Traffic Impact Assessment

Light Horse Interchange Business Hub, Eastern Creek
State Significant Development Application (SSD 9667)

Ref: 0541r03v2
24/05/19

Info@asongroup.com.au | +61 02 9083 6601 | Suite 5.02, Level 5, 1 Castlereagh Street, Sydney, NSW 2000

Document Control

Project No: 0541

Project: Light Horse Interchange Business Hub – 165 Wallgrove Road and 475 Ferrers Road, Eastern Creek

Client: Western Sydney Parklands Trust

File Reference: 0541r03v2 SSD TIA_Light Horse Interchange Business Hub; 165 Wallgrove Rd & 475 Ferrers Rd, Eastern Creek

Revision History

Revision	Date	Details	Author	Approved by
	04/12/18	Draft	S. Hasan	A. Reisch
1	20/03/19	Issue I	S. Hasan	T. Lewis
2	24/05/19	Issue II	S. Hasan	T. Lewis

Table of Contents

Appendices

1 Introduction

1.1 Overview

Ason Group has been engaged by Western Sydney Parklands Trust (WSPT) to prepare a Traffic Impact Assessment (TIA) regarding a State Significant Development Application (SSDA) for the development of the Light Horse Interchange Business Hub (LIBH), Eastern Creek (the Site). The SSDA generally provides for the following:

- A Masterplan for the staged development of the LIBH, including: -
  - Development of a regional warehousing and distribution hub with 24 hours/day, 7 days/week operation, with a total yield of 165,500m^2 of gross floor area (GFA) that includes 157,600m^2 of warehouse space and 7,900m^2 of ancillary office space;
  - Indicative site/lot layout, site access, internal road network, site levels, drainage, building envelopes, parking and landscaping;
  - Development controls; and
  - Biodiversity offsets.
- In the context of this TIA, the SSDA also provides for: -
  - Site access connection to Ferrers Road, and in turn access north to the Great Western Highway (GWH) and south to The Horsley Drive. The existing access to Wallgrove Road will be retained (and improved) for use by emergency vehicles only;
  - In conjunction with broader upgrades to the local road network, localised upgrades along the key access routes to / from the Site;
  - Site road and access intersection design profiles which provide for the largest heavy vehicles accessing the Site; and
  - A sustainable level of on-site parking provision.

Full details of the Masterplan are provided in the Environmental Impact Statement (EIS) to which this TIA accompanies. Department of Planning & Environment (DPE) issued Secretary's Environmental Assessment Requirements (SEARs) regarding the LIBH proposal on 7th November 2018; a copy of which are included in **Appendix A**. The SEARs include a number of "*Traffic and Transport*" requirements as outlined in **Table 1** of **Section 1.3**, including a summary response to each SEAR and reference to the section of this TIA that provides more detailed steps / explanation / analysis of each SEAR.

1.2 Site & Location

The Site has a total area of approximately 29.5 hectares (ha) development and is legally known as Part of Lot 10 in DP 1061237 and Part of Lot 5 in DP 804051, with a formal address of 165 Wallgrove Road and 475 Ferrers Road, Eastern Creek. The Site is bordered by the M4 Western Motorway to the north; a SUEZ recycling centre to the south; Eastern Creek Raceway to the east; and the M7 Westlink Motorway to the west. The Site is shown in its local context in **Figure 1**.

The Site is located within the Blacktown City Council (Council) Local Government Area (LGA) and is zoned as WSP (Western Sydney Parklands) by the Council's Local Environmental Plan (BCC LEP). It is subject to State Environmental Planning Policy - Western Sydney Parklands - 2009 (SEPP-WSP) and Western Sydney Parklands - Plan of Management - 2030 (POM).

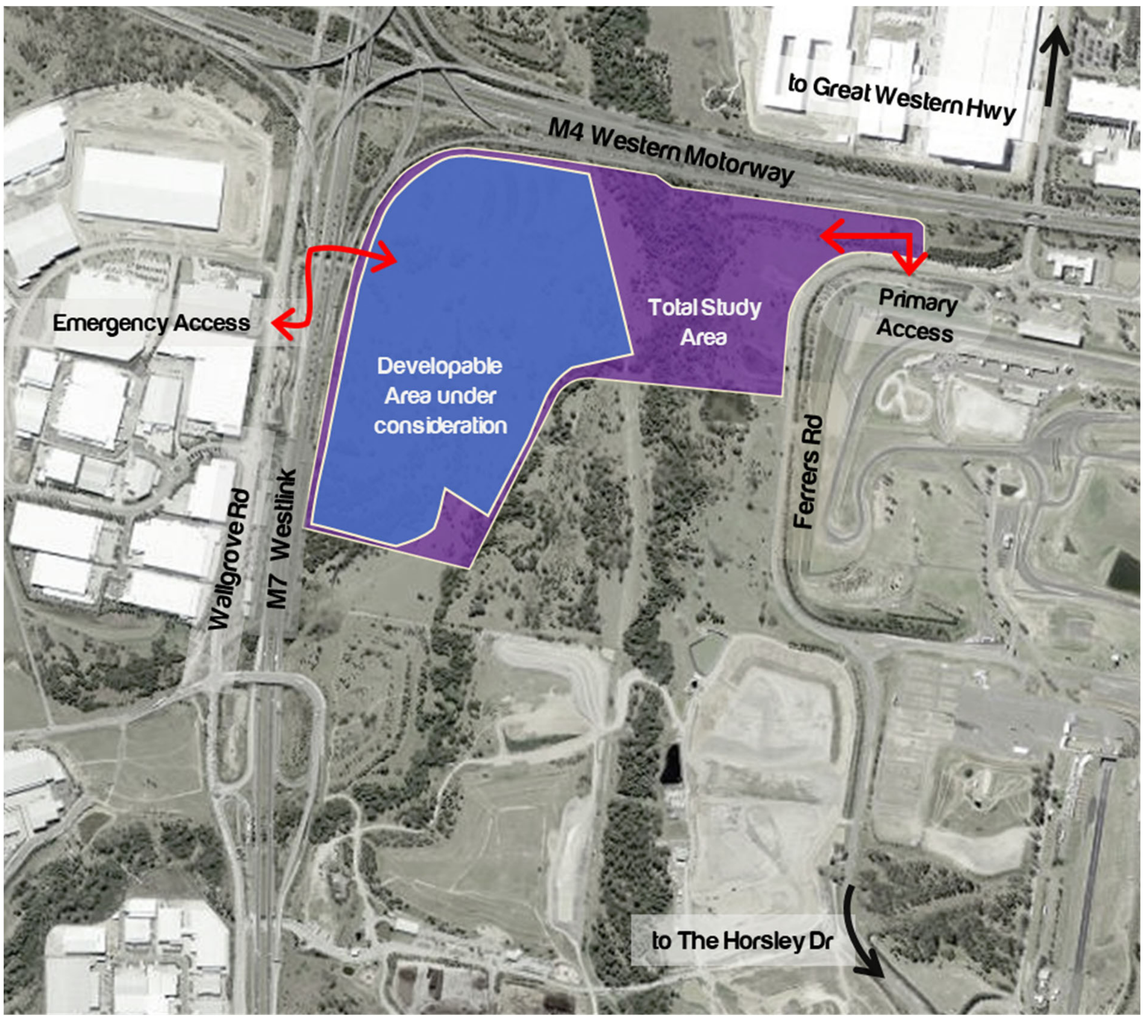


Figure 1: Site Location - Light Horse Interchange Business Hub

1.3 Secretary's Environmental Assessment Requirements

Secretary's Environmental Assessment Requirements (SEARs) were issued by the Department of Planning & Environment (DPE) on 7th November 2018 in regard to the LIBH proposal. The SEARs outline the key areas for consideration in any subsequent development application (i.e. in the SSDA) with specific requirements relating to the assessment of potential traffic and transport impacts.

The SEARs specifically relating to the traffic and transport characteristics of the Masterplan are outlined in **Table 1** below, noting that **Table 1** also provides a summary response to each SEAR, and reference to the section of this TIA providing a more detailed analysis of each SEAR.

Table 1: Secretary's Environmental Assessment Requirements - General

Source	SEARs	Summary Response	TIA Section
DP&E: Traffic and Transport	A quantitative Traffic Impact Assessment prepared in accordance with relevant Blacktown City Council, Austroads and Roads and Maritime Services guidelines	Austroads, Councils DCP and RMS Guide were reviewed to identify appropriate traffic generation as well as parking provisions. Quantitative analysis was carried out to predict traffic distribution as well as the potential impact of development traffic.	3.4 4.1 to 4.3 5.1 to 5.7
DP&E: Traffic and Transport	Details of all daily and peak traffic and transport movements likely to be generated by the development including the impact on the nearby intersections and the need/associated funding for the upgrading or road improvements works (if required)	Trip generation rates were based on RMS and Ason Group surveys of like developments, while trip distribution references available Journey to Work data. Sidra modelling was then undertaken to identify the impact of development traffic. This modelling determined that in addition to currently committed RMS upgrades within the local road network, an additional upgrade is required at the Great Western Highway / Brabham Drive / Doonside Road intersection to appropriately accommodate Base 2036 traffic flows as well as Base 2036 + Development traffic flows.	5.1 to 5.7
DP&E: Traffic and Transport	Impacts on the safety and capacity of the surrounding road network and access points, using SIDRA or similar modelling, to assess impacts from current traffic counts and cumulative traffic from existing and proposed development	As stated, Sidra modelling was undertaken to identify the impact of development traffic. This modelling determined that in addition to currently committed RMS upgrades within the local road network, an additional upgrade is required at the Great Western Highway / Brabham Drive / Doonside Road intersection to appropriately accommodate Base 2036 traffic flows as well as Base 2036 + Development traffic flows.	3.4 4.1 to 4.3 5.1 to 5.7
DP&E: Traffic and Transport	Demonstrate that sufficient pedestrian and cyclist facilities have been provided for the development	The Site enjoys excellent access to the Western Sydney Parklands existing and proposed bicycle network. Accordingly, pedestrian / cyclists shared paths have been proposed to connect to Wallgrove Road (3.5 metres wide concrete footpath) and Ferrers Road (2.5 metres wide concrete footpath), along with an internal pedestrian path along eastern side of the access road (1.2 metres wide concrete footpath).	2.5
DP&E: Traffic and Transport	Details and a justification of access to, from and within the site (vehicular and pedestrian)	Primary vehicle access to the Site will be provided to Ferrers Road, while emergency vehicle access will be provided from Wallgrove Road. Access for pedestrians (and cyclists) will be provided from Wallgrove Road and Ferrers Road.	2.2 2.3 2.5
DP&E: Traffic and Transport	Details of road upgrades, new roads or access points required for the development, if necessary	To facilitate access, a new roundabout is proposed linking the Site to Ferrers Road. An additional upgrade is proposed at the intersection of Great Western Highway / Brabham Drive / Doonside Road to accommodate both Base 2036 traffic flows and Base 2036 + Development traffic flows.	2.2 5.6
Council: Traffic matters	Parking rates for the development should be provided in accordance with Blacktown Council's Development Control Plan for the area	Council's DCP parking rates have been referenced in the assessment; however, it has been determined that an appropriate and sustainable level of parking provision is provided with reference to RMS Guide parking rates, which also reflect numerous Ason Group surveys of similar industrial sites.	6.1

Source	SEARs	Summary Response	TIA Section
RMS	Daily and peak traffic movements likely to be generated by the development including the impact on the nearby intersections and the need/associated funding for the upgrading or road improvements works (if required). The key intersections to be examined / modelled include: - Wallgrove Road / Site Access; - The Horsley Drive / Ferrers Road; - Great Western Highway / Brabham Drive	As stated, trip generation rates were based on RMS and Ason Group surveys of like developments, while trip distribution references available Journey to Work data. Sidra modelling was then undertaken to identify the impact of development traffic. This modelling determined that the RMS planned upgrades at The Horsley Drive / Ferrers Road intersection would perform at a satisfactory level with 2036 Base + Development traffic. However, additional upgrade is required at the Great Western Highway / Brabham Drive / Doonside Road intersection to appropriately accommodate 2036 Background traffic flows (as well as 2036 Base + Development traffic). The Wallgrove Road access is an existing access intended for use by emergency vehicles only and therefore not materially impacted by the development. As such, the proposal does not trigger a need for changes to the intersection.	5.1 to 5.7
RMS	Details of the proposed accesses and the parking provisions associated with the proposed development including compliance with the requirements of the relevant Australian Standards (i.e.: turn paths, sight distance requirements, aisle widths, etc) and relevant parking codes. Swept path plans need to be provided.	Swept path analysis of all critical movements at proposed Ferrers Road roundabout as well as internal access roads have been undertaken to confirm compliance with relevant standards. Relevant swept path diagrams are provided in civil engineering report, provided separately to this report. It is expected that a Condition of Consent would be imposed requiring compliance with AS 2890.1 and AS 2890.2 prior to the issue of a Construction Certificate. In this regard, swept path analysis for individual building hardstands (paved area for heavy vehicle parking) will be undertaken during future stages to accompany the design development of built forms on each lot.	2.2 to 2.4
RMS	Details of service vehicle movements (including vehicle type and likely arrival and departure times)	The details of service vehicle movements to and from the Site is unknown at this stage; however, the assessment provides for some 28% of traffic movements to be heavy vehicle movements, which is in line with the heavy vehicle percentages determined by the RMS at similar industrial sites.	5.1.3
RMS	Assess the implications of the proposed development for non-car travel modes (including public transport use, walking and cycling); the potential for implementing a location-specific sustainable travel plan, and the provision of facilities to increase the non-car mode share for travel to and from the site. This will entail an assessment of the accessibility of the development site by public transport	The JTW data suggests that no employees currently travel to work in the local area by either public or active transport, with the predominant mode of choice being private vehicle, which is consistent with on-site observations. Notwithstanding, there is excellent potential for future public transport routes to service the Site, as well as future pedestrian and cycle connections to Ferrers Road and M7 Cycleway.	2.5 3.2
Transport for NSW	Details of all daily and peak traffic and transport movements likely to be generated (light and heavy vehicle, public transport, pedestrian and cycle trips) during construction and operation of the development	As stated, trip generation rates were based on RMS and Ason Group surveys of like developments, while trip distribution references available Journey to Work data. An assessment of construction traffic impacts has not been undertaken at this time as the details of the construction task are no currently available. It is expected that a detailed Construction Traffic Management Plan would be provided in future development applications.	5.1 5.2

Source	SEARs	Summary Response	TIA Section
Transport for NSW	Details of the current daily and peak hour vehicle, public transport, pedestrian and bicycle movements and existing traffic and transport facilities provided on the road network located adjacent to the proposed development	This assessment provides analysis of existing and future road network operations; and existing and future public and active transport services/infrastructure.	3.1 3.2 3.3
Transport for NSW	An assessment of the operation of existing and future transport networks including public transport, pedestrian and bicycle provisions and their ability to accommodate the forecast number of trips to and from the development	As stated, this assessment provides analysis and existing and future public and active transport services/infrastructure.	3.4 4.3 5.5 to 5.7
Transport for NSW	Details the type of heavy vehicles likely to be used (e.g. B-doubles) during the operation of the development and the impacts of heavy vehicles on nearby intersections	The percentage of heavy vehicles in the future traffic generation of the Site has been specifically identified with reference to RMS surveys and included in the SIDRA modelling of key intersections. From a design perspective, it is expected that the maximum vehicle accessing the Site would be B-Doubles and, as such, the future design of all access roads would appropriately consider such vehicles.	2.3 5.1.3 5.5 to 5.7
Transport for NSW	Details of access to, from and within the site to/from the local road and strategic (motorway) network including intersection location, design and sight distance (i.e. turning lanes, swept paths, sight distance requirements)	As stated, to facilitate access, a new roundabout is proposed linking the Site to Ferrers Road. Both access points comply with the sight distance requirements recommended in Austroads Guide to Road Design.	2.2 2.3
Transport for NSW	Impact of the proposed development on existing and future public transport and walking and cycling infrastructure within and surrounding the site	The Site enjoys excellent access to the Western Sydney Parklands existing and proposed bicycle network. Accordingly, Pedestrian / cyclists shared paths have been proposed to connect to Wallgrove Road (3.5 metres wide concrete footpath) and Ferrers Road (2.5 metres wide concrete footpath), along with an internal pedestrian path along eastern side of Access road (1.2 metres wide concrete footpath).	2.5 3.2
Transport for NSW	An assessment of the existing and future performance of key intersections providing access to the site (Site access with Wallgrove Road, Ferrers Road with Brabham Drive – subject to likely access routes to/from the motorway network), and any upgrades (road/intersections) required as a result of the development	As stated, Sidra modelling was undertaken to identify the impact of development traffic. This modelling determined that in addition to currently committed RMS upgrades within the local road network, an additional upgrade is required at the Great Western Highway / Brabham Drive / Doonside Road intersection to appropriately accommodate Base 2036 traffic flows as well as Base 2036 + Development traffic flows.	3.4 4.3 5.5 to 5.7
Transport for NSW	An assessment of predicted impacts on road safety and the capacity of the road network to accommodate the development	Both access points comply with the sight distance requirements recommended in Austroads Guide to Road Design. As stated, Sidra modelling was undertaken to identify the impact of development traffic and the capacity of the road network to accommodate the traffic.	3.4 4.3 5.5 to 5.7
Transport for NSW	Demonstrate the measures to be implemented to encourage employees of the development to make sustainable travel choices, including walking, cycling, public transport and car sharing	The Site enjoys excellent access to the Western Sydney Parklands existing and proposed bicycle network. It is anticipated that potential future development along Ferrers Road will increase the potential for new public transport (bus) routes servicing the Site, which would include new pedestrian/cycle infrastructure in Ferrers Road.	2.5 3.2

Source	SEARs	Summary Response	TIA Section
Transport for NSW	Appropriate provision, design and location of on-site bicycle parking, and how bicycle provision will be integrated with the existing bicycle network	Details of the on-site bicycle parking design is currently unavailable and therefore no such assessment could be undertaken. It is expected that Conditions of Consent provided for future development applications within the LIBH will necessarily require compliance with the appropriate Australian Standards and other guidelines.	
Transport for NSW	Details of proposed number of car parking spaces and compliance with appropriate parking codes and justify the level of car parking provided on the site	Details of the on-site car parking design is currently unavailable and therefore no such assessment could be undertaken. It is expected that Conditions of Consent provided for future DA within the LIBH will necessarily require compliance with the appropriate Australian Standards and other guidelines.	
Transport for NSW	Details of access and parking arrangements for emergency vehicles	Details of the on-site access and car parking design is currently unavailable and therefore no such assessment could be undertaken. It is expected that Conditions of Consent provided for future development applications within the LIBH will necessarily require compliance with the appropriate Australian Standards and other guidelines.	
Transport for NSW	Detailed plans of the proposed layouts of the internal road network and parking provision on-site in accordance with the relevant Australian standards	The main estate road is as per the Council's guidelines. It is expected that Conditions of Consent provided for future development applications within the LIBH will necessarily require compliance with the appropriate Australian Standards and other guidelines.	
Transport for NSW	The existing and proposed pedestrian and bicycle routes and end of trip facilities within the vicinity of and surrounding the site and to public transport facilities as well as measures to maintain road and personal safety in line with CPTED principles	The Site enjoys excellent access to the Western Sydney Parklands existing and proposed bicycle network. Accordingly, Pedestrian / cyclists shared paths have been proposed to connect to Wallgrove Road (3.5 metres wide concrete footpath) and Ferrers Road (2.5 metres wide concrete footpath), along with an internal pedestrian path along eastern side of Access road (1.2 metres wide concrete footpath).	2.5 3.2
Transport for NSW	Preparation of a draft Construction Traffic Management Plan which includes: • details of vehicle routes, number of trucks, hours of operation, access management and traffic control measures for all stages of construction, • assessment of cumulative impacts associated with other construction activities, • an assessment of road safety at key intersections, • details of anticipated peak hour and daily truck movements to and from the site' • details of access arrangements for workers to/from the site, emergency vehicles and service vehicles movements, • details of temporary cycling and pedestrian access during constructions, • as assessment of traffic and transport impacts during construction and how these impacts will be mitigated for any associated traffic, pedestrians, cyclists and public transport operations	An assessment of construction traffic impacts has not been undertaken at this time as the details of the construction task are no currently available. It is expected that a detailed Construction Traffic Management Plan would be provided in future development applications.	

Source	SEARs	Summary Response	TIA Section
Transport for NSW	The EIS should detail how the proposed development will be consistent and align with the objectives, goals and directions of the following: • Greater Sydney Region Plan; • Western Sydney District Plan; • Future Transport Strategy 2056; • Future Transport- Greater Sydney Services and Infrastructure Plan • NSW Freight & Ports Plan 2018-2023	All these strategic planning documents have been carefully reviewed and their alignment to the proposed plans were taken into consideration. It was assumed that these planning documents are in line with RMS strategic model of 2036, which was the basis of predicting future background traffic for this TIA.	4.1 4.2

1.4 Traffic Impact Assessment Objectives & Methodology

The key objectives of this TIA are to:

- Provide an appropriate response to the SEARs;
- Establish that the development of the Site in accordance with the Masterplan is compliant and consistent with the relevant Council planning guidelines;
- Establish that the trip generation of the Site can be appropriately accommodated by the local and sub-regional network, with due consideration of committed (by others) upgrades to several key intersections providing access for the Site;
- Demonstrate that proposed Site access driveways, car parks and service facilities can be designed to provide full compliance with the relevant Australian Standards; and
- Demonstrate that there is an appropriate and sustainable allocation of car parking across the Site.

To achieve these objectives, this TIA provides an assessment of the existing and future operation of the road network servicing the LIBH, as well as other traffic and transport related issues including car parking requirements, vehicle access, and public and active transport accessibility.

The following key tasks have been undertaken in the preparation of this TIA:

- A review of the existing and proposed future road network providing access to the regional road network.
- The quantification of existing and future traffic flows in key roads and at key intersections providing access for the LIBH, including the commission and review of peak period traffic surveys.
- An assessment of the traffic generation and distribution characteristics of the proposed LIBH, and the potential impact of those additional traffic flows on nearby key roads and intersections.
- An assessment of internal access, parking and servicing provisions with reference to the appropriate Australian Standards.

1.5 Traffic Impact Assessment Reference Documents

This TIA specifically references the most recent assessments of key infrastructure projects within the sub-regional network providing for the Site, such as

- Aecom, *Eastern Creek Resource Energy and Business Precinct – Flood, Traffic and Access Study*, November 2013 (TAS 2013)

This TIA also references general access, traffic, and parking guidelines, including:

- RMS Guide to Traffic Generating Developments (RMS Guide)
- RMS Guide to Traffic Generating Development Updated Traffic Surveys (RMS Guide Update)
- Austroads Guide to Road Design Part 3: Road Geometry (Austroads GRD3)
- Austroads Guide to Road Design Part: 4A Unsignalised and Signalised Intersections (Austroads GRD4A)
- Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis (Austroads GTM3)
- Australian Standard 2890.1: Parking Facilities – Off Street Car Parking (AS 2890.1)
- Australian Standard 2890.2: Parking Facilities – Off Street Commercial Vehicle Facilities (AS 2890.2)
- Australian Standard 2890.6: Parking Facilities – Off Street Parking for People with Disabilities (AS 2890.6)

1.6 Traffic Impact Assessment Structure

This TIA is structured as follows:

- Section 1 summarises the proposal and its objectives, strategic context, reference standards / guidelines as well as responses to SEARs;
- Section 2 provides an overview of the proposed LIBH Masterplan, including provision of site access and circulation for motor vehicles as well as pedestrians and cyclists;
- Section 3 describes existing local traffic and transport conditions including public transport;
- Section 4 establishes the future background traffic forecast as well as planned upgrades;
- Section 5 summarises the assumptions adopted to determine projected trip generation and distribution for LIBH traffic and assesses the potential impacts introducing those additional trips onto the surrounding network;
- Section 6 outlines the parking requirements applicable to the LIBH, and recommended parking provisions;
- Section 7 provides a summary of the key conclusions.

2 The Light Horse Business Hub Masterplan

2.1 Overview

As stated, a detailed description of the Masterplan is provided in the SEE which this TIA accompanies. In summary, the broader SSDA provides for the following:

- Approximately 157,600m^2 GFA of warehouse space and 7,900m^2 GFA of ancillary office space;
- Site access connections to Ferrers Road (primary access) and Wallgrove Road (emergency);
- In conjunction with broader upgrades to the local road network, localised upgrades along the key access routes to/from the Site;
- Design profiles of Site road and access intersections which provide for the largest heavy vehicles accessing the Site; and
- A sustainable level of on-site parking provision.

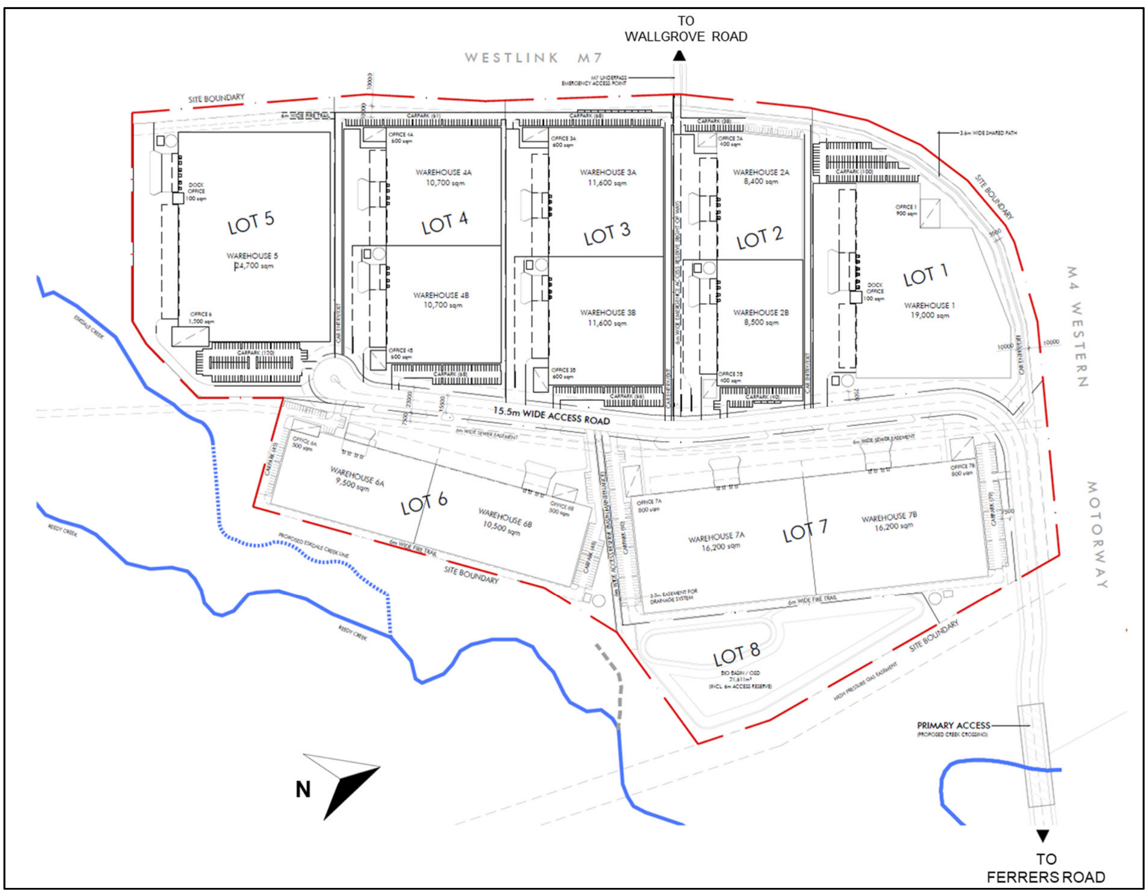


Figure 2: Light Horse Interchange Business Hub Masterplan

2.2 Site Access for Motor Vehicles

Access to the LIBH will be provided through two connection points:

- Primary Access: via Ferrers Road, providing a new roundabout intersection to approximately 200 metres west of the existing (roundabout) intersection of Ferrers Road / Brabham Drive / Peter Brock Drive. This new roundabout would provide primary access for all vehicles. This access road has been termed "LIBH Access" for ease of reference.
- Emergency Access: via Wallgrove Road for emergency vehicles only. In this regard, the existing private road that runs eastbound from Wallgrove Road through M7 underpass is proposed to be extended to connect with LIBH Access.

The design of Ferrers Road roundabout will necessarily consider meeting the requirements of:

- Lane capacity, as determined by SIDRA modelling; and
- Turning path requirements of the largest heavy vehicles permitted to access the Site, expected to be B-Doubles.

It is noted that Ferrers Road north of the intersection with LIBH Access is already approved for heavy vehicles up to and including 26m B-Doubles, while south of Austral Bricks Site, Ferrers Road is approved for 25m B-Doubles travelling southbound only.

The Emergency Access road shall be constructed to achieve a minimum carriageway width of 6 metres to comply with NSW Fire & Rescue *Guidelines for Emergency Vehicle* Access (Policy No. 4) and other relevant emergency service access requirements.

2.3 Internal Access & Circulation for Motor Vehicles

From its intersection with Ferrers Road, the LIBH Access will run west and then south through the centre of the LIBH.

LIBH Access will be constructed in accordance with the road profiles of Blacktown City Council's Development Control Plan (BCC DCP), comprising of a 15.5 metres wide carriageway for its full length to enable two-way traffic and on-street parking (though on-street parking demand is expected to be minimal). Swept path analysis of all critical movements at proposed Ferrers Road roundabout as well as internal access roads have been undertaken to confirm compliance with relevant standards, noting that it is expected that a Condition of Consent would be imposed requiring compliance with AS 2890.1 and AS 2890.2 prior to the issue of a Construction Certificate. All swept path diagrams are provided in Civil Engineering Report.

Proposed vehicular access and circulation within the Site are shown in **Figure 3**.

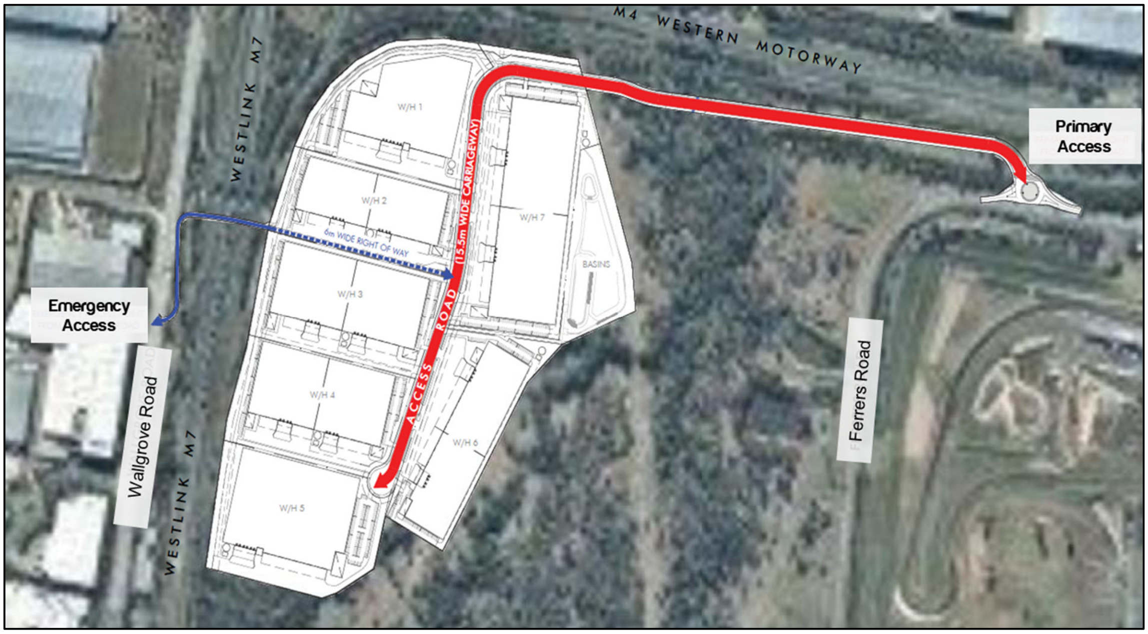


Figure 3: Vehicle Access and Circulation

2.4 Built Form

All car park and loading area access will be provided from LIBH Access via industrial driveways that will be constructed to provide full compliance with the appropriate Australian Standards; specifically AS 2890.1 and AS 2890.2. Swept path analysis for individual hardstand (paved area for heavy vehicle parking) will be undertaken during future stages to accompany the design development of that future built form on each lot, at that time.

2.5 Pedestrian and Cyclist Access

The Westlink M7 Shared Path runs parallel to the Westlink M7 directly west of the Site. While there is currently no immediate access to the Shared Path in this location, the opportunity exists to provide a shared path connection via the (currently closed) access road under the Westlink M7.

From Ferrers Road, cycle access is also available to the extensive off-road cycle network to the east of the Site (the Prospect Loop) linking to key sub-regional centres as well as public transport interchanges. Paired with the provision of appropriate on-site cycle facilities, such as bicycle storage, lockers and shower facilities, the Site is well located to generate cycle trips.

Accordingly, the following onsite Pedestrian and Cyclists facilities have been provided with this SSDA:

- Pedestrian / Cyclists shared path from Wallgrove Road (3.5 metres wide concrete footpath);
- Pedestrian / Cyclists shared path from Ferrers Road (2.5 metres wide concrete footpath); and
- Internal Pedestrian path along eastern side of LIBH Access (1.2 metres wide concrete footpath).

The proposed Pedestrian / cyclists facilities are summarised in **Figure 4**.

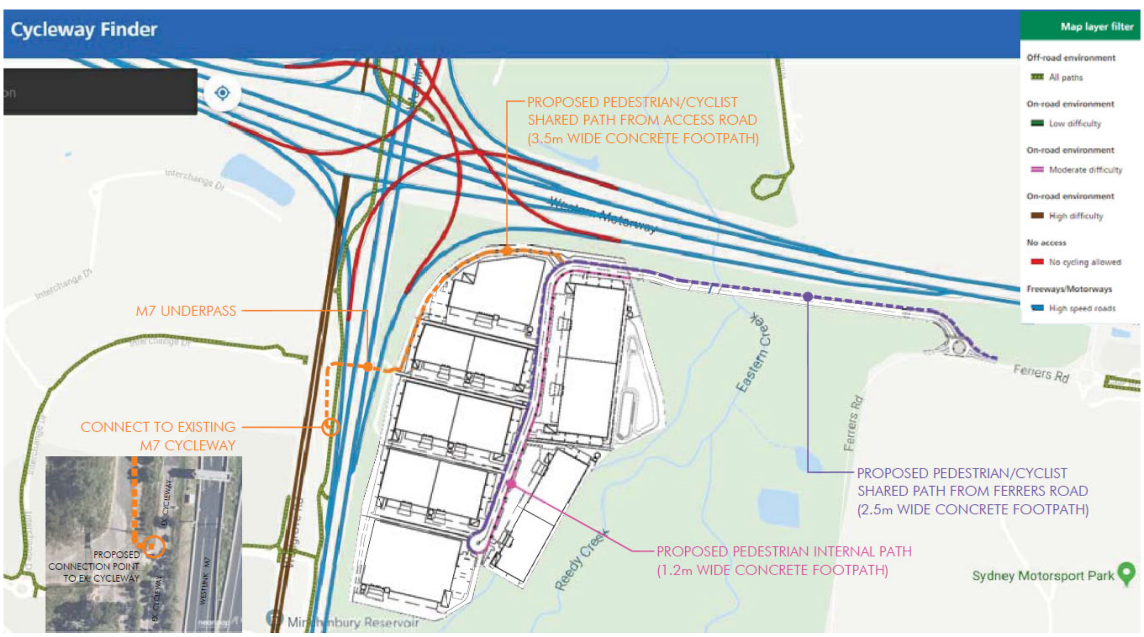


Figure 4: Proposed Pedestrian and Cyclist Facilities

3 Existing Conditions

3.1 Existing Road Network

The existing road network in the vicinity of the LIBH is shown in **Figure 5**, and key roads and intersections are further detailed below.

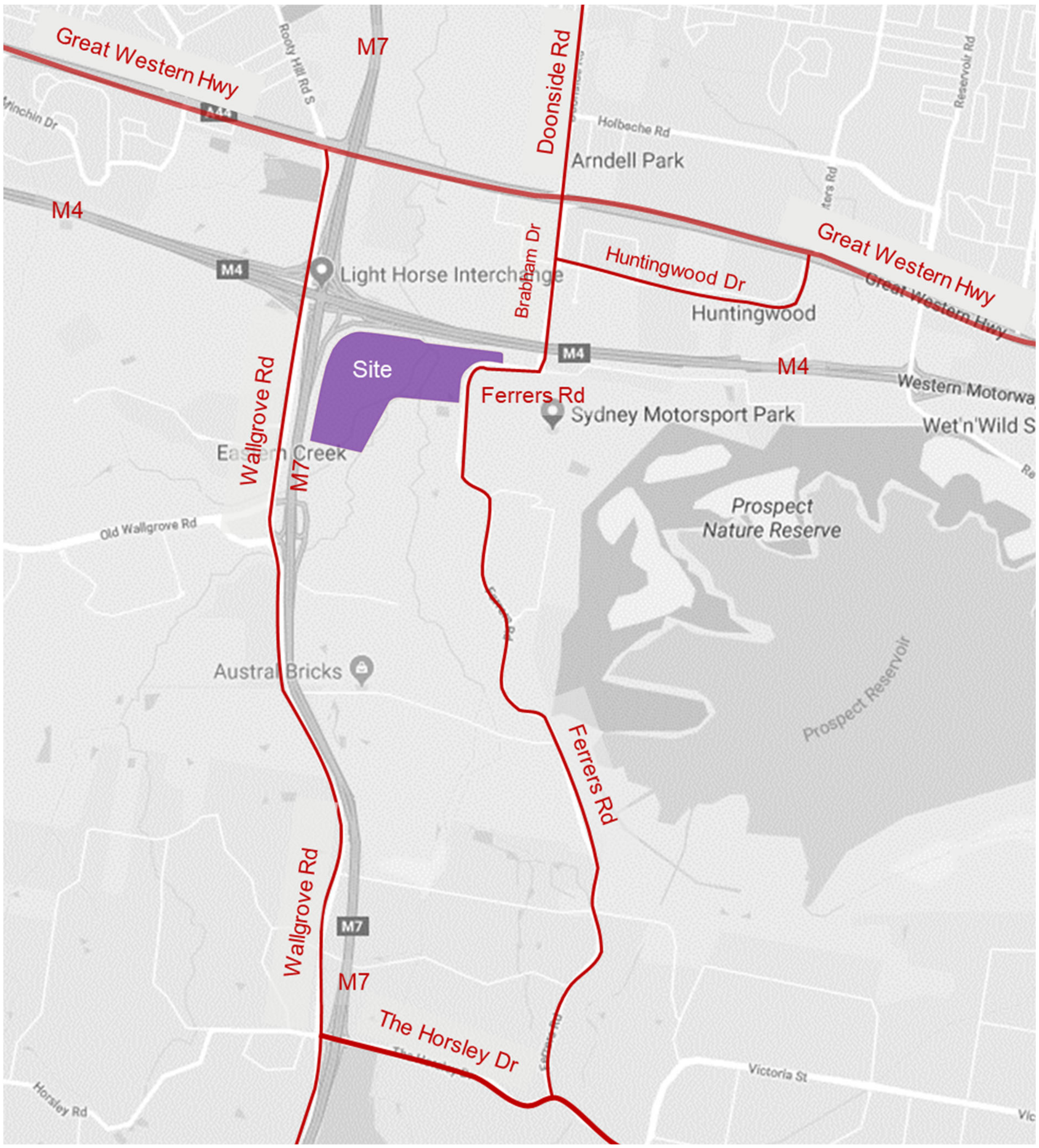


Figure 5: Existing Road Network

3.1.1 M4 Motorway

The M4 Motorway is a high capacity road link of national significance and the primary east-west connection to Western Sydney. The M4 Motorway provides a key western link between the inner west of Sydney to the M7 Motorway and the Blue Mountains. Near the Site, the M4 Motorway carries six traffic lanes within a divided carriageway and provides a major interchange with the M7 Motorway. The speed limit on the M4 Motorway is 110 km/h, and it carries approximately 100,000 vehicles per day (vpd).

3.1.2 M7 Western Motorway

The M7 Motorway is a high capacity road link of national significance and was built to accommodate future traffic growth in Western Sydney. The M7 Motorway provides a key western link between the M2 Motorway (to the north) and the M5 Motorway (to the south). Near the Site, the M7 Motorway has four traffic lanes within a divided carriageway and has a major interchange with the Great Western Highway (and as described with the M4 Motorway). Additional connections to the M7 are provided from Wallgrove Road at its intersections with Old Wallgrove Road and Mini Link Road. The speed limit on the M7 Motorway is 100 km/h, and it carries approximately 70,000 vpd.

3.1.3 Great Western Highway

The Great Western Highway (GWH) is a high capacity road link that runs parallel to the M4 Western Motorway and provides a key link between Penrith and Parramatta. In the vicinity of the Site, the GWH has four traffic lanes within a divided carriageway and on/off ramps to the M7 Westlink Motorway to the west of the Site. The speed limit on the GWH is 80 km/h, and it carries approximately 40,000 vpd.

3.1.4 Doonside Road

Doonside Road is an arterial road to the north of the Site that runs generally north-south from its intersection with Great Western Highway in the south to Bungarribee Road in the north. Near the Site, Doonside Road provides four traffic lanes within a divided carriageway. The speed limit on Doonside Road is 70 km/h, and it carries approximately 25,000 vpd.

3.1.5 Wallgrove Road

Wallgrove Road is an arterial road that runs parallel to the M7 motorway, connecting Great Western Highway at its northern end and Elizabeth Drive at its southern end. Near the site, Wallgrove Road has four traffic lanes and on/off ramps to the M4 motorway. Wallgrove Road also provides connectivity with eastern suburbs via The Horsley Drive and western areas via Old Wallgrove Road. The posted speed is 70km/h.

3.1.6 Ferrers Road

Ferrers Road is a regional road that runs in a north-south direction between Brabham Drive to the north of the Site to The Horsley Drive to the south of the Site. Ferrers Road provides a single traffic lane in each direction, and has a posted speed limit of 60m/h.

3.1.7 Huntingwood Drive

Huntingwood Drive is a local (industrial) road that generally runs east-west between Brabham Drive and the Great Western Highway. Huntingwood Drive provides a single traffic lane in each direction and has a posted speed limit of 50km/h.

3.1.8 Brabham Drive

Brabham Drive is a local (industrial) road that runs north-south between Ferrers Road in the south and the GWH in the north (where is provides the southern approach to the intersection of GWH & Doonside Road). Brabham Drive provides a single wide traffic lane in each direction, and has a posted speed limit of 50km/h.

3.1.9 The Horsley Drive

The Horsley Drive is an arterial road that runs east-west near the intersection with Ferrers Road and provides two lanes in each direction. It provides key link between Eastern Creek and Hume Highway near Fairfield. The posted speed is 60km/h and it carries approximately 40,000 vpd.

3.2 Public Transport

3.2.1 Mode Share – Journey to Work Data

The online open data hub of Transport for New South Wales (TfNSW) provides Journey to Work (JTW) data, which is derived from the 5-yearly Census of Population and Housing conducted by the Australian Bureau of Statistics (ABS). It includes data on trips related to employment as well as mode of travel to work. JTW data for the travel zone containing the Site is presented in **Figure 6**, noting that in summary the following mode share is reported:

- Vehicle (Driver and Passenger): 94%;
- Public and Active Transport: 0%; and
- Mode not stated: 6%.

The high dependence on private vehicle trips is consistent with our observations and can be largely attributed to the relatively isolated location of the area, as well as a lack of public and active transport infrastructure in the area.

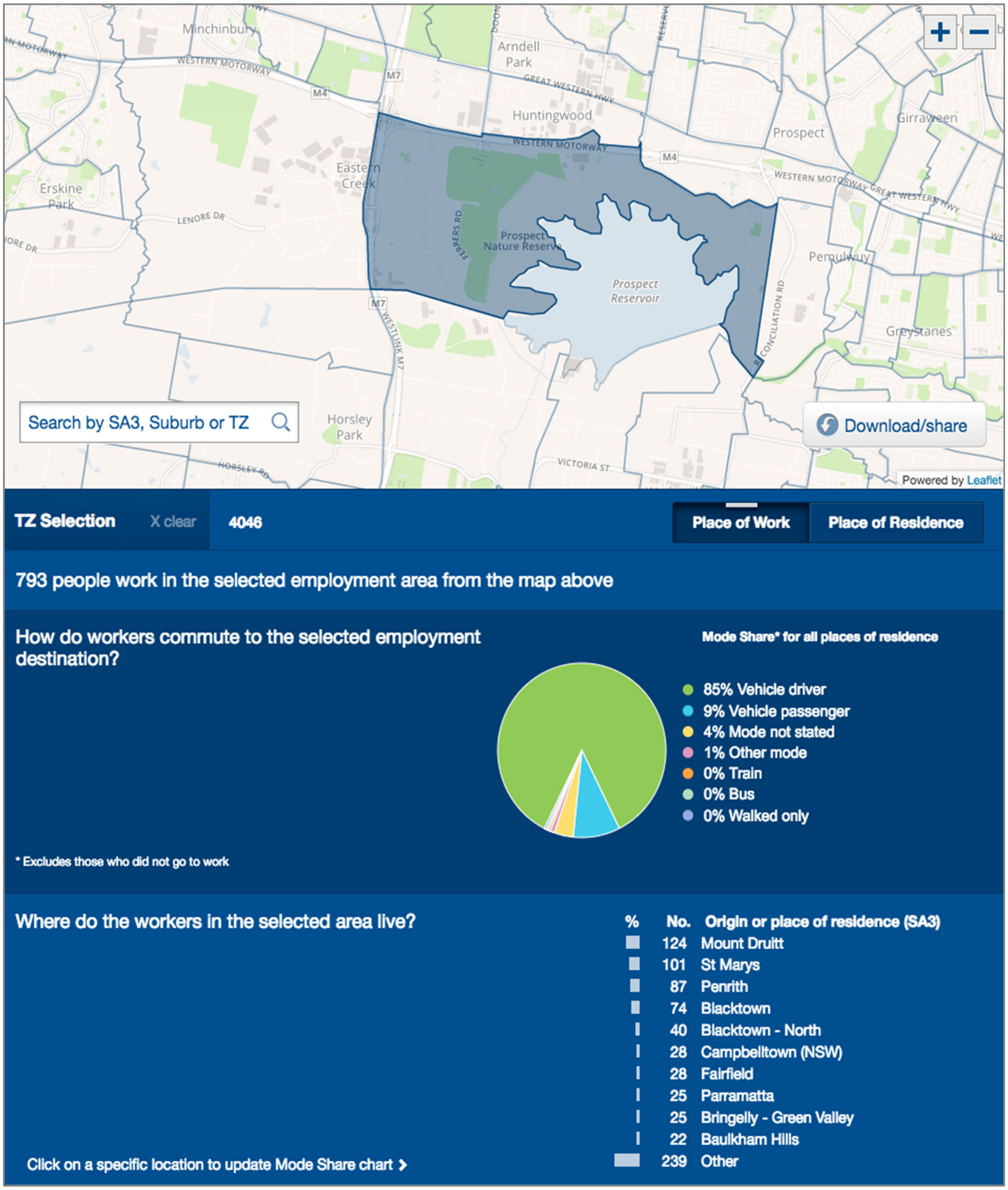


Figure 6: Journey to Work Data for the Subject Site

3.2.2 Bus Services

Busways bus services operate along Wallgrove Road to the west of the Site, and include the following routes:

- Route 738 Mount Druitt to Eastern Creek via Rooty Hill
- Route 723 Blacktown to Mount Druitt via Eastern Creek Business Park

Busways also operates services through the local industrial precinct to the north of the Site, including the following routes:

- Route 723 Blacktown to Mount Druitt via Huntingwood Drive and Brabham Drive
- Route 724 Blacktown loop service via Peter Brock Drive

These bus services operate approximately once every 30 minutes through the broader AM and PM peak periods.

It must be acknowledged that the walk distance between the Site and bus stops along these routes is outside of the 800m walk distance, which is generally considered an acceptable walk distance as part of a trip to work. While the bus stops in Wallgrove Road are nearer the Site, there is no pedestrian infrastructure on the eastern side of Wallgrove Road, nor any potential to provide an appropriate pedestrian crossing in this vicinity by which to reach the northbound bus stop on the western side of Wallgrove Road.

In addition, if the general trip profile of industrial workers is considered – including work shifts often outside of public transport peak periods and the daily use of private vehicles (for work) – there is little potential for public transport to attract any significant work trips in the short term.

Conversely, in the medium to long term there are good opportunities to provide additional bus services linking to the LIBH. The most obvious route would be along Ferrers Road itself, potentially extending north to Mount Druitt or Blacktown, and south to Fairfield or Liverpool. The viability of such a future route would specifically depend upon further development along the Ferrers Road corridor (particularly to the south near Horsley Drive), noting that the available north-south routes to the east (Cumberland Highway) and west (Wallgrove Road) provide the more efficient sub-regional routes at this time.

3.3 Existing Traffic Flows

3.3.1 Traffic Survey Locations

Traffic surveys were undertaken by Matrix Traffic & Transport Surveys in November 2017 at the key intersections north and south of the Site, including:

- Great Western Highway / Huntingwood Road;
- Great Western Highway / Brabham Drive / Doonside Road;
- Brabham Drive / Huntingwood Drive;
- Brabham Drive / Ferrers Road / Peter Brock Drive; and
- Ferrers Road / The Horsley Drive.

The traffic survey data is provided in **Appendix B.**

3.4 Intersection Performance – Existing Conditions

Performance of the key intersections were assessed using SIDRA Intersection modelling.

It is noted that during Site visits undertaken by Ason Group through AM and PM peak periods, it was observed that queues at the key intersections detailed above did not "spill back" to any upstream intersections. As such, SIDRA modelling was carried out on isolated intersections.

SIDRA assessment of "Existing Conditions" refers to analysis of the surveyed peak hour traffic at each intersection under existing road geometries.

SIDRA Modelling outputs provide various performance parameters. The key parameters are:

- Average Vehicle Delay (AVD) – The AVD (or average delay per vehicle in seconds) for intersections provides a measure of the operational performance of an intersection and is used to determine an intersection's Level of Service. For signalised intersections, the AVD reported relates to the average of all vehicle movements through the intersection. For priority (Give Way, Stop & Roundabout controlled) intersections, the AVD reported is that for the movement with the highest AVD.
- Level of Service (LoS) – This is a comparative measure that provides an indication of the operating performance, based on AVD.

Table 2 provides a baseline for LoS assessment as recommended by the RMS Guide to Traffic Generating Developments.

Table 2: RMS Level of Service Summary

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 & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

SIDRA layouts for these intersections are presented in the figures below.

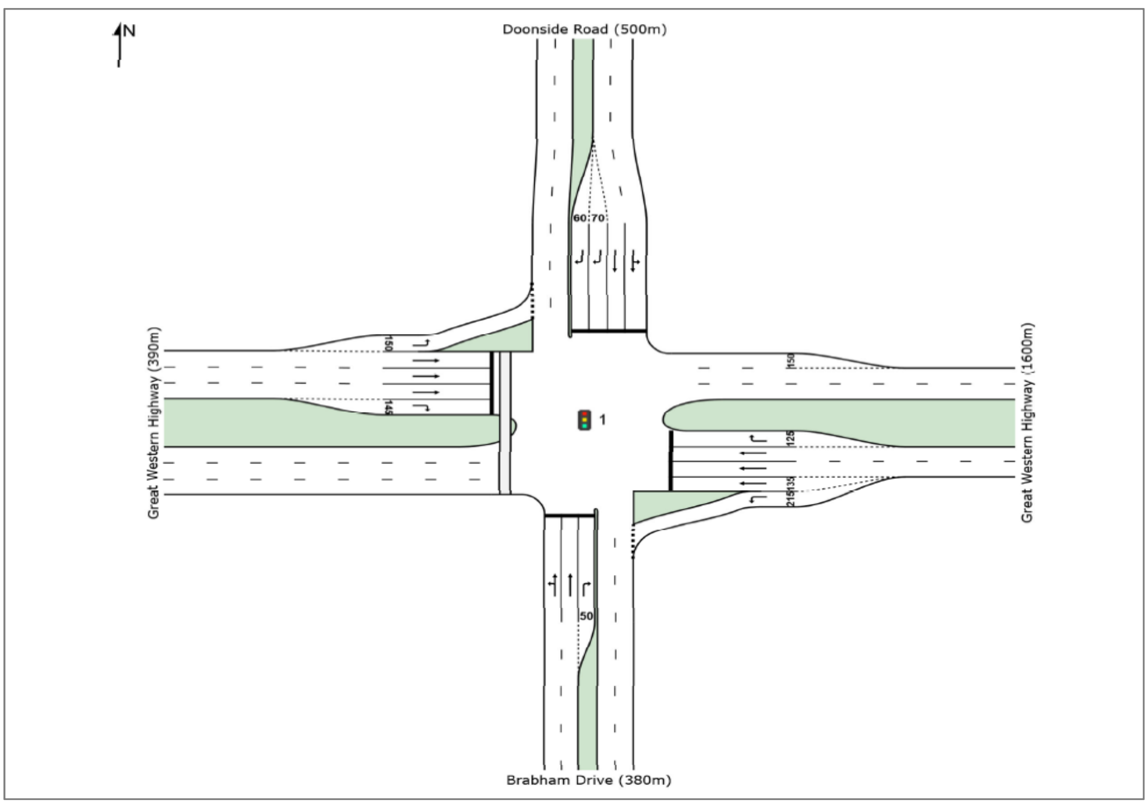


Figure 7: GWH / Brabham Drive / Doonside Road – Existing Layout

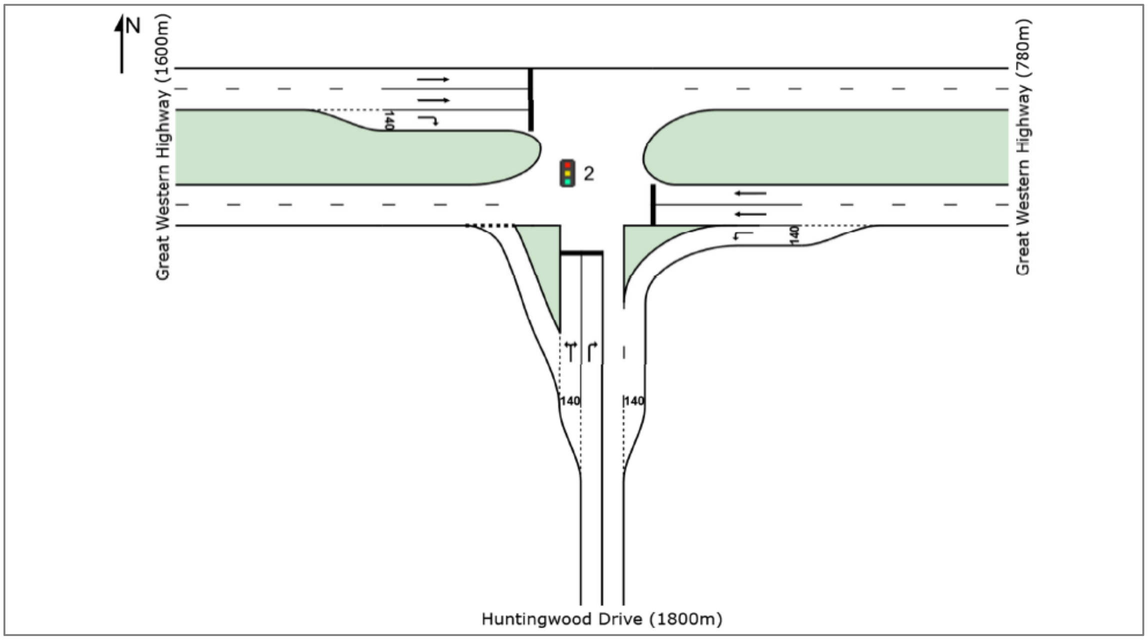


Figure 8: GWH / Huntingwood Drive – Existing Layout

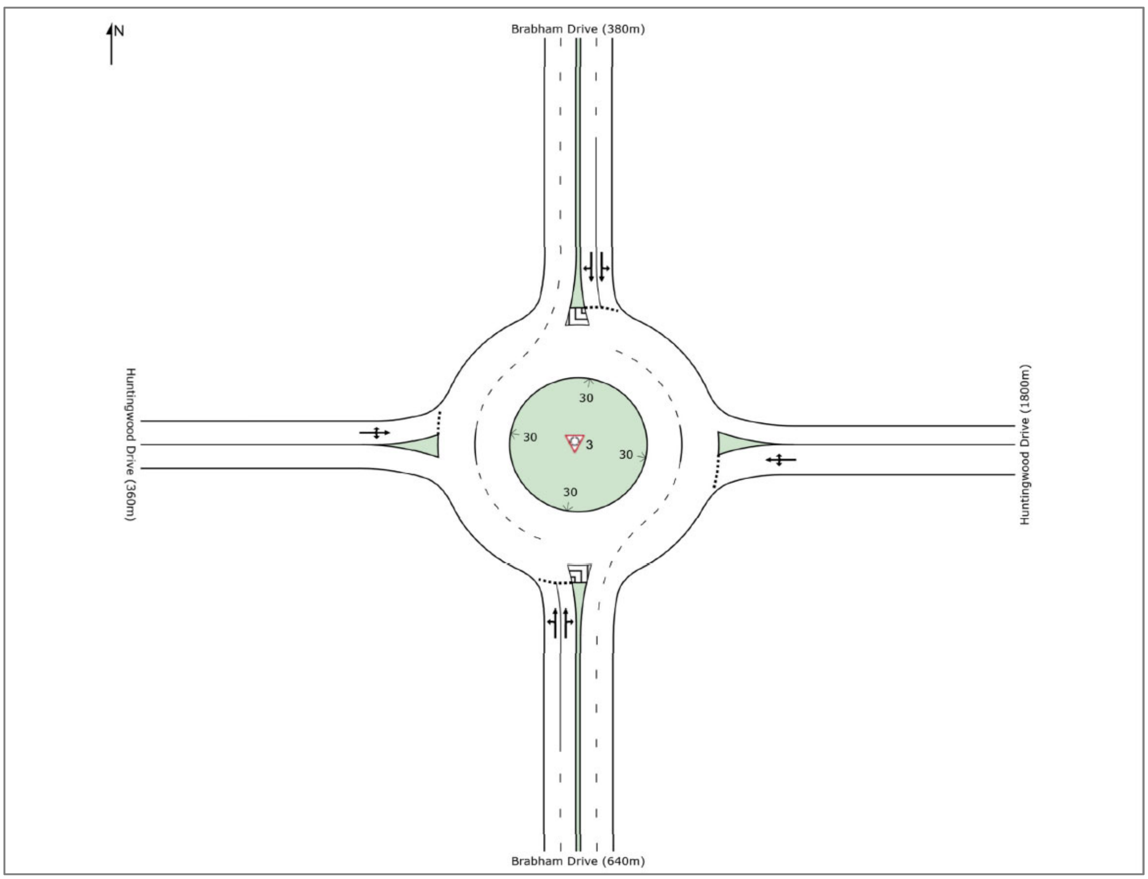


Figure 9: Brabham Drive / Huntingwood Drive – Existing Layout

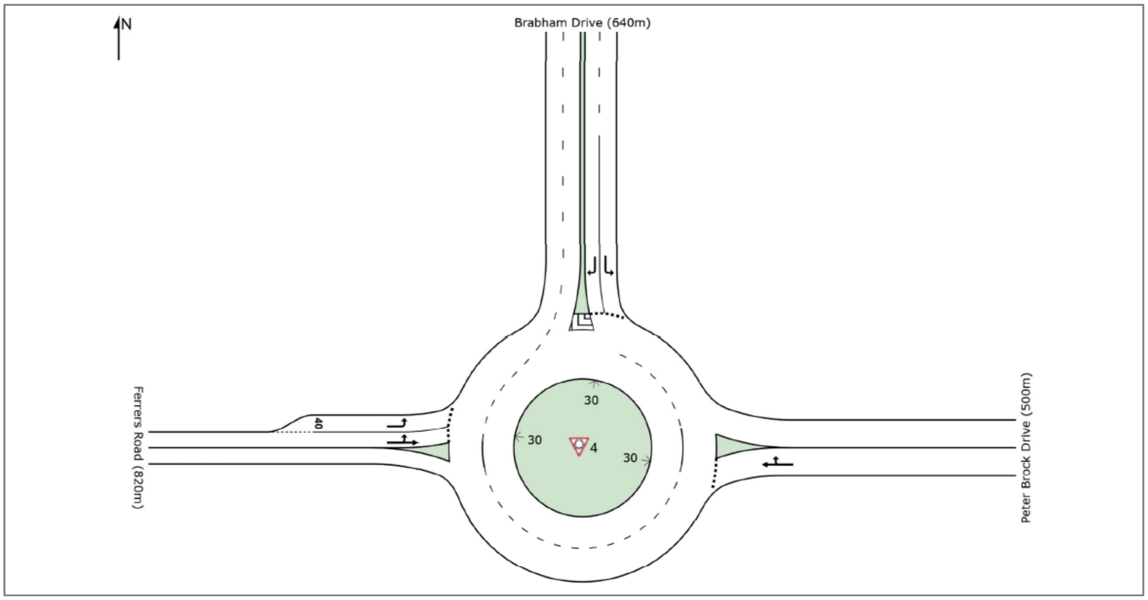


Figure 10: Brabham Drive / Ferrers Road / Peter Brock Drive – Existing Layout

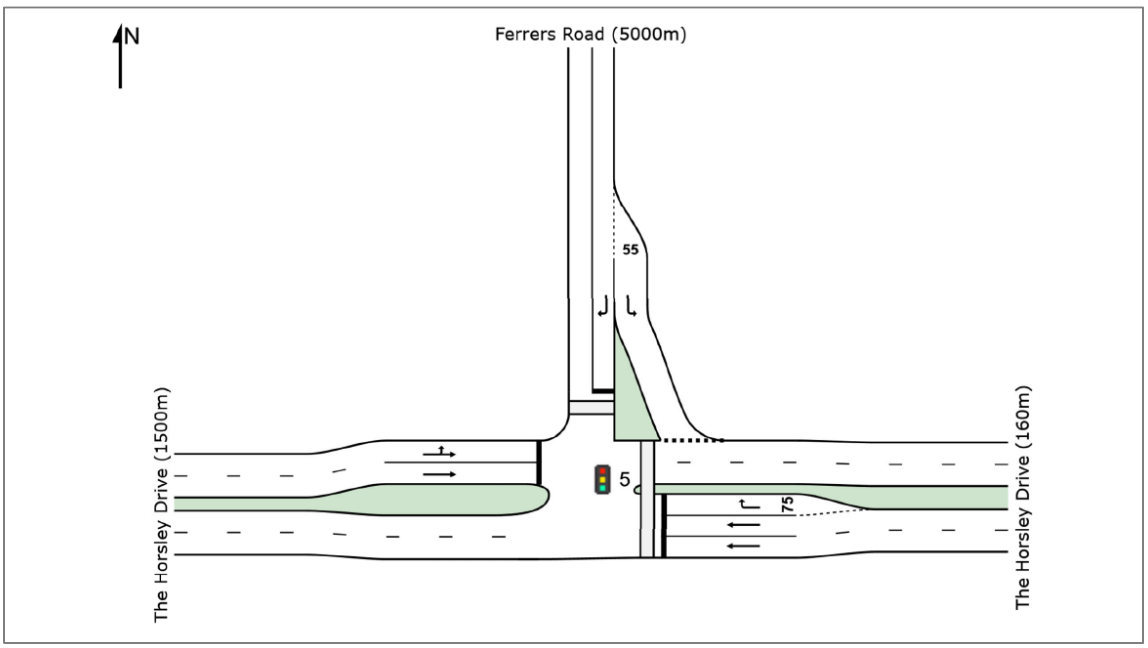


Figure 11: The Horsley Drive / Ferrers Road – Existing Layout

A summary of the SIDRA analysis of Existing Conditions is provided in **Table 3**; detailed SIDRA outputs are provided in **Appendix C.**

Table 3: Intersection Performance – Existing Conditions

Intersection	Control Type	Period	Intersection Delay	Level of Service
Great Western Highway / Doonside Road / Brabham Drive	Signals	AM	57	E
		PM	52	D
Great Western Highway / Huntingwood Drive	Signal	AM	9	A
		PM	23	B
Brabham Drive / Huntingwood Drive	Roundabout[1]	AM	14	A
		PM	14	A
Ferrers Road / Brabham Drive / Peter Brock Drive	Roundabout[1]	AM	11	A
		PM	15	B
The Horsley Drive / Ferrers Road	Signals	AM	38	C
		PM	20	B

Note 1: Intersection delay / LoS for roundabouts, as well as other types of priority-controlled intersections, relates to Worst Movement result. For signalized intersections, reported delay relates to overall average intersection delay, weighted by turn volumes.

With reference to **Table 3**, the SIDRA analysis indicates that the key intersections currently operate satisfactorily, with the exception of the intersection of Great Western Highway / Brabham Drive / Doonside Road, which operates at capacity during the AM peak period and near capacity during PM peak period.

4 Future Base Case

4.1 Background Traffic

4.1.1 Future Base Year

Further to the determination of an estimated construction completion date of 2026 for the LIBH, a forecast year of 2036 has been selected for the assessment of future conditions. Base 2036 traffic volumes (i.e. without the LIBH) were determined with reference to annual growth forecasts in the local road network, as described below.

4.1.2 Growth Rate for Background Traffic

In order to determine background traffic volumes for the Base 3026 forecast year, Ason Group has collated RMS traffic growth rates from the 2036 Sydney Traffic Forecasting Model (2036 STFM). It may be noted that “Link” growth rates reported in the 2036 STFM were the primary reference in determining turn volumes at respective approaches, while Intersection growth rates (also reported in the 2036 STFM) were adopted where ‘Link’ rates were not available.

These growth rates were then applied to the 2017 traffic survey data to obtain 2036 traffic volume (Base 2036), again noting that these volumes do not include the potential traffic generation of the LIBH.

4.2 Planned Road Network Upgrades

The RMS has identified a number of upgrade requirements within the local road network to appropriately accommodate forecast traffic flow increases within the broader sub-region. Planned upgrades of specific relevance to the assessment of the LIBH are detailed in sections below.

4.2.1 Great Western Highway / Doonside Road / Brabham Drive

Proposed upgrades at the Great Western Highway / Doonside Road / Brabham Drive include:

- Widening of the Great Western Highway (from the central median) to provide additional right turn lanes for the movements from Great Western Highway to both Doonside Road and to Brabham Drive;
- Widening of the existing eastbound and westbound left turn slip lanes from Great Western Highway to both Doonside Road and to Brabham Drive and
- The introduction of signalised pedestrian crossings on both the Doonside Road and Brabham Drive approaches to Great Western Highway.

These upgrades are shown in **Figure 12**, while the modified SIDRA layout for testing the upgrade is provided in **Figure 13**.

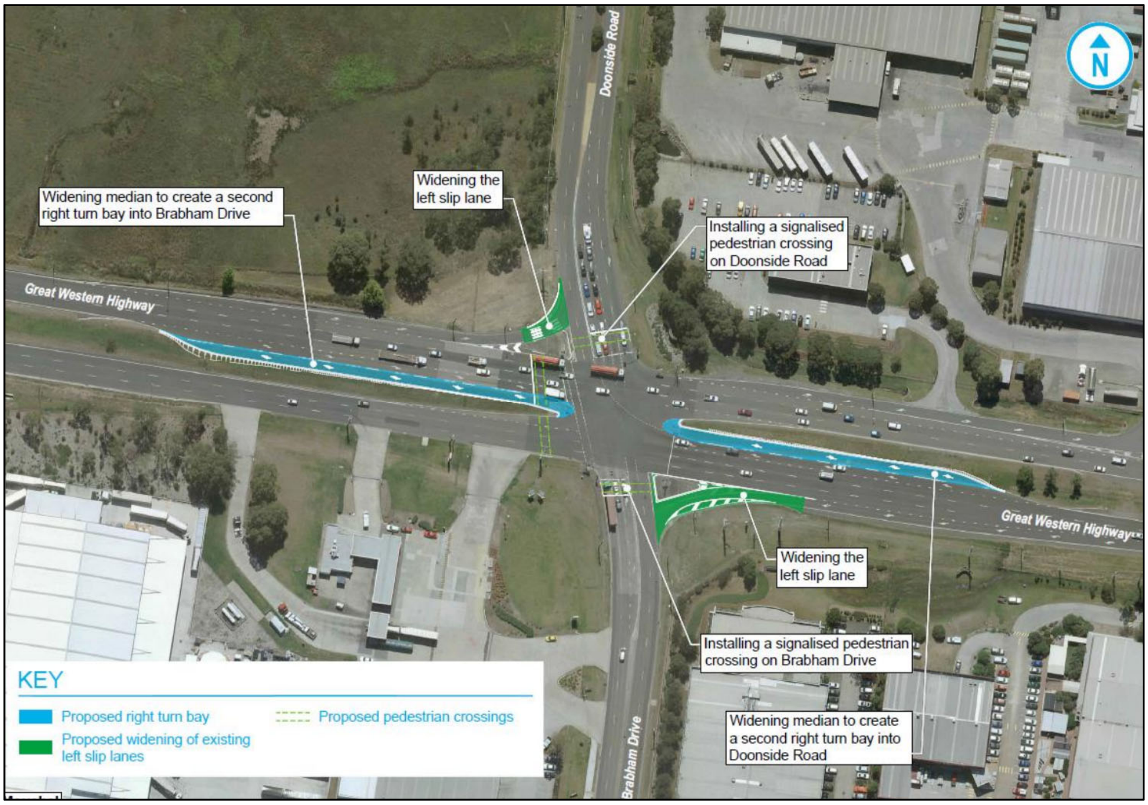


Figure 12: Planned Upgrades at Great Western Highway / Brabham Drive / Doonside Road

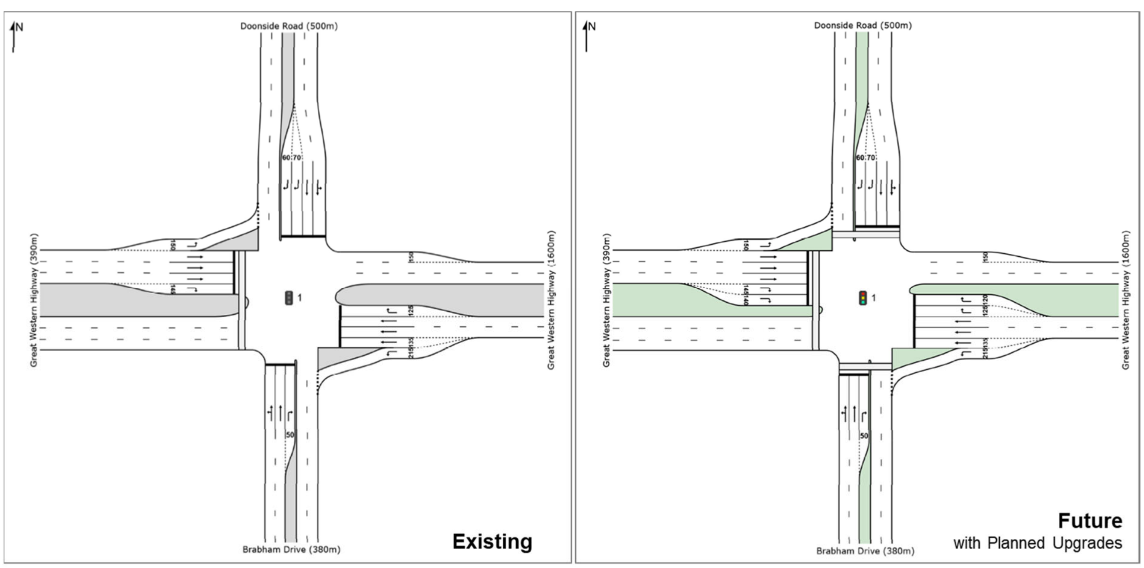


Figure 13: GWH / Brabham Drive / Doonside Road – Existing and Future Layouts

4.2.2 The Horsley Drive

Proposed upgrades along the Horsley Drive include:

- Widening of the existing road to a 4-lane divided carriageway road between the M7 Motorway and Cowpasture Road, to include a wide central median allowing for further widening to a 6-lane divided carriageway in the future;
- The provision of an additional eastbound lane from west of Ferrers Road to Cowpasture Road; and
- The construction of a pedestrian and cyclist shared path along the length of The Horsley Drive, connecting to the existing Western Sydney Parklands cycleway.

4.2.3 The Horsley Drive / Ferrers Road intersection

Proposed upgrades at the Horsley Drive / Ferrers Road intersection include:

- The provision of a left turn slip-lane from The Horsley Drive to Ferrers Road;
- The duplication of the right turn bays from The Horsley Drive to Ferrers Road; and
- The Duplication of the left-turn slip lane from Ferrers Road to The Horsley Drive.

These upgrades are presented in the **Figure 14** while the modified SIDRA layout for testing the upgrade is provided in **Figure 15**.

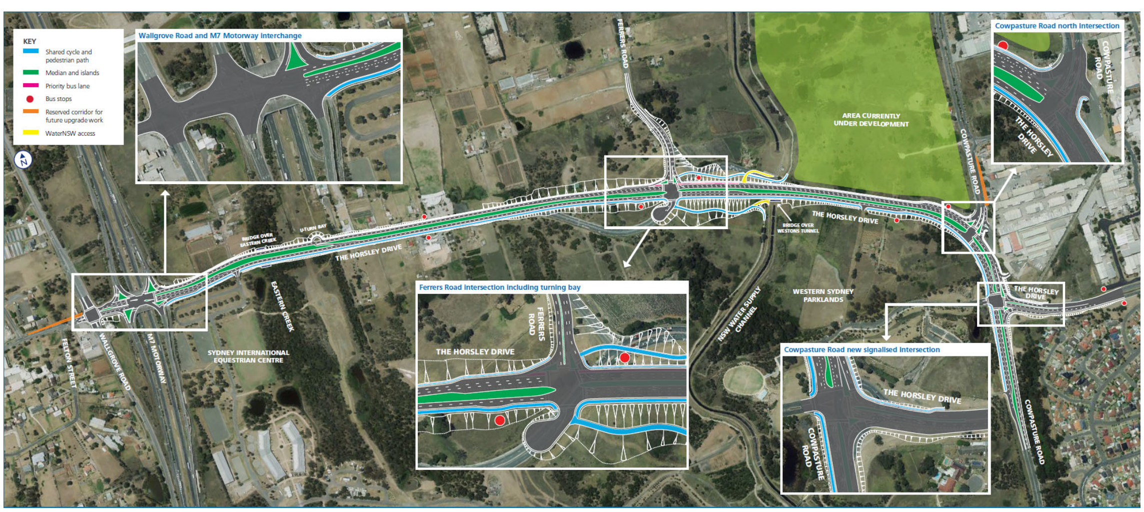


Figure 14: Planned Upgrades to The Horsley Drive

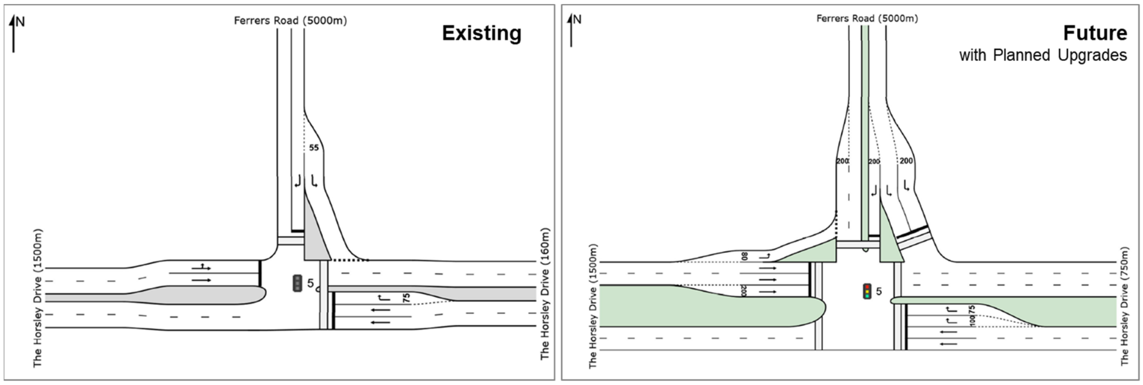


Figure 15: The Horsley Drive / Ferrers Road – Existing and Future Layouts

4.3 Intersection Performance – 2036 Base Case

The key intersections were assessed in SIDRA for 2036 Base Case, which includes-

- background traffic volumes,
- planned upgrades at the intersections of Great Western Highway / Brabham Drive / Doonside Road and The Horsley Drive / Ferrers Road; and
- existing road geometry at the remaining intersections.

SIDRA results are summarised in **Table 4**, while detailed outputs are provided in **Appendix C**.

Table 4: Intersection Performance – 2036 Base

Intersection	Control Type	Period	Intersection Delay	Level of Service
Great Western Highway / Doonside Road / Brabham Drive (Planned Upgrades)	Signals	AM	73	F
		PM	53	D
Great Western Highway / Huntingwood Drive	Signal	AM	11	A
		PM	26	B
Brabham Drive / Huntingwood Drive	Roundabout	AM	15	B
		PM	17	B
Ferrers Road / Brabham Drive / Peter Brock Drive	Roundabout	AM	13	A
		PM	21	B
The Horsley Drive / Ferrers Road (Planned Upgrades)	Signals	AM	19	B
		PM	21	B

With reference to Table 4, the SIDRA analysis indicates that the key intersections would operate satisfactorily under the 2036 Base scenario, with the exception of Great Western Highway / Brabham Drive / Doonside Road intersection which would operate at LoS F during the AM peak. Accordingly, further geometric upgrades (above that already identified by RMS) may be required to mitigate the impacts of the background 2036 Base traffic, irrespective of the Proposal.

5 Project Case

5.1 Traffic Generation

5.1.1 Daily Vehicle Trips

The RMS Guide recommends daily vehicle trip rates of 4 per 100m^2 GFA for warehouse floorspace, and 10 trips per 100m^2 GFA for office floorspace.

Application of these trip rates to the Masterplan results in a daily trip generation of 7,078 vehicle trips per day.

5.1.2 Peak Hour Trips – Standard Use Assessment

The peak hour trip generation of the LIBH has been estimated with reference to the RMS Guide Update, which reports surveys of a number of large industrial developments; specifically, Ason Group has referenced the trip rates surveyed by the RMS at the following sites, which provide similarly land use profiles to the LIBH:

- Site 1: Erskine Park Industrial Estate, Erskine Park;
- Site 3: Wonderland Business Park, Eastern Creek; and
- Site 4: Riverwood Business Park, Riverwood.

With reference to the RMS Guide Update, the average AM and PM peak hour trip rates for these three sites are as follows:

- AM Rate 0.247 trip per 100m^2 of GFA.
- PM Rate 0.182 trip per 100m^2 of GFA.

With reference to the RMS Guide Update trip rates, and to provide a robust assessment, this assessment adopts trip rates that are conservatively higher than the average of the three sites mentioned above, as shown below, being:

- AM Rate: 0.25 trip per 100m^2 of GFA
- PM Rate: 0.20 trip per 100m^2 of GFA

Accordingly, the estimated maximum generation of the LIBH is summarised in **Table 5**.

Table 5: Summary of LIBH Traffic Generation

Land-use	GFA (m^2)	AM Trip Rate (per 100m^2 of GFA)	PM Trip Rate (per 100m^2 of GFA)	AM Trips (veh/hr)	PM Trips (veh/hr)
Warehouse Development	165,500	0.25	0.20	420 *	340 *

* Rounded up

With reference to Table 6, the LIBH is therefore estimated to generate up to 420 vehicle trips and 340 vehicle trips in the AM and PM peak hours respectively., noting that these totals represent two-way traffic flows.

5.1.3 Percentage of Heavy Vehicles

Further reference to the RMS Guide Update indicates that heavy vehicles constitute a significant percentage of the total trip generation of similar industrial sites; referring again to the surveys of the Eastern Creek and Erskine Park industrial sites provided in the RMS Guide Update, heavy vehicles (for example: B-Triples) made up 28% and 26% of the total peak hour vehicle flows respectively.

A heavy vehicle percentage of 28% has been adopted for the assessment.

5.2 Trip Distribution

5.2.1 Arrival and Departure Distribution

The arrival and departure distribution profile adopted for the assessment is based on past surveys and assessments of industrial sites across Western Sydney, being: -

- AM Peak Hour – 80% arrival and 20% departure
- PM Peak Hour – 20% arrival and 80% departure

Accordingly, the total number of inbound and outbound trips are as follows:

- AM Peak Hour – 336 in and 84 out
- PM Peak Hour – 68 in and 272 out

5.2.2 Directional Distribution – Journey to Work Data

The assignment of trips to the road network referenced the JTW data, and indicates the following direction distribution of trips:

- 54% of trips to/from the north-west (e.g. Mount Druitt, St Marys, Penrith);
- 20% of trips to/from the north (e.g. Blacktown);
- 20% of trips to/from the south (e.g. Campbelltown, Fairfield); and
- 6% of trips to/from east (e.g. Parramatta).

5.2.3 Route Choice Assumptions

A review of the most efficient travel routes between the LIBH and key metropolitan and regional centres was carried out to determine the assignment of trips to the available routes. In this regard, a total of eight (8) travel zones were identified (to which trips are generated to / from), as shown in **Figure 16**.

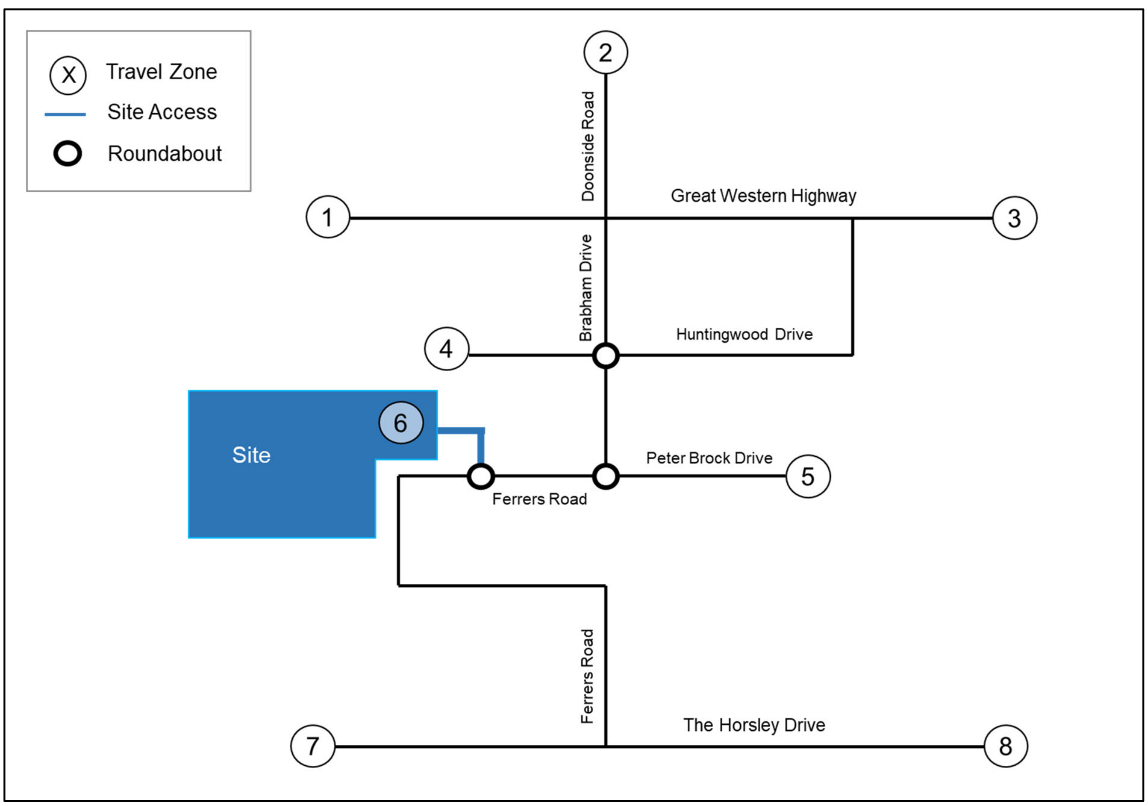


Figure 16: Travel Zones adopted for Trip Distribution

With reference to Figure 16, the following trip assignment assumptions were adopted based on JTW data (section 5.2.2) and Google travelling routes:

- All vehicles travelling to / from the north-west (54%) were assigned to the western side of GWH (Zone 1 in Figure 16).
- For all vehicle trips travelling to / from the north (20%), a 50-50 split has been estimated between Doonside Road (Zone 2) and eastern side of GWH (Zone 3).
- Vehicles travelling to / from the south were further divided into two groups such as south-east (e.g. Fairfield) and south-west (e.g. Campbelltown) and assigned to different sides of The Horsley Drive. All vehicles to / from south-east (13%) were assigned to zone 8, whereas those travelling to / from south-west (7%) were assigned to zone 7.
- All vehicles traveling to and from the east (6%) have been assigned on Ferrers Road via Peter Brock Drive (Zone 5).

5.3 Project Case Traffic Volumes

The LIBH traffic flows were added to the 2036 background traffic to form the “Project Case” traffic volumes, as presented in **Appendix B**.

5.4 SIDRA Layout of LIBH Access

The proposed roundabout at Ferrers Road and LIBH Access has been modelled as a single lane roundabout with two lanes (1 per direction) on each approach. It was estimated that the proposed roundabout will be located approximately 250 metres west of the Brabham Drive / Ferrers Road / Peter Brock Drive roundabout. The SIDRA layout of the proposed Ferrers Road / LIBH Access roundabout is shown in **Figure 17**.

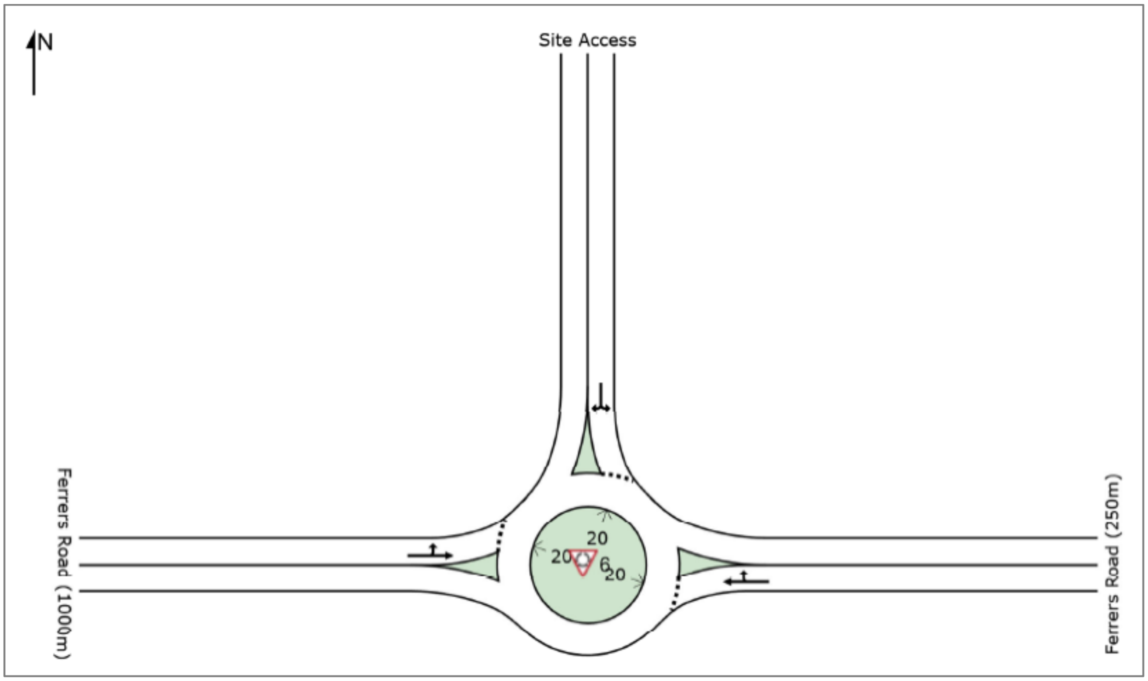


Figure 17: LIBH Access at Ferrers Road – SIDRA Layout

5.5 Intersection Performance – Project Case

The operation of all key intersections has been assessed for "Project Case", which includes-

- Project Case traffic volumes (2036 Background plus LIBH traffic, section 5.3);
- planned upgrades at the intersections of Great Western Highway / Brabham Drive / Doonside Road and The Horsley Drive / Ferrers Road (section 4.2);
- proposed layout for LIBH Access (section 5.4); and
- existing road geometry at the remaining intersections.

The results of SIDRA analysis are provided in **Table 6.**

Table 6: Intersection Performance – Project Case

Intersection	Control Type	Period	Intersection Delay	Level of Service
Great Western Highway / Doonside Road / Brabham Drive (Planned Upgrades)	Signals	AM	81	F
		PM	62	E
Great Western Highway / Huntingwood Drive	Signal	AM	12	A
		PM	27	B
Brabham Drive / Huntingwood Drive	Roundabout	AM	18	B
		PM	19	B
Ferrers Road / Brabham Drive / Peter Brock Drive	Roundabout	AM	19	B
		PM	28	B
The Horsley Drive / Ferrers Rd (Planned Upgrades)	Signals	AM	20	B
		PM	26	B
Ferrers Road / LIBH Access	Roundabout	AM	51	D
		PM	30	C

It is evident from **Table 6** that the key intersections would continue to operate satisfactorily further to the introduction of the LIBH traffic, with LoS and delays quite similar to 2036 Base Case.

An exception is the Great Western Highway / Brabham Drive intersection which experiences a slight increase in AVD at this intersection, of some 8 seconds and 9 seconds in the AM and PM peak hours respectively. As a result, during PM peak hour, the LoS changes from D to E. During the AM peak, the intersection would continue to operate at LoS F and as such, an additional upgrade of this intersection is proposed (detailed in **Section 5.6** below).

5.6 Additional Upgrade

To resolve excessive delays at the GWH / Doonside Road / Brabham Drive intersection, an additional upgrade has been assessed, whereby an additional 70 metre lane is provided on the north approach (Doonside Road) to GWH to be dedicated as a left-turn only lane. The benefit of this upgrade is that the high volume of southbound through traffic (approximately 800vph and 500vph in the AM and PM peak hours respectively) would be provided with two dedicated through lanes. The proposed upgrade layout is shown in **Figure 18**.

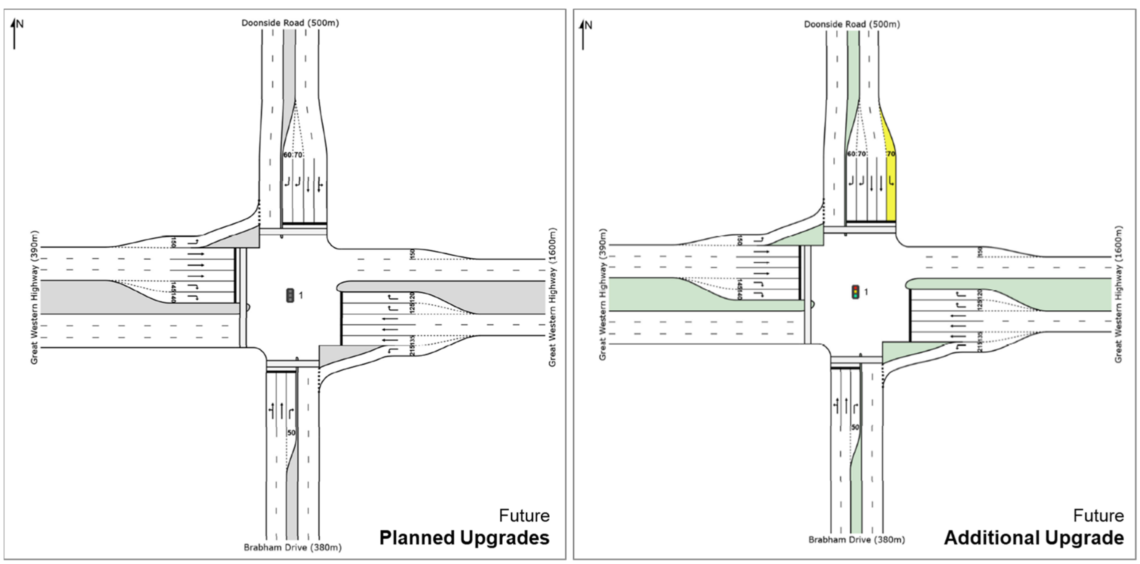


Figure 18: GWH / Doonside Road / Brabham Drive – Proposed Additional Upgrade

SIDRA analysis indicates this proposed upgrade would result in improved intersection performance with and without the LIBH traffic, particularly in AM peak, as presented below.

5.7 Summary of SIDRA Modelling

SIDRA model outputs are summarised below for the AM and PM peak periods, respectively.

Table 7: SIDRA Output Summary – AM Peak

Intersection	Scenario	Volume (veh/h)	DoS (v/c)	Delay (sec)	LoS	Queue (m)
GWH / Doonside Road / Brabham Drive	Existing Conditions	4,988	0.96	57	E	316
	2036 Base Case	5,571	1.02	73	F	480
	Project Case	5,855	1.04	81	F	510
	2036 Base Case + Additional	5,571	0.94	51	D	274
	Project Case + Additional	5,855	0.96	56	D	293
GWH / Huntingwood Drive	Existing Conditions	3,425	0.73	9	A	136
	2036 Base Case	3,722	0.70	11	A	193
	Project Case	3,767	0.71	12	A	201
Brabham Drive / Huntingwood Drive	Existing Conditions	2,507	0.52	14	A	33
	2036 Base Case	2,658	0.56	15	B	40
	Project Case	2,986	0.69	18	B	68
Ferrers Road / Brabham Drive / Peter Brock Drive	Existing Conditions	1,942	0.47	11	A	30
	2036 Base Case	2,115	0.53	13	A	37
	Project Case	2,472	0.71	19	B	72
The Horsley Drive / Ferrers Road	Existing Conditions	3,372	0.98	38	C	324
	2036 Base Case	4,591	0.75	19	B	153
	Project Case	4,677	0.77	20	B	161
Ferrers Road / LIBH Road	Existing Conditions	-	-	-	-	-
	Project Case	2,363	1.01	51	D	402

* DoS: Degree of Saturation; unit: volume / capacity (V/C)

Table 8: SIDRA Output Summary – PM Peak

Intersection	Scenario	Volume (veh/h)	DoS (v/c)	Delay (sec)	LoS	Queue (m)
GWH / Doonside Road / Brabham Drive	Existing Conditions	4,956	0.91	52	D	220
	2036 Base Case	5,408	0.87	53	D	238
	Project Case	5,640	0.96	62	E	328
	2036 Base Case + Additional	5,408	0.87	52	D	238
	Project Case + Additional	5,640	0.98	61	E	316
GWH / Huntingwood Drive	Existing Conditions	3,421	0.80	23	B	253
	2036 Base Case	3,567	0.76	26	B	305
	Project Case	3,603	0.77	27	B	312
Brabham Drive / Huntingwood Drive	Existing Conditions	2,584	0.75	14	A	41
	2036 Base Case	2,803	0.85	17	B	61
	Project Case	3,071	0.89	19	B	75
Ferrers Road / Brabham Drive / Peter Brock Drive	Existing Conditions	2,163	0.57	15	B	46
	2036 Base Case	2,396	0.65	21	B	61
	Project Case	2,688	0.70	28	B	76
The Horsley Drive / Ferrers Road	Existing Conditions	3,817	0.87	20	B	130
	2036 Base Case	5,269	0.83	21	B	205
	Project Case	5,338	0.85	26	B	319
Ferrers Road / LIBH Road	Existing Conditions	-	-	-	-	-
	Project Case	2,573	0.88	30	C	177

* DoS: Degree of Saturation; unit: volume / capacity (V/C)

6 Parking Requirements

6.1 Proposed Car Parking Rates

SEPP (Western Sydney Parklands) 2009 states the following:

Clause 6A – Development control plans – A development control plan does not apply to the Western Sydney Parklands unless it is made by the Director-General.

As such, the provisions of the Blacktown City Council DCP do not strictly apply to the proposed development.

Notwithstanding, the SEPP does not provide alternative parking requirements and, as such, reference is made to Council's controls and the widely accepted RMS *Guide to Traffic Generating Developments*, the latter being adopted as relevant parking rates for numerous State Significant Development (SSD) concept plan approvals in the locality (Oakdale for example).

6.1.1 Council DCP Parking Requirement

Part A6 of the BCC DCP requires that car parking for general industries, warehouses and distribution centres across the LGA be provided at the rate of 1 space per 75m^2 GFA plus 1 space per 40m^2 for the office component of such development.

The application of these rates to the proposed development result in a significant theoretical car parking requirement of 2,292 spaces. In the opinion of Ason Group, this is a level of parking that is significantly in excess of the parking actually required for the LIBH, as detailed in sections below.

Furthermore, it is emphasised that the BCC DCP does not strictly apply and these figures are provided for information only.

6.1.2 RMS Guide Parking Requirement

Section 5.11.2 of the RMS Guide requires parking for warehouse developments be provided at the rate of 1 space per 300m^2 of GFA.

The car parking rate of 1 space per 300m^2 adopted in the RMS Guide was established through surveys of 10 facilities. The surveys undertaken by the RMS demonstrated car parking requirements that ranged between one space per 80m^2 and one space per 960m^2 with a mean and standard deviation of one space per 338m^2 and one space per 280m^2 respectively. The adopted rate of 1 space per 300m^2 therefore reflected a "middle range" parking rate. Furthermore, the adopted parking rate was also based on employee densities of approximately 45 employees per hectare – almost double the densities established by the DPE for the WSEA.

6.1.3 Standard Use Demands Derived from Other Similar Developments

For the purpose of this assessment, Ason group has undertaken surveys of eight comparable industrial developments to establish the effective parking rate of operational developments within the WSEA, surveys which have adopted the same methodology as that used in establishing the RMS Guide rates. The surveys included industrial developments (generally warehouse) in numerous locations including:

- Erskine Park,
- Oakdale Central; and
- M7 Business Hub.

The results of these surveys are summarised in **Table 9**.

Table 9: Effective Parking Rates for Surveyed Developments

Site Address	Car Parking Provided	Total GFA (m^2)	Maximum Parking Demand	Effective Parking Rate (1 space per Xm^2)
Bunning's – 8 Interchange Dr	140	55,550	68	817
Toll – Lot 11 Wonderland Dr	137	27,440	47	584
Ingram Micro – 23 Wonderland Dr	300	36,610	183	200
DHL – Milner Avenue	115	20,170	109	185
Kimberly Clarke – 35 Sarah Andrews Cl	100	45,210	78	580
Linfox – 25 Sarah Andrews Cl	217	51,200	116	441
Ubeeco – 28 Sarah Andrews Cl	150	10,865	71	153
Woolworths – 29 Sarah Andrews Cl	280	52,705	197	268
Total Average Rate				**403**

The surveys demonstrated a range of between 1 space per 153m^2 and 1 space per 817m^2 with a mean and standard deviation of 1 space per 403m^2 and 1 space per 241m^2 respectively. Accordingly, based on the methodology adopted in the RMS Guide, the "middle range" car parking rate based on the surveys would be in the order of 1 space per 350m^2.

These rates are consistent with those established by the RMS Guide and indeed suggest that a reduction in overall car parking could be justified in comparison to the parking rates provided in the BCC

DCP. Furthermore, as mentioned above, these rates are consistent with other approved developments within the broader area. For example, the industrial precincts of Oakdale South and Oakdale West to the west of the Site which provide similar development to this SSDA.

6.2 Proposed Parking Provision

Having regard for the above, it is recommended that the car parking rates as approved in the Oakdale South be adopted as minimum requirement. The proposed car parking rates are outlined **Table 10**.

Table 10: Proposed Warehouse Car Parking Rates

Land Use	Minimum Car Parking Rate
Warehouse / Distribution	1 space per 300m^2
Office	1 space per 40m^2

The adoption of a minimum rate of 1 space per 300m^2 GFA for warehouse floorspace and 1 space per 40m^2 for office floorspace is considered appropriate and sustainable and is consistent with both the RMS Guidelines and State planning policies. The proposed minimum rates will also enable the required flexibility in the design of future developments whilst still ensuring that parking is provided to accommodate both the current and future parking requirements of tenants. For all other non-warehouse uses, it is proposed that parking be provided in accordance with the BCC DCP.

Application of the proposed parking rate to the floorspace proposed under the Masterplan (157,600m^2 of warehouse space and 7,900m^2 of ancillary office space) would result in the minimum provision of 723 parking spaces. In response, a total of 782 car parking spaces has been provided. The specific car parking requirements for each lot/building within the Site would be considered in more detail at the relevant DA stages.

It is noted that the *Disability (Access to Premises – Buildings) Standards 2010* require accessible car parking spaces be provided at the following rate for Class 5, 7, 8 and 9c buildings:

- 1 accessible space for every 100 car parking spaces, or part thereof

It is assumed that any subsequent applications will demonstrate a satisfactory provision of accessible car parking is provided.

Finally, it is expected that a Condition of Consent in regard to future applications would require that all car parking and service vehicle areas be designed in accordance with the relevant Australian Standards including, AS2890.1 AS 2890.2 and AS2890.6.

7 Conclusions

- This Traffic Impact Assessment (TIA) report has been prepared for Western Sydney Parklands Trust to examine the access, traffic and parking characteristics of a SSDA providing for the development of the Light Horse Interchange Business Hub (LIBH) at 165 Wallgrove Road and 475 Ferrers Road, Eastern Creek.
- The SSDA provides for -
  - A Masterplan development providing a regional warehousing and distribution hub with 24 hours/day, 7 days/week operation.
  - A total yield of 165,500m^2 GFA, including 157,600m^2 of warehouse floorspace and 7,900m^2 of ancillary office floorspace;
  - Site access connections to Ferrers Road (LIBH Access) forming a single-lane roundabout. The existing Wallgrove Road access is to be maintained for emergency vehicle access only;
  - In conjunction with broader upgrades to the local road network, localised upgrades along the key access routes to/from the Site;
  - A sustainable level of on-site parking provision; and
  - Shared pedestrian and cyclist access from Wallgrove Road and Ferrers Road (3.5m and 2.5m wide concrete footpath, respectively), as well as internal pedestrian path along eastern side of LIBH access road (1.2m wide concrete footpath).
- Site visits and traffic surveys were undertaken at the key intersections providing access between the Site and the sub-regional road network, including:
  - Great Western Highway / Huntingwood Road;
  - Great Western Highway / Brabham Drive / Doonside Road;
  - Brabham Drive / Huntingwood Drive;
  - Brabham Drive / Ferrers Road / Peter Brock Drive; and
  - Ferrers Road / The Horsley Drive.
- Background traffic growth at the key intersection through to a future forecast year of 2036 was determined with reference to the RMS 2036 STFM outputs.
- The traffic generation of the LIBH was determined with reference to the RMS Guide and RMS Guide Update, as well as relevant survey data of other similar developments. Trip distribution was determined with reference to JTW.
- Sidra intersection analysis was undertaken to measure the performance of the key intersections during the AM and PM peak hours of-

- Existing Conditions,
- 2036 Base Case (background traffic with planned upgrades), and
- Project Case (2036 background plus development traffic, with planned upgrades).

- The Sidra modelling outcomes can be summarised as:
  - **LIBH Access**: The proposed one-lane roundabout at Ferrers Road is expected to operate at acceptable Level of Service (or LoS) during both peak periods.
  - **Great Western Highway / Doonside Road / Brabham Drive**: Even under the RMS planned upgrades at this intersection, it would operate at a LoS F and LoS D in the AM and PM peak hours respectively based on an assignment of 2036 background traffic flows alone. The addition of LIBH traffic results in slight increases to delay, with the intersection would continuing to operate at LoS F during the AM peak hour, while moving to a LoS E in the PM peak hour. Having determined that the key delay at the intersection is attributed to high southbound through movement, it is proposed that an additional short lane be provided in the Doonside Road approach as a dedicated left turn lane, thereby providing 2 southbound through lanes. The additional upgrade has been found to significantly improve the operation of the intersection under both 2036 Base Case and Project Case conditions.
  - **Ferrers Road / The Horsley Drive**: Further to the proposed RMS planned upgrades, this intersection will operate at a good LoS B in both peak hours through 2036 even with the introduction of the LIBH traffic flows.
  - All other key local intersections will operate at LoS B or better during both peak hours through 2036 even with the introduction of the LIBH traffic flows, and as such no additional upgrades of these intersections are required.
- It is proposed that minimum car parking rates – based on the RMS Guide and detailed parking surveys undertaken by Ason Group – be adopted for the LIBH. The application of these rates – being 1 space per 300m^2 GFA for warehouse floorspace and 1 space per 40m^2 GFA for office floorspace – would result in a minimum parking requirement for the LIBH of 723 parking spaces. A total of 782 spaces are proposed, thus readily accommodating this demand.
- It is expected that any future development applications will demonstrate a satisfactory provision of accessible car parking, and that Conditions of Consent relating to future development application would require that all car parking and service vehicle areas be designed in accordance with the relevant Australian Standards.

It is therefore concluded that the Light Horse Interchange Business Hub is supportable on traffic planning grounds.

Appendix A

Secretary’s Environmental Assessment Requirements

Planning Secretary's Environmental Assessment Requirements

Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*
Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*

Application Number	SSD 9667
Project Name	Light Horse Interchange Business Hub, Eastern Creek
Development	• concept proposal for the staged redevelopment of the site as an industrial business hub with approximately 157,000 sqm of industrial and light industrial floorspace and 8,000 sqm ancillary office floorspace • detailed proposal for the first stage of development which will include demolition works, bulk earthworks, installation of infrastructure and subdivision of the site
Location	Lot 10 in DP 1061237 and Lot 5 in DP 804051, Eastern Creek within Blacktown Local Government Area
Applicant	Western Sydney Parklands Trust
Date of Issue	7 November 2018
General Requirements	The environmental impact statement (EIS) must be prepared in accordance with, and meet the minimum requirements of, clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (the Regulation). In addition, the EIS must include: • a detailed description of the development, including: – the need for the proposed development – justification for the proposed development – likely staging of the development – likely interactions between the development and existing, approved and proposed operations in the vicinity of the site – plans of any proposed building works • consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments • a risk assessment of the potential environmental impacts of the development, identifying the key issues for further assessment • a detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment, which includes: – a description of the existing environment, using sufficient baseline data – an assessment of the potential impacts of all stages of the development, including any cumulative impacts, taking into consideration relevant guidelines, policies, plans and statutes – a description of the measures that would be implemented to avoid, minimise, mitigate and if necessary, offset the potential impacts of the development, including proposals for adaptive management and/ or contingency plans to manage significant risks to the environment • a consolidated summary of all the proposed environmental management and monitoring measures, highlighting commitments included in the EIS. The EIS must also be accompanied by a report from a qualified quantity surveyor providing:

	• a detailed calculation of the capital investment value (CIV) (as defined in clause 3 of the Regulation) of the proposal, including details of all assumptions and components from which the CIV calculation is derived. The report shall be prepared on company letterhead and indicate applicable GST component of the CIV • an estimate of jobs that will be created during the proposed development • certification that the information provided is accurate at the date of preparation.
Key issues	The EIS must address the following specific matters: • **Statutory and Strategic Context** – including: – detailed justification that the proposed land use is permissible, taking into consideration the State Environmental Planning Policy (Western Sydney Parklands) 2009 – details of any proposed consolidation or subdivision of land and – demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, adopted precinct plans, draft district plan(s) and adopted management plans and justification for any inconsistencies. The following must be addressed: o State Environmental Planning Policy (Western Sydney Parklands) 2009 o Greater Sydney Region Plan: A Metropolis of Three Cities o Our Greater Sydney 2056: South District Plan o Future Transport Strategy 2056. • **Planning Agreement/Development Contributions** – demonstration that satisfactory arrangements have been or would be made to provide, or contribute to the provision of, necessary local and regional infrastructure required to support the development. • **Suitability of the Site** – including an analysis of site constraints, such as flooding impacts and future road and road corridors. • **Community and Stakeholder Engagement** – including: – a detailed community and stakeholder participation strategy which identifies who in the community has been consulted and a justification for their selection, other stakeholders consulted and the form(s) of consultation, including a justification for this approach – a report on the results of the implementation of the strategy including issues raised by the community and surrounding land owners and occupiers that may be impacted by the proposal – details of how issues raised during community and stakeholder consultation have been addressed and whether they have resulted in changes to the proposal – details of the proposed approach to future community and stakeholder engagement based on the results of consultation. • **Traffic and Transport** – including: – a quantitative Traffic Impact Assessment prepared in accordance with relevant Blacktown City Council, Austroads and Roads and Maritime Services guidelines – details of all daily and peak traffic and transport movements likely to be generated by the development including the impact on the nearby intersections and the need/associated funding for the upgrading or road improvements works (if required) – impacts on the safety and capacity of the surrounding road network and access points, using SIDRA or similar modelling, to assess impacts from current traffic counts and cumulative traffic from existing and proposed development

	– demonstrate that sufficient pedestrian and cyclist facilities have been provided for the development – details and a justification of access to, from and within the site (vehicular and pedestrian) – details of road upgrades, new roads or access points required for the development, if necessary. • **Contamination** – including**:** - a detailed assessment of the extent and nature of any contamination of the soil, groundwater and soil vapour - an assessment of potential risks to human health and the environmental receptors in the vicinity of the site - a description and appraisal of any mitigation and monitoring measures - consideration of whether the site is suitable for the proposed development. • **Flooding** – a detailed hydrological and hydraulic assessment which includes the following: – a comprehensive assessment of the impact of flooding on the development for the full range of flood events up to the probable maximum flood. This assessment should address any relevant provisions of the NSW Floodplain Development Manual (2005) including the potential effects of climate change, sea level rise and an increase in rainfall intensity – consideration of current flooding behaviour and impacts, including on flood detention areas, how flood behaviour and impacts will change due to the proposal and how these changes will be mitigated – assessment of the impact of the development on flood behaviour (i.e., levels, velocities and duration of flooding) and on adjacent, downstream and upstream areas – detail an emergency response plan for the site, which includes consideration of a flood-free access to or from the development site in extreme flood events. • **Hazards and Risk** – including: – a preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 - Hazardous and Offensive Development and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should the preliminary risk screening indicate that the development is "potentially hazardous", a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011) – ongoing consultation with Jemena on the high-pressure gas pipeline adjacent to the development area with regards to requirements of Australian Standard AS 2885 Pipelines - Gas and liquid petroleum – a hazard analysis undertaken in accordance with the Department of Planning's Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis' and Multi-Level Risk Assessment (DoP, 2011). It must include, and not be limited to, an assessment on risk exposures to potential populations within the development from the high-pressure gas pipeline located within or near the development area. The risks established in the hazard analysis must be compared against the relevant qualitative and quantitative risk criteria detailed in the Department of Planning's Hazardous Industry Planning Advisory Paper No. 10, 'Land Use Safety Planning'. If a Safety Management Study (SMS) required under AS

	2885 Pipelines - Gas and liquid petroleum is available, the SMS must be included in the hazard analysis. • **Soils and Water** – including: – a description of the water demands and a breakdown of water supplies, including a detailed site water balance – identification of any water licensing requirements under the *Water Act 1912* or *Water Management Act 2000* – details of proposed erosion and sediment controls during construction – an assessment of potential impacts on surface and groundwater resources, drainage patterns, soil (stability, salinity and acid sulfate soils), related infrastructure, watercourses and riparian land and proposed mitigation, management and monitoring measures. • **Biodiversity** – including an assessment of the proposal's biodiversity impacts in accordance with the *Biodiversity Conservation Act 2016*, including the preparation of a Biodiversity Development Assessment Report (BDAR) where required under the Act, except where a waiver for preparation of a BDAR has been granted. • **Infrastructure Requirements** – including: – a detailed written and/or geographical description of infrastructure required on the site – identification of any infrastructure upgrades required off-site to facilitate the development, and describe any arrangements to ensure that the upgrades will be implemented in a timely manner and maintained – an infrastructure delivery and staging plan, including a description of how infrastructure on and off-site will be co-ordinated and funded to ensure it is in place prior to the commencement of construction – an assessment of the impacts of the development on existing infrastructure surrounding the site. • **Urban Design and Visual** – including: – consideration of the layout and design of the development having regard to the surrounding vehicular, pedestrian and cycling networks – detailed plans showing suitable landscaping which incorporates endemic species. • **Heritage** – including an Aboriginal Cultural Heritage Assessment Report prepared in consultation with Aboriginal people and in accordance with Office of Environment and Heritage guidelines. • **Noise and Vibration**– including: – a quantitative noise and vibration impact assessment undertaken by a suitably qualified person in accordance with the relevant Environment Protection Authority guidelines and including an assessment of nearby sensitive receivers – cumulative impacts of other developments – details of proposed mitigation, management and monitoring measures. • **Bushfire** – including an assessment against the requirements of *Planning for Bushfire Protection 2006*, particularly access and provision of water supply for firefighting purposes. • **Waste** – including: – details of the quantities and classification of all waste streams to be generated on site during the development – details of waste storage, handling and disposal during the development and – details of the measures that would be implemented to ensure that the development is consistent with the aims, objectives and

	guidance in the NSW Waste Avoidance and Resource Recovery Strategy 2014-2021. • **Air Quality** – including: – an assessment of the air quality impacts (including dust) during the development, in accordance with the relevant Environment Protection Authority guidelines – details of proposed mitigation, management and monitoring measures.
Plans and Documents	The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the Regulation. You should provide these as part of the EIS rather than as separate documents.
Consultation	During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. In particular you must consult with: • Blacktown City Council • Jemena Gas Networks • Roads and Maritime Services • Transport for NSW • Department of Industry – Crown Lands and Water • Office of Environment and Heritage • Environment Protection Authority • Fire and Rescue NSW • Rural Fire Service • Sydney Water • WaterNSW • surrounding local residents and stakeholders • any other public transport, utilities or community service providers. The EIS must describe the consultation process and the issues raised and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.
Further consultation after 2 years	If you do not lodge a Development Application and EIS for the development within 2 years of the issue date of these SEARs, you must consult further with the Secretary in relation to the preparation of the EIS.
References	The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this proposal.

<u>ATTACHMENT 1</u>
Technical and Policy Guidelines

The following guidelines may assist in the preparation of the environmental impact statement. This list is not exhaustive and not all of these guidelines may be relevant to your proposal.

Many of these documents can be found on the following websites:
http://www.planning.nsw.gov.au
http://www.shop.nsw.gov.au/index.jsp
http://www.australia.gov.au/publications
http://www.epa.nsw.gov.au/
http://www.environment.nsw.gov.au/
http://www.dpi.nsw.gov.au/

Policies, Guidelines & Plans

Aspect	Policy / Methodology
Traffic, Transport and Access	
	Roads Act 1993
	State Environmental Planning Policy (Infrastructure) 2007
	Guide to Traffic Generating Development (Roads and Maritime Services)
	Road Design Guide (Roads and Maritime Services)
	Austroads Guide to Traffic Management – Pt 12: Traffic Impacts of Development
	Austroads Guidelines for Planning and Assessment of Road Freight Access in Industrial Areas
	NSW Long Term Transport Master Plan
Contamination	
	State Environmental Planning Policy No. 55 – Remediation of Land
	National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC) (amended April 2013)
	Designing Sampling Programs for Sites Potentially Contaminated by PFAS – Guidance Document (EPA, 2016)
Soils and Water	
Acid Sulfate Soils	Acid Sulfate Soil Manual (ASSMAC)
Erosion and Sediment	Managing Urban Stormwater: Soils & Construction (Landcom)
	Design Manual for Soil Conservation Works - Technical Handbook No. 5 (Soil Conservation Service of NSW)
	Soil and Landscape Issues in Environmental Impact Assessment (DLWC)
	Wind Erosion – 2nd Edition
Groundwater	National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC)
	NSW State Groundwater Policy Framework Document (DLWC)
	NSW State Groundwater Quality Protection Policy (DLWC)
	NSW State Groundwater Quantity Management Policy (DLWC) Draft
	The NSW State Groundwater Dependent Ecosystem Policy (DLWC)
	NSW Aquifer Interference Policy (NOW)
	Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources (NOW) 2011
	Bunding and Spill Management (EPA)
Stormwater	Managing Urban Stormwater: Strategic Framework. Draft (EPA)
	Managing Urban Stormwater: Council Handbook. Draft (EPA)
	Managing Urban Stormwater: Treatment Techniques (EPA)

Policies, Guidelines & Plans

Aspect	Policy / Methodology
	Managing Urban Stormwater: Source Control. Draft (EPA)
	Managing Urban Stormwater: Harvesting and Reuse (DEC)
Wastewater	National Water Quality Management Strategy: Guidelines for Sewerage Systems - Effluent Management (ARMCANZ/ANZECC)
	National Water Quality Management Strategy: Guidelines for Sewerage Systems - Use of Reclaimed Water (ARMCANZ/ANZECC)
	National Water Quality Management Strategy - Guidelines For Water Recycling: Managing Health And Environmental Risks (Phase1) (EPHC, NRMMC & AHMC)
Hazards and Risk	
	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
	Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (DUAP)
	Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis
	Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning (DoP 2011)
Biodiversity	
	The Biodiversity Assessment Method (OEH, 2017)
Heritage	
	Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011)
	Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010)
	Draft Guidelines for Aboriginal Cultural Impact Assessment and Community Consultation (Department of Planning 2005)
	Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW 2010)
	Heritage Act 1977
Noise and Vibration	
	Assessing Vibration: A Technical Guide (DEC, 2006)
	Noise Policy for Industry (EPA, 2017)
	Environmental Criteria for Road Traffic Noise (EPA, 1999)
	Noise Guide for Local Government (EPA, 2013)
	Interim Construction Noise Guideline (DECC, 2009)
Bushfire	
	Planning for Bushfire Protection (Rural Fire Service, 2006)
Waste	
	Waste Avoidance and Resource Recovery Strategy 2014-21 (EPA)
Air Quality	
Air Quality	Protection of the Environment Operations (Clean Air) Regulation 2002
	Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (DEC)
	Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (EPA 2016)
Greenhouse Gas	AGO Factors and Methods Workbook (AGO)
	Guidelines for Energy Savings Action Plans (DEUS, 2005)
Social	
	Social Impact Assessment Guideline (Department of Planning and Environment)

ATTACHMENT 2

Government Authority Responses to Request for Key Issues

Blacktown City Council
Growing with Pride

Your ref: SSD 9667
Our ref: MC-18-00004

23 October 2018

Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Attention: Melissa Prochazka

Dear Ms Prochazka,

Re: SSD 9667 – Light Horse Interchange Business Hub Eastern Creek

Thank you for your correspondence dated 10 October 2018 inviting us to provide an input to the Secretary's environmental assessment requirements (SEARS) for Light Horse Interchange Business Hub Eastern Creek, which is a State Significant Development proposal under Section 4.36 of the *Environmental Planning and Assessment Act 1979* ("the Act").

The draft SEARS has been reviewed by our officers and additional comments are listed in **Attachment A** to this letter. We request that these matters be addressed in the preparation of the EIS for this Business Hub.

If you would like to discuss this matter further, please contact Judith Portelli on 9839 6228.

Yours faithfully,

Glennys James
Director Planning & Development

Council Chambers • 62 Flushcombe Road • Blacktown NSW 2148
Telephone: (02) 9839 6000 • **Facsimile:** (02) 9831-1961 • DX 8117 Blacktown
Email: council@blacktown.nsw.gov.au • **Website:** www.blacktown.nsw.gov.au
All correspondence to: The General Manager • PO Box 63 • Blacktown NSW 2148

ATTACHMENT A

Matters to be considered and addressed:

Planning matters

Any draft Development Control Plan for development in the Business Hub to be reviewed and considered by Council to determine the adequacy of the intended planning controls including parking, setbacks etc.

Drainage matters

This area is significantly flood prone, not only from Eastern Creek but from the 3 tributaries coming from the west. Eskdale Creek and Reedy Creek are shown as blue lines on the 1:25,000 topo maps and will need to be referred to Water NSW as they will trigger controlled activities under the Water Management Act – as well as Eastern Creek. Where the catchments exceed 15 ha, the creeks should be maintained in a "natural" condition. Stormwater detention basins should be clear of the 1% Annual Exceedance Probability flood being the 1 in 100 year flood. As discharges are directly into Eastern Creek, water quality is a major concern and discharges should be treated in accordance with Part J of Council's DCP.

Flood evacuation principles will need to be established for the area. This should be prepared with reference to SES requirements.

Engineering matters

The engineering details are required to be in accordance with Blacktown Council's Engineering Guide for Development.

Section 7.11 matters

The proposed development is not on land subject to any Section 7.11 Contributions Plan in Blacktown. As such, the developer is to provide all local infrastructure required to meet the demand of its development in terms of Traffic and Transport impacts, and Water Management (quantity and quality) to mitigate downstream impacts.

Traffic matters

Council's Traffic Engineer has advised that the parking rates for the development should be provided in accordance with Blacktown Council's Development Control Plan for the area.

Environmental Health matters:

a. Contamination

The EIS will need to include a Stage 2 Detailed Site Investigation, including testing to determine the extent of any site contamination.

b. <u>Air Quality</u>

An air quality assessment will need to be carried out for potential impacts to the surrounding locality. The assessment must include and provide recommendations to mitigate the impact of any potentially offensive odours or identified air quality issues that may impact the surrounding locality.

c. <u>Noise and Vibration</u>

An acoustic and vibration assessment must be carried out for potential impacts to the surrounding locality.

Melissa Prochazka

From:	Luke Duncan <luke.duncan@jemena.com.au>
Sent:	Friday, 26 October 2018 3:09 PM
To:	Melissa Prochazka
Cc:	Paul Zurek
Subject:	[WARNING: ATTACHMENT(S) MAY CONTAIN MALWARE]RE: SSD 9667 - SEARs input for the Light Horse Interchange Business Hub, Eastern Creek
Attachments:	20180927 SEARs Request - Light Horse Business Hub (2).pdf

Hi Melissa,

Jemena Gas Networks (NSW) (**Jemena**) has reviewed the Concept Design as requested by the Department now provides preliminary inputs for consideration into the Planning Secretary's environmental assessment (SEAR) for the Light Horse Interchange Business Hub, Eastern Creek (SSD 9667).

Jemena's interest in the parcel of land is twofold. Jemena has a high pressure gas pipeline traversing the allotment, namely the Northern Trunk (Horsely Park to Plumpton) Licence 3. The pipeline alignment is secured via a registered easement on the certificate of title – being primarily Lot 10 on DP1061237 with the landholder Western Sydney Parklands Trust.

Jemena is required by the licences obtained under the *Pipelines Act 1967* and hence the *Pipelines Regulation (NSW) 2013* and *Australian Standard 2885* to operate the pipelines in compliance with the Pipeline Management Plan lodged with the Secretary of the Department.

The objects of Jemena as the operator of the pipelines as stated in the submitted Pipeline Management Plan are to minimise, as low as reasonably practicable, the hazards and risks:

a) to the safety of the public and customer arising from gas transmission;
b) from damage to property of the public and customers arising from gas transmission; and
c) to the safety of the public and customers arising from:
    i. interruptions to the conveyance or supply of gas; and
    ii. the reinstatement of an interrupted gas supply.

Jemena Inputs and recommendations

Jemena Engineering inputs are marked up in the attached document to enable the projects proponents to supply a response (pages 13-14 of 20180927 SEAR doc attached) . Equally, we have consolidated Jemena's inputs below (points 1-5) for ease of review.

1. The proposed access road is shown to cross the high pressure gas easement. It is stated as a primary vehicle access route and hence a permanent structure which will impact Jemena's maintenance due to future inaccessibility.

Proposed crossing designs will require Jemena review and potential workshops are to be undertaken with associated parties to discuss risk and impact of the design to Jemena operations.

2. It is recommended that all proposed stormwater drainage will not be undertaken over the high pressure gas pipeline easement but rather further upstream feeding into either Eskdale or Reedy Creek, as flooding mitigation measures are already in place at the Reedy Creek river crossing.

As the pipeline in this development location is located at a low topographical position, it will be prone to flooding. Flooding assessment and stormwater management designs are to incorporate Jemena assets and be issued to Jemena for review to ensure mitigated impact and risk to Jemena high pressure gas asset.

3. Details of the proposed BIO/OSD basin adjacent to the high pressure gas easement boundary will required Jemena review to ensure the basin is well contained with no contamination to surrounding soils which may impact the integrity of the pipeline.

4. As above, all crossing proposals in relation to the gas pipeline will require Jemena review to ensure mitigated impact and risk to the high pressure pipeline.

5. It is recommended that any proposed demolition or construction related works within close proximity to the easement borders are communicated to Jemena to ensure associated vibration will not impact the integrity of the high pressure gas pipeline.

Jemena requests that the project proponents engages with Jemena on further iterations of the project proposal, because as the project matures, then the understanding and impacts of decisions made will be better appreciated and potentially impact the tenure of Jemena's inputs and recommendations as a stakeholder. Jemena reserves the right to review it's inputs and recommendations going forward, if there are changes in the project design along with changes in adjoining land use which collectively have an impact on the risk and by extension the potential integrity of the pipeline network.

If you require further clarification on the content of this communication, then we will prepare a response as required.

Collectively, we appreciate the opportunity for an early engagement and opportunity to provide inputs on the project proposal.

Kind Regards

Luke Duncan
Property Coordinator
Jemena
Level 12, 99 Walker Street, North Sydney 2060
PO Box 1220, North Sydney 2060
(02) 9867 8104
luke.duncan@jemena.com.au| www.jemena.com.au

Natural Gas Jemena bringing energy to life

From: Melissa Prochazka <Melissa.Prochazka@planning.nsw.gov.au>
Sent: Thursday, 18 October 2018 11:27 AM
To: Luke Duncan <luke.duncan@jemena.com.au>
Cc: Paul Zurek <Paul.Zurek@jemena.com.au>
Subject: SSD 9667 - SEARs input for the Light Horse Interchange Business Hub, Eastern Creek

Dear Mr Zurek,

Please find attached the request for input into Planning Secretary's environmental assessment requirements (SEARs) for the Light Horse Interchange Business Hub, Eastern Creek (SSD 9667).

This is a concept development application at this stage, with further approval being required for the construction of individual buildings, ancillary facilities and associated works. It is noted that a high pressure gas easement runs through the site.

If Jemena would like to comment on the SEARs, we ask that you please do so by the close of business **Friday 26 October 2018**.

If you have any questions, please contact Melissa Prochazka on (02) 8289 6695 or via email at melissa.prochazka@planning.nsw.gov.au.

Kind regards,

Melissa Prochazka
Senior Planning Officer (Part-time: Monday to Thursday)
Industry Assessments
Department of Planning & Environment
Level 29 | 320 Pitt Street | GPO Box 39 SYDNEY NSW 2001
T 02 8289 6695 E melissa.prochazka@planning.nsw.gov.au

Subscribe to our e-news at www.planning.nsw.gov.au/enews
You'll also find us on Facebook , Twitter and Linked In
Please consider the environment before printing this email.

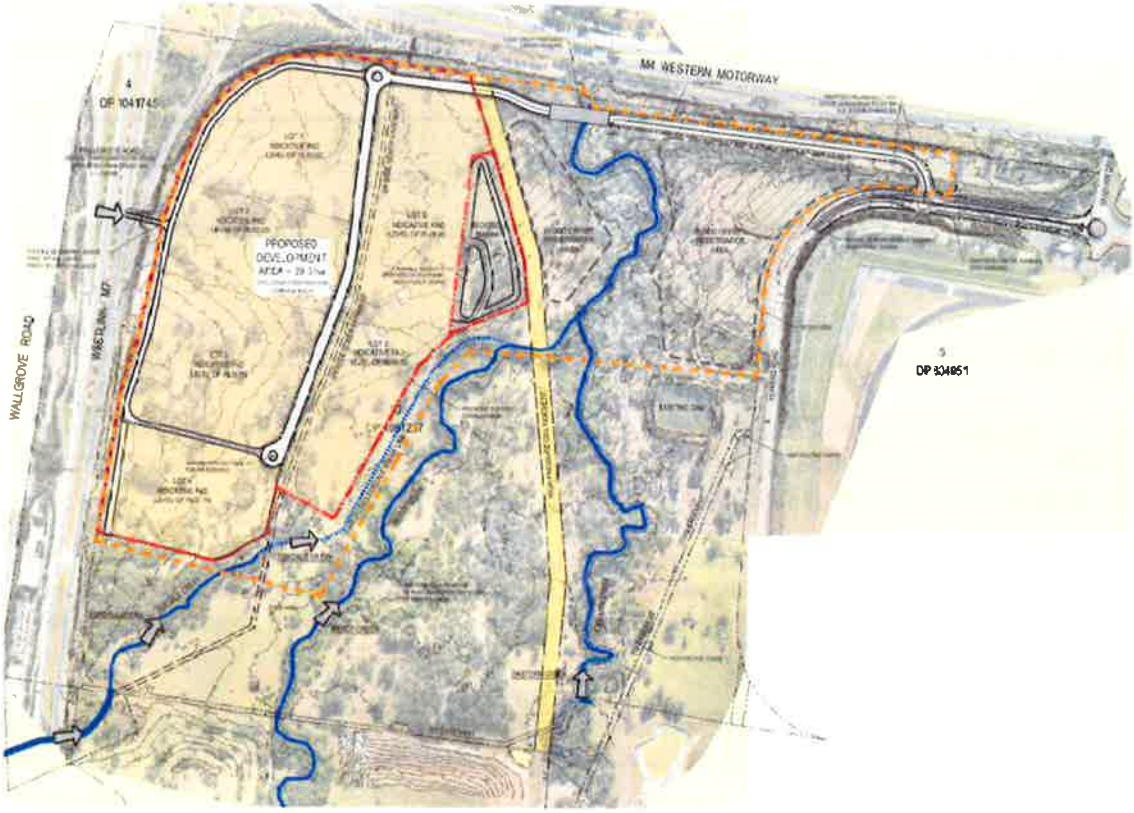
NSW GOVERNMENT Planning & Environment

Report this message as spam

****

****

Figure 10 – Engineering Concept Plan (Source: Henry & Hymas, 2018)



The key features of the concept proposal are described as follows:

- **Land use and built form:** indicative building envelopes are provided for the future construction of large-scale industrial-style buildings including:
  - Approximately 157,000sqm floorspace to accommodate a range of industrial and light industrial land use activities, which could include advanced manufacturing, freight and logistics and warehouse and distribution facilities.
  - Approximately 8,000sqm floorspace comprising ancillary offices to support the primary industrial and light industrial use
- **Landscaping:** the front setbacks of the future industrial lots will be landscaped to complement the architectural design of the future industrial buildings and present an attractive appearance within the streetscape. Additional landscaping will be provided within the rear and side setbacks where required to provide visual screening of the proposed buildings from the surrounding road network.
- **Transport, access and car parking**: primary vehicle access to the development site is proposed from Ferrers Road. Any new roads and road improvement works required to service the proposed development will be designed to address Blacktown City Council requirements and facilitate their dedication as part of the industrial subdivision. A secondary access point for lighter vehicles (ie excluding B-double trucks) may be provided via the existing Wallgrove Road entry/exit driveway, pending further assessment of the potential traffic impacts and compliance with relevant standards.
- **Stormwater management and flooding:** a comprehensive stormwater management system will be provided to manage the quality and quantity of water flows across the site, including mitigation measures to address potential flooding risk and avoid adverse impacts to the development potential of the upstream and downstream properties.
- **Biodiversity:** the site contains scattered trees and more concentrated areas of vegetation along the riparian corridors and within the south-western corner which will be assessed in further detail during the

Summary of Comments on 20180927 SEARs Request - Light Horse Business Hub (2).pdf

Page: 17

Number: 1 Author: JMU Subject: Note Date: 30/10/2018 9:23:27 AM

The proposed access road is shown to cross the high pressure gas easement.

1. It is stated as a primary vehicle access route and hence a permanent structure which will impact Jemena's maintenance due to future inaccessibility.

Proposed crossing designs will require Jemena review and potential workshops are to be undertaken with associated parties to discuss risk and impact of the design to Jemena operations.

Number: 2 Author: JMU Subject: Note Date: 25/10/2018 5:13:23 PM

2. It is recommended that all proposed stormwater drainage will not be undertaken over the high pressure gas pipeline easement but rather further upstream feeding into either Eskdale or Reedy Creek, as flooding mitigation measures are already in place at the Reedy Creek river crossing.

As the pipeline in this development location is located at a low topogrpahical position, it will be prone to flooding. Flooding assessment and stormwater management designs are to incorporate Jemena assets and be issued to Jemena for review to ensure mitigated impact and risk to Jemena high pressure gas asset.

Number: 3 Author: JMU Subject: Note Date: 25/10/2018 5:13:28 PM

3. Details of the proposed BIO/OSD basin adjacent to the high pressure gas easement boundary will required Jemena review to ensure the basin is well contained with no contamination to surrounding soils which may impact the integrity of the pipeline.

preparation of the SSDA. The final concept masterplan and EIS will address the removal of vegetation, including any biodiversity off-set requirements.

- **Bushfire protection measures:** the site is identified as Vegetation Category 2 bushfire prone land and the final concept masterplan and EIS will address the required bushfire protection measures to avoid risk and provide adequate safety for future building occupants and fire-fighting personnel.
- **Utility services:** the final siting and design of the proposed industrial subdivision will incorporate the existing easements for high-pressure gas and sewer, as well as any required augmentation of existing utility services to service the proposed development.

The detailed proposal will include the following early site works:

- **Demolition and remediation:** removal of existing buildings and structures and completion of any site remediation works required to ensure the site is suitable for its intended use as a business hub.
- **Bulk earthworks:** cut and fill details for the future building pad sites to facilitate the future development of the site as an industrial business hub.
- **Infrastructure:** provision of roads, utility services, stormwater works and flood mitigation measures required to facilitate the future development of the site as a business hub.
- **Subdivision:** creation of development lots, public roads, easements/restrictions, etc to facilitate the leasing and development of individual lots to accommodate industrial and light industrial land use activities, including freight and logistics and warehouse and distribution centres.

The EIS and SSDA will include sufficient detail for the first stage of development that will enable a Construction Certificate (CC) to be issued without the need for further development consent. Further detailed development applications will be lodged seeking approval for the development of the proposed industrial lots, including construction of buildings, ancillary facilities and associated site works.

Page: 18

Number: 1 Author: JMU Subject: Note Date: 25/10/2018 5:13:30 PM

4. As above, all crossing proposals in relation to the gas pipeline will require Jemena review to ensure mitigated impact and risk to the high pressure pipeline.

Number: 2 Author: JMU Subject: Note Date: 25/10/2018 5:13:33 PM

5. It is recommended that any proposed demolition or construction related works within close proximity to the easement borders are communicated to Jemena to ensure associated vibration will not impact the integrity of the high pressure gas pipeline.

Additionally any proposed civil works on or near the high pressure gas pipeline easement is to be issued to Jemena for review to ensure mitigated risk or impact to the pipeline.

Transport
Roads & Maritime
Services

17 October 2018

Our Reference: SYD18/01185/02 (A24446473)
DP&E Ref: SEAR 9667

Director/Team Leader
Industry Assessments
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Attention: Melissa Prochazka

Dear Sir/Madam

SEARS REQUEST - LIGHT HORSE INTERCHANGE BUSINESS HUB

Reference is made to your correspondence dated 10 October 2018 requesting Roads and Maritime Services (Roads and Maritime) to provide details of key issues and assessment requirements regarding the abovementioned development for inclusion in the Secretary's Environmental Assessment Requirements (SEARs).

Roads and Maritime require the following issues to be included in the transport and traffic impact assessment of the proposed development:

1. Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby intersections and the need/associated funding for upgrading or road improvement works (if required).The key intersections to be examined/modelled include:

    - Wallgrove Road / Site Access
    - The Horsley Drive / Ferrers Road
    - Great Western Highway / Brabham Drive

2. Details of the proposed accesses and the parking provisions associated with the proposed development including compliance with the requirements of the relevant Australian Standards (ie: turn paths, sight distance requirements, aisle widths, etc) and relevant parking codes. Swept path plans need to be provided.

3. Details of service vehicle movements (including vehicle type and likely arrival and departure times).

4. Roads and Maritime requires the environmental assessment report to assess the implications of the proposed development for non-car travel modes (including public transport use, walking and cycling); the potential for implementing a location-specific sustainable travel plan and the

provision of facilities to increase the non-car mode share for travel to and from the site. This will entail an assessment of the accessibility of the development site by public transport.

Any inquiries in relation to this Application can be directed to Amanda Broderick on 8849 2391 or development.sydney@rms.nsw.gov.au.

Yours sincerely

Pahee Rathan
A/ Senior Land Use Assessment Coordinator
North West Precinct

Transport for NSW

Kane Winwood
A/Team Leader, Industry Assessments
Department of Planning & Environment
GPO Box 39
Sydney NSW 2001

Attention: Melissa Prochazka

Dear Mr. Winwood,

Input on SEARs
Light Horse Interchange Business Hub, Eastern Creek (SSD 9667)

Thank you for your letter sent on 10 October 2018 requesting Transport for NSW (TfNSW) input to the Secretary's Environmental Assessment Requirements (SEARs) for the subject State Significant Development (SSD) application.

TfNSW has reviewed the Applicant's request for SEARs and provide the following input.

Transport and Accessibility (Construction and Operation)

The Environmental Impact Statement (EIS) for the subject development should include a Traffic and Transport Impact Assessment that provides, but is not limited to, the following:

- details all daily and peak traffic and transport movements likely to be generated (light and heavy vehicle, public transport, pedestrian and cycle trips) during construction and operation of the development;
- details of the current daily and peak hour vehicle, public transport, pedestrian and bicycle movements and existing traffic and transport facilities provided on the road network located adjacent to the proposed development;
- an assessment of the operation of existing and future transport networks including public transport, pedestrian and bicycle provisions and their ability to accommodate the forecast number of trips to and from the development;
- details the type of heavy vehicles likely to be used (e.g. B-doubles) during the operation of the development and the impacts of heavy vehicles on nearby intersections;
- details of access to, from and within the site to/from the local road and strategic (motorway) network including intersection location, design and sight distance (i.e. turning lanes, swept paths, sight distance requirements);
- impact of the proposed development on existing and future public transport and walking and cycling infrastructure within and surrounding the site;
- an assessment of the existing and future performance of key intersections providing access to the site (Site access with Wallgrove Road, Ferrers Road with Brabham Drive – subject to likely access routes to/from the motorway network), and any upgrades (road/ intersections) required as a result of the development;
- an assessment of predicted impacts on road safety and the capacity of the road network to accommodate the development;

- demonstrate the measures to be implemented to encourage employees of the development to make sustainable travel choices, including walking, cycling, public transport and car sharing;
- appropriate provision, design and location of on-site bicycle parking, and how bicycle provision will be integrated with the existing bicycle network;
- details of the proposed number of car parking spaces and compliance with appropriate parking codes and justify the level of car parking provided on the site;
- details of access and parking arrangements for emergency vehicles;
- detailed plans of the proposed layout of the internal road network and parking provision on-site in accordance with the relevant Australian Standards;
- the existing and proposed pedestrian and bicycle routes and end of trip facilities within the vicinity of and surrounding the site and to public transport facilities as well as measures to maintain road and personal safety in line with CPTED principles; and
- preparation of a draft Construction Traffic Management Plan which includes:
  - details of vehicle routes, number of trucks, hours of operation, access management and traffic control measures for all stages of construction;
  - assessment of cumulative impacts associated with other construction activities;
  - an assessment of road safety at key intersections;
  - details of anticipated peak hour and daily truck movements to and from the site;
  - details of access arrangements for workers to/from the site, emergency vehicles and service vehicle movements;
  - details of temporary cycling and pedestrian access during constructions;
  - an assessment of traffic and transport impacts during construction and how these impacts will be mitigated for any associated traffic, pedestrians, cyclists and public transport operations.

Transport policies and guidelines

Relevant policies and guidelines that could assist with the preparation of the Traffic and Transport Impact Assessment include:

- Guide to Traffic Generating Development (Roads and Maritime Services)
- Road Design Guide (Roads and Maritime Services)
- Austroads Guide to Traffic Management – Part 12: Traffic Impacts of Development
- Austroads Guidelines for Planning and Assessment of Road Freight Access in Industrial Areas
- Cycling Aspects of Austroads Guides
- Australia Standards AS2890.3 (Bicycle Parking Facilities)
- Integrated Public Transport Service Planning Guidelines: Sydney Metropolitan Area 2013 (TfNSW)

Strategic planning context

The EIS should detail how the proposed development will be consistent and align with the objectives, goals and directions of the following:

- Greater Sydney Region Plan
- Western City District Plan
- Future Transport Strategy 2056

- Future Transport – Greater Sydney Services and Infrastructure Plan
- NSW Freight & Ports Plan 2018-2023

Integration of development with existing shared path network

Finally, the Applicant should investigate, in consultation with relevant landowners, the integration of the development with the existing shared path network along the Westlink M7 and Peter Brock Drive.

If you require any further information regarding this matter, please contact Ken Ho, Transport Planner, via email at ken.ho@transport.nsw.gov.au. I hope this has been of assistance.

Yours sincerely

19/10/2018

Mark Ozinga
Principal Manager, Land Use Planning & Development
Freight, Strategy & Planning

CD18/09222

NSW GOVERNMENT | Department of Industry

OUT18/15758

Melissa Prochazka
Senior Planning Officer
Industry Assessments
NSW Department of Planning and Environment

melissa.prochazka@planning.nsw.gov.au

Dear Ms Prochazka

Light Horse Interchange Business Hub, Eastern Creek (SSD 9667)
Comment on the Secretary's Environmental Assessment Requirements (SEARs)

I refer to your email of 10 October 2018 to the Department of Industry (DoI) in respect to the above matter. Comment has been sought from relevant branches of Lands & Water and Department of Primary Industries (DPI), and the following requirements for the proposal are provided:

DoI - Water

- The identification of an adequate and secure water supply for the life of the project. This includes confirmation that water can be sourced from an appropriately authorised and reliable supply. This is also to include an assessment of the current market depth where water entitlement is required to be purchased.
- A detailed and consolidated site water balance.
- Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.
- Proposed surface and groundwater monitoring activities and methodologies.
- Consideration of relevant legislation, policies and guidelines, including the NSW Aquifer Interference Policy (2012), the Guidelines for Controlled Activities on Waterfront Land (2018) and the relevant Water Sharing Plans (available at https://www.industry.nsw.gov.au/water).

Any further referrals to Department of Industry can be sent by email to landuse.enquiries@dpi.nsw.gov.au.

Yours sincerely

Alison Collaros
A/Manager, Assessment Advice
Lands and Water - Strategy and Policy
17 October 2018

Melissa Prochazka

From:	Mohammed Rahman <mohammed.rahman@crownland.nsw.gov.au>
Sent:	Wednesday, 17 October 2018 11:42 AM
To:	Lands Ministerials; Melissa Prochazka; Paul Layt; Mohammed Rahman
Subject:	Fwd: SSD 9667 - SEARs input for the Light Horse Interchange Business Hub, Eastern Creek
Attachments:	SSD 9667 - SEARs input - DPI.PDF; 20180927 SEARs Request - Light Horse Business Hub.pdf; Assessment Advice Template.docx; Light Horse Interchange Business Hub Eastern Creek Map 12.10.18.pdf
Categories:	Purple Category

Hi,
A Land status investigation on Light Horse Interchange Business Hub, Eastern Creek SSD 9667, shows that there is no Crown land features exist.
Therefore, Department of Industry - Lands has no comments.
Thank You.
Regards,

Mohammed H Rahman | Natural Resources Management Officer Sydney Regional Services
Department of Industry, Lands and Water Division
PO Box 2185 DANGAR NSW 2309
T: 02 9842 8331 | F: 02 8836 5365 | E: mohammed.rahman@crownland.nsw.gov.au
W: www.crownland.nsw.gov.au

---------- Forwarded message ----------
From: **Metro Crownlands** <metro.crownlands@crownland.nsw.gov.au>
Date: 12 October 2018 at 11:00
Subject: Fwd: SSD 9667 - SEARs input for the Light Horse Interchange Business Hub, Eastern Creek
To: Mohammed Rahman <mohammed.rahman@crownland.nsw.gov.au>

FYI

Task allocated to you in Wrike.

Thanks

Ross

Sydney Metropolitan Office

NSW Department of Industry – Lands & Water Division

PO Box 2185 | Dangar NSW 2309

T: 1300 886 235| E: metro.crownlands@crownlands.nsw.gov.au

W: www.crownland.nsw.gov.au | www.industry.nsw.gov.au |

Please Note: For all enquiries, including appointment requests, please call 1300 886 235 during normal business hours

---------- Forwarded message ----------
From: **Lands Ministerials** <lands.ministerials@industry.nsw.gov.au>
Date: 12 October 2018 at 07:14
Subject: Fwd: SSD 9667 - SEARs input for the Light Horse Interchange Business Hub, Eastern Creek
To: Metro Crownlands <metro.crownlands@crownland.nsw.gov.au>

Hi

Can you please arrange for review of the attached information to determine if DoI Crown Lands need to provide a response. Can you please return any comments to this email address by 19 October 2018.

If no feedback is received by 19 October 2018, **it will be assumed that there is "no comment" and will be communicated to the requesting officer.**

If this request for information requires a Crown Land response, could you please use the Assessment Advice template that is attached. **Please return all responses to this email address.**

If this request does not belong to your area, could you please inform me, via return email to this address, as soon as possible.

I have included a map of the area to show if/where Crown land/roads/waterways may be affected.

Thank you
Kirstyn

Lands Ministerial Unit
NSW Department of Industry - Crown Lands
Level 4, 437 Hunter Street, NEWCASTLE NSW 2300
E: lands.ministerials@industry.nsw.gov.au W: www.industry.nsw.gov.au

Please contact Kirstyn Goulding on (02) 4920 5058 for any inquiries

--------- Forwarded message ---------
From: **Landuse Enquiries** <landuse.enquiries@dpi.nsw.gov.au>
Date: Thu, Oct 11, 2018 at 2:14 PM
Subject: Fwd: SSD 9667 - SEARs input for the Light Horse Interchange Business Hub, Eastern Creek
To: Water Referrals <water.referrals@nrar.nsw.gov.au>, AHP Central <ahp.central@dpi.nsw.gov.au>, Lands Ministerials <lands.ministerials@industry.nsw.gov.au>, Landuse Ag <landuse.ag@dpi.nsw.gov.au>

Hi all,

CM9 ref: V18/5075#1

Please see email below from Planning requesting comment on this project. A coordinated L&W/DPI reply through the Cabinet and Legislation team is required.

Please forward your comments (or nil comment) through to landuse.enquiries@dpi.nsw.gov.au for coordinated response prior to **(22/10/18)** to allow time for review and coordination of response to DP&E.

Water please note Cabinet and Legislation will draft water comments for the SEARs per our agreement.

Regards,

Alistair

---------- Forwarded message ---------
From: **Melissa Prochazka** <Melissa.Prochazka@planning.nsw.gov.au>
Date: Wed, 10 Oct 2018 at 12:50
Subject: SSD 9667 - SEARs input for the Light Horse Interchange Business Hub, Eastern Creek
To: Adam Oehlman <landuse.enquiries@dpi.nsw.gov.au>

Good Afternoon,

Please find attached the request for input into Planning Secretary's environmental assessment requirements (SEARs) for the Light Horse Interchange Business Hub, Eastern Creek (SSD 9667).

The Department of Planning and Environment invites you to comment on the request for SEARs by close of business **Tuesday 23 October 2018**.

If you have any questions, please contact Melissa Prochazka on (02) 8289 6695 or via email at melissa.prochazka@planning.nsw.gov.au.

Kind regards,

Melissa Prochazka

Senior Planning Officer (Part-time: Monday to Thursday)

Industry Assessments

Department of Planning & Environment

Level 29 | 320 Pitt Street | GPO Box 39 SYDNEY NSW 2001

T 02 8289 6695 E melissa.prochazka@planning.nsw.gov.au

--

Alistair Drew I Policy Officer Assessments - Cabinet and Legislation Services

NSW Department of Industry I Lands & Water I Strategy and Policy

Level 3 | 26 Honeysuckle Drive | Newcastle | NSW 2300

M: 0417 626 567

E: landuse.enquiries@dpi.nsw.gov.au

This message is intended for the addressee named and may contain confidential information. If you are not the intended recipient, please delete it and notify the sender. Views expressed in this message are those of the individual sender, and are not necessarily the views of their organisation.

This message is intended for the addressee named and may contain confidential information. If you are not the intended recipient, please delete it and notify the sender. Views expressed in this message are those of the individual sender, and are not necessarily the views of their organisation.

The *Crown Land Management Act 2016* commenced on 1 July 2018.
Click here to find out more.

This message is intended for the addressee named and may contain confidential information. If you are not the intended recipient, please delete it and notify the sender. Views expressed in this message are those of the individual sender, and are not necessarily the views of their organisation.

√DONE & SENT

NSW GOVERNMENT | Office of Environment & Heritage

DOC18/767888
SSD 9667

Kane Winwood
Acting Team Leader
Industry Assessment
Planning Services
NSW Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Dear Mr Winwood

Input into SEARs – Light Horse Interchange Business Hub, Eastern Creek (SSD 9667)

Thank you for your letter of 10 October 2018, requesting input into SEARs from the Office of Environment and Heritage (OEH) on the Light Horse Interchange Business Hub for the above State Significant Development.

OEH has reviewed the draft Request for Secretary's Environmental Assessment Requirements prepared by Urbis dated September 2018 and provides the following recommendations in Attachment A.

Please be advised that a separate response may be provided on heritage matters by the Heritage Division of OEH as delegate of the Heritage Council of NSW.

Should you have any queries regarding this matter, please contact Bronwyn Smith on 9873 8604 or Bronwyn.smith@environment.nsw.gov.au

Yours sincerely

12/10/18

AMY DUMBRELL
A/Senior Team Leader Planning
Greater Sydney
Communities and Greater Sydney Division

PO Box 644 Parramatta NSW 2124
Level 6, 10 Valentine Ave Parramatta NSW 2150
Tel: (02) 9995 5000 Fax: (02) 9995 6900
ABN 30 841 387 271
www.environment.nsw.gov.au

Attachment A – OEH Environmental Assessment Requirements – SSD 9667

Biodiversity
1. Biodiversity impacts related to the proposed development are to be assessed in accordance with Section 7.9 of the Biodiversity Conservation Act 2017 the Biodiversity Assessment Method and documented in a Biodiversity Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the Biodiversity Conservation Act 2016 (s6.12), Biodiversity Conservation Regulation 2017 (s6.8) and Biodiversity Assessment Method, including an assessment of the impacts of the proposal (including an assessment of impacts prescribed by the regulations). 2. The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method. 3. The BDAR must include details of the measures proposed to address the offset obligation as follows; • The total number and classes of biodiversity credits required to be retired for the development/project; • The number and classes of like-for-like biodiversity credits proposed to be retired; • The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; • Any proposal to fund a biodiversity conservation action; • Any proposal to conduct ecological rehabilitation (if a mining project); • Any proposal to make a payment to the Biodiversity Conservation Fund. If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits. 4. The BDAR must be submitted with all spatial data associated with the survey and assessment as per Appendix 11 of the BAM. 5. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017 under s6.10 of the *Biodiversity Conservation Act 2016*.
Aboriginal cultural heritage
6. The EIS must identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development and document these in an Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for surface survey and test excavation. The identification of cultural heritage values must be conducted in accordance with the Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW (OEH 2010), and guided by the Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (DECCW, 2011) 7. Consultation with Aboriginal people must be undertaken and documented in accordance with the Aboriginal cultural heritage consultation requirements for proponents 2010 (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the ACHAR.

8. Impacts on Aboriginal cultural heritage values are to be assessed and documented in the ACHAR. The ACHAR must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the ACHAR must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to OEH.

Note that a due diligence report is not acceptable, a ACHAR must be prepared.

Water and soils

9. The EIS must map the following features relevant to water and soils including:
   a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map).
   b. Rivers, streams, wetlands, estuaries (as described in s4.2 of the Biodiversity Assessment Method).
   c. Wetlands as described in s4.2 of the Biodiversity Assessment Method.
   d. Groundwater.
   e. Groundwater dependent ecosystems
   f. Proposed intake and discharge locations

10. The EIS must describe background conditions for any water resource likely to be affected by the development, including:
    a. Existing surface and groundwater.
    b. Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations.
    c. Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters.
    d. Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government.
    e. Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions http://www.environment.nsw.gov.au/research-and-publications/publications-search/risk-based-framework-for-considering-waterway-health-outcomes-in-strategic-land-use-planning

11. The EIS must assess the impacts of the development on water quality, including:
    a. The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction.
    b. Identification of proposed monitoring of water quality.
    c. Consistency with any relevant certified Coastal Management Program (or Coastal Zone Management Plan)

12. The EIS must assess the impact of the development on hydrology, including:
    a. Water balance including quantity, quality and source.

b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas.

c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems.

d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches).

e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water.

f. Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options.

g. Identification of proposed monitoring of hydrological attributes.

Flooding and coastal hazards

13. The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including:
    a. Flood prone land.
    b. Flood planning area, the area below the flood planning level.
    c. Hydraulic categorisation (floodways and flood storage areas)
    d. Flood Hazard.

14. The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 5% Annual Exceedance Probability (AEP), 1% AEP, flood levels and the probable maximum flood, or an equivalent extreme event.

15. The EIS must model the effect of the proposed development (including fill) on the flood behaviour under the following scenarios:
    a. Current flood behaviour for a range of design events as identified in 14 above. This includes the 0.5% and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.

16. Modelling in the EIS must consider and document:
    a. Existing council flood studies in the area and examine consistency to the flood behaviour documented in these studies.
    b. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood, or an equivalent extreme flood.
    c. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazard categories and hydraulic categories
    d. Relevant provisions of the NSW Floodplain Development Manual 2005.

17. The EIS must assess the impacts on the proposed development on flood behaviour, including:
    a. Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure.
    b. Consistency with Council floodplain risk management plans.
    c. Consistency with any Rural Floodplain Management Plans.

d. Compatibility with the flood hazard of the land.
e. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.
f. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.
g. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.
h. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the NSW SES and Council.
i. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the NSW SES and Council.
j. Emergency management, evacuation and access, and contingency measures for the development considering the full range or flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the NSW SES
k. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.

(END OF SUBMISSION)

Heritage Council of New South Wales
NSW GOVERNMENT

Level 6, 10 Valentine Avenue
Parramatta NSW 2150
Locked Bag 5020
Parramatta NSW 2124

Telephone: 61 2 9873 8500
Facsimile: 61 2 9873 8599
heritagemailbox@environment.nsw.gov.au
www.heritage.nsw.gov.au

Ref No: DOC18/765292
Your ref: SSD 9667

Ms Melissa Prochazka
Senior Planning Officer - Industry Assessments
Department of Planning & Environment
Level 22, 320 Pitt Street
SYDNEY NSW 2001

By email: melissa.prochazka@planning.nsw.gov.au

Dear Ms Prochazka

REQUEST FOR SECRETARY'S ENVIRONMENTAL REQUIREMENTS FOR PROPOSED LIGHT HORSE INTERCHANGE BUSINESS HUB – WESTERN SYDNEY PARKLANDS, EASTERN CREEK, BLACKTOWN LGA (SSD 9667)

Reference is made to your correspondence received on 10 October 2018 requesting input on the Secretary's Environmental Assessment Requirements from the Heritage Council of NSW for the abovementioned development proposal. It is understood that this proposal is a Concept Development Application and relates to site establishment and enabling works and no buildings are currently proposed.

The following report has been reviewed:

- *Request for Secretary's Environmental Assessment Requirements, Light Horse Interchange Business Hub, Eastern Creek,* prepared by URBIS, dated 26 September 2018 (Report).

It is noted that heritage is not identified as a key environmental issue in the Report. Based on the assessed documentation, the subject site is not within the curtilage of any State Heritage Register (SHR) items and no historic archaeology is identified within the project area. Consequently, no specific heritage SEARs are recommended.

If you have any questions regarding the above matter, please contact James Quoyle, Senior Heritage Assessment Officer at the Heritage Division, Office of Environment and Heritage on 02 9873 8612 or james.quoyle@environment.nsw.gov.au.

Yours sincerely

16/10/2018
Katrina Stankowski
Senior Ream Leader, Regional Assessments - North
Heritage Division
Office of Environment & Heritage

As Delegate of the Heritage Council of NSW

DOC18/766651-01
SSD 9667

23/10/18

Ms Melissa Prochazka
Department of Planning and Environment
GPO BOX 39
SYDNEY NSW 2001

Dear Ms Prochazka

SSD 9667 – LIGHT HORSE INTERCHANGE BUSINESS HUB – SEARs

I am writing to you in reply to your invitation to the Environment Protection Authority (EPA) to provide input to the draft Secretary's environmental assessment requirements (SEARs) for the above project.

The EPA understands that the proposed development involves a Concept Plan for an industrial subdivision located between Ferrers Road and M7 Westlink adjacent to Eskdale and Reedy Creeks near their confluence with Eastern Creek. The EPA further understands that access to the subdivision is to be provided via a slip/link road that requires construction of a bridge across Eastern Creek adjacent to the southern boundary of the M4 motorway road reserve.

The EPA emphasises that it is fundamental to the proper design and operation of the subdivision and subsequent development of individual allotments that all such measures as may be necessary are adopted to prevent pollution of waters, especially Eskdale Creek, Reedy Creek and Eastern Creek. The environmental impact statement (EIS) should explicitly address the issue of baseline water quality in Eastern Creek and its tributaries and how construction of the subdivision and slip/link road, and development and operation of individual allotments would meet water quality objectives for Eastern Creek.

The EIS should assess, quantify and report on:

- site contamination;
- hazardous materials likely to be encountered during site preparation, bulk excavation and subdivision construction;
- noise impacts during site preparation, bulk excavation, and construction and construction-related work;
- waste management in the context of the waste management hierarchy;
- runoff impacts during site preparation, bulk excavation, subdivision and slip/link road construction and construction-related work;
- air quality (dust) impacts during site preparation, bulk excavation, subdivision and slip/link road construction and construction-related work;

Phone 131 555 **Fax** +61 2 9995 5999 PO Box 668
Phone +61 2 9995 5555 **TTY** 133 677 Parramatta
ABN 43 692 285 758 NSW 2124 Australia
(from outside NSW)
Level 13
10 Valentine Av
Parramatta NSW
2150 Australia
info@epa.nsw.gov.au
www.epa.nsw.gov.au

- water quality impacts on Eastern Creek and its tributaries;
- water conservation, including practical opportunities to implement water sensitive urban design principles;
- energy efficiency, including practical opportunities to minimise energy consumption from non-renewable sources; and
- cumulative environmental impacts.

The proponent should ensure that the EIS is sufficiently comprehensive and detailed to allow the EPA to determine the extent of the impact(s) of the proposal. The EIS should both:

(a) describe mitigation and management options that will be used to prevent, control, abate or minimise identified environmental impacts associated with the project and to reduce risks to human health and prevent the degradation of the environment; and

(b) include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.

The EPA emphasises the need to consider the following additional guidance material during preparation of the EIS and supporting documents:

- Fact Sheets A and B to the Noise Policy for Industry concerning background noise assessment,
- Waste Classification Guideline Part 1 (General);
- NSW EPA Sampling Design Guidelines;
- Guidelines for the NSW Site Auditor Scheme (3rd edition) 2017;
- Guidelines for Consultants Reporting on Contaminated Sites, 2011; and
- The National Environment Protection (Assessment of Site Contamination) Measure 2013 as amended.

The EPA has identified the following site specific concerns based on the information (including the draft SEARs) supplied to it by Department of Planning and Environment:

(a) the need for a detailed assessment of potential site contamination, including information about groundwater;

(b) identification, handling, transport and disposal of any hazardous materials (including asbestos waste) that may be encountered during the site preparation, bulk excavation and construction of the proposed subdivision and slip/link road as well as subsequent development of individual allotments;

(c) characterisation of the existing water quality in the Eskdale Creek, Reedy Creek and Eastern Creek;

(d) identification and implementation of all such measures as may be necessary to prevent the pollution of Eskdale Creek, Reedy Creek and Eastern Creek;

(e) site preparation, bulk excavation, and construction and construction-related erosion and sediment control and management, including during works to develop the subdivision slip/link road (and bridge) and subsequent development of individual allotments;

(f) noise impacts of site preparation, bulk excavation, and construction and construction-related work (including recommended standard construction hours and intra-day respite periods for highly intrusive noise generating work) on noise sensitive receivers such as surrounding residences;

(g) site preparation, bulk excavation, and construction and construction-related dust control and management,

(h) site preparation, bulk excavation, and construction and construction-related waste management, including waste classification in accordance with EPA guidelines and off-site disposal of concrete waste and rinse water;

(i) operational noise impacts on noise sensitive receivers (especially surrounding residences) arising from operational activities;

(j) operational waste management in accordance with the waste management hierarchy;

(k) practical opportunities to implement water sensitive urban design principles, including stormwater re-use for grounds maintenance and toilet flushing; and

(l) practical opportunities to minimise consumption of energy generated from non-renewable sources and to implement effective energy efficiency measures, including passive solar design.

Should you require clarification of any of the above please contact John Goodwin on 9995 6838.

Yours sincerely

Sarah Thomson

SARAH THOMSON
Unit Head Operations, Metropolitan Infrastructure
Environment Protection Authority

All communications to be addressed to:

Headquarters
15 Carter Street
Lidcombe NSW 2141

Headquarters
Locked Bag 17
Granville NSW 2142

Telephone: 1300 NSW RFS
e-mail: records@rfs.nsw.gov.au

Facsimile: 8741 5433

The Secretary
Department of Planning and Environment (Sydney Offices)
GPO Box 39
Sydney NSW 2001

Your Ref: SSD 9667
Our Ref: D18/7603
DA18102315693 AP

ATTENTION: Melissa Prochazka

26 October 2018

Dear Ms Prochazka

Part 3A/State Significant Development Application - 10//1061237 - 165 Wallgrove Road Eastern Creek 2766; 5//804051 - 475 Ferrers Road Eastern Creek 2766

I refer to your correspondence dated 10 October 2018 seeking key issue and assessment requirements regarding bush fire protection for the above Part 3A/State Significant Development Application in accordance with section 75F (4) of the 'Environmental Planning and Assessment Act 1979'.

The New South Wales Rural Fire Service (NSW RFS) has considered the information submitted and provides the following advice:

1. A bush fire assessment report needs to be prepared by a suitably qualified consultant. The report shall demonstrate how the proposal complies with the aims and objectives of 'Planning for Bush Fire Protection 2006' (or equivalent).

Should you wish to discuss this matter please contact Alastair Patton on 1300 NSW RFS.

Yours sincerely

Kalpana Varghese

Kalpana Varghese
Acting Team Leader, Development Assessment and Planning

For general information on bush fire protection please visit www.rfs.nsw.gov.au

WaterNSW

PO Box 398, Parramatta NSW 2124
Level 14, 169 Macquarie Street
Parramatta NSW 2150
www.waternsw.com.au
ABN 21 147 934 787

Contact: Alison Kniha
Telephone: 02 9865 2505
Our ref: D2018/113260

Kane Winwood
Acting Team Leader, Industry Assessment
Planning Services
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

CC: Ms M Prochazka

Dear Mr ~~Winwood~~, Kane

RE: INPUT INTO SEARs LIGHT HORSE INTERCHANGE BUSINESS HUB, EASTERN CREEK (SSD 9667)

Thank you for your email and the opportunity for WaterNSW to provide input to the SEARS for the proposed SSD 9667 Light Horse Interchange Business Hub, Eastern Creek.

WaterNSW understands that Department of Planning and Environment has received a request for SEARs lodged by Western Sydney Parklands. The proposal is for the redevelopment of the site as an industrial business hub in the Blacktown Local Government Area.

The subject site, comprising Lot 10 DP 1061237 and Lot 5, DP 804051, is located more than 3 km northwest of Prospect Reservoir and the Warragamba Pipelines. Considering this, and having reviewed the Preliminary Environmental Impact Assessment, WaterNSW has no particular requirements and has no wish to provide input to the SEARs for the proposal.

We request the Department continues to consult with WaterNSW regarding proposals on land adjacent to and impacting on WaterNSW infrastructure, land or assets due to the potential for impact on water quality and water supply. Please email all correspondence using the address Environmental.Assessments@waternsw.com.au.

Yours sincerely

Malcolm Hughes

MALCOLM HUGHES
Manager Catchment Protection

Date: 19/10/18

Melissa Prochazka

From: Easements&Development <Easements&Development@transgrid.com.au>
Sent: Thursday, 11 October 2018 7:46 AM
To: Melissa Prochazka
Subject: 2018-504 Light Horse Interchange Business Hub SSD 9667

Categories: Purple Category

Attention: **Mellissa Prochazka**

TransGrid Number: **2018-504**

Proposal: **Light Horse Interchange Business Hub SSD 9667**

Location: **165 Wallgrove road & 475 Ferrers road Eastern Creek**

Thank you for referring the above – mentioned Development Application (DA) to TransGrid.

Please be advised after reviewing the proposed Development Application, TransGrid can confirm we have no objections to the DA as it does not affect TransGrid's infrastructure.

If you have any concerns, please do not hesitate to contact the undersigned.

Regards

Michael

Michael Platt
Development Assessment and Control Officer | Network Planning and Operations

TransGrid | 200 Old Wallgrove Road, Wallgrove, NSW, 2766
T: (02) 9620 0161 **M:** 0427 529 997
E: Michael.Platt@transgrid.com.au **W:** www.transgrid.com.au

Appendix B

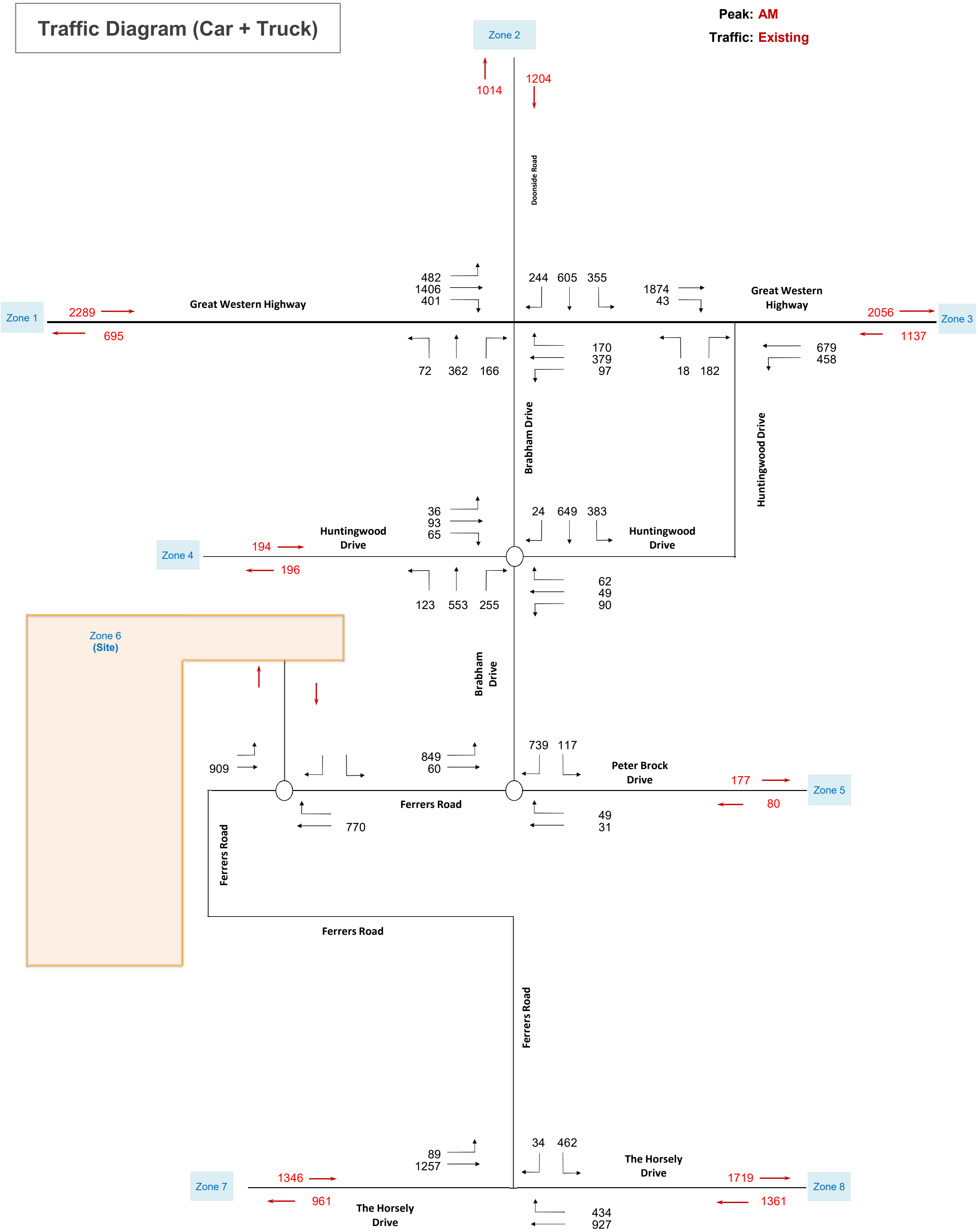
Traffic Diagrams

B1:

Existing Traffic (Surveyed)

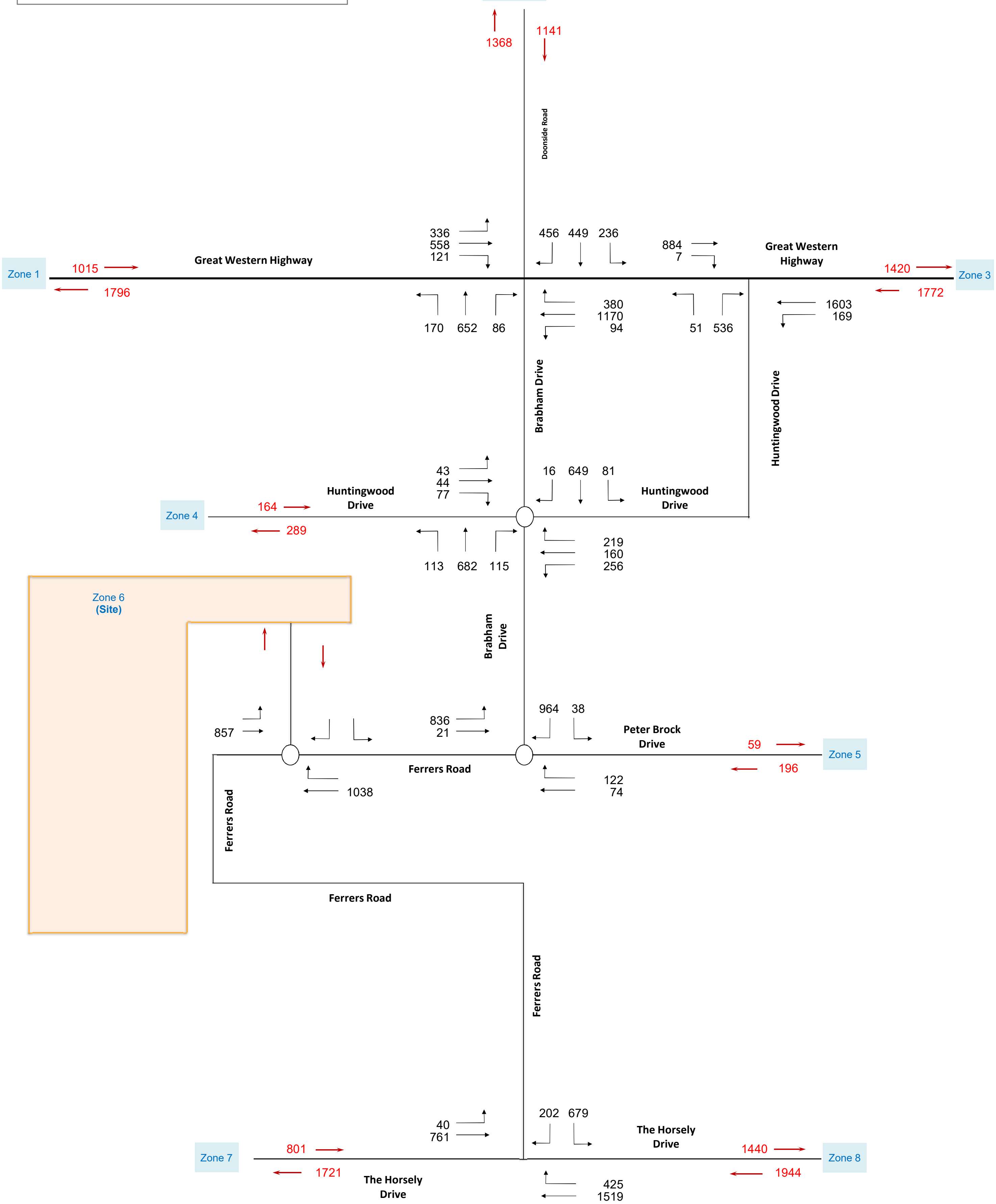
Traffic Diagram (Car + Truck)

Peak: AM
Traffic: Existing



Traffic Diagram (Car + Truck)

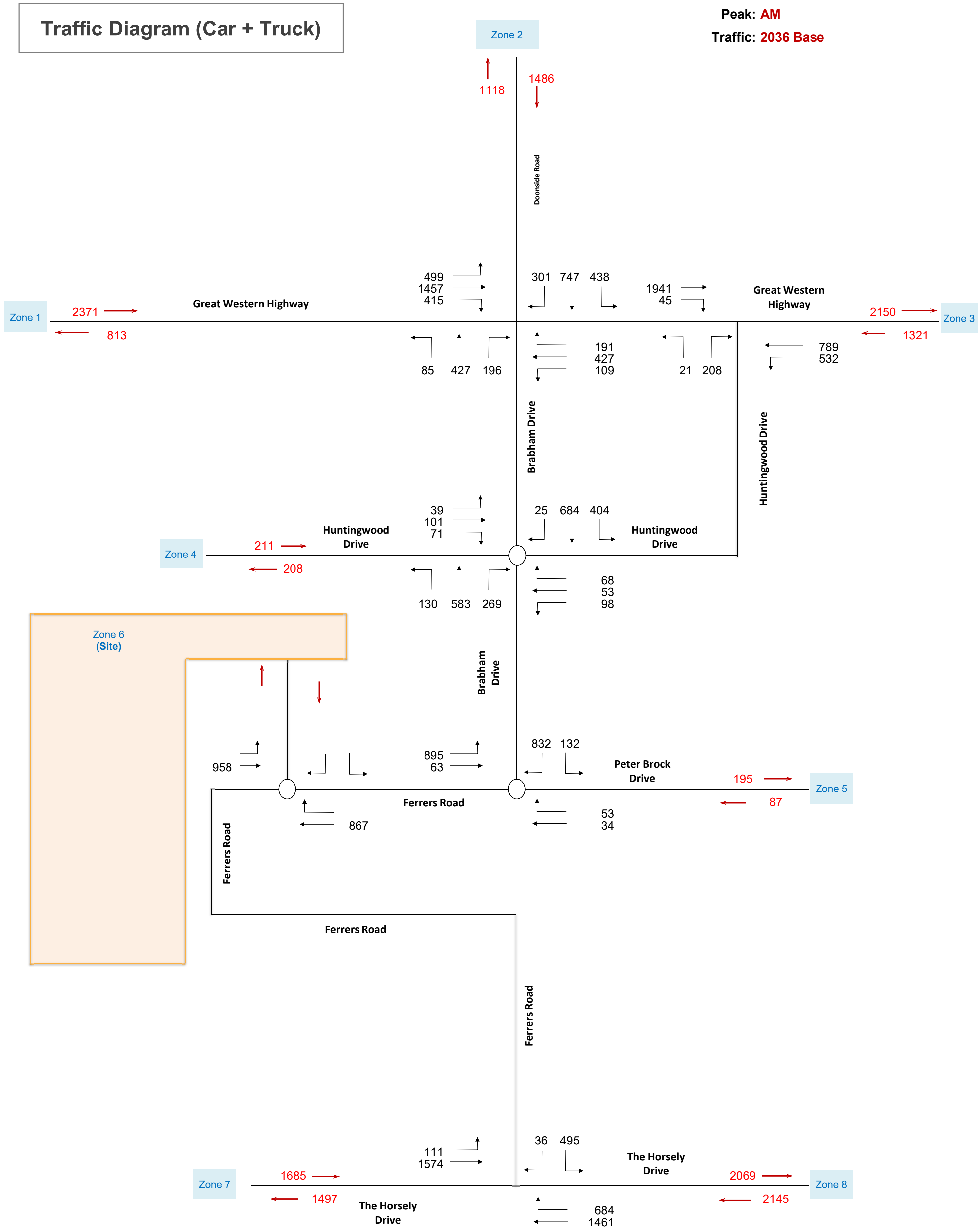
Peak: PM
Traffic: Existing



B2:

2036 Background Traffic

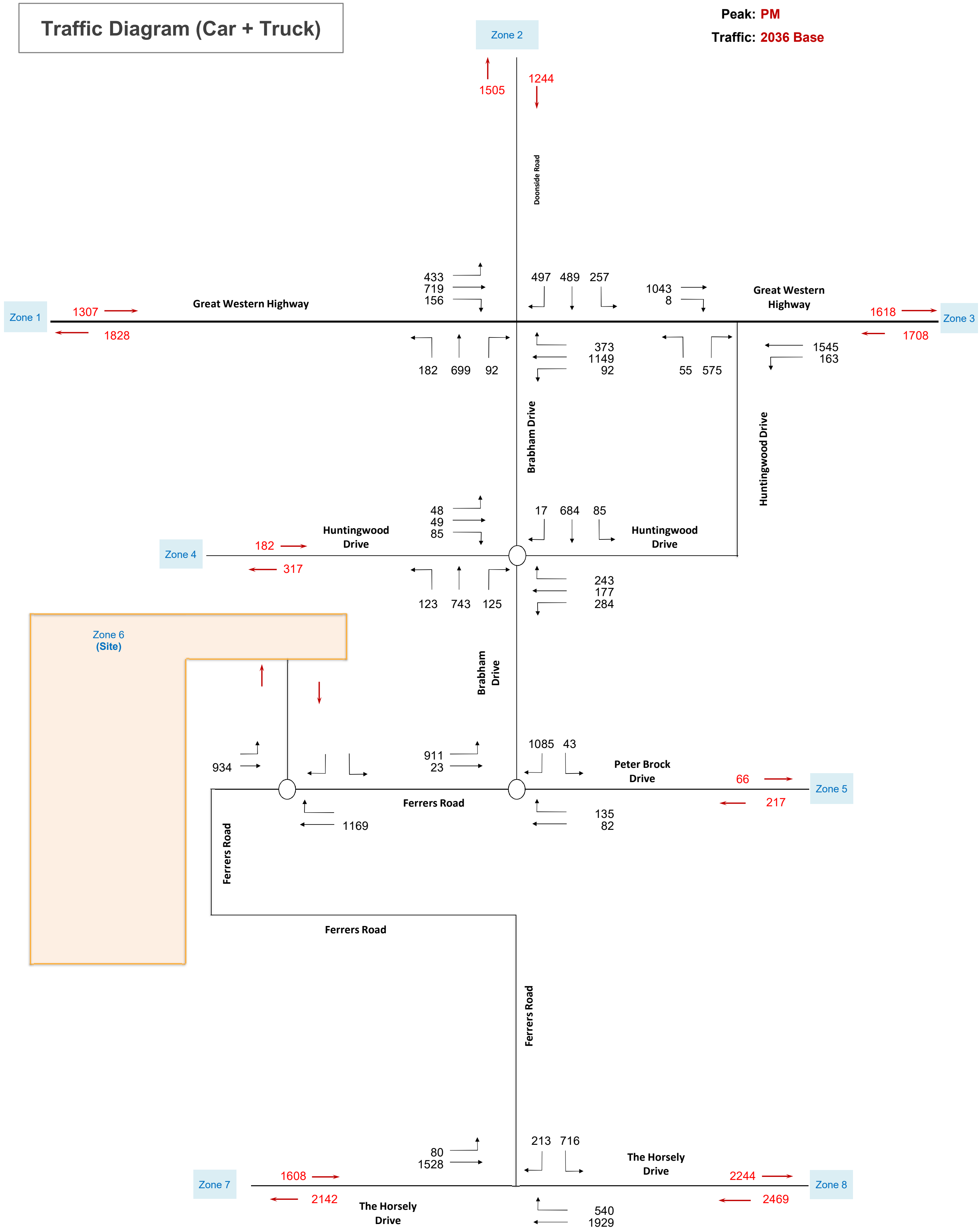
Traffic Diagram (Car + Truck)



Traffic Diagram (Car + Truck)

Peak: PM

Traffic: 2036 Base

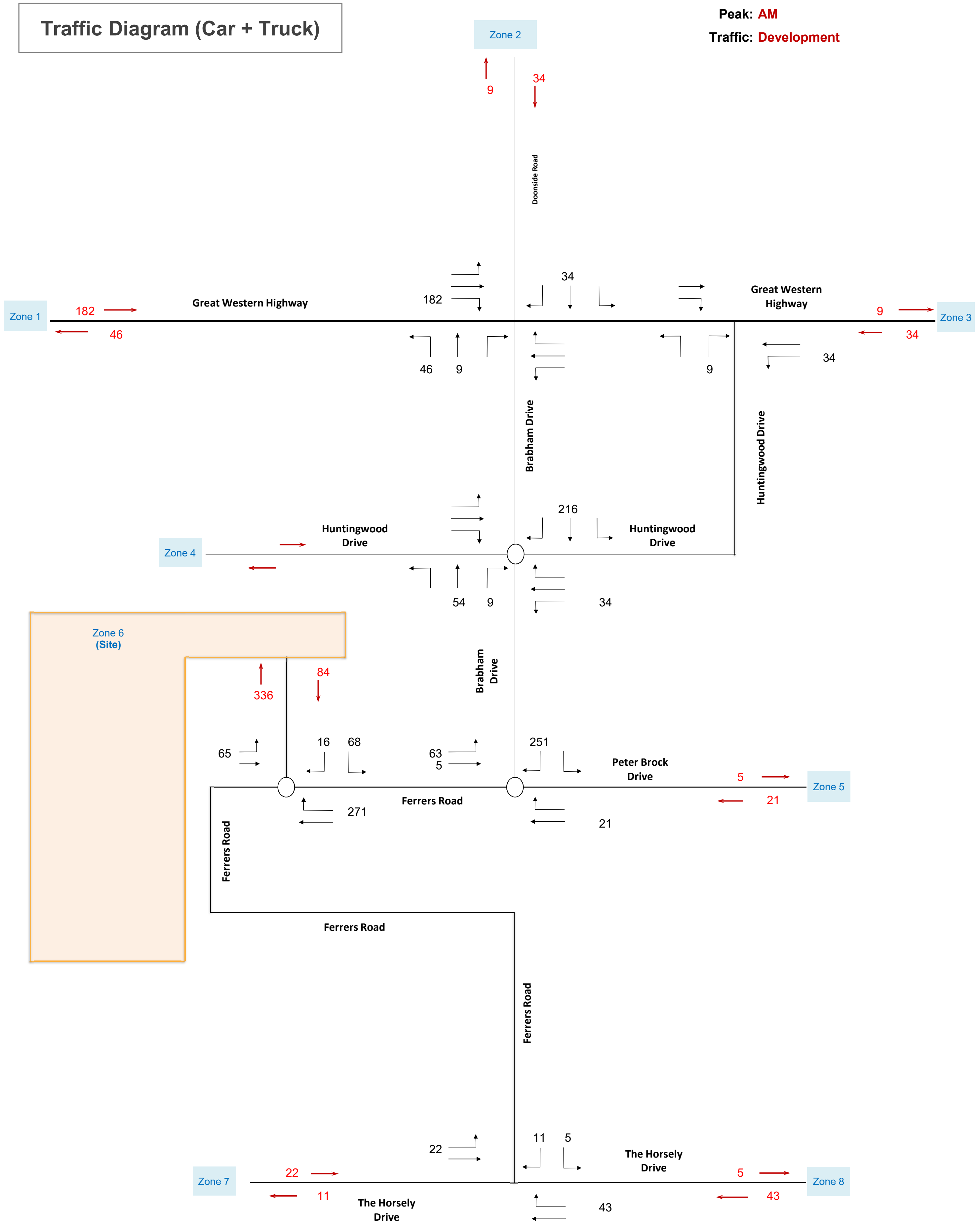


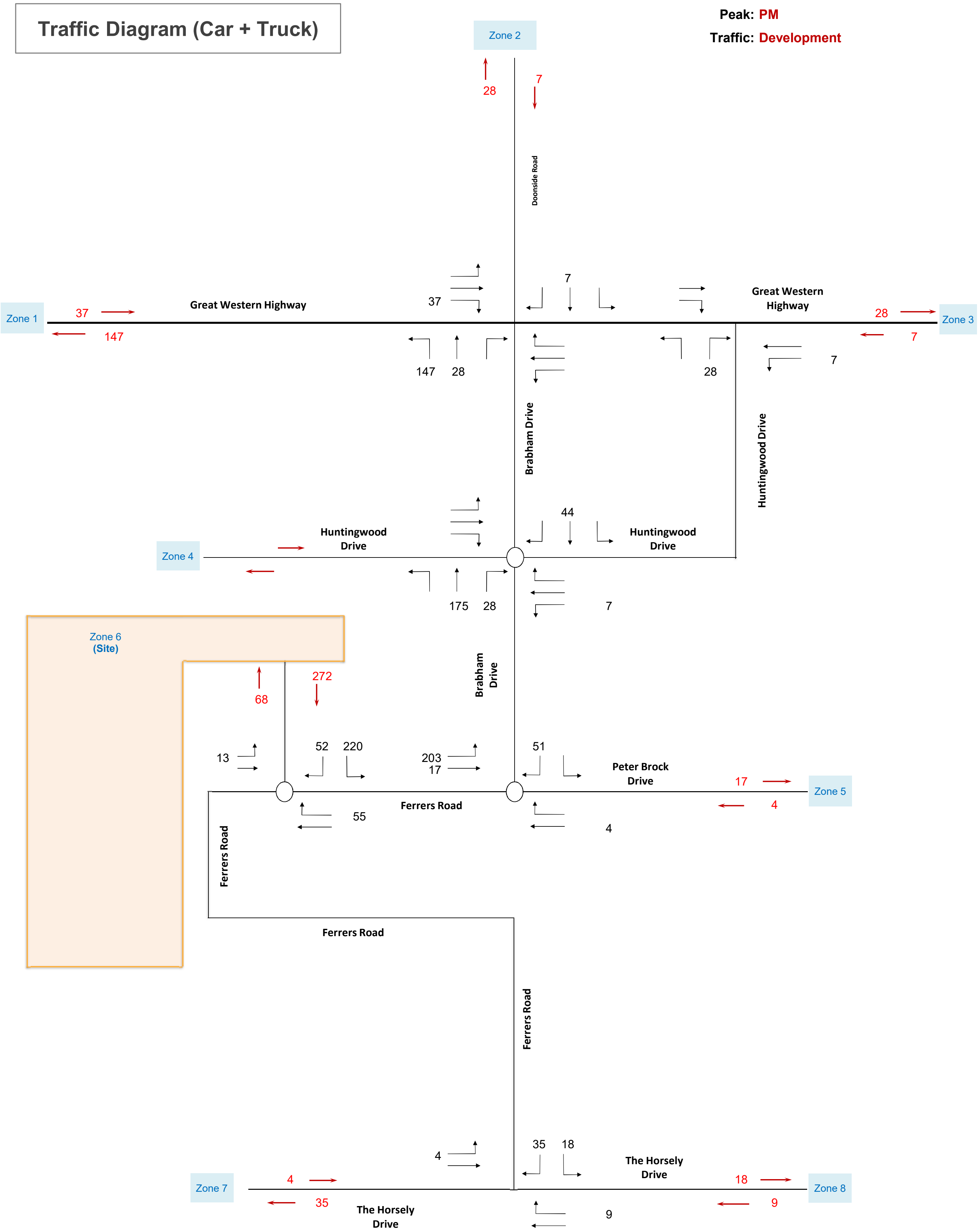
B3:

Development Traffic

Traffic Diagram (Car + Truck)

Peak: AM
Traffic: Development





Traffic Diagram (Car + Truck)
Peak: PM
Traffic: Development
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
(Site)
Zone 7
Zone 8
Great Western Highway
Great Western Highway
Doonside Road
Brabham Drive
Brabham Drive
Huntingwood Drive
Huntingwood Drive
Huntingwood Drive
Peter Brock Drive
Ferrers Road
Ferrers Road
Ferrers Road
Ferrers Road
The Horsely Drive
The Horsely Drive
28
7
37
147
37
7
147
28
28
28
7
28
7
44
175
28
7
68
272
13
52
220
203
17
51
55
4
17
4
4
35
18
4
35
18
9
9

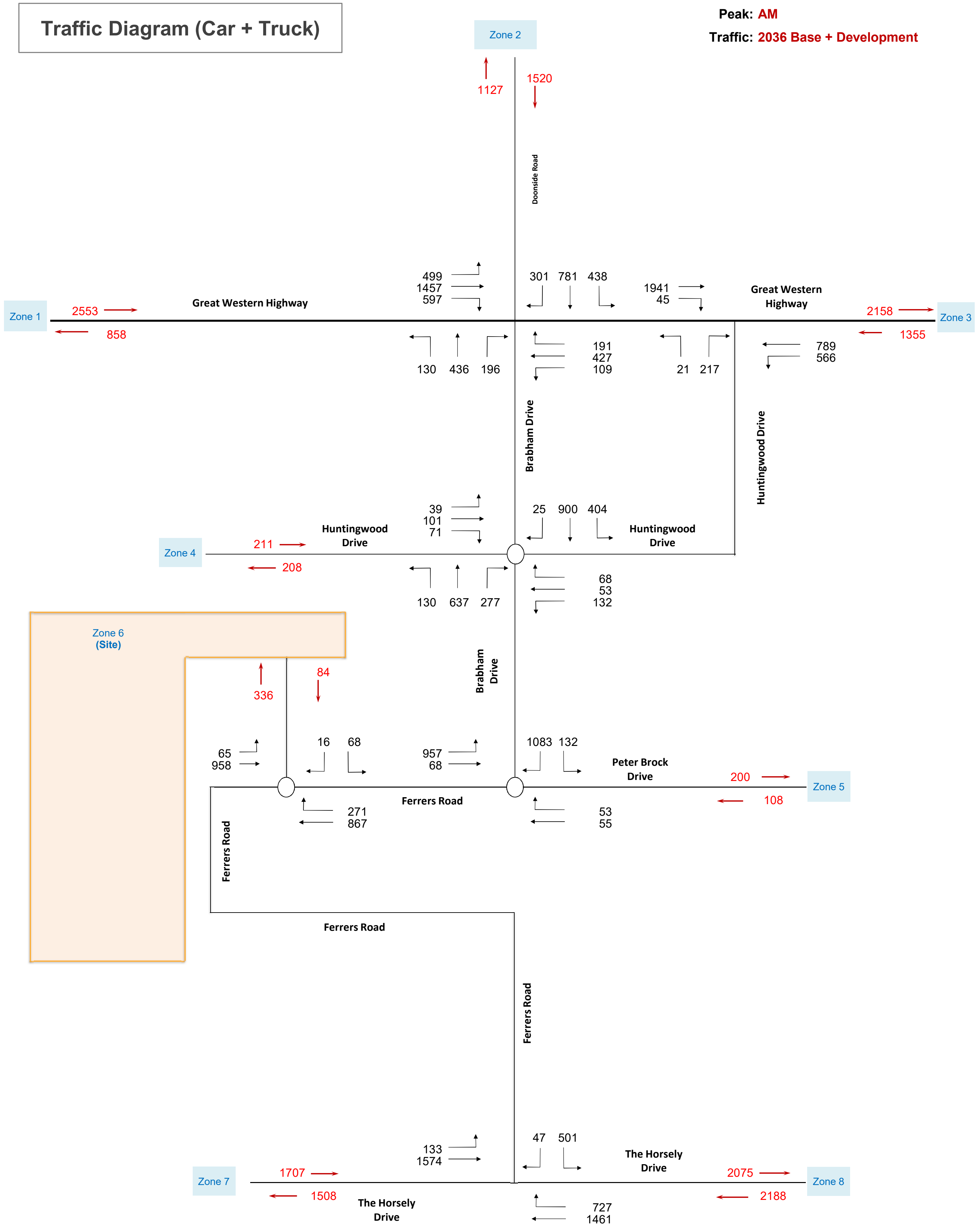
B4:

2036 Background plus Development Traffic

Traffic Diagram (Car + Truck)

Peak: AM

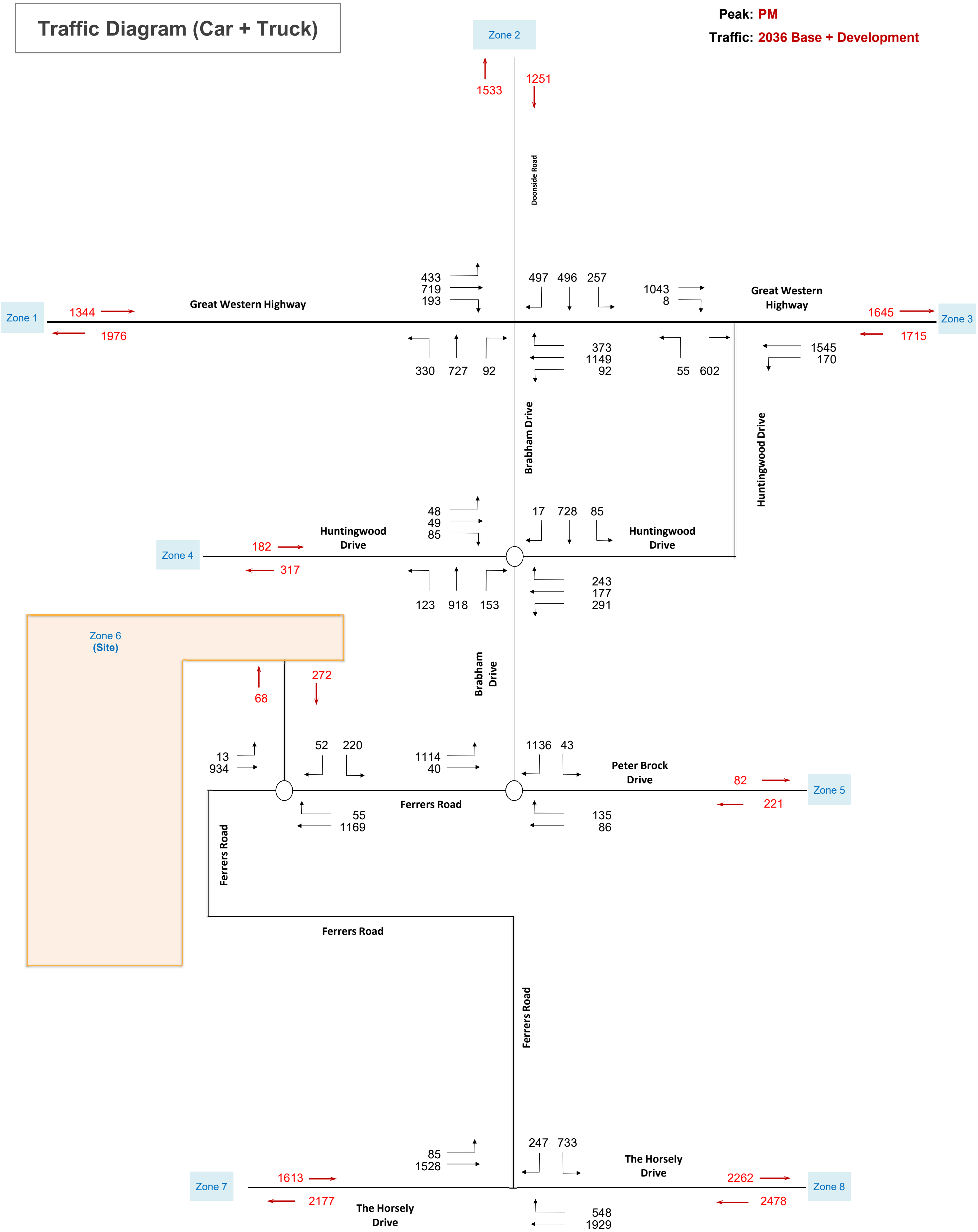
Traffic: 2036 Base + Development



Traffic Diagram (Car + Truck)

Peak: PM

Traffic: 2036 Base + Development



Appendix C

SIDRA Results

C1:

Existing Conditions

MOVEMENT SUMMARY

Site: 1 [Doonside x GWH x Brabham_ Existing_ AM]

Doonside Road x Great Western Highway x Brabham Drive Intersection, Eastern Creek
Road Conditions: 2018 Existing
Traffic: 2018 AM Base
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (380m)											
1	L2	76	36.1	0.652	49.2	LOS D	11.6	94.1	0.97	0.84	29.2
2	T1	381	9.9	0.652	45.5	LOS D	12.3	93.4	0.96	0.82	34.5
3	R2	175	12.0	0.890	75.2	LOS F	11.8	90.9	1.00	1.00	41.1
Approach		632	13.7	0.890	54.2	LOS D	12.3	94.1	0.97	0.87	36.7
East: Great Western Highway (1600m)											
4	L2	102	11.3	0.111	13.1	LOS A	1.8	14.0	0.38	0.69	65.4
5	T1	399	11.9	0.632	56.8	LOS E	7.8	59.9	1.00	0.81	49.2
6	R2	179	8.2	0.937	85.3	LOS F	12.8	96.2	1.00	1.01	40.6
Approach		680	10.8	0.937	57.7	LOS E	12.8	96.2	0.91	0.85	48.2
North: Doonside Road (500m)											
7	L2	374	6.5	0.956	78.5	LOS F	42.8	315.9	1.00	1.08	42.5
8	T1	637	6.1	0.956	74.7	LOS F	42.8	315.9	1.00	1.13	26.0
9	R2	257	19.3	0.555	36.9	LOS C	4.9	39.7	0.98	0.79	37.4
Approach		1267	8.9	0.956	68.2	LOS E	42.8	315.9	1.00	1.05	34.1
West: Great Western Highway (390m)											
10	L2	507	9.1	0.420	13.2	LOS A	10.5	79.5	0.45	0.73	53.0
11	T1	1480	6.2	0.942	61.7	LOS E	38.1	280.6	1.00	1.04	47.6
12	R2	422	8.5	0.846	58.3	LOS E	25.8	194.1	1.00	0.93	28.2
Approach		2409	7.2	0.942	50.9	LOS D	38.1	280.6	0.88	0.96	45.4
All Vehicles		4988	8.9	0.956	56.6	LOS E	42.8	315.9	0.93	0.96	41.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		53	54.3	LOS E			0.95	0.95

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

MOVEMENT SUMMARY

Site: 2 [Huntingwood x GWH_ Existing_ AM]

Huntingwood Drive x Great Western Highway T-Intersection, Huntingwood
Road Conditions: 2018 Existing
Traffic: 2018 AM Base
Signals - Fixed Time Isolated Cycle Time = 66 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Huntingwood Drive (1800m)											
1	L2	19	50.0	0.706	37.2	LOS C	3.4	29.8	1.00	0.88	54.3
3	R2	192	22.5	0.706	39.5	LOS C	3.6	30.4	1.00	0.87	49.4
Approach		211	25.0	0.706	39.3	LOS C	3.6	30.4	1.00	0.88	49.9
East: Great Western Highway (780m)											
4	L2	482	10.0	0.278	7.8	LOS A	0.0	0.0	0.00	0.60	73.2
5	T1	715	8.8	0.355	9.1	LOS A	6.5	49.0	0.60	0.52	73.8
Approach		1197	9.3	0.355	8.6	LOS A	6.5	49.0	0.36	0.55	73.5
West: Great Western Highway (1600m)											
11	T1	1973	7.0	0.727	5.6	LOS A	18.4	136.4	0.63	0.58	76.0
12	R2	45	18.6	0.304	40.1	LOS C	1.5	12.0	0.97	0.74	55.1
Approach		2018	7.3	0.727	6.4	LOS A	18.4	136.4	0.64	0.58	75.1
All Vehicles		3425	9.1	0.727	9.2	LOS A	18.4	136.4	0.56	0.59	72.1

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

MOVEMENT SUMMARY

Site: 3 [Huntingwood x Brabham_ Existing_ AM]

Huntingwood Drive x Brabham Drive Intersection, Eastern Creek
Road Conditions: 2018 Existing
Traffic: 2018 AM Base
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (640m)											
1	L2	129	18.7	0.370	4.7	LOS A	2.9	21.9	0.45	0.45	53.8
2	T1	582	8.7	0.370	4.4	LOS A	2.9	21.9	0.46	0.49	55.3
3	R2	268	9.0	0.370	10.4	LOS A	2.8	20.9	0.48	0.58	57.2
Approach		980	10.1	0.370	6.1	LOS A	2.9	21.9	0.46	0.51	56.0
East: Huntingwood Drive (1800m)											
4	L2	95	18.9	0.292	6.0	LOS A	1.2	10.6	0.60	0.73	56.7
5	T1	52	34.7	0.292	6.2	LOS A	1.2	10.6	0.60	0.73	57.0
6	R2	65	40.3	0.292	12.2	LOS A	1.2	10.6	0.60	0.73	56.8
Approach		212	29.4	0.292	7.9	LOS A	1.2	10.6	0.60	0.73	56.8
North: Brabham Drive (380m)											
7	L2	403	10.4	0.519	6.7	LOS A	4.3	32.6	0.75	0.70	56.5
8	T1	683	5.1	0.519	7.3	LOS A	4.3	32.6	0.76	0.75	54.4
9	R2	25	16.7	0.519	13.9	LOS A	4.3	31.7	0.77	0.77	52.0
Approach		1112	7.3	0.519	7.3	LOS A	4.3	32.6	0.76	0.73	55.5
West: Huntingwood Drive (360m)											
10	L2	38	52.8	0.285	7.1	LOS A	1.1	9.1	0.58	0.72	49.1
11	T1	98	19.4	0.285	6.0	LOS A	1.1	9.1	0.58	0.72	56.9
12	R2	68	24.6	0.285	12.0	LOS A	1.1	9.1	0.58	0.72	53.7
Approach		204	27.3	0.285	8.2	LOS A	1.1	9.1	0.58	0.72	55.3
All Vehicles		2507	11.9	0.519	6.9	LOS A	4.3	32.6	0.61	0.64	55.8

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

MOVEMENT SUMMARY

Site: 4 [Ferrers x Brabham x Peter Brock_ Existing_ AM]

Ferrers Road x Brabham Drive x Peter Brock Drive, Eastern Creek
Road Conditions: 2018 Existing
Traffic: 2018 AM Base
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Peter Brock Drive (500m)											
5	T1	33	19.4	0.120	5.8	LOS A	0.5	4.5	0.61	0.73	51.2
6	R2	52	22.4	0.120	11.4	LOS A	0.5	4.5	0.61	0.73	50.0
Approach		84	21.3	0.120	9.2	LOS A	0.5	4.5	0.61	0.73	50.5
North: Brabham Drive (640m)											
7	L2	123	23.9	0.120	4.3	LOS A	0.7	5.7	0.25	0.44	52.1
9	R2	778	7.7	0.471	9.6	LOS A	4.1	30.3	0.30	0.58	54.8
Approach		901	9.9	0.471	8.9	LOS A	4.1	30.3	0.29	0.56	54.5
West: Ferrers Road (820m)											
10	L2	894	8.0	0.336	3.9	LOS A	2.3	17.1	0.24	0.42	56.7
11	T1	63	8.3	0.336	3.8	LOS A	2.2	16.8	0.24	0.42	54.7
Approach		957	8.0	0.336	3.9	LOS A	2.3	17.1	0.24	0.42	56.6
All Vehicles		1942	9.5	0.471	6.5	LOS A	4.1	30.3	0.28	0.50	55.4

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

MOVEMENT SUMMARY

Site: 5 [Horsley x Ferrers_ Existing_ AM]

The Horsley Drive x Ferrers Road T-Intersection, Horsley Park
Road Conditions: 2018 Existing
Traffic: 2018 AM Base
Signals - Fixed Time Isolated Cycle Time = 78 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: The Horsley Drive (160m)											
5	T1	976	25.6	0.381	3.1	LOS A	6.0	51.3	0.35	0.31	66.8
6	R2	457	9.7	0.982	74.2	LOS F	27.4	207.7	1.00	1.19	48.2
Approach		1433	20.5	0.982	25.8	LOS B	27.4	207.7	0.56	0.59	54.4
North: Ferrers Road (5000m)											
7	L2	486	8.9	0.532	21.0	LOS B	10.5	78.9	0.74	0.87	56.0
9	R2	36	47.1	0.335	46.4	LOS D	1.4	13.9	0.98	0.73	54.3
Approach		522	11.5	0.532	22.7	LOS B	10.5	78.9	0.76	0.86	55.8
West: The Horsley Drive (1500m)											
10	L2	94	19.1	0.958	60.8	LOS E	40.2	324.1	1.00	1.27	53.7
11	T1	1323	17.7	0.958	55.3	LOS D	40.2	324.1	1.00	1.27	42.2
Approach		1417	17.8	0.958	55.6	LOS D	40.2	324.1	1.00	1.27	44.2
All Vehicles		3372	18.0	0.982	37.9	LOS C	40.2	324.1	0.78	0.92	51.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	21	33.3	LOS D	0.0	0.0	0.92	0.92
P3	North Full Crossing	21	16.0	LOS B	0.0	0.0	0.64	0.64
All Pedestrians		42	24.6	LOS C			0.78	0.78

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

MOVEMENT SUMMARY

Site: 1 [Doonside x GWH x Brabham_ Existing_ PM]

Doonside Road x Great Western Highway x Brabham Drive Intersection, Eastern Creek
Road Conditions: 2018 Existing
Traffic: 2018 PM Base
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (380m)											
1	L2	179	9.4	0.898	64.4	LOS E	30.1	220.3	1.00	1.04	26.5
2	T1	686	2.6	0.898	58.4	LOS E	30.1	220.3	1.00	1.05	30.3
3	R2	91	5.8	0.563	64.6	LOS E	5.3	39.1	1.00	0.78	44.0
Approach		956	4.2	0.898	60.1	LOS E	30.1	220.3	1.00	1.02	31.5
East: Great Western Highway (1600m)											
4	L2	99	9.6	0.083	10.2	LOS A	1.2	9.1	0.27	0.67	67.2
5	T1	1232	5.2	0.819	49.2	LOS D	24.3	177.8	1.00	0.93	51.8
6	R2	400	2.9	0.905	70.0	LOS E	27.1	194.6	1.00	0.97	44.6
Approach		1731	4.9	0.905	51.8	LOS D	27.1	194.6	0.96	0.93	50.5
North: Doonside Road (500m)											
7	L2	248	7.2	0.539	37.9	LOS C	17.2	127.0	0.84	0.81	54.9
8	T1	473	5.6	0.539	34.7	LOS C	17.2	127.0	0.86	0.78	38.2
9	R2	480	8.3	0.865	69.9	LOS E	15.7	117.4	1.00	0.95	27.8
Approach		1201	7.0	0.865	49.4	LOS D	17.2	127.0	0.91	0.85	38.1
West: Great Western Highway (390m)											
10	L2	354	11.6	0.359	13.7	LOS A	7.7	59.6	0.46	0.74	52.0
11	T1	587	3.4	0.857	62.4	LOS E	13.3	95.7	1.00	0.92	47.4
12	R2	127	20.7	0.783	70.7	LOS F	8.0	65.8	1.00	0.88	25.0
Approach		1068	8.2	0.857	47.3	LOS D	13.3	95.7	0.82	0.85	45.6
All Vehicles		4956	6.0	0.905	51.8	LOS D	30.1	220.3	0.92	0.91	43.5

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P4	West Full Crossing	53	52.4	LOS E	0.2	0.2	0.94	0.94
All Pedestrians		53	52.4	LOS E			0.94	0.94

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

MOVEMENT SUMMARY

Site: 2 [Huntingwood x GWH_ Existing_ PM]

Huntingwood Drive x Great Western Highway T-Intersection, Huntingwood
Road Conditions: 2018 Existing
Traffic: 2018 PM Base
Signals - Fixed Time Isolated   Cycle Time = 107 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Huntingwood Drive (1800m)											
1	L2	54	23.5	0.799	59.8	LOS E	16.3	121.3	1.00	0.96	50.0
3	R2	564	4.3	0.799	56.1	LOS D	16.6	120.7	1.00	0.93	45.9
Approach		618	6.0	0.799	56.4	LOS D	16.6	121.3	1.00	0.93	46.3
East: Great Western Highway (780m)											
4	L2	178	19.5	0.109	7.9	LOS A	0.0	0.0	0.00	0.59	72.6
5	T1	1687	4.4	0.797	19.8	LOS B	34.8	252.6	0.86	0.79	67.6
Approach		1865	5.8	0.797	18.7	LOS B	34.8	252.6	0.78	0.77	68.1
West: Great Western Highway (1600m)											
11	T1	931	3.7	0.363	8.0	LOS A	10.3	74.5	0.47	0.41	74.5
12	R2	7	28.6	0.085	62.4	LOS E	0.4	3.4	0.97	0.66	50.0
Approach		938	3.9	0.363	8.4	LOS A	10.3	74.5	0.47	0.42	74.1
All Vehicles		3421	5.3	0.799	22.7	LOS B	34.8	252.6	0.73	0.70	63.6

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

MOVEMENT SUMMARY

Site: 3 [Huntingwood x Brabham_ Existing_ PM]

Huntingwood Drive x Brabham Drive Intersection, Eastern Creek
Road Conditions: 2018 Existing
Traffic: 2018 PM Base
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (640m)											
1	L2	119	21.2	0.468	6.5	LOS A	4.0	29.6	0.76	0.62	52.3
2	T1	718	4.4	0.468	6.2	LOS A	4.0	29.6	0.77	0.66	54.1
3	R2	121	12.2	0.468	12.6	LOS A	3.7	27.2	0.78	0.71	57.0
Approach		958	7.5	0.468	7.1	LOS A	4.0	29.6	0.77	0.66	54.6
East: Huntingwood Drive (1800m)											
4	L2	269	4.7	0.747	8.3	LOS A	5.5	40.5	0.76	0.97	56.1
5	T1	168	6.3	0.747	8.2	LOS A	5.5	40.5	0.76	0.97	56.4
6	R2	231	9.1	0.747	14.0	LOS A	5.5	40.5	0.76	0.97	56.5
Approach		668	6.6	0.747	10.3	LOS A	5.5	40.5	0.76	0.97	56.3
North: Brabham Drive (380m)											
7	L2	85	28.4	0.318	5.3	LOS A	2.2	17.1	0.51	0.49	56.6
8	T1	683	6.0	0.318	5.0	LOS A	2.2	17.1	0.53	0.51	55.5
9	R2	17	25.0	0.318	11.4	LOS A	2.2	16.0	0.54	0.52	53.2
Approach		785	8.8	0.318	5.2	LOS A	2.2	17.1	0.52	0.50	55.7
West: Huntingwood Drive (360m)											
10	L2	45	23.3	0.261	6.8	LOS A	1.1	8.7	0.66	0.80	49.2
11	T1	46	11.4	0.261	6.3	LOS A	1.1	8.7	0.66	0.80	56.6
12	R2	81	11.7	0.261	12.1	LOS A	1.1	8.7	0.66	0.80	53.4
Approach		173	14.6	0.261	9.2	LOS A	1.1	8.7	0.66	0.80	54.1
All Vehicles		2584	8.1	0.747	7.4	LOS A	5.5	40.5	0.68	0.71	55.5

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

MOVEMENT SUMMARY

Site: 4 [Ferrers x Brabham x Peter Brock_ Existing_ PM]

Ferrers Road x Brabham Drive x Peter Brock Drive, Eastern Creek
Road Conditions: 2018 Existing
Traffic: 2018 PM Base
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Peter Brock Drive (500m)											
5	T1	78	6.8	0.346	9.4	LOS A	2.0	15.5	0.79	0.90	49.5
6	R2	128	15.6	0.346	15.2	LOS B	2.0	15.5	0.79	0.90	48.1
Approach		206	12.2	0.346	13.0	LOS A	2.0	15.5	0.79	0.90	48.7
North: Brabham Drive (640m)											
7	L2	40	7.9	0.035	3.8	LOS A	0.2	1.4	0.13	0.42	52.6
9	R2	1015	6.0	0.574	9.4	LOS A	6.3	46.4	0.20	0.57	55.1
Approach		1055	6.1	0.574	9.2	LOS A	6.3	46.4	0.20	0.57	55.1
West: Ferrers Road (820m)											
10	L2	880	6.0	0.349	4.3	LOS A	2.4	18.0	0.39	0.48	56.3
11	T1	22	14.3	0.349	4.3	LOS A	2.4	17.6	0.40	0.49	54.2
Approach		902	6.2	0.349	4.3	LOS A	2.4	18.0	0.40	0.48	56.3
All Vehicles		2163	6.7	0.574	7.5	LOS A	6.3	46.4	0.34	0.57	55.0

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

MOVEMENT SUMMARY

Site: 5 [Horsley x Ferrers_ Existing_ PM]

The Horsley Drive x Ferrers Road T-Intersection, Horsley Park
Road Conditions: 2018 Existing
Traffic: 2018 PM Base
Signals - Fixed Time Isolated   Cycle Time = 65 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: The Horsley Drive (160m)											
5	T1	1599	9.9	0.648	6.5	LOS A	14.6	111.1	0.62	0.57	64.4
6	R2	447	6.8	0.869	38.9	LOS C	16.8	124.4	1.00	1.01	53.0
Approach		2046	9.3	0.869	13.6	LOS A	16.8	124.4	0.70	0.66	58.6
North: Ferrers Road (5000m)											
7	L2	715	5.3	0.615	14.1	LOS A	10.0	73.1	0.68	0.84	57.2
9	R2	213	5.0	0.856	43.2	LOS D	7.9	57.7	1.00	1.00	55.2
Approach		927	5.2	0.856	20.8	LOS B	10.0	73.1	0.76	0.88	56.6
West: The Horsley Drive (1500m)											
10	L2	42	55.0	0.850	38.6	LOS C	15.3	129.5	1.00	1.04	56.5
11	T1	801	21.3	0.850	32.6	LOS C	15.5	127.9	1.00	1.03	50.2
Approach		843	23.0	0.850	32.9	LOS C	15.5	129.5	1.00	1.03	51.1
All Vehicles		3817	11.3	0.869	19.6	LOS B	16.8	129.5	0.78	0.80	56.6

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	21	26.8	LOS C	0.0	0.0	0.91	0.91
P3	North Full Crossing	21	20.0	LOS C	0.0	0.0	0.79	0.79
All Pedestrians		42	23.4	LOS C			0.85	0.85

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

C2:

2036 Base Case

MOVEMENT SUMMARY

Site: 1 [Doonside x GWH x Brabham_ Future (with RMS Upgrades)_ AM]

Doonside Road x Great Western Highway x Brabham Drive Intersection, Eastern Creek
Road Conditions: Upgrades approved by RMS (June 2017)
Traffic: 2036 AM Background
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (380m)											
1	L2	89	36.5	0.698	49.2	LOS D	14.7	119.1	0.97	0.87	29.2
2	T1	449	9.8	0.698	43.9	LOS D	14.7	119.1	0.95	0.83	35.2
3	R2	206	12.2	1.024	120.8	LOS F	18.5	142.9	1.00	1.24	32.5
Approach		745	13.7	1.024	65.8	LOS E	18.5	142.9	0.97	0.95	33.4
East: Great Western Highway (1600m)											
4	L2	115	11.0	0.148	26.0	LOS B	3.8	29.2	0.62	0.72	58.6
5	T1	449	11.9	0.433	46.7	LOS D	7.9	60.7	0.93	0.76	52.8
6	R2	201	8.4	0.978	98.7	LOS F	7.7	57.7	1.00	1.03	37.9
Approach		765	10.9	0.978	57.3	LOS E	7.9	60.7	0.90	0.82	48.3
North: Doonside Road (500m)											
7	L2	461	6.4	1.024	111.4	LOS F	65.0	479.9	1.00	1.23	35.8
8	T1	786	6.2	1.024	109.2	LOS F	65.0	479.9	1.00	1.32	20.3
9	R2	317	19.3	0.582	34.2	LOS C	5.4	44.2	0.97	0.80	38.8
Approach		1564	8.9	1.024	94.7	LOS F	65.0	479.9	0.99	1.19	28.3
West: Great Western Highway (390m)											
10	L2	525	9.2	0.410	11.8	LOS A	9.4	70.9	0.40	0.72	54.2
11	T1	1534	6.2	1.005	83.9	LOS F	47.2	347.6	1.00	1.17	41.5
12	R2	437	8.4	0.827	67.8	LOS E	13.7	102.8	1.00	0.90	25.8
Approach		2496	7.2	1.005	65.9	LOS E	47.2	347.6	0.87	1.03	40.5
All Vehicles		5571	9.1	1.024	72.8	LOS F	65.0	479.9	0.92	1.03	37.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	50.5	LOS E	0.2	0.2	0.92	0.92
P3	North Full Crossing	53	44.3	LOS E	0.2	0.2	0.86	0.86
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		158	49.7	LOS E			0.91	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 [Huntingwood x GWH_ Future_ AM]

Huntingwood Drive x Great Western Highway T-Intersection, Huntingwood
Road Conditions: 2018 Existing
Traffic: 2036 AM Background
Signals - Fixed Time Isolated Cycle Time = 110 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Huntingwood Drive (1800m)											
1	L2	22	47.6	0.686	56.3	LOS D	6.3	54.7	1.00	0.86	50.1
3	R2	219	22.6	0.686	58.4	LOS E	6.6	55.4	1.00	0.85	44.9
Approach		241	24.9	0.686	58.2	LOS E	6.6	55.4	1.00	0.85	45.4
East: Great Western Highway (780m)											
4	L2	560	10.0	0.323	7.8	LOS A	0.0	0.0	0.00	0.60	73.2
5	T1	831	8.9	0.349	9.4	LOS A	10.0	75.5	0.49	0.43	73.6
Approach		1391	9.3	0.349	8.8	LOS A	10.0	75.5	0.29	0.50	73.4
West: Great Western Highway (1600m)											
11	T1	2043	7.1	0.701	6.1	LOS A	26.0	192.8	0.53	0.49	75.7
12	R2	47	17.8	0.351	61.6	LOS E	2.5	20.5	0.98	0.75	50.3
Approach		2091	7.3	0.701	7.4	LOS A	26.0	192.8	0.54	0.50	74.5
All Vehicles		3722	9.2	0.701	11.2	LOS A	26.0	192.8	0.48	0.52	70.9

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

MOVEMENT SUMMARY

Site: 3 [Huntingwood x Brabham_ Future_ AM]

Huntingwood Drive x Brabham Drive Intersection, Eastern Creek
Road Conditions: 2018 Existing
Traffic: 2036 AM Background
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (640m)											
1	L2	137	18.5	0.396	4.8	LOS A	3.1	24.1	0.48	0.46	53.6
2	T1	614	8.7	0.396	4.5	LOS A	3.1	24.1	0.49	0.50	55.1
3	R2	283	8.9	0.396	10.5	LOS A	3.0	22.9	0.51	0.59	57.2
Approach		1034	10.1	0.396	6.2	LOS A	3.1	24.1	0.49	0.52	55.9
East: Huntingwood Drive (1800m)											
4	L2	103	19.4	0.333	6.3	LOS A	1.5	12.7	0.63	0.77	56.6
5	T1	56	35.8	0.333	6.5	LOS A	1.5	12.7	0.63	0.77	56.9
6	R2	72	39.7	0.333	12.5	LOS A	1.5	12.7	0.63	0.77	56.7
Approach		231	29.7	0.333	8.2	LOS A	1.5	12.7	0.63	0.77	56.7
North: Brabham Drive (380m)											
7	L2	425	10.4	0.562	7.6	LOS A	5.3	39.9	0.79	0.77	56.3
8	T1	720	5.1	0.562	8.3	LOS A	5.3	39.9	0.81	0.82	54.1
9	R2	26	16.0	0.562	14.9	LOS B	5.2	38.0	0.81	0.84	51.7
Approach		1172	7.3	0.562	8.2	LOS A	5.3	39.9	0.80	0.80	55.3
West: Huntingwood Drive (360m)											
10	L2	41	53.8	0.322	7.5	LOS A	1.3	10.9	0.61	0.75	48.8
11	T1	106	19.8	0.322	6.4	LOS A	1.3	10.9	0.61	0.75	56.8
12	R2	75	23.9	0.322	12.3	LOS A	1.3	10.9	0.61	0.75	53.4
Approach		222	27.5	0.322	8.6	LOS A	1.3	10.9	0.61	0.75	55.1
All Vehicles		2658	12.0	0.562	7.5	LOS A	5.3	39.9	0.65	0.69	55.7

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

MOVEMENT SUMMARY

Site: 4 [Ferrers x Brabham x Peter Brock_ Future_ AM]

Ferrers Road x Brabham Drive x Peter Brock Drive, Eastern Creek
Road Conditions: 2018 Existing
Traffic: 2036 AM Background
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Peter Brock Drive (500m)											
5	T1	36	20.6	0.147	6.9	LOS A	0.7	6.1	0.68	0.79	50.6
6	R2	56	22.6	0.147	12.5	LOS A	0.7	6.1	0.68	0.79	49.4
Approach		92	21.8	0.147	10.3	LOS A	0.7	6.1	0.68	0.79	49.9
North: Brabham Drive (640m)											
7	L2	139	24.2	0.136	4.4	LOS A	0.8	6.6	0.27	0.44	52.1
9	R2	876	7.7	0.532	9.7	LOS A	5.0	37.4	0.33	0.57	54.7
Approach		1015	10.0	0.532	9.0	LOS A	5.0	37.4	0.32	0.56	54.5
West: Ferrers Road (820m)											
10	L2	942	8.0	0.356	4.0	LOS A	2.5	19.0	0.26	0.43	56.7
11	T1	66	7.9	0.356	3.8	LOS A	2.5	18.6	0.26	0.42	54.6
Approach		1008	8.0	0.356	3.9	LOS A	2.5	19.0	0.26	0.43	56.5
All Vehicles		2115	9.6	0.532	6.6	LOS A	5.0	37.4	0.31	0.50	55.2

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

MOVEMENT SUMMARY

Site: 5 [Horsley x Ferrers_ Future (with RMS Upgrade)_ AM]

The Horsley Drive x Ferrers Road
Road Conditions: The Horsley Drive Upgrades (RMS)
Traffic: 2036 AM Background
Signals - Fixed Time Isolated   Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: The Horsley Drive (750m)											
5	T1	1538	25.6	0.593	4.0	LOS A	12.4	106.0	0.45	0.41	64.6
6	R2	720	9.6	0.753	37.3	LOS C	13.9	105.3	0.97	0.90	54.0
Approach		2258	20.5	0.753	14.6	LOS B	13.9	106.0	0.62	0.57	58.4
North: Ferrers Road (5000m)											
7	L2	521	8.9	0.322	22.2	LOS B	6.8	51.1	0.71	0.76	56.2
9	R2	38	47.2	0.364	47.7	LOS D	1.5	15.2	0.99	0.73	54.3
Approach		559	11.5	0.364	23.9	LOS B	6.8	51.1	0.73	0.76	56.1
West: The Horsley Drive (1500m)											
10	L2	117	18.9	0.115	10.4	LOS A	1.4	11.1	0.39	0.67	60.1
11	T1	1657	17.7	0.745	23.4	LOS B	19.0	153.0	0.90	0.84	55.8
Approach		1774	17.7	0.745	22.5	LOS B	19.0	153.0	0.87	0.83	56.5
All Vehicles		4591	18.3	0.753	18.8	LOS B	19.0	153.0	0.73	0.69	57.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P21	East Stage 1	21	34.3	LOS D	0.0	0.0	0.93	0.93
P22	East Stage 2	21	34.3	LOS D	0.0	0.0	0.93	0.93
P3	North Full Crossing	21	19.6	LOS B	0.0	0.0	0.70	0.70
P3S	North Slip/Bypass Lane Crossing	21	17.6	LOS B	0.0	0.0	0.66	0.66
P41	West Stage 1	21	17.6	LOS B	0.0	0.0	0.66	0.66
P42	West Stage 2	21	34.3	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		126	26.3	LOS C			0.80	0.80

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

MOVEMENT SUMMARY

Site: 1 [Doonside x GWH x Brabham_ Future (with RMS Upgrades)_ PM]

Doonside Road x Great Western Highway x Brabham Drive Intersection, Eastern Creek
Road Conditions: Upgrades approved by RMS (June 2017)
Traffic: 2036 PM Background
Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (380m)											
1	L2	192	9.3	0.867	59.7	LOS E	32.5	237.6	1.00	0.98	27.7
2	T1	736	2.6	0.867	53.6	LOS D	32.5	237.6	0.98	0.97	31.8
3	R2	97	5.4	0.550	68.0	LOS E	6.1	44.5	1.00	0.78	43.2
Approach		1024	4.1	0.867	56.1	LOS D	32.5	237.6	0.99	0.96	32.7
East: Great Western Highway (1600m)											
4	L2	97	9.8	0.082	11.6	LOS A	1.5	11.4	0.31	0.67	66.4
5	T1	1209	5.2	0.871	60.2	LOS E	27.7	202.2	1.00	0.98	48.1
6	R2	393	2.9	0.821	73.4	LOS F	13.2	95.0	1.00	0.90	43.7
Approach		1699	5.0	0.871	60.5	LOS E	27.7	202.2	0.96	0.94	47.7
North: Doonside Road (500m)											
7	L2	271	7.4	0.499	34.4	LOS C	18.2	134.9	0.77	0.79	56.3
8	T1	515	5.5	0.499	31.1	LOS C	18.2	134.9	0.79	0.75	40.0
9	R2	523	8.2	0.833	67.0	LOS E	17.2	129.2	1.00	0.92	28.6
Approach		1308	7.0	0.833	46.1	LOS D	18.2	134.9	0.87	0.83	39.3
West: Great Western Highway (390m)											
10	L2	456	11.5	0.452	20.5	LOS B	15.0	115.1	0.60	0.77	47.0
11	T1	757	3.3	0.780	57.5	LOS E	17.0	122.5	1.00	0.87	49.0
12	R2	164	20.5	0.819	81.5	LOS F	5.8	47.4	1.00	0.88	22.8
Approach		1377	8.1	0.819	48.1	LOS D	17.0	122.5	0.87	0.84	45.3
All Vehicles		5408	6.1	0.871	53.0	LOS D	32.5	237.6	0.92	0.89	42.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	47.5	LOS E	0.2	0.2	0.86	0.86
P3	North Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	51.0	LOS E	0.2	0.2	0.89	0.89
All Pedestrians		158	52.6	LOS E			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 [Huntingwood x GWH_ Future_ PM]

Huntingwood Drive x Great Western Highway T-Intersection, Huntingwood
Road Conditions: 2018 Existing
Traffic: 2036 PM Background
Signals - Fixed Time Isolated   Cycle Time = 140 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Huntingwood Drive (1800m)											
1	L2	58	23.6	0.740	65.9	LOS E	20.7	154.7	0.98	0.91	48.8
3	R2	605	4.3	0.740	61.8	LOS E	21.3	154.7	0.98	0.88	44.6
Approach		663	6.0	0.740	62.2	LOS E	21.3	154.7	0.98	0.89	45.1
East: Great Western Highway (780m)											
4	L2	172	19.6	0.105	7.9	LOS A	0.0	0.0	0.00	0.59	72.6
5	T1	1626	4.3	0.760	23.0	LOS B	42.0	305.0	0.80	0.74	65.9
Approach		1798	5.8	0.760	21.6	LOS B	42.0	305.0	0.73	0.73	66.6
West: Great Western Highway (1600m)											
11	T1	1098	3.7	0.434	11.6	LOS A	17.3	124.7	0.51	0.46	72.2
12	R2	8	25.0	0.125	81.3	LOS F	0.6	5.0	0.99	0.67	46.5
Approach		1106	3.9	0.434	12.2	LOS A	17.3	124.7	0.51	0.46	71.8
All Vehicles		3567	5.3	0.760	26.2	LOS B	42.0	305.0	0.71	0.67	62.0

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

MOVEMENT SUMMARY

Site: 3 [Huntingwood x Brabham_ Future_ PM]

Huntingwood Drive x Brabham Drive Intersection, Eastern Creek
Road Conditions: 2018 Existing
Traffic: 2036 PM Background
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (640m)											
1	L2	129	21.1	0.540	7.4	LOS A	5.2	38.7	0.84	0.72	51.9
2	T1	782	4.4	0.540	7.3	LOS A	5.2	38.7	0.85	0.78	53.6
3	R2	132	12.0	0.540	14.1	LOS A	5.0	36.8	0.85	0.85	56.7
Approach		1043	7.5	0.540	8.2	LOS A	5.2	38.7	0.85	0.78	54.2
East: Huntingwood Drive (1800m)											
4	L2	299	4.6	0.854	10.9	LOS A	8.2	60.9	0.86	1.12	55.2
5	T1	186	6.2	0.854	10.8	LOS A	8.2	60.9	0.86	1.12	55.4
6	R2	256	9.1	0.854	16.6	LOS B	8.2	60.9	0.86	1.12	55.5
Approach		741	6.5	0.854	12.8	LOS A	8.2	60.9	0.86	1.12	55.3
North: Brabham Drive (380m)											
7	L2	89	28.2	0.343	5.5	LOS A	2.5	18.9	0.55	0.51	56.5
8	T1	720	6.0	0.343	5.2	LOS A	2.5	18.9	0.56	0.53	55.3
9	R2	18	23.5	0.343	11.6	LOS A	2.4	17.6	0.57	0.54	53.0
Approach		827	8.8	0.343	5.4	LOS A	2.5	18.9	0.56	0.52	55.5
West: Huntingwood Drive (360m)											
10	L2	51	22.9	0.318	7.3	LOS A	1.4	11.4	0.71	0.84	48.8
11	T1	52	12.2	0.318	6.9	LOS A	1.4	11.4	0.71	0.84	56.4
12	R2	89	11.8	0.318	12.7	LOS A	1.4	11.4	0.71	0.84	53.1
Approach		192	14.8	0.318	9.7	LOS A	1.4	11.4	0.71	0.84	53.8
All Vehicles		2803	8.1	0.854	8.7	LOS A	8.2	60.9	0.76	0.80	54.9

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

MOVEMENT SUMMARY

Site: 4 [Ferrers x Brabham x Peter Brock_ Future_ PM]

Ferrers Road x Brabham Drive x Peter Brock Drive, Eastern Creek
Road Conditions: 2018 Existing
Traffic: 2036 PM Background
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Peter Brock Drive (500m)											
5	T1	86	7.3	0.460	15.3	LOS B	3.4	26.0	0.90	1.05	46.7
6	R2	139	15.9	0.460	21.2	LOS B	3.4	26.0	0.90	1.05	45.2
Approach		225	12.6	0.460	18.9	LOS B	3.4	26.0	0.90	1.05	45.8
North: Brabham Drive (640m)											
7	L2	45	7.0	0.039	3.8	LOS A	0.2	1.6	0.14	0.42	52.6
9	R2	1142	6.0	0.647	9.4	LOS A	8.3	61.0	0.24	0.56	55.0
Approach		1187	6.0	0.647	9.2	LOS A	8.3	61.0	0.24	0.56	54.9
West: Ferrers Road (820m)											
10	L2	959	6.0	0.387	4.4	LOS A	2.9	21.1	0.44	0.50	56.2
11	T1	24	13.0	0.387	4.4	LOS A	2.8	20.6	0.44	0.50	54.1
Approach		983	6.2	0.387	4.4	LOS A	2.9	21.1	0.44	0.50	56.1
All Vehicles		2396	6.7	0.647	8.2	LOS A	8.3	61.0	0.38	0.58	54.5

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

Organisation: ASON GROUP PTY LTD | Processed: Thursday, 8 November 2018 9:28:43 AM
Project: C:\Users\Sharif Hasan\Desktop\0541 Lighthorse\sidra\AG0541m2v2 Lighthorse_ Future Base.sip7

MOVEMENT SUMMARY

Site: 5 [Horsley x Ferrers_ Future (with RMS Upgrade)_ PM]

The Horsley Drive x Ferrers Road
Road Conditions: The Horsley Drive Upgrades (RMS)
Traffic: 2036 PM Background
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: The Horsley Drive (750m)											
5	T1	2031	10.0	0.792	9.2	LOS A	27.0	205.4	0.73	0.69	62.1
6	R2	568	6.9	0.755	41.0	LOS C	11.3	84.1	0.99	0.90	53.5
Approach		2599	9.3	0.792	16.1	LOS B	27.0	205.4	0.79	0.73	58.2
North: Ferrers Road (5000m)											
7	L2	754	5.3	0.442	22.6	LOS B	10.3	75.2	0.74	0.78	56.2
9	R2	224	5.2	0.834	48.5	LOS D	9.8	71.6	1.00	0.97	54.7
Approach		978	5.3	0.834	28.5	LOS C	10.3	75.2	0.80	0.83	55.8
West: The Horsley Drive (1500m)											
10	L2	84	55.0	0.093	10.0	LOS A	0.8	8.4	0.34	0.65	60.0
11	T1	1608	21.3	0.761	25.0	LOS B	19.1	158.4	0.92	0.87	55.2
Approach		1693	22.9	0.761	24.3	LOS B	19.1	158.4	0.89	0.86	55.8
All Vehicles		5269	12.9	0.834	21.1	LOS B	27.0	205.4	0.82	0.79	56.8

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P21	East Stage 1	21	34.3	LOS D	0.0	0.0	0.93	0.93
P22	East Stage 2	21	34.3	LOS D	0.0	0.0	0.93	0.93
P3	North Full Crossing	21	20.3	LOS C	0.0	0.0	0.71	0.71
P3S	North Slip/Bypass Lane Crossing	21	18.2	LOS B	0.0	0.0	0.68	0.68
P41	West Stage 1	21	16.9	LOS B	0.0	0.0	0.65	0.65
P42	West Stage 2	21	32.4	LOS D	0.0	0.0	0.90	0.90
All Pedestrians		126	26.1	LOS C			0.80	0.80

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

C3:

Project Case

MOVEMENT SUMMARY

Site: 1 [Doonside x GWH x Brabham_ Future + Dev (RMS Upgrades)_ AM]

Doonside Road x Great Western Highway x Brabham Drive Intersection, Eastern Creek
Road Conditions: Upgrades approved by RMS (June 2017)
Traffic: 2036 AM Background with Development (Site access to/from Ferrers Road only)
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (380m)											
1	L2	137	33.1	0.721	45.6	LOS D	16.2	132.8	0.96	0.88	30.3
2	T1	459	10.3	0.721	41.4	LOS C	16.2	132.8	0.94	0.84	36.0
3	R2	206	12.2	1.025	121.7	LOS F	18.6	143.5	1.00	1.25	32.4
Approach		802	14.7	1.025	62.8	LOS E	18.6	143.5	0.96	0.95	33.6
East: Great Western Highway (1600m)											
4	L2	115	11.0	0.173	31.9	LOS C	4.4	33.5	0.69	0.73	55.9
5	T1	449	11.9	0.586	53.4	LOS D	8.5	65.4	0.99	0.80	50.3
6	R2	201	8.4	0.978	98.7	LOS F	7.7	57.7	1.00	1.03	37.9
Approach		765	10.9	0.978	62.1	LOS E	8.5	65.4	0.95	0.85	46.8
North: Doonside Road (500m)											
7	L2	461	6.4	1.034	117.8	LOS F	68.9	509.7	1.00	1.26	34.7
8	T1	822	7.0	1.034	115.4	LOS F	68.9	509.7	1.00	1.35	19.5
9	R2	317	19.3	0.647	35.6	LOS C	5.4	44.2	0.99	0.81	38.2
Approach		1600	9.3	1.034	100.3	LOS F	68.9	509.7	1.00	1.22	27.2
West: Great Western Highway (390m)											
10	L2	525	9.2	0.416	12.1	LOS A	9.8	73.8	0.42	0.73	53.9
11	T1	1534	6.2	1.035	98.0	LOS F	51.3	377.9	1.00	1.23	38.2
12	R2	628	14.4	0.968	92.9	LOS F	24.7	194.2	1.00	1.05	21.0
Approach		2687	8.7	1.035	80.0	LOS F	51.3	377.9	0.89	1.09	35.8
All Vehicles		5855	10.0	1.035	80.9	LOS F	68.9	509.7	0.93	1.07	34.5

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	45.2	LOS E	0.2	0.2	0.87	0.87
P4	West Full Crossing	53	53.3	LOS E	0.2	0.2	0.94	0.94
All Pedestrians		158	50.9	LOS E			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 [Huntingwood x GWH_ Future + Dev_ AM]

Huntingwood Drive x Great Western Highway T-Intersection, Huntingwood
Road Conditions: 2018 Existing (Site access to/from Ferrers Road only)
Traffic: 2036 AM Background with Development
Signals - Fixed Time Isolated Cycle Time = 110 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Huntingwood Drive (1800m)											
1	L2	22	47.6	0.659	55.2	LOS D	6.5	55.9	1.00	0.85	50.4
3	R2	228	22.6	0.659	57.2	LOS E	6.8	56.8	1.00	0.84	45.2
Approach		251	24.8	0.659	57.0	LOS E	6.8	56.8	1.00	0.84	45.7
East: Great Western Highway (780m)											
4	L2	596	11.1	0.346	7.8	LOS A	0.0	0.0	0.00	0.60	73.1
5	T1	831	8.9	0.349	9.4	LOS A	10.0	75.5	0.49	0.43	73.6
Approach		1426	9.8	0.349	8.8	LOS A	10.0	75.5	0.29	0.50	73.3
West: Great Western Highway (1600m)											
11	T1	2043	7.1	0.709	6.6	LOS A	27.1	200.9	0.55	0.51	75.4
12	R2	47	17.8	0.395	63.1	LOS E	2.6	20.9	0.99	0.75	50.0
Approach		2091	7.3	0.709	7.9	LOS A	27.1	200.9	0.56	0.52	74.2
All Vehicles		3767	9.4	0.709	11.5	LOS A	27.1	200.9	0.48	0.53	70.7

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

MOVEMENT SUMMARY

Site: 3 [Huntingwood x Brabham_ Future + Dev_ AM]

Huntingwood Drive x Brabham Drive Intersection, Eastern Creek
Road Conditions: 2018 Existing (Site access to/from Ferrers Road only)
Traffic: 2036 AM Background with Development
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (640m)											
1	L2	137	18.5	0.426	4.8	LOS A	3.6	27.6	0.51	0.47	53.5
2	T1	671	10.4	0.426	4.6	LOS A	3.6	27.6	0.52	0.51	55.0
3	R2	292	9.7	0.426	10.6	LOS A	3.4	26.2	0.54	0.59	57.1
Approach		1099	11.2	0.426	6.2	LOS A	3.6	27.6	0.52	0.52	55.8
East: Huntingwood Drive (1800m)											
4	L2	139	21.2	0.473	8.1	LOS A	2.5	21.8	0.77	0.91	56.1
5	T1	56	35.8	0.473	8.4	LOS A	2.5	21.8	0.77	0.91	56.4
6	R2	72	39.7	0.473	14.4	LOS A	2.5	21.8	0.77	0.91	56.2
Approach		266	29.2	0.473	9.9	LOS A	2.5	21.8	0.77	0.91	56.2
North: Brabham Drive (380m)											
7	L2	425	10.4	0.694	10.0	LOS A	8.9	68.2	0.89	0.92	55.6
8	T1	947	10.6	0.694	11.2	LOS A	8.9	68.2	0.90	0.97	52.1
9	R2	26	16.0	0.694	18.0	LOS B	8.5	64.7	0.91	1.00	48.9
Approach		1399	10.6	0.694	11.0	LOS A	8.9	68.2	0.90	0.95	53.7
West: Huntingwood Drive (360m)											
10	L2	41	53.8	0.338	7.9	LOS A	1.4	11.9	0.64	0.78	48.6
11	T1	106	19.8	0.338	6.7	LOS A	1.4	11.9	0.64	0.78	56.7
12	R2	75	23.9	0.338	12.6	LOS A	1.4	11.9	0.64	0.78	53.3
Approach		222	27.5	0.338	8.9	LOS A	1.4	11.9	0.64	0.78	55.0
All Vehicles		2986	13.7	0.694	9.0	LOS A	8.9	68.2	0.73	0.78	54.9

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

MOVEMENT SUMMARY

Site: 4 [Ferrers x Brabham x Peter Brock_ Future + Dev_ AM]

Ferrers Road x Brabham Drive x Peter Brock Drive, Eastern Creek
Road Conditions: 2018 Existing (Site access to/from Ferrers Road only)
Traffic: 2036 AM Background with Development
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Peter Brock Drive (500m)											
5	T1	58	21.8	0.294	13.1	LOS A	1.8	15.0	0.89	0.94	40.6
6	R2	56	22.6	0.294	18.6	LOS B	1.8	15.0	0.89	0.94	46.5
Approach		114	22.2	0.294	15.8	LOS B	1.8	15.0	0.89	0.94	43.9
North: Brabham Drive (640m)											
7	L2	139	24.2	0.138	4.4	LOS A	0.8	6.7	0.28	0.45	52.1
9	R2	1140	12.4	0.710	10.1	LOS A	9.3	71.8	0.47	0.56	50.4
Approach		1279	13.7	0.710	9.4	LOS A	9.3	71.8	0.45	0.54	50.6
West: Ferrers Road (250m)											
10	L2	1007	9.3	0.384	4.0	LOS A	3.0	22.8	0.28	0.43	54.6
11	T1	72	10.3	0.384	3.9	LOS A	2.9	22.2	0.29	0.42	51.1
Approach		1079	9.4	0.384	4.0	LOS A	3.0	22.8	0.28	0.43	54.4
All Vehicles		2472	12.2	0.710	7.4	LOS A	9.3	71.8	0.40	0.51	51.7

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

Organisation: ASON GROUP PTY LTD | Processed: Tuesday, 5 February 2019 10:26:46 AM
Project: C:\Users\Sharif Hasan\Desktop\0541 Lighthorse\sidra\models\AG0541m3v3 (No Wallgrove access)_Lighthorse_ Future Base + Development.sip7

MOVEMENT SUMMARY

Site: 5 [Horsley x Ferrers_ Future + Dev (RMS Upgrade)_ AM]

The Horsley Drive x Ferrers Road
Road Conditions: The Horsley Drive Upgrades (RMS)
Traffic: 2036 AM Background with Development (Site access to/from Ferrers Road only)
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: The Horsley Drive (750m)											
5	T1	1538	25.6	0.593	4.0	LOS A	12.4	106.0	0.45	0.41	64.6
6	R2	765	10.7	0.771	37.4	LOS C	14.9	114.3	0.98	0.91	54.0
Approach		2303	20.7	0.771	15.1	LOS B	14.9	114.3	0.63	0.58	58.2
North: Ferrers Road (5000m)											
7	L2	527	9.4	0.318	21.5	LOS B	6.7	50.9	0.69	0.76	56.3
9	R2	49	40.4	0.458	48.0	LOS D	2.0	19.2	1.00	0.75	54.3
Approach		577	12.0	0.458	23.8	LOS B	6.7	50.9	0.72	0.75	56.1
West: The Horsley Drive (1500m)											
10	L2	140	20.3	0.142	10.9	LOS A	1.7	14.4	0.41	0.68	60.1
11	T1	1657	17.7	0.769	25.3	LOS B	19.9	160.5	0.92	0.88	55.1
Approach		1797	17.9	0.769	24.2	LOS B	19.9	160.5	0.88	0.86	56.0
All Vehicles		4677	18.5	0.771	19.7	LOS B	19.9	160.5	0.74	0.71	57.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P21	East Stage 1	21	34.3	LOS D	0.0	0.0	0.93	0.93
P22	East Stage 2	21	34.3	LOS D	0.0	0.0	0.93	0.93
P3	North Full Crossing	21	20.3	LOS C	0.0	0.0	0.71	0.71
P3S	North Slip/Bypass Lane Crossing	21	18.2	LOS B	0.0	0.0	0.68	0.68
P41	West Stage 1	21	16.9	LOS B	0.0	0.0	0.65	0.65
P42	West Stage 2	21	34.3	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		126	26.4	LOS C			0.80	0.80

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

Organisation: ASON GROUP PTY LTD | Processed: Tuesday, 5 February 2019 10:41:53 AM
Project: C:\Users\Sharif Hasan\Desktop\0541 Lighthorse\sidra\models\AG0541m5v3 (No Wallgrove access)_Lighthorse_ Future Base + Development + Upgrades.sip7

MOVEMENT SUMMARY

Site: 6 [Site x Ferrers_ Future + Dev_ AM]

Site Access x Ferrers Road Intersection, Eastern Creek
Road Conditions: Existing 2018 (plus Proposed Site access to/from Ferrers Road only)
Traffic: 2036 AM Background with Development
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Ferrers Road (250m)											
8	T1	913	8.2	0.768	4.1	LOS A	15.5	120.1	0.34	0.40	55.2
9	R2	285	28.0	0.768	9.0	LOS A	15.5	120.1	0.34	0.40	51.3
Approach		1198	12.9	0.768	5.3	LOS A	15.5	120.1	0.34	0.40	54.5
North: Site Access											
10	L2	72	27.9	0.283	13.8	LOS A	2.0	17.4	0.98	0.99	38.7
12	R2	17	31.3	0.283	18.5	LOS B	2.0	17.4	0.98	0.99	48.5
Approach		88	28.6	0.283	14.7	LOS B	2.0	17.4	0.98	0.99	41.3
West: Ferrers Road (1000m)											
1	L2	68	27.7	1.017	50.7	LOS D	53.2	402.1	1.00	1.96	38.2
2	T1	1008	8.0	1.017	49.7	LOS D	53.2	402.1	1.00	1.96	36.1
Approach		1077	9.3	1.017	49.8	LOS D	53.2	402.1	1.00	1.96	36.3
All Vehicles		2363	11.8	1.017	25.9	LOS B	53.2	402.1	0.67	1.13	43.5

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

MOVEMENT SUMMARY

Site: 1 [Doonside x GWH x Brabham_ Future + Dev (RMS Upgrades)_ PM]

Doonside Road x Great Western Highway x Brabham Drive Intersection, Eastern Creek
Road Conditions: Upgrades approved by RMS (June 2017)
Traffic: 2036 PM Background with Development (Site access to/from Ferrers Road only)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (380m)											
1	L2	347	17.6	0.943	72.3	LOS F	42.5	328.3	1.00	1.08	24.0
2	T1	765	3.6	0.943	65.8	LOS E	42.5	328.3	0.99	1.13	28.4
3	R2	97	5.4	0.550	63.5	LOS E	5.6	41.3	1.00	0.78	44.4
Approach		1209	7.7	0.943	67.5	LOS E	42.5	328.3	1.00	1.09	28.9
East: Great Western Highway (1600m)											
4	L2	97	9.8	0.085	12.2	LOS A	1.6	11.9	0.35	0.68	66.0
5	T1	1209	5.2	0.953	76.5	LOS F	30.4	222.3	1.00	1.11	43.4
6	R2	393	2.9	0.920	80.9	LOS F	13.7	98.1	1.00	0.99	41.9
Approach		1699	5.0	0.953	73.8	LOS F	30.4	222.3	0.96	1.06	43.9
North: Doonside Road (500m)											
7	L2	271	7.4	0.501	32.1	LOS C	17.1	126.5	0.77	0.78	57.3
8	T1	522	5.8	0.501	28.7	LOS C	17.1	126.5	0.79	0.75	41.1
9	R2	523	8.2	0.962	90.2	LOS F	20.0	149.6	1.00	1.08	23.8
Approach		1316	7.1	0.962	53.9	LOS D	20.0	149.6	0.87	0.89	36.6
West: Great Western Highway (390m)											
10	L2	456	11.5	0.500	24.4	LOS B	15.6	120.0	0.69	0.81	44.6
11	T1	757	3.3	0.789	54.0	LOS D	15.9	114.6	1.00	0.88	50.1
12	R2	203	22.3	0.946	89.9	LOS F	7.4	61.6	1.00	1.01	21.4
Approach		1416	8.7	0.946	49.6	LOS D	15.9	120.0	0.90	0.88	44.5
All Vehicles		5640	7.0	0.962	61.7	LOS E	42.5	328.3	0.93	0.98	39.6

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	46.9	LOS E	0.2	0.2	0.89	0.89
P3	North Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	45.2	LOS E	0.2	0.2	0.87	0.87
All Pedestrians		158	48.8	LOS E			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 2 [Huntingwood x GWH_ Future + Dev_ PM]

Huntingwood Drive x Great Western Highway T-Intersection, Huntingwood
Road Conditions: 2018 Existing (Site access to/from Ferrers Road only)
Traffic: 2036 PM Background with Development
Signals - Fixed Time Isolated   Cycle Time = 140 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Huntingwood Drive (1800m)											
1	L2	58	23.6	0.755	66.7	LOS E	21.8	163.8	0.98	0.92	48.6
3	R2	634	5.3	0.755	62.2	LOS E	22.4	163.7	0.98	0.89	44.5
Approach		692	6.8	0.755	62.6	LOS E	22.4	163.8	0.98	0.89	44.9
East: Great Western Highway (780m)											
4	L2	179	20.0	0.110	7.9	LOS A	0.0	0.0	0.00	0.59	72.6
5	T1	1626	4.3	0.772	23.8	LOS B	43.0	312.1	0.82	0.75	65.5
Approach		1805	5.9	0.772	22.2	LOS B	43.0	312.1	0.73	0.74	66.2
West: Great Western Highway (1600m)											
11	T1	1098	3.7	0.439	12.1	LOS A	17.6	127.4	0.52	0.47	71.9
12	R2	8	25.0	0.125	81.3	LOS F	0.6	5.0	0.99	0.67	46.5
Approach		1106	3.9	0.439	12.7	LOS A	17.6	127.4	0.52	0.47	71.5
All Vehicles		3603	5.5	0.772	27.0	LOS B	43.0	312.1	0.72	0.69	61.5

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

MOVEMENT SUMMARY

Site: 3 [Huntingwood x Brabham_ Future + Dev_ PM]

Huntingwood Drive x Brabham Drive Intersection, Eastern Creek
Road Conditions: 2018 Existing (Site access to/from Ferrers Road only)
Traffic: 2036 PM Background with Development
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (640m)											
1	L2	129	21.1	0.670	9.5	LOS A	8.4	64.2	0.93	0.90	51.3
2	T1	966	8.9	0.670	9.6	LOS A	8.4	64.2	0.94	0.93	52.6
3	R2	161	15.0	0.670	16.7	LOS B	7.9	60.2	0.94	0.98	56.0
Approach		1257	11.0	0.670	10.5	LOS A	8.4	64.2	0.94	0.93	53.3
East: Huntingwood Drive (1800m)											
4	L2	306	5.2	0.898	13.3	LOS A	10.1	75.1	0.90	1.23	54.4
5	T1	186	6.2	0.898	13.2	LOS A	10.1	75.1	0.90	1.23	54.5
6	R2	256	9.1	0.898	19.0	LOS B	10.1	75.1	0.90	1.23	54.6
Approach		748	6.8	0.898	15.2	LOS B	10.1	75.1	0.90	1.23	54.5
North: Brabham Drive (380m)											
7	L2	89	28.2	0.378	5.8	LOS A	2.9	22.0	0.61	0.53	56.4
8	T1	766	7.3	0.378	5.5	LOS A	2.9	22.0	0.62	0.55	55.0
9	R2	18	23.5	0.378	11.9	LOS A	2.7	20.4	0.63	0.57	52.6
Approach		874	9.8	0.378	5.6	LOS A	2.9	22.0	0.62	0.55	55.2
West: Huntingwood Drive (360m)											
10	L2	51	22.9	0.390	8.8	LOS A	2.0	15.4	0.79	0.92	47.8
11	T1	52	12.2	0.390	8.3	LOS A	2.0	15.4	0.79	0.92	55.9
12	R2	89	11.8	0.390	14.1	LOS A	2.0	15.4	0.79	0.92	52.2
Approach		192	14.8	0.390	11.1	LOS A	2.0	15.4	0.79	0.92	53.1
All Vehicles		3071	9.8	0.898	10.3	LOS A	10.1	75.1	0.83	0.90	54.2

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

MOVEMENT SUMMARY

Site: 4 [Ferrers x Brabham x Peter Brock_ Future + Dev_ PM]

Ferrers Road x Brabham Drive x Peter Brock Drive, Eastern Creek
Road Conditions: 2018 Existing (Site access to/from Ferrers Road only)
Traffic: 2036 PM Background with Development
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Peter Brock Drive (500m)											
5	T1	91	8.1	0.563	21.7	LOS B	4.8	37.3	0.97	1.17	36.7
6	R2	142	15.6	0.563	27.6	LOS B	4.8	37.3	0.97	1.17	42.3
Approach		233	12.7	0.563	25.3	LOS B	4.8	37.3	0.97	1.17	40.5
North: Brabham Drive (640m)											
7	L2	45	7.0	0.041	3.9	LOS A	0.2	1.7	0.20	0.42	52.4
9	R2	1196	7.0	0.702	9.7	LOS A	10.2	75.6	0.38	0.54	51.3
Approach		1241	7.0	0.702	9.5	LOS A	10.2	75.6	0.38	0.54	51.4
West: Ferrers Road (250m)											
10	L2	1173	10.0	0.488	4.6	LOS A	4.1	31.3	0.50	0.52	53.7
11	T1	42	20.0	0.488	4.7	LOS A	4.0	30.5	0.51	0.52	50.0
Approach		1215	10.3	0.488	4.6	LOS A	4.1	31.3	0.50	0.52	53.5
All Vehicles		2688	9.0	0.702	8.6	LOS A	10.2	75.6	0.48	0.58	50.9

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

MOVEMENT SUMMARY

Site: 5 [Horsley x Ferrers_ Future + Dev (RMS Upgrade)_ PM]

The Horsley Drive x Ferrers Road
Road Conditions: The Horsley Drive Upgrades (RMS)
Traffic: 2036 PM Background with Development (Site access to/from Ferrers Road only)
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: The Horsley Drive (750m)											
5	T1	2031	10.0	0.841	12.2	LOS A	41.9	318.7	0.71	0.67	60.7
6	R2	577	7.1	0.718	49.7	LOS D	14.8	110.1	0.98	0.86	52.3
Approach		2607	9.3	0.841	20.5	LOS B	41.9	318.7	0.77	0.71	56.9
North: Ferrers Road (5000m)											
7	L2	772	6.5	0.439	27.5	LOS B	14.0	103.3	0.73	0.78	55.4
9	R2	261	6.5	0.851	61.9	LOS E	15.4	113.6	1.00	0.95	53.0
Approach		1033	6.5	0.851	36.2	LOS C	15.4	113.6	0.80	0.83	54.7
West: The Horsley Drive (1500m)											
10	L2	89	52.9	0.095	10.1	LOS A	1.1	10.8	0.29	0.64	60.0
11	T1	1608	21.3	0.730	28.5	LOS C	24.2	200.3	0.88	0.81	53.9
Approach		1698	22.9	0.730	27.6	LOS B	24.2	200.3	0.85	0.80	54.7
All Vehicles		5338	13.1	0.851	25.8	LOS B	41.9	318.7	0.80	0.76	55.6

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P21	East Stage 1	21	45.5	LOS E	0.1	0.1	0.91	0.91
P22	East Stage 2	21	43.7	LOS E	0.1	0.1	0.89	0.89
P3	North Full Crossing	21	23.6	LOS C	0.0	0.0	0.66	0.66
P3S	North Slip/Bypass Lane Crossing	21	21.7	LOS C	0.0	0.0	0.63	0.63
P41	West Stage 1	21	20.4	LOS C	0.0	0.0	0.61	0.61
P42	West Stage 2	21	41.1	LOS E	0.1	0.1	0.86	0.86
All Pedestrians		126	32.7	LOS D			0.76	0.76

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

Organisation: ASON GROUP PTY LTD | Processed: Tuesday, 5 February 2019 10:42:08 AM
Project: C:\Users\Sharif Hasan\Desktop\0541 Lighthorse\sidra\models\AG0541m5v3 (No Wallgrove access)_Lighthorse_ Future Base + Development + Upgrades.sip7

MOVEMENT SUMMARY

Site: 6 [Site x Ferrers_ Future + Dev_ PM]

Site Access x Ferrers Road Intersection, Eastern Creek
Road Condition: Existing 2018 (plus Proposed Site access to/from Ferrers Road only)
Traffic: 2036 PM Background with Development
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Ferrers Road (820m)											
8	T1	1231	6.1	0.884	5.4	LOS A	23.9	177.4	0.88	0.45	53.9
9	R2	58	27.3	0.884	10.6	LOS A	23.9	177.4	0.88	0.45	46.4
Approach		1288	7.0	0.884	5.7	LOS A	23.9	177.4	0.88	0.45	53.6
North: Site Access											
10	L2	232	27.7	0.674	25.6	LOS B	7.0	60.5	1.00	1.27	33.2
12	R2	56	28.3	0.674	30.1	LOS C	7.0	60.5	1.00	1.27	44.0
Approach		287	27.8	0.674	26.5	LOS B	7.0	60.5	1.00	1.27	36.1
West: Ferrers Road (1000m)											
1	L2	14	30.8	0.692	5.0	LOS A	9.5	70.3	0.50	0.43	52.3
2	T1	983	6.2	0.692	4.8	LOS A	9.5	70.3	0.50	0.43	54.9
Approach		997	6.5	0.692	4.8	LOS A	9.5	70.3	0.50	0.43	54.9
All Vehicles		2573	9.2	0.884	7.7	LOS A	23.9	177.4	0.74	0.54	52.0

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

Organisation: ASON GROUP PTY LTD | Processed: Tuesday, 5 February 2019 10:26:52 AM
Project: C:\Users\Sharif Hasan\Desktop\0541 Lighthorse\sidra\models\AG0541m3v3 (No Wallgrove access)_Lighthorse_ Future Base + Development.sip7

C4:

Additional Upgrade at GWH / Brabham Drive / Doonside Road

MOVEMENT SUMMARY

Site: 1 [Doonside x GWH x Brabham_ Future (with additional Upgrades)_ AM]

Doonside Road x Great Western Highway x Brabham Drive Intersection, Eastern Creek
Road Conditions: Proposed new upgrades for better performance, in addition to Upgrades approved by RMS (June 2017)
Traffic: 2036 AM Background
Signals - Fixed Time Isolated   Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (380m)											
1	L2	89	36.5	0.694	48.5	LOS D	14.6	118.1	0.97	0.86	29.4
2	T1	449	9.8	0.694	43.5	LOS D	14.6	118.1	0.95	0.83	35.3
3	R2	206	12.2	0.939	83.5	LOS F	14.9	115.6	1.00	1.08	39.4
Approach		745	13.7	0.939	55.2	LOS D	14.9	118.1	0.97	0.90	36.5
East: Great Western Highway (1600m)											
4	L2	115	11.0	0.126	17.2	LOS B	2.7	20.8	0.48	0.71	63.0
5	T1	449	11.9	0.665	56.5	LOS D	8.8	67.8	1.00	0.83	49.3
6	R2	201	8.4	0.856	77.2	LOS F	6.6	49.6	1.00	0.91	42.5
Approach		765	10.9	0.856	56.0	LOS D	8.8	67.8	0.92	0.83	48.7
North: Doonside Road (500m)											
7	L2	461	6.4	0.859	48.5	LOS D	25.7	190.1	0.87	0.91	50.4
8	T1	786	6.2	0.933	68.2	LOS E	29.6	218.3	0.97	1.09	27.8
9	R2	317	19.3	0.728	39.1	LOS C	6.0	49.2	1.00	0.85	36.7
Approach		1564	8.9	0.933	56.5	LOS D	29.6	218.3	0.95	0.99	37.4
West: Great Western Highway (390m)											
10	L2	525	9.2	0.412	11.8	LOS A	9.5	71.6	0.40	0.72	54.2
11	T1	1534	6.2	0.920	55.7	LOS D	37.2	274.1	0.99	1.01	49.6
12	R2	437	8.4	0.496	49.1	LOS D	11.0	82.8	0.91	0.82	31.0
Approach		2496	7.2	0.920	45.3	LOS D	37.2	274.1	0.86	0.92	47.5
All Vehicles		5571	9.1	0.939	51.2	LOS D	37.2	274.1	0.91	0.92	43.5

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	42.6	LOS E	0.2	0.2	0.84	0.84
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		158	50.4	LOS E			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Doonside x GWH x Brabham_ Future (with additional Upgrades)_ PM]

Doonside Road x Great Western Highway x Brabham Drive Intersection, Eastern Creek
Road Conditions: Proposed new upgrades for better performance, in addition to Upgrades approved by RMS (June 2017)
Traffic: 2036 PM Background
Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (380m)											
1	L2	192	9.3	0.867	59.7	LOS E	32.5	237.6	1.00	0.98	27.7
2	T1	736	2.6	0.867	53.6	LOS D	32.5	237.6	0.98	0.97	31.8
3	R2	97	5.4	0.421	63.0	LOS E	5.8	42.5	0.96	0.78	44.5
Approach		1024	4.1	0.867	55.6	LOS D	32.5	237.6	0.98	0.96	32.9
East: Great Western Highway (1600m)											
4	L2	97	9.8	0.077	10.4	LOS A	1.3	9.5	0.27	0.66	67.1
5	T1	1209	5.2	0.871	60.2	LOS E	27.7	202.2	1.00	0.98	48.1
6	R2	393	2.9	0.821	73.4	LOS F	13.2	95.0	1.00	0.90	43.8
Approach		1699	5.0	0.871	60.4	LOS E	27.7	202.2	0.96	0.94	47.7
North: Doonside Road (500m)											
7	L2	271	7.4	0.281	22.7	LOS B	8.9	66.2	0.56	0.75	60.8
8	T1	515	5.5	0.368	32.5	LOS C	11.7	85.7	0.77	0.70	39.8
9	R2	523	8.2	0.833	67.0	LOS E	17.2	129.2	1.00	0.92	28.6
Approach		1308	7.0	0.833	44.2	LOS D	17.2	129.2	0.82	0.80	40.0
West: Great Western Highway (390m)											
10	L2	456	11.5	0.452	20.5	LOS B	15.0	115.0	0.60	0.77	47.0
11	T1	757	3.3	0.777	57.4	LOS E	16.9	121.8	1.00	0.87	49.0
12	R2	164	20.5	0.819	81.5	LOS F	5.8	47.4	1.00	0.88	22.8
Approach		1377	8.1	0.819	48.1	LOS D	16.9	121.8	0.87	0.84	45.3
All Vehicles		5408	6.1	0.871	52.4	LOS D	32.5	237.6	0.91	0.88	43.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	47.5	LOS E	0.2	0.2	0.86	0.86
P3	North Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	51.0	LOS E	0.2	0.2	0.89	0.89
All Pedestrians		158	52.6	LOS E			0.90	0.90

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Doonside x GWH x Brabham_ Future + Dev (Additional Upgrades)_ AM]

Doonside Road x Great Western Highway x Brabham Drive Intersection, Eastern Creek
Road Conditions: Additional southbound left turn short lane, in addition to Upgrades approved by RMS (June 2017)
Traffic: 2036 AM Background with Development (Access to/from Ferrers Road only)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (380m)											
1	L2	137	33.1	0.674	46.6	LOS D	16.6	136.1	0.94	0.83	30.0
2	T1	459	10.3	0.674	39.9	LOS C	16.6	136.1	0.92	0.79	36.7
3	R2	206	12.2	0.964	91.7	LOS F	15.8	121.9	1.00	1.13	37.7
Approach		802	14.7	0.964	54.3	LOS D	16.6	136.1	0.94	0.88	36.2
East: Great Western Highway (1600m)											
4	L2	115	11.0	0.140	21.7	LOS B	3.3	25.3	0.56	0.72	60.7
5	T1	449	11.9	0.665	56.5	LOS D	8.8	67.8	1.00	0.83	49.3
6	R2	201	8.4	0.856	77.2	LOS F	6.6	49.6	1.00	0.91	42.5
Approach		765	10.9	0.856	56.7	LOS E	8.8	67.8	0.93	0.83	48.5
North: Doonside Road (500m)											
7	L2	461	6.4	0.842	45.3	LOS D	24.7	182.3	0.86	0.89	51.5
8	T1	822	7.0	0.960	77.2	LOS F	33.4	248.2	0.98	1.15	25.8
9	R2	317	19.3	0.647	60.6	LOS E	9.1	74.4	0.99	0.83	29.6
Approach		1600	9.3	0.960	64.7	LOS E	33.4	248.2	0.95	1.01	34.9
West: Great Western Highway (390m)											
10	L2	525	9.2	0.426	13.0	LOS A	10.9	82.2	0.45	0.73	53.2
11	T1	1534	6.2	0.946	62.2	LOS E	39.7	292.5	1.00	1.05	47.4
12	R2	628	14.4	0.768	56.2	LOS D	18.1	142.1	0.99	0.88	28.7
Approach		2687	8.7	0.946	51.2	LOS D	39.7	292.5	0.89	0.95	44.5
All Vehicles		5855	10.0	0.964	56.0	LOS D	39.7	292.5	0.92	0.94	41.4

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	43.4	LOS E	0.2	0.2	0.85	0.85
P4	West Full Crossing	53	51.5	LOS E	0.2	0.2	0.93	0.93
All Pedestrians		158	49.7	LOS E			0.91	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Doonside x GWH x Brabham_ Future + Dev (Additional Upgrades)_ PM]

Doonside Road x Great Western Highway x Brabham Drive Intersection, Eastern Creek
Road Conditions: Additional southbound left turn short lane, in addition to Upgrades approved by RMS (June 2017)
Traffic: 2036 PM Background with Development (Access to/from Ferrers Road only)
Signals - Fixed Time Isolated Cycle Time = 110 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brabham Drive (380m)											
1	L2	347	17.6	0.954	73.0	LOS F	40.9	316.2	1.00	1.12	23.9
2	T1	765	3.6	0.954	66.5	LOS E	40.9	316.2	1.00	1.18	28.2
3	R2	97	5.4	0.466	56.3	LOS D	5.0	36.9	0.98	0.78	46.4
Approach		1209	7.7	0.954	67.6	LOS E	40.9	316.2	1.00	1.13	28.9
East: Great Western Highway (1600m)											
4	L2	97	9.8	0.080	10.6	LOS A	1.2	9.2	0.31	0.67	66.9
5	T1	1209	5.2	0.983	84.6	LOS F	30.7	224.9	1.00	1.18	41.4
6	R2	393	2.9	0.844	66.1	LOS E	11.6	83.1	1.00	0.93	45.7
Approach		1699	5.0	0.983	76.1	LOS F	30.7	224.9	0.96	1.10	43.3
North: Doonside Road (500m)											
7	L2	271	7.4	0.281	20.2	LOS B	7.6	56.2	0.56	0.75	62.0
8	T1	522	5.8	0.379	28.2	LOS B	10.2	74.9	0.78	0.70	41.9
9	R2	523	8.2	0.965	86.6	LOS F	18.8	141.2	1.00	1.10	24.4
Approach		1316	7.1	0.965	49.8	LOS D	18.8	141.2	0.82	0.87	38.0
West: Great Western Highway (390m)											
10	L2	456	11.5	0.513	23.7	LOS B	14.7	113.0	0.71	0.81	45.0
11	T1	757	3.3	0.841	53.6	LOS D	15.4	110.7	1.00	0.92	50.3
12	R2	203	22.3	0.867	73.0	LOS F	6.3	52.2	1.00	0.94	24.5
Approach		1416	8.7	0.867	46.8	LOS D	15.4	113.0	0.91	0.89	45.6
All Vehicles		5640	7.0	0.983	60.8	LOS E	40.9	316.2	0.92	1.00	39.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	44.6	LOS E	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	43.8	LOS E	0.1	0.1	0.89	0.89
All Pedestrians		158	45.9	LOS E			0.91	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.