the Catholic College at St Mary's, facing Hyde Park to their north. The school, established in 1824, predates the College Street group and serves as one of the nation's oldest Catholic schools. St Mary's Cathedral was constructed on the site in stages between 1868 and 1928 (with spires added in 2000), replacing a chapel from 1824 that had been destroyed by fire. The foundation stone was



laid on 29 October 1821 by Macquarie, making the placement of the chapel the first step in defining the eastern edge of Hyde Park (Thalis & Cantrill, 2013).

In 1862 James Barnet was appointed Colonial Architect, beginning the longest term of any of the Colonial or later Government Architects in NSW. His output during his 28 years in the position was over 1350 works, including 169 post and telegraph offices, 130 courthouses, 155 police stations, 110 lock-ups and 20 lighthouses (Johnson, 2009). In Sydney, his public buildings, including the College Street wing of the Australian Museum, the Lands Department and Colonial Secretary's buildings in Bridge Street, contributed imposing landmarks which endowed the city with a confident civic grace. Barnet's buildings signalled a maturation of the city's character and the final transition from a colonial, Georgian township to a Victorian city (Johnson, 2009).

The collection of colonial buildings along Macquarie Street and clustered around the eastern edge of Hyde Park provided demonstrable evidence of the progressive ideals of imperialism and colonial economic and social development. They were the foundational institutions for Australian intellectual life, whose influences were felt in all the colonial capitals. They remain as a legacy of the colonial desire for civic improvement through knowledge and religion.

#### ...

#### **Open Spaces Defined and Developed**

While sandstone defined the built environment, it was Charles Moore, as the Director of the Botanic Gardens from 1848 until 1896, and his successor, JH Maiden (Director from 1896--1924), who defined the character of the public open space that surrounded the civic precinct. When Moore was appointed, he was instructed to restore the scientific character of the Botanic Gardens while retaining their recreational value. He moved to label trees with their scientific names and restore the borders and pathways; and travelled through Australia collecting new specimens for the Gardens. He was particularly interested in the trees of tropical northern NSW and Moreton Bay and had been introducing these species into the public parks he was in charge of, particularly Hyde Park and the Domain. Moore was especially taken with Moreton Bay Figs, and as he was responsible for all public landscape design in colonial New South Wales, these trees became synonymous with major public parks. In 1854, as an advisor to the Hyde Park Improvement Committee, Moore recommended the figs for the replanting of the central avenue and walkways. Maiden continued Moore's work, being a tireless advocate for the improvement and inviolability of Sydney's public spaces and expanding local and international knowledge about Australian native flora. His preference for palms has provided a counterpoint to Moore's figs in Sydney's parklands, and is most clearly expressed along the Tarpeian Way, Macquarie Street.

Despite the formalisation of these open spaces and public parks, until the mid-1850s Indigenous people continued to use them as informal gathering places and camping grounds. In the more isolated areas of the outer Domain, along the waterfront near the swimming baths (themselves retained in the modern Andrew Boy Charlton Pool), traditional Indigenous gunyahs and shelters were still in spasmodic use in 1852 and 1853. Many of the people who camped there were visiting Sydney from country districts, having led bullock teams in from distant farms or working on coastal trading ships (Smith, 2011).

#### The Established Civic Precinct

By the end of the nineteenth century, a civic precinct had been established in Sydney which reflected the aspirations and ideals of the colony and its place in the British Empire. The developing system of governance and justice was reflected in Government House and grounds, the Supreme Court building, Parliament House, the Mint, the Lands Department, the Colonial Secretary's building, the Registry Office and the Education building. The importance of religion to the intellectual and spiritual life of the colony and its citizens was reflected in St James Church and the grand St Marys Cathedral. Civic aspirations in terms of creating a stately town and providing for the betterment of its citizenry were reflected in the orderly layout of Macquarie Street and Bridge Street and the significant areas of public open space of Macquarie Place, the Domain, the Botanic Gardens and Hyde Park, which embodied colonial planning ideals. The thirst for knowledge, the role of colonial exchange and the desire for intellectual betterment, influenced by the Enlightenment, was embodied in the major scientific institutions of the Botanic Gardens, the Australian Museum and the Sydney College (the first site of Sydney University), as well as the



collections of the Mitchell Library. Concerns for fostering the cultural and artistic life of the colony were reflected in the Art Gallery of New South Wales, prominently sited within the Domain--a Sydney example of a must-have for any self-respecting British colony (McPherson, 1992). Supporting the health of the people was demonstrated by the original Rum Hospital and the new Sydney Hospital. However, it was not just government power reflected in the precinct--the residential terraces, private clubs and commercial premises of the city's elite also clustered along Macquarie Street. While this civic precinct reflected how far the colony had come, reminders of its beginnings as a penal settlement were also retained, embodied in the Hyde Park Barracks and the structures and landscapes designed and built by convict hands, along with the associations of the precinct with the dramatically changed circumstances of Indigenous people...



#### 4. ESTABLISHED STATEMENTS OF SIGNIFICANCE

#### 4.1. Governor's Domain and Civic Precinct

As noted above, part of the subject site along Elizabeth and Liverpool Streets fall within the listing boundaries of the 'Governor's Domain and Civic Precinct' listed on the Australian National Heritage List as an item of National heritage significance. The following Summary Statement of Significance has been extracted in full from the Australian National Heritage List:<sup>2</sup>

The Governors' Domain and Civic Precinct is located in the City of Sydney, near the place of arrival of the First Fleet in Warrane, the Indigenous name recorded in historic journals for Sydney Cove.

The Precinct is of outstanding heritage value to the nation for its capacity to connect people to the early history of Australia including interactions between Indigenous people and British colonisers. Its ability to demonstrate the historic processes which shaped Australia's civic institutions, democratic progress and the physical character of our cities, which were set in train from the early colonial period in the Sydney colony, is outstanding. In particular, the Precinct's ensemble of buildings, parks and gardens tell us about important events in the establishment of early Parliamentary forms of government, the establishment of the Supreme Court and aspects of the history of suffrage.

The archaeological material found near or associated with many of its historic places is rare and has an exceptional research value capable of informing Australians about aspects of British colonisation and the first interactions British colonists had with Indigenous people living in and around the place we now call Sydney.

The Precinct is also outstanding for its collection of buildings and open spaces, which as an ensemble, demonstrates the transition of the early, isolated penal settlement into a more substantial permanent town. Early British Governors and in particular Governor Macquarie, worked to create improvements in civic amenity and fostered the establishment of civic institutions like Australia's first hospital, public parks, a mint and places of worship. Later civic, legal and government institutions continued to be developed which helped to foster greater independence from Britain.

The Precinct and its buildings are also of outstanding heritage value to the nation for their association with a number of important Australians including Governor Macquarie, Elizabeth Macquarie, Governor Phillip, Governor Bligh, Bennelong and Francis Greenway. Their significant contributions in the course of Australia's history are well demonstrated within the precinct.

#### 4.2. Sydney Mardi Gras Parade Route

The following Statement of Significance has been extracted from the State Heritage Inventory (SHI) form for the Sydney Mardi Gras Parade Route heritage item (SHR no. 02068)

The Sydney Mardi Gras Parade Route along lower Oxford Street, Flinders Street and Anzac Parade within Moore Park has state heritage significance for its historic, associative, research, representative and rarity values, as the focus and the evolving site of Sydney's Mardi Gras parades from their beginning in 1978. These streets represent a window into alternative Sydney subcultures, a landscape where political protests, cultural festivals, shops, services and celebration of diversity have been made the most public, over decades. The Mardi Gras Parades build on a longer history of major public parades along Oxford Street, formerly South Head and Old South Head Road.

The corridor of space along these streets leading from Hyde Park South to Moore Park and the Hordern Pavilion and Hall of Industries where post-Mardi Gras-parade dance parties have been held since 1982 is known beyond Australia as the face of Queer Sydney and Australia, a beacon

<sup>&</sup>lt;sup>2</sup> 'Governor's Domain and Civic Precinct', Australian National Heritage List, Australia Government Department of Agriculture, Water and the Environment, accessed September 2021 via <u>http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=place\_detail;place\_id=106103</u>



of tolerance, resilience, political activism and gradual community acceptance and celebration. As a public platform for reclaiming public space by formerly oppressed minorities, this trio of roads takes on a different meaning and purpose at least once a year, as the site of the Mardi Gras Parades.

Sydney Gay and Lesbian Mardi Gras is one of Australia's most famous and well-loved events, bringing tens of thousands of visitors to Sydney to join in celebrations.

The former Darlinghurst Police Station is of state heritage significance as the place where protesters at the original Mardi Gras were arrested and locked up in 1978. This over-reaction and harsh treatment led to the ongoing and growing Mardi Gras Parades and ongoing community and political activism, which continues.

The Oxford Street section of the route has state historic significance as part of possibly the oldest highway in Australia and one of the oldest major roads in New South Wales, which connected the settlement at Sydney Cove with the Signal Station or Lookout Post at South Head from 1790, quickly grew as an artery and an asset, militarily, commercially and recreationally. Oxford Street was, if not the birthplace, one of the most productive nurseries of mod-Oz restaurant food.

The Sydney Mardi Gras Parade Route has historic associations with a range of individuals and groups responsible for road construction, widening and boulevarding, resumption and rebuilding, design of the former Darlinghurst Police Station and LGBTIQA+ activism from the 1970s to today.

The route has social and cultural values at state level for its nineteenth century roles in connecting city, coast and beaches, later increasing urbanisation and evolution as population waves came and went, diversification and increasing sophistication in the late twentieth century.

The route has research potential at state level to inform cultural studies and social history around LBGTIQA+ gender and diverse communities, migration and working class history, town planning history and more.

Sydney Mardi Gras Parade Route is both rare as the singular site in New South Wales that saw public protests begin and accelerate seeking equal human rights, reformed legislation, community organisations and support for LBGTIQA+ communities, and is representative at state level of an early colonial road (in fact two, counting Anzac Parade and Flinders Street as a second), a Victorian High Street with a rich Edwardian and Victorian array of architecture and mix of land uses and services.

#### 4.3. Oxford Street Heritage Conservation Area

The following Statement of Significance has been extracted from the State Heritage Inventory (SHI) form for the Oxford Street Heritage Conservation Area (HCA) (C17):<sup>3</sup>

Oxford Street has state historical significance. As the South Head Road and possibly the oldest highway in Australia, it connected the settlement at Sydney Cove with the Signal Station at South Head, and quickly became one of the most popular recreation resources for Sydney's population during the nineteenth century. In the early twentieth century Oxford Street provided the main artery connecting the centre of Sydney with the coast, thus contributing to the rise of a popular and enduring beach culture in Sydney. As well, the process of road widening that took place at the beginning of the twentieth century at its western end marks a major point in the development of town planning principles in Sydney.

Oxford Street is able to demonstrate in a powerful way the growth and development of Sydney and municipal government during the nineteenth and twentieth centuries. It contains many items that illustrate these processes, such as Busby's Bore, Darlinghurst Courthouse, and buildings erected in the wake of the road widening that took place during the first half of the twentieth century.

<sup>&</sup>lt;sup>3</sup> 'Oxford Street Heritage Conservation Area', State Heritage Inventory (SHI) Form, Heritage NSW, accessed April 2022 via <a href="https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2424247">https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2424247</a>



Oxford Street has remarkable aesthetic significance at a state level, containing buildings of national and state significance and buildings designed by important nineteenth and twentieth century architects.

Sections of the street contain remarkably homogenous and intact streetscapes. These include the collection of Victorian and Federation era buildings along the southern side of the street in Darlinghurst and the consistent groups of Federation Free Style buildings along the northern side of Oxford Street in Darlinghurst, between Liverpool and Bourke Streets. This part of the street is arguably the finest Federation era commercial streetscape within New South Wales. Indeed, it demonstrates many of the characteristics of a Victorian era High Street and still retains evidence of changing patterns of retailing in the nineteenth and twentieth centuries.

Oxford Street provides evidence of the "gentrification" that took place during the 1950s and 1960s when inner city areas were rediscovered as desirable places in which to live. As an extension of this trend, the street has important associations with the rise of the preservation and conservation movement in New South Wales during the 1960s. The street is also significant because of its ongoing associations with Sydney's gay community since the 1960s.

#### 4.4. Paddington Urban Heritage Conservation Area

The following Statement of Significance has been extracted from the State Heritage Inventory (SHI) form for the Paddington Urban Heritage Conservation Area (HCA) (C50):<sup>4</sup>

The Paddington Urban Heritage Conservation Area has historic significance as an 1860-1880 subdivision of the Sydney Common and an earlier subdivision of Georges Farm, both of which developed with the growth of Victoria Barracks. The area has aesthetic values for its fine consistent streetscapes comprising middle and working class terrace housing (of high integrity) built over undulating topography and enhanced by mature avenue plantings. The area is also significant for the high concentration of Victorian institutional and religious establishments resulting from the original dedication of much of the land as Sydney Common.

#### 4.5. Bourke Street North Heritage Conservation Area

The following Statement of Significance has been extracted from the State Heritage Inventory (SHI) form for the Bourke Street North Heritage Conservation Area (HCA) (C59):<sup>5</sup>

The Bourke Street North Heritage Conservation Area is of historical significance due to subdivision patterns and buildings within the heritage conservation area dating from the 1830s, through the 19th century and into the early 20th century, and representing key period layers for the development of Surry Hills as a direct result of the subdivision of the Palmer Estate in the 1830s into Villa estates.

The conservation area is of aesthetic significance as it is predominantly Victorian in character and contains good examples of early, and mid to late Victorian & also Federation terraces, Victorian and early twentieth century buildings and inter war flats which make a positive contribution to the streetscapes and character of the area.

The conservation area represents complex layers of different periods of development, both in terms of its street layout, subdivision pattern and buildings. The heritage conservation area has returned to a residential focus but with surviving commercial activity. It has a built form which responds to the ridges and slopes and is enhanced by various groups of significant street trees. It has an unusual bent and diverging grid like street pattern with non-conforming minor streets and lanes (such as the pattern of lanes between Bourke and Flinders Streets north of Albion Street, which represents an early street pattern). The period of the buildings of the area is predominantly mid to late Victorian but with important early Victorian, Federation and Inter-war

<sup>&</sup>lt;sup>4</sup> 'Paddington Urban Heritage Conservation Area', State Heritage Inventory (SHI) Form, Heritage NSW, accessed April 2022 via <u>https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2421493</u>

<sup>&</sup>lt;sup>5</sup> 'Bourke Street North Heritage Conservation Area', State Heritage Inventory (SHI) Form, Heritage NSW, accessed April 2022 via <u>https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2421460</u>



elements. The most common type of building is terrace housing, which are present in many forms representative of the different key development periods for the area, however there are also significant warehouse, commercial and institutional building forms within the area, mostly dating from the early 20th century.



### 5. HERITAGE IMPACT ASSESSMENT

#### 5.1. Statutory Controls

Parts of the subject site along Liverpool Street and Elizabeth Street fall within the 'Governor's Domain and Civic Precinct', which is listed as an item on the Australian National Heritage List, item no. 106103. The proposed works are therefore subject to the controls outlined in the *Governor's Domain and Civic Precinct: Heritage Place Environment Protection and Biodiversity and Conservation Act (1999): Referral Guidelines 2021.* 

Part of the subject site is also located within the State Heritage Register Curtilage of 'Sydney Mardi Gras Parade Route', located along lower Oxford Street, Flinders Street and Anzac Parade within Moore Park (SHR no. 02068).

In addition, whilst the subject site is not listed as a heritage item in Part 1 of Schedule 5 of the LEP 2012, it is partially located within the Oxford Street Heritage Conservation Area (C17) (HCA), Paddington Urban Heritage Conservation Area (C50) (HCA), and Bourke Street North Heritage Conservation Area (C59) (HCA) as defined under Part 2 of Schedule 5 of the Sydney LEP 2012 and therefore is subject to the heritage provisions of the Sydney LEP 2012 and the Sydney Development Control (DCP) 2012. A part of the subject site (Section L.111) is located within Paddington Urban HCA (C50) and Bourke Street North HCA (C59) as evident from the architectural drawings. However, no works are proposed in the area located within the above mentioned heritage conservation areas. Hence, the proposal has no impacts on Paddington Urban and Bourke Street North Heritage Conservation Areas. Therefore, this heritage impact statement will only assess the proposed works and their likely impacts on the Oxford Street Heritage Conservation Area where the works are concentrated.

In addition, subject site is also located in proximity to several heritage items as detailed in Section 1.3 (Heritage Listing) above.

It is noted that assessment against the individual clauses of the Sydney LEP 2012 and Sydney DCP 2012 have not been undertaken due to the minor nature of the works that encompassed within the road reserve and the non-heritage value of the fabric to be modified under the current proposal. The below general comments cover responses to the relevant heritage matters that are required to be considered and contained within the subject statutory instruments.

## 5.1.1. Governor's Domain and Civic Precinct: Heritage Place Environment Protection and Biodiversity Conservation Act (1999): Referral Guidelines 2021

The Referral Guidelines 2021 defines 'significant impacts' as works with the potential to have sufficient impact on the established significance and values of the Heritage Place; the guidelines in turn establish that any works are likely to have a significant impact if they cause:

- (1) One or more of the National Heritage values to be lost;
- (2) One or more of the National Heritage values to be degraded or damaged; or
- (3) One or more of the National Heritage values to be notably altered, modified, obscured or diminished.

The Guidelines provide a series of examples of works and their potential impact on the separate criterion (a) to (h), with the following noted as applicable to the proposed cycleways:

*Criterion (a) - Early relations between Aboriginal people and settlers; Governance; Founding civic institutions and emerging civic space; and Town planning.* 

Activity	Comments	Impact
	Not considered to have a likely significant impact if all matters relating to intensity, duration and extent are not significant. If one, or more, of these factors are	Possible.



Activity	Comments	Impact
	found to be significant these activities might be considered to have a significant impact.	
Demolition of, or a high degree of development encroachment on, a garden or park identified in the National Heritage values statement.	within the City of Sydney.	Likely.
Statement.	Impact assessment is likely to focus on cumulative impact and the ability to read the distinction between urban space and green space within the precinct.	

#### CPH comments:

The proposed cycleways along Liverpool and Oxford Streets will be located on the northern side of the road, bordering the southern side of Hyde Park and opposite notable buildings including the Museum Station, Darlinghurst Courthouse, and National Art School. As indicated above, there is some possibility of impact to the heritage values outlined in Criterion (a) mainly due to the location of the new cycleways and their proximity to significant buildings; however, the proposed cycleways will overall have a minor to no impact on these values. The existing road alignments, surrounding subdivision patterns and historical significance of the area will be maintained with no impact on the known social and development history of the Governor's Domain and Civic Precinct.

The cycleway will somewhat encroach on the southern boundary of Hyde Park; however, this will be minimised for the most part by the existing footpath with sandstone kerb and sandstone retaining wall which borders the outside of the Park along Elizabeth, Liverpool and College Streets. The addition of the cycleway will therefore have little to no impact on the significance of Hyde Park or to the existing views between the Park and the significant buildings, like Former Mark Foy's Emporium, along the opposite (southern) side of Liverpool Street. Further, the works associated with the cycleway will be primarily to the road itself and will be entirely reversible.

The cycleway along Liverpool Street will be acceptable from a heritage perspective and in keeping with the heritage values outlined in Criterion (a).

Activity	Comments	Impact
Activities such as new buildings or additions to existing buildings that require excavation or major groundworks outside of the individually identified areas in the National Heritage values statement for criterion (b).	Development and groundwork activities outside of the individually identified areas within the listing boundary would not be considered likely to have a significant impact.	Not Likely.

Criterion (b) and (c) - Archaeology

#### CPH comments:

The proposed cycleway will be comprised of two lanes, utilising the existing northern-most lane along Liverpool Street (alongside Hyde Park), with appropriate resurfacing to the road, associated line-marking, and signposting. The works will not involve large-scale or deep excavation, with the only exceptions required being for the erection of signage and is therefore considered to be acceptable from a heritage perspective, maintaining the identified significant heritage values of the Heritage Place and archaeology.



With respect to the existing kerbs along Liverpool Street, separating the road itself from the footpath, the proposed cycleway may have some impact, however this will be of a minor nature and of no greater detriment than previous pedestrian and vehicle usage in the vicinity. Further, signage will be setback from the road itself and not directly to the roadside or associated kerbing.

The proposed cycleway will have no adverse impact on the established archaeological significance of the Governor's Domain and Civic Centre; however, should any sub-surface archaeological resource or relics be uncovered during the works a stop-work order should be enacted to allow for any finds be appropriately recorded by a suitably qualified archaeologist in line with the provisions of the NSW *Heritage Act 1977*.

#### 5.1.2. Heritage Act 1977 (NSW)

As identified prior, the subject site is partially within the State significant 'Sydney Mardi Gras Parade Route', (SHR no. 02068). This State significant heritage item is located along lower Oxford Street, Flinders Street and Anzac Parade within Moore Park, with overlap between this heritage item and the proposed cycleway works occurring on Oxford Street and partially on Flinders Street.

As ascertained at Section 4.2, the Sydney Mardi Gras Parade Route has historic, associative, research, representative and rarity values. The proposed reconfiguring of the roadway to incorporate the cycleway will not impact on the established heritage significance of this item, nor any of the identified values. The historic importance of Oxford Street as the site of the Mardi Gras Parades since 1978 would not be impeded or lost by the installation of the cycleways, nor will the route need to change to accommodate the cycleways. The fabric of the road (asphalt, concrete) is not specifically identified as having heritage significance, rather it is the route within the road reservation. The statement of significance identifies that Oxford Street may be "part of possibly the oldest highway in Australia," however the current fabric of the road is not considered significant. As this asphalt and concrete fabric of the road is not specifically considered significant in this listing, there is no assessed impact on the heritage values of the Sydney Mardi Gras Parade Route.

The proposed cycleways will continue to conserve and maintain the existing Oxford Streets streetscape, with no physical or visual impact on their established significance. This is because the cycleways will be low-rise and focused primarily on the northern elevation of the road.

Additionally, there are a number of State significant heritage items in proximity to the subject site, including Museum Railway Station (SHR no. 01207), Hyde Park (SHR no. 01871), Darlinghurst Court House group including interior, fencing and grounds (SHR 00792) and Busby's Bore (SHR 00568). There is no assessed impact on these heritage items as they are situated away from the road reserve where the works are proposed to be located. These heritage items can still be appreciated despite the works, and none will be visually impacted due to the low rise nature of the cycleways and separators installed.

#### Recommended Management for 'Sydney Mardi Gras Parade Route' (SHR no. 02068).

Site-specific exemptions should be prepared and agreed between major parties (Council of the City of Sydney, Roads & Maritime NSW) to ensure ongoing efficient running of the three roads, excluding all work to 'fabric' or 'layout' of these roads and temporary event related works from needing s.57(1) or s.57(2) approval or exemption by the Heritage Council of NSW.

Site-specific exemptions should be prepared and agreed between NSW Health as owner of the Darlinghurst Police Station and Heritage NSW with regard to changes of use, minor works, non-significant fabric and events, to facilitate the re-opening and use of this site and building where that has no adverse impacts on its heritage values.

The Darlinghurst Police Station building should be retained and conserved. A Heritage Assessment and Heritage Impact Statement, or a Conservation Management Plan, should be prepared prior to any major works being undertaken. There shall be no vertical additions to the building and no alterations to the façade of the building other than to reinstate original features. The principal room layout and planning configuration as well as significant internal original features including ceilings, cornices, joinery, flooring and fireplaces should be retained and conserved. Former Darlinghurst Police Station: any additions and alterations should be confined



to the rear in areas of less significance, should not be visibly prominent and shall be in accordance with the relevant planning controls (LEP, 2012).

Under LEP 2012 Oxford Street is a Conservation Area that incorporates part of the Darlinghurst and Surry Hill sections of the Oxford Street Heritage Streetscape (HS 8) and part of the East Sydney Darlinghurst Conservation Area (CA 18) previously listed under South Sydney LEP 1998 (City of Sydney, 2022).

#### Order under Section 57(2) to Grant Site-Specific Exemptions from Approval (SHR no. 02068)

The following activities described below under 'Exemptions' are exempted from Heritage Council approval under Section 57(1) of the Act:

...

(i) Where such activities are in accordance with the 'Standard exemptions for engaging in or carrying out activities / works' published in the NSW Government Gazette

(ii) Where works do not involve disturbance of a relic; and or

(iii) Where a relic is disturbed, all works shall cease, and the Heritage Council be contacted within a reasonable time and furnish the Heritage Council with such information concerning the relic as the Heritage Council may reasonably require.

Exemptions:

1. All Standard Exemptions

The following Site Specific Exemptions

2. New development

All works and activities which are proposed in accordance with:

a) A valid development consent in force at the date of gazettal for listing the Sydney Mardi Gras Parade Route on the State Heritage Register under the Heritage Act 1977 (NSW)

3. Works by or on behalf of Transport for NSW / Roads and Maritime Services.

The following activities:

a) The carrying out of road work or traffic control works within the meaning of the Roads Act 1933 relevant to: part of MR172 (Oxford Street between Crown Street ending at Boundary Street) and MR171 (ANZAC Parade from Lang Road into Flinders Street to the intersection with Oxford Street at Taylor Square) and part of Road 7310 (Oxford Street between Wentworth Avenue and Crown Street) shown in the curtilage plan for the item, are exempt from subsection 57(1) of the Heritage Act 1977, subject to all excavation or disturbance of land being carried out in accordance with any approval for those works issued under the Environmental Planning and Assessment Act 1979

• • •

#### Discussion

The proposed installation of cycleways on Liverpool and Oxford Streets undertaken by City of Sydney in conjunction with Transport for NSW (TfNSW) / Roads and Maritime Services (RMS) is an approved site-specific exemption (*3 (a). Works by or on behalf of TfNSW / RMS*). This carrying out of roadwork in the form of constructing cycleways on Road 7130 (Oxford Street, between Wenworth Avenue and Crown Street), MR172 (Oxford St, between Crown and Boundary Streets) and MR171 (ANZAC Parade into Flinders Street, between Lang Road and Oxford Street) would not require approval under Section 57(1) of the Heritage Act as it is an already identified 57(2) site-specific exemption, which will have no more than minor impact on the assessed heritage values of the item. As a result, these works to alter the fabric of the roadway do not require any additional clarification or approval by the Heritage Council.

Additionally, the other recommended management guideline addressing the Darlinghurst Police Station building are not considered relevant to this proposal as there are no modifications proposed for that building. As such, the recommended management guidelines within the State Heritage Inventory listing for 'Sydney Mardi Gras Parade Route' are not applicable or relevant to this assessment.



#### 5.1.3. Sydney Local Environment Plan (LEP) 2012

In accordance with Clause 5.10 Heritage Conservation, consent is required for the proposed works. While the proposed route of the cycleways is not listed as a heritage item under the Sydney LEP 2012, it is located in proximity to several heritage items as detailed in Section 1.3 and above. It is also encompassed within the Oxford Street Heritage Conservation Area (C17) (HCA) under Part 2 of Schedule 5 of the Sydney LEP 2012.

Further, this Heritage Impact Statement (HIS) has been prepared in accordance with the requirements of Clause 5.10 of the LEP and has given careful consideration to the proposed works and their impact on the subject site, the HCA and the heritage items located in proximity. This assessment has been guided by the methodology laid out in the Heritage Manual "Statements of Heritage Impact" and "Assessing Heritage Significance Guidelines" and has provided sufficient background history and fabric analysis to inform the likely impact of the proposal. A Conservation Management Plan (CMP) has not been prepared for the subject site and is not considered necessary; however, it is noted that CMPs have previously been prepared for several heritage items located in proximity to the study area. As there are no physical nor visually dominant works under the proposed cycleway project, review and consideration of the policies contained in the CMPs pertinent to the heritage items in the vicinity have not been undertaken.

An archaeological assessment does not form part of the scope of this HIS. While the proposed works do not include excavation, it is recommended that should any unexpected archaeological remnants be uncovered during resurfacing and construction, a stop-work initiative is to be applied to allow for any exposed findings be properly assessed in accordance with the provisions of the NSW *Heritage Act*, *1977*.

Further investigation into potential Aboriginal heritage of the subject site is beyond the scope of this report. Notwithstanding, the nature of the proposed works is not considered to have impact on any known or potential values in this regard.

#### 5.1.4. Sydney Development Control Plan (DCP) 2012

The following sections address the relevant controls of the DCP in particular the principles associated with the locality statements across the route of the proposed cycleways.

#### 5.1.4.1. Locality Statements

#### 2.1.2 College Street/Hyde Park Special Character Area

College Street and Hyde Park form a precinct, which clearly separates the City from the residential areas to the east, forms part of the green eastern edge and frames an important gateway to the City.

Hyde Park has two distinct edges: the north and east, flanking College Street and St James Road, comprise important institutional free-standing sandstone buildings and significant public open spaces including Queens Square, which is one of the earliest examples of formal urban design in Central Sydney. The west and south edges consist of commercial development of larger scale with strong street alignment, creating a greater sense of enclosure to Hyde Park.

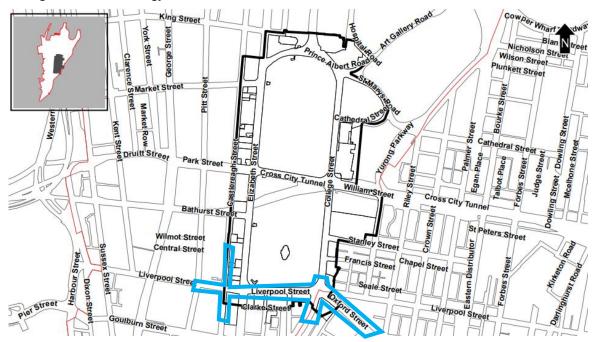
The northern edge is aligned by Hyde Park Barracks, a place of world significance, St James Church and the Supreme Court complex represent the work of Australia's first government 'Civil Architect', Francis Greenway, with additions to the Court by subsequent Colonial Architects. To these East, the Registrar General's building, St Mary's Cathedral, the Australian Museum and Sydney Boys Grammar School form a fine collection of sandstone buildings set in grounds creating a sense of openness and affording views to the Domain, Cook and Phillip Park and beyond to Woolloomooloo and the Darlinghurst ridge.

Hyde Park is of national significance as the oldest public park in Sydney being in continuous use since 1788, although not proclaimed for public recreation until 1810 by Governor Macquarie. Its current formal plan, dating from the 1920s, demonstrates the application of City Beautiful principles. The Park contains significant monuments, fountains and memorials including the



ANZAC War Memorial, the Archibald Fountain and Sandringham Gardens. The monuments and sculptures in Hyde Park not only create a visually interesting outdoor gallery, but bring with them important associations with artists and designers. The Park is a place of both quiet solitude and ongoing public recreation and major events, parades and celebrations that have continue to be held there since the park's inception.

The 2006 Hyde Park Plan of Management and Masterplan are the principle guiding documents for Hyde Park. The documents establish the range of acceptable uses, activities and management practices to reflect contemporary needs. The plan is supported by a range of other studies, policies, plans and strategies.



Significant archaeology is known to remain within the area.

Figure 29: Map showing the extent of the College Street/Hyde Park Special Character Area (in black outline) and the subject site (indicated in blue) (Source: Sydney DCP 2012).

#### Principles

- (a) Development must achieve and satisfy the outcomes expressed in the character statement and supporting principles.
- (b) Recognise the institutional area east of College Street as one of Sydney's pre-eminent public areas characterised by a concentration of heritage items which house activities of State and National significance.
- (c) Reinforce the urban character and scale of College Street by requiring new buildings to be integrated with the form of existing buildings and generally limiting the height of new buildings to the prevailing height of existing buildings, and to maintain the sense of openness east of Hyde Park.
- (d) Enhance and reinforce the precinct's role as a major gateway to the City from the east, particularly from William Street to Park Street, by ensuring that development does not adversely affect the views when approaching the City.
- (e) Maintain and strengthen the sense of enclosure provided by the buildings to the west and south of Hyde Park, by requiring new buildings to be built to street alignment, to have street frontage heights consistent with the existing development and to have adequate setbacks above those street frontage heights.
- (f) Maintain and enhance views to and through the Park and along College Street to landmark buildings such as St Mary's Cathedral east and Centre Point Tower west.



- (g) Maintain and enhance the role of the precinct as a major recreational open space for Sydney's workers and residents.
- (h) Protect and extend mid-winter lunchtime sun access to Hyde Park and other open spaces in this Special Character Area.
- *(i)* Conserve significant tree plantings, grounds, walls, fences and significant archaeological resources.

#### Discussion:

As noted in the above principles and the character statement, the controls and vision for the area essentially relate to the scale and character of the built environment, landscape and open spaces of the locality. The proposed new cycleways will be in keeping with the intended outcomes expressed in the above locality statement for the College Street/Hyde Park Special Character Area. The proposal will have no additional impact on the urban character and scale of Hyde Park or to the precinct's role as a major gateway and will not adversely impact the views of the precinct on approach toward the City Centre. The addition of the cycleways will continue to maintain existing views to and through Hyde Park, along College Street to St Mary's Cathedral and toward Centre Point Tower in the west.

In fact, the proposed new cycleways will provide further enhancement to the recreational role of the precinct by providing new safe and cohesive cycle lanes through the area for use by Sydney's workers and residents.

The proposed cycleways will uphold the values of the College Street/Hyde Park Special Character Area and are considered acceptable from a heritage perspective.

#### 2.4.10 Oxford Street, Darlinghurst

This locality is made up of lots fronting Oxford Street and lots at Taylor Square where Bourke Street and Flinders converge.

Oxford Street, Darlinghurst is to continue to provide uses that reflect its role as a regionally significant retail and entertainment street and a local business centre for surrounding neighbourhoods. The area has a range of day-time and night-time activities.

There are a number of strategies developed by the City of Sydney focus on strengthening Oxford Street as a 24 hour entertainment, tourism and retail precinct. The Oxford Street Cultural Quarter Plan prepared in 2009, builds on and responds to these broader strategies and policies to maintain and develop a healthy and competitive economy, a vibrant community, support the local economy and integrate with overarching Council strategies.

New development will conserve and complement the context established by the heritage fabric and ensure new development while not mimicing heritage styles, but responds to the urban context and contributes to the established built form patterns of the street.

Future development along Oxford Street is to reinforce the established heritage character of narrow shop frontages and consistent awnings.



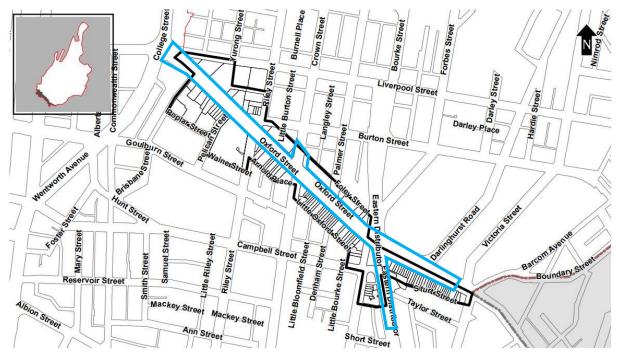


Figure 30: Map showing the extent of the Oxford Street, Darlinghurst (in black outline) and the subject site (indicated in blue) (Source: Sydney DCP 2012).

#### Principles

- (a) Development must achieve and satisfy the outcomes expressed in the character statement and supporting principles.
- (b) Development is to respond to and complement heritage items and contributory buildings within heritage conservation areas, including streetscapes and lanes.
- (c) Retain and enhance the existing heritage buildings along Oxford Street.
- (d) Development is to respect the prevailing scale, character and form of the street, as defined by the Victorian, Federation and Inter-war heritage buildings.
- (e) Ensure that new development reinforces the individuality of different precincts that characterise Oxford Street.
- (f) Significant shop fronts are to be retained and conserved. The design of new shopfronts should take their cues from traditional shopfronts.
- (g) Maintain the mix of uses that contribute to Oxford Street as entertainment, tourism and retail precinct.
- (h) Maintain Oxford Streets retail, commercial, entertainment and tourism uses and encourage these uses to occur both at and above the street level.

#### Discussion:

The proposed new cycleways will be in keeping with the intended outcomes expressed in the above locality statement for the Oxford Street, Darlinghurst. The proposal will have no additional impact on the urban character of the street and will conserve and complement the context established by the heritage fabric. The proposed permeant cycleways will continue to respond to the urban context and contributes to the established alignments of the street. The addition of the cycleways will reinforce the individuality of the precincts that characterise Oxford Street.

Furthermore, the proposed new cycleways will provide further enhancement to the role of Oxford Street as a retail and entertainment street and a local business centre for surrounding neighbourhoods by providing new safe and cohesive cycle lanes through the area for use by Sydney's workers and residents.



The proposed cycleways will uphold the values of the Oxford Street and are considered acceptable from a heritage perspective.

#### 5.1.4.2. Sydney DCP 2012 - General Provisions

#### Clause 3.9 Heritage

As identified above, this HIS has been prepared in accordance with the requirements for consent outlined in the Sydney LEP 2012 and is to be submitted as part of the Review of Environmental Factors (REF) process to the City of Sydney.

As the subject site, comprising the existing North-most lane of Liverpool and Oxford Streets, is in proximity to several heritage items of both State and local significance, the proposed works associated with the new cycleway will be undertaken within the road corridor only and separated from both footpaths and existing kerbing. The general provisions for heritage conservation under Clause 3.9 of the Sydney DCP 2012 relate to proposed works to, and in the vicinity of, heritage items. However, in the case of the proposed works it is noted that the new cycleway will be undertaken only within the confines of the roadways themselves and will have no direct impact to the Liverpool and Oxford Streets and partially extended sections of Elizabeth and Flinders Streets and Wentworth Avenue streetscapes or to any heritage items in the vicinity.

The proposal, as identified in Section 1.4, will consist of a bi-directional cycleway along the northern side of Oxford and Liverpool Street from Flinders Street to Castlereagh Street demarcated by changes to painted road lines and signage and road re-surfacing works. The proposal includes alterations to the existing kerb and use of bluestone separator kerb elements. It further includes changes to the bus stop location and development of two new bus shelters, one along the west of Hyde Park alongside Elizabeth Street and second along the west of Wentworth Avenue, adjacent to Lyons Lane (Figure 31 and Figure 32). These works will be easily installable, easily reversible and will create a new safer cycleway for use by Sydney residents travelling to and from the City Centre.



Figure 31: Location for proposed new bus shelter at Elizabeth Street, adjacent to Hyde Park.



Heritage Impact Statement Permanent Cycleway Oxford and Liverpool Streets, Sydney Project No: H-22042 September 2023



Figure 32: Location of proposed new bus shelter at Wentworth Avenue, adjacent to Lyons Lane.

The proposed cycleways will continue to conserve and maintain the existing Liverpool and Oxford Streets streetscape and the heritage items in proximity with no physical or visual impact on their established significance. Further, it is noted that public domain features within the Liverpool and Oxford Streets will also see minimal to no impact due to the proposed location of the cycleway along the Northern-most laneway of the existing road alongside Hyde Park. Whilst it is noted that there is some possible interference with extant stone kerbing, guttering, paving and street furniture etc, it is not considered that this will be of any greater impact than pedestrian access currently permitted along the southern boundary of Hyde Park. Overall, the proposed cycleway is considered acceptable from a heritage perspective.

#### 5.2. Heritage NSW Guidelines

The following questions have been extracted from the Heritage NSW publication, *Statements of Heritage Impact, 2002.* Responses have been provided in relation to the proposed development.

Questions to be answered	Response & Comments							
The following aspects of the proposal respect or enhance the heritage significance of the item or conservation area for the following reasons:	The proposal will respect the heritage significance of the Nationally significant 'Governor's Domain and Civic Precinct' and the State/Local heritage items located in proximity (listed under the NSW <i>Heritage Act 1977</i> and/or the Sydney LEP 2012) by relegating all works to the extant northern-most laneway of Liverpool and Oxford Streets. The works will be low to the ground, easily applied and reversible with no direct impact to the public domain including sandstone kerbing, gutters, street furniture, etc.							



Questions to be answered	Response & Comments
The following aspects of the proposal could detrimentally impact on heritage significance. The reasons are explained as well as the measures to be taken to minimise impacts:	It is considered by CPH that the proposal will have no detrimental impact on the heritage significance of the 'Governor's Domain and Civic Precinct' or the heritage items in proximity as well as the HCAs that is encompassed within.
The following sympathetic solutions have been considered and discounted for the following reasons:	The proposal has been developed to incorporate new road re- surfacing, painted road markings, signage, alterations to existing kerb and addition of bluestone separator kerb elements. Nonetheless, the works will be entirely reversible.

Τ

Questions to be answered	Response & Comments
Do the proposed works comply with Article 22 of The Burra Charter, specifically Practice note article 22 — new work (Australia ICOMOS 2013b)?	The proposed works will not obscure the cultural significance of the Sydney Mardi Gras Parade Route as the route can still be used with the addition of the cycleways. The cycleways are proposed for the northern elevation of the road and will not obstruct any usage of the route by those marching or participating in the Mardi Gras Parade. The new works will be readily identifiable and separate from the
	road, particularly through the installation of the separate from the newly identifiable cycleways will not impact the cultural significance of the route and not prevent the route's usage.
Are the proposed alterations/additions sympathetic to the heritage item? In what way (e.g. form, proportion, scale, design, materials)?	The proposed alterations are considered sympathetic to the Sydney Mardi Gras Parade Route heritage item as they are not at a large scale and are relatively minor works impacting non- significant road fabric. The low rise nature of the works means that they will not be visually dominant or overwhelming, and will not detract from the heritage values of the Sydney Mardi Gras Parade Route.
Will the proposed works impact on the significant fabric, design or layout, significant garden setting, landscape and trees or on the heritage item's setting or any significant views?	The asphalt and concrete roadway are not specifically identified as significant in the heritage listing for the Sydney Mardi Gras Parade Route, rather it is the route itself. The route will still be able to be used for future Mardi Gras Parades after the cycleways are installed, despite minor changes to the road configuration.
How have the impact of the alterations/additions on the heritage item been minimised?	The impacts to the heritage significance have been minimised by being at a low and non-obtrusive scale. The separator for example is not designed to be obtrusive for the future use of the road by participants in the Mardi Gras Parade, instead being at a small scale.
Are the additions sited on any known or potentially significant archaeological relics? If yes, has specialist advice from archaeologists been sought? How will the impact be avoided or mitigated?	Not applicable



Heritage Impact Statement Permanent Cycleway Oxford and Liverpool Streets, Sydney Project No: H-22042 September 2023



## 6. CONCLUSION AND RECOMMENDATIONS

In conclusion, it is considered by City Plan Heritage that the proposed works associated with the new permanent cycleway along Liverpool Street and Oxford Street from Flinders Street to Castlereagh Street, will result in no impact to the heritage significance of the 'Governor's Domain and Civic Precinct' or the heritage items in proximity listed under the NSW *Heritage Act 1977* and/or the Sydney LEP 2012. The proposed works will also have no impact on the 'Sydney Mardi Gras Parade Route' heritage item (SHR 02068) as it is the route itself and not the fabric of the roadway that is considered to be of State heritage significance. The proposed new cycleways will be located within the extant northern-most road lane along the southern boundary to Hyde Park, demarcated by painted road lines and signage and road resurfacing. The proposed new bus shelter along the western boundary of Hyde Park, adjacent to Elizabeth Street is similar to the existing shelters and will be acceptable from a heritage perspective. The works will be easily applied and are fully reversible with no impact on any fabric or element of significance across the subject site. Overall, the proposed works are acceptable in relation to heritage matters.

The proposal demonstrates compliance with the existing controls regarding heritage conservation and is therefore recommended to Council for approval.

CITY PLAN HERITAGE AUGUST 2023

## **APPENDIX H** ENGAGEMENT REPORT







Engagement report Updated designs for a cycleway on Oxford and Liverpool streets December 2021

# Contents

Background	3
Engagement summary and activities	5
Early engagement	5
Community engagement	5
Snapshot of feedback received	6
Engagement summary – ideas and issues	6
Appendices	11
Appendix A: Sydney Your Say webpage	
(including online survey)	11

## Context

In the City's community strategic plan, Sustainable Sydney 2030, Direction Four is to make Sydney a city for walking and cycling. It includes targets that at least 10 per cent of City trips will be made by bicycle and 50 per cent by pedestrian movement by 2030.

Transport for NSW customer research shows 70% of residents of Greater Sydney would ride or ride more if there were safe cycleways, separated from traffic. Multiple surveys of residents of the City of Sydney and neighbouring council areas over recent years have consistently found over 70% support for building a bike network and separated cycleways.

Council adopted the Cycling Strategy and Action Plan 2018-2030 in November 2018. In the Strategy, Priority 1 is connecting the bike network, as there is strong evidence showing safe connected cycling infrastructure is essential to making bike riding a viable transport option for the majority of the population. Our benchmark is a bike network that is safe enough for a 12-year-old to ride alone. Page 17 of the Strategy shows the adopted planned bike network. The Strategy target is to complete 80% of the regional route network by 2024 and 100% by 2030.

The cycleway along Oxford and Liverpool Streets (between Taylor Square and Castlereagh Street) is a very important regional bike route connection in the planned bike network. It is also part of the NSW Government's Principal Bicycle Network and a strategic cycleway network route in the NSW Government's Sydney City Centre Access Strategy. It connects existing cycleways along Bourke Street and in the city centre on Liverpool and Castlereagh Streets, and is located on a well-used bike commuter route between the city centre and eastern suburbs.

There are over 2,000 bike trips on Oxford Street per day, but with no dedicated facilities for people to ride, Oxford Street is also the street in our council area with the highest number of reported bike crashes. Commonly, when we build new separated cycleways, the number of bike trips doubles within a year or two, with even higher growth in the city centre or where the cycleway is well connected into the network.

The City's Community Recovery Plan gives direction to how we'll work in partnership with our communities, businesses, the state government, and other local governments. The plan supports economic and social recovery in the local area over the next 18 months. It includes building new cycleways to make bike riding a transport priority in response to the pandemic. This will help communities to return to work and local businesses safely, supporting NSW's economic recovery.

We have been working with Transport for NSW on transport changes in response to the Covid-19 pandemic, including construction of more cycleways. Social distancing requirements may persist, and public transport is one of the facets of Sydney life that will be the last to return to 'normal'. The project is part funded by the NSW Government.

Oxford Street is a significant and important village high street. It is home to many local businesses, residents and important community services and destinations. This cycleway would remove one through traffic lane. This would preserve local access and on street parking and help enhance the street through calming the traffic, reducing noise and pollution impacts and provide a space to ride on the road instead of the footpath.

Through the reduced traffic, the project would improve safety and amenity for people walking, sitting at cafés and restaurants and visiting local business.

Access for buses, taxis and to on-street parking and loading will largely remain the same on Oxford Street. Local access to the area is being prioritised. It is proposed to maintain current arrangements for bus stops and taxi, parking and loading spaces. Parking spaces will be removed from Liverpool Street.

Transport for NSW will monitor the performance of the westbound kerbside lane and use of off-peak parking and loading spaces for six months after the cycleway opens, to identify and consider

potential improvements. This will include evaluating bus reliability and potentially changing off-peak parking and loading hours, in consultation with City of Sydney.

The most common causes of reported bicycle crashes over the last ten years on Oxford Street are opening car doors, poor surface conditions, left turns and left side swipes. The cycleway is expected to eliminate these crash causes.

Access for people driving to Oxford Street and into and out of the city would be maintained. The reduction in the number of traffic lanes could impact through traffic during some periods of the day. People driving from the Eastern suburbs along Oxford St to a destination in the City or beyond have numerous alternative routes such as Moore Park Road, the Eastern Distributor and the Cross City Tunnel or might opt for public transport.

## Background

In March 2020 Sydney began to adapt to changes in response to the global pandemic, Covid-19. One of the adaptations was the creation of new cycling infrastructure that would help manage capacity of public transport by providing a safe way to get around by bike.

The City in partnership with Transport for NSW (TfNSW) quickly designed and implemented six cycleways across the City of Sydney. The connections are well used and so other routes were identified including Oxford and Liverpool streets between Taylor Square and Castlereagh Street and College Street.

The original plan included a centre running cycleway on Oxford and Liverpool streets and reinstating the cycleway on College Street removed during light rail construction. The cycleway was to be made using easy to install and remove materials so that the project could be built quickly and help manage impacts of the pandemic.

The community was consulted in November 2020 and the proposal was well received. They told us they a safe connection for this route is needed and that if built would encourage people to ride more. There were some reservations about the centre running alignment and how the connection would be accessed.

#### Previous engagement report

Following this feedback, the connection was redesigned and workshopped with TfNSW in order to get in principle approval to reconsult the community. The best option for Oxford and Liverpool streets is to have the cycleway on the north side. The College Street cycleway is proceeding with the same plan consulted on in November 2020 and so was not re-exhibited.

The purpose of the engagement was to make plans available for comments that will inform a report to Council who will make a determination on the project. Engagement outcomes will also inform reports to Local Pedestrian, Cycling and Traffic Calming Committee.

The majority of feedback received during this round of community engagement is supportive and includes input on the design using Social PinPoint, a map based survey platform that prompts feedback in five categories:

- Bike network connections
- Traffic flow
- Access to properties
- Ideas and suggestions
- Make a comment

In addition to comments supporting (78) and opposing (15) the project, the main feedback topics were:

- 1. Continue safe riding connections to Centennial Park, Flinders Street, St Vincents Hospital and Kings Cross (23)
- 2. Ensure that access to the bus stops over the cycleway is safe, clearly marked and shelters are not covered in advertising (13)
- 3. Ensure light phasing prioritises people walking and riding (12)
- 4. Ensure that the design prioritises safety and access for people walking (10)
- 5. Support the closure of Liverpool Street (9)

Email submissions were also received from community, stakeholders and bike user groups.

## Engagement summary and activities

#### Early engagement

City project staff met with key stakeholders prior to community engagement to present plans, discuss access, public space use and any perceived impacts. The meetings were held with:

- Anzac Memorial
- Sydney Gay and Lesbian Mardi Gras
- Community and business leaders
- Woollahra Municipal Council
- Member for Sydney, Alex Greenwich's office

The updated plans were well received. The project team will make changes to the plans wherever possible to provide the best outcome for the community.

#### Community engagement activities

Key stakeholders and the broader community were consulted on the updated plans from 28 October 25 November 2021.

Two information sessions were held online – a lunch time session on Wednesday 10 November and an afternoon session on Thursday 11 November.

Three in person drop in sessions were held at Taylor Square on Tuesday 16, Wednesday 17 and Thursday 18 November.

The Sydney Your Say page was visited 1012 times during the consultation period. The plan was downloaded 213 times.

A notification letter was sent to 12,500 properties.

126 people dropped 193 pins on the Social PinPoint map based survey

We received a total of 31 emails submissions during the public exhibition period.

## Snapshot of feedback received



157 people had their say

1012 visited the sydneyyoursay.com.au page

126 used the Social Pinpoint map survey



78 comments were made supporting the project15 comments were made opposing the project

127 submissions provided qualified responses and suggestions

## Engagement summary - ideas and issues

	Bike network connections	Traffic flow	Access to properties	Ideas and Suggestions	Make a comment	All pin categories	Email submissions	Total	CoS response
Support the project	3	1			55	59	19	78	Noted
Continue safe riding connections to Centennial Park, Flinders Street, St Vincent's Hospital and Kings Cross	5			2	15	22	1	23	The City's Cycling Strategy and Action Plan 2018-2030 shows planned cycleways, including connections to these locations. We (or TfNSW, for state roads) plan to deliver these in the coming years.
Oppose the project	2				7	9	6	15	Noted
Ensure that access to the bus stops over the cycleway is safe, clearly marked and shelters are not covered in advertising				2	10	12	1	13	Sightlines will be carefully considered in the detail design.
Ensure light phasing prioritises people walking and riding	1	1		2	5	9	3	12	The city is working closely with TfNSW to provide priority for people walking and cycling.
Ensure that the design prioritises safety and access for people walking	1			2	7	10		10	The safety of people walking is a key consideration of the design

	Bike network connections	Traffic flow	Access to properties	Ideas and Suggestions	Make a comment	All pin categories	Email submissions	Total	CoS response
Support the closure of Liverpool Street		1			5	6	3	9	Noted
Support the part-closure of Palmer Street		1		3		4	2	6	Noted
Use new medians and closures for planting (natives preferred)					2	2	3	5	Planting will be incorporated where possible while balancing the needs of space for people walking
Create bike boxes (storage) at intersections	2	1		1		4	1	5	Bike boxes will be incorporated where appropriate.
Continue green line marking along entire length of cycleway especially at bus stops and intersections	1			3		4	1	5	We will design for consistency with the Transport for NSW Cycleway Design Toolbox, which stipulates where green should be used to highlight conflict points.
Install safe entry and exit sections of the cycleway so that people riding can join traffic to access side streets - signalise where needed		1		1	1	3	1	4	Bike riders will be able to enter/exit the cycleway at every intersection. A dedicated signal phase for turning movements will be incorporated where possible.
Install clear signage and enforce requirement that people don't ride on the footpath					2	2		2	Any "no cycling" sign would prevent legitimate footpath riding (for example by children, people with disabilities and posties) when they may need to. Police are responsible for enforcement.
Does not support the closure of Liverpool Street					2	2		2	Noted
Paint the cycleway rainbow					1	1	1	2	Unfortunately, this Is not practical
Provide turn bike signals for people riding in to side streets					1	1	1	2	Bike turn signals don't exist in Australia and the road rules yet, but we're working on it.

	Bike network connections	Traffic flow	Access to properties	Ideas and Suggestions	Make a comment	All pin categories	Email submissions	Total	CoS response
Make the transition over Elizabeth Street straight not a 'dog-leg'					1	1	1	2	The geometry of this transition will be further developed during the detailed design.
Make the cycleway conventional running - one way on each side of the road in the same direction as traffic					1	1	1	2	This option was investigated but found not to be feasible. Due to the interface with bus stops on both sides of the street and additional space required for a conventional running cycleway.
Slip lane from Elizabeth on to Liverpool Street is unsafe	1			1		2		2	The proposal provides additional space for people walking as well as an extended crossing time for people walking and riding.
Create a north-south connection from Liverpool Street to Pitt Street	1			1		2		2	The future cycleways on College Street and King Street will create a connection to Pitt Street cycleway.
Make entries into the cycleway wider				1		1	1	2	The design maximises the amount of road space that can be allocated for the cycleway.
Support relocation of bus stop from Liverpool Street to Elizabeth Street						0	2	2	Noted
Prioritise light phasing for vehicle lanes					1	1		1	The Transport for NSW Road User Space Allocation Policy sets a customer hierarchy that guides the allocation of time and space for different street users.
Make sure the cycleway is wide enough the bus stop islands					1	1		1	The cycleway will narrow slightly behind bus stops to discourage overtaking where bus passengers may be crossing.

	Bike network connections	Traffic flow	Access to properties	Ideas and Suggestions	Make a comment	All pin categories	Email submissions	Total	CoS response
Make parking free on weekends to compensate for loss of parking					1	1		1	The intention is to retain all parking and loading on Oxford Street unless it impacts on bus travel time.
Don't remove parking and loading on the south side of Liverpool Street					1	1		1	There is insufficient road width to retain the parking on the south side of Liverpool Street.
Does not support the half- closure of Palmer Street					1	1		1	Noted
Use space in closed off section of Palmer Street to create motorbike/scooter parking					1	1		1	The design of the half closure including parking allocations will be further refined during the detailed design of the project.
Create shared zones on Yurong Lane and similar - like Premier Lane	1					1		1	This suggestion is outside the scope of this project.
Signalised crossing not required mid block of Liverpool Street	1					1		1	The existing signal crossing provides direct access to The Hyde Park War Memorial.
Create a safe bike connection on Wentworth Avenue between Belmore Park and Oxford Street	1					1		1	There will be a safe bike connection between Belmore Park and Oxford Street using the cycleways on Castlereagh and Liverpool Streets.
Reduce area speed limit to 30km/h				1		1		1	30km/h is not yet an option in the NSW Speed Zoning Guidelines.
Open up the front of the court to the public - connect into Taylor Square				1		1		1	This is not within the scope of this project.
Resurface the road/cycleway				1		1		1	The cycleway will be fully resurfaced. The road will be resurfaced where required based on its current condition.

	Bike network connections	Traffic flow	Access to properties	Ideas and Suggestions	Make a comment	All pin categories	Email submissions	Total	CoS response
Make the use of the cycleway mandatory for people riding - do not allow for people to ride on the road				1		1		1	The Australian Road Rules allow bicycle riders to either use the road or separated cycleway.
Ensure there are adequate lanes for people continuing straight and turning at intersection - eg Kent and King		1				1		1	A dedicated right turn lane will be provided on the cycleway on Oxford St into College St.
Provide bike access north into Palmer Street			1			1		1	This will be investigated during the detailed design stage of the project.
Retain loading and parking for hospitality and entertainment venues		1				1		1	The intention is to retain all parking and loading on Oxford Street unless it impacts on bus travel time.
Narrow lanes on Liverpool Street to manage traffic speeds						0	1	1	The speed limit within the CBD is 40km per hour. The lanes widths are designed to the minimum required.
Remove right hand turn bans at Riley and Crown						0	1	1	The project will not change existing turn restrictions, as they exist for safety reasons.
Create a left hand turn ban at Crown and Oxford						0	1	1	This left turn is needed for car traffic access to the neighbourhood.
Provide more bike parking along the route						0	1	1	Noted. Bike racks can be requested via the City's website.
Prioritise separated cycleways over shared spaces						0	1	1	We do wherever possible. Access for people riding
Ensure bike access into Liverpool is retained						0	1	1	bicycles will be retained at the proposed street closure
When the cycleway is open, restrict access to Hyde Park						0	1	1	We expect the cycleways on Oxford, Liverpool, and College will reduce people riding through the park.

## **Appendices**

#### Appendix A: Sydney Your Say webpage (including online survey)

Proposed works & maintenance

## Oxford Street cycleway: Your feedback on updated designs

The cycleway on Oxford and Liverpool streets will create an important link in the bike network, connecting the city centre to the east.

#### Onder review

Contributions to this consultation are closed for evaluation and review. The project team will report back on key outcomes.

28 October 2021 to 25 November 2021

## Why we're doing this

In November and December 2020, we consulted on a <u>plan for a centre running</u> <u>pop-up cycleway on Oxford Street</u>. The community let us know a safe connection for people riding is well supported and provided feedback about operation and access of the centre running cycleway.

Following community feedback, we have reconsidered the design and now propose a permanent, higher quality bi-directional cycleway on the northern side of Oxford and Liverpool streets.

## What we're doing

Oxford Street is one of the city's busiest bike routes. This project is part of our program to make Sydney a safer place for people to walk and ride and provide more options for people to travel around the city.

The updated design will maintain loading and bus operations on Oxford Street. Transport for NSW will monitor the performance of the westbound kerbside lane and use of off-peak parking and loading spaces for 6 months after the cycleway opens, to identify and consider potential improvements. This will include evaluating bus reliability and potentially changing off-peak parking and loading hours, in consultation with the City of Sydney.

Parking and loading will be removed on Liverpool Street between Elizabeth and College streets and the bus stop on Liverpool Street will be relocated to Elizabeth Street.

This project is jointly funded by the City of Sydney and the NSW Government.

#### Cralg Ryan

SENIOR COMMUNITY ENGAGEMENT COORDINATOR

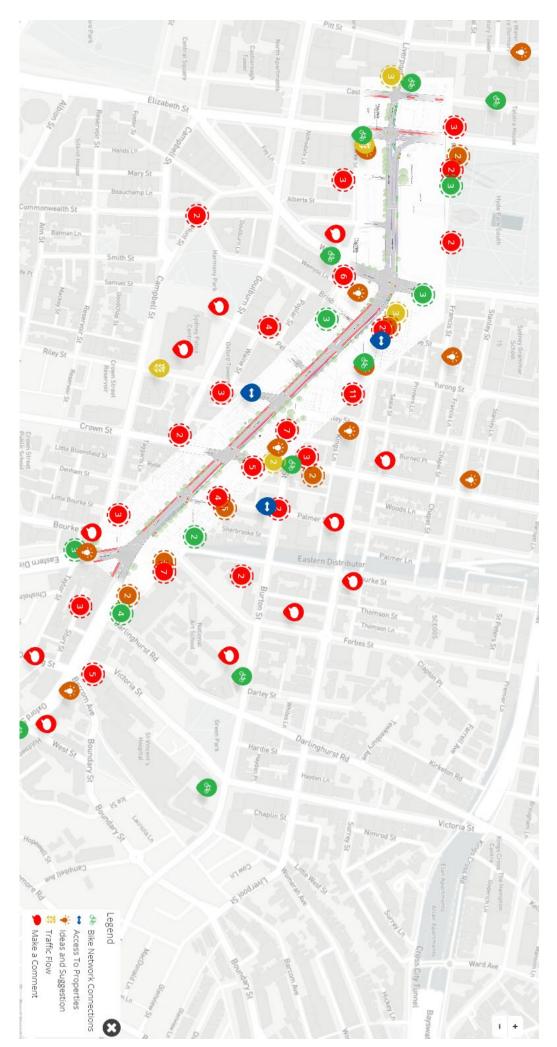
% 02 9265 9333

sydneycycleways@cityofsydn... copy email.aboress

Speak up. Sign up.

Get our regular newsletter to have your say.

Subscribe @





## **APPENDIX I** CONSTRUCTION AND MAINTENANCE NOISE ESTIMATOR



Transport for NSW

#### **Distanced Based Assessment (Noisiest Plant)**

Noise are	a category	R5
RBL or LA90	Day	60
Background level	Evening	55
(dB(A))	Night	50
	Day	70
LAeq(15minute)	Day (OOHW)	65
Noise Mangement Level (dB(A))	Evening	60
	Night	55
Noisie	st plant	Concrete Saw
Is there line of s	ight to receiver?	Yes

Steps for Assessment: 1. Schedule noisy works to occur in standard hours where possible or before 11pm and implement Standard Measures. In worksheat itiled 'Representative Noise Environ.' provides a number select the representative noise area category. The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category. select the noisiest plant. If not found in drop-down list, refer to 'Source List' and select a representative plant with equivalent sound power level. s there line of sight to receiver? Select the appropriate scenario from the drop down list . In the one of sight of received is because where feasible and reasonable. Include any shielding implemented as part of the standard mitigation measures by changing the selection in the 'Is there eof sightioaw to receiver' drop-down list. Solid barriers can be in the form of road cutting, timber lapped and capped fence, shipping container, site office, etc. Substantial solid barriers are barriers greater an 5 metres in height or multiple rows of houses or a sound barrier specifically designed to mitigate construction noise. Please note that vegetation and trees are not considered to be a form of solid barrier and gaps would compromise the acoustic integrity of the solid barrier. Determine if there are any receivers (both residential and non-residential receivers) within the affected distance for each relevant time period. Consider background LA90 noise measurements to check

umption in Step #2 if: there are many affected receivers and the impact duration at any one receiver is more than 3 weeks; or

there are a few affected receivers and the impact duration at any one receiver is more than 6 weeks.

te that consideration need to be given to the construction staging plan when determining impact duration.

dentify if there are any receivers within the additional mitigation measures distances and identify feasible and reasonable measures at each receiver.

Where night works are involved, identify sleep disturbance affected distance.

Document the outcomes of these steps.

to that suitable noise management levels for other noise-sensitive businesses not identified in the Construction and Maintenance Noise Estimator should be investigated on a project-by-project basis. Please ntact a Roads and Maritime noise speciliast for more information)

								LAeg(1)	5minute) noise level above bac	karound (LA90)								
				5 to 10 d	B(A)		10 to 20 dB(A)			o 30 dB(A)		>	> 30 dB(A)		LAeq(15minute) 75 dB	(A) or greater (Highl	y affected)	Sleep disutrbance LAmax 65 dB(A)
				Noticea	ble		Clearly audible	e	Modera	ately intrusive		Hig	hly intrusive					LAmax 03 0B(A)
		Affected distance (m)	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Measures	Within distance (m)	Mitigation level (dB(A))	Affected distance (m)
	Day	55					•		N, PC, RO	30	75	N, PC, RO	30	75	N, PC, RO	30	75	
Undeveloped green fields, rural	Day (OOHW)	95				N, R1, DR	55	70	N, R1, DR	25	80	N, R1, DR, PC, SN	15	85	N, PC, RO	30	75	1
areas with	Evening	140				N, R1, DR	95	65	N, R1, DR	30	75	N, R1, DR, PC, SN	15	85	N, PC, RO	30	75	
isolated dwellings	Night	200	N	200	55	N, R2, DR	140	60	N, PC, SN, R2, DR	55	70	AA, N, PC, SN, R2, DR	25	80	N, PC, RO	30	75	160
isolated dwellings	Highly Affected	30						_							N, PC, RO	30	75	
Developed	Day	60							N PC RO	35	75	N PC RO	35	75	N PC RO	35	75	]
settlements	Day (OOHW)	105				N, R1, DR	60	70	N, R1, DR	25	80	N, R1, DR, PC, SN	15	85	N, PC, RO	35	75	]
(urban and	Evening	155				N, R1, DR	105	65	N, R1, DR	35	75	N, R1, DR, PC, SN	15	85	N, PC, RO	35	75	
suburban)	Night	240	N	240	55	N, R2, DR	155	60	N, PC, SN, R2, DR	60	70	AA, N, PC, SN, R2, DR	25	80	N, PC, RO	35	75	185
Suburbury	Highly Affected	35								-					N, PC, RO	35	75	
	Day	70							N, PC, RO	45	75	N, PC, RO	45	75	N, PC, RO	45	75	
Propagation	Day (OOHW)	115				N, R1, DR	70	70	N, R1, DR	25	80	N, R1, DR, PC, SN	15	85	N, PC, RO	45	75	
across a valley /	Evening	190				N, R1, DR	115	65	N, R1, DR	45	75	N, R1, DR, PC, SN	15	85	N, PC, RO	45	75	
over water	Night	310	N	310	55	N, R2, DR	190	60	N, PC, SN, R2, DR	70	70	AA, N, PC, SN, R2, DR	25	80	N, PC, RO	45	75	230
	Highly Affected	45													N PC RO	45	75	

Non-residential receiver													
Undeveloped green fields, rural areas with isolated dwellings						LAeq(15minut	e) noise level above NML			LAeq(15minute) 75 dE	(A) or greater (High	alv affected)	
		Standard h	ours	<10 dB(A) 10 to 20 dB(A)									
	Period	Period NML Affected M			Within distance	Mitigation level	Measure	Within distance	Mitigation level	I Measure	Within distance		
	i enou	NINE	distance (m)	Measure	(m)	(dB(A))	measure	(m)	(dB(A))	Measure	(m)	(dB(A))	
Classroom at schools and other educational institutions	Day	55	200				N	95	65	N, PC, RO	30	75	
Hospital wards and operating theatres	Day	65	95			-				N, PC, RO	30	75	
Place of worship	Day	55	200				N	95	65	N PC RO	30	75	
Active recreation	Day	65	95							N, PC, RO	30	75	
Passive recreation	Day	60	140				N	55	70	N, PC, RO	30	75	
Industrial premise	Day	75	30			-				N, PC, RO	30	75	
Offices, retail outlets	Day	70	55							N, PC, RO	30	75	

									LAeq(15minut	e) noise level above NML					
		OOHV	V		< 5 dB(A)		5 to	15 dB(A)		15	to 25 dB(A)		>	25 dB(A)	
	Period	NML	Affected	Measure	Within distant	Mitigation level	Measure		Mitigation level	Measure	Within distance		Measure	Within distance	
			distance (m)		(m)	(dB(A))		(m)	(dB(A))		(m)	(dB(A))		(m)	(dB(A))
Hospital wards and operating theatres	Evening	65	95				N, R1, DR	55	70	N, R1, DR	17	80	N, R1, DR, PC, SN	5	90
nospital wards and operating meanes	Night	65	95	N	95	65	N, R2, NR	55	70	N, PC, SN, R2, DR	17	80	AA, N, PC, SN, R2, DR	5	90
Place of worship	Evening	55	200				N, R1, DR	140	60	N, R1, DR	55	70	N, R1, DR, PC, SN	17	80
Flace of worship	Night	55	200	N	200	55	N, R2, NR	140	60	N, PC, SN, R2, DR	55	70	AA, N, PC, SN, R2, DR	17	80
Active recreation	Evening	65	95				N, R1, DR	55	70	N, R1, DR	17	80	N, R1, DR, PC, SN	5	90
Passive recreation	Evening	60	140				N, R1, DR	95	65	N, R1, DR	30	75	N, R1, DR, PC, SN	9	85
Industrial premise	Evening	75	30				N R1 DR	17	80	N R1 DR	5	90	N R1 DR PC SN	2	100
industrial premise	Night	75	30	N	30	75	N, R2, NR	17	80	N, PC, SN, R2, DR	5	90	AA, N, PC, SN, R2, DR	2	100
Offices, retail outlets	Evening	70	55				N, R1, DR	30	75	N, R1, DR	9	85	N, R1, DR, PC, SN	3	95
Unices, retail Outlets	Night	70	55	N	55	70	N, R2, NR	30	75	N, PC, SN, R2, DR	9	85	AA, N, PC, SN, R2, DR	3	95

Non-residential receiver													
Developed settlements (urban and suburban)						LAeq(15minut	e) noise level above NML			LAeq(15minute) 75 dB(A) or greater (Highly affected)			
		Standard h	ours	<10 dB(A) 10 to 20 dB(A)					Exeq(15minute) /5 ub(A) of greater (highly affected)				
	Period	NML	Affected distance (m)	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	Measure	Within distance (m)	Mitigation level (dB(A))	
Classroom at schools and other educational institutions	Day	55	240				N	105	65	N, PC, RO	35	75	
Hospital wards and operating theatres	Day	65	105							N, PC, RO	35	75	
Place of worship	Day	55	240				N	105	65	N, PC, RO	35	75	
Active recreation	Day	65	105							N, PC, RO	35	75	
Passive recreation	Day	60	155				N	60	70	N, PC, RO	35	75	
Industrial premise	Day	75	35							N, PC, RO	35	75	
Offices, retail outlets	Day	70	60							N, PC, RO	35	75	

	LAeq(15minute) noise level above NML											
OOHW	< 5 dB(A)	5 to 15 dB(A)	15 to 25 dB(A)									

Abbreviation	Measure
N	Notification
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Note that spot check verification of noise levels and individual briefings are not required for projects with less than 3 weeks impact duration





	Period NML Affected		Affected	Measure	Within distan	ce Mitigation level	Measure	Within distance	Mitigation level	Measure	Within distance	Mitigation level	Measure	Within distance	Mitigation level
	Period		distance (m)	weasure	(m)	(dB(A))	weasure	(m)	(dB(A))	weasure	(m)	(dB(A))	weasure	(m)	(dB(A))
Hospital wards and operating theatres	Evening	65	105				N, R1, DR	60	70	N, R1, DR	20	80	N, R1, DR, PC, SN	6	90
nospital wards and operating meatres	Night	65	105	N	105	65	N, R2, NR	60	70	N, PC, SN, R2, DR	20	80	AA, N, PC, SN, R2, DR	6	90
Place of worship	Evening	55	240				N, R1, DR	155	60	N, R1, DR	60	70	N, R1, DR, PC, SN	20	80
Place of worship	Night	55	240	N	240	55	N, R2, NR	155	60	N, PC, SN, R2, DR	60	70	AA, N, PC, SN, R2, DR	20	80
Active recreation	Evening	65	105				N, R1, DR	60	70	N, R1, DR	20	80	N, R1, DR, PC, SN	6	90
Passive recreation	Evening	60	155				N, R1, DR	105	65	N, R1, DR	35	75	N, R1, DR, PC, SN	11	85
Industrial premise	Evening	75	35				N, R1, DR	20	80	N, R1, DR	6	90	N, R1, DR, PC, SN	2	100
industrial premise	Night	75	35	N	35	75	N, R2, NR	20	80	N, PC, SN, R2, DR	6	90	AA, N, PC, SN, R2, DR	2	100
Offices, retail outlets	Evening	70	60				N, R1, DR	35	75	N, R1, DR	11	85	N, R1, DR, PC, SN	4	95
Offices, retail outlets	Night	70	60	N	60	70	N, R2, NR	35	75	N, PC, SN, R2, DR	11	85	AA, N, PC, SN, R2, DR	4	95

Non-residential receiver												
Propagation across a valley / over water						LAeq(15minu	te) noise level above NML			LAeq(15minute) 75 dE		nly affected)
		Standard h	ours		<10 dB(A)		10 to	o 20 dB(A)		LAeq(ISIMINULE) /S de	S(A) or greater (Higi	ily allected)
	Period	NML	Affected	Measure	Within distance	Mitigation level	Measure	Within distance	Mitigation level	Measure	Within distance	Mitigation level
	Feriou		distance (m)	Weasure	(m)	(dB(A))	Measure	(m)	(dB(A))	Weasure	(m)	(dB(A))
Classroom at schools and other educational institutions	Day	55	310				N	115	65	N, PC, RO	45	75
Hospital wards and operating theatres	Day	65	115							N, PC, RO	45	75
Place of worship	Day	55	310				N	115	65	N, PC, RO	45	75
Active recreation	Day	65	115							N PC RO	45	75
Passive recreation	Day	60	190				N	70	70	N, PC, RO	45	75
Industrial premise	Day	75	45							N, PC, RO	45	75
Offices, retail outlets	Day	70	70							N, PC, RO	45	75

									LAeq(15minut	te) noise level above NML					
		OOHV	1		< 5 dB(A)		5 to	15 dB(A)		15	to 25 dB(A)		>	25 dB(A)	
	Period	NML	Affected	Measure	Within distance	e Mitigation level	Measure	Within distance	Mitigation level	Measure	Within distance	Mitigation level	Measure	Within distance	Mitigation level
	Fellou		distance (m)	Weasure	(m)	(dB(A))	Weasure	(m)	(dB(A))	IviedSure	(m)	(dB(A))	Weasure	(m)	(dB(A))
Hospital wards and operating theatres	Evening	65	115				N, R1, DR	70	70	N, R1, DR	25	80	N, R1, DR, PC, SN	6	90
Hospital wards and operating meanes	Night	65	115	N	115	65	N, R2, NR	70	70	N, PC, SN, R2, DR	25	80	AA, N, PC, SN, R2, DR	6	90
Place of worship	Evening	55	310				N, R1, DR	190	60	N, R1, DR	70	70	N, R1, DR, PC, SN	25	80
	Night	55	310	N	310	55	N, R2, NR	190	60	N, PC, SN, R2, DR	70	70	AA, N, PC, SN, R2, DR	25	80
Active recreation	Evening	65	115				N, R1, DR	70	70	N, R1, DR	25	80	N, R1, DR, PC, SN	6	90
Passive recreation	Evening	60	190				N, R1, DR	115	65	N, R1, DR	45	75	N, R1, DR, PC, SN	15	85
Industrial premise	Evening	75	45				N, R1, DR	25	80	N, R1, DR	6	90	N, R1, DR, PC, SN	2	100
industrial premise	Night	75	45	N	45	75	N, R2, NR	25	80	N, PC, SN, R2, DR	6	90	AA, N, PC, SN, R2, DR	2	100
Offices, retail outlets	Evening	70	70				N, R1, DR	45	75	N, R1, DR	15	85	N, R1, DR, PC, SN	4	95
Unices, fetall outlets	Night	70	70	N	70	70	N, R2, NR	45	75	N, PC, SN, R2, DR	15	85	AA, N, PC, SN, R2, DR	4	95

#### **ABOUT US**

vsp

WSP is one of the world's leading engineering professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, planners, surveyors, environmental specialists, as well as other design, program and construction management professionals. We design lasting Property & Buildings, Transportation & Infrastructure, Resources (including Mining and Industry), Water, Power and Environmental solutions, as well as provide project delivery and strategic consulting services. With 43,600 talented people in more than 550 offices across 40 countries, we engineer projects that will help societies grow for lifetimes to come.