Transport Management and Accessibility Plan (TMAP)

Proposed Eastern Creek Business Hub
Rooty Hill Road South, Eastern Creek

Ref: 12.108r01v4 TRAFFIX Eastern Creek B-Hub TMAP, Issue IV

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1. Introduction

1.1 Background

TRAFFIX has been commissioned by the Western Sydney Parklands Trust (WSPT) to undertake a Transport Management and Accessibility Plan (TMAP) for the proposed Eastern Creek Business Hub at Rooty Hill Road South, Eastern Creek in the local government area of City of Blacktown. The TMAP supports a State Significant Development Application under the Part 4 of the *Environmental Planning and Assessment Act 1979*.

The State Significant Development Application will seek consent for:

- A Concept Proposal providing a development structure for the proposed Eastern Creek Business Hub, including the site layout, activities, building envelopes, design guidelines; and
- First stage approval for Super Lot Subdivision and Early Works to accommodate future development.

The proposal will achieve the future development of 52,800m^2 of large format, bulky goods and convenience retail with associated parking. The Phase 1 works include a new public road through the site that would provide site access in the form of a signalised intersection with Rooty Hill Road South at its existing intersection with Cable Place.

Plans submitted with the Environmental Assessment (EA) provide sufficient detail to demonstrate that future development can be satisfactorily accommodated on site. Whilst internal traffic and parking arrangements are indicative, they are nonetheless suitable to demonstrate the feasibility of the development. Resolved designs would be prepared for future Project Application stages. In view of this the internal layouts for car and bicycle parking and for loading arrangements are not considered in detail in this report. Suffice to say that the intent is that Australian Standards be adhered to when the Project Application is prepared.

Specifically, this report addresses issue number 8 - Transport and Accessibility, as detailed in the Director General's Requirements (DGRs) issued by the NSW Department of Planning & Infrastructure on 19 March 2012.

This report focuses on external traffic impacts and on general transport and mobility considerations. It follows NSW procedures for the preparation of a Transport Management and Accessibility Plan.

Consultation with NSW Roads and Maritime Services (RMS - formerly Roads and Traffic Authority [RTA]) has been undertaken and includes the following:

- A meeting of 25th June 2012 including issue of a Draft TMAP report; and
- Issue of relevant SIDRA files on 2nd July 2012.

At the time of issue of this report, no comments had been received from the RMS with regard to the analysis within the Draft TMAP.

1.2 Director Generals Requirements

As mentioned above, Section 8 of the DGRs requires the following transport and accessibility issues to be assessed as part of the application:

- Detail proposed access and parking provisions associated with the proposed development, including the type and size of vehicles accessing the site, number of car parking spaces and compliance with the relevant Australian Standards and parking codes.
- Assess the implications of the proposed development on non-car travel modes (including public transport use, walking and cycling) and provision of facilities to increase non-car mode share for travel to and from the site.
- Demonstrate how future users 'of the business hub will be able to make travel ·choices that support the achievement of relevant State Plan targets.
- Describe the measures to be implemented to promote sustainable means of transport including public transport usage and pedestrian and bicycle linkages in addition to addressing the potential for implementing a location specific sustainable travel plan.
- Detail the existing pedestrian and cycle movements within the vicinity of the site and determine the adequacy of the proposal to meet the likely future demand for increased public transport, pedestrian and cycle access, having regard to key State and Regional strategies.

- Provide an analysis of public transport provision, expected transport mode shares based on planned future demographics.

- Provide details of proposed daily and peak vehicle movements and assess the Impacts of this traffic on the local road network, including intersection capacity, having regard to local planning controls. Tile key intersections to be examined/modelled include:

    - Rooty Hill Road South and the Great Western Highway;
    - Great Western Highway and Westlink M7;
    - Rooty Hill Road South and Church Street;
    - Rooty Hill Road South and Eastern Road/Francis Road;
    - Wallgrove Road/Old Wallgrove Road and Westlink M7.

- Detailed plans of any proposed road/intersection upgrades, including the proposed new traffic signal controlled intersection. Opportunities should be investigated to align the new road and intersection with Cable Street.

- Detail the proposed access arrangements for Stage 1 subdivision and early works construction and measures to mitigate any associated traffic impacts.

- The above requirements should be addressed through the preparation of a Transport Management and' Accessibility Plan (TMAP) for the Eastern Creek Business Hub to properly ascertain the cumulative regional traffic impacts associated with the proposed development.

2. Location and Site

The Western Sydney Parklands is a 27 kilometre corridor stretching from Quakers Hill to Leppington, located in Western Sydney. The extent of the Western Sydney Parklands is shown in **Figure 1**.

Source: www.westernsydneyparklands.com.au

Figure 1: Western Sydney Parklands

The subject site is in the suburb of Eastern Creek located about 35km to the west of the Sydney CBD in the south-western area of the Blacktown Local Government Area within the Greater Western Sydney Region.

The subject site is bounded by the Westlink M7 Motorway on the east, the Great Western Highway to the south, Rooty Hill Road South to the west and Church Street to the north. It comprises 16.7ha of developable land (excluding open space and reserves).

Vehicular access to the site is provided via Rooty Hill Road South, which is connected to the Great Western Highway and the M4 Western Motorway to the south and Francis Road/Eastern Road to the north. The Westlink M7 Motorway is also in close vicinity to Rooty Hill Road, just west of the site.

A Location Plan is presented in **Figure 2**, with a Site Plan presented in **Figure 3**.

In addition to Figures 2 and 3, reference should also be made to the Photographic Record presented in **Appendix A**, which provides an appreciation of the general character of roads and other key attributes in proximity of the site.

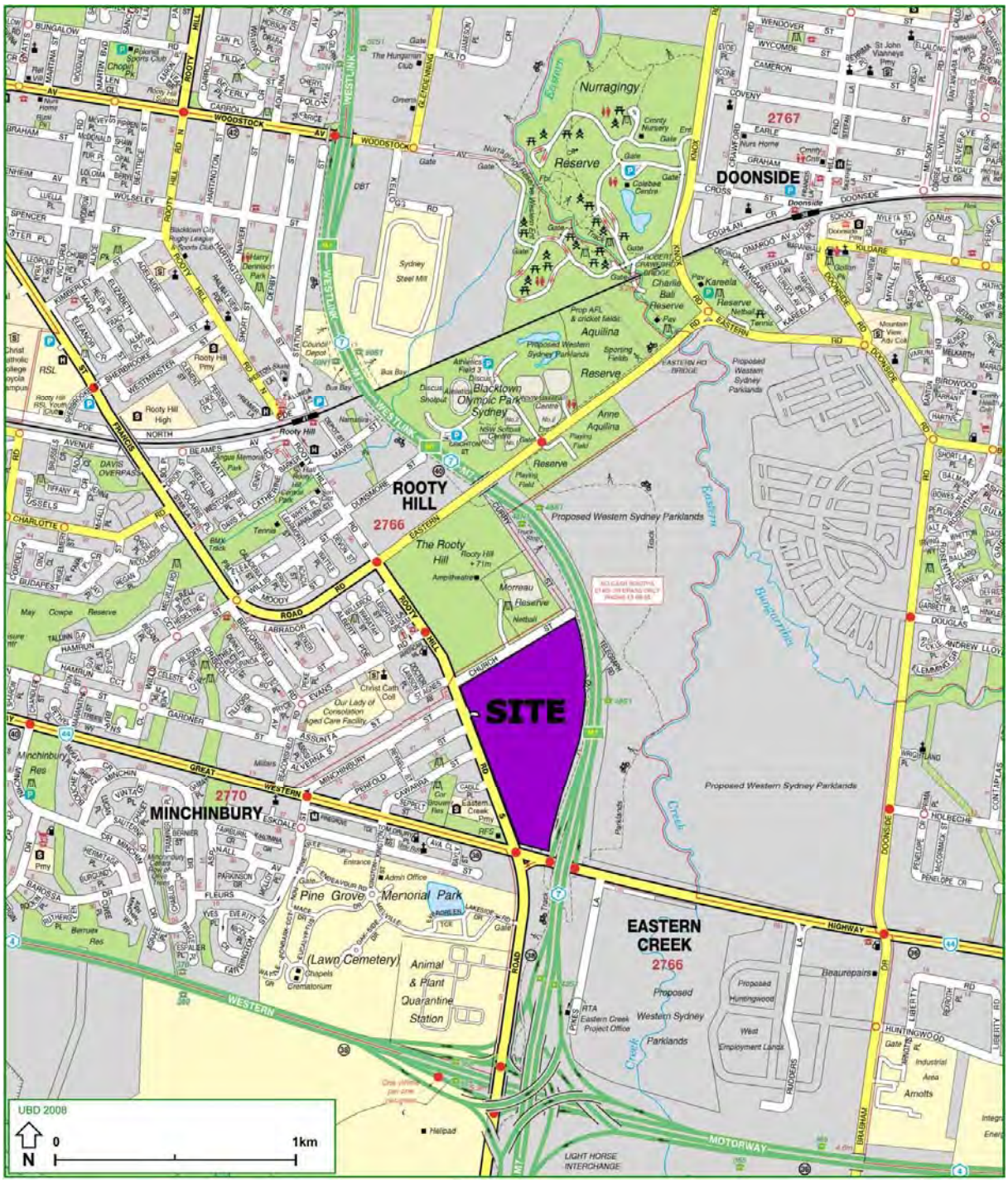


Figure 2: Location Plan

Figure 3: Site Plan

3. Strategic Context

3.1 Relevant State and Local Planning Policies

The strategic policy context of the study area is governed by State and Regional Planning Policies. The NSW planning policies and strategies applicable to the subject site and those considered as part of the development of the TMAP include:

- State Environmental Planning Policy (Infrastructure) 2007
- State Environmental Planning Policy (Western Sydney Employment Area)
- State Environmental Planning Policy (Western Sydney Parklands) 2009
- The Metropolitan Plan (2036)
- The Metropolitan Transport Plan, and
- Planning Guidelines for Walking and Cycling.

A summary of these policies is provided below, together with an overview of local planning policies.

3.2 State Environmental Planning Policy (Infrastructure) 2007

This Policy contains provisions for referral of certain development applications, considered to be traffic generating developments, to the RMS. The Eastern Creek Business Hub will consist mainly of retail floor area and all significant development within this Business Hub will need to be referred to RMS. Notwithstanding this, it is noted that the aims of the SEPP (Infrastructure) 2007 are as follows:

(a) improving regulatory certainty and efficiency though a consistent planning regime for infrastructure and the provision of services,

(b) providing greater flexibility in the location of infrastructure and service facilities,

(c) allowing for the efficient development, redevelopment or disposal of surplus government owned land,

(d) identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development),

(e) identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and

(f) providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing.

3.3 State Environmental Planning Policy (Western Sydney Employment Area)

State Environmental Planning Policy (Western Sydney Employment Area) 2009 was gazetted in August 2009. The SEPP seeks to protect and enhance the Western Sydney Employment Area ("WSEA") for future employment purposes. The aims of the SEPP are as follows:

"(a) to promote economic development and the creation of employment in the Western Sydney Employment Area by providing for development including major warehousing, distribution, freight transport, industrial, high technology and research facilities,

(b) to provide for the co-ordinated planning and development of land in the Western Sydney Employment Area,

(c) to rezone land for employment or environmental conservation purposes,

(d) to improve certainty and regulatory efficiency by providing a consistent planning regime for future development and infrastructure provision in the Western Sydney Employment Area,

(e) to ensure that development occurs in a logical, environmentally sensitive and cost-effective manner and only after a development control plan (including specific development controls) has been prepared for the land concerned,

(f) to conserve and rehabilitate areas that have a high biodiversity or heritage or cultural value, in particular areas of remnant vegetation."

The proposed developments within the Eastern Creek Business Hub are generally consistent with these aims. The land has been zoned appropriately, will be developed in a staged manner and is on land that is suitable for the intended purpose.

3.4 State Environmental Planning Policy (Western Sydney Parklands) 2009

Clause 12 of the Parklands SEPP requires a consent authority to consider a number of matters (insofar as they are relevant) when determining an application for development on land in the Parklands. The matters include:

(a) the aim of the SEPP,

(b) the impact on drinking water catchments and associated infrastructure,

(c) the impact on utility services and easements,

(d) the impact of carrying out the development on environmental conservation areas and the natural environment, including endangered ecological communities,

(e) the impact on the continuity of the Parklands as a corridor linking core habitat such as the endangered Cumberland Plain Woodland,

(f) the impact on the Parkland's linked north-south circulation and access network and whether the development will enable access to all parts of the Parklands that are available for recreational use,

(g) the impact on the physical and visual continuity of the Parklands as a scenic break in the urban fabric of western Sydney,

(h) the impact on public access to the Western Parklands,

(i) consistency with:

(i) any plan of management for the Parklands, or

(ii) any precinct plan for a precinct of the Parklands,

(j) the impact on surrounding residential amenity,

(k) the impact on significant views,

(l) the effect on drainage patterns, groundwater, flood patterns and wetland viability,

(m) the impact on heritage items, and

(n) the impact on traffic and parking.

3.5 Metropolitan Strategy and Transport Plan 2031

In 2005, the Metropolitan Strategy provided a framework for growth within the Sydney Metropolitan Area to 2031. The plan identified housing and employment capacity targets within strategic centres but has been superseded by the Metropolitan Transport Plan (2036) as discussed below.

3.6 Metropolitan Plan 2036

The Metropolitan Plan 2036 is to be reviewed every 5 years and forms an integrated plan for Sydney to 2036. It focuses on transforming Sydney from a single-centred city to a more connected, multi centred city where the regional cities of Parramatta, Liverpool and Penrith in particular deliver increased jobs and improved services. The long term vision is to develop Sydney as a "city of cities" and includes the following objectives:

- Radial public transport links feeding into each city;
- Cross regional transport connections linking more subregions to the Global Economic Corridor; and
- A developing network of transport connections serving a range of different trips and strategic centres that support economic activity across more locations.

3.7 Metropolitan Transport Plan

This plan produced in 2010 provides a 25 year vision for the connection of Sydney's land use planning with the transport network. The plan incorporates ten year funding for transport infrastructure and includes the following noteworthy services:

- A $4.5 billion Western Express City Rail Service which is intended to significantly reduce commuting times between Western Sydney and the City;
- Commencement of works on the North West rail connection from Epping to Rouse Hill with an estimated cost of $6.75 billion;
- Improvement to bus services which includes 100 new buses in strategic bus corridors;
- New trains with an additional 626 rail carriages;
- $158 million for cycleway;
- $400 million for commuter car parks;
- $483 million to deliver important freight works In Sydney; and
- $21.9 million of State and Federal Funded road projects.

3.8 Planning Guidelines for Walking and Cycling (2004)

The aim of this guideline is to assist land-use planners and other related professionals to improve consideration of walking and cycling in their work. The intention of the guideline is to ultimately create further opportunities for people to live in places with easy walking and cycling access to urban services and public transport and reducing private vehicle usage.

3.9 NSW Bike Plan (2010)

The Metropolitan Transport Plan committed $158 million towards improving urban cycle networks and lead to the development of the NSW Bikeplan which outlined a 10 year bicycle infrastructure plan including:

- $80 million over ten years to connect Sydney's district centres by building missing links in the Metro Sydney Bike Network;
- $78 million over ten years to fast-track subregional bike networks for Parramatta, Liverpool and Penrith to grow cycling in these three River Cities; and
- At least $5 million every year for regional cities and local councils across NSW to complete neighbourhood cycleway networks.

3.10 Summary

The plans and strategies discussed above are relevant to the Eastern Creek Business Hub proposal and are referred to throughout this TMAP as appropriate.

4. Existing Traffic Conditions

4.1 Road Hierarchy

The road hierarchy in the vicinity of the site is shown in **Figure 4** with the following roads of particular interest:

- Great Western Highway: is an important RMS State Road (SH5) carrying around 32,000 vpd (2005 AADT) in the vicinity of the site. It serves as an east-west link between Penrith to the west and Sydney CBD to the east;

- M4 Western Motorway: is an important RMS State Road carrying around 26,500 vpd (2005 AADT) in the vicinity of the site. It also serves as an east-west link between the Blue Mountains to the west and the Sydney CBD to the east;

- Westlink M7 Motorway: is a relatively new RMS State Road which is a toll road with a high design capacity. It runs in a north-south direction in the vicinity of the site and serves as a connection between Glendenning and Campbelltown areas to the south; and

- Rooty Hill Road South: is a major arterial connection (MR 537) carrying around 15,370 vpd (2005 AADT) in the vicinity of the site. It serves to connect the Rooty Hill and Mount Druitt neighbourhoods to the major motorways to the south.

It can be seen from Figure 4 that the site is conveniently located with respect to the arterial road system serving the region, while local access is available using the above routes. The site is only able to be accessed via Rooty Hill Road South; with the majority of the development traffic expected to be drawn from the south via the Great Western Highway and the M4 Western Motorway.

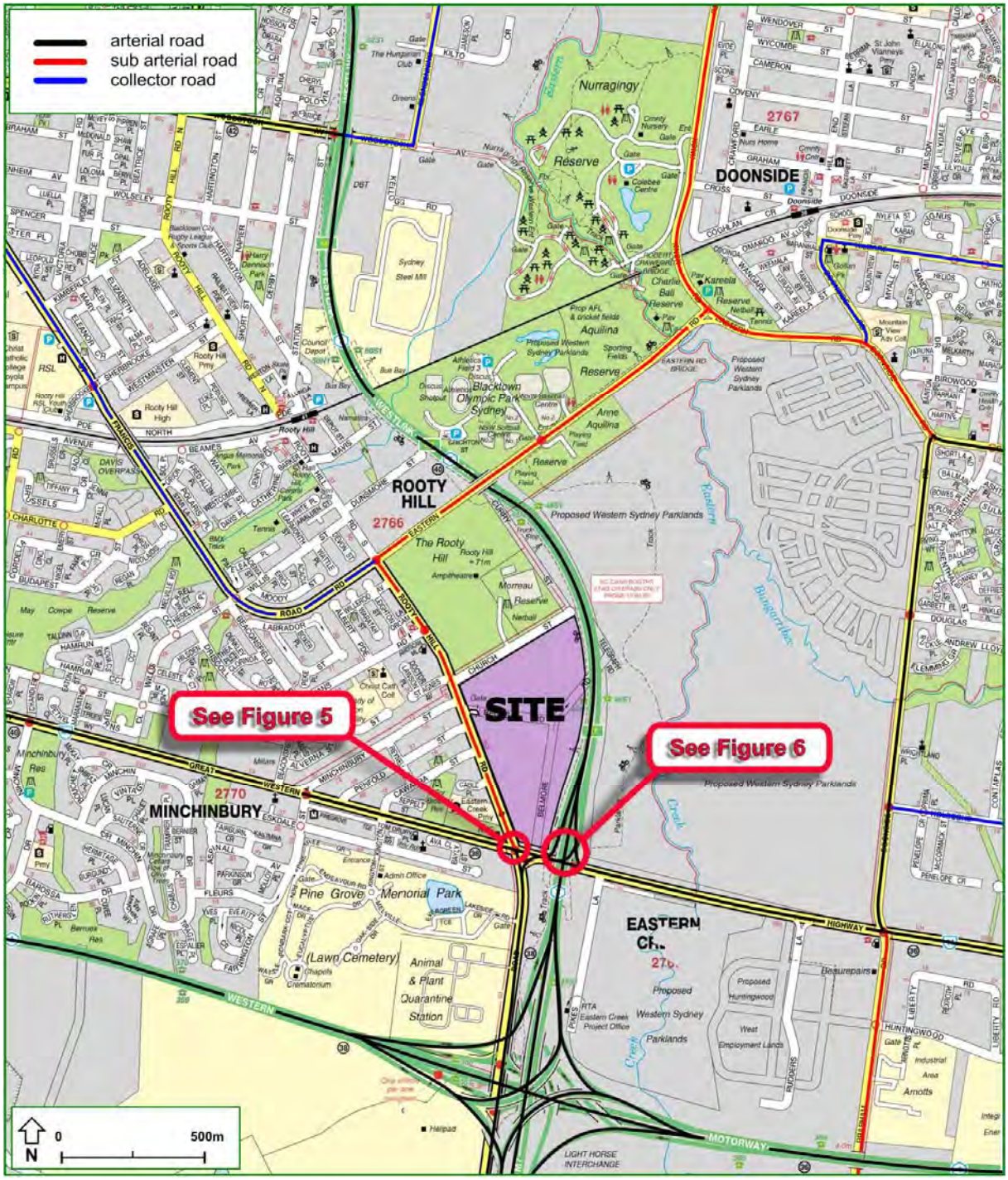


Figure 4: Road Hierarchy

4.2 Key Intersections

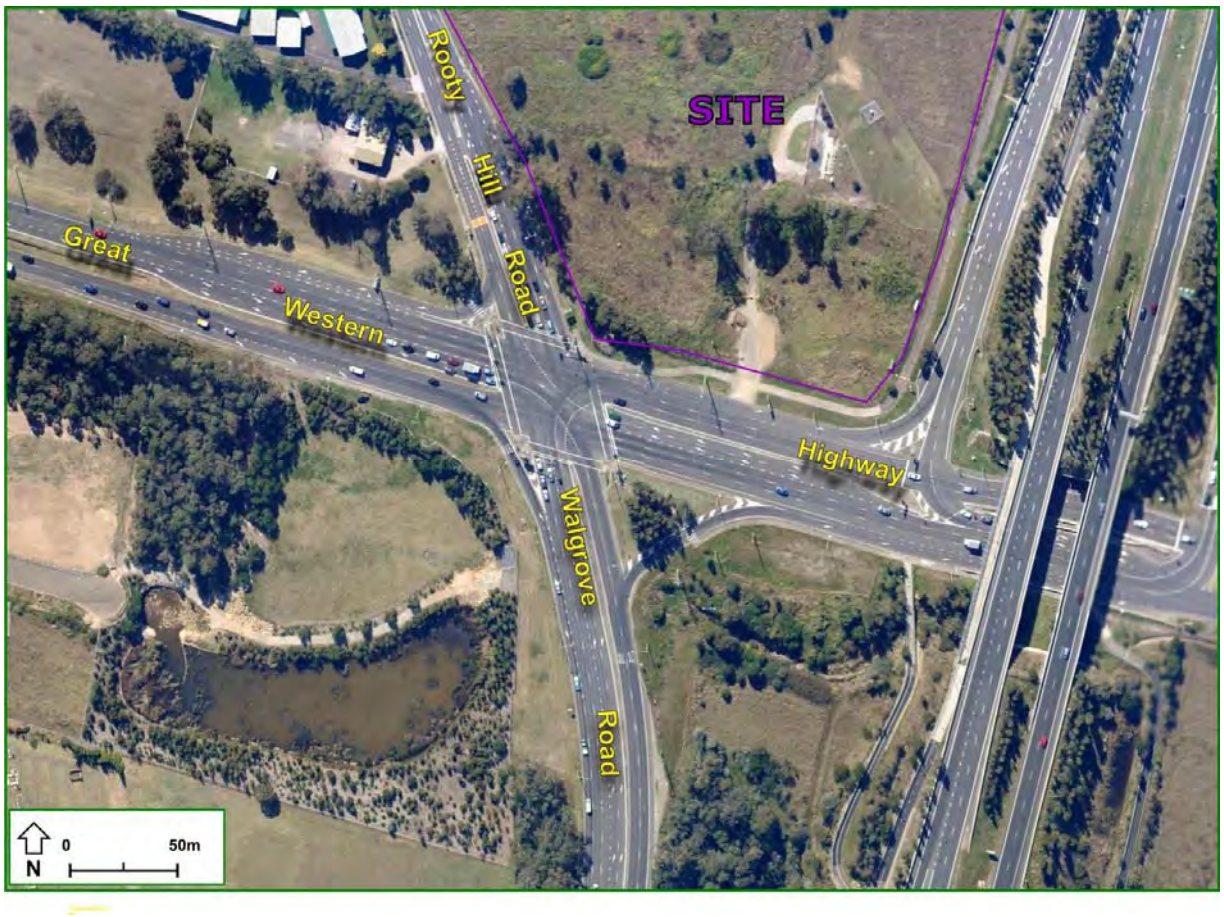


Figure 5: Intersection of the Great Western Highway with Rooty Hill Road South

The intersection of Rooty Hill Road South and the Great Western Highway lies to the south of the site and is constructed as a four-way signal controlled intersection, as shown on **Figure 5**. This will be the primary converging point for most of the vehicles coming and going to the site. This intersection allows for pedestrian access on all approaches. However, most of the pedestrian traffic is expected on the western approach because of the location of the school north-west of the intersection.

Figure 6: Intersection of the Great Western Highway with the Westlink M7 On/Off Ramps

Approximately 100-200m east of the Rooty Hill Road south intersection is the grade-separated intersection of the M7 Westlink motorway with the Great Western Highway, as shown in **Figure 6**. It should be noted that the intersection only provides access to/from the north and that it consists of two separate intersections; one with the northbound M7 on-ramp and the other with the southbound M7 off-ramp.

4.3 Existing Public Transport and Active Transport Facilities

4.3.1 Bus Services

The existing bus services within the vicinity of site are shown in **Figure 7**. It is evident that the site benefits from services which operate along Rooty Hill Road south, namely:

- Busways Route 737 (between Mount Druitt and Eastern Creek)
- Busways Route 738 (between Mount Druitt and the Eastern Creek Business Park)

The 727 route turns south on Rooty Hill Road off Eastern Road, passing the subject site. The 737 and the 738 bus routes pass Rooty Hill Road from Willis Street (north of Eastern Road) to Cawarra Street (north of Great Western Highway) thereby also passing the site.

Both bus services provide connections to Rooty Hill Railway Station which is located approximately 2.5km to the north of the site. The 738 service is the most frequent providing three buses per hour in both directions.

A bus stop with shelter for northbound services is located just north of the intersection with Cawarra Street, adjacent to the site. A further three bus zone points (without shelters) are located near the site, one opposite the bus shelter for southbound services and two located between the intersections with Church Street and Minchinbury Street servicing northbound and southbound services.

4.3.2 Rail Services

As mentioned, Rooty Hill Station is located about 2.5km north of the site. This station is on the Western and Blue Mountain CityRail Lines, connecting the Lithgow and Penrith regions to the Sydney CBD.

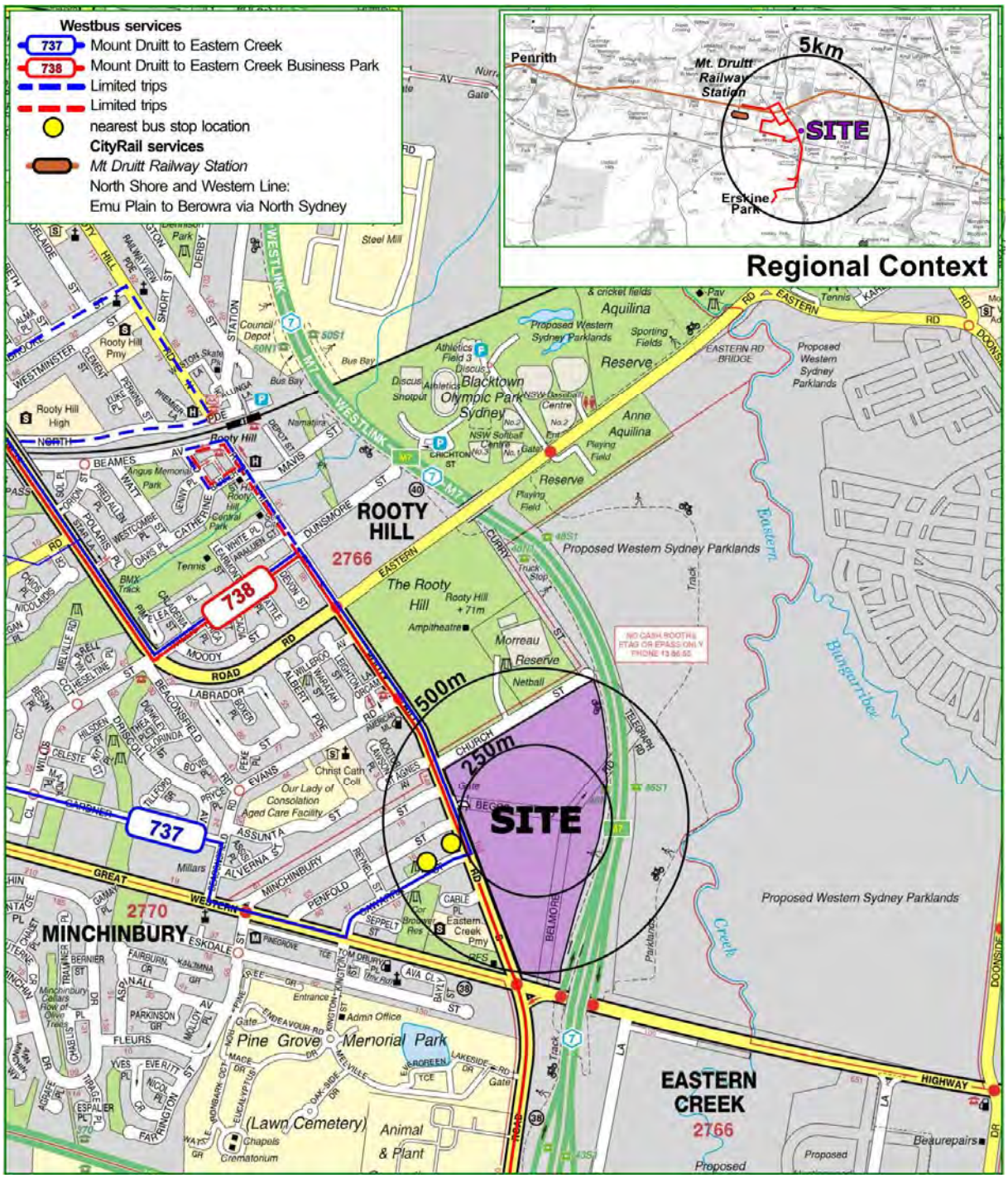


Figure 7: Public Transport

4.3.3 Footpath Network

The residential area west of the site provides a good network of existing footpaths. These provide connections between the residential area and local amenities such as Eastern Creek Public School opposite the site and Rooty Hill town centre and train station north of the site.

Existing pedestrian movements in the vicinity of the site are generally low in volume consisting mainly of school students attending the local school and recreational walkers in the Western Sydney Parklands areas.

4.3.4 Cycle Network

The existing regional and local cycle networks are shown in **Figure 8** below. The site is well located with respect to the existing cycle network which links the site to the major residential land areas to the west. A major north-south M7 Cycleway route also exists directly to the east of the site linking it with Rooty Hill town centre (and train station) in the north, Eastern Creek in the south with onward connections to the regional cycle network.

Existing cyclist movements in the vicinity of the site are generally low in volume consisting mainly of recreational cyclists using the M7 Cycleway and school students attending the local school.

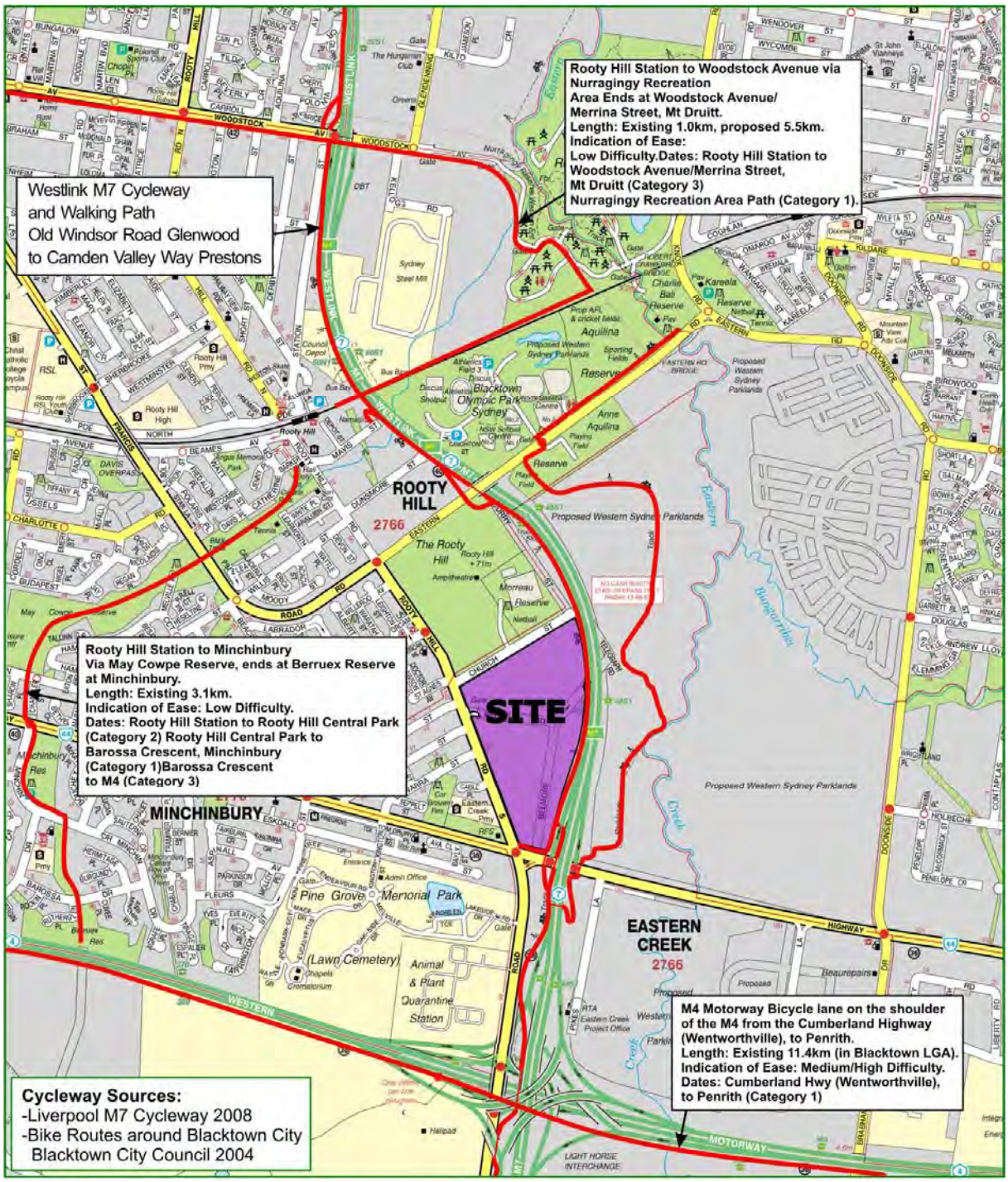


Figure 8: Cycleway Network

4.4 Existing Site Generation

The current site is largely undeveloped, with a few residential properties along Rooty Hill Road South and Church Street. For the purposes of traffic impact assessment, the current traffic generation has been deemed to be insignificant and therefore not taken into consideration. This provides a conservative approach to the forecasted traffic impact of the subject site.

4.5 Existing Intersection Performance

To assess the operation of key intersections in the vicinity of the site, turning movements were surveyed at the critical intersections identified in the DGRs during both the AM and PM Peak Periods. The key intersections analysed include:

- Rooty Hill Road South and the Great Western Highway;
- Great Western Highway and Westlink M7;
- Rooty Hill Road South and Church Street;
- Rooty Hill Road South and Eastern Road/Francis Road; and
- Wallgrove Road/Old Wallgrove Road and Westlink M7.

Signal Diagnostics (IDM data) was also obtained from the RMS for the Great Western Highway intersections.

In order to assess the traffic impacts of this development, traffic surveys were undertaken on Tuesday 8th May 2012. These surveys were undertaken during the 6.30 – 9.30am and 3.00 – 6.00pm peak periods; the results indicating that the local morning peak hour is between 7.15 – 8.15am and the evening peak hour is between 4.45 – 5.45pm.

The results of these surveys were analysed using the SIDRA Intersection computer software program to determine their performance characteristics under existing and future traffic conditions. The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and

Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

DOS - the DOS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DOS approaches 1, it is usual to attempt to keep DOS to less than 0.9. When DOS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit at 1.1 can be assumed. For priority controlled intersections such as roundabouts or give way/stop intersections, satisfactory operation is generally indicated by a DOS of 0.8 or less. It is worth noting that for priority controlled intersections, the assessed intersection delay (that is reported) is the delay for the worst movement at the roundabout or give way/stop intersection and does not therefore reflect overall intersection operation.

AVD - the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

LOS - this is a comparative measure which provides an indication of the operating performance of an intersection as shown below:

Level of Service	Average Delay per Vehicle (secs/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 and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

Table 1: Existing Intersection Performances

Intersection	Control	Peak Period	Degree of Saturation	Average Delay	Level of Service
Rooty Hill Road South & Francis Road & Eastern Road	Signal	AM	1.008	58.3	E
		PM	0.902	47.8	D
Rooty Hill Road South & Church Street	Yield	AM	0.258	2.4	F
		PM	0.287	2.9	F
Great Western Highway & Rooty Hill Road South & Wallgrove Road	Signal	AM	0.836	51.5	D
		PM	0.886	46.3	D
Great Western Highway & M7 On-Ramp	Signal	AM	0.535	2.1	A
		PM	0.417	7.3	A
Great Western Highway & M7 Off-Ramp	Signal	AM	0.557	6.0	A
		PM	0.533	5.3	A
Wallgrove Rd / Old Wallgrove Rd	Signals	AM	1.034	88.8	F
		PM	0.627	31.2	C

The results of the modelling for each intersection are summarised in **Table 1**. Reference should also be made to the SIDRA outputs provided in **Appendix B** which provide detailed results for individual lanes and approaches.

The analysis indicates the current performance of the key intersections is satisfactory, with Levels of Service generally of a D or better.

With regard to the Level of Service E during the morning peak hour at the intersection of Rooty Hill Road South with Francis Road and Eastern Road, it is noted that the average delay of 58.3 seconds per vehicle only just extends the intersection beyond the 57 second threshold, below which the intersection would operate at a Level of Service D.

With regard to the Level of Service F experienced at the Give-Way intersection of Rooty Hill Road South with Church Street, it is noted that the traffic volumes exiting Church Street are very low, with no

vehicles surveyed exiting during the morning peak hour and just four (4) vehicles surveyed exiting during the evening peak hour.

It can be seen from Table 1 that the intersection of Wallgrove Road with Old Wallgrove Road operates unsatisfactorily under the existing 'base case' scenario, with a level of service F during the morning peak period. This deficiency is well documented in numerous strategic planning documents and is subject to a current review being undertaken by the RMS as part of OId Wallgrove Road upgrade discussed above.

Finally, it is noteworthy that the most relevant use of the existing analysis is to compare the relative change in the performance parameters as a result of the proposed development. This is discussed further in the following sections.

5. Description of Application

A State Significant Staged Development Application is made under the Part 4 Division 4.1 of the Environmental Planning and Assessment Act 1979 for:

- A Concept Proposal providing a development structure for the proposed Eastern Creek Business Hub, including the site layout, activities, building envelopes, design guidelines; and
- First Stage approval for Super Lot Subdivision and Early Works to accommodate future development.

The Staged DA will provide for a total of 52,800m^2 of Gross Floor Area (GFA), consisting of:

- 14,000m^2 of GFA of Large Format Retail;
- 29,300m^2 of GFA of Bulky Goods Retail;
- 9,500m^2 of GFA of Convenience Retail; and
- Associated parking and open space.

An indicative development plan for the proposed Eastern Creek Business Hub is presented at reduced scale in **Appendix C**. It is emphasised that this application does not seek approval for built form and assesses only the potential impacts resulting from the Staged DA.

Development would likely begin at the south and move north to Beggs Road (Phase 1). Development north of Beggs Road may take five to ten or more years to commence, depending on market demand.

6. Transport Management & Accessibility

6.1 Traffic Management Objectives

The NSW State Government policies that are particularly relevant for consideration in relation to this application are as follows:

- Metropolitan Transport Plan 'Connecting the City of Cities';
- NSW State Plan;
- NSW Planning Guidelines for Walking and Cycling;
- NSW Bike Plan;

Generally the primary objective of Government is reflected in a Transport Access Guide for major developments which is aimed at reducing the reliance on private vehicle usage associated with the proposed development. Part of reducing the mode share of private vehicle use will involve promoting the use of other travel modes including public transport, cycling and walking.

These are discussed further in the following sections, which include measures to improve mode share for alternative transport modes.

6.2 Pedestrian and Bicycle Linkages

6.2.1 Policy Context

The NSW Government's Metropolitan Plan for Sydney 2036 published in 2010, outlines the following objectives:

- The RMS in cooperation with local government is to continue to upgrade walking and cycling facilities; and
- That future planning of walking and cycling networks should be developed to ensure appropriate linkages with both existing and proposed public transport routes with the aim of improving overall network connectivity.

These objectives have been adopted in the NSW Bike Plan (2010) which outlines a ten-year bicycle infrastructure implementation schedule to improve the existing accessibility to local and regional bike networks. The plan states the RMS will provide on an average $5 million in 50/50 funding each year for the upgrade of cycleways and shared paths to local Councils. Additionally, the NSW Bike Plan seeks to deliver cycleways as an integrated component of road upgrades. The existing cycle network in the vicinity of the site is presented earlier in Figure 8.

6.2.2 Opportunities

Improved pedestrian and/or bicycle linkages which integrate with shared open spaces and amenities will be provided within the site and these will be presented in the future development applications. The following lists key pedestrian and bicycle facilities that will be implemented as part of the proposal:

- A new footpath along the eastern side of Rooty Hill Road South, fronting the site, between Beggs Road in the north and the Great Western Highway in the south;
- Pedestrian crossing facilities at the proposed signalised site access intersection with Rooty Hill Road South and Cable Place, providing onward connections to existing bus stops on Rooty Hill Road South, residential areas west of the site and Rooty Hill town centre and train station to the north of the site;

- Pedestrian and cycle only access to Church Street, providing onward connections to Rooty Hill town centre (and train station) in the north, Eastern Creek in the south with onward connections to the regional cycle network; and
- Appropriate cycle parking across the site.

Within the site the footpath system would feature off-street dedicated links which improve pedestrian safety by separating pedestrians from roadways wherever possible. The internal road system would incorporate kerb blisters and landscaping to provide an attractive streetscape; and to slow traffic. Safe crossing opportunities will also be provided on all major desire-lines.

Future cycleway development is dependent on future road construction and progressive development of the region. The provision of adequate bicycle facilities for all future developments within the site would further encourage the use of the existing networks and would assist in the reduction of trips associated with private vehicles for the journey to work.

It is expected that cyclists would use the internal road carriageways that are provided as a shared on road facility.

6.3 Public Transport Usage

The main opportunities to improve public transport usage would be through the improvement of local bus stop facilities. These improvements include:

- Upgrading of the existing bus stop (for southbound services on Rooty Hill Road South) opposite Cawarra Street through the provision of a bus shelter; and
- Investigation of the opportunities to install bus shelters at the existing bus stops for northbound and southbound services located on Rooty Hill Road between the intersections with Church Street and Minchinbury Street.

The footpath improvements above would also encourage the use of public transport by providing the appropriate connections between the entire site and the existing and proposed bus stop facilities.

It is noted that the footpath and cycle connections provided within the site would provide onward connections to Rooty Hill train station. However, whilst a small minority may walk or cycle between the station and the site, it is recognised that the majority of train users who access the site would do so in conjunction with the bus services.

By their nature, retail uses (in particular bulky goods) are conducive to car-borne traffic, particularly with regard to customer trips. Therefore, the main opportunities to encourage public transport use would be for staff trips and an effective tool for encouraging staff trips by alternative modes is the Transport Access Guide (see following Section 6.4).

Finally, it should be noted that the development would increase local patronage and therefore whilst the development would not warrant increases in services and frequency, the future site population would generate a demand that would assist with maintaining the viability of existing services and contribute (as part of the WSEA) towards future services in the area.

6.4 Transport Access Guide

The NSW Government State Plan (November 2006) includes the following transport targets:

- Increase the mode share of public transport trips to the Sydney CBD to 75%;
- Increase journeys to work within the Sydney metropolitan region by public transport to 25% by 2016;
- Consistently meet public transport reliability targets for all forms of public transport;
- Road fatalities continue to fall relative to distance travelled;
- Increase the number of people who live within 30 minutes of a city or major centre by public transport in metropolitan Sydney; and
- Maintain current travel speeds along Sydney's major road corridors despite increase in travel volumes.

Generally the primary objective of Government behind establishing a Transport Access Guide for a major development is to reduce the reliance on private vehicle usage associated with the proposed

development. Increasing the number of journey to work trips by public transport is considered the most relevant State target, identified above, with regard to the subject development. A reduced target of say 10-15% is arguably more realistic and appropriate when considering that the overall metropolitan target will be significantly influenced by mode shares associated with major centres including the Sydney CBD.

In the subject case and having regard form the proposed uses, a target of 10% is considered readily achievable in relation to the journey to work trips of future staff, as discussed above. This however is unlikely to occur without the provision of additional bus facilities, such as new formal bus shelters and good pedestrian links.

Notwithstanding this, it is recommended that a Transport Access Guide be prepared and displayed in common areas. The guide will include community information such as:

- Local bus network maps and timetables;
- Rail network maps and timetables;
- Cycle route maps;
- Location of critical services within walking distances;
- Taxi contact numbers; and
- Location and contact details for car share operators.

By providing this information to shoppers and employees and ensuring that they are aware of the public transport options and frequencies available to them as well as the location of relevant services, a reduction in car oriented trips to/from the site would be expected.

The implementation of the Transport Access Guide is therefore strongly supported and will encourage the use of alternative transport options and will assist in meeting the relevant targets set out by the NSW State Government.

6.5 Future Road Works

6.5.1 Background

The road improvement schemes set out in this section were developed on the basis of the intersection performance analysis of the existing traffic flows and from preliminary analysis of the likely impact of the traffic increases that would arise from the proposed business hub development.

The improvements not only include improvements to existing intersections, but also include the proposed site access intersection which would be in the form of a signalised crossroads intersection with Rooty Hill Road South and Cable Place.

This section only sets out the road and intersection works proposed by the improvement schemes. The impacts of the proposals are taken into account in the future operational performance analysis in the following sections of this report.

6.5.2 Intersection of Rooty Hill Road South with Francis Street and Eastern Road

As mentioned earlier, this intersection currently operates at a Level of Service E during the morning peak hour period. In order to improve the operation of the intersection and to accommodate the additional traffic flows through the intersection (including the changes in turning proportions) resulting from the proposed business hub development, it is recommended that the two-lane south approach to the intersection, which currently has a left & through lane and a through & right lane, be modified to provide a left & through lane and a dedicated right lane, as shown in **Figure 9**.

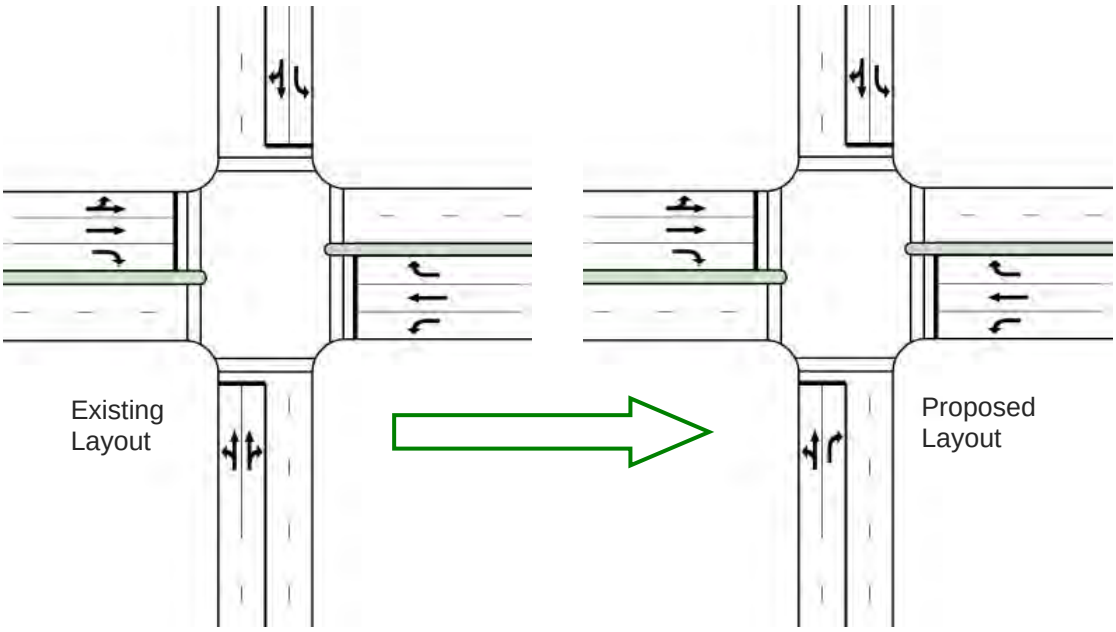


Figure 9: Proposed modifications to lane marking on south approach to the signalised intersection of Rooty Hill Road South with Francis Street and Eastern Road

The intersection currently runs a split-three-phase operation consisting of the following three phase:

- Phase 1 – East and South approaches;
- Phase 2 – North approach; and
- Phase 3 – South approach.

By making the modifications to the lane marking on the south approach, the following operational changes can be made to improve the intersections operation:

1. The phasing can be reduced from three phases to two phases, thereby improving the efficiency of the intersection; and
2. Right-turn movements from the south approach to the east approach are forecasted to increase significantly; therefore, the dedicated right-turn lane allows for the inclusion of a sub-phase that prioritises these movements.

It is worth noting that this improvement would require only changes to line marking.

6.5.3 Intersection of Rooty Hill Road South with Primary Site Access

The main site access is in the form of a signalised crossroad intersection which, as requested in the DGRs, is located at the existing Cable Place intersection with Rooty Hill Road South.

As shown on **Figure 10**, the north and south approaches of the intersection would both consist of a left & through lane, dedicated through lane and a dedicated right-turn bay. The west and east approaches would have a dedicated left-turn lane and a through & right-turn lane. Pedestrian crossings would be provided on all approaches.

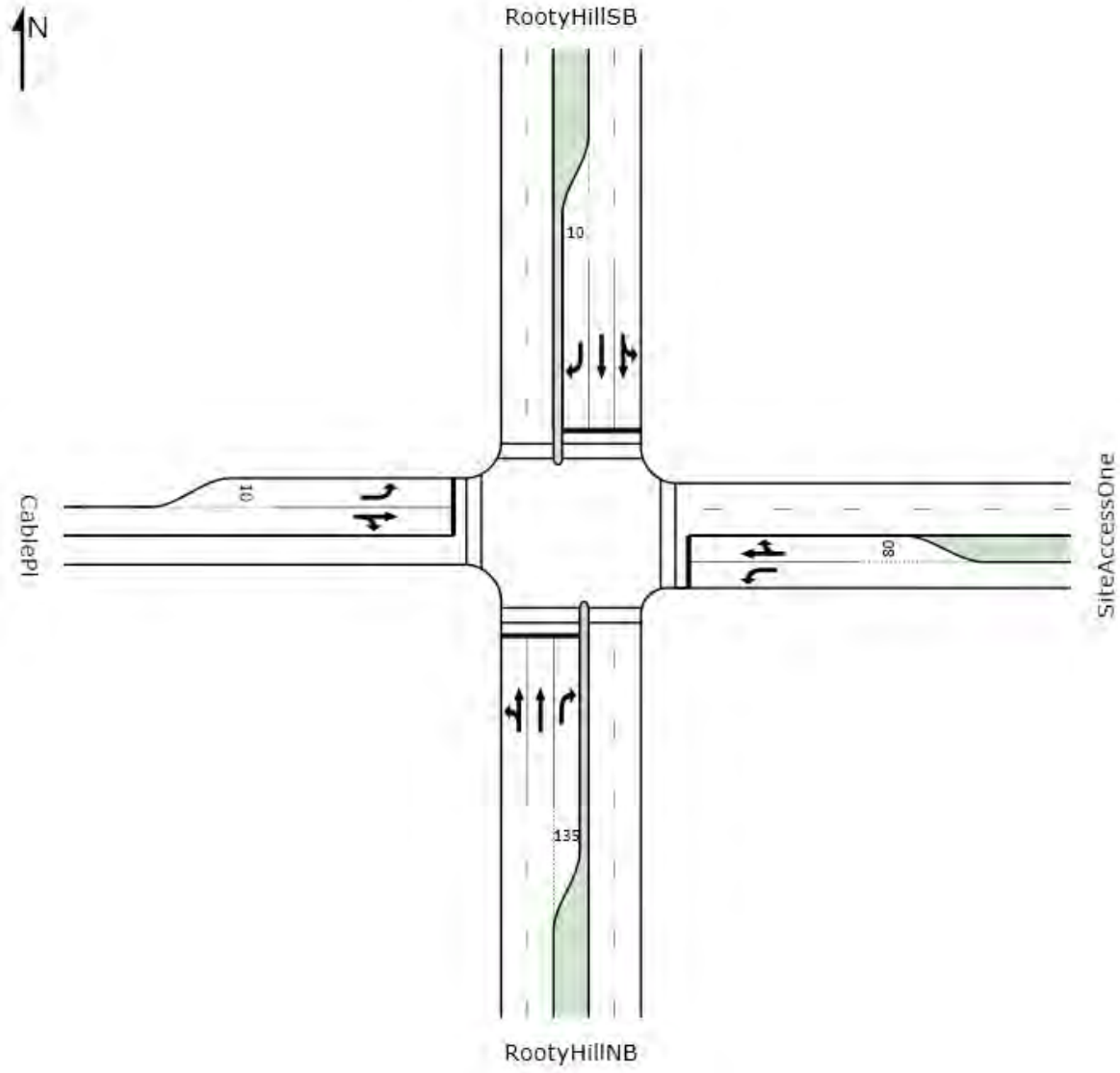


Figure 10: Proposed Intersection of Rooty Hill Road South with Primary Site Access

6.5.4 Intersection of Rooty Hill Road South with the Great Western Highway

To accommodate the forecasted increase in traffic exiting Rooty Hill Road South, the following modifications are proposed for the north approach of the intersection, as shown on **Figure 11**:

1. Provision of a new right-turn lane of 90m in length; and

2. Extension of the 90m left-turn lane to 150m in length (note, that as a result of the new right-turn lane, the approach lanes would need to shift approximately 3-4m east (towards the site) and accordingly the extended left-turn lane would most likely be a wholly new lane).

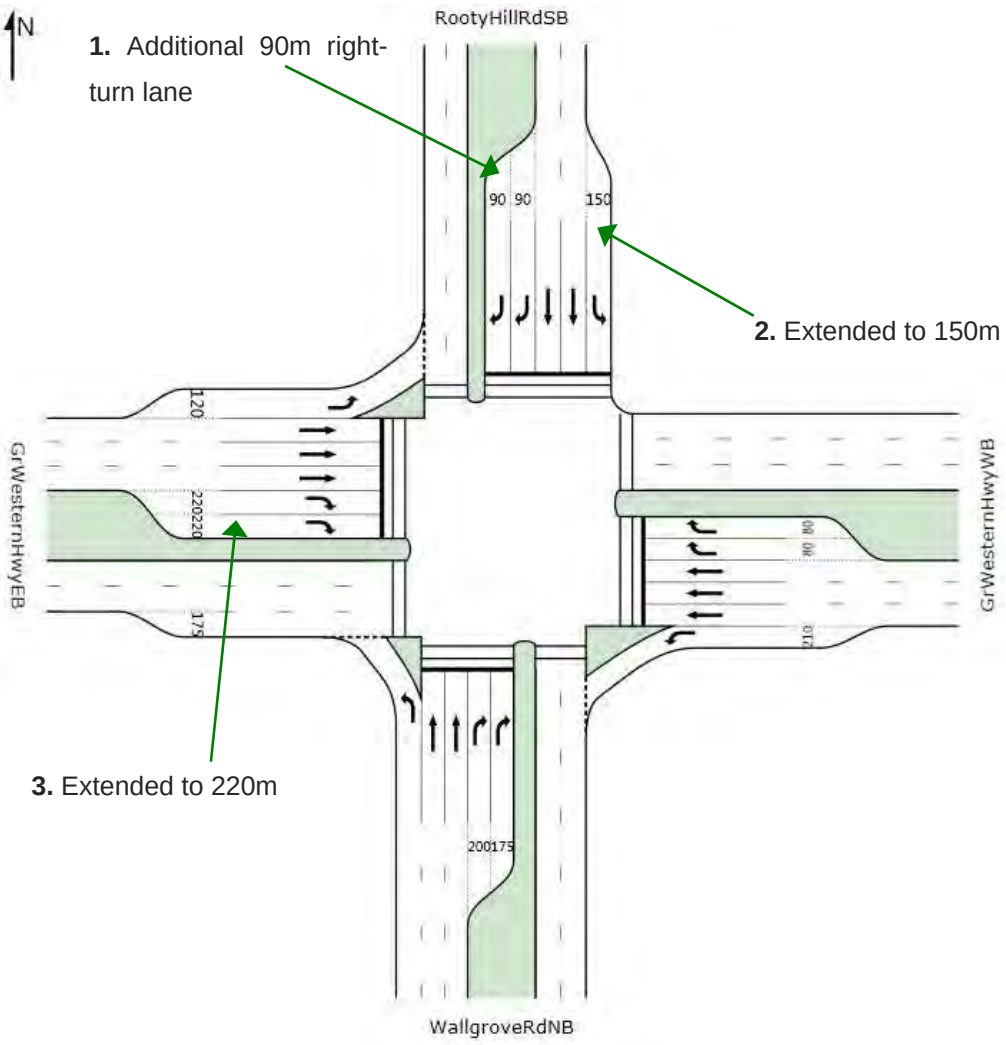


Figure 11: Proposed Signalised Intersection of Rooty Hill Road South with Great Western Highway

In addition, to maintain the current levels of service following completion of the development, the shorter of the two dedicated right-turn lanes on the west approach would need to be extended from 120m to 220m (i.e. both lanes would be 220m [modification 3 below]).

It is noteworthy that modifications 2 and 3 above are generally required to accommodate increases in queue lengths and would provide 'relief' from queuing issues as traffic (background and development) increases and the intersection reaches its capacity threshold.

However, the analysis indicates that traffic flows, even background traffic flows on their own, would eventually reach a level that would require an improvement that increases the overall capacity of the intersection. The duplication of the existing 90 metre right-turn lane (modification 1) has been identified as the most effective measure for increasing the amount of traffic that the intersection can accommodate.

In this regard it is recognised that this proposal presents a significant opportunity to dedicate currently unoccupied land for future road improvements that would not only facilitate the development, but also provide significant public benefit for the many existing and future users of the surrounding road network.

6.5.5 Intersection Wallgrove Road with Old Wallgrove Road

A detailed assessment of the future intersection operation of this intersection has been undertaken by Parsons Brinckerhoff (PB) on behalf of the RMS and DoPI as documented in the report entitled "Erskine Park Link Road Concept Plan Approval Review of Environmental Factors" dated July 2010. This report outlines the need for the future upgrade of the intersection of Old Wallgrove Road with Wallgrove Road and the need to upgrade Old Wallgrove Road between the NLR and Wallgrove Road intersection. The objectives of the upgrade are to:

- Provide a vital connection from Erskine Park Link Road;
- Support the WSEA;
- Provide a new shared cycle/pedestrian path and a connection to the M7 Cycleway; and
- Reduce transport costs for industry located in the WSEA.

The upgrade of the Old Wallgrove Road and Wallgrove Road intersection identifies the need for additional capacity to accommodate the likely increase in traffic associated with the Northern Link Road currently under construction. These upgrades also include the construction of a "mini-link road"

which is to form the western leg of a new signalised intersection with the northbound M7 Interchange. To the north it will form a new intersection with Old Wallgrove Road.

The future designs of these intersections are not currently available however it is envisaged that the Review or Environmental Factors is to be made available for comment in the second half of 2012.

It is difficult at this time to analyse the impacts of the proposed development due to the infrastructure works under construction and currently proposed. In this regard, discussions with the RMS and DoPI were previously held to clarify a number of issues relating to the current status of the network. The outcomes of this meeting were as follows:

- Significant modelling analysis has been undertaken by Maunsell, Aecom and Parsons Brinckerhoff on behalf of the RMS and DoPI associated with Northern Link Road, Southern Link Road and Old Wallgrove Road upgrade, including its intersection with Wallgrove Road and M7.

- The assessments undertaken on behalf of the RMS and DoPI have been undertaken for two main scenarios being:

    - 2016 - Which included the modelling for 100% development north of the water supply pipeline, 50% development of Ropes Creek and 30% development south of the water supply pipeline, and

    - 2031 – This modelling accounted for the full development of Western Sydney Employment Area (WSEA).

Based on the above, reliance on this modeling, which takes full account of development within the WSEA generally (including the subject development) as well as background traffic growth, is considered acceptable in the circumstances, Accordingly, no additional analysis has been undertaken as part of this application at this intersection.

6.6 Traffic Impact Assessment

6.6.1 Full Development Scenario

The floor area scheduled in Section 5 presents the Concept Plan development in terms of the general uses proposed. However, in order to provide a more detailed assessment of the proposed business

hubs, a number of more detailed uses have been assumed for certain components of the scheme. With reference to the units numbered 1-7 on the indicative development plan attached at Appendix C; **Table 2** presents the development schedule in greater detail.

Table 2: Scenario Schedule

Unit	Area Category	Indicative Use	GFA	GLA
1	Large Format Retailer	Large Format Hardware	14000	11900
2	Convenience retail	Village Centre	7500	6375
3	Convenience retail	Liquor Outlet	2000	1700
4	Bulky Goods	Adventure Outdoor / Camping Centre	3500	2975
5(P1)	Bulky Goods	Phase 1 General Bulky Goods	8300	7055
5(P2)	Bulky Goods	Phase 2 General Bulky Goods	5000	4250
6	Bulky Goods	Garden Centre	6000	5100
7	Bulky Goods	Self Storage	3500	2975

To accord with RMS trip rate guidance, Table 2 presents assumed Gross Lettable Floor Areas (GLA) for the retail uses based on 85% of the Gross Floor Area (GFA).

Furthermore, a 'Large Format Hardware' Warehouse-type land use (such as a Bunnings Warehouse) has been assumed for Unit 1.

6.6.2 Evening Peak Hour Trip Rates

Over 80% of the proposed business hub consists of either large format or bulky goods retail. The majority of these uses are unlikely to be trading during the morning peak hour; therefore, the significant peak hour period, in terms of development traffic generation, would be the weekday evening peak hour, when all future land uses would be operating.

In addition to the trip rate guidance provided in the RMS's *Guide to Traffic Generating Developments*, trip rate data has been drawn from a number of other sources, including traffic assessments for similar types of development.

Table 3 presents the development schedule along with the evening peak hour trip rates that have been adopted by this study for the relevant uses. Explanations supporting the different trip rates used follow Table 3. In this regard, consultation has been held with RMS concerning the adopted rates and no concerns have been raised as at the date of preparation of this report.

Table 3: Evening Peak Hour Trip Rates

Unit	Area Category	Indicative Use	Trip Rate
1	Large Format Retailer	Large Format Hardware	2.70 per 100m^2 GFA
2	Convenience retail	Village Centre	6.08 per 100m^2 GLA
3	Convenience retail	Liquor Outlet	6.08 per 100m^2 GLA
4	Bulky Goods	Adventure Outdoor / Camping Centre	1.46 per 100m^2 GFA
5	Bulky Goods	General Bulky Goods	1.46 per 100m^2 GFA
6	Bulky Goods	Garden Centre	1.46 per 100m^2 GFA
7	Bulky Goods	Self Storage	1.46 per 100m^2 GFA

UNIT 1 – Large Format Retail (Large Format Hardware)

The evening peak hour trip rate for the Large Format Retail is based on information from the Transport and Traffic Planning Associates (TTPA) Report dated March 2011 (2011 TTPA report) that supported the proposed Bunnings Warehouse for the site that fronts Richmond Road and Townson Road, Marsden Park. This site is also with the City of Blacktown and is located approximately 8km north of the WSPT subject site.

The 2011 TTPA report referred to a recent RMS commissioned study of 'Large Format Hardware' sites. The study involved surveys at eight existing sites in the Sydney Metropolitan area (in the peak seasonal period) and an aggregated statistical analysis to establish generic trip generation rates. Furthermore, it is understood that the RMS study referred to is the 2009 Hyder Consulting study, the results of which were published in the report '*Trip Generation and Parking Generation Surveys, Bulky Goods/Hardware Stores*' (2009 Hyder report).

The 2009 Hyder report concluded that the average weekday evening peak hour trip generation for this type of land use was 2.7 trips per 100m^2 of GFA. This rate has been adopted for this study.

UNITS 2 and 3 – Convenience Retail

RMS average trip rate guidance for 'Shopping Centre' developments has been used to cover the range of retail uses (including the Liquor Outlet) that could be implemented at Units 2 and 3. RMS guidance provides the following Thursday evening peak hour average trip rates for Shopping Centre developments:

- For Centres of 0 – 10,000m^2 GLA, 12.3 trips per 100m^2 of GLA;

- For Centres of 10,000 – 20,000m^2 GLA, 7.6 trips per 100m^2 of GLA;
- For Centres of 20,000 – 30,000m^2 GLA, 5.9 trips per 100m^2 of GLA; and
- For Centres of 30,000 – 40,000m^2 GLA, 4.6 trips per 100m^2 of GLA.

As the guidance shows, trip generation (by floor area) decreases as shopping centre size increases. The scale of Convenience Retail proposed is 9,500m^2, 95% of the 10,000m^2 threshold identified above, between an average trip rate of 12.3 trips and 7.6 trips (per 100m^2).

However, having regard for the context of the convenience retail and it being a part of a development that as a whole exceeds 50,000m^2 of floor area, it is considered acceptable to use the average Thursday evening peak hour trip rate of 7.6 trips per 100m^2.

Furthermore, a significant proportion of these convenience retail trips would be 'multi-purpose' trips, i.e. trips to the convenience retail would be combined with a trip to one of the other proposed land uses. To account for these multi-purpose trips, a reduction factor of 20% has been applied to the RMS trip rate. Accordingly, an evening peak hour trip rate of 6.08 trips per 100m^2 of GLA has been used in this study.

It is worth noting that shopping centres in excess of 20,000m^2 generate on average 4.6 – 5.9 trips per 100m^2 during the evening peak hour. Whilst it is recognised that the proposal (as a whole) is not for a shopping centre development, it does propose a development in excess of 50,000m^2 of predominantly retail floor area; therefore, the evening peak hour trip rate of 6.08 trips per 100m^2 (which is higher than the 4.6 – 5.9 range above for large shopping centres) is considered acceptable.

UNITS 4-7 – Bulky Goods Retail

The 2009 Hyder report also provided trip rate advice for Bulky Goods developments as well as Hardware Stores. This advice was recently used by Halcrow (*Kirrawee Brick Pit, Updated Traffic Management & Accessibility Plan, October 2011*) in support of the proposed Mixed Use Development at Kirrawee Brick Pit, Kirrawee (MP 10_0076).

The Bulky Goods weighted-average trip rate details presented in the report indicated a trip generation of 1.46 trips per 100m^2 of GFA for the evening peak hour. This rate has been adopted for this study.

6.6.3 Morning Peak Hour Trip Rates

The 2009 Hyder report also provided a weekday-average morning peak trip rates for Large Format Hardware of 1.68 trips per 100m^2 of GFA. This rate has been adopted by this study for Unit 1.

In addition, the 2009 Hyder report indicated that the majority of Bulky Goods stores generate negligible levels of traffic during the morning peak hour. Therefore, it is assumed that Units 4-7 would also generate negligible levels of traffic during the morning peak hour. In addition, it is assumed that Unit 3, indicatively earmarked for a Liquor Outlet, would also generate negligible levels of traffic during the morning peak hour.

For the convenience retail, the morning peak hour trip rate is assumed to be 30% of the assumed evening peak hour trip rate 7.6 trips per 100m^2. Therefore a morning peak hour trip rate of 2.28 trips per 100m^2 of GLA has been adopted by this study.

The 30% factor has been based on the raw traffic survey that informed the RMS's *Guide to Traffic Generating Developments*. This survey data is contained in the *Consultant's Report No.1 Sydney Region Sites – Land Use Traffic Generation Surveys*, dated March 1991 and prepared by Arup Transportation Planning and Australasian Traffic Surveys. In addition, the 30% factor has been conservatively applied to the full evening peak hour trip rate rather than the trip rate that includes a 20% reduction to account for 'multi-purpose' trips.

Table 4 presents the morning peak hour trip rates adopted by the study.

Table 4: Morning Peak Hour Trip Rates

Unit	Area Category	Indicative Use	Trip Rate	
1	Large Format Retailer	Large Format Hardware	1.68	per 100m^2 GFA
2	Convenience retail	Village Centre	2.28	per 100m^2 GLA
3	Convenience retail	Liquor Outlet	n/a	per 100m^2 GLA
4	Bulky Goods	Adventure Outdoor / Camping Centre	n/a	per 100m^2 GFA
5	Bulky Goods	General Bulky Goods	n/a	per 100m^2 GFA
6	Bulky Goods	Garden Centre	n/a	per 100m^2 GFA
7	Bulky Goods	Self Storage	n/a	per 100m^2 GFA

6.6.4 Daily Trip Rates

RMS's *Guide to Traffic Generating Developments* states that for shopping centres between 10,000 – 20,000m^2 of GLA, the average daily traffic generation rate is 78 trips per 100m^2 of GLA. It is noted that this is 10.3 times greater than the PM peak hour trip rate of 7.6 trips per 100m^2 of GLA for centres with a GLA of between 10,000 – 20,000m^2.

Using the raw data from the 2009 Hyder report, the following factors were calculated for the Hardware sites and the Bulky Goods sites:

- Hardware – Average daily (Thursday) traffic generation was 14.3 times that of the evening peak hour; and
- Bulky Goods – Average daily traffic generation was 13.8 times that of the evening peak hour.

By applying these factors to the evening peak hour trip rates in Table 3, the following average daily trip rates have been calculated:

- Hardware – 38.6 trips per 100m^2 of GLA; and
- Bulky Goods – 20.1 trips per 100m^2 of GLA.

6.6.5 Development Traffic Generation

By applying the peak hour trip rates in Tables 3 and 4 to the relevant floor areas/units in Table 2, and assuming a 50:50 split between arrival and departure trips, the following traffic generation has been forecasted for the business hub:

- Morning peak hour 668 veh/hr (334in, 334out)
- Evening peak hour 1,250 veh/hr (625in, 625out)
- Daily 15,900 veh/hr (7,950in, 7,950out)

6.6.6 Peak Period Intersection Performances

To assess the likely impacts of the development on the external road network, the forecasted development traffic has been assigned onto the network based on the current traffic patterns of the surrounding road network.

In addition, background traffic growth of 10.5% (based on local RMS AADT data) has been applied to the 2012 existing traffic flows to generate 2022 Base traffic flows. The combination of the development traffic and the 2022 Base traffic provides us with the forecasted 2022 traffic flows following the full development of the Eastern Creek Business Hub.

It is worth noting that the methodology of applying 'growth-factors' to background traffic, before combining it with the predicted development traffic, provides a conservatively high estimate of the future traffic volumes as it effectively employs an element of 'double-counting'; i.e. the development traffic itself represents the 'traffic growth' that is evident in the RMS AADT data.

Furthermore, RMS guidance indicates that up to 25% of trips generated by shopping centres are 'linked' trips, i.e. a trip taken as a side-track from another trip, for example, a person calling in to the centre on the way home from work. With regard to the subject development, all of the retail uses (the convenience retail in particular) would most likely draw a reasonable amount of its custom from existing traffic already passing the site on Old Rooty Hill Road south and on the Great Western Highway. However, no deductions have been made for these linked trips for the convenience retail or any of the proposed retail uses. Therefore, by distributing 100% of the trip generation forecasted in Tables 3 and 4, this assessment provides a conservatively high estimate of the new trips that the full development would generate on the surrounding road network.

The performance of the surrounding road network, under the forecasted 2022 Base + Development traffic flows, has been assessed using SIDRA. The results of this analysis are summarised in **Table 5 and 6** below for the morning and evening peak hours respectively.

Table 5: Morning Peak Hour Future Intersection Performances

Intersection	Scenario	Degree of Saturation	Average Delay	Level of Service
Rooty Hill Road x Francis Road x Eastern Road	2012 Existing	1.008	58.3	E
	2022 Base + Development	1.000	50.4	D
Great Western Highway x Rooty Hill Road	2012 Existing	0.820	51.5	D
	2022 Base + Development	0.898	52.2	D
Great Western Highway x M7 On-Ramp	2012 Existing	0.499	2.2	A
	2022 Base + Development	0.565	2.3	A
Great Western Highway x M7 Off-Ramp	2012 Existing	0.568	6.2	A
	2022 Base + Development	0.841	7.8	A

Table 6: Evening Peak Hour Future Intersection Performances

Intersection	Scenario	Degree of Saturation	Average Delay	Level of Service
Rooty Hill Road x Francis Road x Eastern Road	2012 Existing	0.902	47.8	D
	2022 Base + Development	0.974	53.9	D
Great Western Highway x Rooty Hill Road	2012 Existing	0.886	46.3	D
	2022 Base + Development	0.972	55.3	D
Great Western Highway x M7 On-Ramp	2012 Existing	0.850	15.1	B
	2022 Base + Development	0.878	13.1	A
Great Western Highway x M7 Off-Ramp	2012 Existing	0.533	5.3	A
	2022 Base + Development	0.630	6.0	A

Tables 5 and 6 also present the 2012 existing results for comparison. The results indicate that with the proposed intersection improvements identified in Section 6.7, all intersections would operate satisfactorily with Levels of Service of D or better.

The proposed site access intersections have also been assessed using SIDRA, the results of which are presented in **Table 7**.

Table 7: Site Access Intersection Performance

Intersection	Period	Degree of Saturation	Average Delay	Level of Service
Rooty Hill Road South Access	AM	0.522	15.4	B
	PM	0.820	24.0	B

The results indicate that the proposed site access would operate satisfactorily with a Levels of Service of B.

Finally, preliminary concept plan design included a secondary access on Church Street. This access has now been removed and therefore Church Street would no longer accommodate development traffic. Accordingly its future performance would generally remain unchanged.

6.7 Development Thresholds

A number of thresholds have been identified which provide indicative levels of development and associated road works required to mitigate against any traffic impacts. The thresholds in this section are defined by the volume of traffic that is anticipated for each of the phases.

6.7.1 Threshold 1 – Construction Traffic

Threshold 1 covers the access requirements for forecasted Construction Traffic levels during the Early Works construction phase. The only road works requirement would be a construction traffic access. Details regarding construction access would be confirmed as part of a Construction Traffic Management Plan that would be submitted for approval prior to the issue of a construction certificate for the early and main building works.

Notwithstanding the above, it is most likely that access would initially be provided via a temporary access from Church Street. Subsequently a secondary access would most likely be provided in the location of the proposed main access intersection so that its construction would eventually be progressed in to the completed signalised access intersection. Further details about construction traffic management are provided at Section 8.

6.7.2 Threshold 2 – 2017 Background Traffic & 310 Evening Peak Hour Development Trips

Only the construction of the signalised access intersection with Rooty Hill Road South and Cable Place is required to accommodate the traffic flows associated with Threshold 2 above. All existing intersections within the study road network have sufficient capacity to accommodate the forecasted background traffic growth and development associated with 310 Evening Peak Hour Development Trips.

6.7.3 Threshold 3 – 2017 Background Traffic and Phase 1 Development Trips

In order to exceed Threshold 2, capacity improvements are required at the intersection of Great Western Highway with Rooty Hill Road South. As mentioned in Section 6.5.4, a total of three (3) modifications to this intersection have been identified to improve this intersection so that it can accommodate forecasted 2022 Background Traffic and full development (Phase 1 & 2) of the subject site.

However, traffic flow and SIDRA analysis indicates that in order to 'release' all of the Phase 1 development by 2017, the only modification required is the duplication of the existing 90 metre right-turn lane on the Rooty Hill Road South approach (Modification 1).

6.7.4 Threshold 4 – 2022 Background Traffic and Phase 1 & 2 Development Trips

In order to exceed Threshold 3, all road works identified in Section 6.5 are required.

With regard to the proposed improvements for the intersection of the Great Western Highway with Rooty Hill Road South (Section 6.5.4), it is noteworthy that the additional peak hour traffic using the intersection would be about 65% background traffic growth and 35% development traffic during the morning peak hour and 35% background traffic growth and 65% development traffic during the evening peak hour.

Furthermore, even if the development did not proceed, an improvement at the Great Western Highway intersection with Rooty Hill Road South would be required solely to accommodate background traffic growth. In these circumstances, the WSPT land required to deliver these improvements would need to be acquired by RMS and/or Council. Accordingly, the early dedication of this land provides a significant public benefit which needs to be 'valued' appropriately. In this regard, Section 8 of the RMS *Guide to Traffic Generating Developments* would identify these improvements as Category A works defined as:

> "*projects planned to be constructed at some future date irrespective of whether or not the development goes ahead or not. These projects would normally be a State or Local Government responsibility but may need to be brought forward for the development*".

The guidelines provide a methodology for determining the appropriate contribution in these circumstances. Nevertheless, it is considered that at least 35% of the benefits afforded by the improvements would be for future users not associated with the site and therefore 35% of the costs of the improvements are not attributable to the development.

6.8 Parking Requirements

Generally the parking requirements will be assessed at subsequent development application stages based on Council's controls whilst also having regard for the NSW Governments objectives of

reducing car dependant travel. Indicatively, the parking supply for the overall development, in the absence of suppressed demand regime, would be 1,427 parking spaces, consisting of:

- 14,000m^2 of GFA of large format retail @ 1 per 25m^2 = 560 spaces;
- 29,300m^2 of GFA of bulky goods retail @ 1 per 60m^2 = 487 spaces; and
- 9,500m^2 of convenience retail @ 1 per 25m^2 = 380 spaces.

In determining the parking rate for the large format retail, consideration was given to the following rates:

- Council's DCP rate of 1 per 45m^2 of GFA;
- The rate used for Costco, Auburn of about 1 per 30m^2 of GFA; and
- The rate used for IKEA, Tempe of about 1 per 20m^2 of GFA.

Due to its highly visible location, it is anticipated that the Large Format Retail site would attract a 'Blue Chip' retailer that would provide the major retail destination within the site. Accordingly it is recommended that a suitable parking provision be provided that would be 'attractive' to potential tenants and meet the minimum requirements of Council's DCP. Accordingly, a parking rate of 1 space per 25m^2 of GFA has been chosen which is the average of the rates used for the Costco and IKEA developments.

Having regard for the generous parking rate adopted for the Large Format Retail, a constrained parking rate of 1 space per 60m^2 of GFA has been adopted for the general bulky goods uses.

Finally, the Convenience Retail rate adopted of 1 per 25m^2 GFA accords with the RMS rate (adjusted from GLA), which is slightly less than Council's rate of 1per 22m^2 of GFA.

It is expected that some further reduction in total parking would be achievable to take account of public transport initiatives and the implementation of the Travel Access Guide. This approach is also consistent with State Government policy.

The above parking provision is nevertheless considered appropriate for adoption as an upper threshold limit to be embodied in this Concept Plan and will be subject to further detailed assessment at subsequent development application stage/s.

7. Road Design

It is anticipated that vehicles up to the size of 19 metre articulated trucks (semis) would access the site. Therefore, the Rooty Hill Road South access intersection locations would be designed to accommodate vehicles of this size in accordance with AUSTROADS guidelines. It should be noted that this intersection has been designed conceptually based on the modelling discussed above and would be subject to further detailed design and assessment.

The internal road network is based on the provision of a single site road from the intersection with Rooty Hill Road South (at Cable Place) northwards towards (but not connecting to) Church Street, as shown on the plan attached at Appendix C. This road would be a local access road that would conform to AUSTROADS Guidelines and Council's DCP as appropriate.

The road provides access to individual development sites (which would be consolidated as far as possible), with no direct access available on either approach or departure to the signals at Rooty Hill Road South. This would ensure that there are no conflicts within sections of road where queuing would occur.

In order to maintain a low speed environment throughout the site it is recommended that a 40km/h speed restriction be enforced. This would allow for the use of shared pedestrian areas which is consistent with the current and future use of the site.

A left-in, left-out only access on Rooty Hill Road South, located between the intersections with Penfold Street and Cawarra Street is also proposed. This access is intended to serve the Unit 3 convenience retail, notionally earmarked for a liquor outlet. This access would also be subject to further detailed design and assessment at which time design features such as a raised median island to prohibit right-turning movements would be considered.

While the traffic assessment discussed above has focussed on the ultimate development of the site, it is noted that the main internal road would be only partially constructed in Phase 1. This is the section that traverses the southern development parcel to Beggs Road. This would require a temporary cul-de-sac to be constructed and the Indicative Development Plan incorporates this facility.

8. Construction Traffic Management Plan

At this Concept Development level of planning it has not been possible to prepare a formal Construction Traffic Management Plan (CTMP). Owing to the scale of the project, the development of the site would occur over at least two phases with Phase 1 being development of the area south of the Beggs Street easement and Phase 2 being the area north of the easement.

Separate formal CTMPs would be submitted for each development stage, most likely in response to a standard condition of consent prior to issue of a construction certificate. Whilst at this stage of planning the formal construction methodologies have not been determined, the following principles would be incorporated given that the site is located close to transit corridors:

- The CTMP would include proposed truck parking areas, construction zones, crane usage, truck routes, etc;
- Pedestrian movements along footpaths would be maintained as much as possible on roads surrounding the site;
- Trucks must enter and leave the site in a forward direction unless accredited flag persons are in place to control traffic and pedestrians;
- The Building Contractor would maintain strict traffic management procedures to ensure the safety of the public road users and pedestrians utilising traffic wardens;
- All vehicles carrying materials to or from the site must have their loads covered with tarpaulins or similar covers;
- Openings in the construction fencing at the construction access driveways would be managed and controlled by qualified site personnel; and
- Temporary pedestrian warning signs and flashing lights would be erected adjacent to construction access driveways where appropriate.

9. Conclusions

In summary:

- The application seeks approval for a Concept Plan for a business hub comprising 52,800m^2 of predominantly large format, bulky goods retail floor area at the Eastern Creek site on Rooty Hill Road South;

- This TMAP has identified a package of improvements that would achieve the objectives of Government Policy by promoting travel by alternative modes, including public transport, walking and cycling. These modes will be encouraged through the implementation of a Travel Access Guide that will be embodied in consents for subsequent project applications;

- The site access arrangements are considered to be the optimal for the site and have developed through discussions with Council officers and adherence to the DGRs. This includes (at full development of all Phases), the provision of traffic signal control at the major access intersection on to Rooty Hill Road South opposite Cable Place;

- The site incorporates a road hierarchy that facilitates safe and efficient access, while providing suitable opportunities for direct access to individual sites within the development. The design of the internal road network would be undertaken in accordance with relevant standards;

- In addition to the site access intersection, a number of external intersection improvements are required to provide the requisite capacity to accommodate both the development traffic and predicted background traffic growth. These improvements are identified in this TMAP and it should be acknowledged they reflect the long term network requirements of the RMS in accordance with its ongoing strategic planning responsibilities.

- Subject to these improvements, the traffic generation of 382 trips during the morning peak hour and 1,312 trips during the evening peak hour that are associated with the proposed development, can be accommodated on the surrounding road network with all key intersection performing satisfactorily;

- Even if the development did not proceed, an improvement at the Great Western Highway intersection with Rooty Hill Road South would be required solely to accommodate background traffic growth. In these circumstances, the WSPT land required to deliver these improvements

would need to be acquired by RMS and/or Council. Accordingly, the early dedication of this land provides a significant public benefit which needs to be 'valued' appropriately;

- The proposal provides a significant opportunity to implement a package of intersection improvements that would not only facilitate the development, but also provide considerable additional public benefits. It is considered that at least 35% of the benefits afforded by the improvements would be for future users not associated with the site and therefore 35% of the costs of the improvements are not attributable to the development;

- A number of key thresholds have been identified that will assist with the staged development of the site by identifying relevant road improvements required at each threshold; and

- Consultation with NSW Roads and Maritime Services has been undertaken; at the time of issue of this report, no comments had been received from the RMS.

It is therefore concluded that the indicative land uses and yields as adopted for the purposes of this Concept Proposal and First Stage Super Lot Subdivision and Early Works is supportable on traffic planning grounds.

Appendix A

Photographic Record

View looking east at the proposed access location for the subject site from the intersection of Rooty Hill Road South and Cable Place

View looking north along Rooty Hill Road South from the intersection with Cable Place

View looking south along Rooty Hill Road South from the proposed site access location

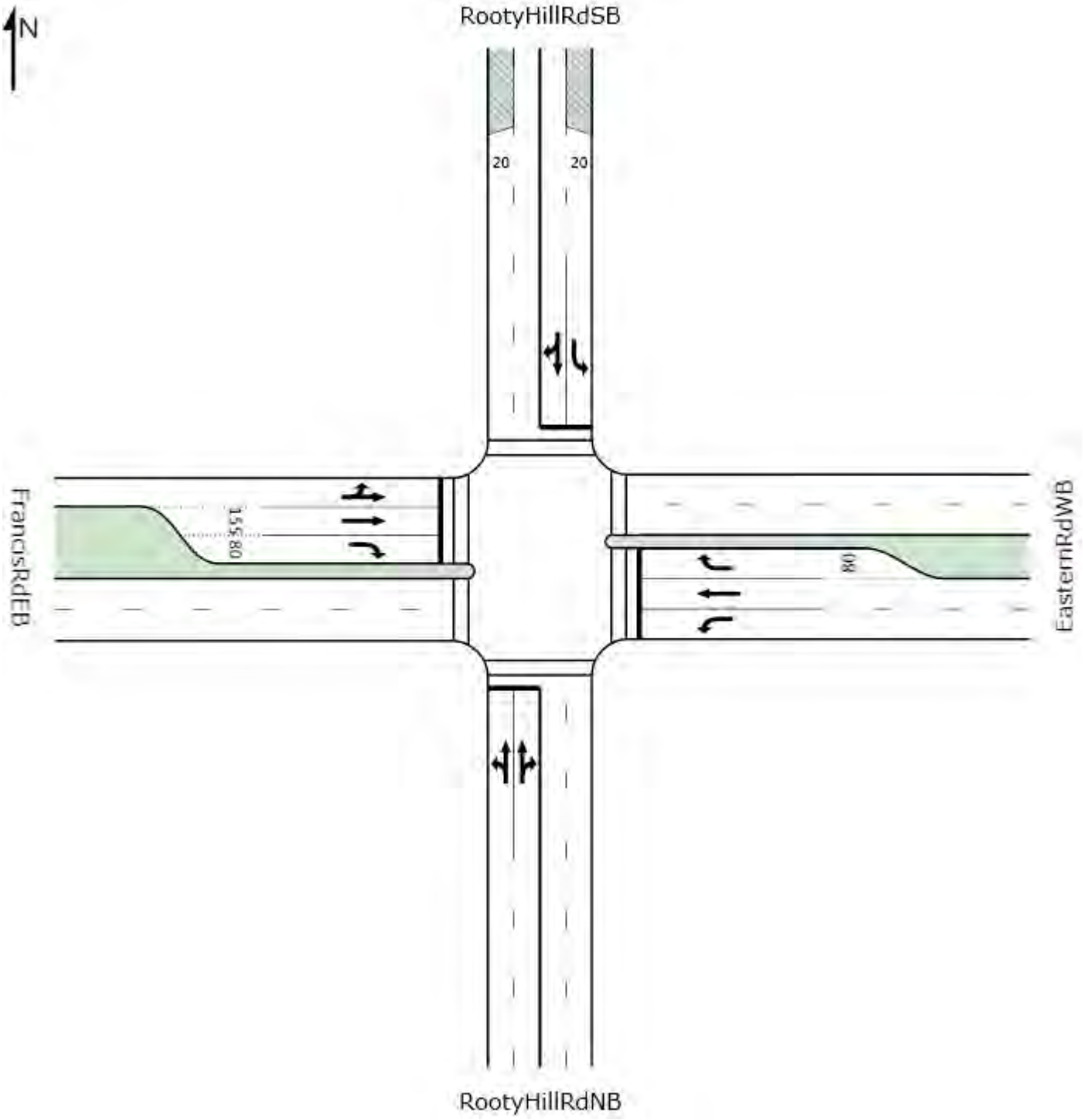
View looking south along Rooty Hill Road South from the intersection with Church Street

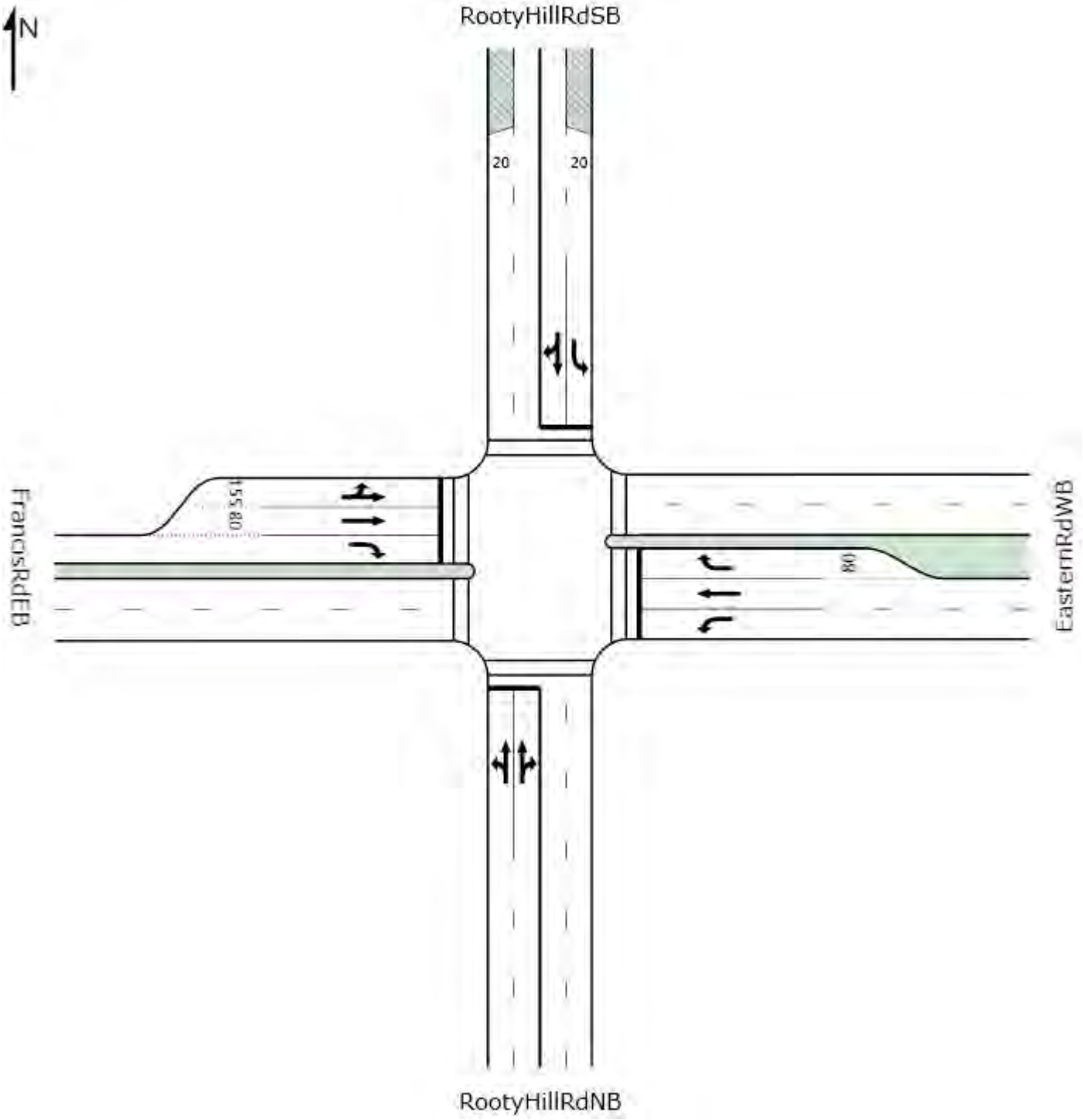
View looking east along Great Western Highway from the western side of the intersection with Rooty Hill Road South and Wallgrove Road

View looking north towards Rooty Hill Road South from the intersection of Great Western Highway and Rooty Hill Road South

Appendix B

SIDRA Intersection Analysis


N
RootyHillRdSB
20
20
FrancisRdEB
155
80
80
EasternRdWB
RootyHillRdNB


N
RootyHillRdSB
20
20
155.80
FrancisRdEB
80
EasternRdWB
RootyHillRdNB

LANE SUMMARY

Rooty Hill Road / Francis Road
Period: AM
Scenario: 2012 Existing
Signals - Fixed Time Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: RootyHillRdNB																
Lane 1	372	0	0	372	1.1	983	0.378	38[5]	25.0	LOS B	12.3	87.2	335	–	0.0	0.0
Lane 2	0	86	343	429	6.7	426	1.008	100	109.8	LOS F	37.9	280.4	335	–	0.0	0.0
Approach	372	86	343	801	4.1		1.008		70.4	LOS E	37.9	280.4				
East: EasternRdWB																
Lane 1	300	0	0	300	5.3	678	0.442	100	24.1	LOS B	7.7	56.0	500	–	0.0	0.0
Lane 2	0	259	0	259	0.0	263	0.986	100	92.6	LOS F	20.6	144.3	500	–	0.0	0.0
Lane 3	0	0	37	37	0.0	242	0.152	100	34.4	LOS C	1.3	9.3	80	Turn Bay	0.0	0.0
Approach	300	259	37	596	2.7		0.986		54.5	LOS D	20.6	144.3				
North: RootyHillRdSB																
Lane 1	163	0	0	163	0.7	164[1]	0.996	100	29.9[8]	LOS C[8]	4.6[8]	32.6[8]	20	Parking	0.0	50.0
Lane 2	0	112	1	113	1.9	332	0.340	100	47.4	LOS D	5.9	41.7	500	–	0.0	0.0
Approach	163	112	1	276	1.2		0.996		37.0	LOS C	5.9	41.7				
West: FrancisRdEB																
Lane 1	1	363	0	364	0.6	647	0.562	100	35.2	LOS C	17.4	122.7	155	Turn Bay	0.0	0.0
Lane 2	0	216	0	216	0.6	384[1]	0.562	100	32.1	LOS C	9.4	66.3	80	Turn Bay	0.0	0.0
Lane 3	0	0	516	516	1.0	527	0.979	100	82.6	LOS F	37.9	267.5	500	–	0.0	0.0
Approach	1	579	516	1096	0.8		0.979		56.9	LOS E	37.9	267.5				
Intersection				2768	2.2		1.008		58.3	LOS E	37.9	280.4				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect
5 Lane underutilisation determined by program
8 Delay, queue length and stops for the short lane have been cut down to fit in the queuing space. You may wish to change the short lane to a full lane to investigate the effect on the adjacent lane performance.

LANE SUMMARY

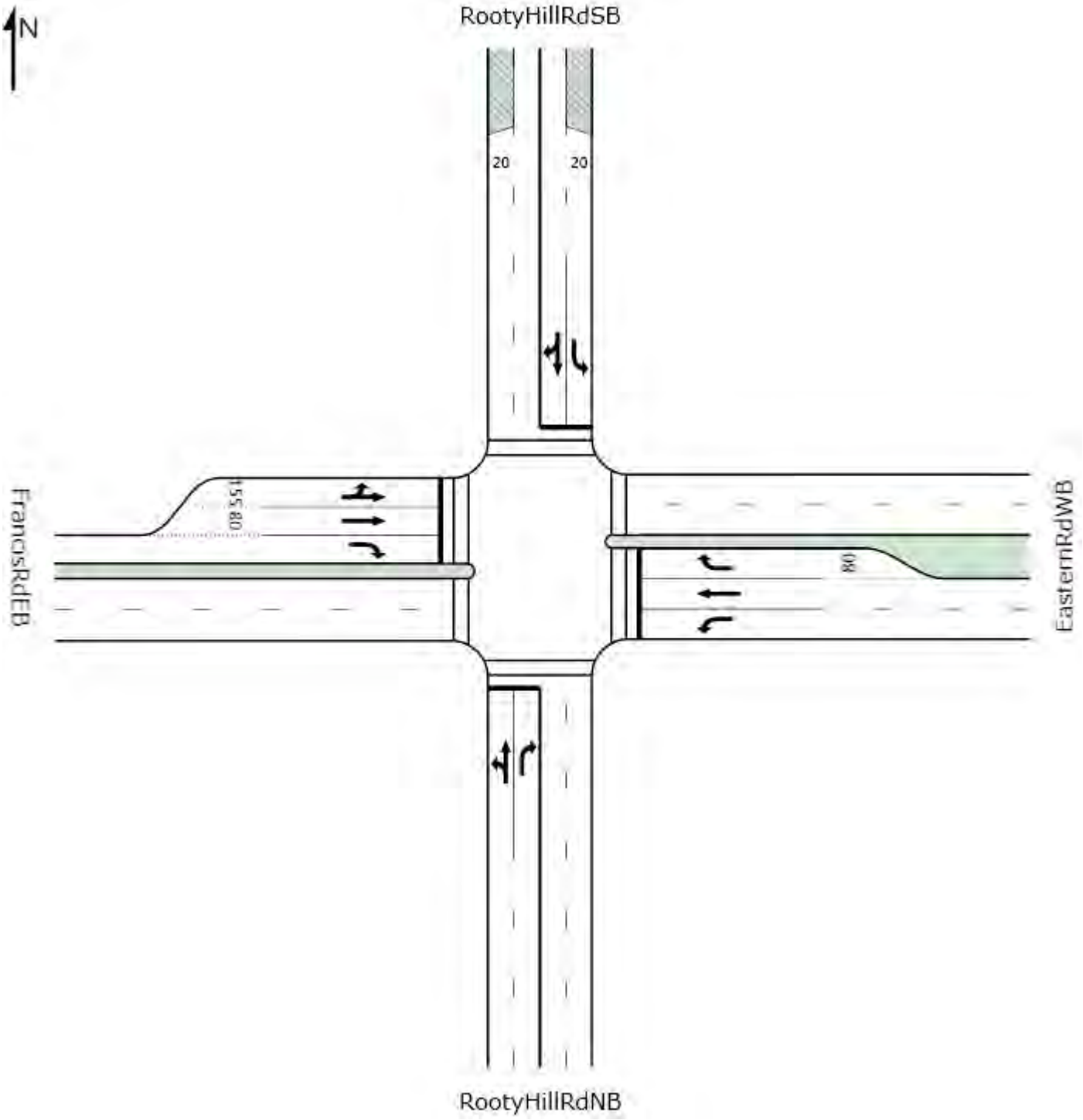
Rooty Hill Road / Francis Road
Period: PM
Scenario: 2012 Existing
Signals - Fixed Time Cycle Time = 137 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: RootyHillRdNB																
Lane 1	451	0	0	451	0.0	867	0.519	58[5]	34.8	LOS C	20.7	144.9	335	–	0.0	0.0
Lane 2	0	133	320	453	1.7	509	0.890	100	69.2	LOS E	33.2	235.6	335	–	0.0	0.0
Approach	451	133	320	903	0.8		0.890		52.1	LOS D	33.2	235.6				
East: EasternRdWB																
Lane 1	382	0	0	382	0.3	970	0.394	100	19.0	LOS B	7.8	54.6	500	–	0.0	0.0
Lane 2	0	409	0	409	0.3	474	0.864	100	61.8	LOS E	28.9	202.9	500	–	0.0	0.0
Lane 3	0	0	166	166	0.0	494	0.337	100	34.6	LOS C	7.0	48.8	80	Turn Bay	0.0	0.0
Approach	382	409	166	958	0.2		0.864		40.0	LOS C	28.9	202.9				
North: RootyHillRdSB																
Lane 1	92	0	0	92	0.0	171[1]	0.536	100	26.1	LOS B	2.4	16.7	20	Parking	0.0	0.0
Lane 2	0	101	5	106	1.9	290	0.367	100	57.1	LOS E	6.5	45.9	500	–	0.0	0.0
Approach	92	101	5	198	1.0		0.536		42.8	LOS D	6.5	45.9				
West: FrancisRdEB																
Lane 1	3	175	0	178	0.0	469	0.379	100	46.8	LOS D	9.9	69.5	155	Turn Bay	0.0	0.0
Lane 2	0	118	0	118	0.0	310[1]	0.379	100	45.0	LOS D	6.3	44.3	80	Turn Bay	0.0	0.0
Lane 3	0	0	319	319	0.0	354	0.902	100	64.0	LOS E	19.8	138.3	500	–	0.0	0.0
Approach	3	293	319	615	0.0		0.902		55.4	LOS D	19.8	138.3				
Intersection				2674	0.4		0.902		47.8	LOS D	33.2	235.6				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect
5 Lane underutilisation determined by program


N
RootyHillRdSB
20
20
155.80
FrancisRdEB
80
EasternRdWB
RootyHillRdNB

LANE SUMMARY

Site: Rooty Hill x Francis 2022 +DEV AM [IMP]

Rooty Hill Road / Francis Road
Period: AM
Scenario: 2022 + Development
Signals - Fixed Time Cycle Time = 121 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: RootyHillRdNB																
Lane 1	431	106	0	537	2.0	827	0.649	100	34.1	LOS C	24.3	173.0	335	–	0.0	0.0
Lane 2	0	0	399	399	7.4	425	0.939	100	69.9	LOS E	25.3	188.5	335	–	0.0	0.0
Approach	431	106	399	936	4.3		0.939		49.3	LOS D	25.3	188.5				
East: EasternRdWB																
Lane 1	352	0	0	352	5.5	656	0.536	100	41.0	LOS C	16.3	119.8	500	–	0.0	0.0
Lane 2	0	286	0	286	0.0	309	0.925	100	72.0	LOS F	20.2	141.2	500	–	0.0	0.0
Lane 3	0	0	41	41	0.0	415	0.099	100	27.0	LOS B	1.2	8.6	80	Turn Bay	0.0	0.0
Approach	352	286	41	679	2.9		0.925		53.2	LOS D	20.2	141.2				
North: RootyHillRdSB																
Lane 1	118	0	0	118	0.7	118[1]	1.000[3]	100	45.2[8]	LOS D[8]	4.6[8]	32.6[8]	20	Parking	0.0	50.0
Lane 2	62[0]	134	1	196	2.0	310	0.633	100	51.1	LOS D	11.0	78.1	500	–	0.0	0.0
Approach	180	134	1	315	1.3		1.000		48.9	LOS D	11.0	78.1				
West: FrancisRdEB																
Lane 1	1	399	0	401	0.6	626	0.640	100	37.6	LOS C	20.2	141.8	155	Turn Bay	0.0	0.0
Lane 2	0	241	0	241	0.6	376[1]	0.640	100	34.0	LOS C	10.9	76.9	80	Turn Bay	0.0	1.4
Lane 3	0	0	589	589	1.0	629	0.937	100	65.3	LOS E	38.9	274.5	500	–	0.0	0.0
Approach	1	640	589	1231	0.8		0.937		50.2	LOS D	38.9	274.5				
Intersection				3160	2.3		1.000		50.4	LOS D	38.9	274.5				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

0 Excess flow from back of an adjacent short lane
1 Reduced capacity due to a short lane effect
3 x = 1.00 due to short lane.
8 Delay, queue length and stops for the short lane have been cut down to fit in the queuing space. You may wish to change the short lane to a full lane to investigate the effect on the adjacent lane performance.

LANE SUMMARY

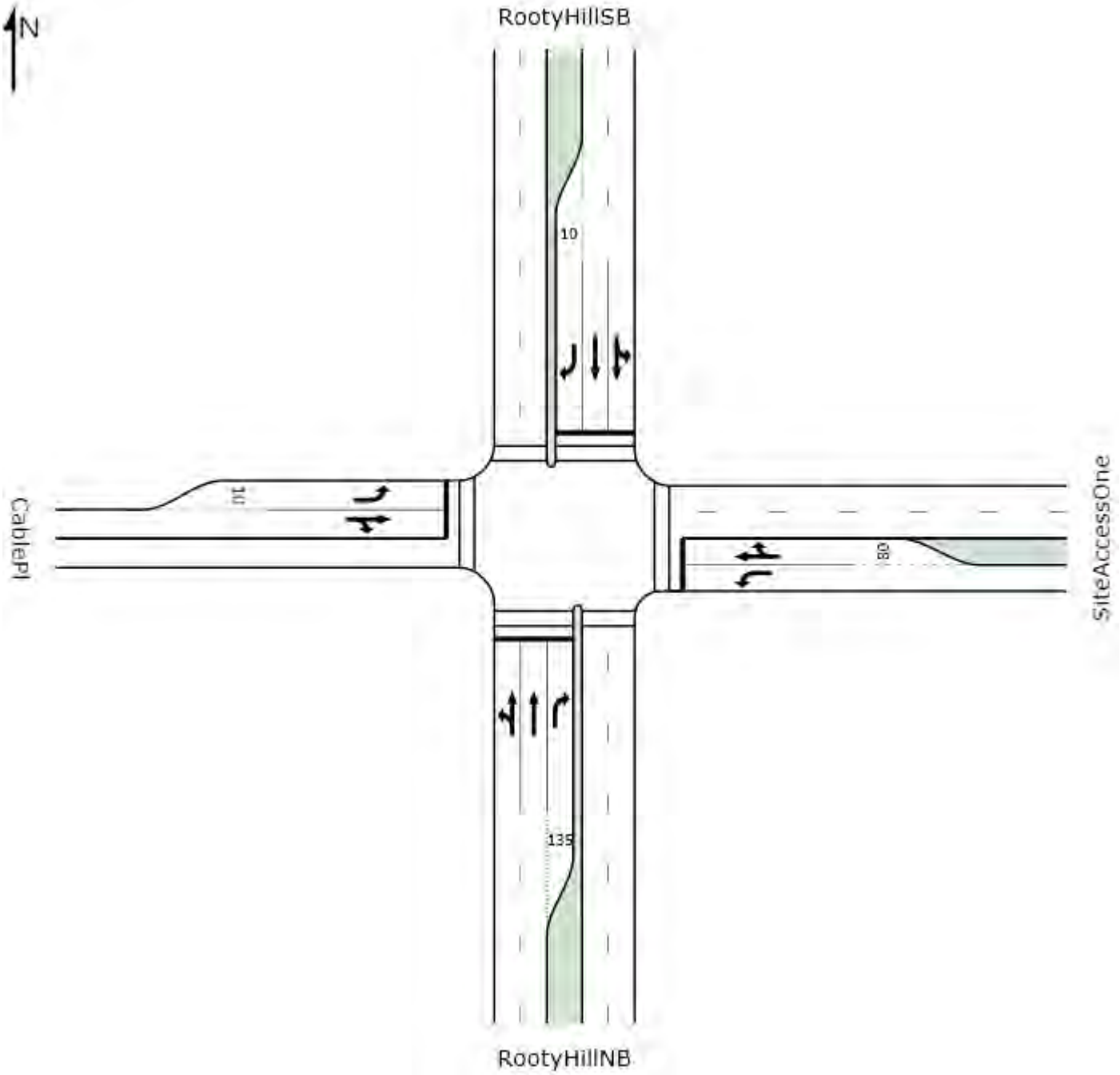
Rooty Hill Road / Francis Road
Period: PM
Scenario: 2022 Existing + Development
Signals - Fixed Time Cycle Time = 115 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: RootyHillRdNB																
Lane 1	567	181	0	748	1.0	832	0.900	100	50.1	LOS D	46.0	324.6	335	–	0.0	2.2
Lane 2	0	0	423	423	0.7	435	0.974	100	77.7	LOS F	27.8	195.9	335	–	0.0	0.0
Approach	567	181	423	1172	0.9		0.974		60.0	LOS E	46.0	324.6				
East: EasternRdWB																
Lane 1	492	0	0	492	0.3	863	0.570	100	32.4	LOS C	20.0	140.2	500	–	0.0	0.0
Lane 2	0	453	0	453	0.3	479	0.945	100	69.8	LOS E	32.1	225.2	500	–	0.0	0.0
Lane 3	0	0	184	184	0.0	483[1]	0.382	100	26.4	LOS B	5.9	41.0	80	Turn Bay	0.0	0.0
Approach	492	453	184	1128	0.3		0.945		46.4	LOS D	32.1	225.2				
North: RootyHillRdSB																
Lane 1	101	0	0	101	0.0	138[1]	0.732	100	40.1	LOS C	4.1	28.6	20	Parking	0.0	37.7
Lane 2	0	146	6	153	1.9	288	0.530	100	49.5	LOS D	8.1	57.4	500	–	0.0	0.0
Approach	101	146	6	254	1.1		0.732		45.8	LOS D	8.1	57.4				
West: FrancisRdEB																
Lane 1	3	183	0	186	0.0	474	0.392	100	39.5	LOS C	8.8	61.4	155	Turn Bay	0.0	0.0
Lane 2	0	140	0	140	0.0	358[1]	0.392	100	38.3	LOS C	6.4	45.0	80	Turn Bay	0.0	0.0
Lane 3	0	0	422	422	0.0	440	0.959	100	73.6	LOS F	27.2	190.2	500	–	0.0	0.0
Approach	3	323	422	748	0.0		0.959		58.5	LOS E	27.2	190.2				
Intersection				3302	0.5		0.974		53.9	LOS D	46.0	324.6				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect


N
RootyHillSB
10
CablePl
11
80
SiteAccessOne
135
RootyHillNB

LANE SUMMARY

Rooty Hill Road / Cable Place / Site Access
Period: AM
Scenario: 2022+ Development
Signals - Fixed Time Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: RootyHillNB																
Lane 1	1	333	0	334	6.2	1383	0.241	100	4.8	LOS A	5.8	42.9	300	–	0.0	0.0
Lane 2	0	334	0	334	6.3	1383	0.241	100	4.8	LOS A	5.8	42.9	300	–	0.0	0.0
Lane 3	0	0	151	151	0.0	333	0.452	100	13.0	LOS A	2.6	18.4	135	Turn Bay	0.0	0.0
Approach	1	666	151	818	5.1		0.452		6.3	LOS A	5.8	42.9				
East: SiteAccessOne																
Lane 1	151	0	0	151	0.0	457	0.329	100	44.2	LOS D	7.2	50.6	500	–	0.0	0.0
Lane 2	0	1	51	52	0.0	235	0.219	100	53.6	LOS D	2.7	19.0	80	Turn Bay	0.0	0.0
Approach	151	1	51	202	0.0		0.329		46.6	LOS D	7.2	50.6				
North: RootyHillSB																
Lane 1	51	502	0	552	2.1	1225	0.451	100	11.4	LOS A	15.7	111.8	500	–	0.0	0.0
Lane 2	0	554	0	554	2.3	1229	0.451	100	11.0	LOS A	15.7	112.4	500	–	0.0	0.0
Lane 3	0	0	1	1	0.0	102[1]	0.010	100	12.2	LOS A	0.0	0.1	10	Turn Bay	0.0	0.0
Approach	51	1056	1	1107	2.2		0.451		11.2	LOS A	15.7	112.4				
West: CablePl																
Lane 1	4	0	0	4	0.0	46[1]	0.092	100	51.0	LOS D	0.2	1.5	10	Turn Bay	0.0	0.0
Lane 2	0	1	4	5	0.0	143	0.037	100	58.4	LOS E	0.3	2.0	70	–	0.0	0.0
Approach	4	1	4	9	0.0		0.092		55.1	LOS D	0.3	2.0				
Intersection				2137	3.1		0.452		12.9	LOS A	15.7	112.4				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect

LANE SUMMARY

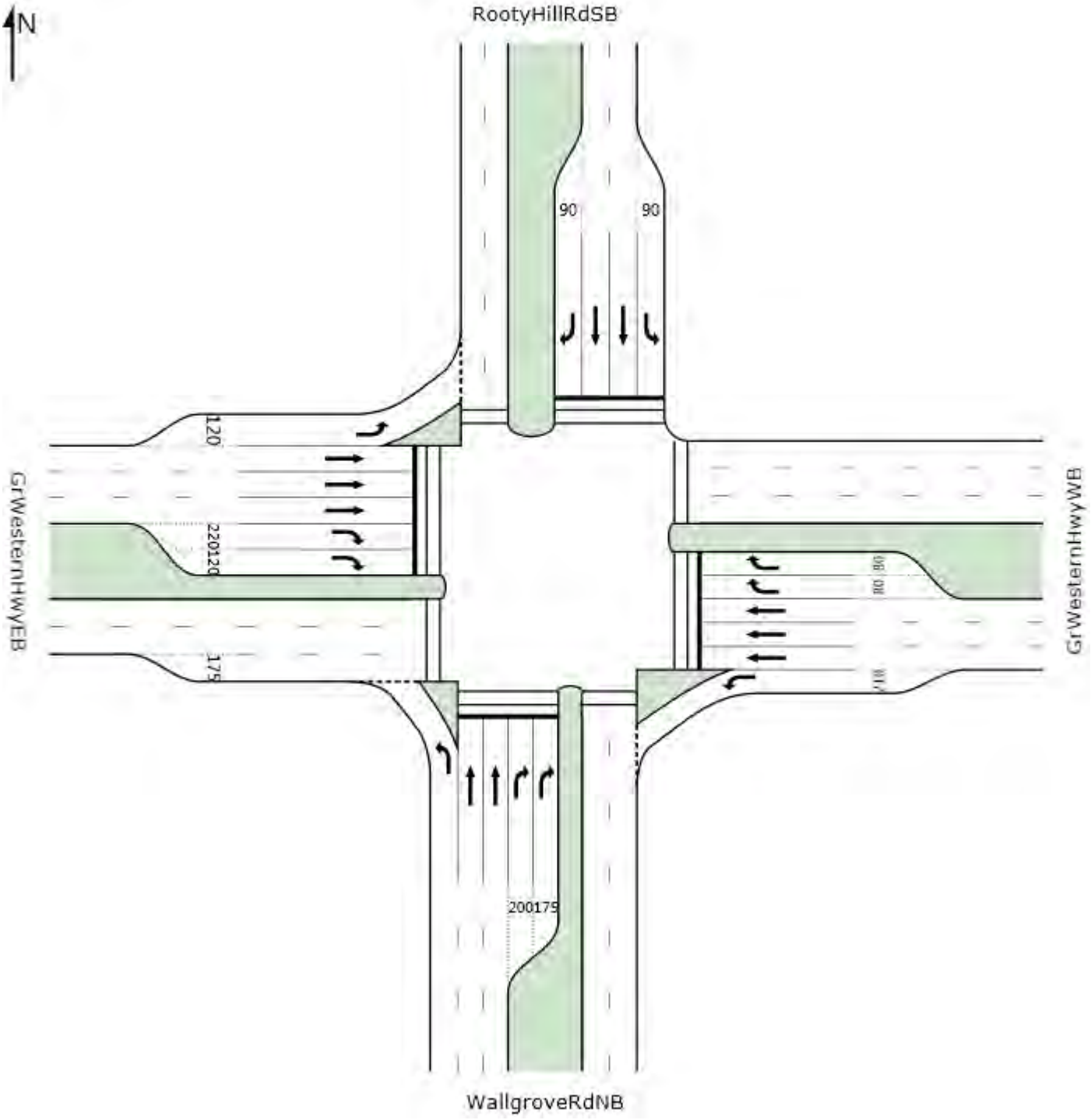
Rooty Hill Road / Cable Place / Site Access
Period: PM
Scenario: 2022+ Development
Signals - Fixed Time Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: RootyHillNB																
Lane 1	4	589	0	593	0.5	1435	0.413	100	5.7	LOS A	12.3	86.4	300	–	0.0	0.0
Lane 2	0	593	0	593	0.5	1435	0.413	100	5.7	LOS A	12.3	86.4	300	–	0.0	0.0
Lane 3	0	0	518	518	0.0	694[1]	0.746	100	28.0	LOS B	17.9	125.0	135	Turn Bay	0.0	0.0
Approach	4	1182	518	1704	0.3		0.746		12.5	LOS A	17.9	125.0				
East: SiteAccessOne																
Lane 1	518	0	0	518	0.0	1005	0.515	100	22.5	LOS B	18.8	131.4	500	–	0.0	0.0
Lane 2	0	1	174	175	0.0	238	0.735	100	60.7	LOS E	10.4	73.0	80	Turn Bay	0.0	0.0
Approach	518	1	174	693	0.0		0.735		32.1	LOS C	18.8	131.4				
North: RootyHillSB																
Lane 1	174	309	0	483	0.4	658	0.734	100	38.3	LOS C	24.7	173.5	500	–	0.0	0.0
Lane 2	0	491	0	491	0.7	669	0.734	100	36.6	LOS C	25.1	176.6	500	–	0.0	0.0
Lane 3	0	0	4	4	0.0	54[1]	0.078	100	32.6	LOS C	0.2	1.2	10	Turn Bay	0.0	0.0
Approach	174	800	4	978	0.6		0.734		37.4	LOS C	25.1	176.6				
West: CablePl																
Lane 1	1	0	0	1	0.0	46[1]	0.023	100	50.6	LOS D	0.1	0.4	10	Turn Bay	0.0	0.0
Lane 2	0	1	1	2	0.0	79	0.027	100	64.3	LOS E	0.1	0.9	70	–	0.0	0.0
Approach	1	1	1	3	0.0		0.027		59.7	LOS E	0.1	0.9				
Intersection				3378	0.3		0.746		23.8	LOS B	25.1	176.6				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect


N
RootyHillRdSB
90
90
120
220120
GrWesternHWYEB
175
GrWesternHwyWB
200179
WallgroveRdNB

LANE SUMMARY

Rooty Hill Road / Great Western Highway
Period: AM
Scenario: 2012 Existing
Signals - Fixed Time Cycle Time = 154 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: WallgroveRdNB																
Lane 1	274	0	0	274	2.7	1406	0.195	100	12.8	LOS A	3.8	27.2	500	–	0.0	0.0
Lane 2	0	267	0	267	6.3	545	0.490	100	49.2	LOS D	16.4	121.3	500	–	0.0	0.0
Lane 3	0	267	0	267	6.3	545	0.490	100	49.2	LOS D	16.4	121.3	500	–	0.0	0.0
Lane 4	0	0	211	211	10.5	257	0.820	100	55.3	LOS D	11.6	88.6	200	Turn Bay	0.0	0.0
Lane 5	0	0	211	211	10.5	257	0.820	100	55.3	LOS D	11.6	88.6	175	Turn Bay	0.0	0.0
Approach	274	534	421	1228	6.9		0.820		43.2	LOS D	16.4	121.3				
East: GrWesternHwyWB																
Lane 1	140	0	0	140	26.3	693[1]	0.202	100	24.0	LOS B	4.3	36.9	210	Turn Bay	0.0	0.0
Lane 2	0	159	0	159	4.7	290	0.546	100	65.3	LOS E	10.8	78.4	245	–	0.0	0.0
Lane 3	0	159	0	159	4.7	290	0.546	100	65.3	LOS E	10.8	78.4	245	–	0.0	0.0
Lane 4	0	159	0	159	4.7	290	0.546	100	65.3	LOS E	10.8	78.4	245	–	0.0	0.0
Lane 5	0	0	25	25	0.0	166	0.152	100	80.7	LOS F	1.8	12.5	80	Turn Bay	0.0	0.0
Lane 6	0	0	25	25	0.0	166	0.152	100	80.7	LOS F	1.8	12.5	80	Turn Bay	0.0	0.0
Approach	140	476	51	666	8.9		0.546		57.8	LOS E	10.8	78.4				
North: RootyHillRdSB																
Lane 1	231	0	0	231	0.0	383[1]	0.602	100	42.5	LOS C	11.5	80.2	90	Turn Bay	0.0	0.0
Lane 2	0	315	0	315	3.2	389	0.811	100	67.4	LOS E	23.8	170.9	500	–	0.0	0.0
Lane 3	0	315	0	315	3.2	389	0.811	100	67.4	LOS E	23.8	170.9	500	–	0.0	0.0
Lane 4	0	0	95	95	1.1	181	0.522	100	82.1	LOS F	7.0	49.2	90	Turn Bay	0.0	0.0
Approach	231	631	95	956	2.2		0.811		62.9	LOS E	23.8	170.9				
West: GrWesternHwyEB																
Lane 1	19	0	0	19	5.6	829[1]	0.023	100	12.3	LOS A	0.2	1.7	120	Turn Bay	0.0	0.0
Lane 2	0	554	0	554	1.6	702	0.789	100	46.6	LOS D	36.7	260.8	500	–	0.0	0.0
Lane 3	0	554	0	554	1.6	702	0.789	100	46.6	LOS D	36.7	260.8	500	–	0.0	0.0
Lane 4	0	554	0	554	1.6	702	0.789	100	46.6	LOS D	36.7	260.8	500	–	0.0	0.0
Lane 5	0	0	389	389	1.5	477	0.815	100	56.5	LOS E	19.6	138.6	220	Turn Bay	0.0	0.0
Lane 6	0	0	389	389	1.5	477	0.815	100	56.5	LOS E	19.6	138.6	120	Turn Bay	0.0	18.1
Approach	19	1662	778	2459	1.6		0.815		49.4	LOS D	36.7	260.8				
Intersection				5309	3.9		0.820		51.5	LOS D	36.7	260.8				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect

LANE SUMMARY

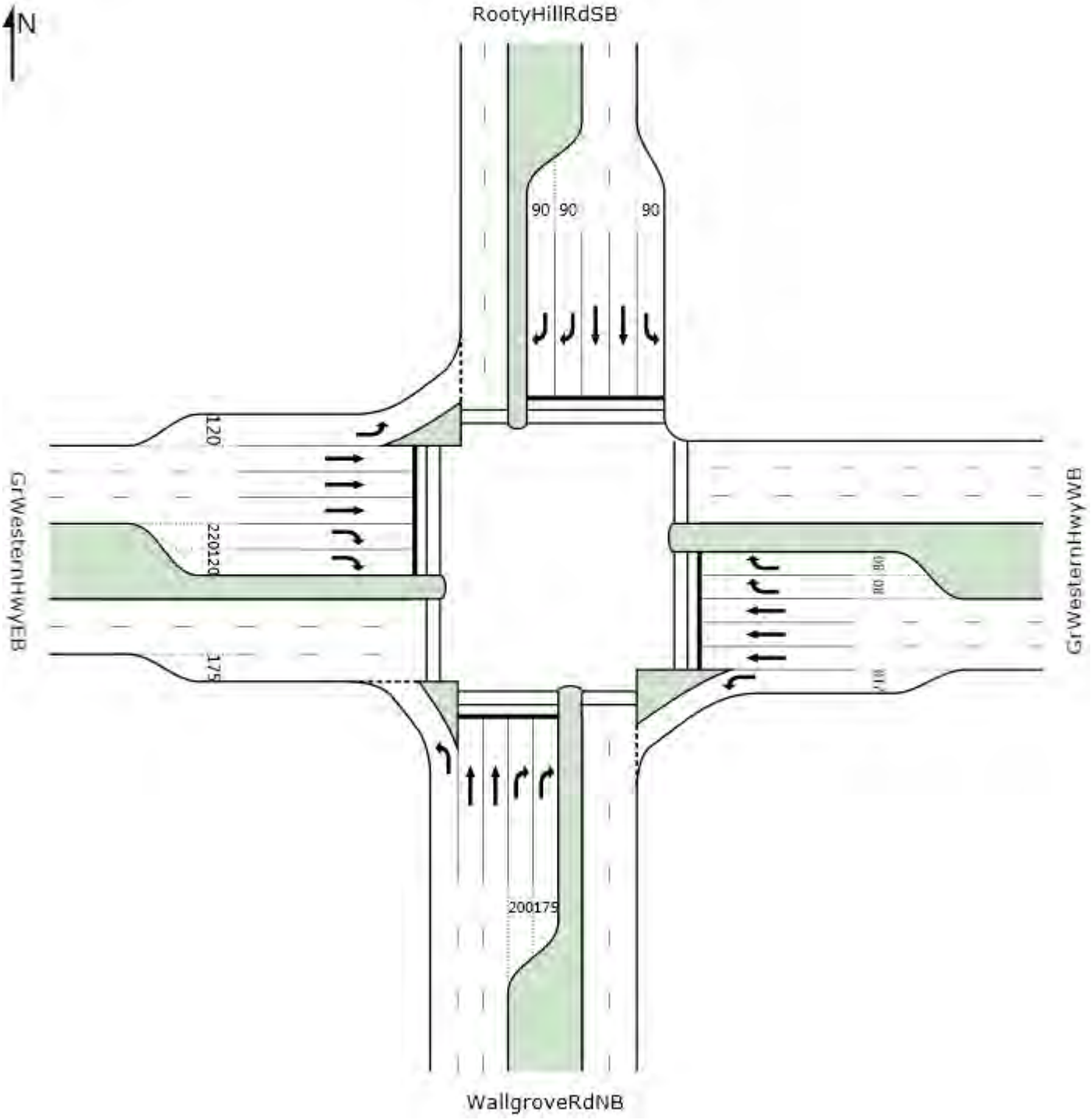
Rooty Hill Road / Great Western Highway
Period: PM
Scenario: 2012 Existing
Signals - Fixed Time Cycle Time = 132 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: WallgroveRdNB																
Lane 1	594	0	0	594	1.6	1039	0.572	100	26.1	LOS B	20.9	148.5	500	–	0.0	0.0
Lane 2	0	371	0	371	0.4	469	0.791	100	54.6	LOS D	23.4	164.3	500	–	0.0	0.0
Lane 3	0	371	0	371	0.4	469	0.791	100	54.6	LOS D	23.4	164.3	500	–	0.0	0.0
Lane 4	0	0	138	138	11.0	208	0.667	100	48.8	LOS D	6.6	50.9	200	Turn Bay	0.0	0.0
Lane 5	0	0	138	138	11.0	208	0.667	100	48.8	LOS D	6.6	50.9	175	Turn Bay	0.0	0.0
Approach	594	742	277	1613	2.7		0.791		43.1	LOS D	23.4	164.3				
East: GrWesternHwyWB																
Lane 1	279	0	0	279	9.4	1100[1]	0.254	100	18.0	LOS B	6.3	47.8	210	Turn Bay	0.0	0.0
Lane 2	0	501	0	501	1.0	679	0.738	100	37.3	LOS C	26.0	183.3	245	–	0.0	0.0
Lane 3	0	501	0	501	1.0	679	0.738	100	37.3	LOS C	26.0	183.3	245	–	0.0	0.0
Lane 4	0	501	0	501	1.0	679	0.738	100	37.3	LOS C	26.0	183.3	245	–	0.0	0.0
Lane 5	0	0	137	137	0.4	262	0.522	100	67.4	LOS E	8.3	58.5	80	Turn Bay	0.0	0.0
Lane 6	0	0	137	137	0.4	262	0.522	100	67.4	LOS E	8.3	58.5	80	Turn Bay	0.0	0.0
Approach	279	1504	274	2057	2.1		0.738		38.7	LOS C	26.0	183.3				
North: RootyHillRdSB																
Lane 1	84	0	0	84	0.0	554	0.152	100	34.9	LOS C	3.3	22.9	90	Turn Bay	0.0	0.0
Lane 2	0	257	0	257	0.8	297	0.867	100	68.3	LOS E	18.1	127.3	500	–	0.0	0.0
Lane 3	0	257	0	257	0.8	297	0.867	100	68.3	LOS E	18.1	127.3	500	–	0.0	0.0
Lane 4	0	0	125	125	0.8	141	0.886	100	86.2	LOS F	9.1	64.3	90	Turn Bay	0.0	0.0
Approach	84	515	125	724	0.7		0.886		67.5	LOS E	18.1	127.3				
West: GrWesternHwyEB																
Lane 1	55	0	0	55	1.9	934[1]	0.059	100	16.2	LOS B	1.1	7.6	120	Turn Bay	0.0	0.0
Lane 2	0	225	0	225	2.2	685	0.329	100	33.0	LOS C	10.5	74.6	500	–	0.0	0.0
Lane 3	0	225	0	225	2.2	685	0.329	100	33.0	LOS C	10.5	74.6	500	–	0.0	0.0
Lane 4	0	225	0	225	2.2	685	0.329	100	33.0	LOS C	10.5	74.6	500	–	0.0	0.0
Lane 5	0	0	233	233	0.9	266	0.878	100	81.1	LOS F	16.7	117.7	220	Turn Bay	0.0	0.0
Lane 6	0	0	233	233	0.9	266	0.878	100	81.1	LOS F	16.7	117.7	120	Turn Bay	0.0	3.3
Approach	55	676	466	1197	1.7		0.878		51.0	LOS D	16.7	117.7				
Intersection				5591	2.0		0.886		46.3	LOS D	26.0	183.3				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect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RootyHillRdSB
90
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GrWesternHWYEB
175
GrWesternHwyWB
200179
WallgroveRdNB

LANE SUMMARY

Rooty Hill Road / Great Western Highway
Period: AM
Scenario: 2022 Existing + Development
Signals - Fixed Time Cycle Time = 131 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: WallgroveRdNB																
Lane 1	302	0	0	302	2.7	1374	0.220	100	12.7	LOS A	3.9	28.2	500	–	0.0	0.0
Lane 2	0	315	0	315	6.6	554	0.568	100	42.9	LOS D	17.0	125.6	500	–	0.0	0.0
Lane 3	0	315	0	315	6.6	554	0.568	100	42.9	LOS D	17.0	125.6	500	–	0.0	0.0
Lane 4	0	0	233	233	10.5	262	0.887	100	81.4	LOS F	16.8	128.2	200	Turn Bay	0.0	0.0
Lane 5	0	0	233	233	10.5	262	0.887	100	81.4	LOS F	16.8	128.2	175	Turn Bay	0.0	0.0
Approach	302	629	465	1397	7.1		0.887		49.2	LOS D	17.0	128.2				
East: GrWesternHwyWB																
Lane 1	155	0	0	155	26.3	746	0.207	100	28.7	LOS C	5.4	46.0	210	Turn Bay	0.0	0.0
Lane 2	0	175	0	175	4.7	355	0.493	100	51.5	LOS D	9.6	70.2	245	–	0.0	0.0
Lane 3	0	175	0	175	4.7	355	0.493	100	51.5	LOS D	9.6	70.2	245	–	0.0	0.0
Lane 4	0	175	0	175	4.7	355	0.493	100	51.5	LOS D	9.6	70.2	245	–	0.0	0.0
Lane 5	0	0	63	63	0.0	98	0.647	100	80.5	LOS F	4.3	29.9	80	Turn Bay	0.0	0.0
Lane 6	0	0	63	63	0.0	98	0.647	100	80.5	LOS F	4.3	29.9	80	Turn Bay	0.0	0.0
Approach	155	525	126	806	8.1		0.647		51.7	LOS D	9.6	70.2				
North: RootyHillRdSB																
Lane 1	325	0	0	325	0.0	587	0.554	100	49.3	LOS D	17.2	120.5	150	Turn Bay	0.0	0.0
Lane 2	0	368	0	368	3.3	412	0.894	100	66.5	LOS E	26.4	189.7	500	–	0.0	0.0
Lane 3	0	368	0	368	3.3	412	0.894	100	66.5	LOS E	26.4	189.7	500	–	0.0	0.0
Lane 4	0	0	72	72	1.3	128	0.565	100	76.1	LOS F	4.7	33.4	90	Turn Bay	0.0	0.0
Lane 5	0	0	72	72	1.3	128	0.565	100	76.1	LOS F	4.7	33.4	90	Turn Bay	0.0	0.0
Approach	325	737	144	1206	2.2		0.894		63.0	LOS E	26.4	189.7				
West: GrWesternHwyEB																
Lane 1	61	0	0	61	8.4	960[1]	0.064	100	13.7	LOS A	0.9	6.7	120	Turn Bay	0.0	0.0
Lane 2	0	612	0	612	1.6	766	0.799	100	38.2	LOS C	34.8	247.2	500	–	0.0	0.0
Lane 3	0	612	0	612	1.6	766	0.799	100	38.2	LOS C	34.8	247.2	500	–	0.0	0.0
Lane 4	0	612	0	612	1.6	766	0.799	100	38.2	LOS C	34.8	247.2	500	–	0.0	0.0
Lane 5	0	0	429	429	1.5	477	0.901	100	74.9	LOS F	31.0	220.0	220	Turn Bay	0.0	5.0
Lane 6	0	0	429	429	1.5	477	0.901	100	74.9	LOS F	31.0	220.0	220	Turn Bay	0.0	5.0
Approach	61	1836	859	2756	1.7		0.901		49.1	LOS D	34.8	247.2				
Intersection				6165	3.9		0.901		52.2	LOS D	34.8	247.2				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect

LANE SUMMARY

Rooty Hill Road / Great Western Highway
Period: AM
Scenario: 2022 Existing + Development
Signals - Fixed Time Cycle Time = 131 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
South: WallgroveRdNB																
Lane 1	656	0	0	656	1.6	1030	0.637	100	30.1	LOS C	22.4	158.6	500	–	0.0	0.0
Lane 2	0	476	0	476	0.4	502	0.947	100	77.5	LOS F	37.8	265.2	500	–	0.0	0.0
Lane 3	0	476	0	476	0.4	502	0.947	100	77.5	LOS F	37.8	265.2	500	–	0.0	0.0
Lane 4	0	0	153	153	11.0	196	0.781	100	76.2	LOS F	10.3	78.7	200	Turn Bay	0.0	0.0
Lane 5	0	0	153	153	11.0	196	0.781	100	76.2	LOS F	10.3	78.7	175	Turn Bay	0.0	0.0
Approach	656	952	306	1914	2.5		0.947		61.0	LOS E	37.8	265.2				
East: GrWesternHwyWB																
Lane 1	308	0	0	308	9.4	975[1]	0.316	100	21.1	LOS B	8.8	66.4	210	Turn Bay	0.0	0.0
Lane 2	0	554	0	554	1.0	626	0.885	100	51.1	LOS D	35.9	253.6	245	–	0.0	8.1
Lane 3	0	554	0	554	1.0	626	0.885	100	51.1	LOS D	35.9	253.6	245	–	0.0	8.1
Lane 4	0	554	0	554	1.0	626	0.885	100	51.1	LOS D	35.9	253.6	245	–	0.0	8.1
Lane 5	0	0	249	249	0.4	417	0.598	100	36.5	LOS C	9.1	64.1	80	Turn Bay	0.0	0.0
Lane 6	0	0	249	249	0.4	417	0.598	100	36.5	LOS C	9.1	64.1	80	Turn Bay	0.0	0.0
Approach	308	1662	499	2469	1.9		0.885		44.4	LOS D	35.9	253.6				
North: RootyHillRdSB																
Lane 1	289	0	0	289	0.0	813[1]	0.356	100	20.1	LOS B	6.7	47.0	150	Turn Bay	0.0	0.0
Lane 2	0	350	0	350	0.8	449	0.780	100	53.7	LOS D	21.8	154.0	500	–	0.0	0.0
Lane 3	0	350	0	350	0.8	449	0.780	100	53.7	LOS D	21.8	154.0	500	–	0.0	0.0
Lane 4	0	0	151	151	0.8	157	0.964	100	100.6	LOS F	12.1	85.6	90	Turn Bay	0.0	0.5
Lane 5	0	0	151	151	0.8	157	0.964	100	100.6	LOS F	12.1	85.6	90	Turn Bay	0.0	0.5
Approach	289	700	302	1292	0.6		0.964		57.1	LOS E	21.8	154.0				
West: GrWesternHwyEB																
Lane 1	224	0	0	224	1.9	623[1]	0.360	100	23.1	LOS B	6.7	47.8	120	Turn Bay	0.0	0.0
Lane 2	0	249	0	249	2.2	382	0.652	100	52.6	LOS D	14.8	105.5	500	–	0.0	0.0
Lane 3	0	249	0	249	2.2	382	0.652	100	52.6	LOS D	14.8	105.5	500	–	0.0	0.0
Lane 4	0	249	0	249	2.2	382	0.652	100	52.6	LOS D	14.8	105.5	500	–	0.0	0.0
Lane 5	0	0	258	258	0.9	268	0.964	100	99.9	LOS F	21.1	148.9	220	Turn Bay	0.0	0.0
Lane 6	0	0	258	258	0.9	268	0.964	100	99.9	LOS F	21.1	148.9	220	Turn Bay	0.0	0.0
Approach	224	746	516	1486	1.7		0.964		64.5	LOS E	21.1	148.9				
Intersection				7161	1.8		0.964		55.3	LOS D	37.8	265.2				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect

LANE SUMMARY

Great Western Highway / M7 On-Ramps
Period: AM
Scenario: 2012 Existing
Signals - Fixed Time Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: GrWesternHwyWB																
Lane 1	0	0	18	18	38.2	109	0.164	100	54.6	LOS D	0.7	6.6	80	–	0.0	0.0
Lane 2	0	0	18	18	38.2	109	0.164	100	54.6	LOS D	0.7	6.6	80	–	0.0	0.0
Approach	0	0	36	36	38.2		0.164		54.6	LOS D	0.7	6.6				
West: GrWesternHwyEB																
Lane 1	111	0	0	111	5.7	1849	0.060	100	11.3	X	X	X	115	Turn Bay	0.0	X
Lane 2	0	745	0	745	2.8	1492	0.499	100	0.9	LOS A	2.7	19.6	120	–	0.0	0.0
Lane 3	0	745	0	745	2.8	1492	0.499	100	0.9	LOS A	2.7	19.6	120	–	0.0	0.0
Lane 4	0	745	0	745	2.8	1492	0.499	100	0.9	LOS A	2.7	19.6	120	–	0.0	0.0
Approach	111	2235	0	2345	2.9		0.499		1.4	LOS A	2.7	19.6				
Intersection				2381	3.5		0.499		2.2	LOS A	2.7	19.6				

X: Not applicable for Continuous lane.

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

SIDRA INTERSECTION

LANE SUMMARY

Great Western Highway / M7 On-Ramps
Period: PM
Scenario: 2012 Existing
Signals - Fixed Time Cycle Time = 128 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: GrWesternHwyWB																
Lane 1	0	0	92	92	9.1	108	0.850	100	86.1	LOS F	6.4	48.5	80	–	0.0	0.0
Lane 2	0	0	92	92	9.1	108	0.850	100	86.1	LOS F	6.4	48.5	80	–	0.0	0.0
Approach	0	0	184	184	9.1		0.850		86.1	LOS F	6.4	48.5				
West: GrWesternHwyEB																
Lane 1	141	0	0	141	4.5	1865	0.076	100	11.3	X	X	X	115	Turn Bay	0.0	X
Lane 2	0	292	0	292	4.3	1609	0.181	100	0.7	LOS A	1.1	7.7	120	–	0.0	0.0
Lane 3	0	292	0	292	4.3	1609	0.181	100	0.7	LOS A	1.1	7.7	120	–	0.0	0.0
Lane 4	0	292	0	292	4.3	1609	0.181	100	0.7	LOS A	1.1	7.7	120	–	0.0	0.0
Approach	141	875	0	1016	4.3		0.181		2.2	LOS A	1.1	7.7				
Intersection				1200	5.1		0.850		15.1	LOS B	6.4	48.5				

X: Not applicable for Continuous lane.

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

SIDRA INTERSECTION

LANE SUMMARY

Great Western Highway / M7 On-Ramps
Period: AM
Scenario: 2022 + Development
Signals - Fixed Time Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: GrWesternHwyWB																
Lane 1	0	0	20	20	38.2	109	0.184	100	54.7	LOS D	0.8	7.4	80	–	0.0	0.0
Lane 2	0	0	20	20	38.2	109	0.184	100	54.7	LOS D	0.8	7.4	80	–	0.0	0.0
Approach	0	0	40	40	38.2		0.184		54.7	LOS D	0.8	7.4				
West: GrWesternHwyEB																
Lane 1	133	0	0	133	6.0	1845	0.072	100	11.3	X	X	X	115	Turn Bay	0.0	X
Lane 2	0	843	0	843	2.9	1491	0.565	100	1.0	LOS A	3.5	25.2	120	–	0.0	0.0
Lane 3	0	843	0	843	2.9	1491	0.565	100	1.0	LOS A	3.5	25.2	120	–	0.0	0.0
Lane 4	0	843	0	843	2.9	1491	0.565	100	1.0	LOS A	3.5	25.2	120	–	0.0	0.0
Approach	133	2528	0	2661	3.0		0.565		1.5	LOS A	3.5	25.2				
Intersection				2701	3.5		0.565		2.3	LOS A	3.5	25.2				

X: Not applicable for Continuous lane.

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

LANE SUMMARY

Great Western Highway / M7 On-Ramps
Period: PM
Scenario: 2022 + Development
Signals - Fixed Time Cycle Time = 120 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: GrWesternHwyWB																
Lane 1	0	0	102	102	9.1	116	0.878	100	83.7	LOS F	6.8	51.3	80	–	0.0	0.0
Lane 2	0	0	102	102	9.1	116	0.878	100	83.7	LOS F	6.8	51.3	80	–	0.0	0.0
Approach	0	0	203	203	9.1		0.878		83.7	LOS F	6.8	51.3				
West: GrWesternHwyEB																
Lane 1	191	0	0	191	4.5	1865	0.102	100	11.3	X	X	X	115	Turn Bay	0.0	X
Lane 2	0	380	0	380	4.3	1589	0.239	100	0.8	LOS A	1.4	10.1	120	–	0.0	0.0
Lane 3	0	380	0	380	4.3	1589	0.239	100	0.8	LOS A	1.4	10.1	120	–	0.0	0.0
Lane 4	0	380	0	380	4.3	1589	0.239	100	0.8	LOS A	1.4	10.1	120	–	0.0	0.0
Approach	191	1139	0	1329	4.3		0.239		2.3	LOS A	1.4	10.1				
Intersection				1533	4.9		0.878		13.1	LOS A	6.8	51.3				

X: Not applicable for Continuous lane.

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

LANE SUMMARY

Great Western Highway / M7 Off-Ramp
Period: AM
Scenario: 2012 Existing
Signals - Fixed Time Cycle Time = 117 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: GrWesternHwyWB																
Lane 1	0	500	0	500	2.7	909[1]	0.551	100	4.1	LOS A	6.7	48.2	75	Turn Bay	0.0	0.0
Lane 2	0	875	0	875	2.7	1589	0.551	100	3.6	LOS A	16.0	114.5	500	–	0.0	0.0
Lane 3	0	875	0	875	2.7	1589	0.551	100	3.6	LOS A	16.0	114.5	500	–	0.0	0.0
Approach	0	2251	0	2251	2.7		0.551		3.7	LOS A	16.0	114.5				
North: M7 Ramps																
Lane 1	75	0	0	75	12.7	132	0.568	100	69.4	LOS E	4.4	34.0	100	Turn Bay	0.0	0.0
Lane 2	75	0	0	75	12.7	132	0.568	100	69.4	LOS E	4.4	34.0	200	Turn Bay	0.0	0.0
Lane 3	0	0	60	60	7.0	137	0.439	77[5]	68.0	LOS E	3.5	25.6	500	–	0.0	0.0
Lane 4	0	0	60	60	7.0	137	0.439	77[5]	68.0	LOS E	3.5	25.6	115	Turn Bay	0.0	0.0
Approach	149	0	120	269	10.2		0.568		68.8	LOS E	4.4	34.0				
West: GrWesternHwyEB																
Lane 1	0	648	0	648	2.8	1571	0.412	82[6]	1.0	LOS A	3.0	21.3	90	–	0.0	0.0
Lane 2	0	793	0	793	2.8	1571	0.505	100	1.1	LOS A	4.3	30.5	90	–	0.0	0.0
Lane 3	0	793	0	793	2.8	1571	0.505	100	1.1	LOS A	4.3	30.5	90	–	0.0	0.0
Approach	0	2235	0	2235	2.8		0.505		1.0	LOS A	4.3	30.5				
Intersection				4755	3.2		0.568		6.2	LOS A	16.0	114.5				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect
5 Lane underutilisation determined by program
6 Lane underutilisation due to downstream effects

LANE SUMMARY

Great Western Highway / M7 Off-Ramp
Period: PM
Scenario: 2012 Existing
Signals - Fixed Time Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: GrWesternHwyWB																
Lane 1	0	524	0	524	2.7	983[1]	0.533	100	3.2	LOS A	6.2	44.1	75	Turn Bay	0.0	0.0
Lane 2	0	863	0	863	2.7	1619	0.533	100	2.8	LOS A	13.4	95.8	500	–	0.0	0.0
Lane 3	0	863	0	863	2.7	1619	0.533	100	2.8	LOS A	13.4	95.8	500	–	0.0	0.0
Approach	0	2251	0	2251	2.7		0.533		2.9	LOS A	13.4	95.8				
North: M7 Ramps																
Lane 1	33	0	0	33	46.2	77	0.425	100	70.8	LOS F	1.9	18.1	100	Turn Bay	0.0	0.0
Lane 2	22	0	13	35	32.9	82	0.425	100	69.8	LOS E	2.0	17.8	200	Turn Bay	0.0	0.0
Lane 3	0	0	40	40	10.1	95	0.425	100	68.0	LOS E	2.3	17.2	500	–	0.0	0.0
Lane 4	0	0	40	40	10.1	95	0.425	100	68.0	LOS E	2.3	17.2	115	Turn Bay	0.0	0.0
Approach	55	0	94	148	23.4		0.425		69.0	LOS E	2.3	18.1				
West: GrWesternHwyEB																
Lane 1	0	254	0	254	4.3	1587	0.160	82[6]	0.6	LOS A	0.8	5.7	90	–	0.0	0.0
Lane 2	0	311	0	311	4.3	1587	0.196	100	0.6	LOS A	1.0	7.2	90	–	0.0	0.0
Lane 3	0	311	0	311	4.3	1587	0.196	100	0.6	LOS A	1.0	7.2	90	–	0.0	0.0
Approach	0	875	0	875	4.3		0.196		0.6	LOS A	1.0	7.2				
Intersection				3274	4.1		0.533		5.3	LOS A	13.4	95.8				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect
6 Lane underutilisation due to downstream effects

LANE SUMMARY

Great Western Highway / M7 Off-Ramp
Period: AM
Scenario: 2022 + Development
Signals - Fixed Time Cycle Time = 122 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: GrWesternHwyWB																
Lane 1	0	174	0	174	2.9	959[1]	0.181	100	1.7	LOS A	1.7	12.3	75	Turn Bay	0.0	0.0
Lane 2	0	296	0	296	2.9	1633	0.181	100	1.8	LOS A	3.1	22.6	500	–	0.0	0.0
Lane 3	0	296	0	296	2.9	1633	0.181	100	1.8	LOS A	3.1	22.6	500	–	0.0	0.0
Approach	0	766	0	766	2.9		0.181		1.8	LOS A	3.1	22.6				
North: M7 Ramps																
Lane 1	83	0	0	83	12.7	98	0.841	100	80.8	LOS F	5.5	42.8	100	Turn Bay	0.0	0.0
Lane 2	83	0	0	83	12.7	98	0.841	100	80.8	LOS F	5.5	42.8	200	Turn Bay	0.0	0.0
Lane 3	0	0	72	72	7.4	102	0.703	84[5]	76.0	LOS F	4.6	34.0	500	–	0.0	0.0
Lane 4	0	0	72	72	7.4	102	0.703	84[5]	76.0	LOS F	4.6	34.0	115	Turn Bay	0.0	0.0
Approach	165	0	143	308	10.2		0.841		78.6	LOS F	5.5	42.8				
West: GrWesternHwyEB																
Lane 1	0	733	0	733	2.9	1616	0.454	82[6]	0.9	LOS A	3.7	26.8	90	–	0.0	0.0
Lane 2	0	898	0	898	2.9	1616	0.555	100	1.1	LOS A	5.5	39.6	90	–	0.0	0.0
Lane 3	0	898	0	898	2.9	1616	0.555	100	1.1	LOS A	5.5	39.6	90	–	0.0	0.0
Approach	0	2528	0	2528	2.9		0.555		1.0	LOS A	5.5	39.6				
Intersection				3603	3.5		0.841		7.8	LOS A	5.5	42.8				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect
5 Lane underutilisation determined by program
6 Lane underutilisation due to downstream effects

LANE SUMMARY

Great Western Highway / M7 Off-Ramp
Period: PM
Scenario: 2022 + Development
Signals - Fixed Time Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

Lane Use and Performance

	Demand Flows L veh/h	T veh/h	R veh/h	Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Lane Length m	SL Type	Cap. Adj. %	Prob. Block. %
East: GrWesternHwyWB																
Lane 1	0	619	0	619	2.7	982[1]	0.630	100	4.1	LOS A	7.8	55.8	75	Turn Bay	0.0	0.0
Lane 2	0	1020	0	1020	2.7	1620	0.630	100	3.3	LOS A	18.5	132.7	500	–	0.0	0.0
Lane 3	0	1020	0	1020	2.7	1620	0.630	100	3.3	LOS A	18.5	132.7	500	–	0.0	0.0
Approach	0	2659	0	2659	2.7		0.630		3.5	LOS A	18.5	132.7				
North: M7 Ramps																
Lane 1	43	0	0	43	46.2	77	0.559	100	71.7	LOS F	2.5	24.2	100	Turn Bay	0.0	0.0
Lane 2	17	0	32	49	22.7	88	0.559	100	69.9	LOS E	2.8	23.4	200	Turn Bay	0.0	0.0
Lane 3	0	0	53	53	9.9	95	0.559	100	68.9	LOS E	3.0	22.9	500	–	0.0	0.0
Lane 4	0	0	53	53	9.9	95	0.559	100	68.9	LOS E	3.0	22.9	115	Turn Bay	0.0	0.0
Approach	60	0	138	198	20.9		0.559		69.8	LOS E	3.0	24.2				
West: GrWesternHwyEB																
Lane 1	0	330	0	330	4.3	1587	0.208	82[6]	0.7	LOS A	1.1	7.8	90	–	0.0	0.0
Lane 2	0	404	0	404	4.3	1587	0.255	100	0.7	LOS A	1.4	10.1	90	–	0.0	0.0
Lane 3	0	404	0	404	4.3	1587	0.255	100	0.7	LOS A	1.4	10.1	90	–	0.0	0.0
Approach	0	1139	0	1139	4.3		0.255		0.7	LOS A	1.4	10.1				
Intersection				3996	4.0		0.630		6.0	LOS A	18.5	132.7				

Level of Service (LOS) Method: Delay (RTA NSW).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model used.

1 Reduced capacity due to a short lane effect
6 Lane underutilisation due to downstream effects

Appendix C

Eastern Creek Business Hub, Indicative Development Plan

architectus™

Architecture
Urban Design
Planning
Interior Architecture

LEGEND

- Superlot Boundary
- Indicative subdivison
- Indicative bld. footprint
- Indicative parking layout
- Open Space/ CPW
- Preferred location for playground
- Stormwater Strategy
- Remnant vegetation to be retained
- Gas pipeline
- Buffer to Gas pipeline (Belmore Road)
- Parking Access

1 - LARGE FORMAT RETAILER *(w/ undercroft parking)*
2 - VILLAGE CENTRE *(CONVENIENCE RETAIL)*
3 - BULK LIQUOR OUTLET *(CONVENIENCE RETAIL)*
4 - ADVENTURE OUTDOOR/CAMPING CENTRE *(BULKY GOODS)*
5 - BULKY GOODS
6 - GARDEN CENTRE *(BULKY GOODS)*
7 - SELF STORAGE *(BULKY GOODS)*
(location of uses and areas indicative only)

AREA BREAKDOWN

(all areas are GFA)

Phase 1
(south of Beggs Road easement)

Bulky Goods - **10,000qm**
Large Format Retail - **14,000sqm**
Convenience Retail - **9,500sqm**

Phase 2
(north of Beggs St easement)

Bulky Goods - **19,300sqm**

EASTERN CREEK BUSINESS HUB - WESTERN SYDNEY PARKLANDS

DATE	21st August, 2012	PREPARED FOR	Western Sydney Parklands Trust	PREFERRED INDICATIVE PLAN	SCALE 1:3000 @ A3	DRAWING NO. EIS-05(D)