Appendix R

Ason Group traffic report

Prepared for
STOCKLAND

Traffic Impact Assessment Report

Master Plan for Proposed Commercial Development
11-17 Khartoum Road and 33-39 Talavera Road, Macquarie Park

Ref: 0513r01
3/08/2018

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Document Control

Project: 0513

Reference: 11-17 Khartoum Road and 33-39 Talavera Road, Macquarie Park

Client: Stockland

File Reference: 0513r01v1 DA TIA_Khartoum Road and Talavera Road, Macquarie Park, Issue

Revision History

Revision	Date	Details	Author	Approved by
-	06/07/2018	Draft	R. Butler-Madden	J. Mulhaire
I	3/08/2018	Issue	R. Butler-Madden	J. Mulhaire

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1 Introduction

1.1 Background

Ason Group has been commissioned by Stockland to provide traffic, transport and parking advice in support of a Masterplan Development Application (DA) for the commercial development at 11-17 Khartoum Road and 33-39 Talavera Road, Macquarie Park (the Site). The Site is located within the City of Ryde (the Council) Local Government Area and the development has been assessed against that Councils controls.

An indicative Masterplan (the Proposal) – known as the Macquarie Technology Centre (MTC) - has been developed which consists of 5 commercial buildings (A – E) with ancillary retail, new external public roads, two internal private roadways and a central park accommodating internal/ancillary retail for the Site. The Masterplan will undergo 5 stages of construction, with the Stage 1 DA currently under consideration. The Stage 1 development consists of an internal roadway that will connect to Khartoum Road and provide vehicular access to the basement level car park and loading bay.

This report addresses the relevant traffic and parking implications of the Masterplan including compliance with relevant State and Local Government controls and impacts on the local and regional road networks. Given the evolving nature of the Macquarie Park Precinct, this report provides high level overview of the likely traffic impacts noting that each building would be subject to a detailed Development Application. As there is no projected timing for the ultimate completion of the MTC, the horizon year of 2031 has been adopted for assessment purposes.

1.2 Document References

In the preparation of this report, reference is made to the following documents:

- Ryde Local Environmental Plan 2014 (Council LEP)
- City of Ryde Development Control Plan 2014 (Council DCP)
- City of Ryde Development Control Plan 2014, Part: 4.5 – Macquarie Park Corridor (Macquarie Park DCP)
- TfNSW Integrated Public Transport Service Planning Guidelines (TfNSW Guideline)
- RMS (formerly RTA) Guide to Traffic Generating Developments (RMS Guide)
- RMS Technical Direction 2013/04a – Guide to Traffic Generating Developments; Updated traffic surveys - TDT 2013/04a (RMS Guide Update)
- Australian Standard 2890.1 (2004): *Off-street car parking* (AS2890.1)

- Australian Standard 2890.2 (2002): *Off-street commercial vehicle facilities* (AS2890.2)

1.3 Site Description

The subject Site is located on the western corner of 11-17 Khartoum Road and 33 Talavera Road, Macquarie Park, and it is legally described as Lot 1 DP633221 and under the Masterplan for the site, will accommodate a total of 5 separate buildings, titled Buildings A to E with supporting retail. These buildings will be located around the perimeter of an open space with a new pedestrian through link cutting through the middle of the Site. A Location and Site Plan is presented in **Figure 1** highlighting the Masterplan boundaries of the site.

The Site is surrounded by existing commercial developments and is generally rectangular in shape, encompassing an approximate area of 30,030m^2. The Site is currently comprised of a number of large car parks, with two commercial building at the centre of the site.

Vehicular access to the site is currently provided via 3 accesses along Khartoum Road and 2 access points along Talavera Road.

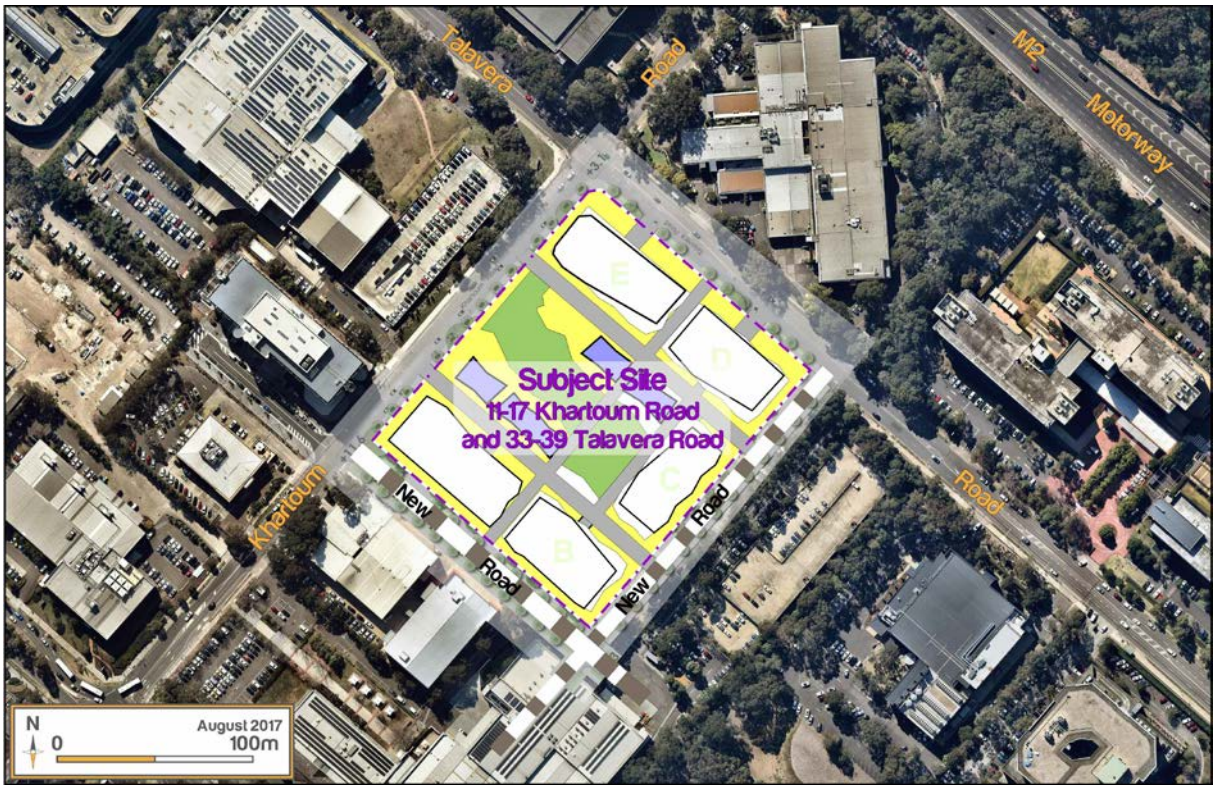


Figure 1: Location and Site Plan

1.4 Macquarie Park Corridor

The Macquarie Park Development Control Plan (MPDCP) 2014 provides guidelines, objectives and controls for applicants who wish to carry out development in the City of Ryde. Part 4.5 outlines the objectives, controls and design criteria to achieve desirable development outcomes in line with Council's vision for the Macquarie Park Corridor (MPC). The subject site is located within the MPC boundaries.

The MPDCP outlines the importance of Sustainable transport and travel demand management which is a major strategic concern within the MPC. With a travel modal split for public transport at 20% in 2011, the MPDCP seeks to increase public transport usage to 40% by 2031. As of April 2017, reduced parking rates and maximum provisions were set for MPC which sought to increase public transport usage. These revised rates are applicable to the subject Site and compliance has been achieved to assist with the mode share shift.

A key aim of this DCP is to create an access network that will:

"a. Achieve a more permeable network promoting greater connectivity and integration between land uses and the station precincts.

b. Achieve a safe and convenient pedestrian environment that encourages public transport use and social interaction.

c. Create additional streets that will:

i. Reduce pressure on the existing road and pedestrian infrastructure; and

ii. Provide new opportunities for business and street addresses."

The MPDCP aims to create a permeable network of streets and pedestrian ways to improve vehicular, pedestrian and cycle permeability within the corridor. This is particularly relevant to this Masterplan DA which is afforded signalised pedestrian crossings to the north of the site at the intersection of Khartoum Road and Talavera Road which is directly at the Site's northern street front corner as well as the proposed pedestrian link through the middle of Site as part of MPDCP's access network.

Pedestrian Connections and specifically through site links are required under the MPDCP to contribute to the walkability of the corridor and maximise pedestrian accessibility, amenity and safety. A key pedestrian connection objective is to expand and enhance the pedestrian network and increase pedestrian permeability throughout the Macquarie Park Corridor. Furthermore, the MPDCP acknowledges that these pedestrian connections should be accommodated across barriers such as the M2 and link to pedestrian amenities such as Macquarie University Station and Macquarie Centre bus interchange – in order to promote walking access to public space and public transport.

Given the Site's location, in close proximity to excellent public transport (existing and future facilities), it is ideally located to align with the objectives and premises of the MPCP.

1.5 Study Objectives

This Masterplan Traffic Impact Assessment (TIA) seeks to detail the traffic and parking demand of the Site with estimated projections on the external road network. With this, the TIA study objectives are:

- Traffic Generation Rates:

  OB1 Confirm and endorse a suitable 'trip per parking space' rate to adopt for assessing traffic impacts of the development.

  Ryde DCP 2014 permits 'constrained' levels of car parking and indeed local parking restrictions exist which would generally prohibit Macquarie Park employees parking on-street. It is therefore considered that the most accurate way of assessing the traffic generation of development within Macquarie Park is to use a 'trip per parking space' rate. Ason Group has liaised with CoR Council, agreed on a suitable comparable development and undertaken a weeks survey to estimate the most appropriate trip rate for adoption.

- Traffic Impacts:

  OB2 Assess the forecast traffic generation of the current Proposal and undertake network performance testing to demonstrate that the net traffic impacts of the Proposal.

- Sustainable Travel:

  OB3 Assess the Site's sustainable transport accessibility to demonstrate that the Site is strategically located to achieve the public transport goals of the MPDCP and provides improved pedestrian connectivity and permeability across the Site, at Khartoum Road and towards the Macquarie Park Train Station / Macquarie University Train Station.

- Design:

  OB4 Demonstrate that the Site can provide suitable Site access, internal design, car parking and loading facilities for each building which would be designed to comply with relevant Australian standards and MPDCP controls and therefore would provide safe and efficient access to, from and within the proposed development.

1.6 Report Structure

The report is structured as follows:

- Section 2 provides a summary of the proposed MTC development.
- Section 3 details the relevant strategic transport planning context.
- Section 4 describes the existing site conditions, public transport, pedestrian and cycling links.
- Section 5 outlines the parking requirements applicable to the Proposal.
- Section 6 assesses the traffic impacts of the development including the Site's projected trip generation and forecasted network performance
- Section 7 discusses the site access and internal design of the development
- Section 8 outlines the Framework for the future travel planning of the commercial building
- Section 9 provides a summary of the key conclusions.

2 Proposed Development

2.1 Proposed Development Scheme

This DA seeks approval for a concept Masterplan for the proposed Macquarie Technology Centre (MTC), which would consist of commercial buildings with ancillary retail. It is understood that approval is sought for the GFA and building envelopes only and that each building would be subject to a separate DA.

A detailed description of the Proposal is included in the Statement of Environmental Effects (SEE). In summary, approval is sought for the following:

- A total of 59,769m^2 GFA including:
    - 59,219m^2 of Commercial GFA
    - 550m^2 of Retail GFA (ancillary use)
- 2 new internal access roads

These will be designed with the following RLEP and RDCP objectives in mind:

- Site & Building Layout including internal road structure which is proposed in accordance with Council's Structure Plan.
- The proposed internal road and pedestrian link network for the Site is consistent with that shown in Figure 4.1.1 of Part 4.5 of Council's DCP.
- City of Ryde permits maximum parking based on the LEP parking rates of 1 space per 60 m^2. The Proposal is therefore permitted to provide 998 car parking spaces noting that compliance with these rates would be sought at the relevant DA stages.

The Masterplan consists of five separate buildings titled Buildings A to E, surrounding an open space which fronts onto Khartoum Road with a pedestrian link cutting through the middle of the Site connecting Talavera Road to Council's proposed Road 1. The concept of the Masterplan layout is shown by **Figure 2**. This concept is consistent with the permitted land use and Council's structure plan for the area.

The masterplan for the site will be constructed over five stages (Buildings A-E). The concept proposal will provide a new road (Road 22 – 14.5m wide) along the south eastern boundary in accordance with Council's future road layout / structure plan and in delivered two parts during Stage 2 and 4. It should be noted that Council will provide a road along the south western site boundary (Road 1) and delivered at a future stage. Two Internal (private) roads will provide connectivity between Khartoum

Road and Road 22 and improved permeability/dispersion of traffic through the site. A central park with ancillary retail is also proposed as part of the future master planning for the site.

This summary provides an overview of the future site development and potential traffic generating characteristics for which separate Development Applications would be submitted and assessed in detail at a later stage.

Figure 2: Site Plan

The above Site Plan is indicative only for illustration purposes of the Site massing and based on conceptual ideas. Thus, it should be noted that no private access driveways are proposed from Talavera Road. All car and servicing access to Building D and E would be provided from the internal road network.

3 Strategic Transport and Planning Context

3.1 Introduction

The strategic context of the study area is governed by three frameworks, being:

- State and regional strategic planning policies;
- Regional transport planning policies;
- and Local transport planning context.

This section provides an overview of the main aspects of each these and their relevance to the study area. It then goes on to discuss the current transport planning projects being undertaken to improve traffic congestion in Macquarie Park, these being:

- Bus Priority & Capacity Improvements for Macquarie Park; and
- Sydney Metro Northwest.

3.2 State and Regional Strategic Planning Policies

3.2.1 NSW State Policies

NSW State Priorities	
Organisation	NSW Government
Date	22 December 2017
Purpose	Improving outcomes for the people of NSW – with clear goals and accountability
Content	**Building infrastructure** Improving road travel reliability – to ensure consistency of journey times on key roads continues to improve, we are working to make better use of existing road infrastructure, build extra road capacity and encourage commuters to use public transport and to undertake off-peak travel more often. This will enable business and the community to move around the city with greater ease, reducing travel times, boosting productivity and reducing business costs. **Ensure on-time running for public transport** Maintain or improve reliability of public transport services over the next four years. Public transport services in Sydney are crucial in getting customers to their destinations. Although Sydney is undergoing a large amount of infrastructure construction, we are working to ensure that public transport services continue to run on time. The government is also improving integration across public transport services, updating timetables and providing clear information to get people to their destinations on time. **Creating Jobs** Create 150,000 new jobs by 2019. The government is supporting businesses by funding and support for start-ups, fast-growth small and medium-sized enterprises, regional businesses, accelerators and incubators. Creating jobs and apprenticeships for the construction sector through government sector is helping to ensure a skilled workforce. Regional development is being supported with $1.3 billion invested in regional infrastructure.

NSW State Priorities	
Relevance to the Site	The Masterplan provides the concept and framework for future development of the Site, which will provide six buildings for commercial purposes, providing space to create new jobs. Connectivity and permeability of the urban design encourages sustainable transport use.

3.2.2 NSW Long Term Transport Masterplan

NSW Long Term Transport Masterplan	
Organisation	NSW Government
Date	December 2012
Purpose	Setting the framework for the NSW Government to deliver an integrated, modern transport system that puts the customer first.
Content	The Masterplan is principally focused on the **six key transport challenges** that emerged from our analysis and our engagement with our customers. • Integrating modes to meet customer needs • Getting Sydney moving again • Sustaining growth in Greater Sydney • Providing essential access to regional NSW • Supporting efficient and productive freight • Statewide actions The Masterplan responds to these challenges through **four types of action**: • Integrate transport services • Modernise our system • Grow our networks to meet future demand (including the important tasks of corridor preservation) • Maintain important road and public transport assets.
Relevance to the Site	New roads will: • Offer the opportunity to provide improved pedestrian and cycle connectivity • Enhance vehicular connectivity with the surrounding areas • Accommodate increased traffic movement • Help to establish a clear hierarchy of streets.

3.2.3 The NSW State Infrastructure Strategy 2018-2038

The NSW State Infrastructure Strategy 2018-2038 builds on the NSW Government's major long-term infrastructure plans over the last 7 years. It sets out the government's priorities for the next 20 years, and is underpinned by:

- NSW State Infrastructure Strategy 2018-2038: Building Momentum
- Greater Sydney Region Plan
- Future Transport Strategy 2056

NSW State Infrastructure Strategy 2018-2038: Building Momentum	
Organisation	Infrastructure NSW
Date	February 2018
Purpose	Infrastructure NSW's independent advice on the current state of NSW's infrastructure and the needs and priorities over the next 20 years.
Content	The Strategy sets six cross-sectoral strategic directions, each designed to achieve 'more with less' from the State's large infrastructure program and asset base. • Continuously improve the integration of land and infrastructure planning • Plan, prioritise and deliver an infrastructure program that represents the best possible investment • Optimise the management, performance and use of State's assets • Ensure NSW's existing and future infrastructure is resilient • Improve statewide connectivity and realise the benefits of technology • Drive high quality consumer-centric services and expand innovative service delivery models
Relevance to the Site	Business cases for on-road rapid transit links for buses and high efficiency vehicles connecting strategic centres together, including Macquarie Park, are to be developed by the end of 2019.

Greater Sydney Region Plan: A Metropolis of Three Cities – Connecting People	
Organisation	Greater Sydney Commission
Date	March 2018
Purpose	Supports the vision for a metropolis of three cities that will rebalance growth and deliver its benefits more equally and equitably to residents across Greater Sydney.
Content	Conceptualises Greater Sydney as a metropolis of three cities: • Established Eastern City • Developing Central City • Emerging Western City A productive Sydney A liveable Sydney A sustainable Sydney
Relevance to the Site	The well-connected Eastern Economic Corridor from Macquarie Park to Sydney Airport is of national significance and currently contains approximately 775,000 jobs, with Macquarie Park a major asset of the corridor. A number of committed and potential transport infrastructure projects will improve accessibility along the corridor and significantly increase the size of the labour market which can access the corridor by public transport, boosting productivity. This includes a potential mass transit link from Parramatta to Epping which would significantly improve the connection between Macquarie Park and Greater Parramatta.

Future Transport Strategy 2056	
Organisation	Transport for NSW
Date	March 2018
Purpose	The vision for how transport and land-use planning can support growth and the NSW economy. The Strategy is an update of the NSW Long Term Transport Master Plan.
Content	The Strategy is focused on six key outcomes for the future of mobility in the state, which together aim to positively impact the economy, communities and environment of NSW. • Customer Focused – experiences are interactive and personalised, supported by technology • Successful Places – success of communities and places are enhanced by transport • Growing the Economy – transport system enables economic activity across the state • Safety and Performance – Every customer enjoys safe travel across an efficient network • Accessible Services – transport enables everyone to get the most out of life • Sustainable – transport system is economically and environmentally sustainable. The projects set out by the 2012 Master Plan align with State Priorities to deliver better infrastructure and services, create safer communities, reduce road fatalities by more than 30 per cent by 2021 and improve road travel reliability and on time running. Improvements resulting from the 2012 Master Plan have created a solid foundation for the deployment of new technology and innovative service models. Through Future Transport 2056, NSW will maximise the benefits of emerging technologies and innovation in delivering outcomes.
Relevance to the Site	The Strategy aims to increase the mode share of public transport services and reduce the use of single occupant vehicles. The Proposal will look to reduce private vehicle travel through the implementation of Green Travel Plans for each building with the MTC, aligning with the objectives of the Strategy.

3.2.4 NSW Planning Guidelines for Walking and Cycling

NSW Planning Guidelines for Walking and Cycling	
Organisation	NSW Government
Date	December 2004
Purpose	Assisting land use planners and related professionals to improve consideration of walking and cycling in their work. It is anticipated that this will ultimately create more opportunities for people to live in places with easy walking and cycling access to urban services and public transport.
Content	Assistance is provided by these guidelines in the form of principles, background information, case studies and references to other supportive policies and guidelines. This information can be used to develop planning instruments, at all levels, that are supportive of walking and cycling.
Relevance to the Site	In 2002, a TMAP was prepared for the NSW Government and Ryde Council to guide the redevelopment of the Macquarie Park employment corridor for the next 15 to 20 years.

3.3 Regional Transport Context Documents

3.3.1 North District Plan

North District Plan	
Organisation	Great Sydney Commission
Date	March 2018
Purpose	Setting out aspirations and proposals for Greater Sydney's North District
Content	This District Plan includes three chapters focusing on the means to enhance the District's productivity, sustainability and liveability in accordance with A Plan for Growing Sydney and the Commission's mandate.
Relevance to the Site	Macquarie Park is the largest non-CBD office market in Australia and is set to become Australia's fourth largest commercial precinct by 2030. Economic growth and a greater diversity of jobs is to be targeted at strategic centres like Macquarie Park, the Site will facilitate employment opportunities. The Site will add to producing new walking and cycling networks for the North District.

3.3.2 A Plan for Growing Sydney

A Plan for Growing Sydney	
Organisation	NSW Government Planning & Environment
Date	December 2014
Purpose	To development a competitive economy with world-class services and transport; to deliver greater housing choice to meet our changing needs and lifestyles; to create communities that have a strong sense of wellbeing; and to safeguard our natural environment.
Content	The actions include: • accelerating urban renewal across Sydney at train stations, providing homes closer to jobs • growing a more internationally competitive Sydney CBD • growing Greater Parramatta as Sydney's second CBD • transforming the productivity of Western Sydney through growth and investment • enhancing capacity at Sydney's Gateways – Port Botany, Sydney Airport and Badgerys Creek Airport • delivering the infrastructure that is needed • promoting Sydney's arts and culture, tourism and entertainment industries • protecting our natural environment • managing long-term growth
Relevance to the Site	Priorities for strategic centres - Macquarie Park: • Work with council to retain a commercial core in Macquarie Park for long-term employment growth. • Work with council to concentrate capacity for additional mixed-use development around train stations, including retail, services and housing. • Facilitate delivery of Herring Road, Macquarie Park Priority Precinct, and North Ryde Station Priority Precinct. • Investigate potential future opportunities for housing in areas within walking distance of train stations. • Support education and health-related land uses and infrastructure around Macquarie University and Macquarie University Private Hospital. • Support the land use requirements of the Medical Technology knowledge hub. • Investigate a potential light rail corridor from Parramatta to Macquarie Park via Carlingford. • Investigate opportunities to deliver a finer grain road network in Macquarie Park. • Investigate opportunities to improve bus interchange arrangements at train stations. • Work with council to improve walking and cycling connections to North Ryde train station.

3.3.3 Development Near Rail Corridors and Busy Roads – Interim Guideline

Development Near Rail Corridors and Busy Roads – Interim Guideline	
Organisation	NSW Government Department of Planning
Date	2008
Purpose	To assist in reducing the health impacts of rail and road noise and adverse air quality on sensitive adjacent development. To assist in the planning, design and assessment of development in, or adjacent to, rail corridors and busy roads.
Content	Strategic planning context: contains general guidance for council strategic planning purposes, and for other government agencies or private proponents investigating possible locations for residential development, places of worship, hospitals, child care centres and schools. It also provides guidance on site selection to reduce or avoid the need for mitigation measures Potential impacts of roads and railways on adjacent development: contains information on development that may be impacted by rail corridors and busy roads. Potential impacts of adjacent development on roads and railways: contains information on development that may impact on rail corridors and busy roads. Land use strategies for transport corridors and centres include providing places and locations for services, commercial and business activities and a range of other employment and economic activity; increasing densities and clustering business and other activities in strategic centres.
Relevance to the Site	Location of site near Macquarie Park station means will increase rail patronage.

3.3.4 Sydney's Walking Future 2013

Sydney's Walking Future 2013	
Organisation	NSW Government
Date	December 2013
Purpose	Getting people in Sydney walking more through actions that make it a more convenient, better connected and safer mode of transport.
Content	Three pillars of Sydney's Walking Future • PROMOTE benefits and provide information • CONNECT through infrastructure and technology • ENGAGE through policy and partnerships
Relevance to the Site	In 2011-12, the NSW Government delivered 65 pedestrian infrastructure projects, including the delivery of $5 million pedestrian footbridge at Macquarie Park connecting Epping High School students and local residents to locations across Epping Road. Transport Management Associations, which are partnerships across multiple levels of government and local businesses, are being piloted at Macquarie Park and will be rolled out progressively in other areas of Sydney.

3.4 Local Planning Context

3.4.1 Ryde Local Environmental Plan 2014

Ryde Local Environmental Plan 2014	
Organisation	City of Ryde Council
Date	1 September 2017
Purpose	Ryde Local Environmental Plan (LEP) 2014 – a comprehensive Plan for the City of Ryde together with the Ryde Development Control Plan (DCP) 2014 provides the necessary framework for how the City of Ryde will advance. It also balances the needs of residents, businesses and investors today with those of future generations.
Content	Contains various maps for the Macquarie Park Corridor, including a Parking Restrictions Map, Floor Space Ratio Map; and Height of Buildings Map. Part 4.5B of the LEP points towards restricting car parking for the Macquarie Park Corridor to *encourage the use of alternative types of transport by providing for accessibility by pedestrians, cycling and public transport*
Relevance to the Site	The Site will help improve pedestrian connectivity to the south side of Waterloo Road and thus Macquarie Park train station.

3.4.2 City of Ryde DCP 2014 – Part 4.5 Macquarie Park Corridor

City of Ryde Development Control Plan 2014	
Organisation	City of Ryde Council
Date	14 February 2017
Purpose	The Development Control Plan (DCP) 2014 provides guidelines, objectives and controls for people who wish to carry out development in the City of Ryde. Part 4.5 provides objectives, controls and design criteria to achieve desirable development outcomes in line with Council's vision for the Macquarie Park Corridor.
Content	Development Control Plan 2014 Part: 4.5 Macquarie Park Corridor To create an access network that will: a. Achieve a more permeable network promoting greater connectivity and integration between land uses and the station precincts. b. Achieve a safe and convenient pedestrian environment that encourages public transport use and social interaction. c. Create additional streets that will: i. Reduce pressure on the existing road and pedestrian infrastructure; and ii. Provide new opportunities for business and street addresses.
Relevance to the Site	The Site is located within this land covered by Part 4.5 of the DCP.

3.4.3 Macquarie Park Pedestrian Access and Mobility Plan

Macquarie Park Pedestrian Access and Mobility Plan	
Organisation	City of Ryde Council (Arup)
Date	21 June 2013
Purpose	Provides a framework for developing safe and convenient pedestrian routes and fostering improvements in personal mobility.
Content	Recommended actions are identified in the form of the PAMP Action Plan. The PAMP Action Plan also explores potential funding sources for the works identified in the plan.
Relevance to the Site	Key issues: • Lack of pedestrian crossing/ need for increased pedestrian crossings • Pedestrian safety at all crossing • Pedestrian safety at other locations • Motorist behaviour Main locations of concern: • Waterloo Road • Waterloo Road/Lane Cove Road intersection • Lane Cove Road (between Talavera Road and Waterloo Road)

3.5 Bus Priority & Capacity Improvements for Macquarie Park

The site will benefit from the proposed bus priority and capacity improvements currently planned for Macquarie Park by Transport for NSW and RMS. Accordingly, reference has been made to the Review of Environmental Factors prepared by RPS and RMS dated March 2017, which states:

"The Macquarie Park area is currently undergoing rapid growth and development with extensive planning for increased high density residential, commercial (Macquarie Shopping Centre extensions) and industry (business park) development within the area. Macquarie Park is expected to experience some of the highest levels of employment growth in NSW, with an additional 7,000 workers expected over the next decade (Transport for NSW (TfNSW), 2016).

The proposal would improve road network capacity and support existing traffic movements and the estimated growth of traffic within and around Macquarie Park into the future.

The proposal would include upgrades to intersections on Lane Cove Road and Epping Road as well as road widening and intersection upgrades along Waterloo Road and Herring Road at Macquarie Park. The key features of the overall concept design for this proposal would include:

- *Upgrade of the Herring Road/Epping Road intersection.*
- *Upgrade of the intersection of Herring Road and Ivanhoe Place by replacing the existing roundabout with a signalised four-way intersection.*

- *Adjustments to the median along Herring Road, between Ivanhoe Place and Waterloo Road to provide two general traffic through lanes and a dedicated bus lane in both directions.*
- *Upgrades to the intersection of Herring Road and Waterloo Road.*
- *Widening of Waterloo Road (into the median and along the southern side and parts of the northern side of the road) between Cottonwood Crescent and Lane Cove Road to provide two general through traffic lanes and a dedicated bus lane in both directions.*
- *Upgrade of the Byfield Road and Waterloo Road intersection by replacing the existing roundabout with a signalised four-way intersection.*
- *Upgrade of the Khartoum Road and Waterloo Road intersection by replacing the existing roundabout with a signalised four-way intersection.*
- *Upgrade of the Waterloo Road/Lane Cove Road intersection.*
- *Extension of the existing southbound bus lane on Lane Cove Road, between Waterloo Road and Epping Road, by widening the eastern kerb line to provide a continuous bus lane from Waterloo Road to the commencement of the existing left turn lane into Epping Road eastbound.*
- *Upgrade of the Lane Cove Road/Epping Road intersection.*
- *Extension of the dedicated right turn lane northbound on Lane Cove Road onto Epping Road eastbound by narrowing the median on Lane Cove Road between Allengrove Crescent and Lorna Avenue*
- *Removal of about 150 trees.*
- *Strip property acquisition along Herring Road, Waterloo Road, Byfield Street, Khartoum Road and Lane Cove Road.*
- *Removal of up to 125 on-street parking spaces (a combination of time restricted and paid parking spaces).”*

The project is proposed be delivered in two stages:

Stage 1: As part of Sydney Metro Northwest, the Epping to Chatswood rail line is scheduled to temporarily close from September 30th 2018 for about seven months. During this period, the Station Link bus services will be implemented to replace railway services with additional buses. The proposed road and intersection upgrades would support the running of buses and improve traffic flow in the area. The proposed work for Stage 1 is currently underway.

Stage 2: Once Sydney Metro Northwest opens, the remainder of the road and intersection upgrades would be carried out. The work would also benefit other bus services operating in the area and provide important upgrades to the road network to reduce congestion and improve access for all road users.

The proposed upgrades of the Waterloo Road and Khartoum Road intersection from a roundabout to signals are shown in **Figure 3**. The upgrades to this intersection include:

- Two general traffic through lanes and a bus lane on Waterloo Road both westbound and eastbound
- An extension of the dedicated right turn lane westbound from Waterloo Road onto Khartoum Road
- A fourth leg on the southern side of the intersection with potential connection to Giffnock Avenue
- A high angle entry left turn lane eastbound from Waterloo Road into Khartoum Road (northbound) with a marked (unsignalised) pedestrian crossing
- A high angle entry left turn lane southbound out of Khartoum Road into Waterloo Road (eastbound) with a marked (unsignalised) pedestrian crossing
- Dedicated right turn and a shared through/right turn lane southbound out of Khartoum Road onto Waterloo Road
- Signalised pedestrian crossings on all sides of the intersection
- Banning the existing right turn into the business park across from Khartoum Road from Waterloo Road eastbound
- Adjustments to and reinstatement of the existing shared path.

The southern leg of the intersection is also proposed to connect to Giffnock Avenue as outlined in the Busways modelling undertaken for the Bus Priority and Capacity Improvements Project. This layout has been included in the SIDRA intersection modelling undertaken for this TIA when assessing the future year scenario.

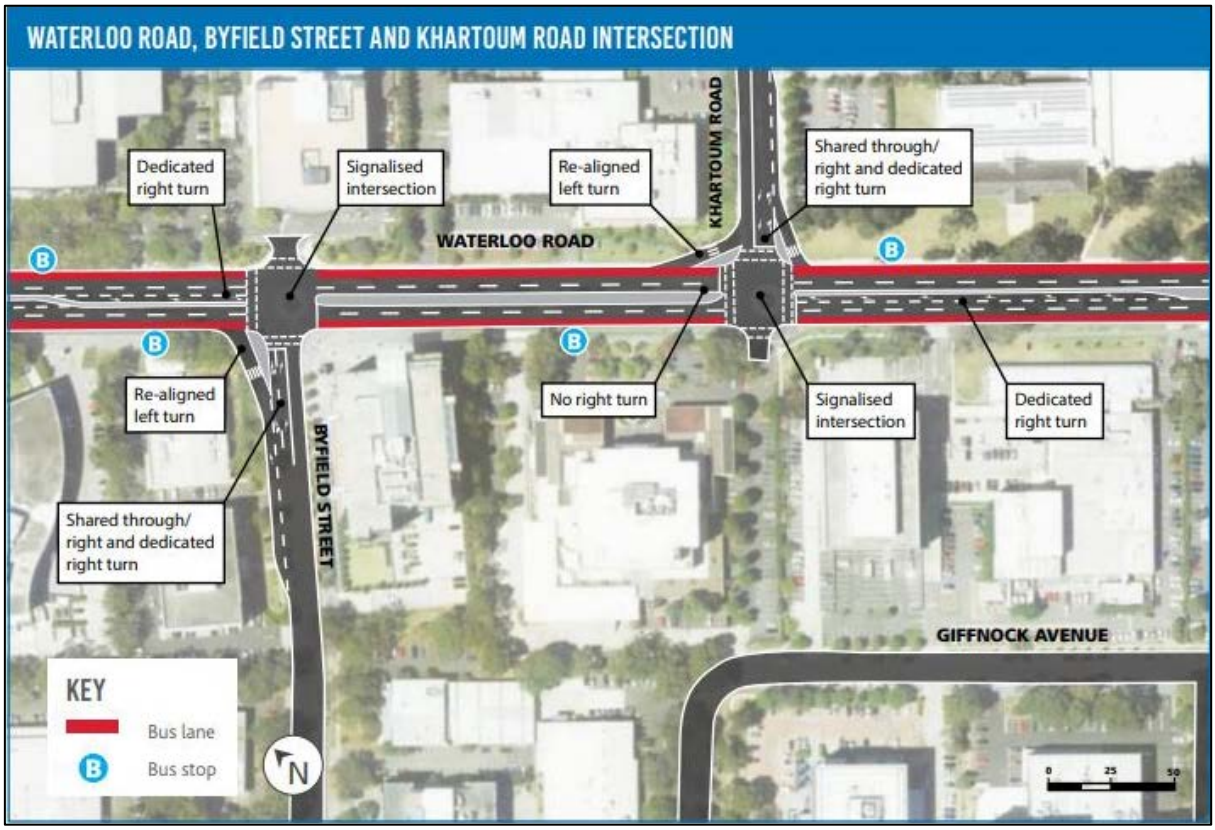


Figure 3: Proposed Upgrades to Waterloo Road & Khartoum Road Intersection

3.6 Sydney Metro

The Sydney Metro is a new standalone rail network identified in *Sydney's Rail Future* and consists of the Sydney Metro Northwest (previously known as the North West Rail Link) and the Sydney Metro City & Southwest. The Sydney Metro Northwest proposes to construct and operate a new rail line between Rouse Hill and Chatswood, and it will connect with the existing service at the Chatswood. The proposed stations for the new Sydney Metro is shown in **Figure 4**.

Figure 4: Proposed Stations for the Sydney Metro

In the locality of the Site, the Sydney Metro Northwest will be the main metro line that will interact with the Site's future commuters. The key components of the Sydney Metro Northwest are expected to include:

- Construction of eight new train stations (between Cudgegong Road and Cherrybrook) and upgrades to the existing rail infrastructure between Epping and Chatswood. These new train stations include the following:
    - Cudgegong Road
    - Rouse Hill
    - Kellyville
    - Bella Vista

  - Norwest
  - Showgrounds
  - Castle Hill
  - Cherrybrook
- Trains will run every four minutes (or 15 trains every hour)
- The construction of 15 kilometres of twin tunnels between Bells Vista and Epping
- A four-kilometre elevated skytrain between Bella Vista and Rouse Hill

The Sydney Metro Northwest ralline is expected to start operating at the beginning of 2019. With the completion of the ultimate Sydney Metro, the new railway network would deliver a major increase in the capacity of Sydney's rail network, with the capacity to run up to 30 trains per hour through the Sydney CBD in each direction. This provides the foundation for delivering a 60 per cent increase in the number of trains operating on Sydney's rail network in peak periods, which would cater for an extra 100,000 customers per hour.

4 Existing Conditions

4.1 Site Location & Description

The subject Site is located on the western corner of 11-17 Khartoum Road and 33 Talavera Road, Macquarie Park, and it is legally described as Lot 1 DP633221. Under the Masterplan for the Site, it will accommodate a total of 5 separate main buildings, titled Buildings A to E, with additional support retail. These buildings will be located around the perimeter of the proposed open space at the centre of the Site that will help facilitate the required pedestrian link under CoR planning controls.

The Site is located on the southern corner of Khartoum Road / Talavera road signalised intersection and surrounded by existing commercial and mixed-use developments. Nearby to the northwest of the site is Macquarie Shopping Centre, a major retail precinct in the surrounding region with supporting public transport infrastructure. The entire site is generally rectangular in shape and encompasses an approximate area of 30,030m^2.

With reference to **Figure 5**, vehicular access to the site is provided via the following vehicle crossings:

- Three vehicle crossings on Khartoum Road known as the northern, central and southern driveways
- Two vehicle crossings on Talavera Road known as the northern and southern driveways

Surveys undertaken of the existing development on the Site (conducted in September 2017 for the Building A DA) indicates that it generates 144 veh/hr during the Site AM peak period and 100 veh/hr during the Site PM peak periods, as presented in **Appendix A**.

Figure 5: Existing Precinct Access Driveways

4.2 Road Network and Hierarchy

Notable roads in the vicinity of the site include:

- M2 Motorway – an RMS State Road (MR 6002) that generally runs in an east-west direction between Lane Cove in the east and Baulkham Hills in the west. The M2 Motorway is one of Sydney's major transport corridors to the north-western suburbs. It carries in the order of 95,000 vehicles per day (vpd).

- Lane Cove Road – an RMS Main Road (MR 162) that generally runs in a north-east / south-west direction between the M2 Motorway in the north-east and Blaxland Road in the south-west. It carries approximately 95,00 vpd.

- Epping Road – an RMS State Road (MR 373) that generally runs in an east-west direction between the M2 Motorway (at Lane Cove) in the east and Blaxland Road (Epping) in the west. Epping Road carries approximately 50,000 vpd.

- Herring Road – a collector road that runs in north-south direction approximately 600m to the north west of the Precinct. It provides direct access to the M2 motorway and Epping Road.

- Waterloo Road – a local road located to the south west of the subject precinct. It generally consists of two lanes in each direction, which are divided by a traffic median. It is subjected to a speed limit of 60km/hr.

- Khartoum Road – a local road the forms the north-west boundary of the subject Precinct. It currently consists of a single lane in each direction with restricted parking on both sides of the carriageway, and subjected to a speed limit of 60km/hr.

- Talavera Road – a local road that forms the north-east precinct boundary. It is subjected to a posted speed limit of 50km/hr and generally consists of two lanes in each direction. Talavera Road and Khartoum Road form a signalised intersection directly to the north of the Precinct.

Reference should be made to **Figure 6**, which provides an appreciation of the Site and its surrounding.

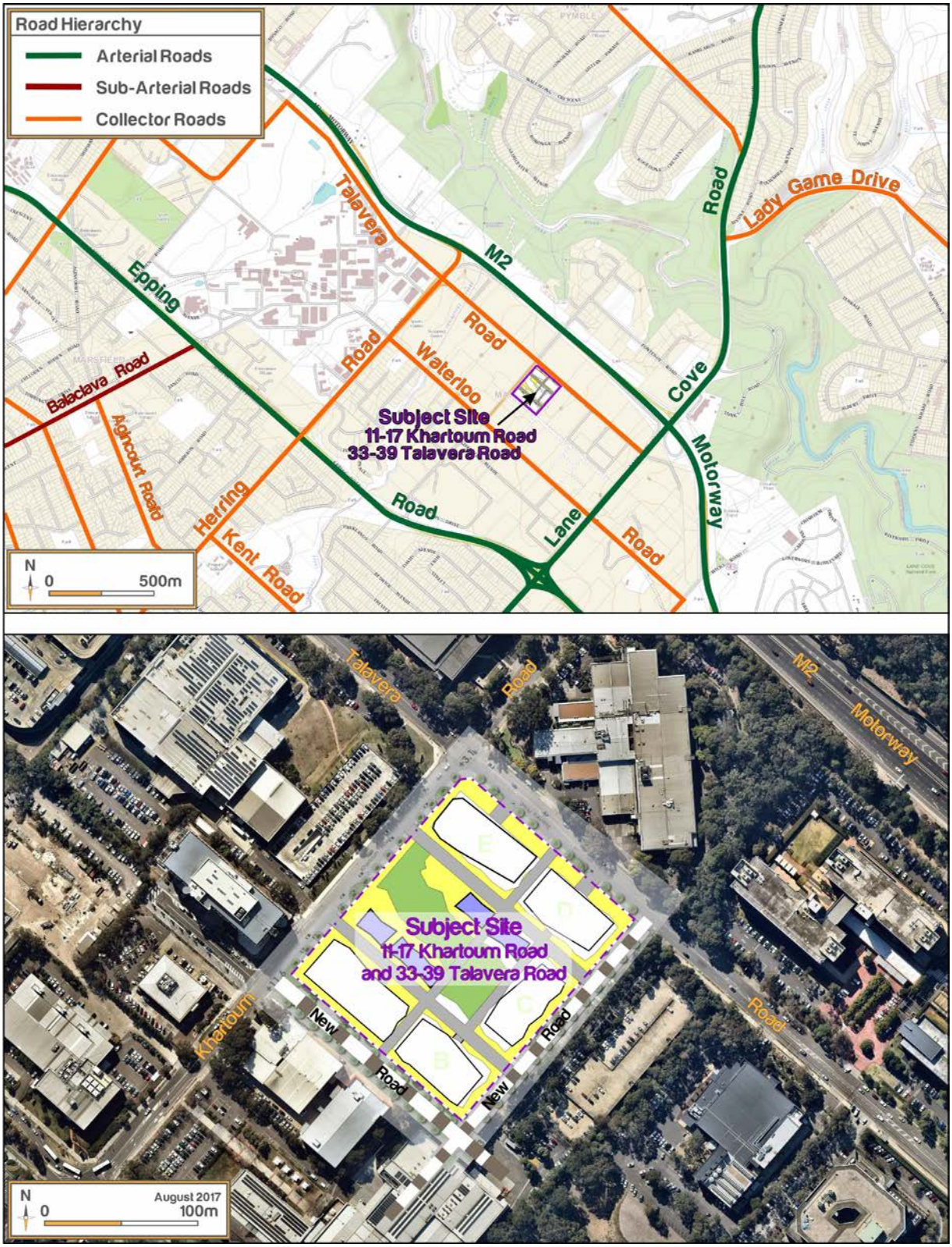


Figure 6: Location and Site Plan

4.3 Planning Controls

The site is located within the City of Ryde Local Government Area (LGA) and subject to the provisions of the City of Ryde Development Control Plan 2014 (DCP) Section 4.5 Macquarie Park Corridor and Ryde Local Environmental Plan (LEP). Under these documents, the site is zoned B7 – Business Park. The Masterplan Development is consistent with the Planning Controls for the Site.

It should be noted that the development yield exceeds 10,000m^2 of commercial floor space and therefore the application will require formal referral to RMS in accordance with Clause 104 of State Environmental Planning Policy (Infrastructure) 2007.

Further discussion in relation to access to public transport and proximity to services is discussed below.

4.4 Public Transport

The Site is ideally located with close proximity to a range of public transport services, as shown in **Figure 7**. A summary of the existing public transport services is provided below.

4.4.1 Bus Services

TfNSW Guidelines state that bus services influence the travel mode choices of sites within 400 metres (approximately 5 minutes' walk) of a bus stop. In this regard, the Precinct is accessible by a number of bus services operating along Waterloo Road, Khartoum Road and Talavera Road. The details of each service that stops within 400 metres of the Site are presented in **Table 1**. The table details each route number, route description and service frequencies during the morning, evening and off-peak periods.

Table 1: Existing Bus Services

Route No.	Route	Route Description	Average Service Frequency
197	Macquarie University to Mona Vale	Gordon, St. Ives, Austlink, Terrey Hills	AM Peak: 15 minutes PM Peak: 15 minutes Off-Peak: 30 minutes
292	Marsfield to City-Wynyard	Macquarie University, Macquarie Centre, Macquarie Park, North Ryde, Lane Cove	AM Peak: 20 minutes PM Peak: 20 minutes Off-Peak: 30 minutes
294	Marsfield to City-Wynyard	North Ryde, Lane Cove	AM Peak: 10 minutes PM Peak: 10 minutes Off-Peak: No Service
458	Macquarie University to Burwood	Top Ryde, Rhodes, Concord, Strathfield	AM Peak: 30 minutes PM Peak: 30 minutes Off-Peak: 30 minutes

459	Macquarie University to Burwood	Macquarie University, Macquarie Park, North Ryde, Top Ryde, Rhodes, Concord, Strathfield	AM Peak: 30 minutes PM Peak: 30 minutes Off-Peak: 1 hour
506	Macquarie University to City-Domain	Macquarie Centre, North Ryde, Gladesville, Drummoyne, Rozelle, Town Hall	AM Peak: 30 minutes PM Peak: 30 minutes Off-Peak: 30 minutes
545	Parramatta to Chatswood	Telopea, Dundas Valley, Eastwood, Macquarie University, Macquarie Park, North Ryde	AM Peak: 15 minutes PM Peak: 15 minutes Off-Peak: 15 minutes
550	Chatswood to Parramatta	North Ryde, Macquarie Centre, Macquarie Park, Eastwood	AM Peak: 15 minutes PM Peak: 15 minutes Off-Peak: 15 minutes
562	Gordon to Macquarie University	West Pymble, Macquarie Centre, Macquarie University	AM Peak: 1 hour PM Peak: 1 hour Off-Peak: No Service
565	Chatswood to Macquarie University	Roseville, Lindfield, Killara, Macquarie Centre, Macquarie University	AM Peak: 1 hour PM Peak: 1 hour Off-Peak: 1 hour
572	Macquarie University to Turramurra	Macquarie University, Macquarie Centre, Lane Cove, West Pymble, Turramurra	AM Peak: 15 minutes PM Peak: 15 minutes Off-Peak: 30 minutes
575	Macquarie University to Hornsby	Macquarie University, Lane Cove, Gordon, Turramurra, Wahroonga, Waitara Hornsby	AM Peak: 20 minutes PM Peak: 20 minutes Off-Peak: 30 minutes
611	Blacktown to Macquarie Park	Macquarie Park, Oakes Road, Seven Hills, Blacktown	AM Peak: 15 minutes PM Peak: 15 minutes Off-Peak: 15 minutes
619	Rouse Hill Town Centre to Macquarie Park	Rouse Hill, Caste Hill, Baulkham Hills, Oakes Road, Macquarie Park	AM Peak: 30 minutes PM Peak: 30 minutes Off-Peak: 30 minutes
621	Castle Hill to City	Castle Hill, Dural, Cherrybrook, West Pennant Hills, Macquarie Park, Lane Cove, City	AM Peak: 30 minutes PM Peak: 30 minutes Off-Peak: 30 minutes
628	City & Chatswood to Norwest	City QVB, City Wynyard, Lane Cove, Macquarie Park, Oakes Road, Baulkham Hills, Norwest	AM Peak: 15 minutes PM Peak: 15 minutes Off-Peak: No Service
630	Blacktown to Macquarie Park	Macquarie University, Macquarie Park, Epping, Carlingford, North Rocks, Baulkham Hills, Winston Hills, Seven Hills, Blacktown	AM Peak: 30 minutes PM Peak: 30 minutes Off-Peak: 1 hour
651	Castle Hill to Macquarie and City	Castle Hill, Beecroft, Macquarie	AM Peak: 30 minutes PM Peak: 30 minutes Off-Peak: 1 hour
740	Plumpton Marketplace to Macquarie Park	Glendenning, Quakers Hill, Stanhope Gardens, Kings Langley, Macquarie University	AM Peak: 30 minutes PM Peak: 30 minutes Off-Peak: No Services
M41	Hurstville to Macquarie Park	Macquarie Park, Top Ryde, Rhodes, Concord, Burwood, Campsie, Hurstville	AM Peak: 10 minutes PM Peak: 10 minutes Off-Peak: 15 minutes
M54	Parramatta to Macquarie Park via Epping	Parramatta, Carlingford, Epping, Marsfield, Macquarie Park	AM Peak: 10 minutes PM Peak: 10 minutes Off-Peak: 15 minutes

In summary, the subject site is favourably located to encourage future staff and visitors to use alternative transport modes, in particular train services, to access the site.

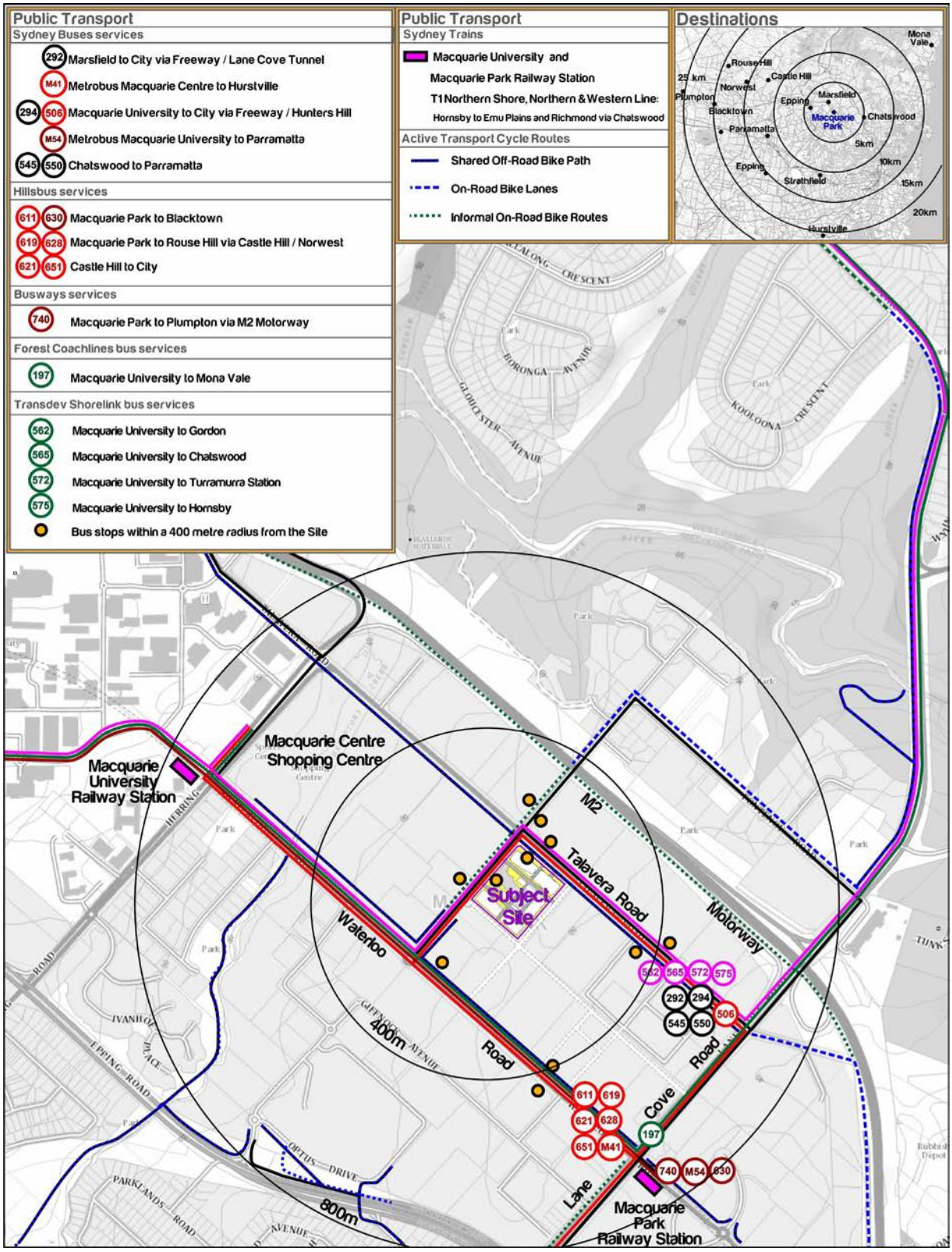


Figure 7: Public Transport Services

4.4.2 Rail services

TfNSW Guidelines states that train services influence the travel mode choices of areas within 800 metres distance (approximately 10 minutes' walk) of a train station. It is therefore noteworthy that the Site is located within 800 metres from the Macquarie University Station (approximately 600 metres) and the Macquarie Park Station (approximately 550 metres), on the T1 North Shore, Northern & Western Line. Accordingly, a significant proportion of future commuters travelling from the Precinct would be expected to use the train services at both train stations. **Table 2** summarises the peak hour train frequencies for Macquarie University train station.

Table 2: Macquarie University Train Station - Train Service Frequencies

Peak Period	To Central / From Epping	From Central / To Epping	Total
Morning Peak Hour (7-8AM)	5	5	10
Off Peak Hour	5	5	10
Evening Peak Hour (5-6PM)	8	5	13

In summary, review of the available services, indicates that the Site is located within the influence zone of train services and there is a train servicing Macquarie University Railway Station approximately every 6 minutes in the morning and afternoon peak periods and approximately every 4-5 minutes outside of-peak commuter periods.

4.5 Taxi services

A taxi rank is located on Herring Road adjacent to the Macquarie Shopping Centre. This taxi rank is located on the north-eastern approach to the intersection with the Waterloo Road, extends for approximately 60 metres and could theoretically accommodate approximately 10 vehicles at any one time.

4.6 Pedestrian Demands and Existing Infrastructure

The Macquarie Park Pedestrian Access and Mobility Plan (produced by Arup (Arup PAMP)) provides an extensive review of the existing pedestrian facilities in Macquarie Park. The purpose of the Arup PAMP is to improve the safety and convenience of the footpath network in Macquarie Park.

Khartoum Road is identified as a major commuter peak desire line with many pedestrians walking from the surrounding public transport options available towards Talavera Road during the morning and evening travel peaks as shown by **Figure 8**. The Arup PAMP identifies Talavera Road as an area where footpath and crossing provision would need to be designed to cater for the potential high pedestrian flow resulting from the emerging higher density development.

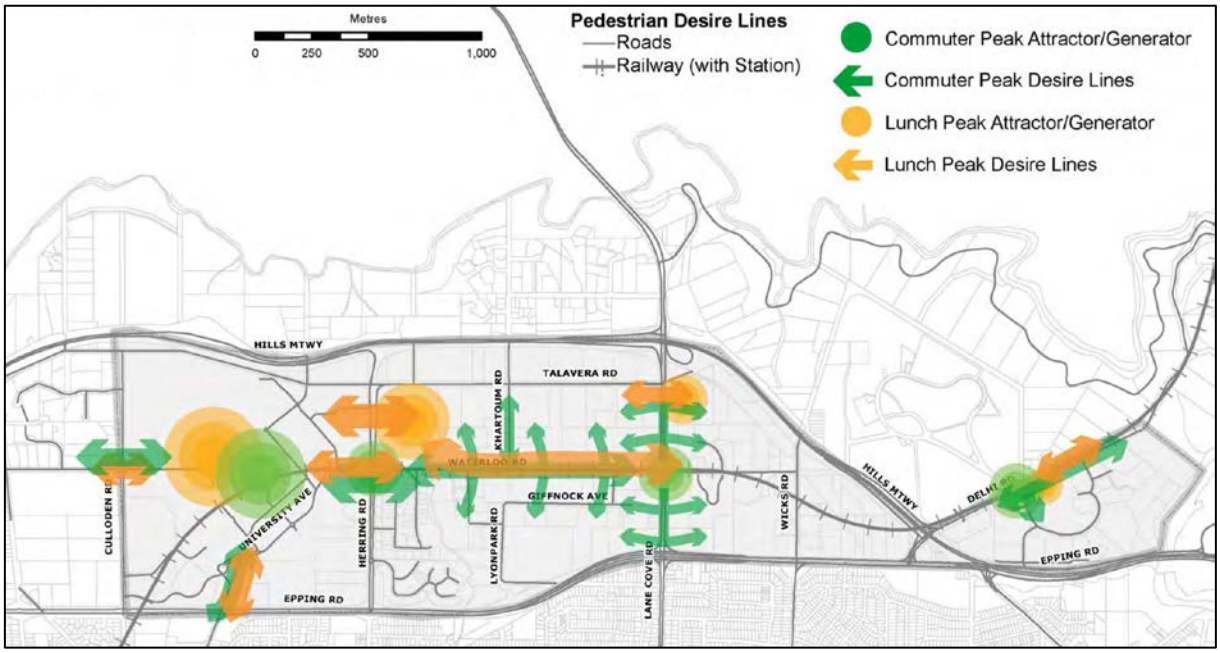


Figure 8: Macquarie Park Pedestrian Desire Lines

The existing pedestrian infrastructure through the Macquarie Park Precinct is presented in **Figure 9**, and demonstrates existing footpath and pedestrian crossing locations. In general, pedestrian facilities are provided along public roadways within limited permeability at midblock locations.

In the vicinity of the Site, footpaths are provided on Waterloo Road, Khartoum Road and Talavera Road providing connectivity to local bus stops. Direct pedestrian access to both the Macquarie University Railway Station and the Macquarie Park Railway Station is provided via a footpath along Waterloo Road. Footpaths along the frontage of the Site also provide connectivity to the Macquarie Shopping Centre.

Signalised crossing facilities are provided at major intersections along Herring Road, Talavera Road, Epping Road and Waterloo Road. However, pedestrians crossing Khartoum Road near Waterloo Road must currently walk via an unsignalized pedestrian refuge island crossing. The upgrade of the Waterloo Road / Khartoum Road intersection will provide signalised pedestrian crossings on all sides of the intersection as well as unsignalised crossings across the slip lanes. This will result in improved safety for the large number of pedestrians who are likely to travel via this intersection on their way to Macquarie Park Train Station.

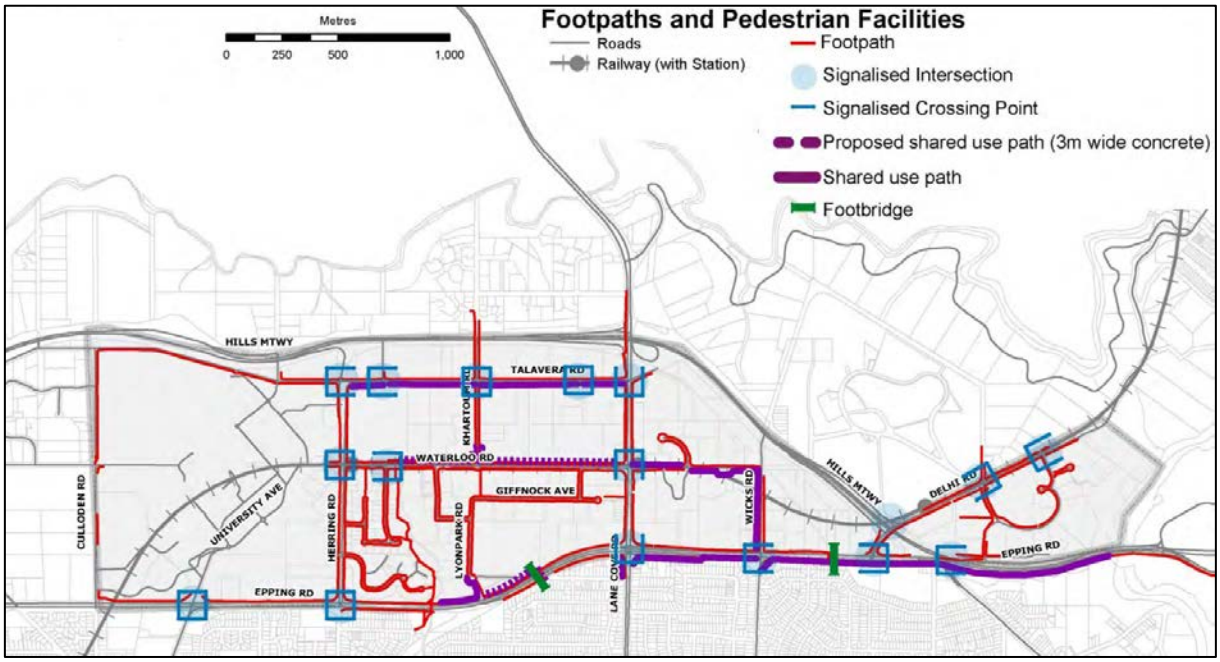


Figure 9: Existing Macquarie Park Pedestrian Facilities

4.7 Bicycle Network

The bicycle network in the vicinity of the Site is shown in **Figure 10**. An on-road marked bicycle path is provided along Waterloo Road Street, Khartoum Road and Talavera Road to the north of the Site. These paths provide access to the wider walking and cycling network, including links to Ryde, as illustrated in Figure 10.

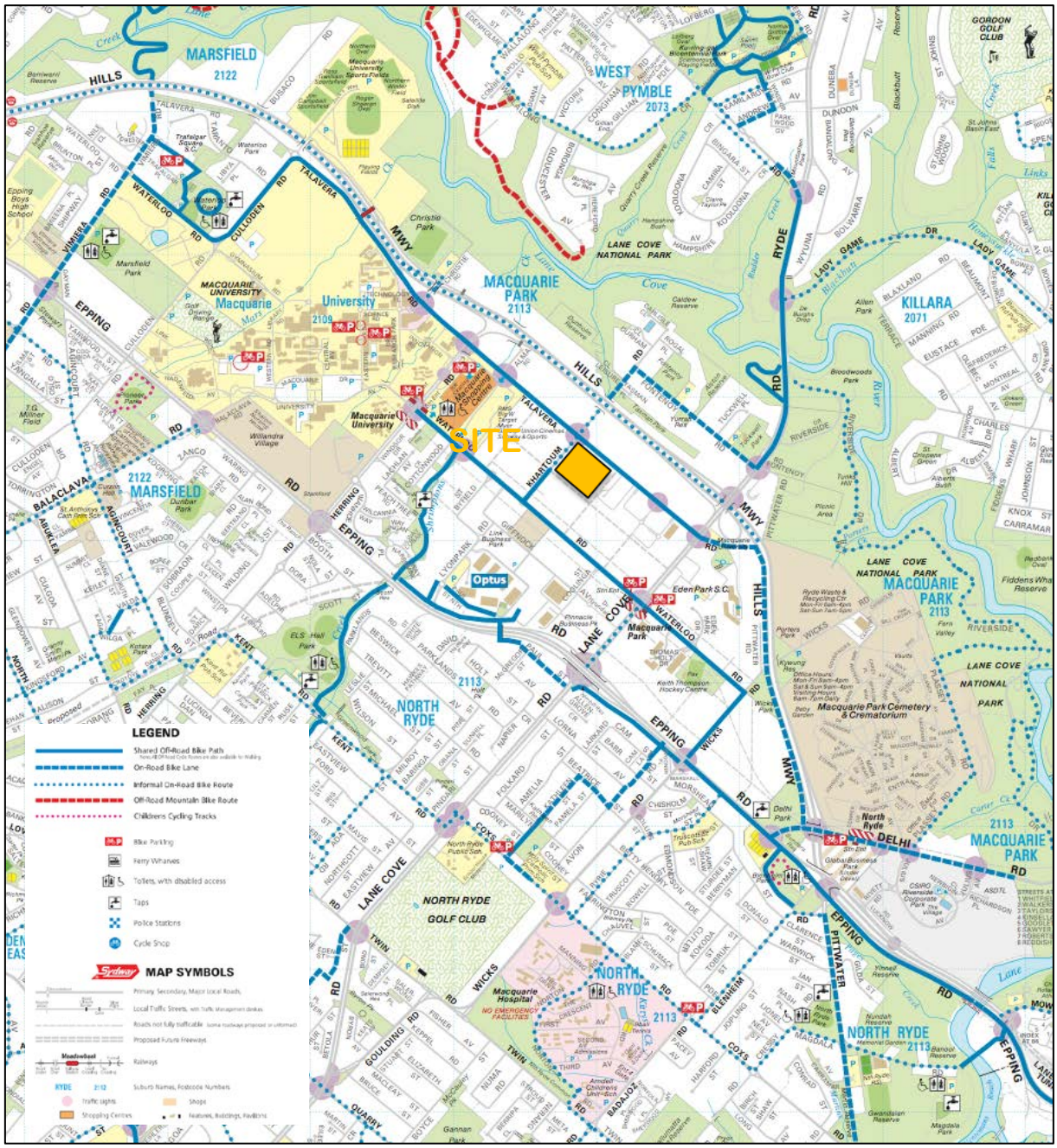


Figure 10: Surrounding Bicycle Paths

4.8 Journey to Work Data Analysis

The existing travel patterns of residents and workers within the surrounding locality was surveyed within the 2011 Census and presented in the Journey to Work data provided by the Bureau of Transport Statistics. A summary of key travel modes for workers within the locality (Travel Zone 1545) is presented in **Figure 11**.

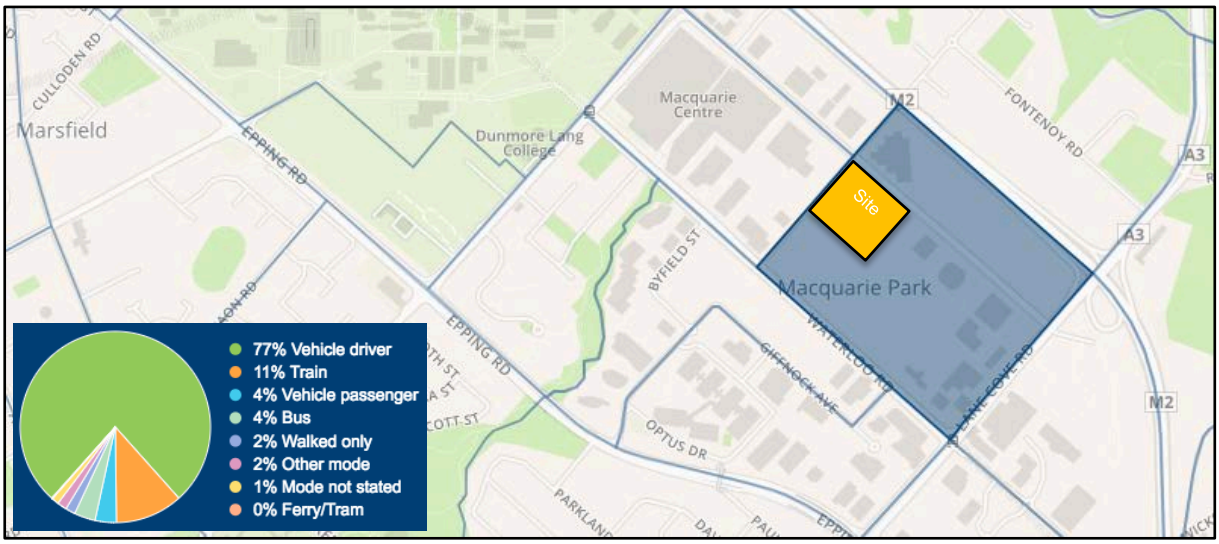


Figure 11: Journey-to-Work Travel Zones

4.9 Existing Road Network Performance

A SIDRA Intersection modelling assessment has been undertaken for the Building A DA submitted separately:

- Talavera Road / Khartoum Road
- Waterloo Road / Khartoum Road

The performance of the above intersections has been analysed using the SIDRA modelling outputs and the following performance measures, in particular:

- *Degree of Saturation (DOS)* – The DOS is defined as the ratio of demand (arrival) flow to capacity. The DOS is used to measure the performance of intersections where a value of 1.0 represents an intersection at theoretical capacity, above 1.0 represent over-saturated conditions (demand flows exceed capacity) and degrees of saturation below 1.0 represent under-saturated conditions (demand flows are below capacity). As the performance of an intersection approaches DOS of 1.0, queue lengths and delays increase rapidly. It is usual to attempt to keep DOS to less than 0.9, with satisfactory intersection operation generally achieved with a DOS below 0.8.

- *Average Vehicle Delay (AVD)* – Delay represents the difference between interrupted and uninterrupted travel times through an intersection and is measured in seconds per vehicle. Delays include queued vehicles accelerating and decelerating from/to the intersection stop lines, as well as general delays to all vehicles travelling through the intersection. The AVD (or average delay per vehicle in seconds) for intersections also provides a measure of the operational performance of an intersection and is used to determine an intersection's Level of Service (see below). For signalised intersections, the AVD reported relates to the average of all vehicle movements through the intersection. For priority (Give Way, Stop & Roundabout controlled) intersections, the AVD reported is that for the movement with the highest AVD.
- *Level of Service (LOS)* – This is a comparative measure that provides an indication of the operating performance, based on AVD. For signalised and roundabout intersections, LOS is based on the average delay to all vehicles, while at priority controlled intersections LOS is based on the worst approach delay. The following table provides a recommended baseline for assessment as per the RMS Guide:

Table 3 outlines the relevant performance criteria in accordance with the RMS Guide.

Table 3: Traffic Model Performance Criteria

Level of Service	Average Delay per Vehicle (sec/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

The results of the 'Existing Scenario' SIDRA analysis are summarised in **Table 4** below with the relevant network diagram and SIDRA outputs attached at **Appendix B**.

Table 4: Intersection Performance – Existing

Intersection	Intersection Control	Period	Degree of Saturation (DOS)	Average Vehicle Delay (AVD)	Level of Service (LOS)
Waterloo Rd / Khartoum Rd / 68-72 Waterloo Rd	Existing Roundabout	AM	0.511	15.1 seconds	B
		PM	0.546	16.8 seconds	B
Khartoum Rd / Talavera Rd	Signals	AM	1.006	57.1 seconds	E
		PM	0.807	38.7 seconds	C

It can be seen from **Table 4** that all intersections operate within acceptable Level of Service under existing conditions noting the intersection of Khartoum Road/Talavera Road is operating at capacity during the AM peak period. Notwithstanding, the Masterplan Development has been assessed under the future road network assessment for the horizon year 2031.

5 Parking Requirements

5.1 Council Car Parking Requirements

Car parking for the Masterplan has been assessed having regard for the City of Ryde Development Control Plan (CoR DCP 2014) Part 9.3 - Parking Controls, with the maximum car parking provisions permitted for each land use summarised in **Table 5**. Any car parking requirements that resulted in a fraction were rounded up to the nearest whole number in accordance with the DCP 2014.

Table 5: Council DCP Parking Requirement

Land Use	Area	Parking Rate	Maximum Parking Provision
Commercial	59,219m^2	1 space / 60m^2 GFA	987

As shown in **Table 5**, the development is permitted to provide a maximum of 987 car parking spaces.

There would be some small retail elements to each of the buildings however, these would be ancillary land uses, servicing commercial staff / visitors within the Site. That is to say, the retail land use is not expected to be a "destination" facility which would require car parking and generate a high proportion of "walking" trips. Thus, consideration of car parking provisions under the commercial land use is considered to be appropriate for the purpose of assessing the overall Masterplan proposal. The objective of the future proposals for each of the buildings will be to comply with the standards of the CoR DCP 2014.

5.2 Other Parking Considerations

The Ryde DCP 2014 also includes guidance for other parking considerations. All future DA's for each of the buildings covered by the Masterplan will aim to comply with the requirements of the CoR DCP 2014. Other parking consideration include:

- Accessible parking – Council's requirement which necessitates 3% of the overall parking quantum in parking areas with more than 10 spaces for Classes 5,6,7 and 8 (non-residential). This would be achieved and designed in accordance with AS 2890.6.
- Bicycle Parking - in every new building with floor are that exceed 600m2 GFA, bicycle parking shall be provided equivalent to 10% of the required car spaces or part thereof (rounded up).

- Car Share Parking – Part 4.5 of the CoR DCP 2014 encourages the delivery of car share spaces for new developments, although does not stipulate any car share parking rates. The addition of car share spaces will be given consideration during the design for each building.

5.3 Service Vehicles

The Ryde DCP 2014: Part 9.3 - Parking Controls requires loading facilities to be provided for all developments, excluding residential flat buildings and multi-dwelling housing, with access from the local road network although provides limited guidance on servicing requirements for commercial and retail uses. The provision of servicing areas would be given consideration during the design for each building to ensure the demands of the commercial and retail uses on-site are accommodated, including deliveries and waste collection.

Currently, the first stage (Building A) has been submitted for DA approval. The proposed development for the first stage would accommodate the servicing demands for Building A, as the future development of all other stages is currently uncertain. It is noted that a consolidated precinct solution is proposed to be investigated by Stockland as part of future DAs, in liaison with TfNSW. The options for consideration include option testing for a single service area within proximity of Building C.

A detailed Loading Dock Management Plan (LDMP) would be prepared for the servicing area(s), again in liaison with TfNSW.

6 Traffic Assessment

6.1 Traffic Generation

6.1.1 Existing Generation

As discussed in Section 4.1, the Site is currently served by 5 vehicle crossings (Figure 5). Accordingly, traffic volume surveys were undertaken at the subject driveways on Thursday 21st September 2017, which demonstrated the traffic volumes in **Table 6,** entering and exiting the Site via each Talavera Road and Khartoum Road respectively.

Table 6: Site Traffic Survey Results

	AM			PM		
	In	**Out**	**Total**	**In**	**Out**	**Total**
Talavera Road	51	12	63	2	16	18
Khartoum Road	67	14	81	8	74	82
Total	**118**	**26**	**144**	**4**	**41**	**100**

The survey results demonstrated that the existing Site generates 144 veh/hr during the morning peak and 100 veh/hr during the evening peak.

6.1.2 Comparable Development Surveys

Ryde DCP 2014 permits 'constrained' levels of car parking. It is therefore considered that the most accurate way of assessing the traffic generation of the Stage 1 development is to use a 'trip per parking space' rate.

In developing the 'trip per parking space' rate, a traffic survey of 8 Khartoum Road, Macquarie Park (located directly opposite the Site) was undertaken following liaison and agreement with CoR Council. Traffic count surveys were conducted during the week of Monday 28 May – Wednesday 30 May 2018 between the hours 6.00AM-10.00AM and 4.00PM-7.00PM.

The development is currently ~80% occupied with 200 spaces out of the 250 on-site being utilised at the time of the surveys being undertaken. The survey results by day are provided in **Table 7**.

Table 7: 8 Khartoum Road Survey Results

	AM				PM			
	In	**Out**	**Total**	**Trip Rate**	**In**	**Out**	**Total**	**Trip Rate**
Monday	106	5	111	0.55	2	70	72	0.36
Tuesday	73	5	78	0.39	3	64	67	0.34
Wednesday	87	5	92	0.46	1	69	70	0.35
Thursday	83	6	89	0.45	3	82	85	0.43
Friday	78	3	81	0.41	1	60	61	0.31
Average	**85**	**5**	**90**	**0.45**	**2**	**69**	**71**	**0.36**

Table 7 indicates the following average parking space trip rates:

- 0.45 AM peak trips per parking space
- 0.36 PM peak trips per parking space

These trip rates are comparable to those adopted for the Building A Stage 1 DA which adopted rates of 0.42 for the morning peak and 0.30 for the evening peak (also based on surveys for 8 Khartoum Road undertaken in September 2017), and thus validates the adoption of the average trip rates as per Table 7 for this assessment.

Accordingly, the commercial component, with 987 car parking spaces would generate the following peak hourly traffic volumes:

- 444 veh/hr (422 in / 22 out) during the morning peak
- 355 veh/hr (11 in / 344 out) during the evening peak

6.1.3 Net Change to Site Traffic Volumes

Having regard for the existing traffic generation outlined in Section 6.1, the net traffic increase of the Proposal is as follows:

- AM Peak 300vph
- PM Peak 255vph

The distribution and impact of this additional traffic is discussed further below.

6.2 Traffic Modelling Methodology

6.2.1 Study Road Network

Ason Group liaised with Ryde Council to determine the study road network which includes the following intersections:

- Lane Cove Road / Talavera Road;
- Talavera Road / Hitech Access Road / Gateway 2000 Access Road;
- Talavera Road / Road 22;
- Talavera Road / Existing Talavera Site Access;
- Talavera Road / Khartoum Road;
- Khartoum Road / Northern Site Access
- Khartoum Road / Central Site Access;
- Khartoum Road / Southern Site Access;
- Khartoum Road / Waterloo Road.

6.2.2 Trip Distribution

The Bureau of Statistics' Journey to Work Data for the locality (Travel Zone 1545) has been reviewed in order to determine the likely distribution of traffic onto the surrounding road for the individual buildings located within the Site. In this regard, the traffic flows will be distributed as follows:

▪ North	17%	▪ South	24%
▪ Northeast	2%	▪ Southwest	16%
▪ East	10%	▪ West	23%
▪ Southeast	6%	▪ Northwest	2%

It should be noted that each building and trip distribution profile was individually assessed wo account for building location and attractiveness of likely route dispersion. Application of the above trip distribution to the net change in traffic volume is displayed graphically in **Figure 12**, **Figure 13**, and **Figure 14** for the AM and PM period respectively.

The In/Out directional split of traffic has been based on the 8 Khartoum Road traffic surveys as follows:

- AM Peak 95% in, 5% out
- PM Peak 3% in, 97% out

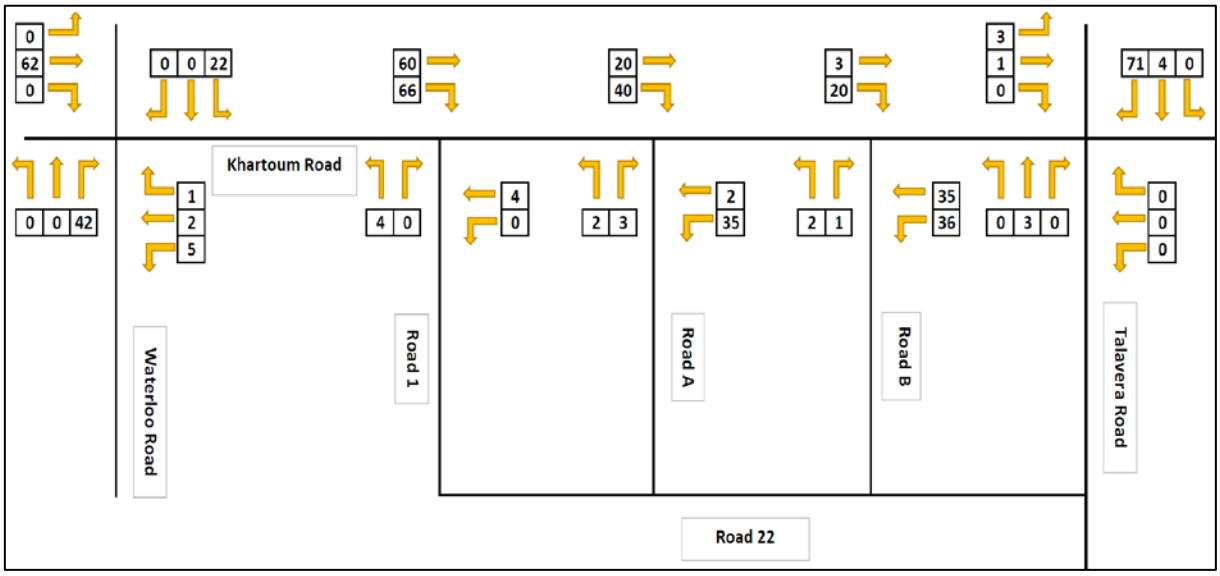


Figure 12: AM Traffic Distribution – Khartoum Road

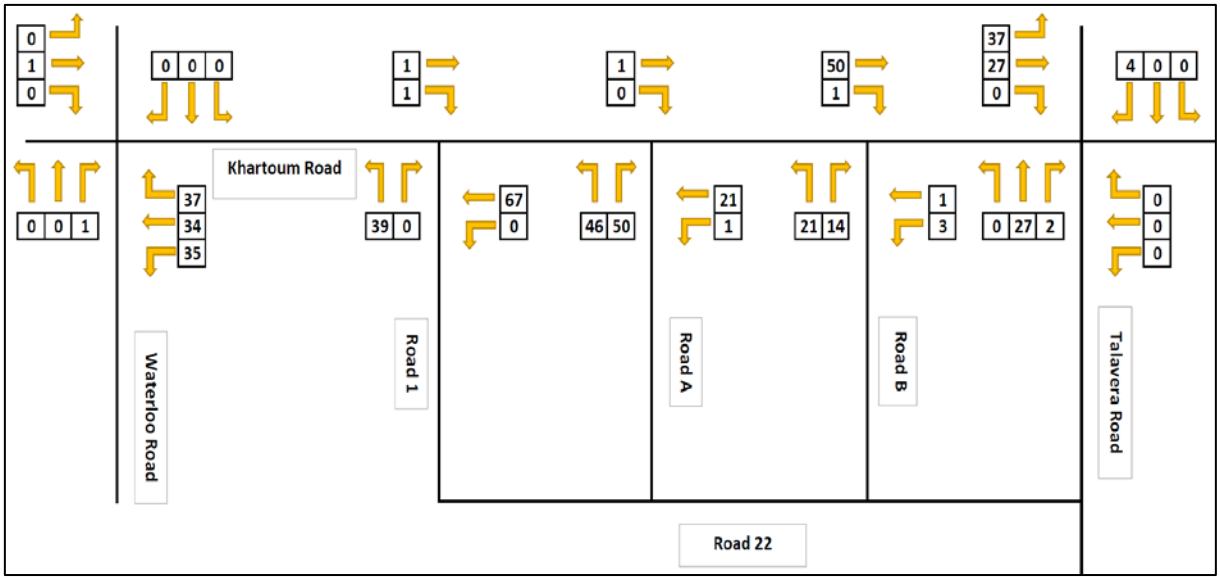


Figure 13: PM Traffic Distribution – Khartoum Road

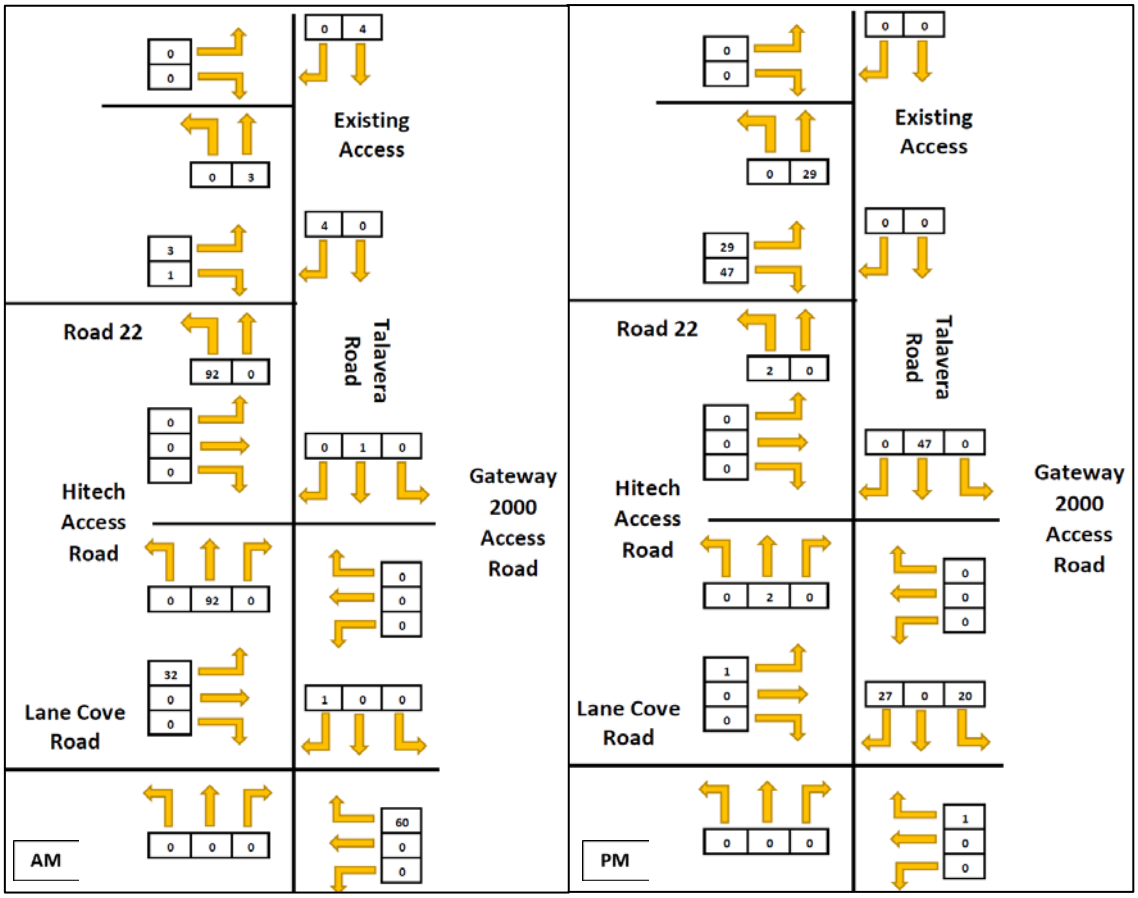


Figure 14: Traffic Distribution – Talavera Road

6.2.3 Growth Rates

The traffic modelling assessment adopts the horizon year of 2031 which corresponds with the delivery of Bus Priority and Capacity Improvements for Macquarie Park upgrades. To determine the background traffic volumes for 2031, Ason Group liaised with RMS who provided EMME modelling outputs which detail the anticipated growth rates of the directional traffic volumes within the Macquarie Park corridor along the major roads (up to 2026). It is unclear what growth rates are projected from 2026 – 2031 however, the per annum growth rates from 2016-2026 have been adopted up to 2031 which could be considered a worst-case scenario. The growth rates generally range from 0.8-2.6% per annum.

Using these growth volumes, the traffic volumes in the study road network was determined and forms the “2031 Base Case” assessment scenario.

6.2.4 Khartoum Road / Waterloo Road – Future Intersection Layout

As per the Bus Priority and Capacity Improvements for Macquarie Park upgrade report, the existing roundabout intersection of Khartoum Road / Waterloo Road would be upgraded to a signalised intersection. The future intersection layout is detailed in **Figure 15.**

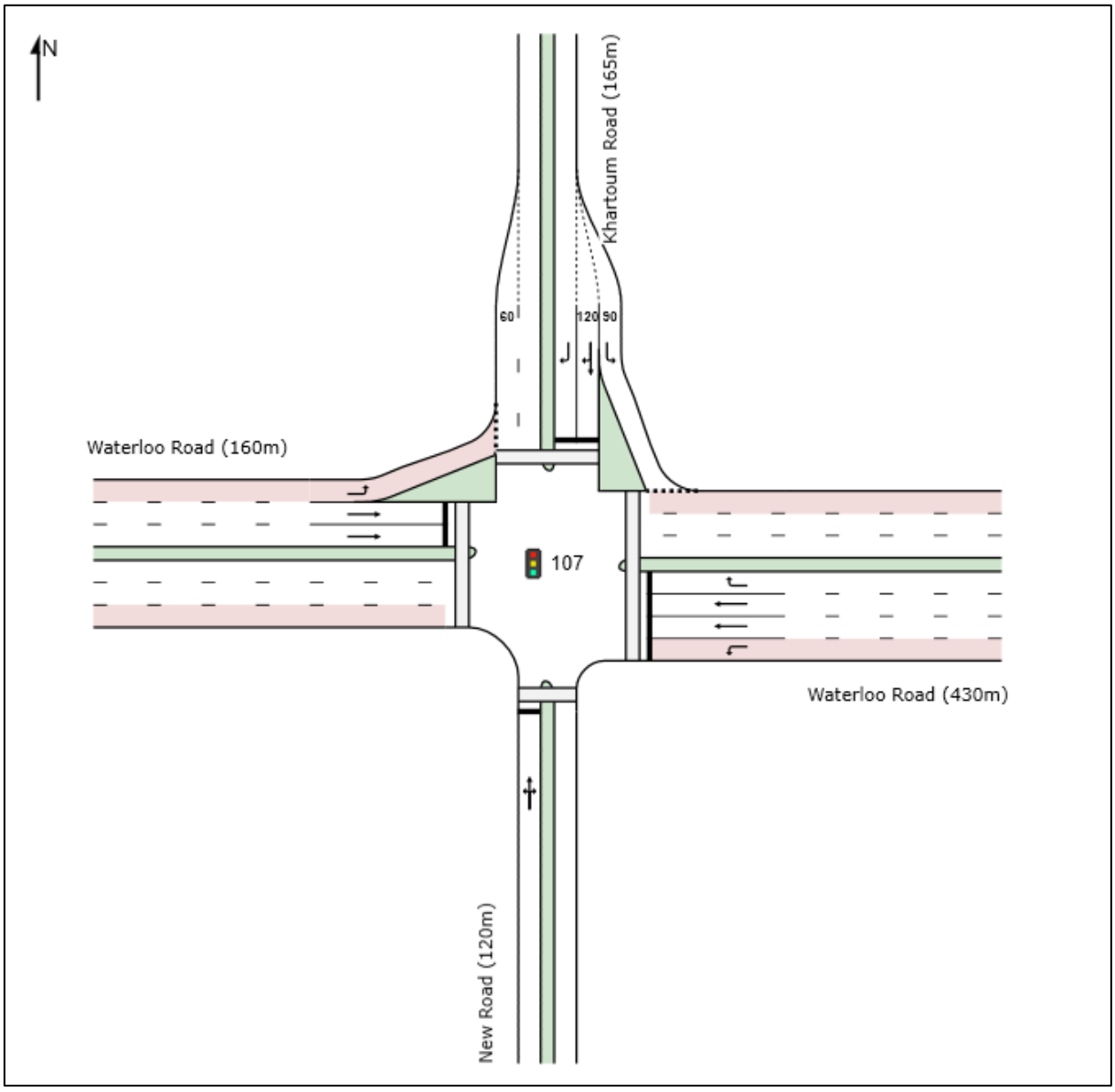


Figure 15: Khartoum Road / Waterloo Road – Future Intersection Layout

6.3 Traffic Impacts

6.3.1 2031 Base Case

To assess the traffic impacts of the 2031 Base Case scenario, SIDRA intersection and network modelling was undertaken of the study road network. The results of this analysis for the 2031 Base Case are detailed in **Table 8**.

Table 8: 2031 Base Case Intersection Performance

Intersection	Scenario	Period	Average Vehicle Delay (AVD)	Level of Service (LOS)
Lane Cove Road / Talavera Road	2031 Base Case	AM	81.1 secs	F
		PM	101.3 secs	F
Talavera Road / Hitech Access / Gateway 2000 Access	2031 Base Case	AM	32.5 secs	C
		PM	20.1 secs	B
Talavera Road / Road 22	2031 Base Case	AM	84.3 secs	F
		PM	128.7 secs	F
Talavera Road / Existing Site Access	2031 Base Case	AM	97.6 secs	F
		PM	163.4 secs	F
Talavera Road / Khartoum Road	2031 Base Case	AM	174.4 secs	F
		PM	121.4 secs	F
Khartoum Road / Northern Site Access (Existing)	2031 Base Case	AM	23.4 secs	B
		PM	28.3 secs	B
Khartoum Road / Central Site Access (Existing)	2031 Base Case	AM	26.9 secs	B
		PM	23.9 secs	B
Khartoum Road / Southern Site Access (Existing)	2031 Base Case	AM	24.0 secs	B
		PM	21.0 secs	B
Waterloo Rd / Khartoum Rd (Signals)	2031 Base Case	AM	29.2 secs	C
		PM	181.6 secs	F

It can be seen from Table 8 that the background growth traffic generated by the Macquarie Park Corridor would cause some of the intersections to operate above the operational capacity at a LOS F during both the AM and PM peak periods.

6.3.2 2031 Base Case + Development

In order to assess the traffic impact of the Masterplan, the additional development traffic was included into the SIDRA modelling. The proposed new site accesses along Khartoum Road are generally located at the existing site access points. The existing site access on Talavera Road (Talavera Road /

Existing Site Access) is also being removed as part of the Masterplan proposal. A comparison of the 2031 Base Case and the 2031 Base Case + Development results is shown in **Table 9**.

Table 9: 2031 Base Case Intersection Performance

Intersection	Period	2031 Base Case		2031 Base Case + Development	
		Average Vehicle Delay (AVD)	Level of Service (LOS)	Average Vehicle Delay (AVD)	Level of Service (LOS)
Lane Cove Road / Talavera Road	AM	81.1 secs	F	101.1 secs	F
	PM	101.3 secs	F	102.8 secs	F
Talavera Road / Hitech Access / Gateway 2000 Access	AM	32.5 secs	C	32.9 secs	C
	PM	20.1 secs	B	20.1 secs	B
Talavera Road / Road 22	AM	84.3 secs	F	90.5 secs	F
	PM	128.7 secs	F	1,120.6 secs	F
Talavera Road / Khartoum Road	AM	174.4 secs	F	241.6 secs	F
	PM	121.4 secs	F	144.0 secs	F
Khartoum Road / Northern Site Access	AM	23.4 secs	B	24.4 secs	B
	PM	28.3 secs	B	36.4 secs	C
Khartoum Road / Central Site Access	AM	26.9 secs	B	26.6 secs	B
	PM	23.9 secs	B	35.1 secs	C
Khartoum Road / Southern Site Access	AM	24.0 secs	B	25.1 secs	B
	PM	21.0 secs	B	23.9 secs	B
Waterloo Rd / Khartoum Rd	AM	29.2 secs	C	49.9 secs	D
	PM	181.6 secs	F	187.4 secs	F

The intersections of Talavera Road / Hitech Access / Gateway 2000 Access, Khartoum Road / Northern Site Access, Khartoum Road / Central Site Access, Khartoum Road / Southern Site Access are projected to operate at a LOS of C or better during both peak periods under both scenarios. This is within the acceptable limits of intersection performance.

The signalised intersection of Waterloo Road / Khartoum Road operates at a LOS D or better during the AM peak period under both scenarios, however operates at LOS of F during the PM peak period and consistent with the projected 2031 Base operation.

The intersection of Talavera Road / Road 22 during the PM peak period is estimated to operate at LoS F which is primarily due to the increased traffic volumes along Talavera Road and the necessity for right turners (South Approach of Road 22) to cross 4 lanes. Road 22 is required to be delivered as part of Council's structure plan and this analysis which has assessed the Masterplan Development

traffic in isolation indicates that this intersection should be limited to Left in, Left out movements only. This is a key finding of the modelling assessment and is an outcome that would be realised for all future developments utilising the proposed public road of Road 22.

The intersection of Talavera Road and Khartoum Road underperforms during both the AM and PM peak periods for both Base 2031 and Base 2031 + Development Scenarios. This conclusion is consistent with the findings of the Aecom studies for the 'Macquarie Park Bus Priority and Capacity Improvement Project' undertaken by RMS. It is understood that parcel of work is ongoing, and the subject development would have been included within that assessment on the basis that the Proposed Masterplan Development is consistent with the structure plan and LEP.

This masterplan modelling assessment has been undertaken based on standard traffic growth methodology however it does not appropriately take into account the congested network of Macquarie Park which would influence the change in travel behaviour in the Precinct supported further by the upgraded public transport network and driven by the reduced parking allocations within the Macquarie Park precinct.

Aecom has highlighted that the BPIP modelling estimated that the primary cause for network oversaturation in the 2031 PM peak period may due to insufficient capacity at intersections. However, the traditional method of addressing intersection performance issues with "geometry" will not solve Macquarie Parks congested networks. That is to say, that any additional capacity at these intersections would be used by the latent demand on the network.

6.3.3 Modelling Conclusions

The modelling analysis undertaken by Ason Group for the Concept Proposal provides an overview of the projected study network performance for 2031 'with' and 'without' development. It is clear the Base 2031 projections with projected growth results in network congestion and intersection underperformance however this approach does not accurately account for the evolving nature of the MP precinct and the public transport infrastructure projects (Sydney Metro etc).

Traffic modelling indicates a number of intersections are forecast to operate above operational capacity in the forecast year 2031. It is evident that even without the subject development, intersections were found to operate at Level of Service F at the year 2031 and that upgrades are required irrespective of any future development at the subject Site. The modelling indicates that the proposal does not result in any change to intersection level of service compared in 2031.

The Concept Proposal is consistent with the LEP. This summary provides an overview of the future site development and potential traffic generating characteristics for which separate Development Applications would be submitted and assessed in detail at a later stage.

6.4 Construction Pedestrian and Traffic Management Plan

A Construction Pedestrian and Traffic Management Plan (CTMP) would be prepared for each stage of the Masterplan to detail a traffic plan during construction to minimise traffic impacts on the surrounding road network, ensure safety and efficiency for workers, pedestrians and road users, and provide information regarding the construction vehicle access routes and any changed road conditions (if applicable).

A detailed CPTMP would be undertaken for each stage of the works, in consultation with Council, Sydney Metro and TfNSW and in response to suitable conditions of consent.

Each of the CPTMPs would consider any potential impacts on the operation of Station Link, if works are proposed prior to May 2019. The CPTMP would address the following matters:

- Traffic and public transport customer management in the vicinity of the development;
- Location of all proposed work zones;
- Construction vehicle access arrangements;
- Proposed construction hours;
- Estimated number and type of construction vehicle movements including volume, time of day and truck routes;
- Construction program highlighting details of peak construction activities and proposed construction 'Staging';
- Any potential impacts to general traffic, cyclists, pedestrians and bus services within the vicinity of the Site from construction vehicles during the construction of the proposed works;
- Cumulative construction impacts of projects in the Macquarie Park precinct, as applicable. Should any impacts be identified, the duration of the impacts;
- Timing of and reinstatement standards for footpath and road openings if closures are required; and
- Measures proposed to mitigate any associated general traffic, public transport, pedestrian and cyclist impacts.

7 Building Design Aspects

7.1 Site Access, Car Park Design and internal Layout

The design for the accesses for the separate buildings would be developed during the staged DAs. Each of the buildings would be designed to comply with the relevant Australian Standards (AS2890.1).

Any of the car parking to be provided alongside each of the buildings will be required to comply with the following Australian Standards:

- AS2890.1 (2004) Part 1: Off-street car parking;
- AS2890.2 (2002) Part 2: Off-street commercial vehicle facilities;
- AS2890.2 (1993) Part 5: On-street car parking;
- AS2890.6 (2009) Part 6: Off-street parking for people with disabilities. As an alternative, adaptable parking spaces may be designed in accordance with AS4299.

The following items would be considered noteworthy in the design of the individual buildings:

- Access Driveways:
  - All access driveways would be accommodated within the internal road system. Previous Concept Layouts identified a access driveway onto Talavera Road, however this is no longer proposed.
- Ramps:
  - Internal ramps grades to not exceed the maximum grade of 25% (1:4) as permissible under AS2890.1 2.5.3 (b) for private developments.
  - Grade transitions shall be provided in accordance with AS2890. For a 25% ramp grade, this requires a minimum sag transition length of 2.0m, with a summit transition gradient of 12.5% (1:8), and a sag gradient of 15% (1:6.7). The design provides compliant grade transitions.
  - Swept path analysis would be undertaken for the main ramps demonstrating satisfactory operation
- Pedestrian Safety – Figure 3.3 of AS 2890.1 specifies the minimum sight lines for pedestrian safety where a 2.5m X 2.0m splay is required to be kept clear of all obstructions.
- Parking Modules & Internal Circulation:

- Commercial and employee parking spaces are designed in accordance with a User Class 1A and provided with a minimum space length of 5.4m, width of 2.4m and a minimum aisle width of 5.8m.
- Small parking spaces have been designed in accordance with AS 2890.1 with a 2.3m space width and 5.0m space length.
- Disabled parking spaces are designed in accordance with AS2890.6.
- Dead-end aisles are provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1.

- Headroom Requirements
  - A minimum headroom of 4.5m is required for the on-site loading bay and access thereto.
  - A general minimum headroom of 2.2m shall apply throughout the basement car park.
  - An increased headroom of 2.5m shall be provided above all accessible parking spaces.

7.2 Internal Streets

The Macquarie Park DCP's vision for the access network serves to intensify the Commercial Core and the residential areas. The proposed road and pedestrian network for this area will improve vehicular, pedestrian and cycling accessibility and connectivity for the projected growth in traffic movements within the Corridor. These new streets will follow the existing grid configuration anchored upon the alignment of Lane Cove Road.

Section 4.1 of the Macquarie Park Corridor DCP outlines the following two street types to be adopted within the road network of the precinct:

- 20m Wide Streets
- 14.5m Wide Streets

Their respective street cross-sections are displayed in the following figures:

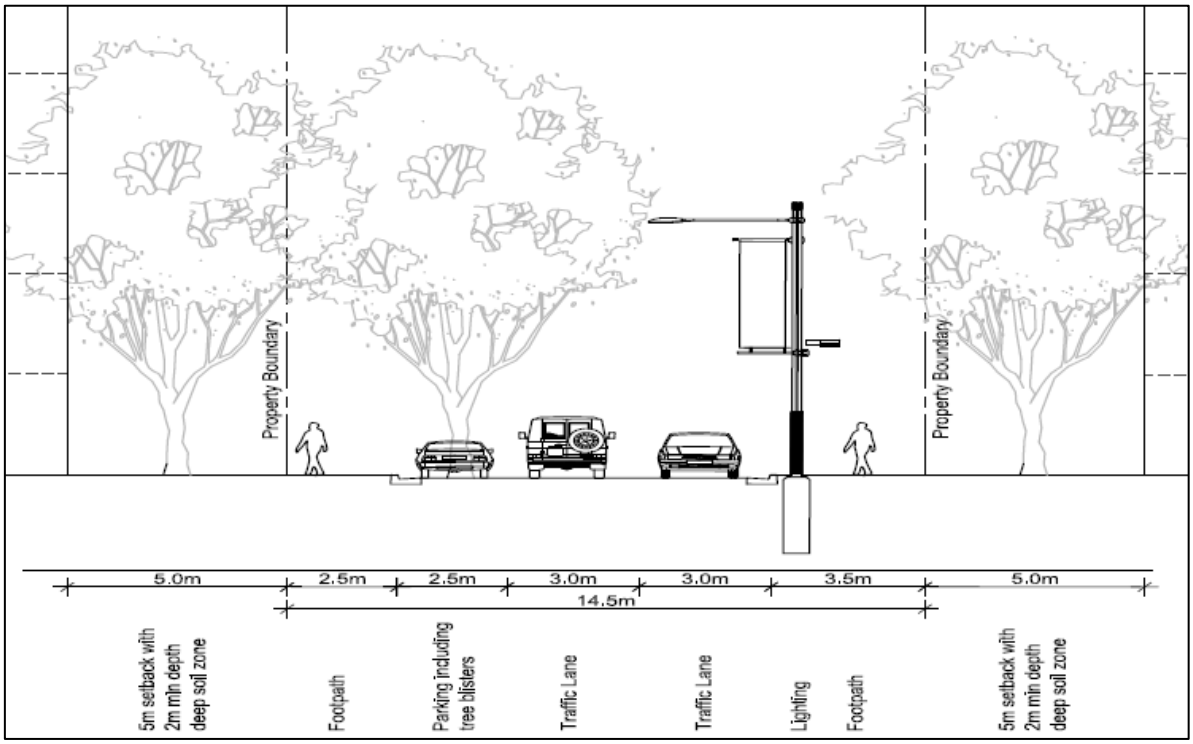


Figure 16: 14.5m Wide Streets - Typical section

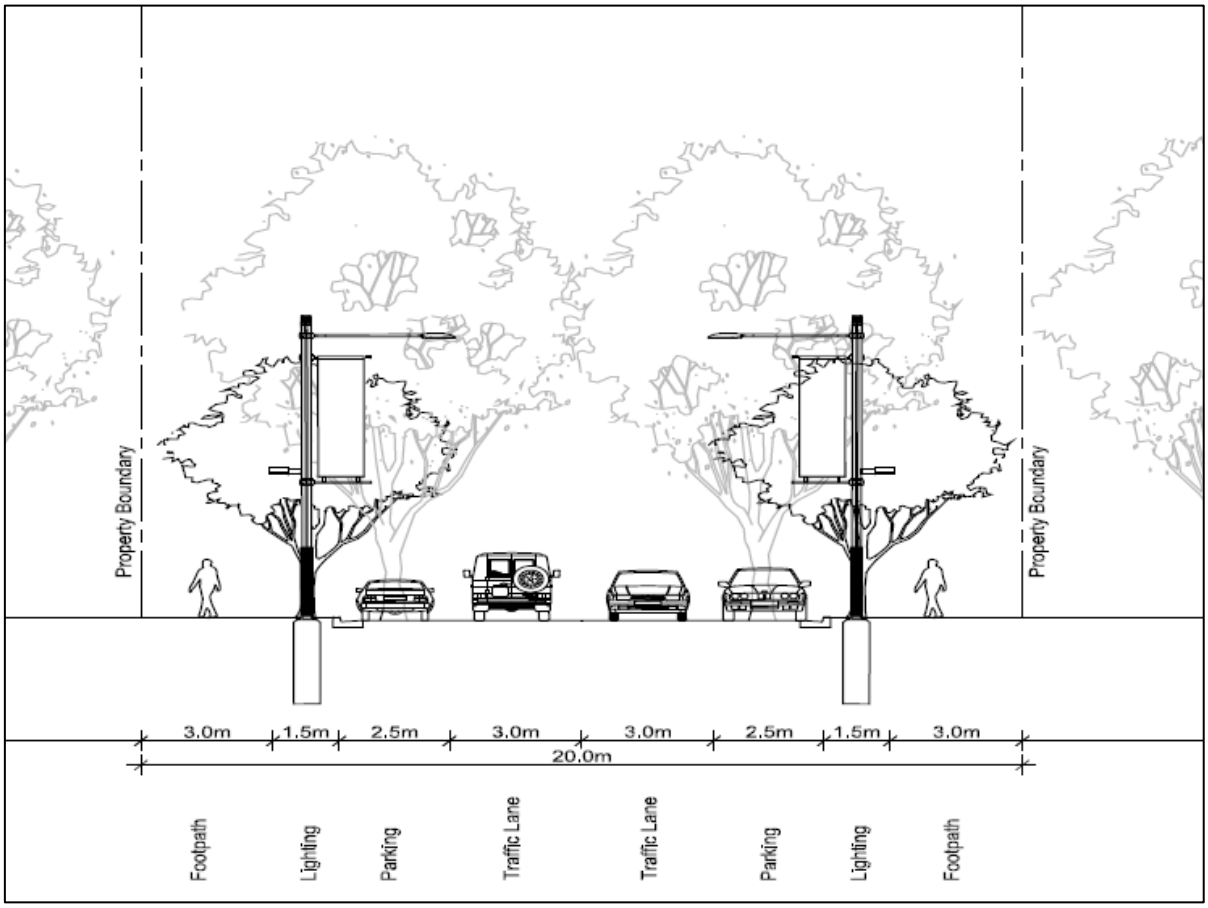


Figure 17: 20m Wide Streets - Typical section

The DCP further emphasises that the new streets are to follow the layout in accordance with **Figure 18**. These new streets are to be dedicated to Council and are to be maintained by the landowner until dedicated to Council. The City of Ryde Council wishes to achieve a minimum of 2.5m wide footpaths throughout the access network to cater for residential and worker growth in the precinct. All other street amenities are to follow the guidelines set out in the Macquarie Park Corridor Public Domain Technical Manual.

The proposed road structure for Council owned road namely Road 22 and Road 1 complies with the DCP and access network.

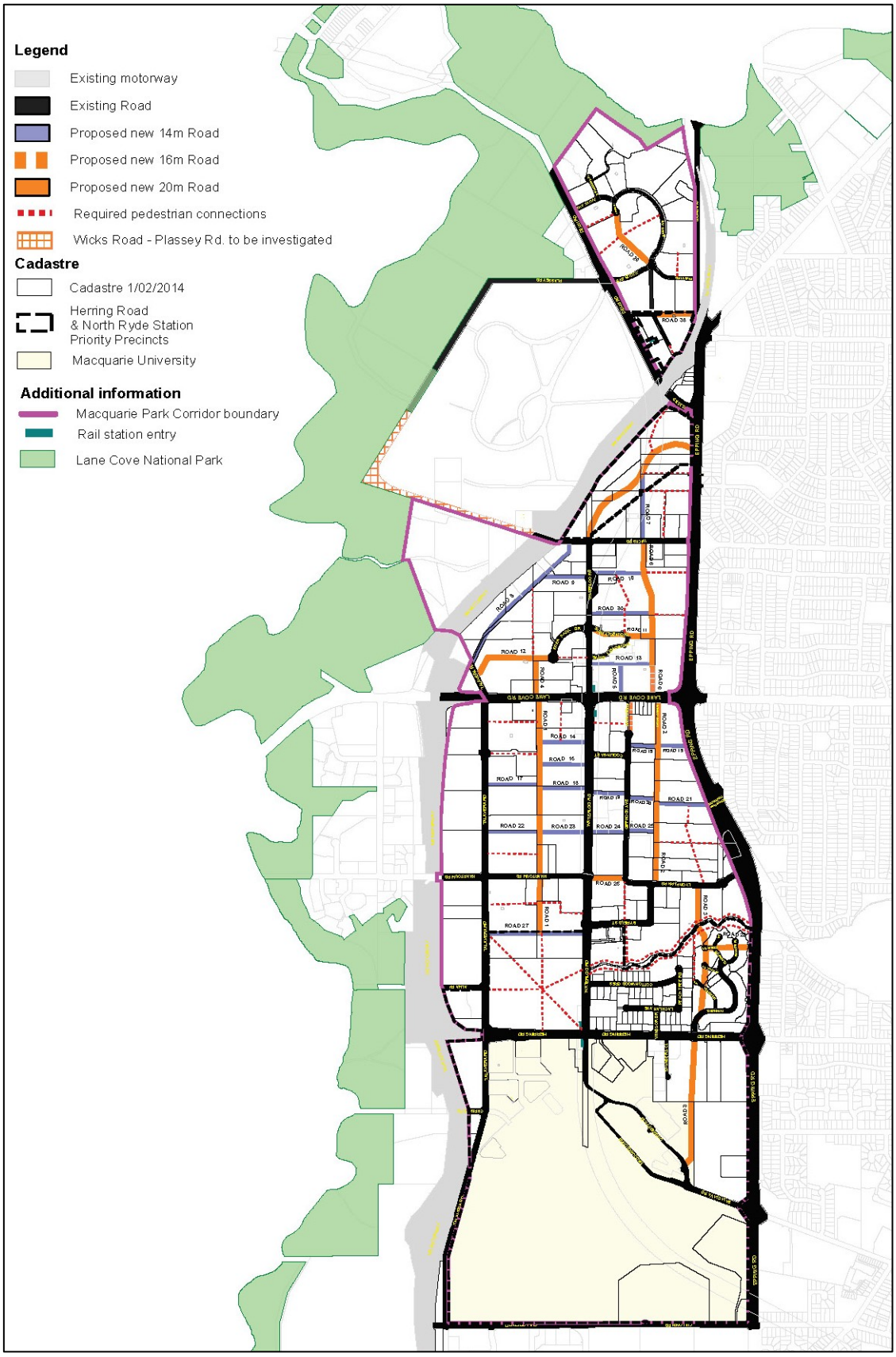


Figure 18: Macquarie Park Corridor Access Network

8 Sustainable Traffic Management

8.1 Framework Travel Plan

Council require a Framework Travel Plan (FTP) to be submitted with for all development that exceed 10,000m^2 of new floor space. Green Travel Plans (GTP) would be produce for each building as required. The primary objectives of the GTP will be to:

- Reduce the environmental footprint of the development
- Promote the use of 'active transport' modes such walking and cycling, particularly for short-medium distance journeys.
- Reduce reliance on the use of private vehicles for all journeys.
- Encourage a healthier, happier and more active social culture.

Having regard for the above, this Plan would seek to adopt the following movement hierarchy with priority given to 'active transport'.

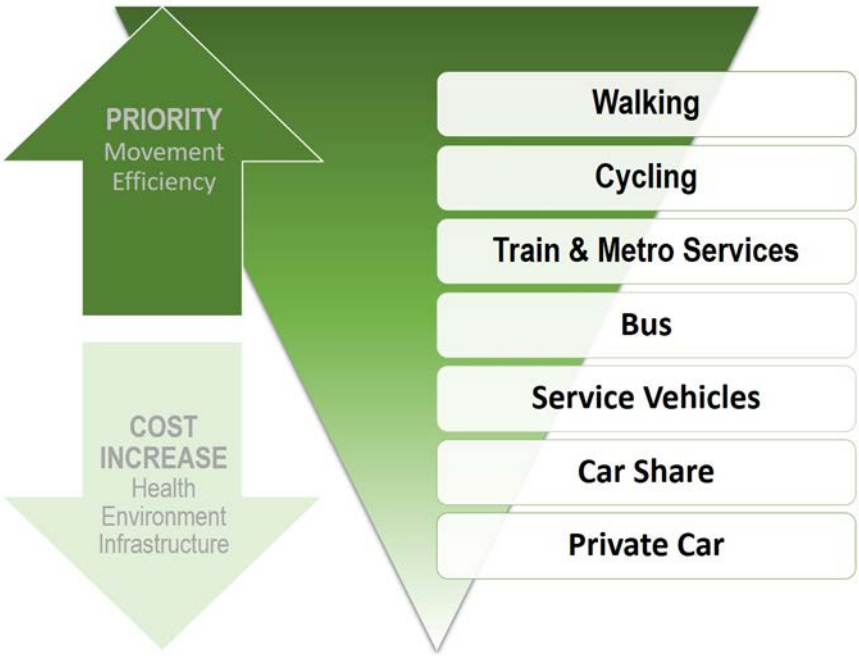


Figure 19: Movement Hierarchy

8.2 Site Audit and Targets

The existing travel patterns of employees within the surrounding locality was surveyed within the 2011 Census and presented in the JTW data provided by the Bureau of Transport Statistics (BTS). The

data has been presented in **Figure 20** for Travel Zone (TZ) 1545. The modal share data shows that 15% of persons working within the area travel by public transport. Corresponding mode share to 'vehicle driver' is 77% for persons employed within the TZ.

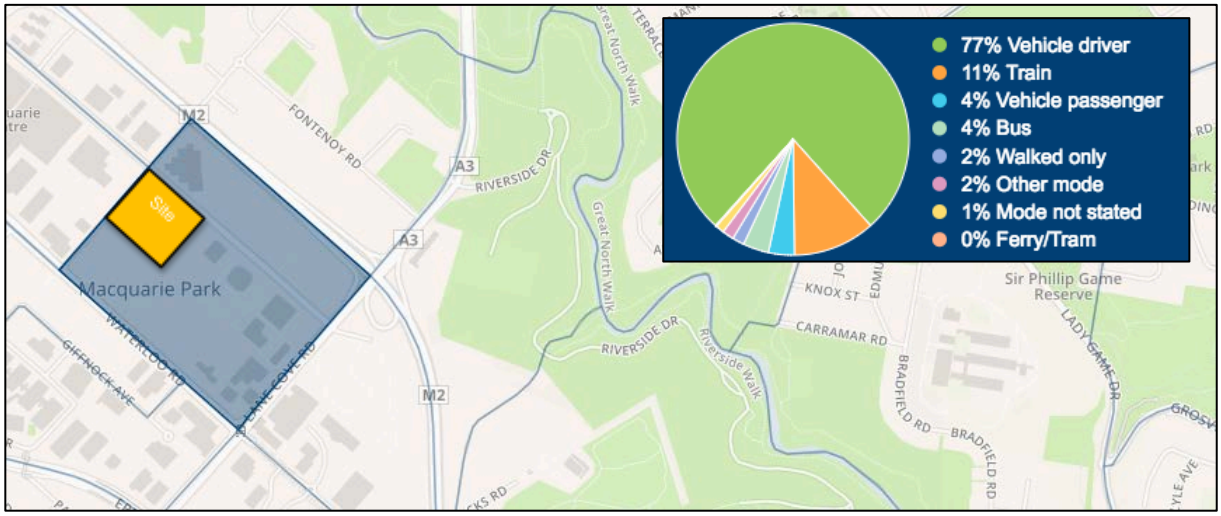


Figure 20: Journey-to-Work Mode Share

In this regard, **Table 10** details the existing mode share targets. These mode shares will be used as a base to form proposed targets for the GTP. These targets will be developed with consideration to the Macquarie Park Corridor Development Control Plan (2014), which seeks to meet a target of 40% for public transport trips by 2031.

Table 10: Mode Share – Existing and Proposed Targets

Transport Mode	Existing
Vehicle Driver	77%
Vehicle Passenger	4%
Train	11%
Bus	4%
Walking	2%
Cycling	N/A
Other	2%

The FTP is intended to develop a package of site specific measures to promote and maximise the use of sustainable travel modes, including walking, cycling, public transport and car sharing. It will include a review of existing transport choices and sets targets so that the effective implementation of the plan can be assessed. These targets are to be realistic but ambitious enough to initiate substantiative behavioural change to achieve the desired outcomes. The plan shall be reviewed regularly as part of an ongoing review to ensure it remains relevant and reflective of current conditions.

With regards to the Proposal, the existing public transport infrastructure available within close proximity to the Site has been detailed in Section 2. Due to the existing provision of multiple bus stops within close proximity to the Site, no additional infrastructure is proposed.

Workplace Travel Plans would be produced for each of the individual DAs, as has been done for the Building A DA, a copy of which has been provided in **Appendix D**.

8.3 Action Strategies

Three main strategies have been identified and the actions required for each are detailed in **Table 11** below. The table details how the targets the specific actions to be implemented as part of this FTP, the timeframe for implementation and who will be responsible for implementing each action.

In developing this FTP and the strategies and actions comprising it, it is recognised that the end user is not known to the developer. Consequently, it is vital that the developer explains to future tenants the expectations regarding travel planning that are agreed for the Site to facilitate the important process of monitoring and review.

Table 11: Framework Travel Plan Action Table

STRATEGY	HOW IT WORKS	IMPLEMENTATION	REPSONSIBILTY
1 Managing Car Use			
1.1 Car Sharing	Staff and visitors are encouraged to use a shared car (egg. GoGet) to reduce the need for individuals to drive to work.	Utilise car share spaces provided and actively promote on site to staff and visitors	Building Management, Commercial tenant responsibility
1.2 Carpooling	Establish a car pooling program to help people find someone to share in their daily commute.	Prepare information sheets specific to employees on site.	Building Management, commercial space staff
1.3 Electric Vehicle Charging Points	Provision of EV charging points would allow travellers to use electric vehicles.	Provide EV charging points in convenient parking areas (i.e. close to entrances).	Developer
2 Promoting Public Transport			
2.1 Travel Pass Loan Schemes	Commercial business may consider subsidising staff travel passes to increase public transport use. Alternatively, staff can pay for their own annual travel pass through their salary, spreading the cost over the year to make it more affordable.	Subject to owner/tenant negotiations and incentives.	Commercial tenant responsibility
2.2 Public transport for Business travel	The commercial space organisation can promote public transport as the first preference for business travel. This should be supported by employees having access to travel passes.	Subject to owner/tenant negotiations and incentives.	Commercial tenant responsibility
3 Promoting Cycling and Walking			
3.1 Providing End of Journey Facilities	Providing facilities such as showers, change rooms, lockers.	613 bicycle parking spaces will be provided for staff. Commercial tenant can consider provision of other facilities.	Developer, commercial tenant
3.2 Bicycle Fleets	Building management staff and commercial tenant may consider having bicycle fleets which employees can use for local trips.	Utilisation of on-site bicycle parking facilities and purchase/lease of shared bicycles.	Building management

4 Other			
4.1 Flexible Working hours	Allowing staff the flexibility to commute outside peak periods to reduce overall congestion and travel time.	Manage staff rosters, and develop work-from-home policies and procedures, where possible.	Employers
4.2 Teleworking	Providing the option to work remotely means there will be fewer vehicles on the road.	Manage staff rosters, and develop work-from-home policies and procedures, where possible.	Employers
4.3 Workplace Travel Plan	Provide staff with a Workplace Travel Plan (as per Append D) to advise them of the transport options available in the area.	Keep a copy of the Workplace Travel Plan current, relevant, useful and accessible. The WTP should be clearly displayed in communal areas.	Building management

9 Conclusions

As discussed in Section 1, the study objectives of this Traffic Impact Assessment are:

- Traffic Generation Rates:

  OB1 Confirm and endorse a suitable 'trip per parking space' rate to adopt for assessing traffic impacts of the development.

- Traffic Impacts:

  OB2 Assess the forecast traffic generation of the current Proposal and undertake network performance testing to demonstrate the net traffic impacts of the Proposal.

- Sustainable Travel:

  OB3 Assess the Site's sustainable transport accessibility to demonstrate that the Site is strategically located to achieve the public transport goals of the MPDCP and provides improved pedestrian connectivity and permeability across the Site, at Khartoum Road and towards the Macquarie Park Train Station / Macquarie University Train Station.

- Design:

  OB4 Demonstrate that the Site can provide suitable Site access, internal design, car parking and loading facilities for each building which would be designed to comply with relevant Australian standards and MPDCP controls and therefore would provide safe and efficient access to, from and within the proposed development.

With regard to these objectives, the key findings of this Traffic Impact Assessment are:

Proposal

- The Proposal seeks approval for a Concept Masterplan of the MTC consisting of a commercial development at 11-17 Khartoum Road and 33-39 Talavera Road, Macquarie park. The Masterplan DA consists of 5 commercial buildings totalling 59,769m^2 GFA, 550m^2 ancillary retail use with supporting infrastructure, servicing areas and 987 parking spaces.

  A DA for Building A (Stage 1 of the Masterplan) is currently being considered by Council, with the traffic impacts of Building A considered within a separate TIA. This TIA considers the traffic impacts of the Masterplan as a whole to present the likely traffic generation and impacts of the development to Council. Individual DAs are required for the remaining stages (Building B-E).

Sustainable Transport

- The Site is favourably located with regard to public transport services and future employment areas to encourage future tenants to use alternative transport modes for peak hour commuting

and would assist in reducing the traffic demand on the surrounding road network, through the proposed Framework Travel Planning.

- In relation to the above existing transport provisions, the MPDCP outlines the importance of Sustainable transport and travel demand management which is a major strategic concern within the MPC. With a travel modal split for public transport at 20% in 2011, the MPDCP seeks to increase public transport usage to 40% by 2031. As of April 2017, reduced parking rates and maximum provisions were set for MPC which sought to increase public transport usage. These revised rates are applicable to the subject Site and compliance is proposed to assist with the mode share shift. The Proposal therefore aligns with the sustainable travel objective to help achieve the public transport goals of the MPDCP.
- Council requires a Framework Travel Plan (FTP) to be submitted for all development that exceed 10,000m^2 of new floor space. In this regard any future transport assessment undertaken for individual building DAs would be accompanied by a Green Travel Plan. Ason Group prepared a Workplace Travel Plan for Building A DA, which is provided in Appendix D.
- Thus, the Proposal aligns with Study Objective OB3 to demonstrate that the Site is strategically located to achieve the public transport goals of the MPDCP

Parking

- Compliance with Council DCP parking rates is proposed for each building. Accessible parking, motorcycle parking and bicycle parking would be provided for each building in accordance with Council's DCP. The Proposal thus aligns with Study Objective OB4 to ensure safe and efficient access to, from and within the proposed development.

Traffic Assessment

- A Trip Rate Assessment (per parking space) has been undertaken which demonstrates trip rates of 0.45 in the morning peak hour and 0.36 in the evening peak hour. These rates have been derived from traffic count surveys undertaken of 8 Khartoum Road between Monday 18 June 2018 – Friday 22 June 2018 and agreed with CoR Council. This survey analysis meets Study Objective OB1 concluding the most appropriate trip rate for the subject development.
- Application of the adopted trip rate, with 987 car parking spaces, would generate 444 veh/hr during the AM Peak and 355 veh/hr during the PM Peak. The Proposal would therefore generate a net increase of 300 and 255 vehicle trips per hour (veh/hr) during the morning and evening peak periods, respectively. This meets Study Objective OB2 to assess the Proposal traffic impacts.

- The modelling analysis undertaken by Ason Group for the Concept Proposal provides an overview of the projected study network performance for 2031 'with' and 'without' development. It is clear the Base 2031 projections with projected growth results in network congestion and intersection underperformance however this approach does not accurately account for the evolving nature of the MP precinct and the public transport infrastructure projects (Sydney Metro etc).
- Traffic modelling indicates a number of intersections are forecast to operate above operational capacity in 2031. It is evident that without the subject development, intersections were found to operate at Level of Service F and that upgrades are required irrespective of any future development at the subject Site. The modelling indicates that the proposal does not result in any change to intersection level of service compared in 2031.
- The intersection of Road 22 and Talavera Road should be limited to left in, left out movements.
- The Concept Proposal is consistent with the LEP. The modelling assessment provides an overview of the future site development and potential traffic generating characteristics for which separate Development Applications would be submitted and assessed in detail at a later stage.

Macquarie Park DCP

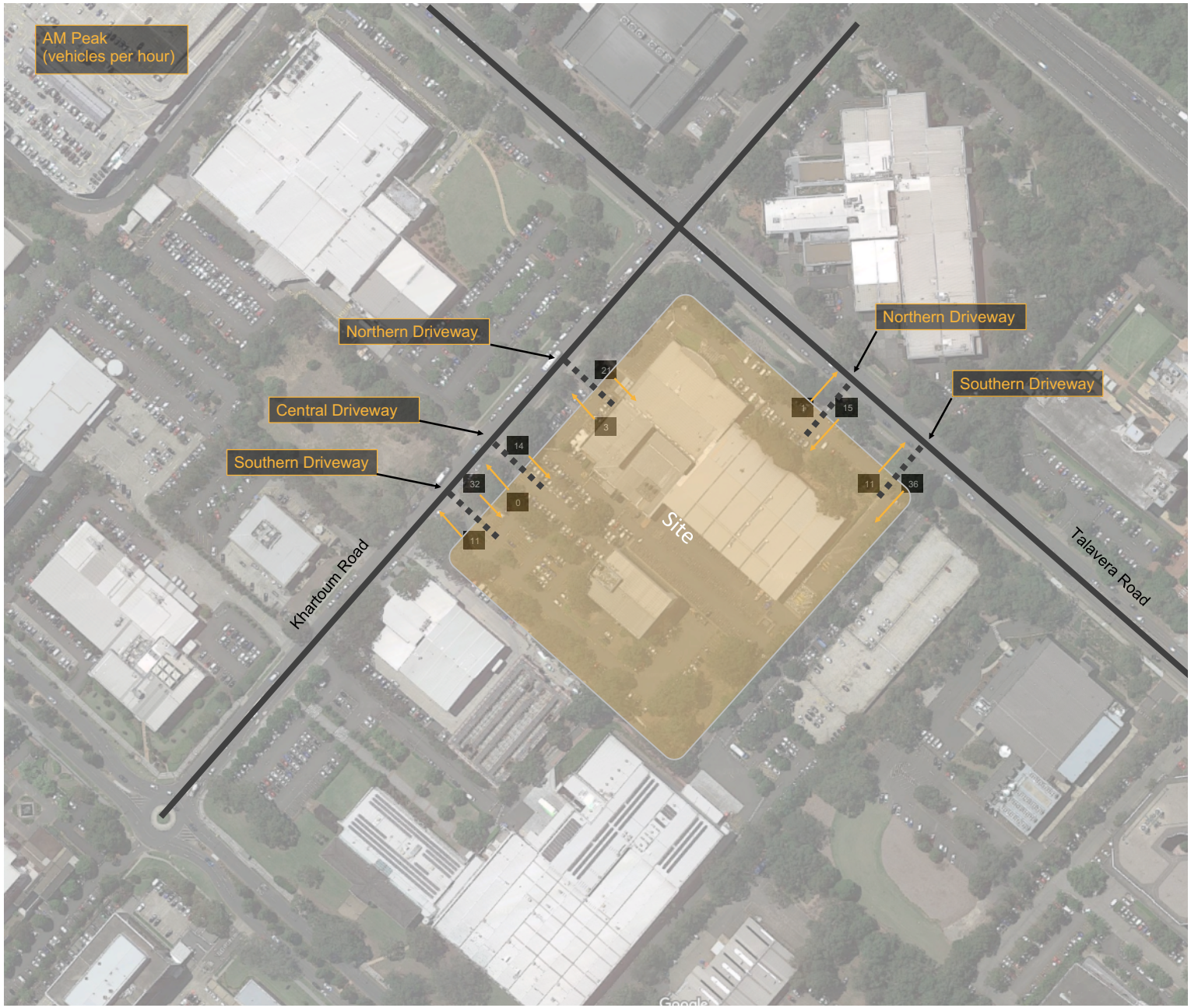
- The street network proposed for the Masterplan not only aligns with the MPDCP but goes beyond it as it provides a highly permeable network of streets and pedestrian ways. The street layout would improve vehicular, pedestrian and cycle permeability within the corridor, a key objective of MPDCP.

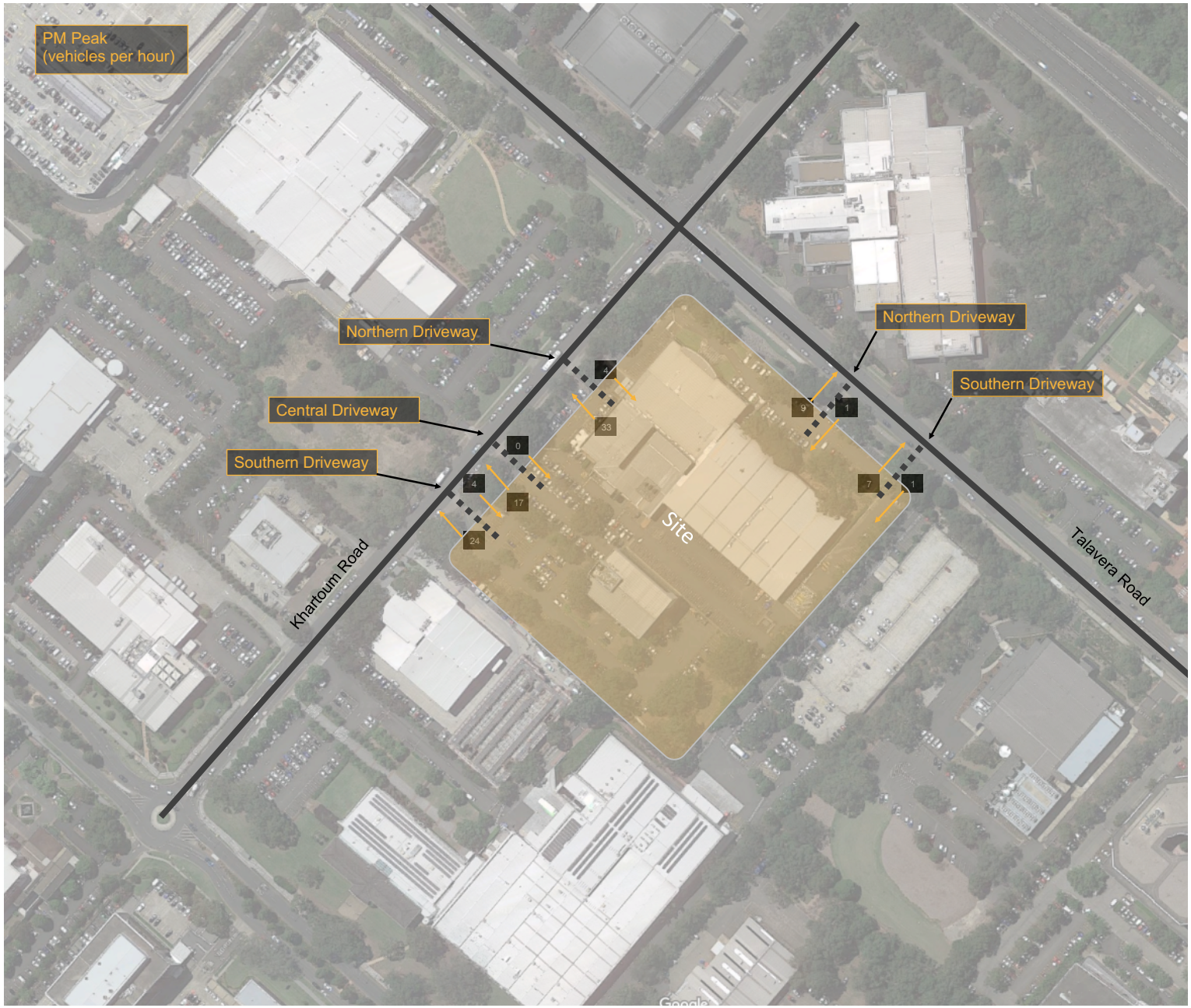
Design

- The internal road configuration of the Site has been designed in accordance with the MPDCP and the relevant Australian Standards. The access, car parking and servicing areas for the separate buildings would be designed in accordance with the relevant Australian Standards, which aligns with Study Objective OB4. The design for each would be developed during each of the staged DAs.

Appendix A

Existing Traffic Volumes


AM Peak
(vehicles per hour)
Northern Driveway
Central Driveway
Southern Driveway
Northern Driveway
Southern Driveway
27
3
14
32
0
11
1
15
11
36
Site
Khartoum Road
Talavera Road


PM Peak
(vehicles per hour)
Northern Driveway
Central Driveway
Southern Driveway
Northern Driveway
Southern Driveway
4
33
0
4
17
24
9
1
7
1
Site
Khartoum Road
Talavera Road

Appendix B

SIDRA Movement Summary (2031 BASE)

MOVEMENT SUMMARY

Site: 101 [Talavera Rd x Khartoum Rd AM_2031_Base]

Network: N101 [AM_Khartoum Rd_2031_Base]

Talavera Rd x Khartoum Rd
AM
2031 Base
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (60m)														
1	L2	81	7.8	81	7.8	0.230	34.4	LOS C	2.8	21.3	0.83	0.73	0.83	17.9
2	T1	118	10.7	118	10.7	1.112	156.5	LOS F	7.9	60.0	0.96	1.28	1.75	10.1
3	R2	185	8.5	185	8.5	1.112	194.4	LOS F	7.9	60.0	1.00	1.42	1.99	3.7
Approach		384	9.0	384	9.0	1.112	149.0	LOS F	7.9	60.0	0.95	1.23	1.67	6.9
East: Talavera Road (150m)														
4	L2	209	6.5	209	6.5	1.120	178.4	LOS F	24.6	178.9	1.00	1.37	1.98	2.7
5	T1	454	1.9	454	1.9	1.120	188.0	LOS F	24.7	176.0	1.00	1.52	1.99	5.6
6	R2	69	0.0	69	0.0	0.180	56.3	LOS D	2.5	17.8	0.86	0.75	0.86	22.8
Approach		733	3.0	733	3.0	1.120	172.8	LOS F	24.7	178.9	0.99	1.40	1.88	5.6
North: Khartoum Road (500m)														
7	L2	35	0.0	35	0.0	0.568	75.0	LOS F	4.9	35.7	1.00	0.79	1.00	19.9
8	T1	120	7.0	120	7.0	0.568	70.8	LOS F	4.9	35.7	1.00	0.79	1.00	16.9
9	R2	61	0.0	61	0.0	0.568	75.9	LOS F	4.6	32.9	1.00	0.79	1.00	20.3
Approach		216	3.9	216	3.9	0.568	72.9	LOS F	4.9	35.7	1.00	0.79	1.00	18.5
West: Talavera Road (190m)														
10	L2	359	1.8	359	1.8	1.132	181.2	LOS F	58.7	417.1	1.00	1.41	1.93	9.9
11	T1	878	1.8	878	1.8	1.132	190.8	LOS F	58.7	417.1	1.00	1.55	1.98	5.5
12	R2	658	2.4	658	2.4	1.153	198.7	LOS F	47.6	340.0	1.00	1.36	2.04	3.0
Approach		1895	2.0	1895	2.0	1.153	191.7	LOS F	58.7	417.1	1.00	1.46	1.99	5.5
All Vehicles		3227	3.2	3227	3.2	1.153	174.4	LOS F	58.7	417.1	0.99	1.37	1.86	6.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	61.8	LOS F	0.2	0.2	0.91	0.91
P2	East Full Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	38.2	LOS D	0.2	0.2	0.71	0.71
P4	West Full Crossing	53	62.7	LOS F	0.2	0.2	0.92	0.92

All Pedestrians	211	58.0	LOS E	0.88	0.88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Talavera Rd x Khartoum Rd PM_2031_Base]

Network: N101 [PM_Khartoum Rd_2031_Base]

Talavera Rd x Khartoum Rd
PM
2031 Base
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (60m)														
1	L2	343	0.3	326	0.3	0.361	18.3	LOS B	5.9	41.2	0.66	0.75	0.66	25.1
2	T1	309	3.4	294	3.6	1.076	162.8	LOS F	8.2	60.0	1.00	1.45	1.81	9.9
3	R2	116	11.8	111	12.3	1.076	167.1	LOS F	8.2	60.0	1.00	1.45	1.81	4.4
Approach		768	3.3	731 N1	3.4	1.076	99.0	LOS F	8.2	60.0	0.85	1.13	1.30	10.7
East: Talavera Road (150m)														
4	L2	236	3.1	236	3.1	1.099	178.2	LOS F	43.2	306.2	1.00	1.44	1.84	3.1
5	T1	812	0.0	812	0.0	1.099	174.5	LOS F	43.2	306.2	1.00	1.51	1.85	6.2
6	R2	66	0.0	66	0.0	0.306	40.6	LOS C	1.8	12.3	0.95	0.75	0.95	26.8
Approach		1114	0.7	1114	0.7	1.099	167.3	LOS F	43.2	306.2	1.00	1.45	1.79	6.1
North: Khartoum Road (500m)														
7	L2	18	0.0	18	0.0	0.572	80.6	LOS F	4.6	34.7	1.00	0.84	1.39	19.1
8	T1	105	10.0	105	10.0	0.572	75.5	LOS F	4.6	34.7	1.00	0.84	1.34	16.4
9	R2	92	0.0	92	0.0	0.572	76.0	LOS F	4.6	32.6	1.00	0.79	1.00	20.1
Approach		215	4.9	215	4.9	0.572	76.1	LOS F	4.6	34.7	1.00	0.82	1.20	18.3
West: Talavera Road (190m)														
10	L2	515	0.0	515	0.0	0.930	73.7	LOS F	25.4	178.0	1.00	1.19	1.59	20.4
11	T1	420	0.8	420	0.8	0.930	76.0	LOS F	25.4	178.0	0.96	1.09	1.33	12.6
12	R2	285	1.1	285	1.1	1.100	186.3	LOS F	22.4	158.0	1.00	1.27	1.95	3.5
Approach		1220	0.5	1220	0.5	1.100	100.8	LOS F	25.4	178.0	0.99	1.18	1.58	12.4
All Vehicles		3317	1.5	3279 N1	1.5	1.100	121.4	LOS F	43.2	306.2	0.96	1.24	1.57	9.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	48.9	LOS E	0.2	0.2	0.81	0.81
P2	East Full Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	48.1	LOS E	0.2	0.2	0.80	0.80

P4	West Full Crossing	53	45.0	LOS E	0.2	0.2	0.78	0.78
All Pedestrians		211	52.8	LOS E			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 107 [Khartoum Rd x Waterloo Rd AM_2031_Base]

Network: N101 [AM_Khartoum Rd_2031_Base]

Khartoum Rd x Waterloo Rd
AM
2031 Base
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: New Road (120m)														
1	L2	31	0.0	31	0.0	0.800	50.1	LOS D	3.0	20.9	1.00	0.93	1.36	14.9
2	T1	4	0.0	4	0.0	0.800	45.6	LOS D	3.0	20.9	1.00	0.93	1.36	8.3
3	R2	77	0.0	77	0.0	0.800	50.1	LOS D	3.0	20.9	1.00	0.93	1.36	22.5
Approach		112	0.0	112	0.0	0.800	49.9	LOS D	3.0	20.9	1.00	0.93	1.36	20.3
East: Waterloo Road (430m)														
4	L2	42	0.0	42	0.0	0.047	16.0	LOS B	0.5	3.6	0.55	0.66	0.55	35.5
5	T1	561	9.9	561	9.9	0.314	13.3	LOS A	4.1	30.8	0.64	0.55	0.64	38.4
6	R2	304	8.7	304	8.7	0.837	43.3	LOS D	8.2	61.9	1.00	1.01	1.29	21.5
Approach		907	9.0	907	9.0	0.837	23.5	LOS B	8.2	61.9	0.76	0.71	0.86	31.5
North: Khartoum Road (165m)														
7	L2	155	4.1	138	4.2	0.108	6.9	LOS A	0.8	5.5	0.33	0.60	0.33	43.3
8	T1	137	0.0	122	0.0	0.828	38.9	LOS C	8.5	61.0	1.00	0.99	1.24	17.3
9	R2	586	3.9	523	4.0	0.828	43.5	LOS D	8.5	61.0	1.00	0.98	1.24	18.2
Approach		878	3.4	782 N1	3.4	0.828	36.4	LOS C	8.5	61.0	0.88	0.91	1.08	21.6
West: Waterloo Road (160m)														
10	L2	371	6.5	371	6.5	0.333	9.6	LOS A	3.4	25.2	0.49	0.67	0.49	28.8
11	T1	378	18.4	378	18.4	0.789	41.4	LOS C	4.9	39.8	1.00	0.96	1.25	25.7
Approach		748	12.5	748	12.5	0.789	25.7	LOS B	4.9	39.8	0.75	0.82	0.88	26.4
All Vehicles		2645	7.8	2550 N1	8.0	0.837	29.2	LOS C	8.5	61.9	0.80	0.81	0.95	26.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P2	East Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P4	West Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93

All Pedestrians	211	34.3	LOS D	0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 107 [Khartoum Rd x Waterloo Rd PM_2031_Base]

Network: N101 [PM_Khartoum Rd_2031_Base]

Khartoum Rd x Waterloo Rd
PM
2031 Base
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: New Road (120m)														
1	L2	136	0.0	136	0.0	1.279	326.8	LOS F	56.4	395.0	1.00	1.76	2.52	3.0
2	T1	144	0.0	144	0.0	1.279	322.2	LOS F	56.4	395.0	1.00	1.76	2.52	1.4
3	R2	249	0.0	249	0.0	1.279	326.8	LOS F	56.4	395.0	1.00	1.76	2.52	5.4
Approach		529	0.0	529	0.0	1.279	325.5	LOS F	56.4	395.0	1.00	1.76	2.52	3.8
East: Waterloo Road (430m)														
4	L2	112	0.0	112	0.0	0.119	24.9	LOS B	2.6	17.9	0.56	0.69	0.56	30.7
5	T1	615	10.1	615	10.1	0.332	23.1	LOS B	8.0	60.9	0.63	0.55	0.63	32.8
6	R2	241	0.4	241	0.4	1.260	320.1	LOS F	25.7	180.6	1.00	1.67	2.56	4.4
Approach		967	6.5	967	6.5	1.260	97.3	LOS F	25.7	180.6	0.72	0.85	1.10	14.4
North: Khartoum Road (165m)														
7	L2	280	2.3	264	2.3	0.271	19.8	LOS B	5.5	39.4	0.56	0.70	0.56	34.7
8	T1	119	0.0	112	0.0	0.877	77.9	LOS F	12.2	87.9	1.00	0.99	1.24	10.8
9	R2	400	5.8	377	5.9	0.877	82.7	LOS F	12.2	87.9	1.00	0.97	1.24	11.6
Approach		799	3.7	752 N1	3.8	0.877	59.9	LOS E	12.2	87.9	0.84	0.88	1.00	17.1
West: Waterloo Road (160m)														
10	L2	429	8.1	429	8.1	0.389	15.1	LOS B	8.3	61.9	0.51	0.68	0.51	23.3
11	T1	1248	5.3	1248	5.3	1.274	316.5	LOS F	66.3	485.4	1.00	2.07	2.48	5.9
Approach		1678	6.0	1678	6.0	1.274	239.4	LOS F	66.3	485.4	0.87	1.72	1.98	6.3
All Vehicles		3974	4.9	3927 N1	4.9	1.279	181.6	LOS F	66.3	485.4	0.85	1.35	1.65	7.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	45.7	LOS E	0.2	0.2	0.78	0.78
P2	East Full Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	50.5	LOS E	0.2	0.2	0.82	0.82
P4	West Full Crossing	53	67.4	LOS F	0.2	0.2	0.95	0.95

All Pedestrians	211	58.2	LOS E	0.88	0.88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 104 [Talavera Rd x Existing Site Access AM_2031_Base]

Network: N101 [Talavera Rd_AM_2031_Base]

Talavera Rd x Existing Site Access
AM
2031 Base
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Road 22 (60m)														
1	L2	1	0.0	1	0.0	0.030	8.5	LOS A	0.0	0.2	0.84	0.84	0.84	9.7
3	R2	1	0.0	1	0.0	0.030	97.9	LOS F	0.0	0.2	0.84	0.84	0.84	4.7
Approach		2	0.0	2	0.0	0.030	53.2	LOS D	0.0	0.2	0.84	0.84	0.84	7.4
East: Talavera Rd (55m)														
4	L2	9	0.0	9	0.0	0.137	4.1	LOS A	0.0	0.0	0.00	0.02	0.00	40.9
5	T1	528	3.0	515	2.9	0.137	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.7
Approach		538	2.9	524[N1]	2.9	0.137	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.5
West: Talavera Rd (100m)														
11	T1	1214	2.9	1214	2.9	0.320	0.0	LOS A	0.0	0.3	0.01	0.00	0.01	49.5
12	R2	5	0.0	5	0.0	0.320	8.5	LOS A	0.0	0.3	0.02	0.00	0.02	42.6
Approach		1219	2.9	1219	2.9	0.320	0.1	NA	0.0	0.3	0.01	0.00	0.01	49.5
All Vehicles		1759	2.9	1745[N1]	3.0	0.320	0.1	NA	0.0	0.3	0.01	0.01	0.01	49.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 104 [Talavera Rd x Existing Site Access PM_2031_Base]

Network: N101 [Talavera Rd_PM_2031_Base]

Talavera Rd x Existing Site Access
PM
2031 Base
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Road 22 (60m)														
1	L2	2	0.0	2	0.0	0.264	29.7	LOS C	0.3	2.0	0.97	1.02	1.03	4.4
3	R2	6	0.0	6	0.0	0.264	163.4	LOS F	0.3	2.0	0.97	1.02	1.03	2.0
Approach		8	0.0	8	0.0	0.264	130.0	LOS F	0.3	2.0	0.97	1.02	1.03	2.6
East: Talavera Rd (55m)														
4	L2	1	0.0	1	0.0	0.315	4.1	LOS A	0.0	0.0	0.00	0.00	0.00	41.4
5	T1	1302	1.0	1221	1.0	0.315	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		1303	1.0	1222 N1	1.0	0.315	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.9
West: Talavera Rd (100m)														
11	T1	705	1.0	705	1.0	0.184	0.1	LOS A	0.0	0.2	0.01	0.00	0.01	49.3
12	R2	1	0.0	1	0.0	0.184	18.8	LOS B	0.0	0.2	0.01	0.00	0.01	42.3
Approach		706	1.0	706	1.0	0.184	0.1	NA	0.0	0.2	0.01	0.00	0.01	49.3
All Vehicles		2018	1.0	1937 N1	1.0	0.315	0.6	NA	0.3	2.0	0.01	0.01	0.01	47.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 101 [Lane Cove Rd x Talavera Rd AM_2031_Base]

Network: N101 [Talavera Rd_AM_2031_Base]

Lane Cove Rd x Talavera Rd
AM
2031 Base
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 137 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lane Cove Rd (360m)														
1	L2	442	5.0	442	5.0	1.017	111.9	LOS F	45.4	331.4	1.00	1.20	1.52	10.5
2	T1	1932	5.0	1932	5.0	1.017	101.6	LOS F	55.3	403.5	1.00	1.29	1.49	18.7
3	R2	171	4.9	171	4.9	0.945	95.7	LOS F	8.5	62.1	1.00	1.02	1.51	14.3
Approach		2544	5.0	2544	5.0	1.017	103.0	LOS F	55.3	403.5	1.00	1.26	1.50	17.1
East: Talavera Rd (110m)														
4	L2	23	4.5	23	4.5	0.057	48.9	LOS D	0.7	5.4	0.81	0.69	0.81	21.8
5	T1	9	0.0	9	0.0	0.070	61.6	LOS E	0.4	2.5	0.93	0.64	0.93	7.0
6	R2	11	0.0	11	0.0	0.056	65.0	LOS E	0.4	2.8	0.93	0.67	0.93	18.5
Approach		43	2.4	43	2.4	0.070	55.6	LOS D	0.7	5.4	0.87	0.68	0.87	18.0
North: Lane Cove Rd (350m)														
7	L2	12	9.1	12	9.1	0.734	48.6	LOS D	21.8	159.4	0.87	0.81	1.32	24.5
8	T1	2193	5.0	2193	5.0	0.734	29.2	LOS C	23.0	168.1	0.83	0.76	0.96	39.3
9	R2	508	4.8	508	4.8	1.059	155.9	LOS F	18.1	132.0	1.00	1.20	1.89	7.5
Approach		2713	5.0	2713	5.0	1.059	53.0	LOS D	23.0	168.1	0.86	0.85	1.14	27.1
West: Talavera Rd (180m)														
10	L2	268	3.1	268	3.1	0.556	39.3	LOS C	7.5	53.8	0.91	0.86	1.02	26.3
11	T1	86	3.7	86	3.7	1.108	179.8	LOS F	11.9	85.9	1.00	1.43	2.12	5.4
12	R2	236	3.1	236	3.1	1.108	184.5	LOS F	11.9	85.9	1.00	1.41	2.12	9.0
Approach		591	3.2	591	3.2	1.108	117.8	LOS F	11.9	85.9	0.96	1.16	1.62	12.0
All Vehicles		5891	4.8	5891	4.8	1.108	81.1	LOS F	55.3	403.5	0.93	1.05	1.34	19.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	62.8	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	53	62.8	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	62.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		158	62.8	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Lane Cove Rd x Talavera Rd PM_2031_Base]

Network: N101 [Talavera Rd_PM_2031_Base]

Lane Cove Rd x Talavera Rd
PM
2031 Base
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 137 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lane Cove Rd (360m)														
1	L2	108	5.8	108	5.8	1.031	114.2	LOS F	59.6	435.7	1.00	1.32	1.52	10.6
2	T1	2597	5.0	2597	5.0	1.031	108.8	LOS F	59.6	435.7	1.00	1.34	1.53	17.8
3	R2	28	3.7	28	3.7	0.137	66.0	LOS E	1.1	7.7	0.93	0.72	0.93	18.9
Approach		2734	5.0	2734	5.0	1.031	108.6	LOS F	59.6	435.7	1.00	1.33	1.53	17.5
East: Talavera Rd (110m)														
4	L2	194	1.1	194	1.1	0.387	48.3	LOS D	6.4	45.6	0.86	0.79	0.86	22.2
5	T1	65	1.6	65	1.6	0.400	60.8	LOS E	3.6	25.4	0.97	0.76	0.97	6.9
6	R2	118	0.9	118	0.9	0.400	65.4	LOS E	3.6	25.4	0.97	0.77	0.97	18.5
Approach		377	1.1	377	1.1	0.400	55.8	LOS D	6.4	45.6	0.91	0.78	0.91	18.6
North: Lane Cove Rd (350m)														
7	L2	12	9.1	12	9.1	0.858	47.9	LOS D	29.4	214.9	0.96	0.92	1.23	24.8
8	T1	2251	5.0	2251	5.0	0.858	39.8	LOS C	29.4	214.9	0.96	0.92	1.09	33.9
9	R2	496	5.1	496	5.1	1.203	262.6	LOS F	22.3	162.8	1.00	1.40	2.44	4.6
Approach		2758	5.0	2758	5.0	1.203	79.9	LOS F	29.4	214.9	0.97	1.01	1.33	20.6
West: Talavera Rd (180m)														
10	L2	533	1.2	533	1.2	1.184	219.5	LOS F	25.5	180.0	1.00	1.48	2.28	6.8
11	T1	21	0.0	21	0.0	0.920	81.1	LOS F	10.6	74.7	1.00	1.04	1.39	10.5
12	R2	419	1.0	419	1.0	0.920	85.6	LOS F	10.6	74.7	1.00	1.04	1.39	16.8
Approach		973	1.1	973	1.1	1.184	158.8	LOS F	25.5	180.0	1.00	1.28	1.88	9.3
All Vehicles		6841	4.2	6841	4.2	1.203	101.3	LOS F	59.6	435.7	0.98	1.16	1.46	16.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	62.8	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	53	62.8	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	62.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		158	62.8	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 105 [Khartoum Rd x Private Rd A AM_2031_Base]

Network: N101 [AM_Khartoum Rd_2031_Base]

Khartoum Rd x Private Rd A
AM
2031 Base
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (40m)														
2	T1	434	8.0	434	8.0	0.245	0.3	LOS A	5.4	40.0	0.04	0.01	0.05	44.9
3	R2	6	0.0	6	0.0	0.245	10.6	LOS A	5.4	40.0	0.04	0.01	0.05	44.3
Approach		440	7.9	440	7.9	0.245	0.4	NA	5.4	40.0	0.04	0.01	0.05	44.9
East: Private Rd A (150m)														
4	L2	11	0.0	11	0.0	0.133	14.5	LOS B	0.1	0.7	0.82	1.00	0.82	19.0
6	R2	11	0.0	11	0.0	0.133	26.9	LOS B	0.1	0.7	0.82	1.00	0.82	19.0
Approach		21	0.0	21	0.0	0.133	20.7	LOS B	0.1	0.7	0.82	1.00	0.82	19.0
North: Khartoum Rd (40m)														
7	L2	8	0.0	7	0.0	0.457	3.4	LOS A	0.0	0.0	0.00	0.00	0.00	47.5
8	T1	968	3.8	861	3.9	0.457	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.5
Approach		977	3.8	869 N1	3.9	0.457	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.4
All Vehicles		1438	5.0	1330 N1	5.4	0.457	0.5	NA	5.4	40.0	0.03	0.02	0.03	44.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 105 [Khartoum Rd x Private Rd A PM_2031_Base]

Network: N101 [PM_Khartoum Rd_2031_Base]

Khartoum Rd x Private Rd A
PM
2031 Base
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (40m)														
2	T1	724	3.5	677	3.7	0.357	0.0	LOS A	5.5	40.0	0.00	0.00	0.00	49.6
3	R2	1	0.0	1	0.0	0.357	8.0	LOS A	5.5	40.0	0.00	0.00	0.00	45.4
Approach		725	3.5	678[N1]	3.7	0.357	0.0	NA	5.5	40.0	0.00	0.00	0.00	49.6
East: Private Rd A (150m)														
4	L2	9	0.0	9	0.0	0.106	11.1	LOS A	0.1	0.6	0.75	0.99	0.75	20.8
6	R2	11	0.0	11	0.0	0.106	23.9	LOS B	0.1	0.6	0.75	0.99	0.75	20.8
Approach		20	0.0	20	0.0	0.106	17.9	LOS B	0.1	0.6	0.75	0.99	0.75	20.8
North: Khartoum Rd (40m)														
7	L2	1	0.0	1	0.0	0.330	3.4	LOS A	0.0	0.0	0.00	0.00	0.00	47.6
8	T1	676	3.3	629	3.4	0.330	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		677	3.3	630[N1]	3.4	0.330	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.9
All Vehicles		1422	3.3	1328[N1]	3.6	0.357	0.3	NA	5.5	40.0	0.01	0.02	0.01	46.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 103 [Khartoum Rd x Private Rd B AM_2031_Base]

Network: N101 [AM_Khartoum Rd_2031_Base]

Khartoum Rd x Private Rd B
AM
2031 Base
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (40m)														
2	T1	382	8.5	382	8.5	0.222	0.4	LOS A	5.3	40.0	0.06	0.01	0.06	42.6
3	R2	9	0.0	9	0.0	0.222	9.9	LOS A	5.3	40.0	0.06	0.01	0.06	44.8
Approach		392	8.3	392	8.3	0.222	0.6	NA	5.3	40.0	0.06	0.01	0.06	42.8
East: Private Rd B (150m)														
4	L2	1	0.0	1	0.0	0.018	7.9	LOS A	0.0	0.1	0.47	0.89	0.47	20.3
6	R2	2	0.0	2	0.0	0.018	23.4	LOS B	0.0	0.1	0.47	0.89	0.47	20.3
Approach		3	0.0	3	0.0	0.018	18.2	LOS B	0.0	0.1	0.47	0.89	0.47	20.3
North: Khartoum Rd (60m)														
7	L2	13	0.0	11	0.0	0.077	4.3	LOS A	0.0	0.0	0.00	0.04	0.00	46.9
8	T1	978	4.0	870	4.1	0.387	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.4
Approach		991	3.9	881 N1	4.0	0.387	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.3
All Vehicles		1385	5.2	1276 N1	5.6	0.387	0.3	NA	5.3	40.0	0.02	0.01	0.02	47.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 103 [Khartoum Rd x Private Rd B PM_2031_Base]

Network: N101 [PM_Khartoum Rd_2031_Base]

Khartoum Rd x Private Rd B
PM
2031 Base
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (40m)														
2	T1	746	3.4	708	3.6	0.374	0.0	LOS A	5.5	40.0	0.01	0.00	0.01	49.3
3	R2	2	0.0	2	0.0	0.374	7.7	LOS A	5.5	40.0	0.01	0.00	0.01	46.5
Approach		748	3.4	710[N1]	3.5	0.374	0.0	NA	5.5	40.0	0.01	0.00	0.01	49.3
East: Private Rd B (150m)														
4	L2	18	0.0	18	0.0	0.217	7.8	LOS A	0.2	1.4	0.36	0.90	0.36	19.6
6	R2	22	0.0	22	0.0	0.217	28.3	LOS B	0.2	1.4	0.36	0.90	0.36	19.6
Approach		40	0.0	40	0.0	0.217	19.1	LOS B	0.2	1.4	0.36	0.90	0.36	19.6
North: Khartoum Rd (60m)														
7	L2	2	0.0	2	0.0	0.051	4.3	LOS A	0.0	0.0	0.00	0.01	0.00	47.6
8	T1	624	3.4	577	3.5	0.253	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
Approach		626	3.4	579[N1]	3.5	0.253	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.8
All Vehicles		1415	3.3	1329[N1]	3.5	0.374	0.6	NA	5.5	40.0	0.01	0.03	0.01	44.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 106 [Khartoum Rd x Road 1 AM_2031_Base]

Network: N101 [AM_Khartoum Rd_2031_Base]

Khartoum Rd x Road 1
AM
2031 Base
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (165m)														
2	T1	432	8.0	432	8.0	0.257	0.6	LOS A	12.1	90.0	0.09	0.02	0.11	46.5
3	R2	15	0.0	15	0.0	0.257	11.8	LOS A	12.1	90.0	0.09	0.02	0.11	45.3
Approach		446	7.8	446	7.8	0.257	0.9	NA	12.1	90.0	0.09	0.02	0.11	46.4
East: Private Rd A (150m)														
4	L2	6	0.0	6	0.0	0.092	14.2	LOS A	0.1	0.5	0.80	1.00	0.80	19.6
6	R2	8	0.0	8	0.0	0.092	24.0	LOS B	0.1	0.5	0.80	1.00	0.80	19.6
Approach		15	0.0	15	0.0	0.092	19.8	LOS B	0.1	0.5	0.80	1.00	0.80	19.6
North: Khartoum Rd (40m)														
7	L2	19	0.0	17	0.0	0.454	3.4	LOS A	0.0	0.0	0.00	0.01	0.00	47.3
8	T1	951	3.9	847	4.0	0.454	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.0
Approach		969	3.8	863[N1]	3.9	0.454	0.1	NA	0.0	0.0	0.00	0.01	0.00	48.8
All Vehicles		1431	5.0	1325[N1]	5.4	0.454	0.6	NA	12.1	90.0	0.04	0.02	0.04	46.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 106 [Khartoum Rd x Road 1 PM_2031_Base]

Network: N101 [PM_Khartoum Rd_2031_Base]

Khartoum Rd x Road 1
PM
2031 Base
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Khartoum Rd (165m)														
2	T1	708	3.6	658	3.8	0.348	0.0	LOS A	22.8	165.0	0.01	0.00	0.01	49.8
3	R2	2	0.0	2	0.0	0.348	9.3	LOS A	22.8	165.0	0.01	0.00	0.01	47.0
Approach		711	3.6	660 N1	3.8	0.348	0.1	NA	22.8	165.0	0.01	0.00	0.01	49.8
East: Private Rd A (150m)														
4	L2	14	0.0	14	0.0	0.137	11.3	LOS A	0.1	0.8	0.73	1.00	0.73	21.9
6	R2	16	0.0	16	0.0	0.137	21.0	LOS B	0.1	0.8	0.73	1.00	0.73	21.9
Approach		29	0.0	29	0.0	0.137	16.5	LOS B	0.1	0.8	0.73	1.00	0.73	21.9
North: Khartoum Rd (40m)														
7	L2	2	0.0	2	0.0	0.335	3.4	LOS A	0.0	0.0	0.00	0.00	0.00	47.6
8	T1	684	3.4	637	3.5	0.335	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
Approach		686	3.4	639 N1	3.5	0.335	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.8
All Vehicles		1426	3.4	1329 N1	3.6	0.348	0.4	NA	22.8	165.0	0.02	0.02	0.02	47.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 102 [Talavera Rd x Hitech Access Rd x Gateway 2000 Access Rd AM_2031_Base]

Network: N101 [Talavera Rd_AM_2031_Base]

Talavera Rd x Hitech Access Rd x Gateway 2000 Access Rd
AM
2031 Base
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 94 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Hitech Access Rd (100m)														
1	L2	37	2.9	37	2.9	0.048	12.3	LOS A	0.4	2.9	0.47	0.64	0.47	19.1
2	T1	1	0.0	1	0.0	0.143	29.5	LOS C	1.2	8.6	0.81	0.72	0.81	15.2
3	R2	54	2.0	54	2.0	0.143	34.1	LOS C	1.2	8.6	0.81	0.72	0.81	9.2
Approach		92	2.3	92	2.3	0.143	25.3	LOS B	1.2	8.6	0.67	0.69	0.67	11.7
East: Talavera Rd (180m)														
4	L2	168	3.1	163	3.1	0.855	36.4	LOS C	20.5	147.3	0.97	0.96	1.09	18.9
5	T1	1282	2.9	1243	2.8	0.855	31.7	LOS C	20.5	147.3	0.95	0.96	1.08	15.2
6	R2	43	2.4	42	2.4	0.219	47.7	LOS D	1.1	8.0	0.95	0.73	0.95	15.2
Approach		1494	2.9	1448[N1]	2.8	0.855	32.7	LOS C	20.5	147.3	0.95	0.95	1.07	15.7
North: Gateway 2000 Access Rd (100m)														
7	L2	20	5.3	20	5.3	0.023	6.9	LOS A	0.1	0.9	0.28	0.59	0.28	27.2
8	T1	5	0.0	5	0.0	0.056	28.6	LOS C	0.5	3.3	0.78	0.66	0.78	15.8
9	R2	17	0.0	17	0.0	0.056	33.2	LOS C	0.5	3.3	0.78	0.66	0.78	10.4
Approach		42	2.5	42	2.5	0.056	20.1	LOS B	0.5	3.3	0.55	0.63	0.55	15.6
West: Talavera Rd (260m)														
10	L2	55	1.9	55	1.9	0.522	24.7	LOS B	8.9	64.0	0.77	0.69	0.77	27.8
11	T1	762	3.0	762	3.0	0.522	19.7	LOS B	8.9	64.0	0.76	0.67	0.76	24.8
12	R2	191	2.8	191	2.8	0.999	90.6	LOS F	8.0	57.0	1.00	1.25	1.93	11.2
Approach		1007	2.9	1007	2.9	0.999	33.4	LOS C	8.9	64.0	0.80	0.78	0.98	19.5
All Vehicles		2635	2.9	2589[N1]	2.9	0.999	32.5	LOS C	20.5	147.3	0.88	0.87	1.01	17.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	41.3	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	41.3	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	41.3	LOS E	0.1	0.1	0.94	0.94

P4	West Full Crossing	53	41.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	41.3	LOS E			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 102 [Talavera Rd x Hitech Access Rd x Gateway 2000 Access Rd PM_2031_Base]

Network: N101 [Talavera Rd_PM_2031_Base]

Talavera Rd x Hitech Access Rd x Gateway 2000 Access Rd
PM
2031 Base
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 99 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Hitech Access Rd (100m)														
1	L2	127	0.8	127	0.8	0.143	6.4	LOS A	0.7	5.1	0.27	0.61	0.27	27.0
2	T1	1	0.0	1	0.0	0.611	38.4	LOS C	5.5	38.6	0.95	0.82	0.95	12.8
3	R2	198	1.1	198	1.1	0.611	43.0	LOS D	5.5	38.6	0.95	0.82	0.95	7.6
Approach		326	1.0	326	1.0	0.611	28.7	LOS C	5.5	38.6	0.69	0.74	0.69	10.5
East: Talavera Rd (180m)														
4	L2	14	0.0	12	0.0	0.339	20.1	LOS B	5.8	40.7	0.64	0.56	0.64	27.7
5	T1	725	1.0	644	1.0	0.339	15.6	LOS B	5.8	40.7	0.64	0.56	0.64	23.6
6	R2	8	0.0	7	0.0	0.045	50.1	LOS D	0.2	1.5	0.94	0.66	0.94	14.7
Approach		747	1.0	664[N1]	1.0	0.339	16.1	LOS B	5.8	40.7	0.64	0.56	0.64	23.4
North: Gateway 2000 Access Rd (100m)														
7	L2	56	0.0	56	0.0	0.139	8.6	LOS A	0.5	3.4	0.36	0.63	0.36	24.5
8	T1	1	0.0	1	0.0	0.125	33.7	LOS C	0.9	6.6	0.83	0.72	0.83	14.0
9	R2	38	0.0	38	0.0	0.125	38.3	LOS C	0.9	6.6	0.83	0.72	0.83	9.0
Approach		95	0.0	95	0.0	0.139	20.8	LOS B	0.9	6.6	0.56	0.67	0.56	14.4
West: Talavera Rd (260m)														
10	L2	2	0.0	2	0.0	0.551	23.0	LOS B	5.6	39.3	0.73	0.65	0.73	29.2
11	T1	765	1.0	765	1.0	0.551	17.8	LOS B	9.8	69.1	0.72	0.64	0.72	26.3
12	R2	45	0.0	45	0.0	0.272	51.9	LOS D	1.3	9.2	0.97	0.74	0.97	16.7
Approach		813	0.9	813	0.9	0.551	19.8	LOS B	9.8	69.1	0.74	0.65	0.74	25.2
All Vehicles		1981	0.9	1897[N1]	0.9	0.611	20.1	LOS B	9.8	69.1	0.69	0.63	0.69	21.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	43.8	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	43.8	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	43.8	LOS E	0.1	0.1	0.94	0.94

P4	West Full Crossing	53	43.8	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	43.8	LOS E			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 103 [Talavera Rd x Road 22 AM_2031_Base]

Network: N101 [Talavera Rd_AM_2031_Base]

Talavera Rd x Road 22
AM
2031 Base
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Road 22 (60m)														
1	L2	5	0.0	5	0.0	0.204	11.2	LOS A	0.2	1.7	0.84	0.91	0.87	4.3
3	R2	9	0.0	9	0.0	0.204	84.3	LOS F	0.2	1.7	0.84	0.91	0.87	4.3
Approach		15	0.0	15	0.0	0.204	58.2	LOS E	0.2	1.7	0.84	0.91	0.87	4.3
East: Talavera Rd (260m)														
4	L2	35	3.0	34	3.0	0.145	4.6	LOS A	0.0	0.0	0.00	0.07	0.00	45.3
5	T1	534	3.0	518	2.9	0.145	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	49.3
Approach		568	3.0	552[N1]	2.9	0.145	0.3	NA	0.0	0.0	0.00	0.03	0.00	49.0
West: Talavera Rd (55m)														
11	T1	1191	3.0	1191	3.0	0.324	0.1	LOS A	0.2	1.3	0.03	0.01	0.04	47.3
12	R2	23	0.0	23	0.0	0.324	7.4	LOS A	0.2	1.3	0.07	0.02	0.08	39.0
Approach		1214	2.9	1214	2.9	0.324	0.3	NA	0.2	1.3	0.03	0.01	0.04	47.0
All Vehicles		1797	2.9	1780[N1]	3.0	0.324	0.8	NA	0.2	1.7	0.03	0.03	0.03	46.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 103 [Talavera Rd x Road 22 PM_2031_Base]

Network: N101 [Talavera Rd_PM_2031_Base]

Talavera Rd x Road 22
PM
2031 Base
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Road 22 (60m)														
1	L2	3	0.0	3	0.0	0.244	22.1	LOS B	0.3	1.9	0.95	1.02	1.01	2.7
3	R2	7	0.0	7	0.0	0.244	128.7	LOS F	0.3	1.9	0.95	1.02	1.01	2.7
Approach		11	0.0	11	0.0	0.244	96.7	LOS F	0.3	1.9	0.95	1.02	1.01	2.7
East: Talavera Rd (260m)														
4	L2	1	0.0	1	0.0	0.315	4.6	LOS A	0.0	0.0	0.00	0.00	0.00	46.3
5	T1	1300	1.0	1219	1.0	0.315	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		1301	1.0	1220 N1	1.0	0.315	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.9
West: Talavera Rd (55m)														
11	T1	712	1.0	712	1.0	0.185	0.1	LOS A	0.0	0.2	0.01	0.00	0.01	49.0
12	R2	1	0.0	1	0.0	0.185	16.4	LOS B	0.0	0.2	0.01	0.00	0.01	40.3
Approach		713	1.0	713	1.0	0.185	0.1	NA	0.0	0.2	0.01	0.00	0.01	49.0
All Vehicles		2024	1.0	1943 N1	1.0	0.315	0.6	NA	0.3	1.9	0.01	0.01	0.01	48.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Appendix C

SIDRA Movement Summary (2031 BASE + Proposed Development)

MOVEMENT SUMMARY

Site: 101 [Talavera Rd x Khartoum Rd AM_2031_Base+Dev]

Network: N101 [AM_Khartoum Rd_2031_Base +Dev]

Talavera Rd x Khartoum Rd
AM
2031 Base+Dev
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (60m)														
1	L2	84	7.5	84	7.5	0.247	35.8	LOS C	3.0	22.6	0.85	0.74	0.85	17.5
2	T1	119	10.6	119	10.6	1.197	209.2	LOS F	7.9	60.0	0.97	1.42	1.99	7.9
3	R2	185	8.5	185	8.5	1.197	261.5	LOS F	7.9	60.0	1.00	1.60	2.30	2.8
Approach		388	8.9	388	8.9	1.197	196.6	LOS F	7.9	60.0	0.96	1.36	1.89	5.4
East: Talavera Road (150m)														
4	L2	209	6.5	209	6.5	1.189	235.4	LOS F	27.6	200.7	1.00	1.51	2.25	2.2
5	T1	457	1.8	457	1.8	1.189	243.9	LOS F	30.1	213.7	1.00	1.71	2.25	4.5
6	R2	69	0.0	69	0.0	0.156	51.8	LOS D	2.4	16.9	0.82	0.74	0.82	23.8
Approach		736	3.0	736	3.0	1.189	223.4	LOS F	30.1	213.7	0.98	1.56	2.11	4.5
North: Khartoum Road (500m)														
7	L2	35	0.0	35	0.0	0.589	76.2	LOS F	4.8	34.8	1.00	0.79	1.00	19.7
8	T1	120	7.0	120	7.0	0.589	71.6	LOS F	4.8	34.8	1.00	0.79	1.00	16.8
9	R2	61	0.0	61	0.0	0.589	76.1	LOS F	4.8	34.2	1.00	0.79	1.00	20.3
Approach		216	3.9	216	3.9	0.589	73.6	LOS F	4.8	34.8	1.00	0.79	1.00	18.4
West: Talavera Road (190m)														
10	L2	359	1.8	359	1.8	1.237	272.4	LOS F	71.6	509.2	1.00	1.64	2.34	7.2
11	T1	882	1.8	882	1.8	1.237	279.8	LOS F	71.6	509.2	1.00	1.82	2.37	3.9
12	R2	733	2.2	733	2.2	1.239	271.9	LOS F	63.6	453.3	1.00	1.51	2.36	2.3
Approach		1974	1.9	1974	1.9	1.239	275.5	LOS F	71.6	509.2	1.00	1.67	2.36	4.0
All Vehicles		3314	3.1	3314	3.1	1.239	241.6	LOS F	71.6	509.2	0.99	1.55	2.16	4.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	61.8	LOS F	0.2	0.2	0.91	0.91
P2	East Full Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	40.4	LOS E	0.2	0.2	0.73	0.73

P4	West Full Crossing	53	64.5	LOS F	0.2	0.2	0.93	0.93
All Pedestrians		211	59.0	LOS E			0.88	0.88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Talavera Rd x Khartoum Rd PM_2031_Base+Dev]

Network: N101 [PM_Khartoum Rd_2031_Base +Dev]

Talavera Rd x Khartoum Rd
PM
2031 Base+Dev
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (60m)														
1	L2	382	0.3	363	0.3	0.402	18.7	LOS B	6.7	47.0	0.68	0.76	0.68	24.8
2	T1	338	3.1	321	3.3	1.138	209.5	LOS F	8.2	60.0	1.00	1.62	2.05	8.0
3	R2	116	11.8	111	12.3	1.138	213.8	LOS F	8.2	60.0	1.00	1.62	2.05	3.5
Approach		836	3.0	795[N1]	3.2	1.138	123.0	LOS F	8.2	60.0	0.85	1.23	1.42	9.0
East: Talavera Road (150m)														
4	L2	236	3.1	236	3.1	1.129	201.8	LOS F	47.3	335.1	1.00	1.53	1.96	2.8
5	T1	840	0.0	840	0.0	1.129	197.9	LOS F	47.3	335.1	1.00	1.60	1.97	5.6
6	R2	68	0.0	68	0.0	0.218	62.1	LOS E	2.6	18.5	0.90	0.75	0.90	21.6
Approach		1144	0.6	1144	0.6	1.129	190.6	LOS F	47.3	335.1	0.99	1.54	1.90	5.5
North: Khartoum Road (500m)														
7	L2	18	0.0	18	0.0	0.579	75.3	LOS F	4.8	36.0	1.00	0.79	1.00	20.0
8	T1	105	10.0	105	10.0	0.579	70.8	LOS F	4.8	36.0	1.00	0.79	1.00	17.1
9	R2	92	0.0	92	0.0	0.579	76.1	LOS F	4.7	33.0	1.00	0.79	1.00	20.1
Approach		215	4.9	215	4.9	0.579	73.4	LOS F	4.8	36.0	1.00	0.79	1.00	18.7
West: Talavera Road (190m)														
10	L2	515	0.0	515	0.0	0.989	96.2	LOS F	30.6	214.0	1.00	1.23	1.66	17.3
11	T1	420	0.8	420	0.8	0.989	101.8	LOS F	30.6	214.0	0.98	1.23	1.51	10.0
12	R2	289	1.1	289	1.1	1.139	215.8	LOS F	24.5	173.3	1.00	1.34	2.09	3.1
Approach		1224	0.5	1224	0.5	1.139	126.4	LOS F	30.6	214.0	0.99	1.26	1.71	10.4
All Vehicles		3419	1.4	3378[N1]	1.5	1.139	144.0	LOS F	47.3	335.1	0.96	1.31	1.66	8.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	48.9	LOS E	0.2	0.2	0.81	0.81
P2	East Full Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96

P3	North Full Crossing	53	50.5	LOS E	0.2	0.2	0.82	0.82
P4	West Full Crossing	53	44.2	LOS E	0.2	0.2	0.77	0.77
All Pedestrians		211	53.2	LOS E			0.84	0.84

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 107 [Khartoum Rd x Waterloo Rd AM_2031_Base+Dev]

Network: N101 [AM_Khartoum Rd_2031_Base +Dev]

Khartoum Rd x Waterloo Rd
AM
2031 Base+Dev
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 140 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: New Road (120m)														
1	L2	31	0.0	31	0.0	0.872	81.4	LOS F	8.2	57.1	1.00	1.00	1.30	10.6
2	T1	69	0.0	69	0.0	0.872	76.8	LOS F	8.2	57.1	1.00	1.00	1.30	5.7
3	R2	77	0.0	77	0.0	0.872	81.4	LOS F	8.2	57.1	1.00	1.00	1.30	17.0
Approach		177	0.0	177	0.0	0.872	79.6	LOS F	8.2	57.1	1.00	1.00	1.30	12.2
East: Waterloo Road (430m)														
4	L2	42	0.0	42	0.0	0.040	18.3	LOS B	0.7	5.2	0.46	0.64	0.46	34.1
5	T1	592	9.4	592	9.4	0.282	16.1	LOS B	6.2	46.8	0.55	0.47	0.55	36.6
6	R2	348	7.6	348	7.6	0.900	71.6	LOS F	17.4	129.7	1.00	1.04	1.28	15.6
Approach		982	8.4	982	8.4	0.900	35.9	LOS C	17.4	129.7	0.70	0.68	0.80	26.3
North: Khartoum Road (165m)														
7	L2	160	3.9	134	4.1	0.099	7.6	LOS A	1.1	8.3	0.27	0.58	0.27	42.7
8	T1	139	0.0	116	0.0	0.883	70.7	LOS F	14.6	104.1	1.00	0.99	1.23	11.5
9	R2	604	3.8	507	4.0	0.883	75.4	LOS F	14.6	104.1	1.00	0.98	1.23	12.4
Approach		903	3.3	758 N1	3.4	0.883	62.7	LOS E	14.6	104.1	0.87	0.91	1.06	15.3
West: Waterloo Road (160m)														
10	L2	409	5.9	409	5.9	0.438	22.3	LOS B	9.8	72.1	0.65	0.74	0.65	18.6
11	T1	415	16.8	415	16.8	0.869	74.6	LOS F	9.6	76.5	1.00	1.02	1.27	18.5
Approach		824	11.4	824	11.4	0.869	48.6	LOS D	9.8	76.5	0.83	0.88	0.96	18.5
All Vehicles		2886	7.1	2741 N1	7.5	0.900	49.9	LOS D	17.4	129.7	0.81	0.83	0.95	19.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	57.7	LOS E	0.2	0.2	0.91	0.91
P2	East Full Crossing	53	63.3	LOS F	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	63.3	LOS F	0.2	0.2	0.95	0.95

P4	West Full Crossing	53	58.6	LOS E	0.2	0.2	0.92	0.92
All Pedestrians		211	60.8	LOS F			0.93	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 107 [Khartoum Rd x Waterloo Rd PM_2031_Base+Dev]

Network: N101 [PM_Khartoum Rd_2031_Base +Dev]

Khartoum Rd x Waterloo Rd
PM
2031 Base+Dev
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: New Road (120m)														
1	L2	136	0.0	136	0.0	1.282	328.9	LOS F	56.7	397.1	1.00	1.77	2.52	3.0
2	T1	145	0.0	145	0.0	1.282	324.3	LOS F	56.7	397.1	1.00	1.77	2.52	1.4
3	R2	249	0.0	249	0.0	1.282	328.8	LOS F	56.7	397.1	1.00	1.77	2.52	5.4
Approach		531	0.0	531	0.0	1.282	327.6	LOS F	56.7	397.1	1.00	1.77	2.52	3.7
East: Waterloo Road (430m)														
4	L2	112	0.0	112	0.0	0.119	24.9	LOS B	2.6	17.9	0.56	0.69	0.56	30.7
5	T1	645	9.6	645	9.6	0.347	23.3	LOS B	8.5	64.3	0.64	0.56	0.64	32.6
6	R2	242	0.4	242	0.4	1.308	360.0	LOS F	27.4	192.5	1.00	1.74	2.71	4.0
Approach		999	6.3	999	6.3	1.308	105.1	LOS F	27.4	192.5	0.72	0.86	1.13	13.6
North: Khartoum Road (165m)														
7	L2	317	2.0	294	2.0	0.306	20.6	LOS B	6.4	45.6	0.58	0.71	0.58	34.2
8	T1	155	0.0	143	0.0	1.010	120.4	LOS F	18.1	129.2	1.00	1.23	1.60	7.6
9	R2	456	5.1	423	5.2	1.010	125.5	LOS F	18.1	129.2	1.00	1.17	1.60	8.2
Approach		927	3.2	860 N1	3.3	1.010	88.8	LOS F	18.1	129.2	0.86	1.02	1.25	12.9
West: Waterloo Road (160m)														
10	L2	445	7.8	445	7.8	0.398	14.8	LOS B	8.5	63.6	0.51	0.68	0.51	23.5
11	T1	1285	5.2	1285	5.2	1.277	319.4	LOS F	68.7	501.9	1.00	2.08	2.49	5.8
Approach		1731	5.8	1731	5.8	1.277	241.0	LOS F	68.7	501.9	0.87	1.72	1.98	6.3
All Vehicles		4187	4.6	4120 N1	4.7	1.308	187.4	LOS F	68.7	501.9	0.85	1.37	1.69	7.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	45.0	LOS E	0.2	0.2	0.78	0.78
P2	East Full Crossing	53	69.3	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	49.7	LOS E	0.2	0.2	0.82	0.82

P4	West Full Crossing	53	67.4	LOS F	0.2	0.2	0.95	0.95
All Pedestrians		211	57.8	LOS E			0.88	0.88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Lane Cove Rd x Talavera Rd AM_2031_Base+Dev]

Network: N101 [Talavera Rd_AM_2031_Base+Dev]

Lane Cove Rd x Talavera Rd
AM
2031 Base+Dev
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 137 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lane Cove Rd (360m)														
1	L2	476	4.6	476	4.6	1.043	130.0	LOS F	47.9	348.9	1.00	1.25	1.64	9.1
2	T1	1932	5.0	1932	5.0	1.043	118.8	LOS F	60.8	444.0	1.00	1.38	1.60	16.6
3	R2	169	5.0	169	5.0	0.939	94.2	LOS F	8.4	61.2	1.00	1.01	1.49	14.5
Approach		2577	4.9	2577	4.9	1.043	119.2	LOS F	60.8	444.0	1.00	1.33	1.60	15.1
East: Talavera Rd (110m)														
4	L2	23	4.5	23	4.5	0.057	48.9	LOS D	0.7	5.4	0.81	0.69	0.81	21.8
5	T1	9	0.0	9	0.0	0.072	61.7	LOS E	0.4	2.5	0.93	0.65	0.93	7.0
6	R2	11	0.0	11	0.0	0.056	65.0	LOS E	0.4	2.8	0.93	0.67	0.93	18.5
Approach		43	2.4	43	2.4	0.072	55.6	LOS D	0.7	5.4	0.87	0.68	0.87	18.0
North: Lane Cove Rd (350m)														
7	L2	12	9.1	12	9.1	0.734	48.6	LOS D	21.8	159.5	0.87	0.81	1.32	24.5
8	T1	2194	5.0	2194	5.0	0.734	29.2	LOS C	23.0	168.2	0.83	0.76	0.96	39.3
9	R2	572	4.2	572	4.2	1.221	280.4	LOS F	28.2	204.4	1.00	1.46	2.51	4.3
Approach		2777	4.9	2777	4.9	1.221	81.0	LOS F	28.2	204.4	0.86	0.91	1.28	20.1
West: Talavera Rd (180m)														
10	L2	268	3.1	268	3.1	0.556	39.3	LOS C	7.5	53.8	0.91	0.86	1.02	26.3
11	T1	86	3.7	86	3.7	1.111	182.5	LOS F	12.1	86.9	1.00	1.44	2.13	5.3
12	R2	237	3.1	237	3.1	1.111	187.2	LOS F	12.1	86.9	1.00	1.41	2.14	8.8
Approach		592	3.2	592	3.2	1.111	119.4	LOS F	12.1	86.9	0.96	1.17	1.63	11.9
All Vehicles		5988	4.7	5988	4.7	1.221	101.1	LOS F	60.8	444.0	0.93	1.11	1.45	16.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	62.8	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	53	62.8	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	62.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		158	62.8	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Lane Cove Rd x Talavera Rd PM_2031_Base+Dev]

Network: N101 [Talavera Rd_PM_2031_Base+Dev]

Lane Cove Rd x Talavera Rd
PM
2031 Base+Dev
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 137 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Lane Cove Rd (360m)														
1	L2	109	5.8	109	5.8	1.032	114.5	LOS F	59.7	436.4	1.00	1.32	1.53	10.5
2	T1	2597	5.0	2597	5.0	1.032	109.1	LOS F	59.7	436.4	1.00	1.34	1.53	17.7
3	R2	28	3.7	28	3.7	0.137	66.0	LOS E	1.1	7.7	0.93	0.72	0.93	18.9
Approach		2735	5.0	2735	5.0	1.032	108.8	LOS F	59.7	436.4	1.00	1.33	1.53	17.5
East: Talavera Rd (110m)														
4	L2	194	1.1	194	1.1	0.387	48.3	LOS D	6.4	45.6	0.86	0.79	0.86	22.2
5	T1	65	1.6	65	1.6	0.400	60.8	LOS E	3.6	25.4	0.97	0.76	0.97	6.9
6	R2	118	0.9	118	0.9	0.400	65.4	LOS E	3.6	25.4	0.97	0.77	0.97	18.5
Approach		377	1.1	377	1.1	0.400	55.8	LOS D	6.4	45.6	0.91	0.78	0.91	18.6
North: Lane Cove Rd (350m)														
7	L2	12	9.1	12	9.1	0.858	47.9	LOS D	29.4	214.9	0.96	0.92	1.23	24.8
8	T1	2251	5.0	2251	5.0	0.858	39.8	LOS C	29.4	214.9	0.96	0.92	1.09	33.9
9	R2	497	5.1	497	5.1	1.206	264.7	LOS F	22.4	163.8	1.00	1.41	2.45	4.5
Approach		2759	5.0	2759	5.0	1.206	80.4	LOS F	29.4	214.9	0.97	1.01	1.33	20.5
West: Talavera Rd (180m)														
10	L2	554	1.1	537	1.2	1.195	228.5	LOS F	25.5	180.0	1.00	1.50	2.33	6.6
11	T1	21	0.0	20	0.0	0.951	89.0	LOS F	11.5	81.3	1.00	1.09	1.48	9.7
12	R2	447	0.9	434	1.0	0.951	93.5	LOS F	11.5	81.3	1.00	1.09	1.48	15.7
Approach		1022	1.0	992[N1]	1.1	1.195	166.5	LOS F	25.5	180.0	1.00	1.31	1.94	9.0
All Vehicles		6893	4.2	6863[N1]	4.2	1.206	102.8	LOS F	59.7	436.4	0.98	1.17	1.48	16.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	62.8	LOS F	0.2	0.2	0.96	0.96
P2	East Full Crossing	53	62.8	LOS F	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	62.8	LOS F	0.2	0.2	0.96	0.96

All Pedestrians	158	62.8	LOS F	0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 105 [Khartoum Rd x Private Rd A AM_2031_Base+Dev]

Network: N101 [AM_Khartoum Rd_2031_Base +Dev]

Khartoum Rd x Private Rd A
AM
2031 Base+Dev
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (40m)														
2	T1	455	7.6	455	7.6	0.323	1.7	LOS A	5.4	40.0	0.26	0.07	0.34	28.9
3	R2	48	0.0	48	0.0	0.323	10.8	LOS A	5.4	40.0	0.26	0.07	0.34	39.0
Approach		503	6.9	503	6.9	0.323	2.6	NA	5.4	40.0	0.26	0.07	0.34	31.3
East: Private Rd A (150m)														
4	L2	2	0.0	2	0.0	0.039	13.4	LOS A	0.0	0.2	0.82	0.99	0.82	18.6
6	R2	3	0.0	3	0.0	0.039	26.6	LOS B	0.0	0.2	0.82	0.99	0.82	18.6
Approach		5	0.0	5	0.0	0.039	21.3	LOS B	0.0	0.2	0.82	0.99	0.82	18.6
North: Khartoum Rd (40m)														
7	L2	45	0.0	38	0.0	0.448	3.4	LOS A	0.0	0.0	0.00	0.02	0.00	47.1
8	T1	971	3.8	812	3.9	0.448	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	47.8
Approach		1016	3.6	850[N1]	3.8	0.448	0.2	NA	0.0	0.0	0.00	0.02	0.00	47.7
All Vehicles		1524	4.7	1358[N1]	5.3	0.448	1.1	NA	5.4	40.0	0.10	0.04	0.13	39.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 105 [Khartoum Rd x Private Rd A PM_2031_Base+Dev]

Network: N101 [PM_Khartoum Rd_2031_Base +Dev]

Khartoum Rd x Private Rd A
PM
2031 Base+Dev
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (40m)														
2	T1	725	3.5	678	3.7	0.357	0.0	LOS A	5.5	40.0	0.00	0.00	0.00	49.6
3	R2	1	0.0	1	0.0	0.357	8.0	LOS A	5.5	40.0	0.00	0.00	0.00	45.4
Approach		726	3.5	679[N1]	3.7	0.357	0.0	NA	5.5	40.0	0.00	0.00	0.00	49.6
East: Private Rd A (150m)														
4	L2	58	0.0	58	0.0	0.640	20.4	LOS B	0.8	5.3	0.81	1.18	1.37	15.4
6	R2	63	0.0	63	0.0	0.640	35.1	LOS C	0.8	5.3	0.81	1.18	1.37	15.4
Approach		121	0.0	121	0.0	0.640	28.1	LOS B	0.8	5.3	0.81	1.18	1.37	15.4
North: Khartoum Rd (40m)														
7	L2	1	0.0	1	0.0	0.331	3.4	LOS A	0.0	0.0	0.00	0.00	0.00	47.6
8	T1	698	3.2	630	3.3	0.331	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		699	3.2	631[N1]	3.3	0.331	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.9
All Vehicles		1546	3.1	1432[N1]	3.3	0.640	2.4	NA	5.5	40.0	0.07	0.10	0.12	32.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 103 [Khartoum Rd x Private Rd B AM_2031_Base+Dev]

Network: N101 [AM_Khartoum Rd_2031_Base +Dev]

Khartoum Rd x Private Rd B
AM
2031 Base+Dev
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (40m)														
2	T1	385	8.5	385	8.5	0.258	1.3	LOS A	5.4	40.0	0.18	0.05	0.20	32.5
3	R2	31	0.0	31	0.0	0.258	10.2	LOS A	5.4	40.0	0.18	0.05	0.20	41.4
Approach		416	7.8	416	7.8	0.258	1.9	NA	5.4	40.0	0.18	0.05	0.20	34.2
East: Private Rd B (150m)														
4	L2	3	0.0	3	0.0	0.027	7.8	LOS A	0.0	0.2	0.34	0.89	0.34	21.7
6	R2	3	0.0	3	0.0	0.027	24.4	LOS B	0.0	0.2	0.34	0.89	0.34	21.7
Approach		6	0.0	6	0.0	0.027	16.1	LOS B	0.0	0.2	0.34	0.89	0.34	21.7
North: Khartoum Rd (60m)														
7	L2	51	0.0	42	0.0	0.078	4.3	LOS A	0.0	0.0	0.00	0.15	0.00	44.5
8	T1	1015	3.8	849	4.0	0.391	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	48.4
Approach		1065	3.7	891[N1]	3.8	0.391	0.2	NA	0.0	0.0	0.00	0.03	0.00	47.9
All Vehicles		1487	4.8	1313[N1]	5.5	0.391	0.8	NA	5.4	40.0	0.06	0.04	0.06	42.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 103 [Khartoum Rd x Private Rd B PM_2031_Base+Dev]

Network: N101 [PM_Khartoum Rd_2031_Base +Dev]

Khartoum Rd x Private Rd B
PM
2031 Base+Dev
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (40m)														
2	T1	799	3.2	757	3.3	0.400	0.0	LOS A	5.6	40.0	0.01	0.00	0.01	49.0
3	R2	3	0.0	3	0.0	0.400	7.8	LOS A	5.6	40.0	0.01	0.00	0.01	46.4
Approach		802	3.1	760 N1	3.3	0.400	0.1	NA	5.6	40.0	0.01	0.00	0.01	49.0
East: Private Rd B (150m)														
4	L2	40	0.0	40	0.0	0.389	12.3	LOS A	0.5	3.3	0.34	0.94	0.44	16.9
6	R2	37	0.0	37	0.0	0.389	36.4	LOS C	0.5	3.3	0.34	0.94	0.44	16.9
Approach		77	0.0	77	0.0	0.389	23.8	LOS B	0.5	3.3	0.34	0.94	0.44	16.9
North: Khartoum Rd (60m)														
7	L2	5	0.0	5	0.0	0.050	4.3	LOS A	0.0	0.0	0.00	0.03	0.00	47.2
8	T1	625	3.4	563	3.5	0.248	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.6
Approach		631	3.3	568 N1	3.5	0.248	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.6
All Vehicles		1509	3.1	1405 N1	3.3	0.400	1.4	NA	5.6	40.0	0.02	0.05	0.03	39.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 106 [Khartoum Rd x Road 1 AM_2031_Base+Dev]

Network: N101 [AM_Khartoum Rd_2031_Base +Dev]

Khartoum Rd x Road 1
AM
2031 Base+Dev
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (165m)														
2	T1	495	7.0	495	7.0	0.393	2.5	LOS A	19.6	144.1	0.38	0.12	0.49	38.2
3	R2	84	0.0	84	0.0	0.393	11.9	LOS A	19.6	144.1	0.38	0.12	0.49	40.7
Approach		579	6.0	579	6.0	0.393	3.8	NA	19.6	144.1	0.38	0.12	0.49	38.8
East: Private Rd A (150m)														
4	L2	11	0.0	11	0.0	0.099	13.4	LOS A	0.1	0.6	0.78	1.00	0.78	20.4
6	R2	8	0.0	8	0.0	0.099	25.1	LOS B	0.1	0.6	0.78	1.00	0.78	20.4
Approach		19	0.0	19	0.0	0.099	18.6	LOS B	0.1	0.6	0.78	1.00	0.78	20.4
North: Khartoum Rd (40m)														
7	L2	19	0.0	16	0.0	0.429	3.4	LOS A	0.0	0.0	0.00	0.01	0.00	47.4
8	T1	955	3.9	800	4.0	0.429	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.0
Approach		974	3.8	815[N1]	3.9	0.429	0.1	NA	0.0	0.0	0.00	0.01	0.00	48.9
All Vehicles		1572	4.6	1413[N1]	5.1	0.429	1.9	NA	19.6	144.1	0.17	0.07	0.21	40.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 106 [Khartoum Rd x Road 1 PM_2031_Base+Dev]

Network: N101 [PM_Khartoum Rd_2031_Base +Dev]

Khartoum Rd x Road 1
PM
2031 Base+Dev
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Khartoum Rd (165m)														
2	T1	709	3.6	656	3.8	0.348	0.1	LOS A	22.8	165.0	0.01	0.00	0.01	49.6
3	R2	3	0.0	3	0.0	0.348	9.9	LOS A	22.8	165.0	0.01	0.00	0.01	46.9
Approach		713	3.5	659[N1]	3.8	0.348	0.1	NA	22.8	165.0	0.01	0.00	0.01	49.6
East: Private Rd A (150m)														
4	L2	55	0.0	55	0.0	0.251	12.7	LOS A	0.2	1.6	0.69	1.02	0.76	23.1
6	R2	16	0.0	16	0.0	0.251	23.9	LOS B	0.2	1.6	0.69	1.02	0.76	23.1
Approach		71	0.0	71	0.0	0.251	15.2	LOS B	0.2	1.6	0.69	1.02	0.76	23.1
North: Khartoum Rd (40m)														
7	L2	2	0.0	2	0.0	0.496	3.4	LOS A	0.0	0.0	0.00	0.00	0.00	47.5
8	T1	755	3.1	687	3.2	0.496	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.7
Approach		757	3.1	689[N1]	3.2	0.496	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.7
All Vehicles		1540	3.1	1419[N1]	3.4	0.496	0.8	NA	22.8	165.0	0.04	0.05	0.04	45.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 102 [Talavera Rd x Hitech Access Rd x Gateway 2000 Access Rd AM_2031_Base+Dev]

Network: N101 [Talavera Rd_AM_2031_Base+Dev]

Talavera Rd x Hitech Access Rd x Gateway 2000 Access Rd
AM
2031 Base+Dev
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 94 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Hitech Access Rd (100m)														
1	L2	37	2.9	37	2.9	0.048	12.7	LOS A	0.4	3.0	0.48	0.64	0.48	18.7
2	T1	1	0.0	1	0.0	0.143	29.5	LOS C	1.2	8.6	0.81	0.72	0.81	15.2
3	R2	54	2.0	54	2.0	0.143	34.1	LOS C	1.2	8.6	0.81	0.72	0.81	9.2
Approach		92	2.3	92	2.3	0.143	25.4	LOS B	1.2	8.6	0.68	0.69	0.68	11.6
East: Talavera Rd (180m)														
4	L2	167	3.1	154	3.0	0.861	37.1	LOS C	21.0	150.3	0.97	0.98	1.10	18.7
5	T1	1379	2.7	1267	2.6	0.861	32.4	LOS C	21.0	150.3	0.96	0.97	1.09	14.9
6	R2	43	2.4	40	2.3	0.207	47.7	LOS D	1.1	7.6	0.95	0.73	0.95	15.2
Approach		1589	2.7	1460[N1]	2.6	0.861	33.3	LOS C	21.0	150.3	0.96	0.96	1.09	15.4
North: Gateway 2000 Access Rd (100m)														
7	L2	20	5.3	20	5.3	0.023	6.9	LOS A	0.1	0.9	0.28	0.59	0.28	27.2
8	T1	5	0.0	5	0.0	0.056	28.6	LOS C	0.5	3.3	0.78	0.66	0.78	15.8
9	R2	17	0.0	17	0.0	0.056	33.2	LOS C	0.5	3.3	0.78	0.66	0.78	10.4
Approach		42	2.5	42	2.5	0.056	20.1	LOS B	0.5	3.3	0.55	0.63	0.55	15.6
West: Talavera Rd (260m)														
10	L2	54	2.0	54	2.0	0.522	24.7	LOS B	8.9	64.0	0.77	0.69	0.77	27.8
11	T1	763	3.0	763	3.0	0.522	19.7	LOS B	8.9	64.0	0.76	0.67	0.76	24.8
12	R2	191	2.8	191	2.8	0.999	90.6	LOS F	8.0	57.0	1.00	1.25	1.93	11.2
Approach		1007	2.9	1007	2.9	0.999	33.4	LOS C	8.9	64.0	0.80	0.78	0.98	19.5
All Vehicles		2731	2.8	2601[N1]	2.9	0.999	32.9	LOS C	21.0	150.3	0.88	0.88	1.02	17.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	41.3	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	41.3	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	41.3	LOS E	0.1	0.1	0.94	0.94

P4	West Full Crossing	53	41.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	41.3	LOS E			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 102 [Talavera Rd x Hitech Access Rd x Gateway 2000 Access Rd PM_2031_Base+Dev]

Network: N101 [Talavera Rd_PM_2031_Base+Dev]

Talavera Rd x Hitech Access Rd x Gateway 2000 Access Rd
PM
2031 Base+Dev
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 99 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Hitech Access Rd (100m)														
1	L2	127	0.8	127	0.8	0.143	6.4	LOS A	0.7	5.1	0.27	0.61	0.27	27.0
2	T1	1	0.0	1	0.0	0.611	38.4	LOS C	5.5	38.6	0.95	0.82	0.95	12.8
3	R2	198	1.1	198	1.1	0.611	43.0	LOS D	5.5	38.6	0.95	0.82	0.95	7.6
Approach		326	1.0	326	1.0	0.611	28.7	LOS C	5.5	38.6	0.69	0.74	0.69	10.5
East: Talavera Rd (180m)														
4	L2	14	0.0	12	0.0	0.340	20.1	LOS B	5.8	40.8	0.64	0.56	0.64	27.7
5	T1	727	1.0	645	1.0	0.340	15.6	LOS B	5.8	40.8	0.64	0.56	0.64	23.6
6	R2	8	0.0	7	0.0	0.045	50.1	LOS D	0.2	1.5	0.94	0.66	0.94	14.7
Approach		749	1.0	665[N1]	1.0	0.340	16.1	LOS B	5.8	40.8	0.64	0.56	0.64	23.4
North: Gateway 2000 Access Rd (100m)														
7	L2	56	0.0	56	0.0	0.140	8.9	LOS A	0.5	3.6	0.37	0.64	0.37	24.0
8	T1	1	0.0	1	0.0	0.125	33.7	LOS C	0.9	6.6	0.83	0.72	0.83	14.0
9	R2	38	0.0	38	0.0	0.125	38.3	LOS C	0.9	6.6	0.83	0.72	0.83	9.0
Approach		95	0.0	95	0.0	0.140	21.0	LOS B	0.9	6.6	0.56	0.67	0.56	14.3
West: Talavera Rd (260m)														
10	L2	2	0.0	2	0.0	0.563	23.1	LOS B	5.7	40.4	0.74	0.65	0.74	29.1
11	T1	815	0.9	783	0.9	0.563	18.0	LOS B	10.1	71.5	0.73	0.65	0.73	26.2
12	R2	45	0.0	44	0.0	0.262	51.9	LOS D	1.3	8.8	0.97	0.73	0.97	16.7
Approach		862	0.9	829[N1]	0.9	0.563	19.8	LOS B	10.1	71.5	0.74	0.65	0.74	25.2
All Vehicles		2033	0.9	1915[N1]	0.9	0.611	20.1	LOS B	10.1	71.5	0.69	0.63	0.69	21.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	43.8	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	43.8	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	43.8	LOS E	0.1	0.1	0.94	0.94

P4	West Full Crossing	53	43.8	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	43.8	LOS E			0.94	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 103 [Talavera Rd x Road 22 AM_2031_Base+Dev]

Network: N101 [Talavera Rd_AM_2031_Base+Dev]

Talavera Rd x Road 22
AM
2031 Base+Dev
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Road 22 (60m)														
1	L2	9	0.0	9	0.0	0.240	12.5	LOS A	0.3	2.0	0.75	0.87	0.80	6.1
3	R2	11	0.0	11	0.0	0.240	90.5	LOS F	0.3	2.0	0.75	0.87	0.80	4.7
Approach		20	0.0	20	0.0	0.240	53.6	LOS D	0.3	2.0	0.75	0.87	0.80	5.4
East: Talavera Rd (260m)														
4	L2	142	0.7	131	0.7	0.163	4.6	LOS A	0.0	0.0	0.00	0.23	0.00	43.1
5	T1	534	3.0	490	2.8	0.163	0.0	LOS A	0.0	0.0	0.00	0.08	0.00	48.5
Approach		676	2.5	621 N1	2.4	0.163	1.0	NA	0.0	0.0	0.00	0.11	0.00	47.2
West: Talavera Rd (55m)														
11	T1	1191	3.0	1191	3.0	0.330	0.2	LOS A	0.3	2.0	0.05	0.02	0.06	45.9
12	R2	33	0.0	33	0.0	0.330	8.0	LOS A	0.3	2.0	0.11	0.03	0.12	37.9
Approach		1223	2.9	1223	2.9	0.330	0.4	NA	0.3	2.0	0.05	0.02	0.06	45.4
All Vehicles		1919	2.7	1864 N1	2.8	0.330	1.2	NA	0.3	2.0	0.04	0.06	0.05	44.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 103 [Talavera Rd x Road 22 PM_2031_Base+Dev]

Network: N101 [Talavera Rd_PM_2031_Base+Dev]

Talavera Rd x Road 22
PM
2031 Base+Dev
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total	HV	Arrival Flows Total	HV	Deg. Satn	Average Delay	Level of Service	Aver. Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Road 22 (60m)														
1	L2	36	0.0	36	0.0	2.110	1065.2	LOS F	15.7	110.0	1.00	3.01	7.78	0.4
3	R2	63	0.0	63	0.0	2.110	1120.6	LOS F	15.7	110.0	1.00	3.01	7.78	0.2
Approach		99	0.0	99	0.0	2.110	1100.6	LOS F	15.7	110.0	1.00	3.01	7.78	0.3
East: Talavera Rd (260m)														
4	L2	4	0.0	4	0.0	0.315	4.6	LOS A	0.0	0.0	0.00	0.00	0.00	46.3
5	T1	1300	1.0	1218	1.0	0.315	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		1304	1.0	1222 N1	1.0	0.315	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.9
West: Talavera Rd (55m)														
11	T1	712	1.0	712	1.0	0.185	0.1	LOS A	0.0	0.2	0.01	0.00	0.01	49.0
12	R2	1	0.0	1	0.0	0.185	16.5	LOS B	0.0	0.2	0.01	0.00	0.01	40.3
Approach		713	1.0	713	1.0	0.185	0.1	NA	0.0	0.2	0.01	0.00	0.01	49.0
All Vehicles		2116	0.9	2034 N1	1.0	2.110	53.6	NA	15.7	110.0	0.05	0.15	0.38	11.2

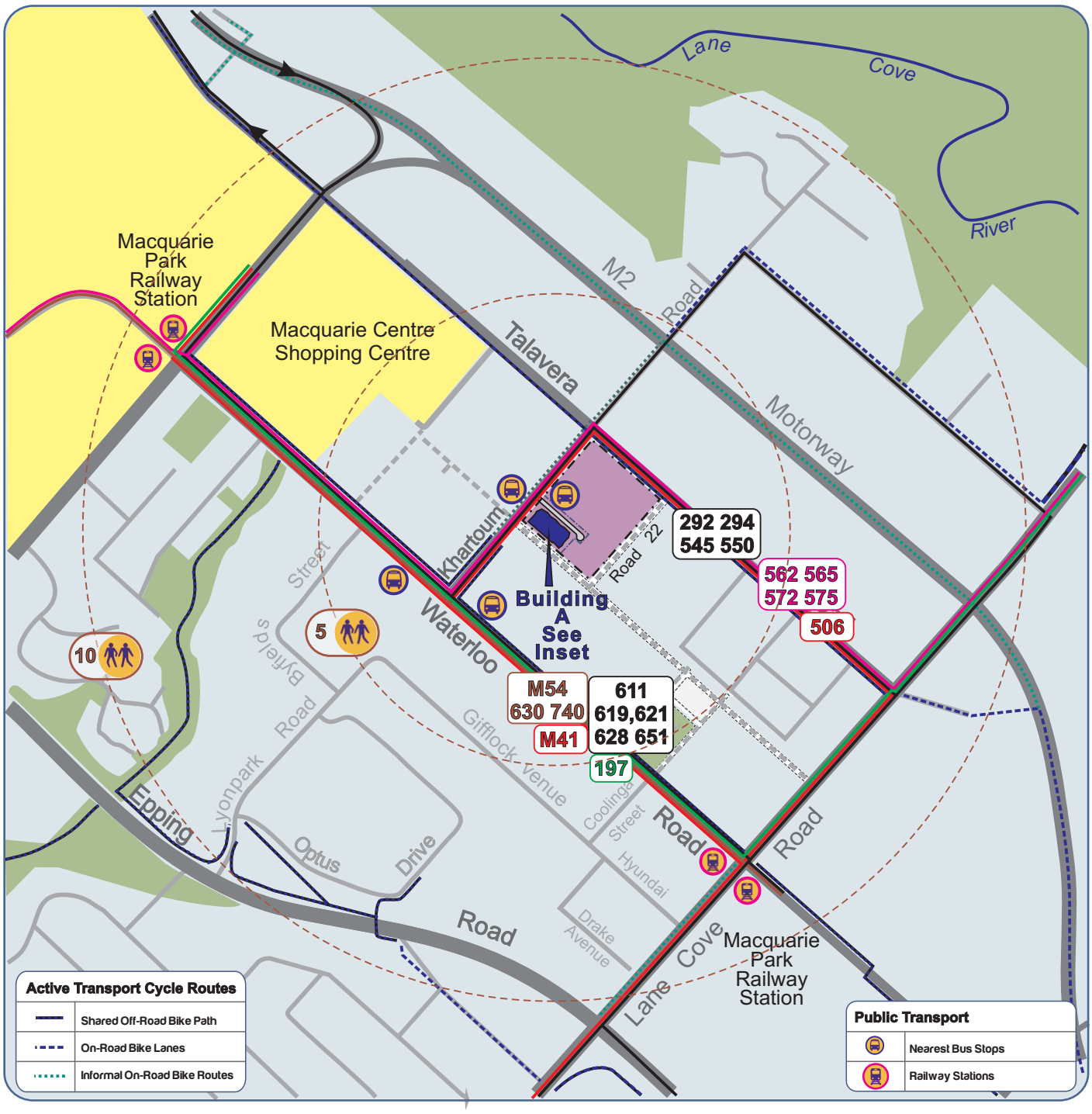
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Appendix D

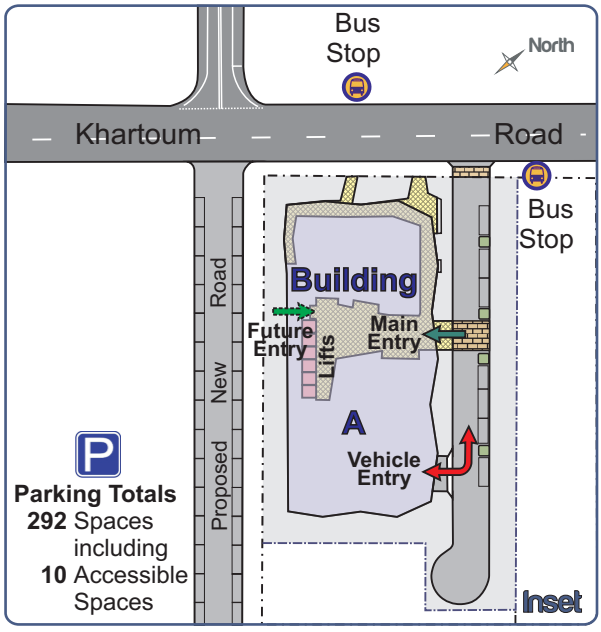
Workplace Travel Plan (Example)

Workplace Travel Plan: Macquarie Technology Park Building A



Stops	Operator	Route	Destinations
Waterloo Road	Sydney Buses	M41	Metrobus Macquarie Centre to Hurstville
		M54	Metrobus Macquarie University to Parramatta
	Hillsbus	611 630	Macquarie Park to Blacktown
		619 628	Macquarie Park to Rouse Hill via Castle Hill / Norwest
		621 651	Castle Hill to City
	Busways	740	Macquarie Park to Plumpton via M2 Motorway
	Forest Coachlines	197	Macquarie University to Mona Vale
Khartoum Road	Sydney Buses	292	Marsfield to City via Freeway
		294	Macquarie University to City via Freeway
		506	Macquarie University to City via Hunters Hill
		545 550	Chatswood to Parramatta
	Transdev	562	Macquarie University to Gordon
		565	Macquarie University to Chatswood
		572	Macquarie University to Turramurra Station
		575	Macquarie University to Hornsby

Macquarie Park and Macquarie University Railway Stations	Sydney Trains	T1 Northern Shore, Northern and Western Line	Hornsby to Emu Plains and Richmond via Chatswood
	Sydney Metro	North West (2019)	Cudgegong Road to Chatswood
		Metro City & South West (2024)	Chatswood to Sydenham and Bankstown



Parking Totals
292 Spaces including **10** Accessible Spaces