Cardno Eppell Olsen
Shaping the Future

Proposed Alternative Waste Technology Facility at Lucas Heights Waste and Recycling Centre

Traffic Impact Assessment

transportation | traffic | engineering | planning

prepared for: WSN Environmental Solutions

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1.0 INTRODUCTION

WSN Environmental Solutions (WSN) commissioned Cardno Eppell Olsen to undertake a traffic impact assessment for the provision of an Alternative Waste Technology (AWT) facility at the existing Lucas Heights Waste and Recycling Centre (LHWRC).

WSN submitted the draft Environmental Assessment (EA) including the traffic impact assessment to the Department of Planning (DOP) on 9 April 2009. On 25 May 2009 WSN received the DoP's Adequacy Review requirements. This report has been updated to reflect the comments received from the DoP which incorporated issues raised by the Roads and Traffic Authority and Sutherland Shire Council.

WSN have subsequently decided to revise the EA to reflect the need to transport the AWT residual waste offsite for the 10 years from 2025-2034 (beyond the life of the current LHWRC landfill). This report examines the impacts of this.

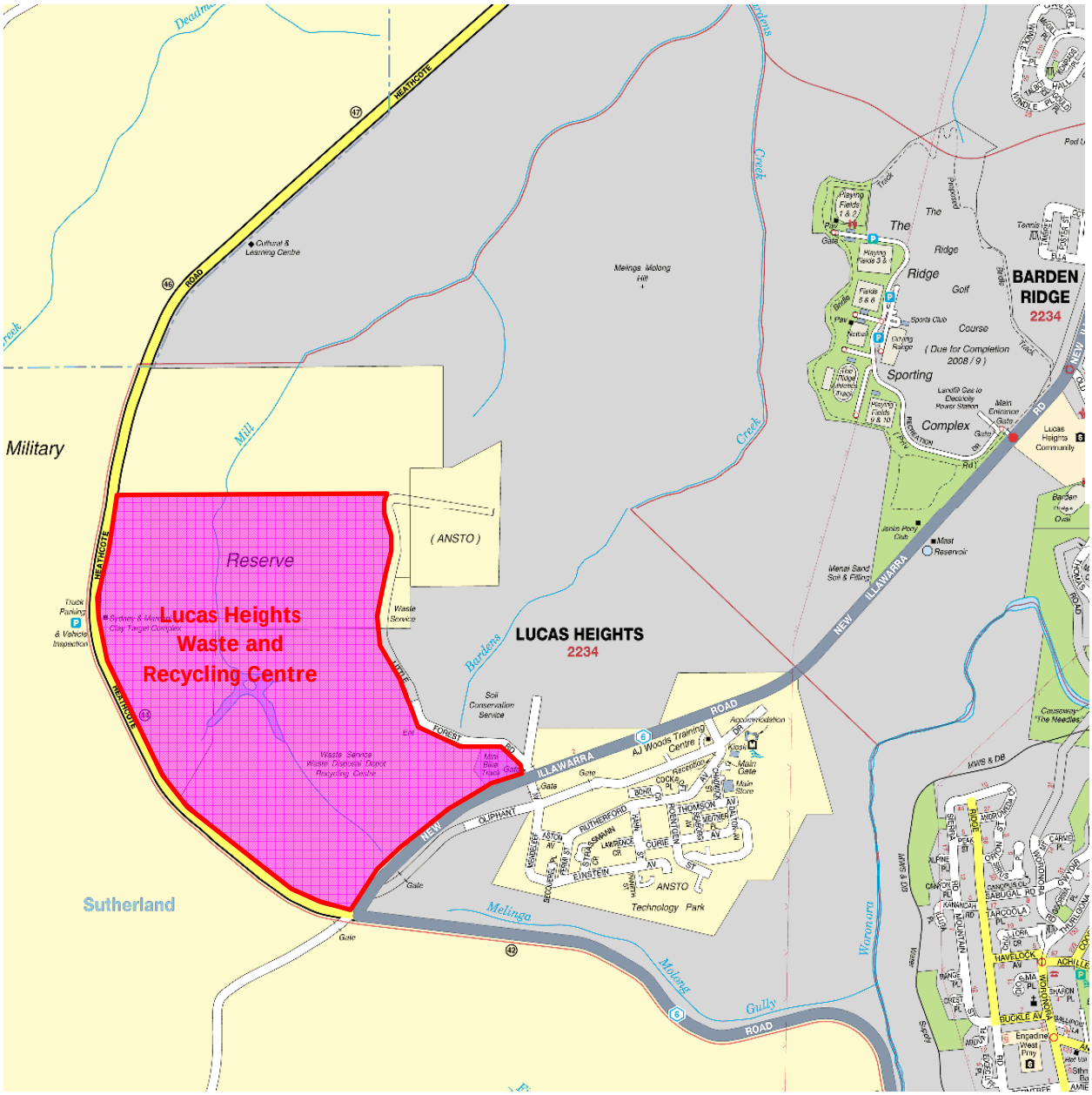
The LHWRC is located within the Sutherland Shire Local Government Area (LGA), which is in the southern region of the Sydney Metropolitan Region. Access to the site is from Little Forest Road, which runs off New Illawarra Road. The facility is approximately 30 km south west of Sydney and 7 km from Sutherland. The location of the LHWRC is shown in Figure 1.1.

WSN is proposing to construct and operate an AWT facility within the south-eastern corner of the LHWRC. The AWT is expected to receive 100,000 tonnes per annum of municipal solid waste (MSW) when fully operational, in addition to normal landfill operations. The AWT will not increase overall tonnage to the landfill and associated recycling services. A more detailed description of the proposal is provided in Section 4.

A detailed description of the current LHWRC site operations is provided in Section 2. It should be noted that all current landuses will continue to operate under the development proposal. However, the location of the proposed AWT facility within the LHWRC site will require relocation of the existing Police and Community Youth Club (PCYC) mini-bike facility to a new location within the existing LHWRC site. Furthermore, some changes to the internal site access arrangements will also be required, including a provision of a potential new weighbridge.

WSN are also seeking, separately to the proposal for the proposed AWT facility, a modification to a development consent issued by the then Minister for Urban Affairs and Planning for the LHWRC. This proposed modification would include the operation of a truck parking area for the WSN waste collection business on part of the LHWRC site, adjacent to the AWT Site. This study will consider the potential cumulative impact of the proposed truck parking area along with the proposed AWT facility.

Figure 1.1 Locality Map



1.1 SCOPE OF STUDY

The construction and operation of the proposed AWT facility is likely to generate additional vehicle movements to and from the LHWRC. This report will investigate the traffic and transport implications of the construction and operation of the proposed AWT facility within the LHWRC. The purpose of this assessment is to:

- Provide an overview of current uses of the existing LHWRC site.
- Understand and document the existing traffic and transport conditions at the LHWRC.
- Assess the effects of construction and operation of the proposed AWT facility.
- Make recommendations in terms of remedial measures to cater for the expected traffic conditions resulting from the development and operation of the site, if required.

The report has been prepared in accordance with the NSW Department of Planning (DoP) Director General's requirements (DGR), dated 22nd August 2008, which are as follows for the traffic assessment:

- Prepare a detailed traffic impact study of the project on the safety and performance of the surrounding road network, and a description of the measures that would be implemented to upgrade and/or maintain this network over time.
- An assessment of the potential parking demand of the project.
- Detailed plans of the proposed layout of the internal road network and parking on site in accordance with the relevant Australian Standards.

In addition, this report has been prepared to respond to the general requirements of the Roads and Traffic Authority (RTA) in relation to traffic and transport, which are as follows:

- Demonstrate how employees of the proposed development will be able to make travel choices that support the achievement of relevant State Plan targets.
- Assessment of peak traffic movements generated by their proposed development and their impact on nearby intersections and the need for funding of upgrading or road improvement works (if required).
- Details of the proposed access and parking provision and confirmation of compliance with the requirements of the relevant Australian Standards.
- Confirmation that the proposed number of car parking spaces complies with appropriate parking codes.
- Details of service vehicle movements.
- Assessment of the implication of the proposed development for non-car travel modes, the potential for 'Travel Smart' or other travel behaviour change initiative, and the provision of facilities to increase the non-car mode share for travel to and from the site by employees, including an assessment of the development's accessibility by public transport.

With regard to the above requirements this report provides an assessment of the following:

- The traffic impacts of additional peak vehicles (including service vehicles) from the proposed AWT facility on the surrounding road network including the following intersections:
  - New Illawarra Road and Little Forest Road.
  - Heathcote Road with New Illawarra Road.
- The capacity and operation of the proposed internal road network including new intersections.
- Assessment of proposed parking demand and adequacy of parking supply.
- Review of proposed access and parking provision.
- Non-car based transport accessibility of the site.
- The location of a potential second weighbridge.
- Vehicle access to the AWT, current landfill and recycling areas, the relocated mini-bike tracks operated by the PCYC and the proposed truck parking area.

1.2 REPORT STRUCTURE

This report consists of the following:

- Section 2 - description of the existing LHWRC facility.
- Section 3 - account of the existing traffic conditions in the vicinity of the site.
- Section 4 - overview of the development proposal.
- Section 5 – assessment of the traffic impact of the planned construction of the AWT facility.
- Section 6 – assessment of the cumulative traffic impact of the operation of the proposed AWT facility and other LHWRC site changes. This includes assessment of the expected traffic generation and distribution and evaluation of impact on the surrounding road network under existing and future conditions. A description of proposed traffic infrastructure measures to cater for additional traffic if required.
- Section 7 – provides an assessment of the parking provision, parking layout, access arrangement and the changes to the internal road network.
- Section 8 – provides a summary of recommendations and conclusions.

2.0 EXISTING LHWRC SITE OPERATIONS

This section of the report provides an overview of the existing operations on the LHWRC site and includes information on current traffic generation of the existing site.

2.1 GENERAL DESCRIPTION

The LHWRC is owned and operated by WSN and is managed by WSN through their contracting partner Cleary Bros (Bombo) Pty Ltd. Currently the LHWRC is approved to receive 630,000 tonnes of waste per annum, of which no more than 575,000 tonnes per annum shall be landfilled and no more than 55,000 tonnes per annum shall be treated at the recycling and resource recovery facilities at the LHWRC site.

There are a number of facilities currently operating on site at the existing LHWRC, which include:

- Landfill.
- Police and Community Youth Club (PCYC) Mini-bike facility.
- Garden Organics Area.
- Community recycling centre.
- Soil mix batch plant.
- Nursery.
- Biogas Power Plant (operated by Energy Developments Limited (EDL)).
- Mechanical workshop.

Figure 2.1 shows the location of current landuses on the existing LHWRC site. All current landuses will continue to operate under the development proposal.

2.2 HOURS OF OPERATION

The current LHWRC hours of operation are:

- Monday to Friday 6:00am to 4:00pm.
- Saturday and Sunday 8:00am to 5:00pm.

2.3 EXISTING WORKFORCE

Under regular operating conditions approximately 43 employees operate from the site, six employed by WSN and 37 by Cleary Bros. Generally employees commence work at 6.00 am when the LHWRC opens and finish when the LHWRC closes at 4.00 pm. The peak traffic generation periods for LHWRC staff are from 5.30 am – 6.00 am and 4.00 pm – 4.30 pm.

Figure 2.1 Existing Land uses at LHWRC

2.4 EXISTING PARKING PROVISION

On-site parking is provided for staff on the LHWRC site. Currently there are approximately 43 staff working on the site and 30 parking spaces are provided on the LHWRC site. The parking provision is sufficient to accommodate the existing staff parking requirements.

The staff numbers servicing the landfill and recycling services will not change in the future. It is also expected that there will be no increase in the number of visitors. Overall the parking demand for the LHWRC is not expected to increase and the parking demand will remain as it currently is. The parking supply is therefore adequate to meet the existing and future parking demand.

The operation of the existing EDL facility is not expected to differ from the existing and therefore the existing parking supply is considered adequate to meet the parking demand.

2.5 EXISTING ACCESS

The existing access to the LHWRC is via Little Forest Road off New Illawarra Road. Little Forest Road provides access to the various facilities at LHWRC and continues on to the north east after the access road (including weighbridge) to the WRC.

Access to the major Sydney arterial road network is provided as follows:

- The South Western Motorway (M5) is via two key routes:
  - The most direct route for eastbound traffic is along New Illawarra Road, Old Illawarra Road, Alfords Point Road and Davies Road.
  - The most direct route for westbound traffic is along Heathcote Road.
- The M7 Motorway (M7) is via the M5.
- The Princes Highway is via New Illawarra Road and Heathcote Road.

2.6 INTERNAL LHWRC ACCESS

All vehicles enter the LHWRC site via Little Forest Road, Figure 2.2 shows the external and internal site access and egress locations.

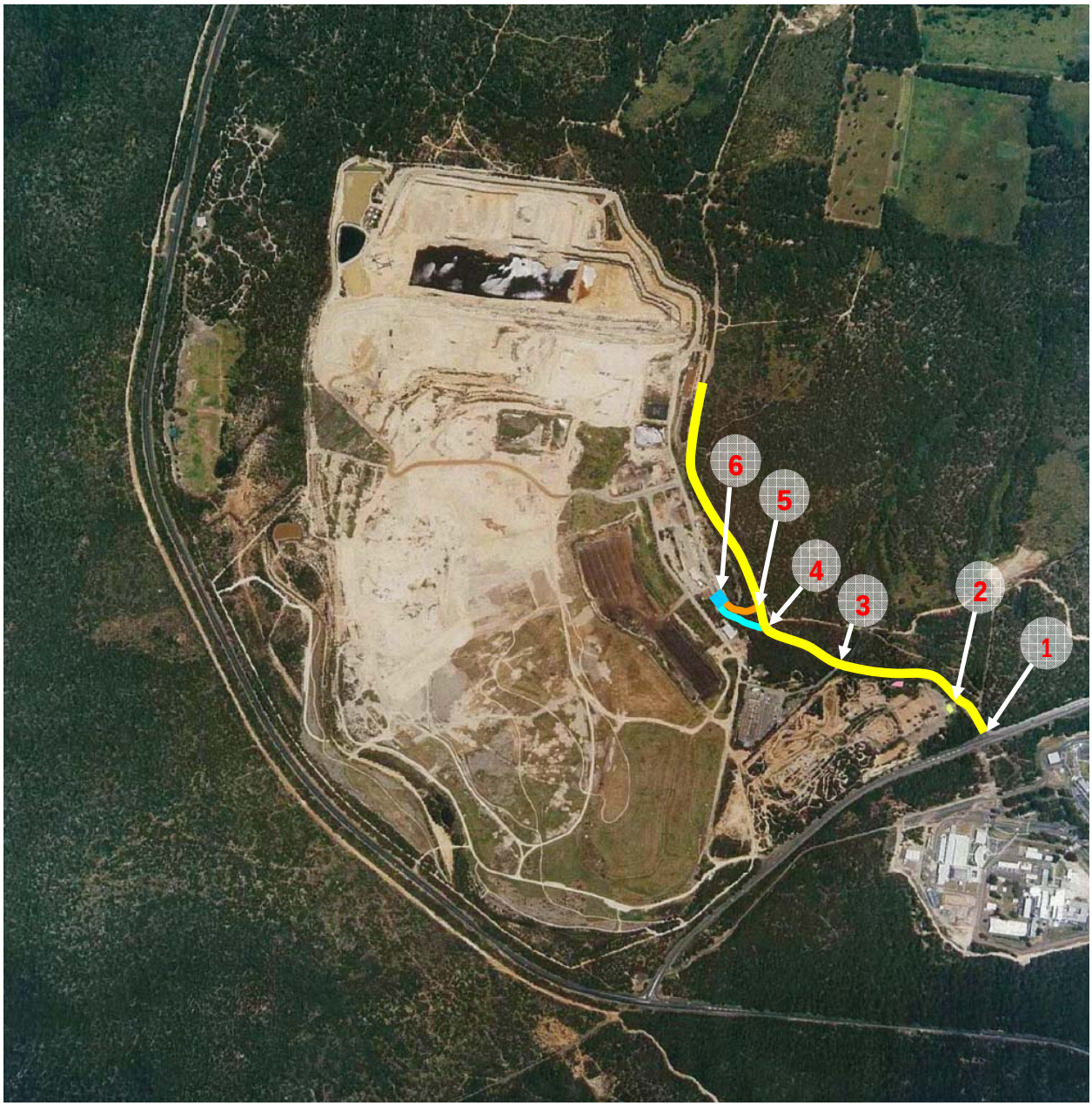
PCYC mini-bike club visitors access the PCYC carpark and the mini-bike tracks via a side entrance located off Little Forest Road (to the left entering the site), approximately 95 metres from New Illawarra Road. The PCYC race tracks are for low powered mini-bikes. The PCYC is in use on Sunday from approximately 8am to 4pm. This time period coincides with the Sunday operating hours of the LHWRC, although the main waste vehicles using the LHWRC on Sundays are private citizens rather than Council waste trucks.

Entry to the Energy Developments Limited (EDL) Biogas Power Plant is via a side road on the left, off Little Forest Road, approximately 380 metres from New Illawarra Road after entering the LHWRC site and prior to the LHWRC weighbridge. The EDL facility is largely run automatically with only a small number of on-site staff.

Vehicles accessing the majority of on-site LHWRC uses must pass through the existing LHWRC weighbridge. Beyond the weighbridge lies:

- Landfill and waste recycling services.
- To the left after the weighbridge is office buildings for WSN and the contract company running the waste and landfill operations on the behalf of WSN.
- LHWRC visitor and staff car park areas.

Figure 2.2 LHWRC Site Access



Legend

1	Site Entrance	4	Entry to Weighbridge		Little Forest Rd
2	Entry/Exit to PCYC	5	Exit from Weighbridge		Entry road to weighbridge
3	Entry/Exit to EDL	6	Weighbridge		Exit road from weighbridge

2.7 TRAFFIC GENERATION OF THE EXISTING LHWRC

WSN regularly record vehicle movements and tonnage at the existing weighbridge. This vehicle count data, for the one year period from August 2007 to August 2008, was analysed to provide base line figures and to gain an appreciation of the existing operations of the LHWRC under regular conditions.

The average annual daily distribution of vehicles arriving at the existing LHWRC site is provided in detail in Appendix A for the one year period August 2007 to August 2008. Averages for the most recent 3 month period (June 2008 to August 2008) are also provided in Appendix A.

2.7.1 Existing LHWRC Employee Traffic Generation

It is understood that there are 43 staff employed at the LHWRC facility. It is assumed that a maximum number of staff on the site at any one time is in the order of 40 persons. Based on information provided by WSN staff, the existing traffic generation characteristics of the site revealed a typical car driver rate of 100% (i.e. each employee driving a car).

Application of that car driver rate to the existing workforce yields a traffic generation in the order of 80 vehicle trips per day (one-way), i.e. 40 vehicle trips in and 40 vehicle trips out.

The majority of the existing workforce arrive between 5.30 am and 6.00 am and depart generally between 4.00 pm and 4.30 pm. Thus it is likely that the peak employee traffic generation periods will occur outside the existing road network AM commuter peak hour periods.

2.7.2 Existing LHWRC Traffic Generation

Vehicle traffic generation for the existing LHWRC site has been determined through a review of operations undertaken at the site and information provided by WSN. From this information provided by WSN, which is based on a traffic count at the weighbridge, the operations on an average day are shown in Table 2.1.

Table 2.1 Vehicle Movements at LHWRC[1]

Description	Annual Average Vehicles
Average Monday	440.5 vehicles per day
Average Tuesday	430.2 vehicles per day
Average Wednesday	423.0 vehicles per day
Average Thursday	435.8 vehicles per day
Average Friday	434.6 vehicles per day
Average Saturday	392.9 vehicles per day
Average Sunday	364.8 vehicles per day
Average Weekday	432.8 vehicles per day
Average Weekend	378.9 vehicles per day
Average Daily	417.4 vehicles per day
Average Weekly	2,921.9 vehicles per week

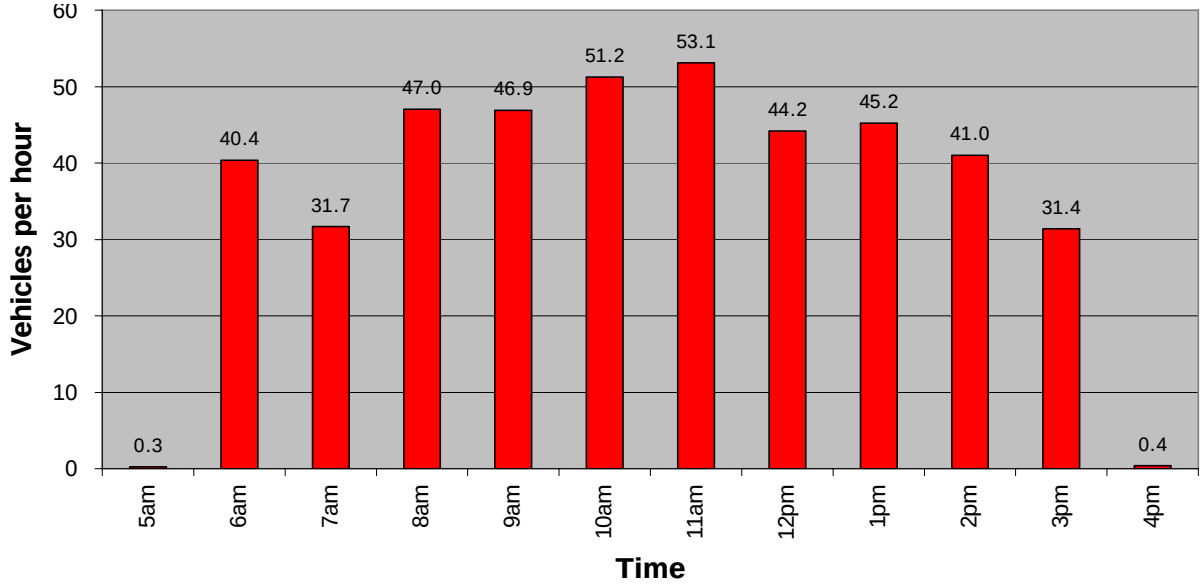
Source: WSN Environmental Solutions

From this it can be seen that on an average weekday there are around 433 vehicles accessing the existing LHWRC site per day. On the weekends the average number of vehicles is slightly lower at 379 vehicles per day. Over a week the average number of vehicles was observed to be 2,922 vehicles per week.

The average annual daily distribution of vehicles arriving at the existing LHWRC site is provided in detail in Appendix A. The average weekday and weekend hourly traffic volumes are summarised in Figure 2.3 and Figure 2.4 respectively.

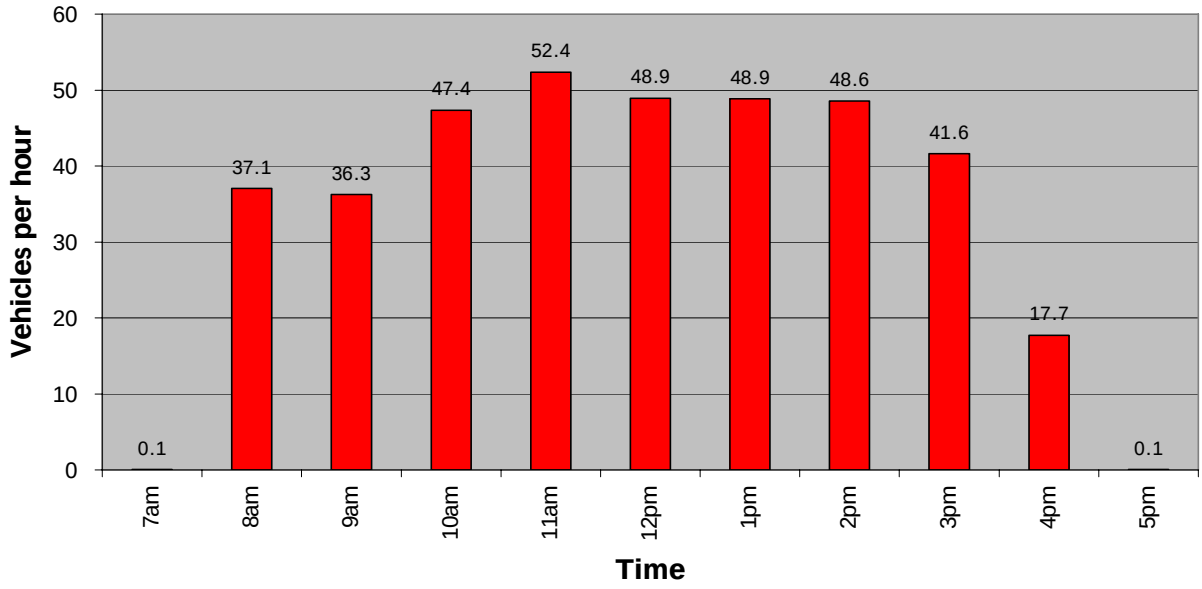
[1] Average for August 2007 to August 2008

Figure 2.3 LHWRC Daily Distribution of Annual Average Weekday Traffic Volumes[2]



During an average weekday most vehicles arrive between 6am and 4pm, with hourly volumes varying during this period from 31 to 53 vehicles per hour. The peak period was observed to be 11am to 12pm.

Figure 2.4 LHWRC Daily Distribution of Annual Average Weekend Traffic Volumes[2]



During an average weekend most vehicles arrive between 8am and 5pm, with hourly volumes varying during this period from 18 to 52 vehicles per hour. Similar to the weekdays the peak period was also observed to be 11am to 12pm.

[2] Average for August 2007 to August 2008

2.8 EXISTING WEIGHBRIDGE OPERATION

The current capacity of the existing LHWRC weighbridge is 60 trucks an hour. The capacity is based on a 60 second process time for a truck to await instructions to enter the weighbridge in a truck queue, stopping on the weighbridge and for the processing of the dockets and the departure time.

Based on average hourly vehicle volumes, presented in Appendix A for the period of 13th August 2007 to 13th August 2008, the weekday peak hourly vehicle volumes through the existing weighbridge were 53 vehicles per hour. However the overall peak was observed to be 56 vehicles per hour.

Site observations show that the truck arrival patterns are random at the weighbridge rather than uniform. Hence there are times where the hourly truck volume is within the traffic capacity of the weighbridge, but there is queuing of three to four vehicles for about 5 minutes within the hour.

The current level of congestion and delays is acceptable. Moreover the traffic effects of queuing are contained within the LHWRC site and do not affect the external road network namely the intersection of New Illawarra Road with Little Forest Road.

2.9 CESSATION OF LHWRC LANDFILL

WSN are not seeking to change the capacity limit or life of the landfill operating at LHWRC. The approved final design height and capacity of landfill will not change. The original masterplan will remain unchanged. Current consent indicates landfilling operations at LHWRC must cease on 31 December 2024.

Once the landfill is closed a number of operations at the LHWRC site will remain as per the conditions of consent e.g. operating under the same operating hours of LHWRC (Monday to Friday 6am-4pm and Saturday-Sunday 8am-5pm), community drop off facility, greenwaste facility, and EDL power plant.

Rehabilitation of the landfill site will occur as per the original conditions of consent and therefore modelling of this process is not required (as it has already been approved). The public would gain access to the rehabilitated landfill from 2026 as per the original masterplan and timeframe. It is not known at this time how many visitors there will be to the site.

Ideally the access to the recreational parts of the site will be separate to Little Forest Road, to avoid any conflict with the access to the AWT and other facilities still operating. The consent for this will be sought at a later date.

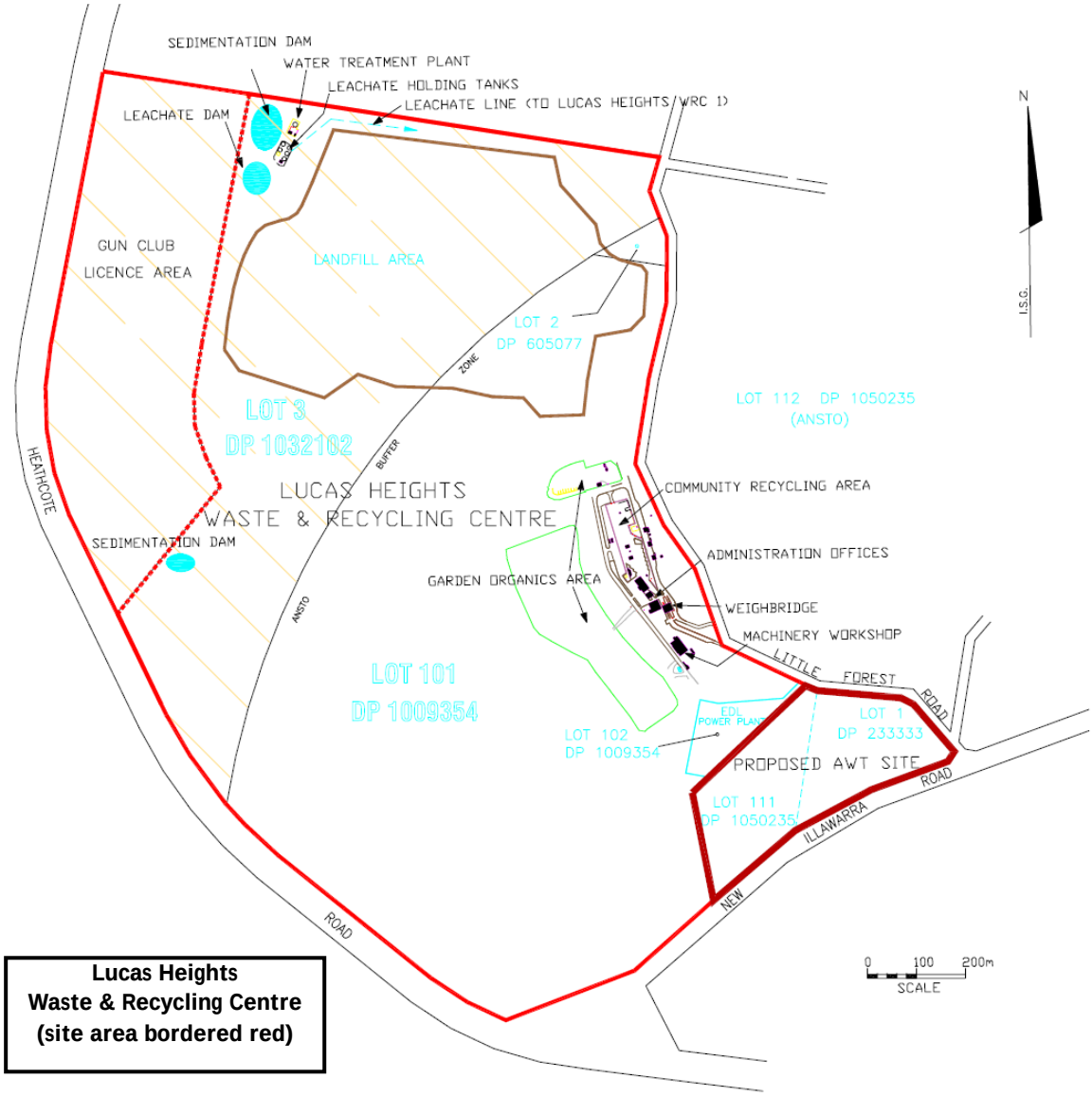
3.0 EXISTING CONDITIONS

The focus of this section is the assessment of existing external conditions surrounding the site. This considers site location, land uses, operation of the surrounding road network and assessment of other transport modes. The analysis does not consider traffic impacts as a result of the development proposal; this is undertaken in subsequent sections.

3.1 SITE LOCATION

The LHWRC is located adjacent to Little Forest Road at Lucas Heights, in southern Sydney. Little Forest Road is a public road that originated as a Crown road. Little Forest Road runs off New Illawarra Road approximately 1km north east of the intersection of New Illawarra Road and Heathcote Road as shown in Figure 3.1.

Figure 3.1 Location of LHWRC



Within 30 metres of New Illawarra Road, along Little Forest Road, is the formal entrance and exit for the LHWRC site (See Photograph 3.1).

Photograph 3.1 Little Forest Road, showing formal entrance to the LHWRC

Directional signposting is provided on both New Illawarra Road and Heathcote Road, directing motorists to the LHWRC as shown in Photograph 3.2.

Photograph 3.2 Directional Signage on Heathcote Road & New Illawarra Road

3.2 SURROUNDING LANDUSES

The site is located on the outskirts of the Sydney urban area containing a variety of land uses including agriculture, residential, recreation, commercial and industrial activities. The main developed land use near the LHWRC is the Australian Nuclear Science and Technology Organisation (ANSTO) site, located on the opposite side of New Illawarra Road.

Residential development is located in the surrounding suburbs of:

- Barden Ridge approximately 2.6km north east of the site.
- North Engadine approximately 2km east of the site.

There is also substantial undeveloped forest/scrub bushland, most of which forms part of the Holsworthy Military Reserve, surrounding the site with some recreational areas. A clay target shooting centre is located adjacent to Heathcote Road approximately 2km north-west of New Illawarra Road.

3.3 PRINCIPLES AND GUIDELINES

Guidelines for assessment of the road network can be allocated into three main categories:

- Road classification (road hierarchy) – how will traffic move through the precincts and are roads designed to accommodate with function in mind?
- Road capacity – are adequate lanes provided on the streets to accommodate traffic without significant congestion?
- Intersection performance – are delays at intersections acceptable?

A detailed description of the principles and guidelines against which the road network performance will be assessed is provided in the following sections.

3.4 ROAD CLASSIFICATION

There are two main systems for the classification of roads in New South Wales, the functional classification system and the funding classification system. A third system that defines the environmental capacity of residential streets is also a form of classification.

Funding Classification

The RTA has also adopted a "funding related" classification system that is primarily for administrative purposes. The key road classifications under the funding classification system are defined as:

- State Roads – roads performing an important state function and for which the RTA fully funds the maintenance cost. State roads are essentially arterial roads.
- Regional Roads – roads performing a significant regional function and for which the RTA and Council share the costs of maintenance. Regional roads are essentially sub-arterial roads.
- Local Roads – roads performing a local or collector function and for which the Councils fully fund the maintenance cost. Additional funding is available from the RTA in certain circumstances on grounds of urban amenity and road safety.

Functional Classification

The functional role or performance of individual roads can be appraised according to the classification of that road within an overall road hierarchy. Changes to traffic flows on the road can then be assessed within the context of the road hierarchy.

Both the NSW Roads and Traffic Authority (RTA) and Growth Centres Commission have developed guidelines for classification of roads. The RTA published guidelines for the classifications of roads in a functional system in their document "Functional Classification of Roads".

The objectives of these guidelines can be summarised as:

- In planning terms – the classification of streets and development of an operational hierarchy is seen as "an essential component of structural planning at the neighbourhood level.
- In operational terms – the concept of functional classification is seen as "an endeavour to match the class of road to its use and to the environmental needs of the community".

The RTA document classifies roads according to the role they fulfil and the appropriate volume of traffic that they should convey:

- **Arterial Road** - is typically a main road carrying in excess of 15,000 vehicles per day and over 1,500 vehicles per hour in the peak period. They predominantly carry traffic from one region to another, forming principal avenues of communication for metropolitan traffic movements.
- **Sub-Arterial Road** – is typically a secondary road carrying between 5,000 and 20,000 vehicles per day and between 500 and 2,000 vehicles per hour in the peak period. They predominantly carry traffic from one sub-region to another forming secondary inter-regional transport links.
- **Collector Road** – is typically a minor road carrying between 2,000 and 10,000 vehicles per day and between 250 and 1,000 vehicles per hour in the peak period. They provide a link between local areas and regional road carrying low traffic volumes. At volumes greater than 5,000 vehicles per day, residential amenity begins to decline noticeably.
- **Local Road** – is typically a local street carrying less than 2,000 vehicles per day and 250 vehicles per hour in the peak period. They provide immediate access to individual houses and carry low traffic volumes.

Table 3.1 provides details of the characteristics of different functional classifications of roads. The table shows that there is considerable overlap between the functions of the various classes of roads.

Table 3.1 Functional Classification of Roads - Parameters

Factor/ Measure of Effectiveness	Arterial/ Freeway	Sub-Arterial	Collector	Local
Vehicle Speed /Operating Speed	70-110km/h	60-80km/h	40-60km/h	40km/h (or less)
Traffic Volume (AADT)				
- Residential Area	No Limit	< 20,000	< 5,000	< 2,000
- Other Area	No Limit	< 20,000	< 10,000	< 4,000
Through Traffic	yes	some	little	no
Intersection Spacing	Approx. 1km	Approx. 0.5km	-	-
Road Geometry				
- Number of Lanes	4 or more	2 or more	2 or more	1 or more
- Medians	✔	As needed	no	no
- Minimum Carriageway Width	13m	7m	7m	4m
Traffic Management				
- Intersection Control	---------- Refer to Table 3.2 ----------			
- Lane and Separation Lines	✔	✔	✔	✔
- Property Access	Minimised	Minimised	✔	✔
- Control of Turning Vehicles mid-block access	Median controlled	Maybe control	no	no
- Right Turn Bays	✔	Preferred	no	no
- Road Closures	none	none	possible	
- LATM devices	-	-	✔	✔
- SATM devices	-	✔	-	-
Interconnections	sub-arterial	arterial/collector	sub-arterial/local	collector
Heavy Vehicle Load Restrictions	None	Preferably none	Yes, if residential	Yes, if residential
Parking				
- Peak Period	no	no	✔	✔
- Off Peak	no	✔	✔	✔
- Period Parking	no	maybe	✔	✔
- Unrestricted	no	no	maybe	✔
- Parallel Parking	no	no	maybe	✔
Bus and Transit Lanes	✔	✔	✔	-
Pedestrian Crossings	Grade Separated or Signals	Signals or Refuge	Marked Crossing, Children's Crossing or Refuge	Marked Crossing, Children's Crossing or Refuge

Sources: "Updated Guidelines for Functional Classification of Roads", Roads and Traffic Authority of New South Wales, 1993
"Road Design Guide", Roads and Traffic Authority of New South Wales

Table 3.2 Suitability for Provision of Right Turn Movements

Right Turn From	Right Turn To			
	Arterial/ Freeway	Sub-Arterial	Collector	Local
Arterial/Freeway	Yes	Yes	Possible	No
Sub-Arterial	Yes	Yes	Yes	Possible
Collector	Possible	Yes	Yes	Yes
Local	No	Possible	Yes	Yes

Source: "Road Design Guide", Roads and Traffic Authority of New South Wales

The Growth Centres Development Code classifications, shown in Table 3.3, are consistent with the RTA classifications.

Table 3.3 Functional Classification of Roads (Growth Centres Commission)

Road Type	AADT	Functions and Connections	Speed Limit
Arterial/Freeway	35,000+	Connects large urban areas	Up to 80km/h
Sub-Arterial	10,000 – 35,000	Arterial roads to town centres Carries major bus routes	Up to 70km/h
Collector	3,000 – 10,000	Connects neighbourhoods Can accommodate public transport	Up to 60km/h
Local	1,000 – 3,000	Priority to pedestrians and cyclists Designed to slow residential traffic	Up to 50km/h

Source: Growth Centres Development Code, Growth Centres Commission, October 2006

3.5 EXISTING ROAD NETWORK CHARACTERISTICS

The proposed development is likely to generate traffic along Little Forest Road, New Illawarra Road and Heathcote Road. This section will assess the existing situation in relation to these roads.

3.5.1 Little Forest Road

Little Forest Road is a public road (originating as a crown boundary road) serving the LHWRC, PCYC and EDL facility (gas generation from the landfill site). Little Forest Road runs off New Illawarra Road from an unsignalised T-intersection. Little Forest Road provides access to the LHWRC weighbridge, through which all vehicles accessing the landfill areas on site must travel. For the general public the weighbridge is the formal entrance to the waste and recycling services.

Little Forest Road is a sealed single carriageway road with a gravel shoulder and provides one traffic lane in each direction way. The posted speed limit is 40km/h.

3.5.2 New Illawarra Road

New Illawarra Road performs the functional role of an arterial road and is designated as a state road and a B-Double route (26 metre), under the care and control of the RTA. The road forms part of the NSW MetRoad 6 from Carlingford to Heathcote, linking Heathcote Road to Alford Points Road in Menai and forming part of a major north-south route between the Princes and Pacific Highways.

In the vicinity of the LHWRC, New Illawarra Road provides one traffic lane in each direction on a single undivided carriageway (at the mid-block) with a speed limit of 70km/h. New Illawarra Road has edge lines to delineate the traffic lanes and the shoulder.

Photograph 3.3 New Illawarra Road looking north from approximately 50 metres north of Heathcote Road

3.5.3 Heathcote Road

Heathcote Road performs the functional role of an arterial road and is designated as a state road and a B-Double route (26 metre), under the care and control of the RTA. Heathcote Road forms an important link between Sydney's west and the Illawarra region, linking the Princes, Hume and Cumberland Highways.

In the vicinity of New Illawarra Road, Heathcote Road generally provides one traffic lane in each direction on an undivided carriageway at the mid-block, however overtaking lanes are provided along various sections. Various speed limits are in place on Heathcote Road. The section of Heathcote Road west of the New Illawarra Road has a posted speed limit of 100km/h, whilst east of New Illawarra Road the speed limit is 70km/h, due to the steep and narrow ascent/descent through the Woronora River valley.

Photograph 3.4 Heathcote Road looking south-east near the intersection with New Illawarra Road

3.6 EXISTING INTERSECTION CONTROLS

This section provides a detailed description including photographs and conceptual layouts of the two closest intersections to the LHWRC site:

- New Illawarra Road with Little Forest Road.
- Heathcote Road with New Illawarra Road.

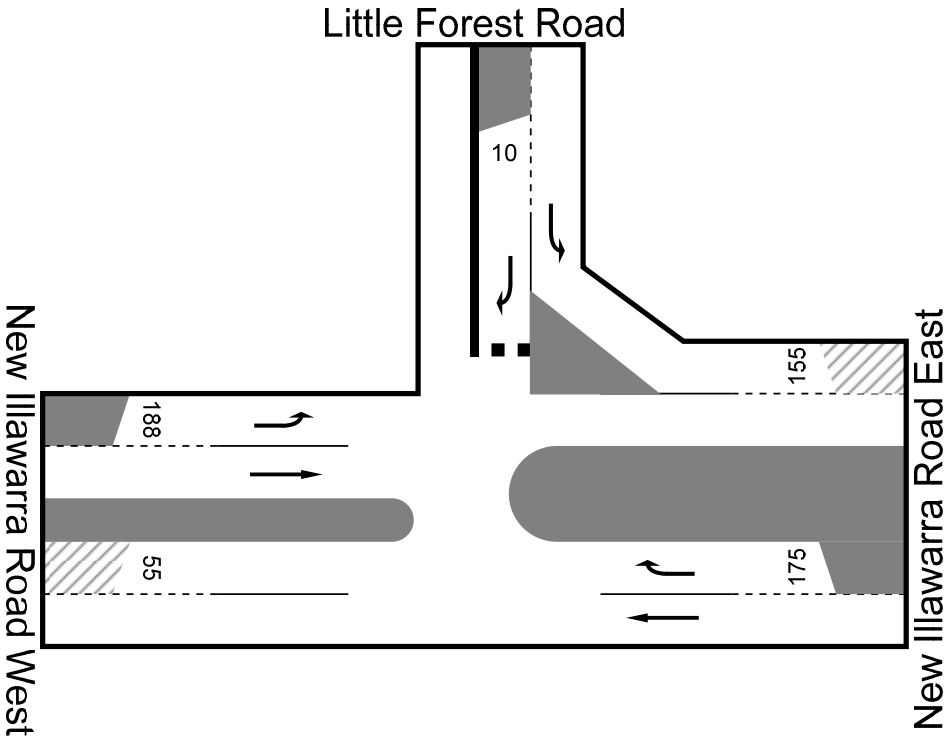
3.6.1 Intersection of New Illawarra Road with Little Forest Road

The intersection of New Illawarra Road with Little Forest Road is an unsignalised T-junction with traffic from Little Forest Road provided with a stop sign at New Illawarra Road. Key features of the intersection are:

- One continuous through lane is provided in each direction along New Illawarra Road.
- A deceleration lane is provided for the left turn into Little Forest Road (approximately 188 metres in length).
- An acceleration lane is provided for the left turn into New Illawarra Road from Little Forest (approximately 155 metres in length).
- A right turn storage bay is provided on New Illawarra Road for vehicles turning right into Little Forest Road (approximately 175 metres in length).
- An acceleration/merge lane (approximately 55 metres) is provided for traffic turning right from Little Forest Road into New Illawarra Road.

On Little Forest Road there is a stop sign and sufficient pavement width to enable left and right turning cars to wait at the stop line. However, there is limited length for trucks to undertake the same manoeuvre. A conceptual layout diagram of the intersection is presented in Figure 3.2.

Figure 3.2 Conceptual Layout of New Illawarra Road with Little Forest Road



Photograph 3.5 shows the westbound acceleration/merge lane and the eastbound deceleration lane on New Illawarra Road at Little Forest Road.

Photograph 3.5 Intersection of New Illawarra Road with Little Forest Road

3.6.2 Intersection of Heathcote Road with New Illawarra Road

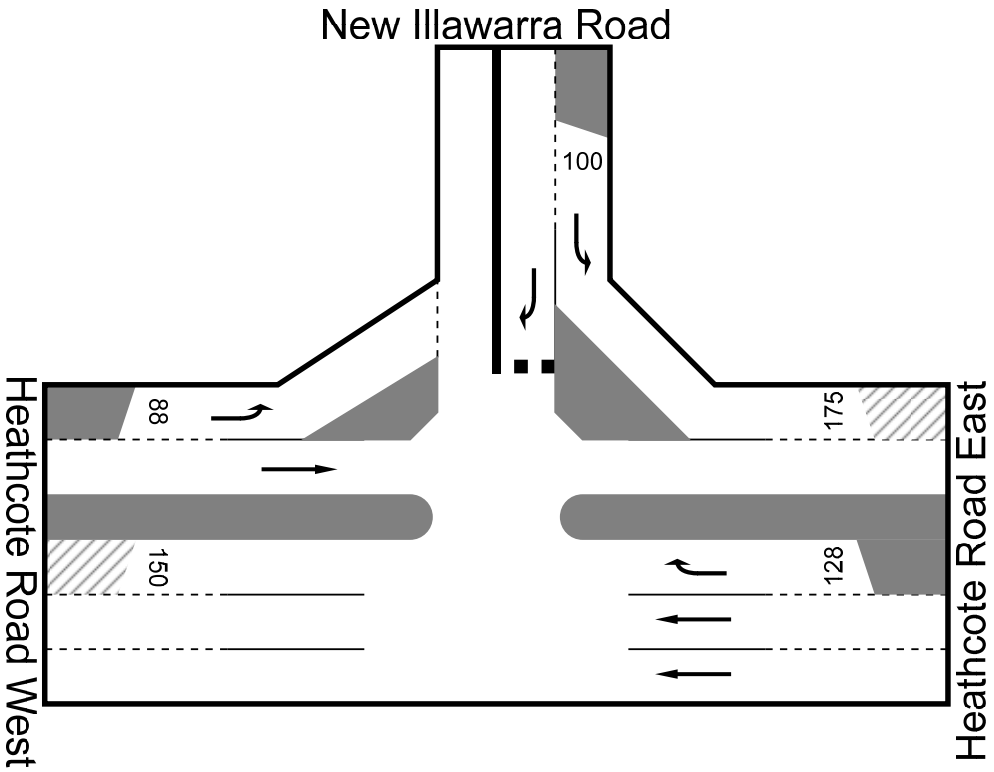
The intersection of Heathcote Road with New Illawarra Road is also an unsignalised T-junction with traffic from New Illawarra Road required to give way to traffic on Heathcote Road. The layout of the intersection is characterised with:

- One through traffic lane on Heathcote Road eastbound and two traffic lanes westbound.
- 88 metre left turn deceleration lane into New Illawarra Road from Heathcote Road.
- Left turn slip lane/acceleration lane provided from New Illawarra Road onto Heathcote Road. The acceleration lane provides approximately 175 metres for merging traffic.
- 128 metre right turn storage lane on Heathcote Road for vehicles turning right into New Illawarra Road.
- 150 metre acceleration/merge lane for vehicles turning right into Heathcote Road from New Illawarra Road.

New Illawarra Road is provided with a give way sign at the intersection. The left turn from New Illawarra Road is facilitated with a left turn slip lane that is defined with a painted chevron island. The visibility of the chevron island could be improved with the installation of pavement markers to outline the chevron island.

A conceptual layout diagram of the intersection is presented in Figure 3.3.

Figure 3.3 Conceptual Layout of Heathcote Road with New Illawarra Road



Photograph 3.6 New Illawarra Road at Heathcote Road

3.7 REPORTED CRASHES

Crash statistics for the five year period 2003 to 2007 inclusive were obtained from the RTA for the intersections of New Illawarra Road/Little Forest Road, Heathcote Road/New Illawarra Road and the mid-block road section of New Illawarra Road between Heathcote Road and Little Forest Road.

3.7.1 Intersection of New Illawarra Road with Little Forest Road

For the period under review, three crashes were reported at the intersection of New Illawarra Road/Little Forest Road and all were injury crashes with the following details:

- One crash involved a right turning vehicle losing control.
- One crash involved a collision between a right turning vehicle and a vehicle moving through from adjacent approaches.
- One crash involved a head on collision between two opposing vehicles.

The number and type of crashes do not show an obvious pattern or a safety concern at this intersection.

3.7.2 Intersection of Heathcote Road with New Illawarra Road

Table 3.4 summarises the reported crashes at the intersection of Heathcote Road with New Illawarra Road.

Table 3.4 Crashes at Heathcote Road with New Illawarra Road

Crash Code[3]	Description	No. of crashes	No. of Casualties
104	Collision between vehicles turning right and moving thru from adjacent approaches	23	12
202	Collision between vehicles turning right and moving thru from opposing directions	11	5
301	Rear end collision between vehicles moving from one direction	4	
105	Right turn vehicle hitting an opposing right turn vehicle	2	1
102	Through vehicle hitting right turn vehicle heading in same direction	2	1
101	Collision between vehicles moving thru from adjacent approaches	2	2
105	Right turn vehicle hitting an opposing right turn vehicle	1	
107	Through vehicle hitting a left turn vehicle on same carriageway	1	1
201	Collision between vehicles head-on	1	
303	Vehicle hitting rear of right turning vehicle	1	
501	Head on	1	1
207	U-turn	1	
303	Vehicle hitting rear of right turning vehicle	1	1
704	Vehicle right off carriageway into object	1	
Total		**52**	**24**

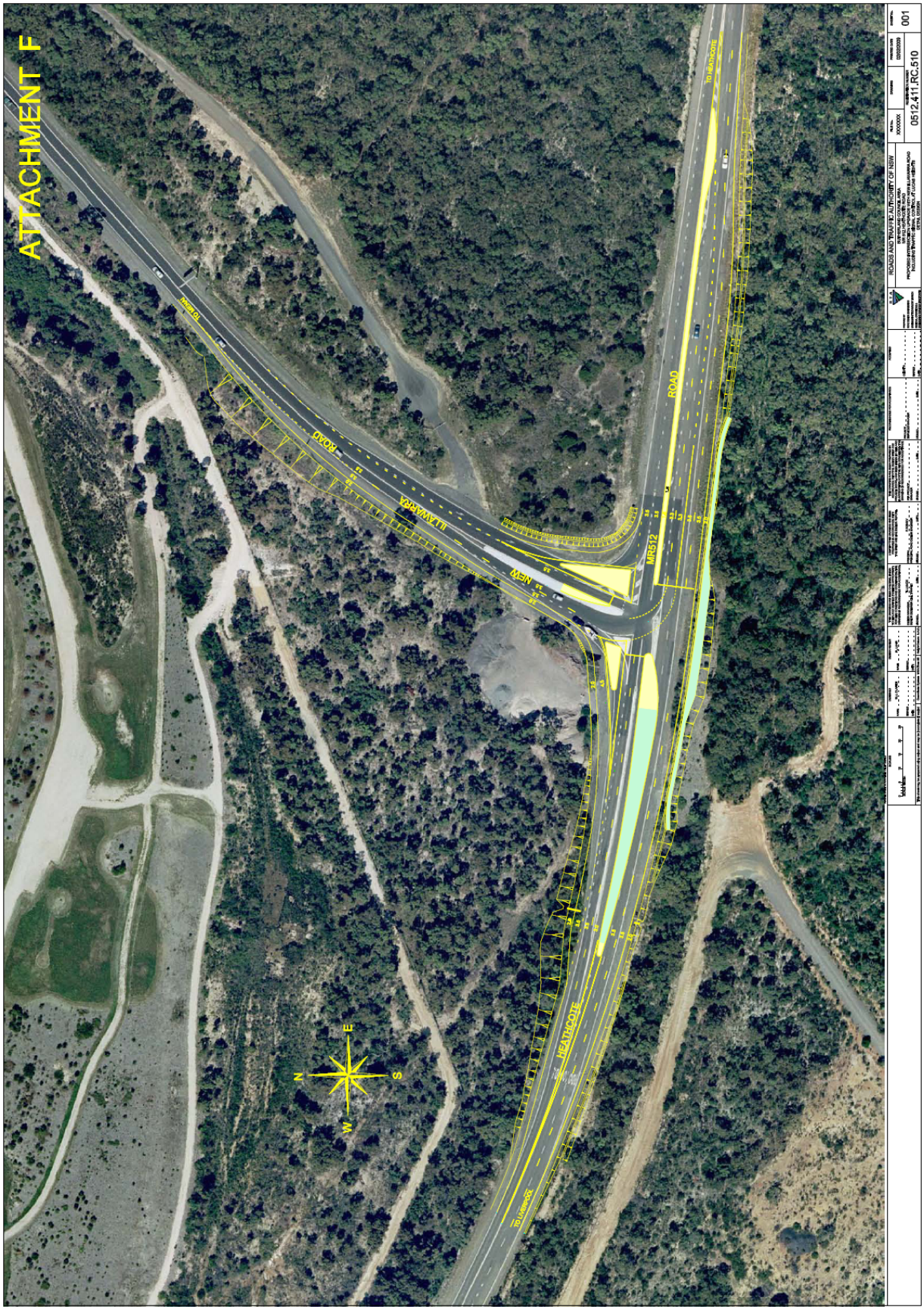
Fifty-two crashes were reported with 24 casualties. The number of casualties as a proportion of crashes is high and possibly as a consequence of the relatively high speed of traffic on Heathcote Road.

Thirty four crashes involved a right turning vehicle being hit by another vehicle travelling in an opposing or in the same direction. These right turn crashes are largely a result of the priority junction control and the relatively high right turn volumes.

The number of crashes could be reduced through a change in the intersection control from a priority controlled intersection to traffic signals. The RTA has recently undertaken a review of this intersection and has recommended that traffic signals be installed at this location, with works to commence in mid-2009. A copy of the RTA's proposed concept plans for the upgraded intersection are provided in Figure 3.4.

[3] Crash code is used to classify the crash for analysis purposes

Figure 3.4 RTA Concept Plans for Intersection of Heathcote Road/New Illawara Road



3.7.3 New Illawarra Road between Heathcote Road and Little Forest Road

The incidence of mid-block crashes on New Illawarra Road between Heathcote Road and Little Forest Road is presented in Table 3.5.

Table 3.5 Mid-block Crashes - New Illawarra Road, Heathcote Road to New Forest Road

Rum Code[4]	Description	No. of crashes	No. of Casualties
301	Rear end collision between vehicles moving from one direction	10	4
703	Vehicle left off carriageway into object	3	2
304	Vehicle hitting U-turning vehicle	1	
401	Vehicle leaving parking hit by on going traffic	1	
308	Side swipe collision between vehicles turning right and moving thru from one direction	1	1
704	Vehicle right off carriageway into object	1	
803	Vehicle turning right losing control hitting object	1	1
Total		**18**	**8**

In total eighteen crashes were reported in the period under review, with the majority of crashes being rear-end collisions. The number of casualties as a proportion of crashes is high and possibly as a consequence of the relatively high speed of traffic on New Illawarra Road.

3.8 EXISTING TRAFFIC VOLUMES

3.8.1 Average Annual Daily Traffic (AADT) Volumes

The RTA maintains a database of Average Annual Daily Traffic (AADT) volumes on key roads in the New South Wales network. Nine years of historical data is used to determine historical traffic growth of the study area. The relevant AADT data is summarised in Table 3.6.

Considering the historical AADT data between 1996 and 2005, the highest growth rate observed was 1.9% per annum linear growth on New Illawarra Road, south of Old Illawarra Road. Growth rates on Heathcote Road varied from 1.8% per annum linear growth around Hammondville to negative growth observed at two locations:

- Moorebank, south of Moorebank Avenue.
- Menai, north of Forum Drive.

[4] RUM Code refers to the standard RTA code used to identify the type of Road User Movement in crashes

Table 3.6 AADT Summary

Road	Location	AADT				Growth (%pa)		
		1996	1999	2002	2005	Period	Linear	Compound
Heathcote Road	Moorebank, south of Moorebank Avenue	35438	34128	34790		1996 - 2002	-0.3%	-0.3%
Heathcote Road	Heathcote, west of Princes Highway	19782	21238	21473	20144	1996 - 2005	0.2%	0.2%
Heathcote Road	Menai, north of Forum Drive		21658	20815	20203	1999 - 2005	-1.1%	-1.2%
Heathcote Road	Moorebank, north of South Western Fwy	17436	20809	20939	18998	1996 - 2005	1.0%	1.0%
Heathcote Road	Hammondville, north of Macarthur Drive	18080	19397	20809	21066	1996 - 2005	1.8%	1.7%
New Illawarra Road	Lucas Heights, south of Old Illawarra Road	13829	14703	15595	16214	1996 - 2005	1.9%	1.8%

When considering future background traffic a compound growth rate of 2.0% per annum is used for this study. This is considered conservative and is a worst case scenario for background traffic growth.

3.8.2 Existing Peak Hour Volumes

A review of existing peak hour traffic flows on the surrounding road network was conducted to ascertain whether the level of traffic activity on the roads within the study area is carrying acceptable levels of traffic during these peak periods. The following intersections in close proximity to the existing development site were considered critical:

- New Illawarra Road with Little Forest Road.
- Heathcote Road with New Illawarra Road.

Peak hour intersection traffic volume counts were undertaken by Cardno on a weekday in August 2008 for the morning (7:30am – 9:00am) and evening peak (3:30pm– 5:00pm) periods for these intersections. Site observations revealed these to be the critical times for the commuter peak traffic movements on the surrounding road network and to capture the truck movements to and from the LHWRC. Analysis of the surveyed traffic volumes revealed that the one hour peak periods were:

- 7:30am to 8:30am.
- 3:45pm to 4:45pm.

The operating hours of the existing LHWRC on a weekday are 6am to 4pm with hourly volumes varying throughout the day from between 32 to 53 vehicles per hour. The highest hourly volumes were observed to be during the middle of the day as detailed previously in Figure 2.3.

The peak hour traffic volume results are summarised in Table 3.7 and presented in Figure 3.5 and Figure 3.6 for the AM and PM peak hours respectively.

Table 3.7 Peak Hour Traffic Volumes

Location		AM Peak (7:30 to 8:30am)			PM Peak (3:45 to 4:45pm)		
		Volume/Direction		Total	Volume/Direction		Total
New Illawarra Road, north of Little Forest Road	vph	891 (NB)	595 (SB)	1486	580 (NB)	862 (SB)	1442
	%HV	6.7%	7.1%	6.9%	7.1%	4.4%	5.5%
New Illawarra Road, south of Little Forest Road	vph	874 (NB)	584 (SB)	1458	571 (NB)	855 (SB)	1426
	%HV	4.9%	5.5%	5.1%	6.0%	3.6%	4.6%
Heathcote Road, east of New Illawarra Road	vph	539 (EB)	1132 (WB)	1671	1099 (EB)	569 (WB)	1668
	%HV	4.6%	4.9%	4.8%	3.5%	7.0%	4.7%
Heathcote Road, west of New Illawarra Road	vph	519 (EB)	822 (WB)	1341	711 (EB)	465 (WB)	1176
	%HV	4.4%	5.2%	4.9%	4.4%	6.5%	5.2%
Little Forest Road, west of New Illawarra Road	vph	45 (EB)	39 (WB)	84	21 (EB)	19 (WB)	40
	%HV	95.6%	92.3%	94.0%	85.7%	94.7%	90.0%

Notes:
NB = northbound SB = southbound EB = eastbound WB = westbound
%HV = Percentage heavy vehicles

Figure 3.5 2008 AM Peak Traffic Turning Volumes

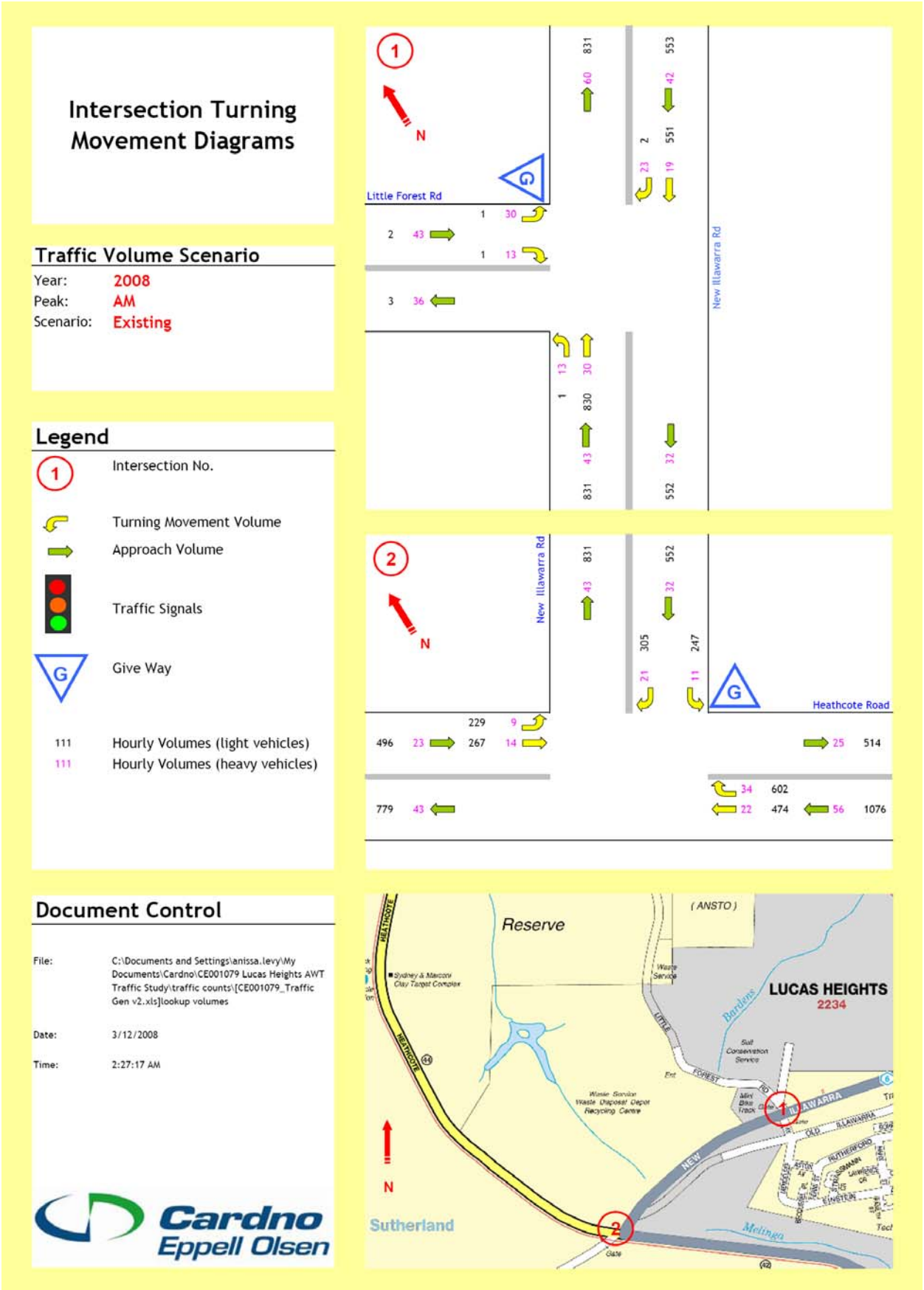
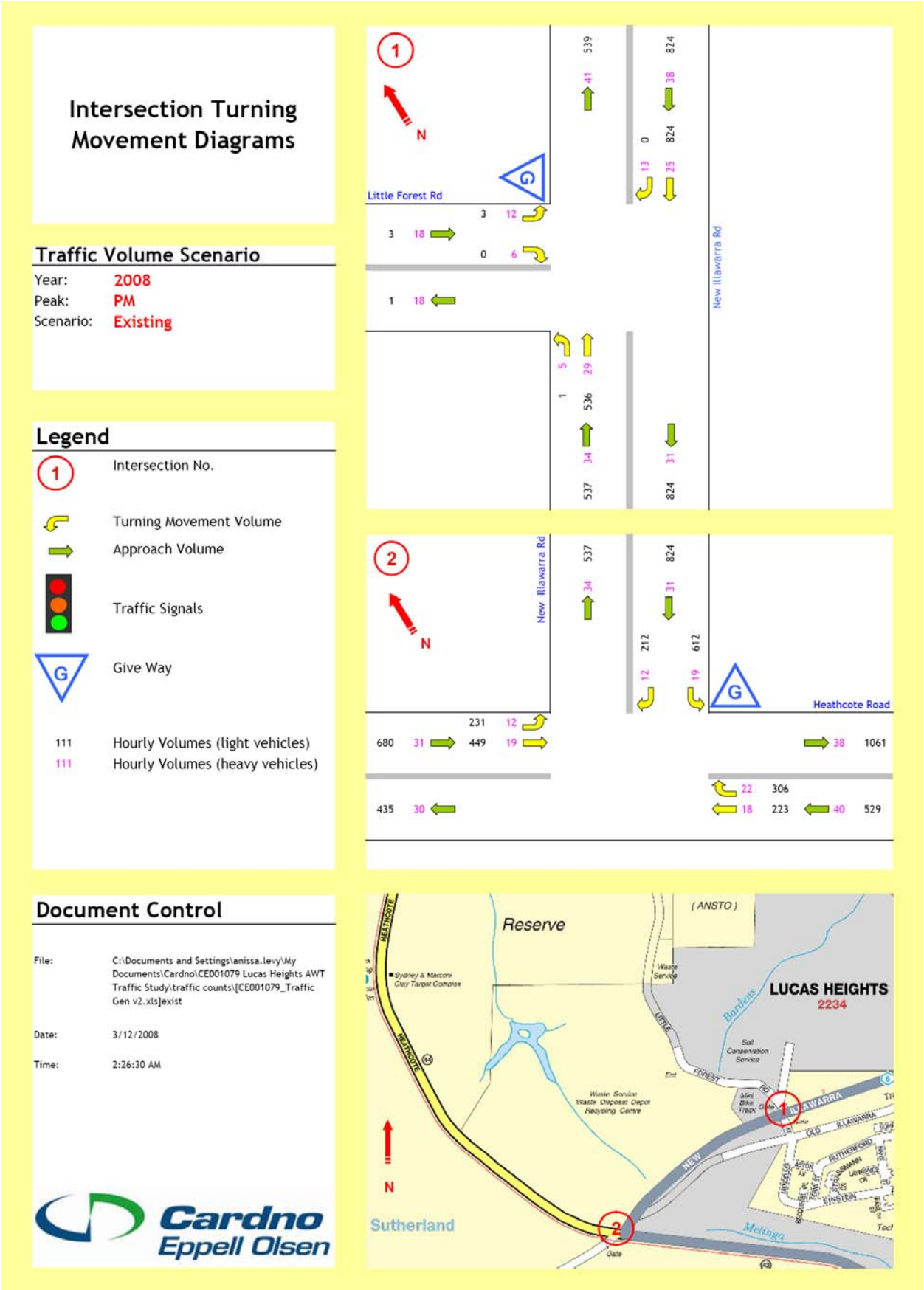


Figure 3.6 2008 PM Peak Traffic Turning Volumes



3.9 MID-BLOCK CARRIAGEWAY CAPACITY AND PERFORMANCE

This section provides an assessment of the mid-block volume capacity (v/c) ratio and level of service of New Illawarra Road, Little Forest Road and Heathcote Road in the vicinity of LHWRC.

3.9.1 Volume Capacity Ratio

Volume capacity ratio (v/c) is a measure of the observed traffic volumes along a section of road against the total capacity of the road. The capacity is defined by the Austroads Guide to Traffic Engineering Practice Road Capacity - Part 2. The mid-block carriageway volume to capacity ratios for the AM and PM peak hours respectively are presented in Table 3.8 and Table 3.9.

Table 3.8 Mid-block AM Peak Hour Volume to Capacity Ratio

Location	Travel Direction	Capacity (vph)[5]	Volume (vph)	v/c Ratio
Little Forest Road, west of New Illawarra Road	eastbound	500	45	0.09
	westbound	500	39	0.08
New Illawarra Road, north of Little Forest Road	northbound	1300	891	0.69
	southbound	1300	595	0.46
New Illawarra Road, south of Little Forest Road	northbound	1300	874	0.67
	southbound	1300	584	0.45
Heathcote Road, west of New Illawarra Road	eastbound	1300	519	0.40
	westbound	1300	822	0.63
Heathcote Road, east of New Illawarra Road	eastbound	1300	539	0.41
	westbound	1300	1132	0.87

A volume capacity ratio greater than 0.85 suggests that mid-block congestion is occurring with reduced travel speeds, minimal gaps in the traffic stream, and reduced vehicle headways. The results presented in Table 3.8 and Table 3.9 generally show ratios less than 0.85 and the traffic flow at the mid-block is unimpeded by congestion for the AM and PM peak hours respectively. Westbound traffic on Heathcote Road, east of New Illawarra Road is approaching capacity.

[5] Capacity based on the Austroads Guide to Traffic Engineering Practice Part Road Capacity Part 2 for the relevant type of carriageway

Table 3.9 Mid-block PM Peak Hour Volume to Capacity Ratio

Location	Travel Direction	Capacity (vph)[6]	Volume (vph)	v/c Ratio
Little Forest Road, west of New Illawarra Road	eastbound	500	21	0.04
	westbound	500	19	0.04
New Illawarra Road, north of Little Forest Road	northbound	1300	580	0.45
	southbound	1300	862	0.66
New Illawarra Road, south of Little Forest Road	northbound	1300	571	0.44
	southbound	1300	885	0.66
Heathcote Road, west of New Illawarra Road	eastbound	1300	711	0.55
	westbound	1300	465	0.36
Heathcote Road, west of New Illawarra Road	eastbound	1300	571	0.44
	westbound	1300	855	0.66

3.9.2 Level of Service

Level of Service (LoS) is a qualitative measure describing the operational conditions on a road and their perception by a driver. The capacity of urban lanes with interrupted flow is provided in Table 3.10 for each LoS. These capacities may increase when priority is given to the major traffic flow at intersections or if there is widening at intersections to accommodate more traffic. The spacing of intersections will differ with the hierarchy and function of the road.

The capacity of major streets within an urban area can be based on an assessment of their operating Level of Service. Level of service is defined by AUSTROADS (1988) as a qualitative measure of the effects of a number of features, which include speed and travel time, traffic interruptions, freedom to manoeuvre, safety, driving comfort and convenience, and operating costs. Levels of service are designated from 'A' to 'F' from best (free flow conditions) to worst (forced flow with stop start operation, long queues and delays) as defined in Table 3.10.

The typical capacity of urban lanes with interrupted flow is provided in Table 3.11 for each LoS, as defined in the RTA Guide to Traffic Generating Developments. These capacities may increase when priority is given to the major traffic flow at intersections or if there is widening at intersections to accommodate more traffic. The spacing of intersections will differ with the hierarchy and function of the road.

[6] Capacity based on the Austroads Guide to Traffic Engineering Practice Part Road Capacity Part 2 for the relevant type of carriageway

Table 3.10 Mid-block Level of Service and Capacity

LoS	Description	Hourly flow (vehicles)	
		1 Lane	2 Lanes
A	Free flow - A condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.	200	900
B	Stable flow (slight delays) - In the zone of stable flow and drivers still have the reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is a little less than with LOS A.	380	1400
C	Stable flow (acceptable delays) - Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.	600	1800
D	Approaching unstable flow (tolerable delays) - Close to the limit of stable flow and is approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.	900	2200
E	Unstable flow (congestion; intolerable delays) - Occurs when traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause break-down.	1400	2800
F	Forced flow (jammed)	>1400	>2800

Source: RTA Guide to Traffic Generating Developments

A service volume, as defined by AUSTROADS (1988), is the maximum number of vehicles that can pass over a given section of roadway in one direction during one hour while operating conditions are maintained at a specified level of service. It is suggested that ideally arterial and sub-arterial roads should not exceed service volumes at Level of Service 'C'. At this level, whilst most drivers are restricted in their freedom to manoeuvre, operating speeds are still reasonable and acceptable delays experienced.

However, in urban situations, arterial and sub-arterial roads operating at Level of Service 'D' are still considered adequate. It is acceptable to provide road capacity at Level of Service 'D' in the peak hour since overprovision of road capacity is not conducive to promoting alternative transport modes to the car. The LoS for uninterrupted flow conditions along urban roads is identified in Table 3.11.

Table 3.11 Level of Service Uninterrupted Flow Conditions Along Urban Roads (One Way Hourly Volumes)

Description	LEVEL OF SERVICE					
	A	B	C	D	E	F
2 Lane Undivided (2U)	760	880	1000	1130	1260	Forced Flows
2 Lane with Clearways and limited access (2CL)	1010	1170	1330	1500	1680	
4 Lane Undivided (13m) (4U)	1260	1470	1680	1890	2100	
4 Lane Undivided with Clearways (4UC)	1510	1760	2010	2270	2520	
4 Lane Divided with Clearways (4DC)	1600	1860	2130	2400	2660	
4 Lane Divided with Clearways, limited access and intersections(4DCL)	2250	2620	3000	3380	3740	
6 Lane Undivided (6U)	2020	2350	2690	3020	3360	
6 Lane Divided with Clearway (6DC)	2440	2840	3250	3660	4060	
6 Lane Divided with Clearways, limited access and intersections (6DCL)	3375	3930	4500	5070	5610	

The existing mid-block carriageway level of service for the AM and PM peak hours respectively are presented in Table 3.12.

Table 3.12 Mid-block Peak Hour Level of Service

Location	Travel Direction	Type of Carriageway[7]	AM Peak		PM Peak	
			Volume (vph)	LoS	Volume (vph)	LoS
Little Forest Road, west of New Illawarra Road	eastbound	2U	45	A	21	A
	westbound	2U	39	A	19	A
New Illawarra Road, north of Little Forest Road	northbound	2CL	891	A	580	A
	southbound	2CL	595	A	862	A
New Illawarra Road, south of Little Forest Road	northbound	2CL	874	A	571	A
	southbound	2CL	584	A	885	A
Heathcote Road, west of New Illawarra Road	eastbound	2CL	519	A	711	A
	westbound	2CL	822	A	465	A
Heathcote Road, east of New Illawarra Road	eastbound	2CL	539	A	571	A
	westbound	2CL	1132	B	855	A

[7] Refers to the descriptions provided in Table 3.11

In the vicinity of the site both New Illawarra Road and Heathcote Road generally provide 2 traffic lanes but do not provide any parking opportunities and have limited accesses, hence are considered to operate as "2 Lane with Clearways and limited access". This shows that all sections of road assessed currently perform at LoS 'A' or 'B'.

3.10 PEAK HOUR ENVIRONMENTAL CAPACITY PERFORMANCE

The RTA Guide to Traffic Generating Developments (RTA Guide) provides guidelines on the assessment of peak hour environmental capacity for local and collector roads. It is important to note that the environmental performance standards provided in the RTA Guide are typically used for residential streets in urban conditions. The peak hour flow environmental goal for local and collector roads is determined by the functional classification of the street and the physical characteristics of the street.

Both New Illawarra Road and Heathcote Road are arterial roads. Little Forest Road does not provide access to any residential properties. Therefore the consideration of peak hour environmental capacity is not applicable.

3.11 INTERSECTION PERFORMANCE

This section provides an evaluation of the existing performance of the two closest intersections to the LHWRC site. The evaluation of these intersections includes existing traffic generation from the LHWRC but not the impact of the proposed AWT facility.

In an urban area the performance of any road network is generally dependent on the operating performance of key intersections that act as critical capacity control points. An assessment of the current intersection operating performance has been undertaken for the intersections of New Illawarra Road with Little Forest Road and Heathcote Road with New Illawarra Road using SIDRA intersection assessment software.

SIDRA is a program that assesses intersection performance taking into account intersection control, lane numbers, traffic volumes and other infrastructure details. SIDRA is an industry standard software package that is accepted by the RTA and Councils in NSW. The default parameters in SIDRA have been used in the intersection assessment and are accepted by the RTA. The use of the default parameters makes the intersection a worst case assessment. This includes a peak flow factor of 95 percent which effectively increases the traffic volume by 5 percent with an intra-peak of 30 minutes in the peak hour assessment.

The key indicator of intersection performance is Level of Service (LoS), where results are placed on a measure from 'A' to 'F'. The level of service for a sign controlled intersection is determined based on the average vehicle delay on the worst approach movement. The LoS criteria are described in Table 3.13.

Table 3.13 Intersection Level of Service Criteria

LoS	Traffic Signal/Roundabout	Give Way/Stop Sign/ T-Junction control	Average Delay per Vehicle (secs/veh)
A	Good operation	Good operation	Less than 14
B	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity	15 to 28
C	Satisfactory	Satisfactory, but accident study required	29 to 42
D	Operating near capacity	Near capacity & accident study required	43 to 56
E	At capacity, at signals incidents will cause excessive delays.	At capacity, requires other control mode	57 to 70
F	Unsatisfactory and requires additional capacity, Roundabouts require other control mode	At capacity, requires other control mode	>70

Source: RTA Guide to Traffic Generating Developments

LoS 'D' is generally accepted as the design constraint, that is, intersections overall should be designed to operate at LoS 'D' or better. It should also be noted that capacity constraint can be used as a demand management technique and that over-provision of capacity can encourage more car use.

Average Vehicle Delay (AVD) also provides a measure of the operational performance of an intersection as indicated in Table 3.13, which relates AVD to LoS. The AVD should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route). The average delay ranges for each level of service band are also shown in Table 3.13.

For traffic signals, the average delay over all movements should be taken. For roundabouts and priority control intersections (sign control) the critical movement for level of service assessment should be that movement with the highest average delay. Analysis of priority controlled intersections does not give an overall LoS for the intersection as individual movements do not necessarily impact on the overall operation of the intersection.

The Degree of Saturation (DS), or the ratio of flow to capacity, is another measure of the operational performance of individual intersections. For intersections controlled by traffic signals both queue length and delay increase rapidly as DS approaches 1. It is usual to attempt to keep DS to less than 0.9 for any movement and for the intersection overall. DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceed 0.9, queues can be anticipated.

Table 3.14 to Table 3.17 present a summary of the results of the existing intersection performance analysis for of the intersection of New Illawarra Road with Little Forest Road and Heathcote Road and New Illawarra Road for the AM and PM peak hours. Full movement summary results are presented in Appendix B.

Table 3.14 New Illawarra Road/Little Forest Road - Intersection Performance 2008 AM Peak Hour

Movement Description	Demand Flow (veh/h)	Degree of Saturation (Ds)	Average Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road (northern approach)					
Through	570	0.299	0.0	LOS B	10
Right	25	0.150	34.2	LOS C	9
Approach	595	0.299	1.5	LOS A	9
Little Forest Road					
Left	31	0.028	10.3	LOS A	0
Right	14	0.483	124.6	LOS F	16
Approach	**45**	**0.483**	**45.8**	**LOS D**	**16**
New Illawarra Road (southern approach)					
Left	14	0.013	11.6	LOS A	0
Through	860	0.451	0.0	LOS A	0
Approach	**874**	**0.451**	**0.2**	**LOS A**	
All Vehicles	**1514**	**0.483**	**2.0**	**n/a**	**n/a**

Table 3.15 New Illawarra Road/Little Forest Road - Intersection Performance 2008 PM Peak Hour

Movement Description	Demand Flow (veh/h)	Degree of Saturation (Ds)	Average Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road (northern approach)					
Through	849	0.444	0.1	LOS A	15
Right	3	0.042	22.1	LOS B	3
Approach	862	0.444	0.4	LOS A	3
Little Forest Road					
Left	15	0.013	9.8	LOS A	0
Right	7	0.097	36.7	LOS C	3
Approach	**22**	**0.097**	**45.8**	**LOS B**	**3**
New Illawarra Road (southern approach)					
Left	6	0.005	11.3	LOS A	0
Through	565	0.299	0.0	LOS A	0
Approach	**571**	**0.299**	**0.1**	**LOS A**	
All Vehicles	**1455**	**0.444**	**0.6**	**n/a**	**n/a**

Table 3.16 Heathcote Road/New Illawarra Road - Intersection Performance 2008 AM Peak Hour (Unsignalised)

Movement Description	Demand Flow (veh/h)	Degree of Saturation (Ds)	Average Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road					
Left	258	0.143	9.6	LOS A	4
Right	326	0.970	75.5	LOS F	138
Approach	**584**	**0.969**	**46.4**	**LOS D**	**138**
Heathcote Road (Western approach)					
Left	238	0.461	20.4	LOS B	21
Through	281	0.149	4.0	LOS A	0
Approach	**519**	**0.462**	**11.5**	**LOS A**	**21**
Heathcote Road (Eastern approach)					
Through	496	0.131	0.0	LOS A	4
Right	636	0.462	11.8	LOS A	32
Approach	1132	0.462	6.6	LOS A	32
All Vehicles	**2235**	**0.970**	**18.2**	**n/a**	**n/a**

Table 3.17 Heathcote Road/New Illawarra Road - Intersection Performance 2008 PM Peak Hour (Unsignalised)

Movement Description	Demand Flow (veh/h)	Degree of Saturation (Ds)	Average Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road					
Left	631	0.347	9.5	LOS A	9
Right	224	0.552	23.2	LOS B	27
Approach	**855**	**0.551**	**13.1**	**LOS A**	**27**
Heathcote Road (Western approach)					
Left	243	0.296	14.9	LOS B	12
Through	468	0.246	4.0	LOS A	0
Approach	**711**	**0.296**	**7.8**	**LOS A**	**12**
Heathcote Road (Eastern approach)					
Through	241	0.065	0.0	LOS A	2
Right	328	0.300	12.4	LOS A	14
Approach	569	0.300	7.2	LOS A	14
All Vehicles	**2135**	**0.552**	**9.7**	**n/a**	

The right turn movement from Little Forest Road into New Illawarra Road during the AM peak period shows significant delays and operates at LoS 'F' due to the heavy northbound through traffic on New Illawarra Road. During the PM peak the delays are less significant at around 37 seconds per vehicle. All other movements at this intersection operate within capacity. Only a small number of vehicles experience delays on the minor side road and hence the overall intersection is considered to perform well during both peak periods.

At the intersection of Heathcote Road and New Illawarra Road all turn movements for both peak hours have an acceptable LoS except for the right turn from New Illawarra Road into Heathcote Road. The right turn from New Illawarra Road into Heathcote Road requires finding sufficient gaps in two traffic streams (eastbound and westbound through traffic on Heathcote Road) in two movements (a storage bay/acceleration lane is provided in the median on Heathcote Road). Consequently the delay and the LoS for the right turn from New Illawarra Road into Heathcote Road is poor. Additional intersection capacity would be required to address this issue.

The intersection of Heathcote Road and New Illawarra Road was re-assessed as signalised intersections assuming the concept designs being implemented by the RTA (as noted in Section 3.7.2), represented in Figure 3.7. A summary of the results of the intersection performance analysis when assessed as a signalised intersection are presented in Table 3.18 and Table 3.19.

Figure 3.7 Conceptual Layout of Heathcote Road with New Illawarra Road (signalised)

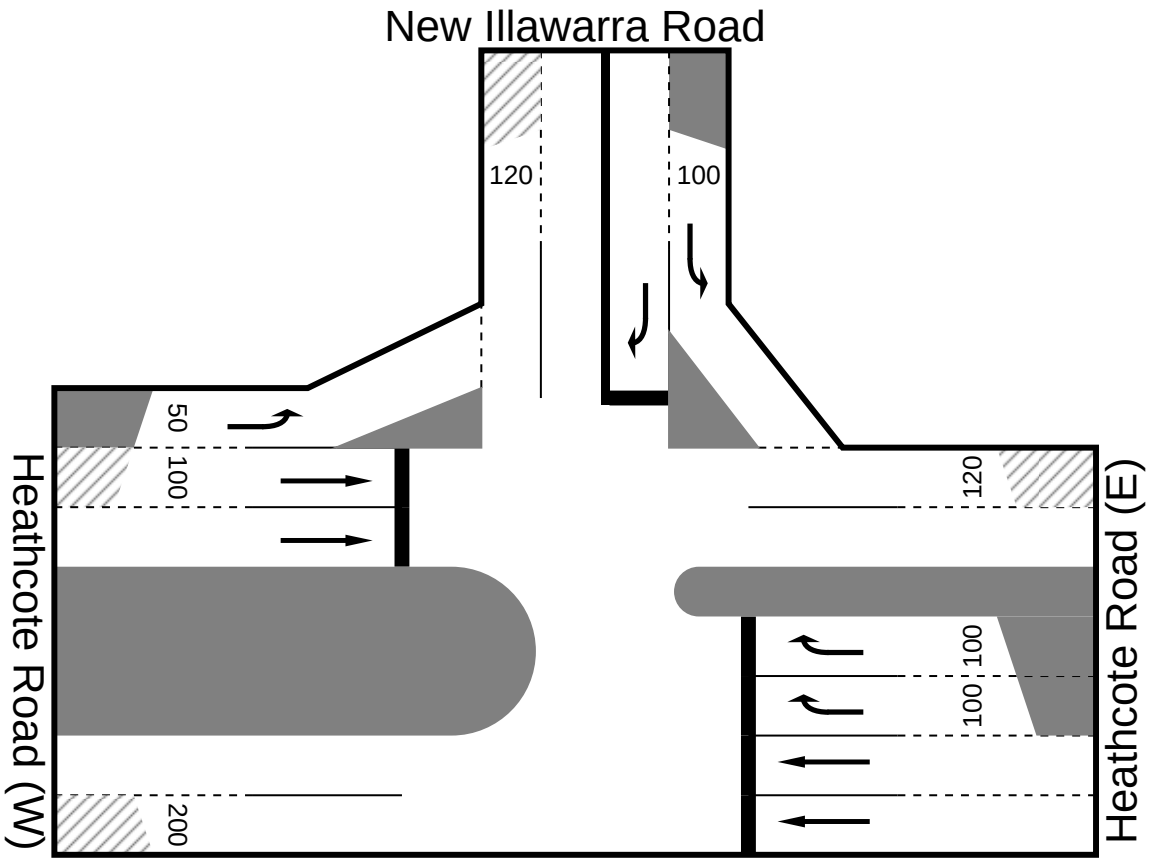


Table 3.18 Heathcote Road/New Illawarra Road - Intersection Performance 2008 AM Peak Hour (Signalised)

Movement Description	Demand Flow (veh/h)	Degree of Saturation (Ds)	Average Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road					
Left	258	0.188	10.5	LoS A	10.0
Right	326	0.835	36.7	LoS C	81.0
Approach	**584**	**0.835**	**25.1**	**LoS B**	**81.0**
Heathcote Road (Western approach)					
Left	238	0.216	10.5	LoS A	10.0
Through	281	0.748	25.7	LoS B	45.0
Approach	**519**	**0.748**	**18.7**	**LoS B**	**45.0**
Heathcote Road (Eastern approach)					
Through	496	0.242	6.6	LoS A	33.0
Right	636	0.917	39.6	LoS C	112.0
Approach	**1132**	**0.917**	**25.2**	**LoS B**	**112.0**
All Vehicles	**2235**	**0.917**	**23.7**	**LoS B**	**112.0**

Table 3.19 Heathcote Road/New Illawarra Road - Intersection Performance 2008 PM Peak Hour (Signalised)

Movement Description	Demand Flow (veh/h)	Degree of Saturation (Ds)	Average Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road					
Left	631	0.496	11.1	LoS A	31.0
Right	224	0.715	29.6	LoS C	46.0
Approach	**855**	**0.716**	**15.9**	**LoS B**	**46.0**
Heathcote Road (Western approach)					
Left	243	0.211	10.8	LoS A	10.0
Through	468	0.661	16.3	LoS B	52.0
Approach	**711**	**0.661**	**14.4**	**LoS A**	**52.0**
Heathcote Road (Eastern approach)					
Through	241	0.123	5.3	LoS A	14.0
Right	328	0.722	29.8	LoS C	42.0
Approach	**569**	**0.722**	**19.4**	**LoS B**	**42.0**
All Vehicles	**2135**	**0.722**	**16.4**	**LoS B**	**52.0**

Overall as a signalised intersection Heathcote Road and New Illawarra Road will perform at LoS B during both peak periods. The lengthy delays for the right turn from New Illawarra Road into Heathcote Road will be significantly improved during the AM peak period (less than half).

3.12 NON-CAR BASED TRANSPORT

3.12.1 Public Transport

The closest bus route to the LHWRC is route 961, operated by Veolia Transport. The route runs from Miranda Railway Station, via Sutherland to Barden Ridge and return, with the closest bus stops located on Old Illawarra Road adjacent to the New Illawarra Road intersection, approximately three (3) kilometres walk away.

The 961 bus service operates generally half-hourly during the commuter peak periods and throughout the day.

The frequency of the service, combined with the walking distance between the bus stop and the LHWRC indicates that very few LHWRC-related employee trips are likely to be attracted to public transport.

In addition to regular public transport services, a chartered bus service is provided to/from the Australian Nuclear Science and Technology Organisation (ANSTO) facility, located approximately 800 metres north of the development site. The service is provided by Veolia, with "ANSTO" shown as the destination, and can be used by members of the general public. Only one service is provided in each direction - the service running to the ANSTO facility in the morning, arriving at Lucas Heights at 8:30am, and returning to Sutherland via Heathcote and Engadine at 5:00pm. The fare is $2.50.

The service timings are generally not convenient with respect to the shift start and finish times at the proposed development, so significant utilisation of this service is unlikely.

3.12.2 Cycling

New Illawarra Road, between Heathcote Road and Old Illawarra Road, provides some capacity for cycling on-road with fully sealed shoulders. There are no dedicated cycle paths in the vicinity of the LHWRC.

The lack of dedicated cycle-specific infrastructure suggests that very few LHWRC-related employee trips are likely to be attracted to cycling.

3.12.3 Walking

The proposed development is located in a semi-rural environment and hence the road infrastructure does not provide suitable pedestrian facilities. Pedestrians can utilise the wide sealed shoulders along New Illawarra Road between the proposed development and Barden Ridge however, there are no specific pedestrian facilities provided.

3.13 EXISTING CONDITIONS CONCLUSIONS

The assessment and surveys of the existing LHWRC and the surrounding road network provide the basis for:

- Distinguishing existing from development conditions.
- Identifying existing infrastructure issues that can be referred to Council or the RTA, irrespective of whether the AWT facility proceeds or not.

The road network and the associated intersections surrounding LHWRC generally perform adequately and are able to carry the existing traffic volumes. However, a small number of vehicles exiting Little Forest Road turning right onto New Illawarra Road during the AM peak period experience significant delays. Similarly at the intersection of Heathcote Road and New Illawarra Road the right turn from New Illawarra Road into Heathcote Road experiences significant delays and additional intersection capacity would be required to address this issue.

The intersection of Heathcote Road/New Illawarra Road experiences a significant number of casualty crashes and the intersection operation highlights the delays for right turning traffic from New Illawarra Road. The NSW RTA has plans to signalise this intersection with works expected to commence in mid-2009. This will be addressed through the installation of traffic signals.

4.0 DEVELOPMENT PROPOSAL

This section provides a detailed description of the development proposal.

4.1 GENERAL DESCRIPTION

The proposed AWT facility has a life of 20 years, it is anticipated that the AWT will commence operation in 2011/2012.

The proposed AWT facility would include a mechanical biological treatment (MBT) plant to process up to 100,000 tonnes per annum of mixed solid waste (MSW) (putrescible waste) using the patented ArrowBio technology. The MBT technology is similar to that currently being commissioned at WSN's Jacks Gully site (EcolibriumTM Mixed Waste Facility at the Macarthur Resource Recovery Park) in south west Sydney and would incorporate the following:

- Receivals hall.
- Processing building.
- Biological plant.
- Energy generation plant.
- Staff facilities.
- Parking area for 72 vehicles.
- Internal road network.

The plant would use material separation technologies to recover recyclable materials from the municipal waste stream and conventional anaerobic digestion to produce stabilised sludge/soil conditioner with market potential and biogas, suitable for electricity generation. It would divert an estimated 70% of the incoming material from landfill.

4.1.1 AWT Residual Waste

It is anticipated that between 30-40% of the incoming waste stream will be AWT residual waste, which equates to a maximum of 40,000 tonnes per annum of residual waste that must be disposed of. WSN have classified the residual waste for the approved Jacks Gully AWT at the Macarthur Resource Recovery Park as "General Solid Waste" (non-putrescible) as per the Waste Classification Guidelines (DECC) to be disposed of at a Class 2 landfill. The AWT residual is anticipated to be inert and non-putrescible.

The AWT residual will be disposed of at the landfill at LHWRC whilst it remains in operation (current consent indicates landfilling operations at LHWRC must cease on 31 December 2024). AWT residual is to be disposed off site for the 10 year period from 1 Jan 2025 to 31 Dec 2034.

Hence additional truck movements will be generated off-site for the disposal of AWT residual in the years 2025-2035. The assessment of traffic generation has been split into the following time periods:

- Pre-2025 - representing the period when AWT residual is disposed of on-site at the LHWRC.
- Post-2025 - representing the period when AWT residual is disposed of of-site at an alternative landfill site.

The location of a waste disposal facility post-2025 is not nominated and will be determined closer to the 10 year period in question. At best, the AWT residual waste will be disposed of at an appropriately licenced facility to accept Class 2 non putrescible waste.

4.2 HEAVY VEHICLE MOVEMENTS

4.2.1 Pre-2025

The proposed AWT site will require the movement of heavy vehicles into and out of the site to deliver the 100,000 tonnes per annum of MSW. Once the AWT site is open the heavy vehicle movements will generally be as a result of incoming waste for treatment.

The following characteristics of the heavy vehicle movements for delivery of waste are anticipated:

- A maximum of four (4) vehicles can deliver at one time.
- Once operational the vast majority of the movements will be completed by 10 tonne capacity compactor vehicles (not waste transfer vehicles).
- The general turnaround time (from weighbridge to exit) is estimated to be 10-15 minutes, with a maximum turnaround of 25 minutes.
- The site will operate 5 days per week for 52 weeks per year.

4.2.2 Post-2025

Once the LHWRC landfill has ceased operation (post-2025) AWT residual will be transported off-site with the following characteristics:

- 22 tonne capacity transfer trailer to transfer material.
- Maximum of 40% of 100,000 tonnes per annum = 40,000 tonnes per annum of AWT residual
- The site will operate 5 days per week for 52 weeks per year.
- Trucks will deliver 10 hours per day.

4.3 OPERATING HOURS

The proposed AWT facility would generally operate weekdays only, however differing components of the facility will have different operating hours, assumed to be as follows:

- Waste Receival – 10 hours per day from 6am to 4pm Monday to Friday.
- Biological plant – 24 hours per day, seven days a week (24/7).
- Waste Processing - 16hrs per day (5am to 9pm), 5 days per week

4.4 FUTURE WORKFORCE

When the proposed AWT facility is fully operational it is likely to employ 69 staff members at the site. The proposed AWT facility will employ staff on a shift basis. The estimated staffing levels for the different shifts/working hours for the LH AWT consist of the following for the different core activities:

- Control Room – operators in the control room's main focus is monitoring the plant from the control room & mixed pattern of maintenance/cleaning and waste processing:
  - 5am to 5pm (12 hour), 7 days a week, 2 people.
  - 5pm to 5am (12 hour), 7 days a week, 2 people.
- Waste Receival and Processing:
  - 5am to 1pm (8 hour), 5 days per week (Mon to Fri), up to 30 people.
  - 1pm to 9pm (8 hour), 5 days per week (Mon to Fri), up to 25 people.
- Administration – management:
  - 8am to 4pm (8 hour), 5 days per week (Mon to Fri), up to 10 people.

It is assumed that all employees would arrive within 30 minutes leading up to their shift and leave within 30 minutes at the end of their shift.

4.5 FUTURE SITE LAYOUT AND INTERNAL ACCESS

The location of the proposed AWT facility within the LHWRC site is shown on Figure 4.1. A proposed concept layout for the AWT site is provided in Figure 4.2. The construction of the AWT facility near the corner of New Illawarra Road with Little Forest Road will require some adjustments to the internal road networks to provide access to existing and proposed facilities.

The proposed AWT Facility also includes a second weighbridge for vehicle entry to the AWT site. All other traffic for the landfill and associated facilities will continue to use the existing weighbridge.

With the development of the AWT facility, it is proposed that the Police and Community Youth Club (PCYC) mini-bike facility will be relocated to a rehabilitated landfill area within the LHWRC site, west of its current location (also shown on Figure 4.1). Relocation of the PCYC mini-bike track (subject to a separate Development Application) is not anticipated to impact on the current development proposal as the facility is predominantly used on Sundays when commercial waste truck volumes are at their lowest (almost no commercial waste vehicles operate on Sunday). Access and egress to the mini-bike facility will change as the internal road network will be altered.

WSN are also proposing to provide a truck parking area for the WSN waste collection business on part of the LHWRC site, adjacent to the AWT site (also shown on Figure 4.1). The approval of the truck parking area will be subject to a separate development application. However, the traffic implications of the truck parking area for the WSN waste collection business are considered in this report (for cumulative traffic impacts to be considered).

Figure 4.1 Proposed Relocated Facilities and Vehicle Access Route

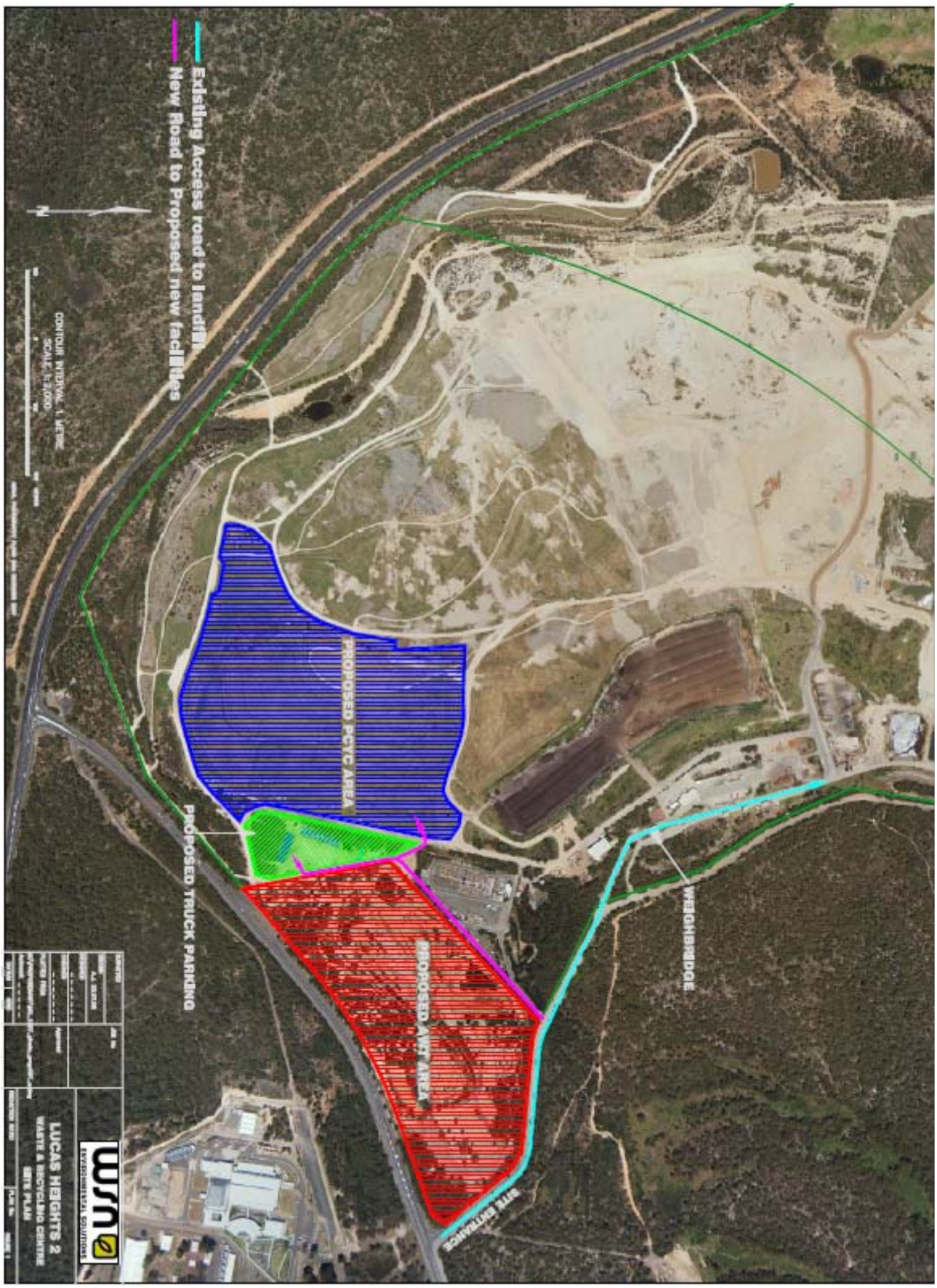
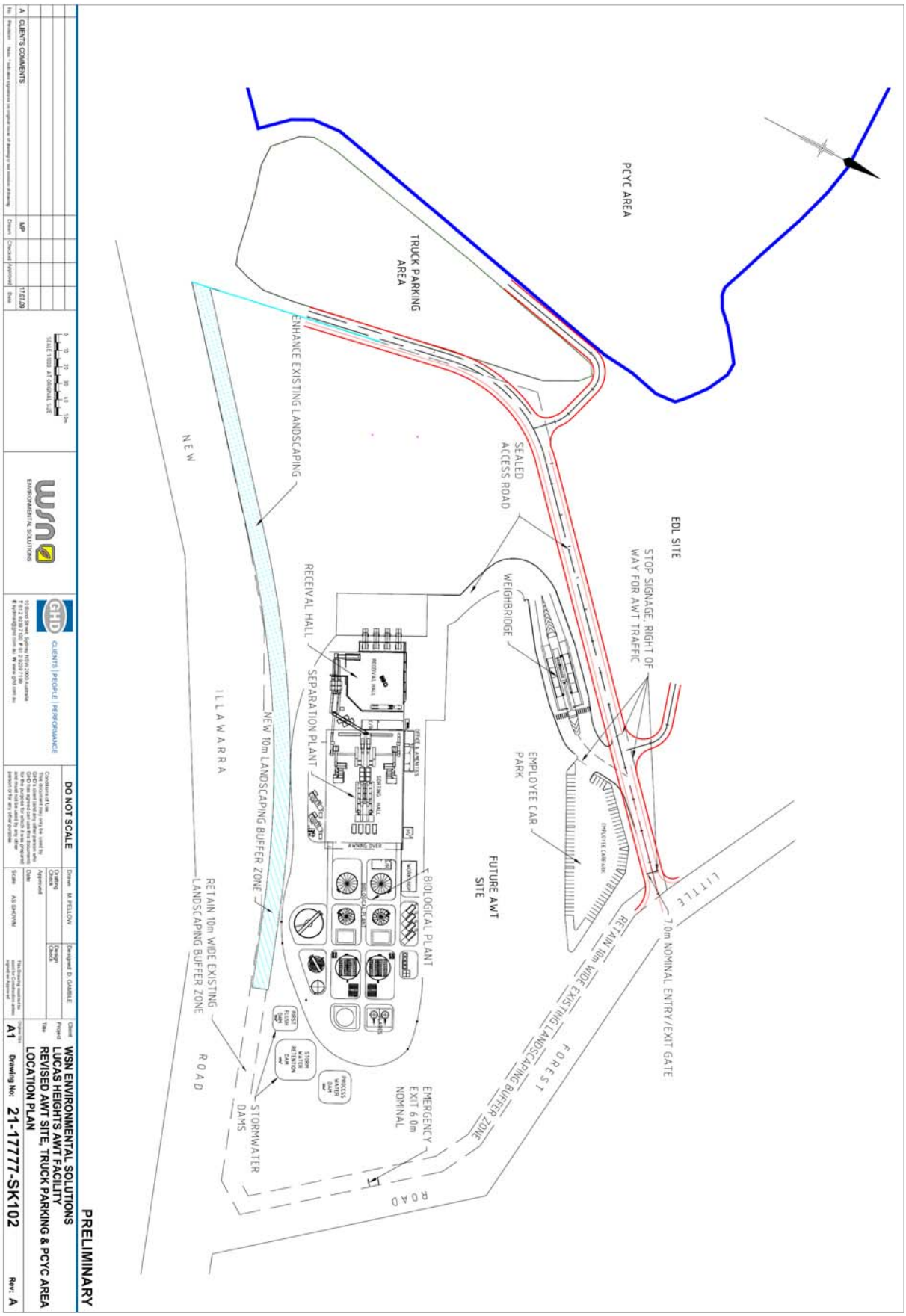


Figure 4.2 Proposed AWT Concept Layout



It is proposed to construct a new internal access road to provide ingress/egress to the proposed AWT facility, the existing EDL site, the relocated PCYC facility and the proposed WSN truck parking area. The proposed access road is depicted in Figure 4.2. Vehicles accessing these facilities will travel via the new internal road off Little Forest Road.

Vehicles accessing the AWT site will proceed left onto the AWT access road. Light vehicles will turn left into the employee/visitor car park. Heavy vehicles will proceed straight ahead through the proposed new weighbridge and then continue into the AWT facility.

Vehicles exiting the AWT site will be required to turn right into the new internal access road and then onto Little Forest Road. The majority of vehicles will turn right onto Little Forest Road to exit the site via the intersection of New Illawarra Road. However, pre-2025 vehicles transporting AWT residual will turn left onto Little Forest Road to dispose of the residual at the LHWRC landfill area.

4.6 FUTURE EXTERNAL SITE ACCESS

No new access to New Illawarra Road for vehicular traffic is proposed for the project site. The existing access arrangements at Little Forest Road and New Illawarra Road to the LHWRC will remain in place during construction and operation of the AWT facility. However, the proposal involves some minor changes to internal site access and circulation.

There are currently two accesses off Little Forest Road for the existing PCYC facility and the EDL site. These two accesses will be consolidated into one single internal access road off Little Forest Road, some 350metres from the intersection with New Illawarra Road. Access will then be gained for the EDL site and the re-located PCYC site off this internal access road. General traffic (light and heavy) access to the AWT site will be provided via the new internal access road off Little Forest Road. Furthermore, access to the proposed WSN truck parking area will also be gained off this internal access road.

However, it should be noted that a 6,000mm wide gated emergency vehicle only access to the AWT site is proposed off Little Forest Road some 70 metres from the intersection with New Illawarra Road.

4.7 PROPOSED WSN WASTE COLLECTION TRUCK PARKING AREA

As noted previously, WSN have a proposal to develop a Truck Parking Area at the LHWRC site. The proposal will be subject to a separate application for a Section 96(1A) modification to the 12 November 1999 development consent issued by the then Minister for Urban Affairs and Planning for the Lucas Heights Waste and Recycling Centre (LHWRC).

A Statement of Environmental Effects supporting the proposed modification application has been prepared and will include a full traffic impact assessment.

The proposed modification would enable construction and operation of a truck parking area and associated internal access road, administrative office and utilities for WSN's Collection business.

The truck parking area would be used by up to 32 waste collection trucks. The majority of the trucks are yet to be purchased to service new council kerbside collection contracts commencing in 2009 and 2010. Some of the existing trucks in the fleet currently park at a number of locations, including the WSN Rockdale transfer station (3 trucks) and informally at Lucas Heights (6 trucks).

These current and new trucks would continue to undertake collections within the St George Region of Councils. WSN propose to park the trucks within the LHWRC for the following reasons:

- Achieve increased fleet efficiencies through location on site at the LHWRC.
- Enhance a growing business unit of waste collection within WSN.
- Reduce overall truck movements and achieve improved traffic management.
- Service a regional waste collection contract for the St George Group of Councils which already dispose at LHWRC.

The proposed truck parking area is to be located near the eastern boundary of the LHWRC as shown on Figure 4.1 and Figure 4.2.

The proposed truck parking area would house up to 32 waste collection trucks. The trucks would collect and dispose of waste that is currently being disposed at the LHWRC. It is assumed that 32 employees would be associated with the truck parking area. The potential cumulative traffic impact of the proposed WSN Truck parking area is considered in Section 6 of this report.

4.8 HEAVY VEHICLE ACCESS ROUTES

4.8.1 Waste Delivery

Heavy vehicles are anticipated to deliver to the proposed AWT facility from various Sydney LGA's. The main arterial road network will be used to access proposed AWT facility from the following areas is as follows:

- To north-east, east and inner west of Sydney the routes will include:
  - Little Forest Road.
  - New Illawarra Road/Alfords Point Road/ Davies Road/Fairford Road.
  - South Western Motorway (M5).
- To north-west, south-west and western Sydney the routes will include:
  - Little Forest Road.
  - New Illawarra Road.
  - Heathcote Road (west of New Illawarra Road).
  - M5 Motorway.
  - M7 Motorway.
- From south east and southern Sydney the routes will include:
  - Little Forest Road.
  - Heathcote Road (east of New Illawarra Road).
  - Princes Highway.

4.8.2 AWT Residual

Prior to 2025 AWT residual will be deposited at the LHWRC landfill via Little Forest Road. Post 2025 the residual will be transported off site. All trucks will exit the AWT via the new access road turning right onto Little Forest Road and then onto New Illawarra Road and either head north or south:

- Travel south along New Illawarra Road and enter onto Heathcote Road, turning right and heading north, ultimately connecting with the South Western Motorway at Wattle Grove;
- Alternatively it could travel south along New Illawarra Road and enter onto Heathcote Road, turning left and heading south, ultimately connecting with the Princess Highway at Heathcote; or
- Travel north along New Illawarra Rd which changes into Alfords Point Rd (at Menai) which leads to the South Western Motorway at Padstow.

5.0 TRAFFIC IMPACTS DURING CONTRUCTION OF PROPOSED AWT FACILITY

Traffic generation as a result of construction activities associated with the development of the proposed AWT facility will generally be limited to movements of construction workers and delivery of material and equipment. All vehicles will access the site via the Little Forest Road entry. Construction work will impact on Little Forest Road/New Illawarra Road and Heathcote Road/New Illawarra intersections.

Parking will be provided for the construction workers on site.

It is anticipated that there will be an 18 month construction program involving 6 months of earthworks to prepare the site and build the engineered platform, and another 12 months of building, equipment installation and commissioning.

The footprint of the AWT site is 34,820m^2 (stage 1). Stage 1 requires about 51,000 m^3 of fill to be moved for preliminary earthworks. Disturbed areas would be temporarily grassed until needed to avoid dust etc.

5.1 CONSTRUCTION TRAFFIC GENERATION

The traffic volumes associated with the construction are not anticipated to be greater than the operation of the AWT facility and can be accommodated. Access to the construction site will need to be negotiated with the RTA and Sutherland Shire Council.

5.1.1 Proposed Work Hours

The proposed construction period is 18 months. The construction hours during this period are anticipated to be as follows:

- Monday to Friday: 7.00am – 6.00pm.
- Saturday: 7.00am – 1.00pm.
- Sunday: No Work.

5.1.2 Light Vehicle Traffic Generation

There will be, on average, 30 construction staff accessing the site during most of the construction period. It is assumed that each construction worker will drive a car to the site during this period. This will generate a daily traffic volume of 60 vehicle trips per day. It is assumed the construction workers will arrive between 6.30am and 7.00am and leave the site between 6.00pm and 6.30pm.

The peak generation periods of the site during the construction period will occur outside the peak period of the surrounding road network. For the purpose of worst case assessment, the proposed construction worker traffic generated on the existing road network during the AM and PM peak period will be 80% of the daily movements.

The traffic movements generated by the construction workers has been assumed to be distributed on a 100/0 split. During the AM peak period, all traffic movement will move into the site and vice versa for PM peak period, where all construction staff will egress from the site.

From these assumptions, the light vehicles generation during the weekday peak periods is 24 vehicle trips per hour, with 24 vehicles moving into the site during AM peak period and 24 vehicles moving out of the site during the PM peak period.

5.1.3 Heavy Vehicle Traffic Generation

The program and staging of the construction is yet to be determined. However, it is assumed that the heavy vehicles generated during construction will mainly consist of concrete trucks, delivery trucks, water trucks and dump trucks. For the worst case scenario, it is assumed that 100 heavy vehicles will be generated per day during construction.

Based on this worst case scenario, 200 heavy vehicle trips will be generated on a typical weekday. It has been conservatively estimated that approximately 20% of the heavy vehicle trips will occur during the AM and PM peak periods with a 50/50 split. Hence, 40 heavy vehicle trips per hour during the AM and PM peak periods with 20 trips in and 20 trips out.

5.1.4 Total Traffic Generation

Total traffic generation during construction is summarised in Table 5.1. During the construction of the AWT facility, there would be a maximum traffic generation of 64 vehicle trips per hour during the AM and PM peak periods. The 64 vehicle trips are consisting of 24 construction worker trips and 40 heavy vehicle trips. Of the 24 construction worker trips, 24 trips are going into the site and zero trips are going out of the site during the AM peak period and vice versa for PM peak period. For the heavy vehicles, 20 trips are going into the site and 20 trips are going out of the site during the AM and PM peak periods.

Table 5.1 Traffic Generation and Split during Construction

Component	Daily		AM Peak		PM Peak	
	IN	OUT	IN	OUT	IN	OUT
Construction Worker Traffic	30	30	24	0	0	24
Heavy Vehicle Traffic	100	100	20	20	20	20
Total	**130**	**130**	**44**	**20**	**20**	**44**

5.1.5 Traffic Assignment during Construction

A number of assumptions in regards to the impact from the traffic distribution of construction along the surrounding road network. These assumptions are based on the observed traffic patterns on the surrounding road network. The following traffic assignment has been adopted:

- All heavy vehicles and employee traffic approach / depart the site on Little Forest Road.
- 70% of employee traffic approach / depart the site along New Illawarra Road north of Little Forest Road.
- 50% of heavy vehicles approach / depart the site along New Illawarra Road north of Little Forest Road.
- 67% of employee traffic approaching / departing the site along New Illawarra Road south of the site will travel along Heathcote Road east of New Illawarra Road.
- 60% of heavy vehicles approaching / departing the site along New Illawarra Road south of the site will travel along Heathcote Road east of New Illawarra Road.

Given the above assumptions, the estimated total traffic volumes on the road network with construction traffic from the AWT facility during the AM and PM peak periods are shown in Figure 5.1 and Figure 5.2 respectively. The additional traffic demand on the road network serving the site is minor.

Figure 5.1 2008 AM Peak Traffic Turning Volumes with AWT Construction Traffic

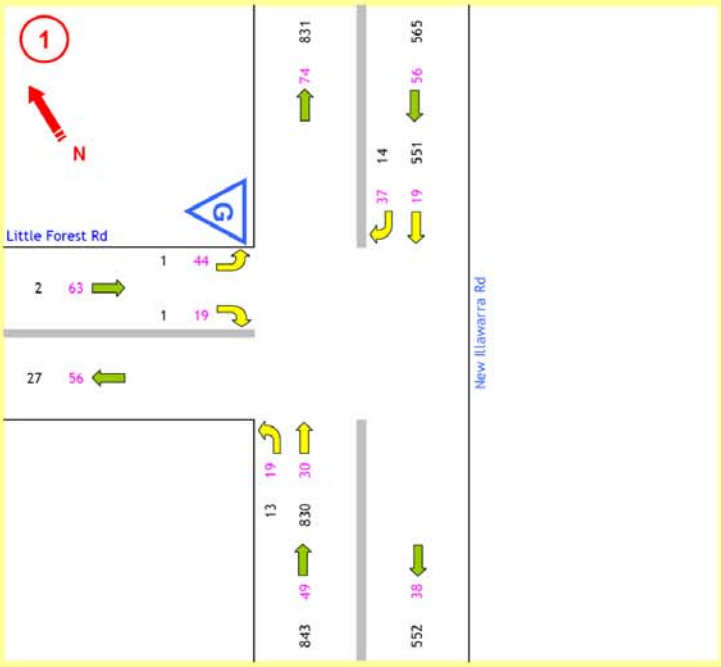
Intersection Turning Movement Diagrams

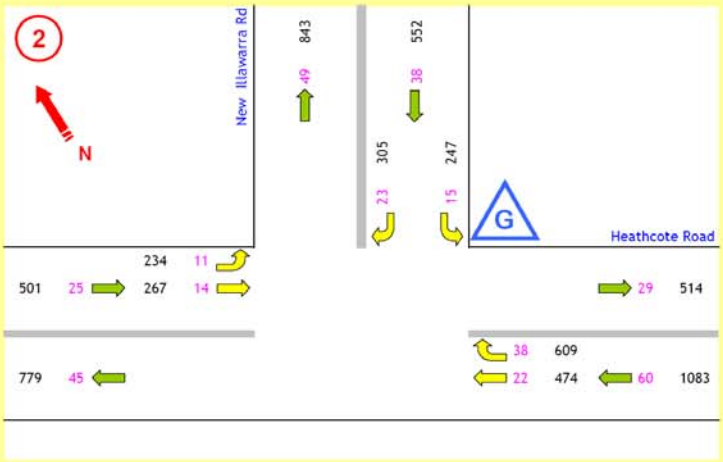
Traffic Volume Scenario

Year: 2008
Peak: AM
Scenario: Base plus Construction Traffic

Legend

- 1 — Intersection No.
- Turning Movement Volume
- Approach Volume
- Traffic Signals
- G — Give Way
- 111 — Hourly Volumes (light vehicles)
- 111 — Hourly Volumes (heavy vehicles)





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Cardno Eppell Olsen

Figure 5.2 2008 PM Peak Traffic Turning Volumes with AWT Construction Traffic

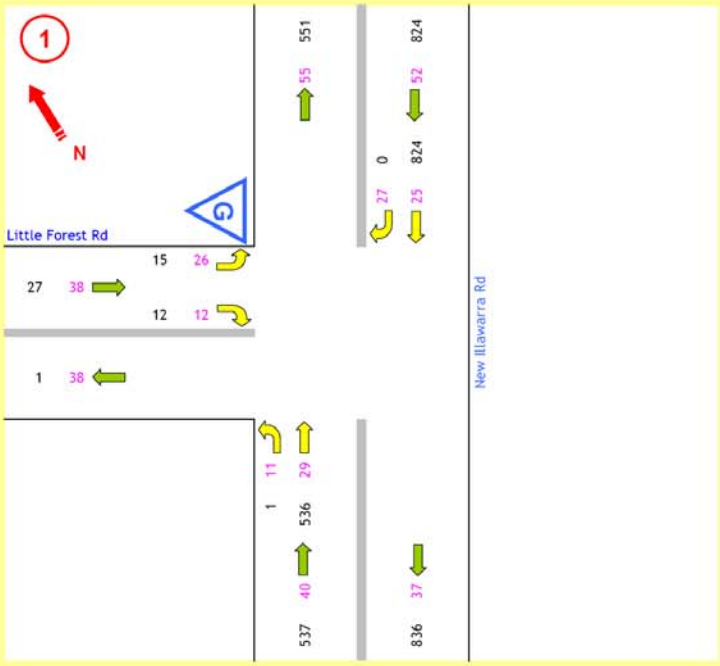
Intersection Turning Movement Diagrams

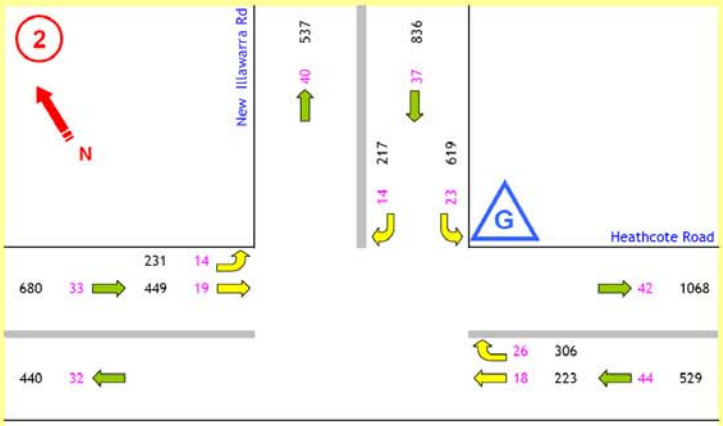
Traffic Volume Scenario

Year: 2008
Peak: PM
Scenario: Base plus Construction Traffic

Legend

- 1 — Intersection No.
- Turning Movement Volume
- Approach Volume
- Traffic Signals
- G — Give Way
- 111 — Hourly Volumes (light vehicles)
- 111 — Hourly Volumes (heavy vehicles)





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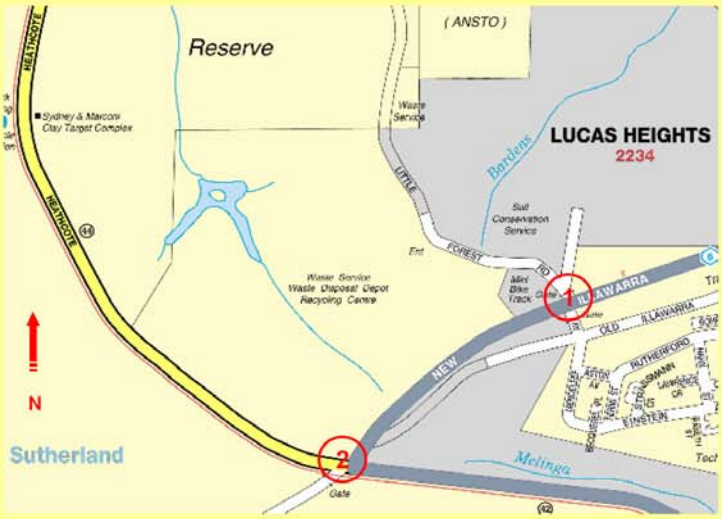


5.2 INTERSECTION PERFORMANCE DURING CONSTRUCTION

The critical intersections were analysed with the additional construction traffic to determine their operating performance with this additional traffic under existing intersection control and configuration (as in 2008). SIDRA was again used to undertake the analysis. Table 5.2 to Table 5.5 presents a summary of the results of the intersection performance analysis for of the intersection of New Illawarra Road with Little Forest Road and Heathcote Road and New Illawarra Road for the AM and PM peak hours. Full movement summary results are presented in Appendix C.

Table 5.2 New Illawarra Road/Little Forest Road Intersection Operation – 2008 AM Peak Hour with AWT Construction Traffic

Movement Description	Existing Traffic					Existing + AWT Construction Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road (northern approach)										
Through	570	0.299	0.0	B	10	570	0.299	0.0	B	10
Right	25	0.150	34.2	C	9	51	0.237	29.9	C	13
Approach	595	0.299	1.5	A	9	**621**	**0.299**	**2.5**	**A**	**13**
Little Forest Road										
Left	31	0.028	10.3	A	0	45	0.041	10.3	A	1
Right	14	0.483	124.6	F	16	20	0.833	191.7	F	31
Approach	**45**	**0.483**	**45.8**	**D**	**16**	**65**	**0.835**	**66.1**	**E**	**31**
New Illawarra Road (southern approach)										
Left	14	0.013	11.6	A	0	32	0.025	10.4	A	0
Through	860	0.451	0.0	A	0	860	0.451	0.0	A	0
Approach	**874**	**0.451**	**0.2**	**A**		**874**	**0.451**	**0.4**	**A**	
All Vehicles	**1514**	**0.483**	**2.0**	**n/a**	**n/a**	**1578**	**0.833**	**3.9**	**n/a**	**n/a**

Table 5.3 New Illawarra Road/Little Forest Road Intersection Operation - 2008 PM Peak Hour with AWT Construction Traffic

Movement Description	Existing Traffic					Existing + AWT Construction Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road (northern approach)										
Through	849	0.444	0.1	A	15	849	0.444	0.1	A	15
Right	3	0.042	22.1	B	3	27	0.091	22.9	B	6
Approach	862	0.444	0.4	A	3	876	0.444	0.4	A	6
Little Forest Road										
Left	15	0.013	9.8	A	0	41	0.032	9.3	A	1
Right	7	0.097	36.7	C	3	24	0.192	26.4	B	5
Approach	**22**	**0.097**	**45.8**	**B**	**3**	**65**	**0.097**	**15.6**	**B**	**5**
New Illawarra Road (southern approach)										
Left	6	0.005	11.3	A	0	12	0.011	11.6	A	0
Through	565	0.299	0.0	A	0	565	0.299	0.0	A	0
Approach	**571**	**0.299**	**0.1**	**A**		**571**	**0.299**	**0.2**	**A**	
All Vehicles	**1455**	**0.444**	**0.6**	**n/a**	**n/a**	**1518**	**0.444**	**1.2**	**n/a**	**n/a**

Table 5.4 Heathcote Road/New Illawarra Road Intersection Operation - 2008 Existing AM Peak Hour with AWT Construction Traffic

Movement Description	Existing Traffic					Existing + AWT Construction Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road										
Left	258	0.143	9.6	A	4	262	0.147	9.6	A	4
Right	326	0.970	75.5	F	138	328	1.012	114.5	F	201
Approach	**584**	**0.969**	**46.4**	**D**	**138**	**590**	**0.969**	**46.4**	**D**	**201**
Heathcote Road (western approach)										
Left	238	0.461	20.4	B	21	245	0.488	21.0	B	23
Through	281	0.149	4.0	A	0	281	0.149	4.0	A	0
Approach	**519**	**0.462**	**11.5**	**A**	**21**	**526**	**1.**	**11.5**	**A**	**23**
Heathcote Road (eastern approach)										
Through	496	0.131	0.0	A	4	496	0.131	0.0	A	4
Right	636	0.462	11.8	A	32	647	0.473	11.9	A	34
Approach	1132	0.462	6.6	A	32	**1143**	**0.473**	**6.6**	**A**	**34**
All Vehicles	**2235**	**0.970**	**18.2**	**n/a**	**n/a**	**2259**	**1.012**	**23.9**	**n/a**	**n/a**

Table 5.5 Heathcote Road/New Illawarra Road Intersection Operation - 2008 Existing PM Peak Hour with AWT Construction Traffic

Movement Description	Existing Traffic					Existing + AWT Construction Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road										
Left	631	0.347	9.5	A	9	642	0.355	9.6	A	9
Right	224	0.552	23.2	B	27	231	0.583	24.2	B	29
Approach	**855**	**0.551**	**13.1**	**A**	**27**	**873**	**0.583**	**13.4**	**A**	**29**
Heathcote Road (western approach)										
Left	243	0.296	14.9	B	12	245	0.304	15.1	B	12
Through	468	0.246	4.0	A	0	468	0.246	4.0	A	0
Approach	**711**	**0.296**	**7.8**	**A**	**12**	**713**	**0.304**	**7.8**	**A**	**12**
Heathcote Road (eastern approach)										
Through	241	0.065	0.0	A	2	241	0.065	0.0	A	2
Right	328	0.300	12.4	A	14	332	0.308	12.6	A	15
Approach	569	0.300	7.2	A	14	573	0.308	7.3	A	15
All Vehicles	**2135**	**0.552**	**9.7**	**n/a**		**2159**	**0.583**	**10.0**	**n/a**	

The delays for right turn movement from Little Forest Road into New Illawarra Road during the peak periods will worsen with construction traffic. All other movements at this intersection will experience only minor changes.

Similarly at the intersection of Heathcote Road and New Illawarra Road only the existing problematic right turn from New Illawarra Road into Heathcote Road will experience some increases in delay.

5.3 RECOMMENDED MITAGATION MEASURES

During the construction of the proposed AWT facility development, no mitigation measures are required on the external road network. However, a construction traffic management plan (TMP) detailing construction vehicle routes, number of trucks, hours of operation, access arrangements and traffic control should be submitted to the Department of Planning, for approval prior to the issue of a Construction Certificate.

All works/regulatory signposting associated with the proposed development are to be at no cost to the RTA.

6.0 TRAFFIC IMPACTS OF PROPOSED AWT FACILITY OPERATIONS

This section of the report examines the potential traffic impact of the proposed AWT facility on the surrounding road network and also considers the potential cumulative impact of the proposed WSN Truck Parking Area and PCYC facility (where appropriate).

For the purposes of the traffic assessment, analysis has been undertaken for the following forecast periods:

- 2018 - A ten year forecast period (2008 to 2018). It is understood that the AWT facility is expected to be fully operational by 2012. The forecast period of 2018 represents a future development scenario where the site has been fully operational for six years.
- 2025 – Post cessation of the LHWRC landfill, when AWT residual must be transported off-site. The forecast period of 2025 represents a future development scenario where the site has been fully operational for 13 years and removal of AWT residual has just commenced.
- 2035 – at the end of the potential life span of the AWT facility.

6.1 ASSUMPTIONS

The potential impact of the relocation of the PCYC mini-bike facility and the proposed development of a WSN Truck Parking Area have been discussed and considered in this report even though these proposals would be subject to separate development applications.

The changes to internal access and egress within the LHWRC site are discussed in Section 7. This section focuses the traffic assessment during a weekday peak hour when waste vehicles are operating. Analysis of the surveyed traffic volumes revealed that the one hour peak periods (see Section 3.7) were:

- 7:30am to 8:30am.
- 3:45pm to 4:45pm.

The impact assessment considers a worst case scenario based on:

- For the period 2012-2035:
  - Normal operational activities (current levels) at LHWRC including the landfill (even though this will cease in 2024 it is assumed to continue for the impact assessment), community drop off centre, greenwaste facility, EDL etc.
  - Number of staff on site at existing facilities (LHWRC and EDL etc) will remain the same as current levels (even though it is likely less staff will be present due to the closure of the landfill).
  - Projected levels with WSN Truck Parking Area and PCYC.
- For the period 2012-2024: AWT waste delivery occurring with AWT residual disposed of at LHWRC landfill.
- For the period 2025-2035: AWT waste delivery occurring with AWT residual disposed of off-site.

6.2 BACKGROUND TRAFFIC GROWTH

The background traffic growth for the forecast years was assumed to be 2.0% per annum compounded, based on the historical growth rates detailed in Section 3.8.1. Figure 6.1 and Figure 6.2 presents the 2018 background traffic volumes to be used in the intersection assessment for the AM and PM peak periods respectively.

This future background traffic will be evaluated for comparison purposes to assess the impact of the proposed AWT facility traffic on the surrounding road network in 2018, 2025 and 2035.

Figure 6.1 2018 AM Peak Background Traffic Volumes

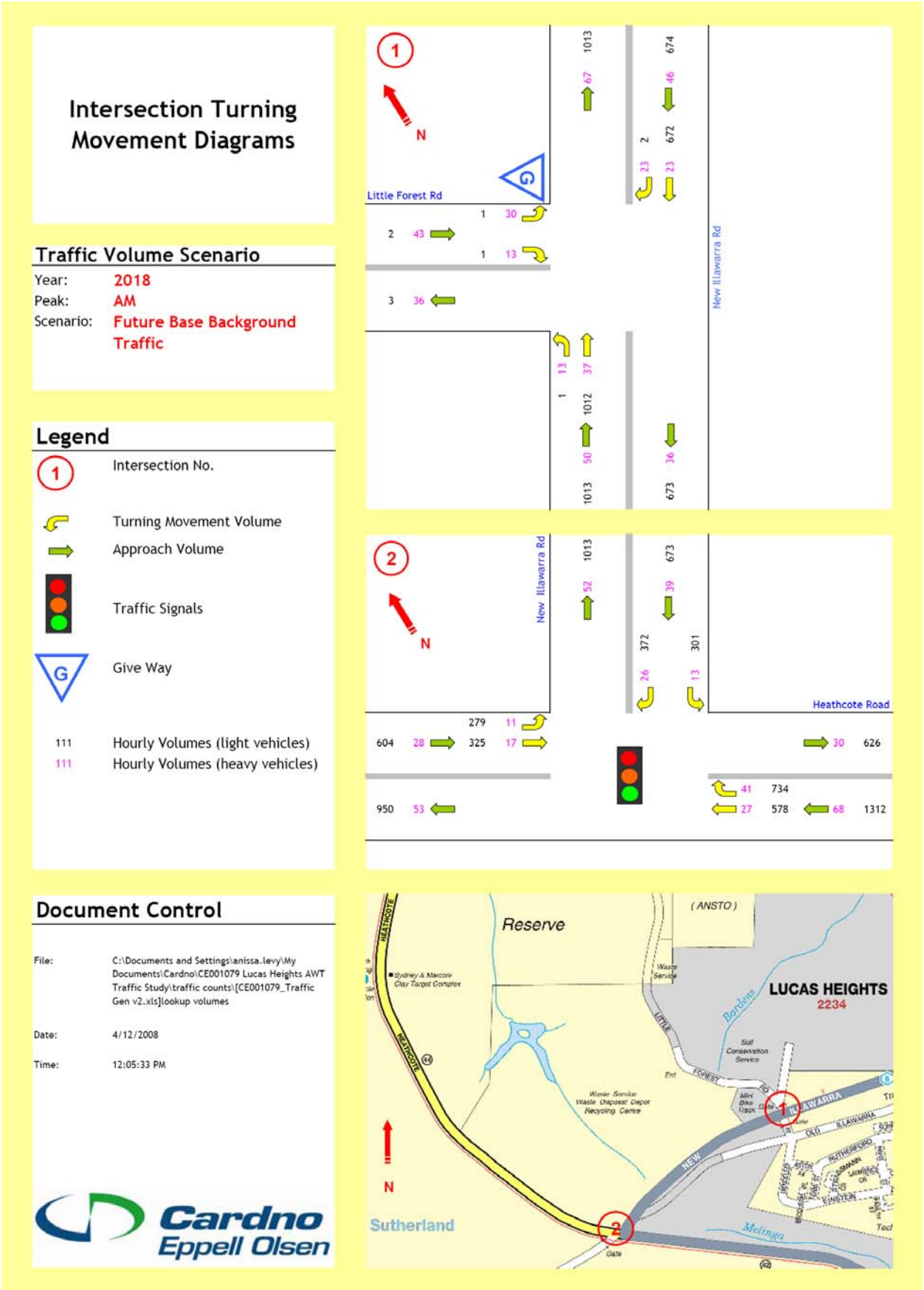


Figure 6.2 2018 PM Peak Background Traffic Volumes

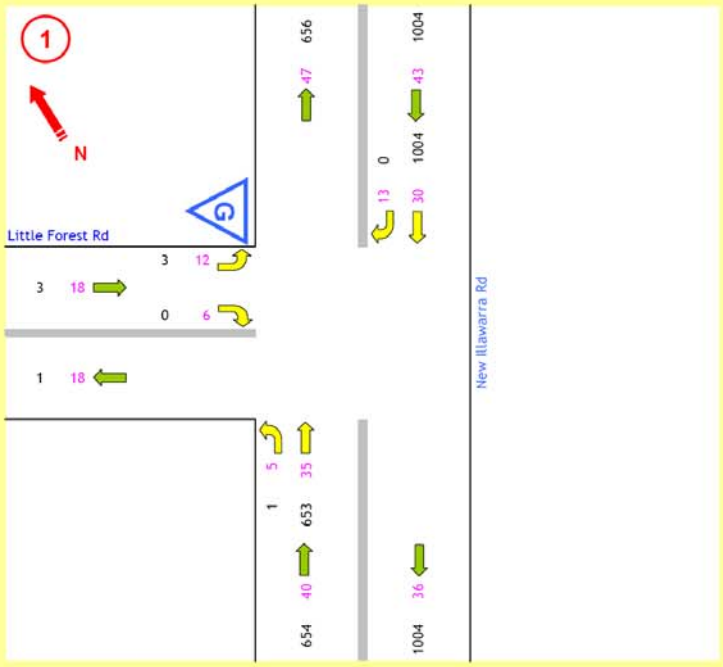
Intersection Turning Movement Diagrams

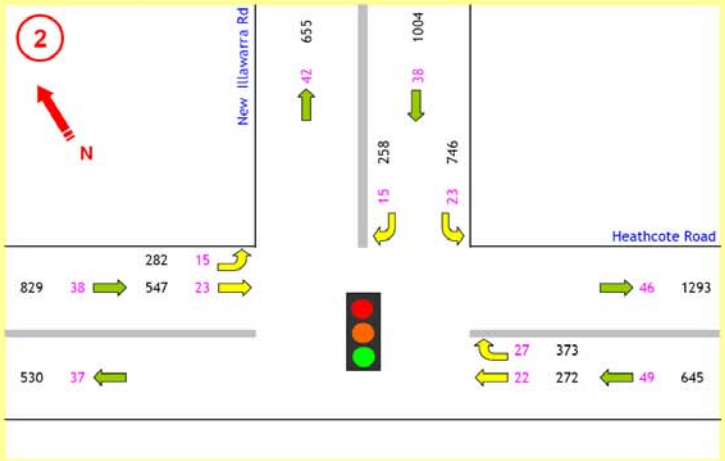
Traffic Volume Scenario

Year: 2018
Peak: PM
Scenario: Future Base Background Traffic

Legend

- 1 — Intersection No.
- Turning Movement Volume
- Approach Volume
- Traffic Signals
- G — Give Way
- 111 — Hourly Volumes (light vehicles)
- 111 — Hourly Volumes (heavy vehicles)





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6.3 POTENTIAL TRAFFIC GENERATION

6.3.1 Proposed AWT Facility Traffic Generation

The proposed AWT facility will generate additional traffic movements on the key surrounding road network, via New Illawarra Road, associated with:

- Vehicles entering and leaving the site associated with the estimated 69 employees (2012 to 2035).
- Heavy vehicles (10 tonne trucks) associated with the delivering 100,000 tonnes per annum of MSW (2012 to 2035.
- Heavy vehicles (22 tonne trucks) associated with the removing 40,000 tonnes per annum of AWT residual (2025 to 2035).

Truck Movements

The number of potential truck movements generated by the proposed AWT facility is based on the expected operating capacity of the facility. The following assumptions were made in estimating the daily and hourly truck movement to/from the site:

- Delivering MSW (2012 to 2035)
  - The site will process 100,000 tonnes per annum.
  - The site will operate 52 weeks per year and hence will process 1,923 tonnes per week.
  - The site will operate 5 days per week and hence will process 384.6 tonnes per day.
  - All vehicles will be 10 tonne capacity compactor vehicles, hence 39 trucks per day will deliver to the proposed site. This will result in 78 vehicle movements per day (39 in and 39 out).
  - The site will operate 10 hours per day (6am to 4pm) and hence 4 trucks per hour will deliver to the proposed site. This will result in 8 vehicle movements per hour (4 in and 4 out) throughout the operating hours on site.
- AWT Off-Site Residual (2025 to 2035):
  - The site will generate up to 40,000 tonnes of residual per year (actually estimated to be 30-40% of total).
  - The site will operate 52 weeks per year and hence will generate 769 tonnes of residual per week.
  - The site will operate 5 days per week and hence will generate 153.8 tonnes of residual per day.
  - All vehicles will be 22 tonne capacity transfer trailer vehicles and hence 7 trucks per day will remove residual from the proposed site. This will result in 14 vehicle movements per day (7 in and 7 out).
  - The site will operate 10 hours per day (6am to 4pm) and hence approximately 1 truck per hour will deliver to the proposed site. This will result in 2 vehicle movements per hour (1 in and 1 out) throughout the operating hours on site.

Employee Vehicle Generation

As previously estimated, there will be up to 69 new employees associated with the proposed AWT facility on a typical operating weekday. It is assumed that the employee numbers will remain the same after 2025.

However, the number of staff represents the total employment by the facility and not all staff will be on-site at the same time. The working hours for the AWT facility consist of the following hours:

- 5am to 5pm, 7 days a week, 2 staff members.
- 5pm to 5am, 7 days a week, 2 staff members.
- 5am to 1pm, Monday to Friday, 30 staff members.
- 1pm to 9pm, Monday to Friday, 25 staff members.
- 8am to 4pm, Monday to Friday, 10 staff members.

Similar to the existing LHWRC, it is assumed that all staff will drive to work. Therefore, the proposed AWT facility will generate 138 vehicle movements per day (69 in and 69 out) as a result of employee traffic.

As previously stated, it has been assumed that staff would arrive within 30 minutes leading to their shift and depart within 30 minutes at the end of their shift. Hence, the majority of the staff would arrive and depart the AWT facility outside of the AM and PM commuter peak traffic periods. The peak hours assessed in the traffic study are 7:30am to 8:30am and 3:45pm to 4:45pm (refer Section 3.7).

The peak traffic generation for employee vehicle traffic will occur between 12.30 and 1.30pm when the 'waste receival and processing' staff are changing shift. At this time vehicle traffic generation is estimated to be 55 vehicle trips (25 in and 30 out). These vehicle trips will occur outside the peak weekday AM commuter peak period. Staff traffic generation during the commuter peak periods is estimated to be:

- 7.30-8.30am – 10 vehicle trips per hour (10 in and 0 out).
- 4.30pm to 5.30pm – 14 vehicle trips per hour (2 in and 12 out).

An initial assessment of the impact of the proposed AWT site was carried out. At this time it was assumed that there would be 40 staff working one shift (6am to 4pm weekdays). The staff traffic generation during the commuter peak periods under this scenario were estimated to be:

- 7.30-8.30am – 0 vehicle trips per hour.
- 4.30pm to 5.30pm – 40 vehicle trips per hour (40 out).

Total Vehicle Generation

The total traffic generation from the proposed AWT facility of the previous scenario (40 staff) and updated scenario (69 staff) scenarios are summarised in Table 6.1 to Table 6.3.

Table 6.1 Previously assumed AWT facility employee traffic generation Pre-2025 (40 staff)

Component	Daily		AM Peak		PM Peak	
	IN	OUT	IN	OUT	IN	OUT
Employee Vehicle Traffic	40	40	0	0	0	40
Heavy Vehicle Traffic	39	39	4	4	4	4
Total	**79**	**79**	**4**	**4**	**4**	**44**

Table 6.2 Updated AWT facility employee traffic generation Pre-2025 (69 staff)

Component	Daily		AM Peak		PM Peak	
	IN	OUT	IN	OUT	IN	OUT
Employee Vehicle Traffic	69	69	10	0	2	12
Heavy Vehicle Traffic:						
- AWT MSW delivery	39	39	4	4	4	4
- AWT Off-site residual	0	0	0	0	0	0
Total	**108**	**108**	**14**	**4**	**6**	**16**

Table 6.3 Updated AWT facility employee traffic generation post-2025 (69 staff)

Component	Daily		AM Peak		PM Peak	
	IN	OUT	IN	OUT	IN	OUT
Employee Vehicle Traffic	69	69	10	0	2	12
Heavy Vehicle Traffic:						
- AWT MSW delivery	39	39	4	4	4	4
- AWT Off-site residual	7	7	1	1	1	1
Total	**115**	**115**	**15**	**5**	**7**	**17**

When comparing the previously assumed scenario and the pre-2025 scenario the total daily vehicle trips increase from 158 to 216 (79 in/79 out to 108 in/108 out). The number of trips during the PM commuter peak period decrease from 48 to 22 vehicle trips per hour. The AM commuter peak increases slightly from 8 to 18 vehicle trips per hour. An intersection analysis of the 2018 forecast year was undertaken for the previous scenario (40 staff). Due to the fact that there is minimal change in the AM peak and a decrease in vehicle trips during the peak periods, the results of the previous analysis are considered to remain valid.

The post-2025 scenarios (2025 and 2035) have assumed the revised total daily vehicle trips of 230 (115 in/115 out).

6.3.2 Proposed WSN Truck Parking Area Traffic Generation

WSN's proposed waste collection truck parking area would result in only minor changes to current vehicle movements generated by the LHWRC. The change would be associated with:

- Vehicles entering and leaving the site associated with the estimated 40 employees.
- Change in truck vehicle movement times (all trucks currently operate on site).

It is assumed that the during the 10 year period (2025-2035) post LHWRC landfill cessation, the proposed WSN Truck Parking area will remain in operation. The current contract runs until approx 2018-2020 and if successful again, would be under contract until approx 2030. There would in fact be less truck movements during the 10 year period as the trucks would not be disposing of waste at LHWRC and would leave the site early and not return until the end of the shift (the collection and disposal service would occur off-site). However, the worst case assessment does not reduce the truck movements to/from LHWRC post 2025.

Truck Movements

The proposed truck parking area would house up to 32 waste collection trucks. The trucks would collect and dispose of waste that is currently being disposed at the LHWRC. Therefore there is not expected to be any additional truck movements throughout the day however there may be a change in the vehicle movement times with an additional departure in the morning and arrival at the end of the day. It is proposed that the trucks:

- Leave the site at approximately 4:30 am on weekdays and on weekends for the first waste collection run.
- Trucks would enter and depart from the site for disposal at the same time as current movements and will not generate additional vehicle movements over the current situation.
- Trucks will return to the site by around 11am to 1pm on weekdays and weekends to park.

Although it is likely that the total number of trips to the site will not change a worst case scenario has been assumed that an additional 40 trucks will depart the site in the early morning (4.30-5.00am) and arrive back in the late morning/early afternoon (11am-1pm). **Hence, no additional WSN truck parking area truck movements will occur during the commuter peak traffic periods**.

Employee Vehicle Generation

It is estimated that 40 employees would be associated with the proposed truck parking area. Similarly, to the existing LHWRC it is assumed that all staff will drive to work and hence will generate 80 vehicle movements per day (40 in and 40 out). The employee start and finish times will be directly associated with the times that the waste collection vehicles are used and as such employees would generally:

- Enter the site between 4.00am and 4.30am on both weekdays and on weekends.
- Depart from the site after parking their trucks and washing down the trucks prior to leaving:
  - Between 1pm and 3pm on weekdays.
  - Between 12.30pm and 1.00pm on weekends.

The weekday employee arrival and departure times are outside current commuter peak vehicle movement times and the site peak generation times of 11 am to 1pm. **Hence, no additional WSN truck parking area employee traffic movements will occur during the commuter peak traffic periods.**

6.3.3 Estimated Vehicle Movements for the PCYC

Currently the PCYC only operate on Sunday from approx 8am to 4pm. Some 200 vehicles access the site on this day. One off events occur approx 4 times per year (generally during school holidays). **With the proposed relocation of the mini-bike facility there is not expected to be any change in potential traffic generation to the LHWRC site.**

6.3.4 Total LHWRC Development Traffic Generation

The Total additional traffic generation during operation of the proposed AWT facility the WSN Truck Parking area and the PCYS relocation for both pre-2025 and post-2025 scenarios are summarised in Table 6.4 and Table 6.5.

Table 6.4 Additional Cumulative LHWRC* Development Traffic Generation Pre-2025

Component	Daily		AM Peak[8]		PM Peak[9]	
	IN	OUT	IN	OUT	IN	OUT
Employee Vehicle Traffic						
AWT Site	69	69	10	0	2	12
WSN Truck Parking	40	40	0	0	0	0
PCYC[10]	0	0	0	0	0	0
Sub-Total Employee	**109**	**109**	**10**	**0**	**2**	**12**
Heavy Vehicle Traffic						
AWT Site	39	39	4	4	4	4
WSN Truck Parking	40	40	0	0	0	0
Sub-Total Trucks	**79**	**79**	**4**	**4**	**4**	**4**
Total	**188**	**188**	**14**	**4**	**6**	**16**

* Includes AWT facility, WSN Truck Parking area and relocated PCYC additional trips

[8] WSN Truck Parking area staff will arrive between 4-4.30am and will not generate any employee traffic during the commuter AM peak period (7.30am to 8.30am). The WSN Truck Parking heavy vehicles will generate an additional trip at approximately 4.30am, also outside the commuter peak.

[9] The WSN Truck Parking area will generate an additional heavy vehicle return trip to the site between 11am and 1pm and staff will depart the site between 1pm and 3pm, both are outside the commuter PM peak period (3.45-4.45pm).

[10] The PCYC will not generate any addition al traffic

Table 6.5 Additional Cumulative LHWRC* Development Traffic Generation Post-2025

Component	Daily		AM Peak[11]		PM Peak[12]	
	IN	OUT	IN	OUT	IN	OUT
Employee Vehicle Traffic						
AWT Site	69	69	10	0	2	12
WSN Truck Parking	40	40	0	0	0	0
PCYC[13]	0	0	0	0	0	0
Sub-Total Employee	**109**	**109**	**10**	**0**	**2**	**12**
Heavy Vehicle Traffic						
AWT Site	46	46	5	5	5	5
WSN Truck Parking	40	40	0	0	0	0
Sub-Total Trucks	**86**	**86**	**5**	**5**	**5**	**5**
Total	**195**	**195**	**15**	**5**	**7**	**17**

* Includes AWT facility, WSN Truck Parking area and relocated PCYC additional trips

During the operation of all facilities (AWT facility, WSN Truck Parking area and relocated PCYC) there would be a maximum additional traffic generation of 376 vehicle trips per day and 390 vehicle trips per day from 2025 to 2035. There would be a maximum hourly additional traffic generation during the AM and PM commuter peak periods of 18vph and 22vph respectively up to 2024 and 20vph and 24vph respectively from 2025 to 2035.

It should be noted that the vehicle movements generated from the proposed WSN Truck Parking area are outside the commuter peak vehicle traffic periods. Hence, only the vehicle movements generated from the proposed AWT facility impact on the commuter peak vehicle traffic periods.

[11] WSN Truck Parking area staff will arrive between 4-4.30am and will not generate any employee traffic during the commuter AM peak period (7.30am to 8.30am). The WSN Truck Parking heavy vehicles will generate an additional trip at approximately 4.30am, also outside the commuter peak.

[12] The WSN Truck Parking area will generate an additional heavy vehicle return trip to the site between 11am and 1pm and staff will depart the site between 1pm and 3pm, both are outside the commuter PM peak period (3.45-4.45pm).

[13] The PCYC will not generate any addition al traffic

6.3.5 Traffic Assignment during AWT Operation

The future trip distribution of trips generated by the proposed AWT facility during the AM and PM peak hours are assumed to be the same as under the existing conditions, based on the observed traffic patterns on the surrounding road network. The assumptions are similar to those detailed for the potential construction traffic (Section 5.1.5):

- All heavy vehicles and employee traffic approach / depart the site on Little Forest Road.
- 70% of employee traffic approach / depart the site along New Illawarra Road north of Little Forest Road.
- 50% of heavy vehicles approach / depart the site along New Illawarra Road north of Little Forest Road.
- 67% of employee traffic approaching / departing the site along New Illawarra Road south of the site will travel along Heathcote Road east of New Illawarra Road.
- 60% of heavy vehicles approaching / departing the site along New Illawarra Road south of the site will travel along Heathcote Road east of New Illawarra Road.

Given the above assumptions, the estimated total traffic volumes on the road network in 2018, 2025 and 2035 with background traffic growth and operational traffic from the AWT facility[14] during the AM and PM peak periods are shown in Figure 6.3 to Figure 6.8. The additional traffic demand on the road network serving the site is minor.

[14] It is noted again that the WSN Truck parking area nor relocated PCYC will not generate additional traffic during the commuter peak periods.

Figure 6.3 2018 AM Peak Traffic Volumes with LHWRC Development Traffic

Intersection Turning Movement Diagrams

Traffic Volume Scenario

Year: 2018
Peak: AM
Scenario: Future Background Traffic plus Operational Traffic

Legend

- 1 — Intersection No.
- Turning Movement Volume
- Approach Volume
- Traffic Signals
- G — Give Way
- 111 — Hourly Volumes (light vehicles)
- 111 — Hourly Volumes (heavy vehicles)

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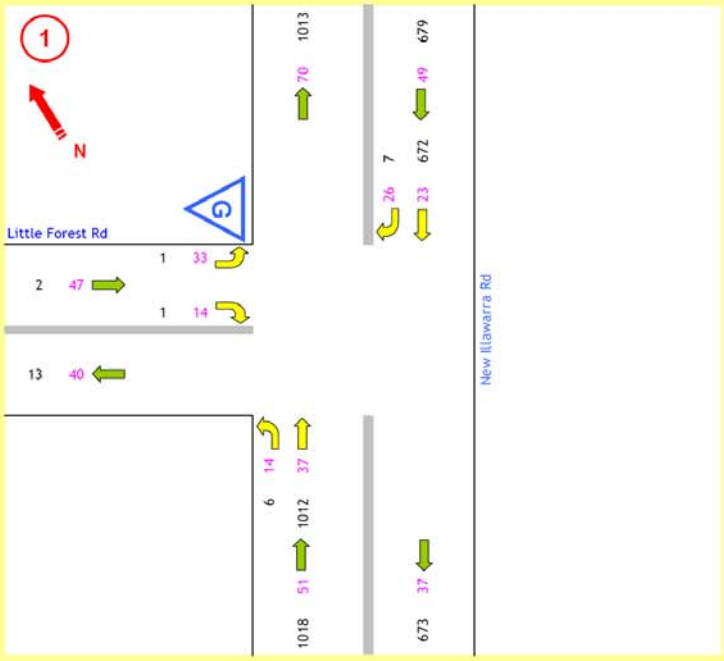
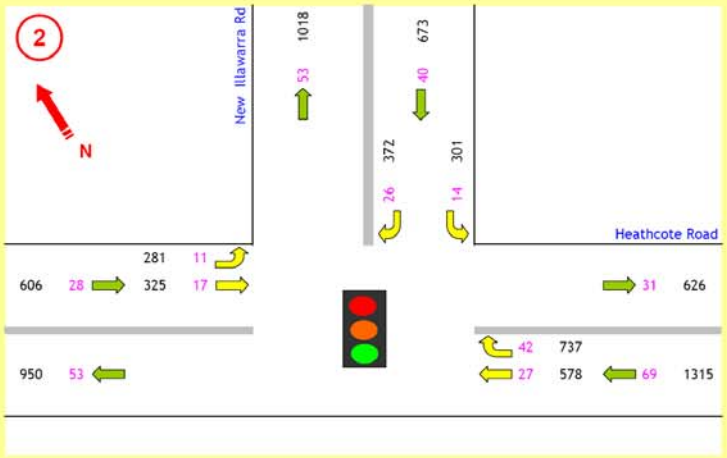




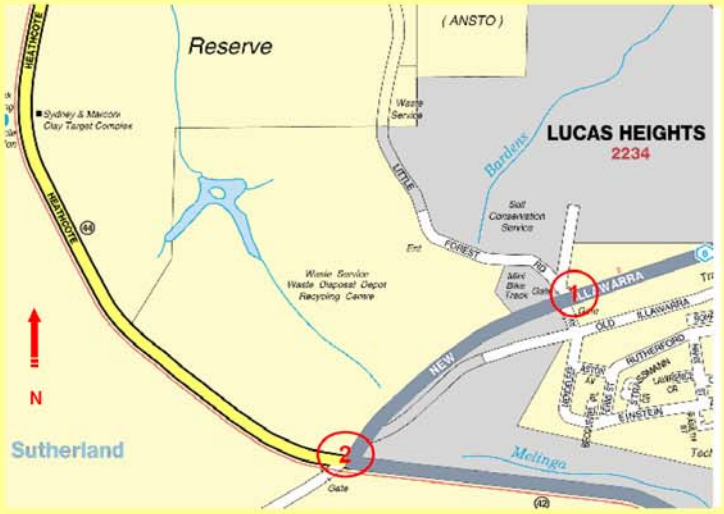


Figure 6.4 2018 PM Peak Traffic Volumes with LHWRC Development Traffic

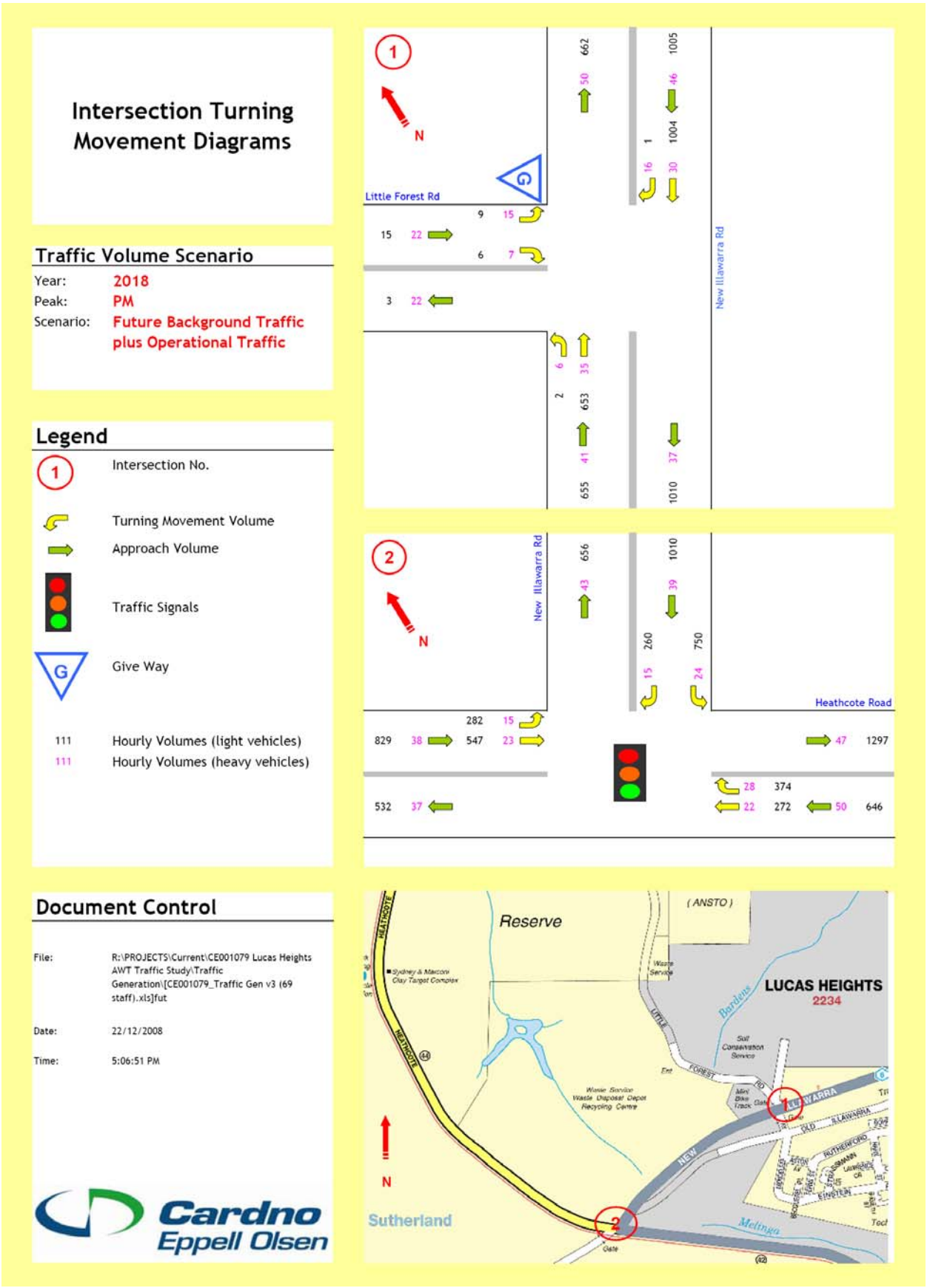


Figure 6.5 2025 AM Peak Traffic Volumes with LHWRC Development Traffic

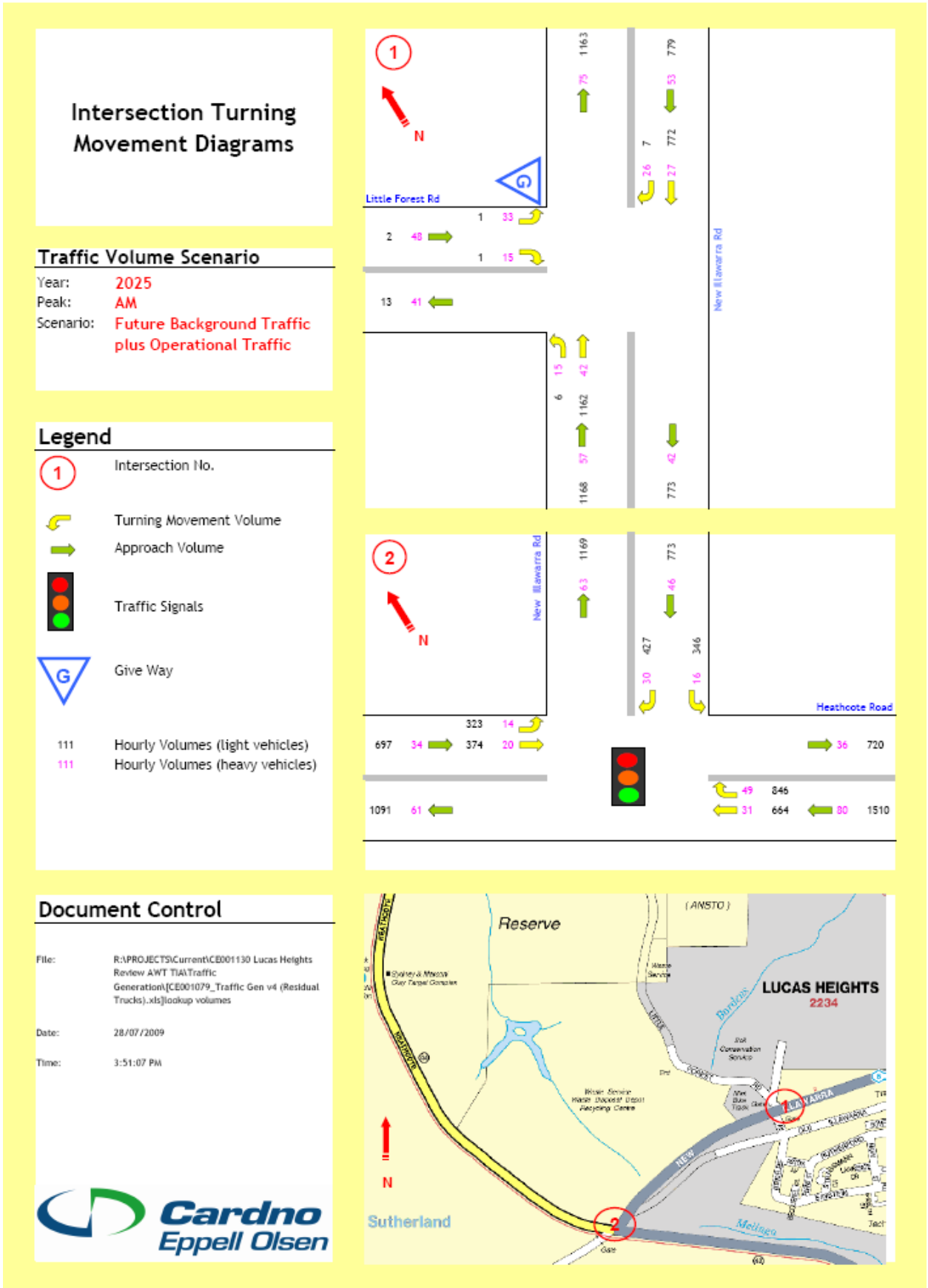


Figure 6.6 2025 PM Peak Traffic Volumes with LHWRC Development Traffic

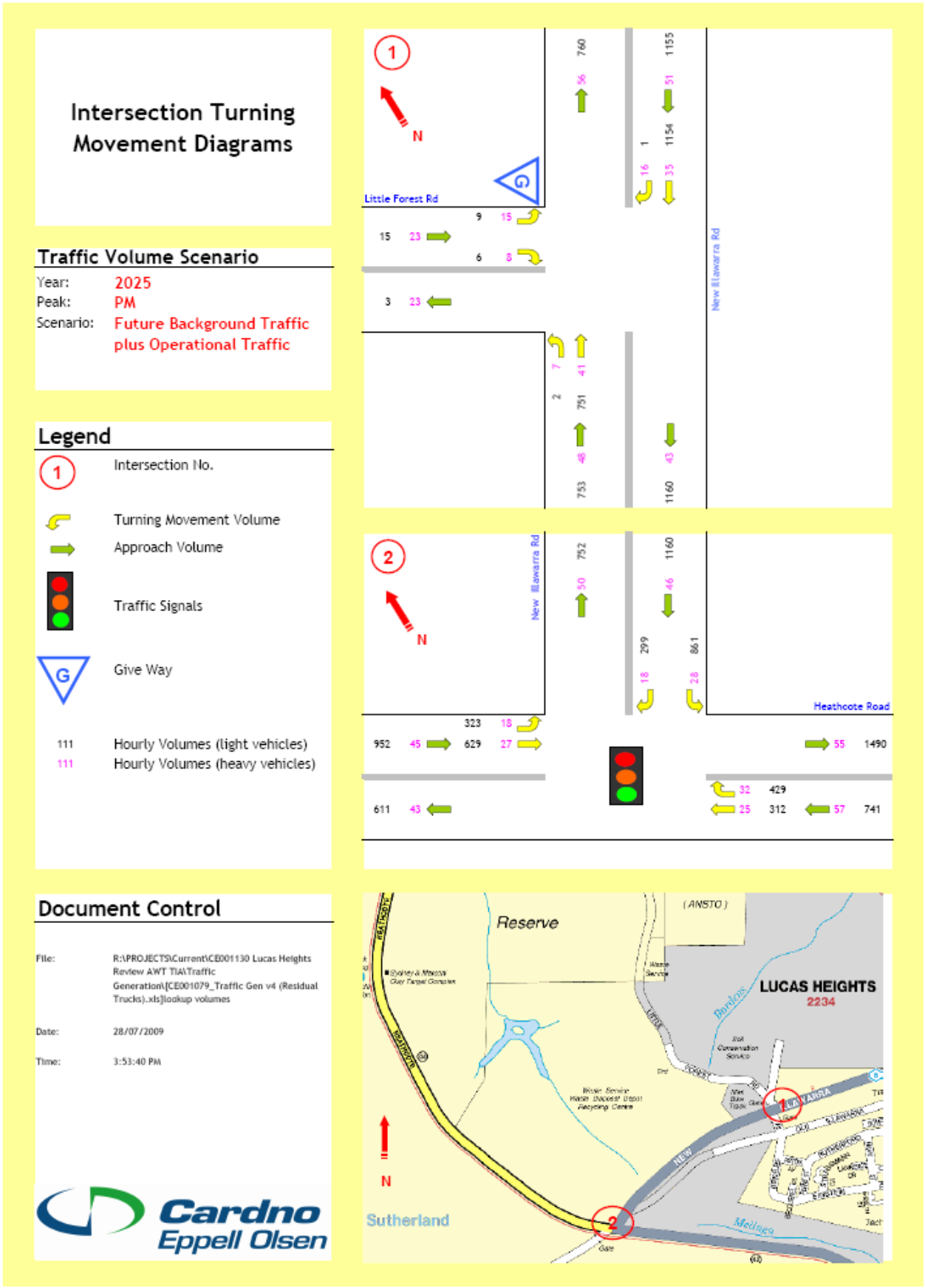


Figure 6.7 2035 AM Peak Traffic Volumes with LHWRC Development Traffic

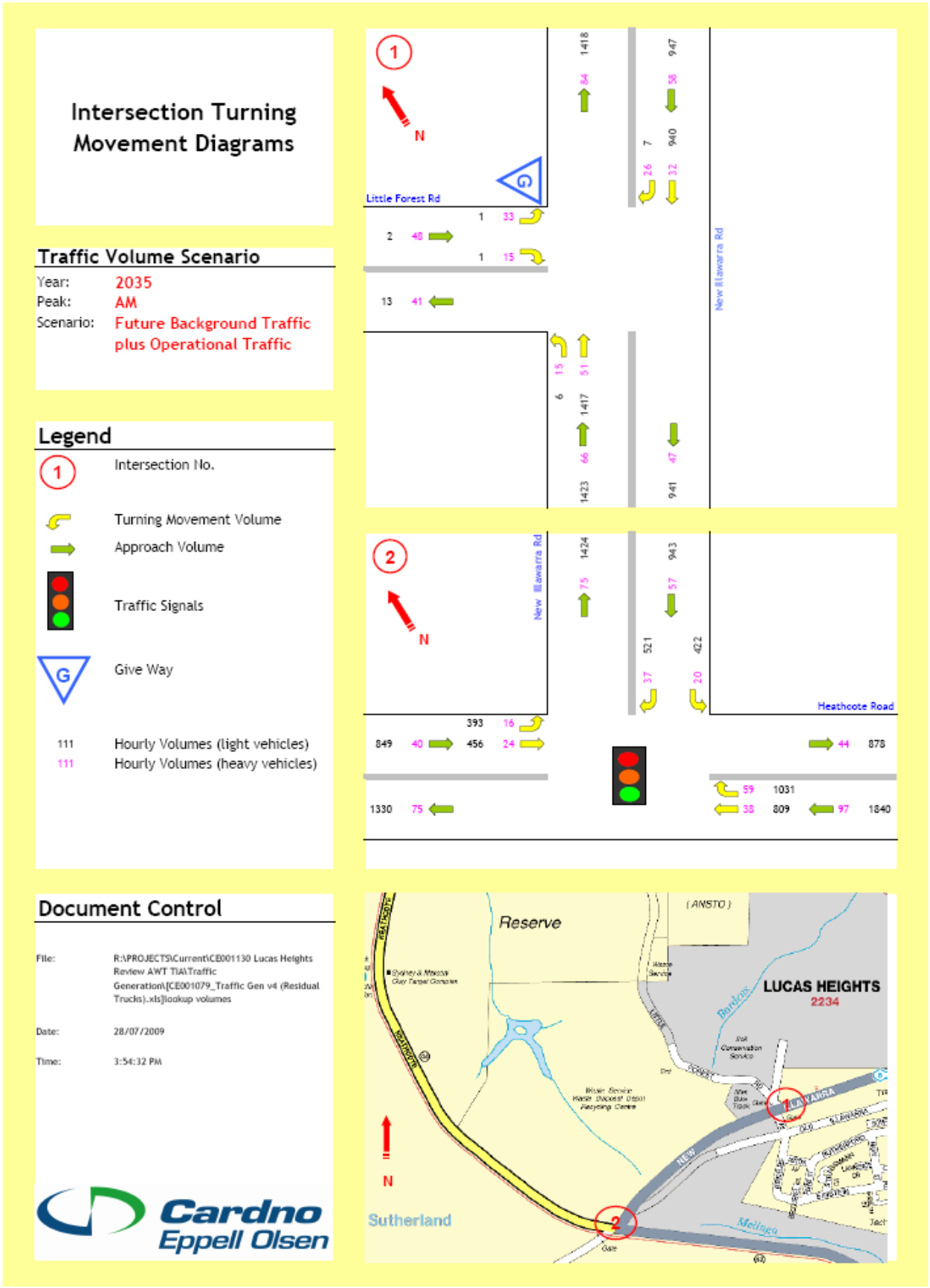


Figure 6.8 2035 PM Peak Traffic Volumes with LHWRC Development Traffic

Intersection Turning Movement Diagrams

Traffic Volume Scenario

Year: 2035
Peak: PM
Scenario: Future Background Traffic plus Operational Traffic

Legend

1 — Intersection No.

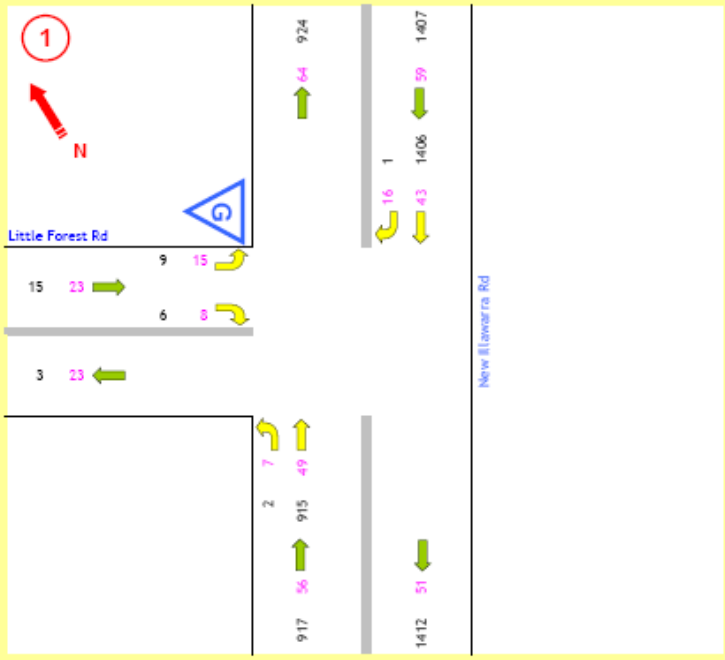
Turning Movement Volume

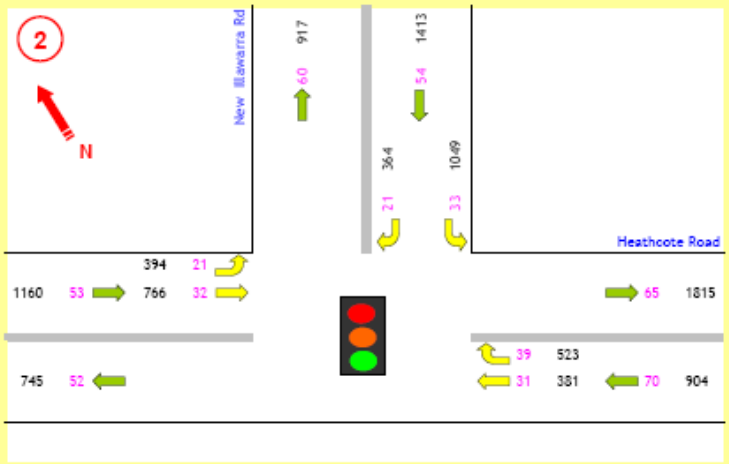
Approach Volume

Traffic Signals

G — Give Way

111 — Hourly Volumes (light vehicles)
111 — Hourly Volumes (heavy vehicles)





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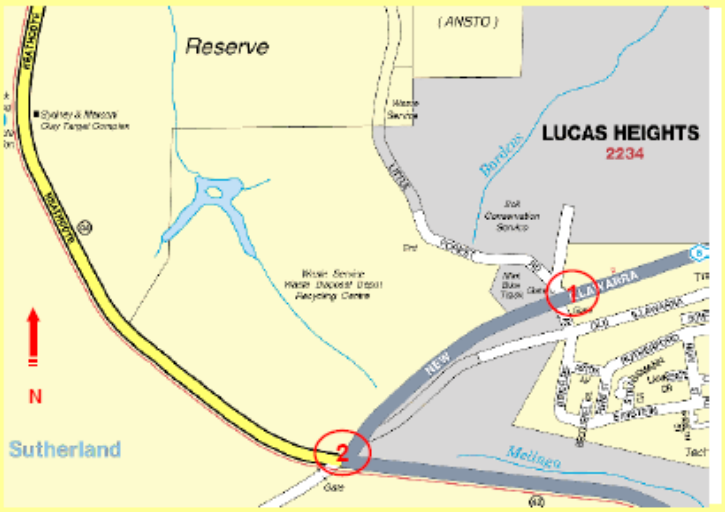


6.4 FUTURE MID-BLOCK CARRIAGEWAY CAPACITY AND PERFORMANCE

This section provides an assessment of the future mid-block traffic volume capacity (v/c) ratio and level of service of New Illawarra Road, Little Forest Road and Heathcote Road in the vicinity of LHWRC. The mid-block operational performance is assessed under background traffic peak hour traffic volumes in 2018, 2025 and 2035 and by superimposing the development traffic demand on background peak hour traffic volumes. The development traffic is considered to be the cumulative impact of the following elements:

- AWT operational traffic for delivery of MSW - in scenarios 2018, 2025 and 2035.
- AWT operational traffic for removal of residual off-site in scenarios 2025 and 2035.

It should be noted that as discussed in previous sections the WSN Truck Parking Area and PCYC relocation will not generate any additional vehicular traffic during peak periods. The assessment of mid-block carriageway capacity and performance is based on peak hour performance.

6.4.1 2018 Mid-block Carriageway Capacity and Performance

Volume Capacity Ratio

Table 6.6 and Table 6.7 show the volume to capacity ratios for the AM and PM peak hours respectively in the 2018 forecast year with background growth and with the proposed AWT operational traffic.

Table 6.6 Mid-block 2018 AM Peak Hour Volume to Capacity Ratio

Location	Travel Direction	Capacity (vph)	Background Traffic Only		Background + AWT Operational Traffic		% Increase
			Volume (vph)	v/c Ratio	Volume (vph)	v/c Ratio	
Little Forest Road, west of New Illawarra Road	eastbound	500	45	0.09	49	0.1	8.9%
	westbound	500	39	0.08	53	0.11	35.9%
New Illawarra Road, north of Little Forest Road	northbound	1300	1080	0.83	1083	0.83	0.3%
	southbound	1300	720	0.55	728	0.56	1.1%
New Illawarra Road, south of Little Forest Road	northbound	1300	1063	0.82	1069	0.82	0.6%
	southbound	1300	709	0.55	710	0.55	0.1%
Heathcote Road, west of New Illawarra Road	eastbound	1300	632	0.49	634	0.49	0.3%
	westbound	1300	1003	0.77	1003	0.77	0.0%
Heathcote Road, east of New Illawarra Road	eastbound	1300	656	0.50	657	0.51	0.2%
	westbound	1300	1380	1.06	1384	1.06	0.3%

Table 6.7 Mid-block 2018 PM Peak Hour Volume to Capacity Ratio

Location	Travel Direction	Capacity (vph)	Background Traffic Only		Background + AWT Operational Traffic		% Increase
			Volume (vph)	v/c Ratio	Volume (vph)	v/c Ratio	
Little Forest Road, west of New Illawarra Road	eastbound	500	21	0.04	37	0.078	76.2%
	westbound	500	19	0.04	25	0.05	31.6%
New Illawarra Road, north of Little Forest Road	northbound	1300	703	0.54	712	0.55	1.3%
	southbound	1300	1047	0.81	1051	0.81	0.4%
New Illawarra Road, south of Little Forest Road	northbound	1300	694	0.53	696	0.54	0.3%
	southbound	1300	1040	0.80	1047	0.81	0.7%
Heathcote Road, west of New Illawarra Road	eastbound	1300	867	0.67	867	0.67	0.0%
	westbound	1300	567	0.44	569	0.44	0.4%
Heathcote Road, east of New Illawarra Road	eastbound	1300	1339	1.03	1344	1.03	0.4%
	westbound	1300	694	0.53	696	0.54	0.3%

As highlighted in Section 3.9, a volume capacity ratio greater than 0.85 suggests that mid-block congestion is occurring with reduced travel speeds, minimal gaps in the traffic stream, and reduced vehicle headways.

The following road sections show a volume to capacity ratio approaching 0.85:

- New Illawarra Road north of Little Forest Road
  - heading north in the AM peak - the AWT operational traffic represents 0.3% growth over the 2018 background traffic, with no perceptible change in v/c ratio.
  - heading south in the PM peak - the AWT operational traffic represents 0.4% growth over the 2018 background traffic, with no perceptible change in v/c ratio.
- New Illawarra Road south of Little Forest Road:
  - heading north in the AM peak - the AWT operational traffic represents 0.6% growth over the 2018 background traffic, with no perceptible change in v/c ratio.
  - heading south in the PM peak - the AWT operational traffic represents 0.7% growth over the 2018 background traffic, with a minor change in v/c ratio.

The following road sections show a volume to capacity ratio exceeding 0.85:

- Heathcote Road east of New Illawarra Road:
  - heading west in the AM peak - the AWT operational traffic represents 0.3% growth over the 2018 background traffic, with no perceptible change in v/c ratio.
  - heading east in the PM peak - the AWT operational traffic represents 0.4% growth over the 2018 background traffic, with a minor change in v/c ratio.

In the forecast year of 2018 the road sections highlighted above will experience congestion with reduced travel speeds, minimal gaps in the traffic stream, and reduced vehicle headways under expected background traffic growth.

The additional traffic as a result of the AWT operational traffic will cause only minimal incremental increases in traffic volumes and zero to minor perceptible changes in v/c ratio.

Level of Service

The mid-block carriageway level of service for the AM and PM peak hours respectively are presented in Table 6.8 and Table 6.9 for the 2018 forecast year with background growth and with the AWT operational traffic.

Table 6.8 2018 Mid-block AM Peak Hour Level of Service

Location	Travel Direction	Type of Carriageway[15]	Background Traffic Only		Background + AWT Operational Traffic	
			Volume (vph)	LoS	Volume (vph)	LoS
Little Forest Road, west of New Illawarra Road	eastbound	2U	45	A	49	A
	westbound	2U	39	A	53	A
New Illawarra Road, north of Little Forest Road	northbound	2CL	1080	B	1083	B
	southbound	2CL	720	A	728	A
New Illawarra Road, south of Little Forest Road	northbound	2CL	1063	B	1069	B
	southbound	2CL	709	A	710	A
Heathcote Road, west of New Illawarra Road	eastbound	2CL	632	A	634	A
	westbound	2CL	1003	A	1003	A
Heathcote Road, east of New Illawarra Road	eastbound	2CL	656	A	657	A
	westbound	2CL	1380	D	1384	D

[15] Refers to the descriptions provided in Table 3.11

Table 6.9 2018 Mid-block PM Peak Hour Level of Service

Location	Travel Direction	Type of Carriageway[16]	Background Traffic Only		Background + AWT Operational Traffic	
			Volume (vph)	LoS	Volume (vph)	LoS
Little Forest Road, west of New Illawarra Road	eastbound	2U	21	A	37	A
	westbound	2U	19	A	25	A
New Illawarra Road, north of Little Forest Road	northbound	2CL	703	A	712	A
	southbound	2CL	1047	B	1051	B
New Illawarra Road, south of Little Forest Road	northbound	2CL	694	A	696	A
	southbound	2CL	1040	B	1047	B
Heathcote Road, west of New Illawarra Road	eastbound	2CL	867	A	867	A
	westbound	2CL	567	A	569	A
Heathcote Road, east of New Illawarra Road	eastbound	2CL	1339	D	1344	D
	westbound	2CL	694	A	696	A

Heathcote Road east of New Illawarra Road shows Los D for westbound traffic in the AM peak and for eastbound traffic in the PM peak period. As previously noted the increase in traffic volumes as a result of the AWT operational traffic represents 0.2% to 0.4% growth over the 2018 background traffic, with no change in LoS.

6.4.2 2025 Mid-block Carriageway Capacity and Performance

Volume Capacity Ratio

Table 6.10 and Table 6.11 show the volume to capacity ratios for the AM and PM peak hours respectively in the 2025 forecast year with background growth and with the proposed AWT operational traffic.

[16] Refers to the descriptions provided in Table 3.11

Table 6.10 Mid-block 2025 AM Peak Hour Volume to Capacity Ratio

Location	Travel Direction	Capacity (vph)	Background Traffic Only		Background + AWT Operational Traffic		% Increase
			Volume (vph)	v/c Ratio	Volume (vph)	v/c Ratio	
Little Forest Road, west of New Illawarra Road	eastbound	500	45	0.09	50	0.10	11.1%
	westbound	500	39	0.08	54	0.11	38.5%
New Illawarra Road, north of Little Forest Road	northbound	1300	1235	0.95	1238	0.95	0.2%
	southbound	1300	824	0.63	832	0.64	1.0%
New Illawarra Road, south of Little Forest Road	northbound	1300	1217	0.94	1225	0.94	0.7%
	southbound	1300	817	0.63	819	0.63	0.2%
Heathcote Road, west of New Illawarra Road	eastbound	1300	728	0.56	731	0.56	0.4%
	westbound	1300	1151	0.89	1152	0.89	0.1%
Heathcote Road, east of New Illawarra Road	eastbound	1300	755	0.58	756	0.58	0.1%
	westbound	1300	1586	1.22	1590	1.22	0.3%

Table 6.11 Mid-block 2025 PM Peak Hour Volume to Capacity Ratio

Location	Travel Direction	Capacity (vph)	Background Traffic Only		Background + AWT Operational Traffic		% Increase
			Volume (vph)	v/c Ratio	Volume (vph)	v/c Ratio	
Little Forest Road, west of New Illawarra Road	eastbound	500	21	0.04	38	0.04	81.0%
	westbound	500	19	0.04	26	0.04	36.8%
New Illawarra Road, north of Little Forest Road	northbound	1300	807	0.62	816	0.62	1.1%
	southbound	1300	1202	0.92	1206	0.92	0.3%
New Illawarra Road, south of Little Forest Road	northbound	1300	797	0.61	801	0.61	0.5%
	southbound	1300	1195	0.92	1203	0.92	0.7%
Heathcote Road, west of New Illawarra Road	eastbound	1300	996	0.77	997	0.77	0.1%
	westbound	1300	651	0.50	654	0.50	0.5%
Heathcote Road, east of New Illawarra Road	eastbound	1300	1540	1.18	1545	1.18	0.3%
	westbound	1300	796	0.61	798	0.61	0.3%

As highlighted in Section 3.9, a volume capacity ratio greater than 0.85 suggests that mid-block congestion is occurring with reduced travel speeds, minimal gaps in the traffic stream, and reduced vehicle headways.

The following road sections show a volume to capacity ratio exceeding 0.85:

- New Illawarra Road north of Little Forest Road
  - heading north in the AM peak - the AWT operational traffic represents 0.2% growth over the 2025 background traffic, with no perceptible change in v/c ratio.
  - heading south in the PM peak - the AWT operational traffic represents 0.3% growth over the 2018 background traffic, with no perceptible change in v/c ratio.
- New Illawarra Road south of Little Forest Road:
  - heading north in the AM peak - the AWT operational traffic represents 0.7% growth over the 2025 background traffic, with no perceptible change in v/c ratio.
  - heading south in the PM peak - the AWT operational traffic represents 0.7% growth over the 2025 background traffic, with a minor change in v/c ratio.
- Heathcote Road east of New Illawarra Road:
  - heading west in the AM peak - the AWT operational traffic represents 0.3% growth over the 2025 background traffic, with no perceptible change in v/c ratio.
  - heading east in the PM peak - the AWT operational traffic represents 0.4% growth over the 2025 background traffic, with a minor change in v/c ratio.

In the forecast year of 2025 the road sections highlighted above will experience congestion with reduced travel speeds, minimal gaps in the traffic stream, and reduced vehicle headways under expected background traffic growth.

The additional traffic as a result of the AWT operational traffic will cause only minimal incremental increases in traffic volumes and zero to minor perceptible changes in v/c ratio.

Level of Service

The mid-block carriageway level of service for the AM and PM peak hours respectively are presented in Table 6.12 and Table 6.13 for the 2025 forecast year with background growth and with the AWT operational traffic.

Table 6.12 2025 Mid-block AM Peak Hour Level of Service

Location	Travel Direction	Type of Carriageway[17]	Background Traffic Only		Background + AWT Operational Traffic	
			Volume (vph)	LoS	Volume (vph)	LoS
Little Forest Road, west of New Illawarra Road	eastbound	2U	45	A	50	A
	westbound	2U	39	A	54	A
New Illawarra Road, north of Little Forest Road	northbound	2CL	1235	C	1238	C
	southbound	2CL	824	A	832	A
New Illawarra Road, south of Little Forest Road	northbound	2CL	1217	C	1225	C
	southbound	2CL	817	A	819	A
Heathcote Road, west of New Illawarra Road	eastbound	2CL	728	A	731	A
	westbound	2CL	1151	B	1152	B
Heathcote Road, east of New Illawarra Road	eastbound	2CL	755	A	756	A
	westbound	2CL	1586	E	1590	E

Table 6.13 2025 Mid-block PM Peak Hour Level of Service

Location	Travel Direction	Type of Carriageway[18]	Background Traffic Only		Background + AWT Operational Traffic	
			Volume (vph)	LoS	Volume (vph)	LoS
Little Forest Road, west of New Illawarra Road	eastbound	2U	21	A	38	A
	westbound	2U	19	A	26	A
New Illawarra Road, north of Little Forest Road	northbound	2CL	807	A	816	A
	southbound	2CL	1202	C	1206	C
New Illawarra Road, south of Little Forest Road	northbound	2CL	797	A	801	A
	southbound	2CL	1195	C	1203	C
Heathcote Road, west of New Illawarra Road	eastbound	2CL	996	A	997	A
	westbound	2CL	651	A	654	A
Heathcote Road, east of New Illawarra Road	eastbound	2CL	1540	E	1545	E
	westbound	2CL	796	A	798	A

[17] Refers to the descriptions provided in Table 3.11
[18] Refers to the descriptions provided in Table 3.11

Heathcote Road east of New Illawarra Road shows Los 'E' for westbound traffic in the AM peak and for eastbound traffic in the PM peak period. As previously noted the increase in traffic volumes as a result of the AWT operational traffic represents 0.3% to 0.4% growth over the 2025 background traffic, with no change in LoS.

6.4.3 2035 Mid-block Carriageway Capacity and Performance

Volume Capacity Ratio

Table 6.14 and Table 6.15 show the volume to capacity ratios for the AM and PM peak hours respectively in the 2035 forecast year with background growth and with the proposed AWT operational traffic.

Table 6.14 Mid-block 2035 AM Peak Hour Volume to Capacity Ratio

Location	Travel Direction	Capacity (vph)	Background Traffic Only		Background + AWT Operational Traffic		% Increase
			Volume (vph)	v/c Ratio	Volume (vph)	v/c Ratio	
Little Forest Road, west of New Illawarra Road	eastbound	500	45	0.09	50	0.10	11.1%
	westbound	500	39	0.08	54	0.11	38.5%
New Illawarra Road, north of Little Forest Road	northbound	1300	1499	1.15	1502	1.16	0.2%
	southbound	1300	997	0.77	1005	0.77	0.8%
New Illawarra Road, south of Little Forest Road	northbound	1300	1482	1.14	1489	1.15	0.5%
	southbound	1300	986	0.76	988	0.76	0.2%
Heathcote Road, west of New Illawarra Road	eastbound	1300	886	0.68	889	0.68	0.3%
	westbound	1300	1404	1.08	1405	1.08	0.1%
Heathcote Road, east of New Illawarra Road	eastbound	1300	921	0.71	922	0.71	0.1%
	westbound	1300	1933	1.49	1937	1.49	0.2%

Table 6.15 Mid-block 2035 PM Peak Hour Volume to Capacity Ratio

Location	Travel Direction	Capacity (vph)	Background Traffic Only		Background + AWT Operational Traffic		% Increase
			Volume (vph)	v/c Ratio	Volume (vph)	v/c Ratio	
Little Forest Road, west of New Illawarra Road	eastbound	500	21	0.04	38	0.04	81.0%
	westbound	500	19	0.04	26	0.04	36.8%
New Illawarra Road, north of Little Forest Road	northbound	1300	979	0.75	988	0.75	0.9%
	southbound	1300	1462	1.12	1466	1.12	0.3%
New Illawarra Road, south of Little Forest Road	northbound	1300	970	0.75	973	0.75	0.3%
	southbound	1300	1455	1.12	1463	1.12	0.5%
Heathcote Road, west of New Illawarra Road	eastbound	1300	1212	0.93	1213	0.93	0.1%
	westbound	1300	794	0.61	797	0.61	0.4%
Heathcote Road, east of New Illawarra Road	eastbound	1300	1875	1.44	1880	1.44	0.3%
	westbound	1300	972	0.75	974	0.75	0.2%

As highlighted in Section 3.9, a volume capacity ratio greater than 0.85 suggests that mid-block congestion is occurring with reduced travel speeds, minimal gaps in the traffic stream, and reduced vehicle headways.

The following road sections show a volume to capacity ratio exceeding 0.85:

- New Illawarra Road north of Little Forest Road
  - heading north in the AM peak - the AWT operational traffic represents 0.2% growth over the 2035 background traffic, with no perceptible change in v/c ratio.
  - heading south in the PM peak - the AWT operational traffic represents 0.3% growth over the 2035 background traffic, with no perceptible change in v/c ratio.
- New Illawarra Road south of Little Forest Road:
  - heading north in the AM peak - the AWT operational traffic represents 0.5% growth over the 2035 background traffic, with no perceptible change in v/c ratio.
  - heading south in the PM peak - the AWT operational traffic represents 0.5% growth over the 2035 background traffic, with a minor change in v/c ratio.
- Heathcote Road east of New Illawarra Road:
  - heading west in the AM peak - the AWT operational traffic represents 0.1% growth over the 2035 background traffic, with no perceptible change in v/c ratio.
  - heading east in the PM peak - the AWT operational traffic represents 0.1% growth over the 2035 background traffic, with a minor change in v/c ratio.
- Heathcote Road west of New Illawarra Road:
  - heading west in the AM peak - the AWT operational traffic represents 0.2% growth over the 2035 background traffic, with no perceptible change in v/c ratio.
  - heading east in the PM peak - the AWT operational traffic represents 0.3% growth over the 2035 background traffic, with a minor change in v/c ratio.

In the forecast year of 2035 the road sections highlighted above will experience congestion with reduced travel speeds, minimal gaps in the traffic stream, and reduced vehicle headways under expected background traffic growth.

The additional traffic as a result of the AWT operational traffic will cause only minimal incremental increases in traffic volumes and zero to minor perceptible changes in v/c ratio.

Level of Service

The mid-block carriageway level of service for the AM and PM peak hours respectively are presented in Table 6.16 and Table 6.17 for the 2035 forecast year with background growth and with the AWT operational traffic.

Table 6.16 2035 Mid-block AM Peak Hour Level of Service

Location	Travel Direction	Type of Carriageway[19]	Background Traffic Only		Background + AWT Operational Traffic	
			Volume (vph)	LoS	Volume (vph)	LoS
Little Forest Road, west of New Illawarra Road	eastbound	2U	45	A	50	A
	westbound	2U	39	A	54	A
New Illawarra Road, north of Little Forest Road	northbound	2CL	1499	D	1502	E
	southbound	2CL	997	A	1005	A
New Illawarra Road, south of Little Forest Road	northbound	2CL	1482	D	1489	D
	southbound	2CL	986	A	988	A
Heathcote Road, west of New Illawarra Road	eastbound	2CL	886	A	889	A
	westbound	2CL	1404	D	1405	D
Heathcote Road, east of New Illawarra Road	eastbound	2CL	921	A	922	A
	westbound	2CL	1933	F	1937	F

New Illawarra Road north of Little Forest Road shows LoS 'E' for northbound traffic in the AM peak and LoS 'D' for southbound traffic in the PM Peak period. New Illawarra Road south of Little Forest Road shows LoS 'D' for northbound traffic in the AM peak and southbound traffic in the PM peak period. Heathcote Road east of New Illawarra Road shows LoS 'F' for westbound traffic in the AM peak and for eastbound traffic in the PM peak period. As previously noted the increase in traffic volumes as a result of the AWT operational traffic represents 0.1% to 0.5% growth over the 2035 background traffic.

[19] Refers to the descriptions provided in Table 3.11

Table 6.17 2035 Mid-block PM Peak Hour Level of Service

Location	Travel Direction	Type of Carriageway[20]	Background Traffic Only		Background + AWT Operational Traffic	
			Volume (vph)	LoS	Volume (vph)	LoS
Little Forest Road, west of New Illawarra Road	eastbound	2U	21	A	38	A
	westbound	2U	19	A	26	A
New Illawarra Road, north of Little Forest Road	northbound	2CL	979	A	988	A
	southbound	2CL	1462	D	1466	D
New Illawarra Road, south of Little Forest Road	northbound	2CL	970	A	973	A
	southbound	2CL	1455	D	1463	D
Heathcote Road, west of New Illawarra Road	eastbound	2CL	1212	C	1213	C
	westbound	2CL	794	A	797	A
Heathcote Road, east of New Illawarra Road	eastbound	2CL	1875	F	1880	F
	westbound	2CL	972	A	974	A

6.5 FUTURE INTERSECTION PERFORMANCE

The main traffic impact concern is the effect of the additional traffic demand generated by the AWT operational traffic once the proposals are operational on the performance of key intersections serving the site in the forecast year. The SIDRA traffic model has been used to assess the operational performance of the key intersections under background traffic peak hour traffic volumes in 2018, 2025 and 2035 and by superimposing the development traffic demand on background peak hour traffic volumes. The development traffic is considered to be the cumulative impact of the following elements:

- AWT operational traffic for delivery of MSW - in scenarios 2018, 2025 and 2035.
- AWT operational traffic for removal of residual off-site in scenarios 2025 and 2035.

It should be noted that as discussed in previous sections the WSN Truck Parking Area and PCYC relocation will not generate any additional vehicular traffic during peak periods. The assessment of mid-block carriageway capacity and performance is based on peak hour performance.

6.5.1 Upgrading Heathcote Road with New Illawarra Road Intersection

It is proposed that the intersection of Heathcote Road with New Illawarra Road will be upgraded to traffic signals. It is expected that the final intersection configuration will reduce the high number of casualties to crashes ratio highlighted in the reported crash assessment in Section 3.7.2. The concept layout for the simple signalisation of the sign controlled seagull intersection of Heathcote Road with New Illawarra Road is presented in Figure 3.7.

[20] Refers to the descriptions provided in Table 3.11

This intersection concept layout proposes in addition to the installation of traffic signals the following key elements:

- Additional right turn lane for traffic turning right from Heathcote Road into New Illawarra Road.
- A second approach lane for eastbound traffic on Heathcote Road.
- A second departure lane for westbound traffic on Heathcote Road.
- An acceleration lane from the left slip lane into New Illawarra Road.

6.5.2 2018 Intersection Performance

The intersections of New Illawarra Road with Little Forest Road and Heathcote Road with New Illawarra Road were assessed for the forecast years of 2018 for AM and PM peak hours with background traffic growth only and with AWT operational traffic.

Full movement summary results are presented in Appendix D for the 2018 background traffic only and Appendix E for the 2018 background plus AWT operational traffic.

Little Forest Road/New Illawarra Road

Table 6.18 and Table 6.19 present a summary of the results of the 2018 intersection performance analysis for of the intersection of New Illawarra Road with Little Forest Road for the AM and PM peak hours respectively.

Table 6.18 Little Forest Road/New Illawarra Road - Intersection Performance 2018 AM Peak Hour

Movement Description	Background Traffic Only					Background + AWT Operational Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road (northern approach)										
Through	695	0.364	0.1	A	10	695	0.364	0.1	A	10
Right	25	0.210	46.5	D	12	33	0.224	40.0	C	12
Approach	**720**	**1.000**	**1.7**	**A**	**12**	**728**	**0.364**	**1.9**	**A**	**12**
Little Forest Road										
Left	31	0.031	4.2	A	2	34	0.031	4.2	A	2
Right	14	0.824	291.4	F	31	15	0.938	201.1	F	31
Approach	**45**	**1.000**	**77.5**	**F**	**31**	**49**	**0.951**	**64.5**	**E**	**31**
New Illawarra Road (southern approach)										
Left	14	0.013	11.7	A	0	20	0.016	11.0	A	0
Through	1049	0.550	0.0	A	0	1049	0.550	0.0	A	0
Approach	**1063**	**0.550**	**0.2**	**A**	**0**	**1069**	**0.550**	**0.2**	**A**	**0**
All Vehicles	**1828**	**0.824**	**3.1**		**31**	**1846**	**0.938**	**2.6**		**31**

In 2018 during the AM peak period the intersection of Little Forest Road with New Illawarra Road will operate well for through traffic on New Illawarra Road. The right turn movement from Little Forest Road into New Illawarra Road operates at LoS 'F' with and without development traffic. The right turn movement from New Illawarra Road into Little Forest Road is expected to operate at LoS 'D' with delays of approximately 46.5 seconds under the background traffic scenario and LoS 'C' with delays of approximately 40 seconds with the AWT operational traffic. The maximum queue length will be minimal and will not exceed the 175 metres provided. Both right turn movement delays are experienced by low numbers of vehicles.

There is minimal impact on this intersection during the AM peak period as a result of the AWT operational traffic.

Table 6.19 Little Forest Road/New Illawarra Road - Intersection Performance 2018 PM Peak Hour

Movement Description	Background Traffic Only					Background + AWT Operational Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road (northern approach)										
Through	1034	0.540	0.1	C	15	1034	0.540	8.8	A	15
Right	14	0.053	24.6	B	3	16	0.062	25.1	B	4
Approach	**1048**	**0.540**	**0.5**	**A**	**3**	**1050**	**0.540**	**9.1**	**A**	**4**
Little Forest Road										
Left	15	0.013	4.1	A	1	18	0.015	4.1	A	1
Right	7	0.130	46.6	D	4	13	0.131	29.6	C	4
Approach	**22**	**0.129**	**17.6**	**B**	**4**	**31**	**0.132**	**14.8**	**B**	**4**
New Illawarra Road (southern approach)										
Left	6	0.005	11.4	A	0	8	0.007	11.2	A	0
Through	688	0.364	0.0	A	0	688	0.364	0.0	A	0
Approach	**694**	**0.364**	**0.1**	**A**	**0**	**696**	**0.364**	**0.1**	**A**	**0**
All Vehicles	**1764**	**0.540**	**0.5**		**4**	**1777**	**0.540**	**5.7**		**4**

In 2018 during the PM peak period the intersection of Little Forest Road with New Illawarra Road will generally operate well for all movements. There is minimal impact on this intersection during the PM peak period as a result of the AWT operational traffic.

Heathcote Road/New Illawarra Road

The Heathcote Road with New Illawarra Road intersection was modelled as a signalised intersection as discussed in Section 6.5.1. Table 6.20 to Table 6.21 present a summary of the results of the 2018 intersection performance analysis for the AM and PM peak hours respectively.

Table 6.20 New Illawarra Road/Heathcote Road - Intersection Performance 2018 AM Peak Hour

Movement Description	Background Traffic Only					Background + AWT Operational Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road										
Left	605	0.253	8.6	A	59	605	0.256	8.7	A	63
Right	775	0.996	37.3	C	167	779	1.000	36.6	C	167
Approach	**1380**	**0.996**	**24.8**	**B**	**167**	1384	1.000	24.0	B	167
Heathcote Road (western approach)										
Left	314	0.215	10.0	A	12	315	0.215	10.0	A	12
Through	398	0.897	63.9	E	174	398	0.914	72.1	F	194
Approach	**712**	**0.897**	**40.1**	**C**	**174**	**713**	**0.914**	**44.7**	**D**	**194**
Heathcote Road (eastern approach)										
Through	290	0.234	10.0	A	12	292	0.236	10.0	A	12
Right	342	0.841	50.4	D	92	342	0.925	62.9	E	109
Approach	**632**	**0.841**	**31.8**	**C**	**92**	**634**	**0.925**	**38.5**	**C**	**109**
All Vehicles	**2724**	**0.996**	**30.4**	**C**	**174**	**2731**	**1.000**	**32.8**	**C**	**194**

In 2018 during the AM peak period the intersection of Heathcote Road with New Illawarra Road will operate at LoS 'C' when analysed as a signalised intersection with and without development with average delays of 30.4 seconds and 32.8 seconds, respectively. The through eastbound movements along Heathcote Road operate at a LoS 'E' with development and LoS 'F' without development. There is minimal impact on this intersection during the AM peak period as a result of the AWT operational traffic.

Table 6.21 New Illawarra Road/Heathcote Road - Intersection Performance 2018 PM Peak Hour

Movement Description	Background Traffic Only					Background + AWT Operational Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road										
Left	294	0.151	5.4	A	17	294	0.151	5.4	A	17
Right	400	0.896	34.6	C	59	402	0.903	35.1	C	60
Approach	**694**	**0.896**	**22.2**	**B**	**59**	**696**	**0.903**	**22.5**	**B**	**60**
Heathcote Road (western approach)										
Left	769	0.604	11.3	A	42	774	0.609	11.3	A	42
Through	273	0.873	35.6	C	62	275	0.879	36.1	C	63
Approach	**1042**	**0.873**	**17.7**	**B**	**62**	**1049**	**0.879**	**17.8**	**B**	**63**
Heathcote Road (eastern approach)										
Through	297	0.259	10.8	A	12	297	0.259	10.8	A	12
Right	570	0.805	18.6	B	68	570	0.805	18.6	B	68
Approach	**867**	**0.805**	**15.9**	**B**	**68**	**867**	**0.805**	**15.9**	**B**	**68**
All Vehicles	**2603**	**0.896**	**18.3**	**B**	**68**	**2612**	**0.903**	**18.4**	**B**	**68**

In 2018 during the PM peak period the intersection of Heathcote Road with New Illawarra Road will generally operate well for all movements. There is minimal impact on this intersection during the PM peak period as a result of the AWT operational traffic.

6.5.3 2025 Intersection Performance

The intersections of New Illawarra Road with Little Forest Road and Heathcote Road with New Illawarra Road were assessed for the forecast years of 2025 for AM and PM peak hours with background traffic growth only and with AWT operational traffic.

Full movement summary results are presented in Appendix F for the 2025 background traffic only and Appendix G for the 2025 background plus AWT operational traffic.

Little Forest Road/New Illawarra Road

Table 6.22 and Table 6.23 present a summary of the results of the 2025 intersection performance analysis for of the intersection of New Illawarra Road with Little Forest Road for the AM and PM peak hours respectively.

Table 6.22 Little Forest Road/New Illawarra Road - Intersection Performance 2025 AM Peak Hour

Movement Description	Background Traffic Only					Background + AWT Operational Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road (northern approach)										
Through	799	0.419	0.1	C*	12	799	0.419	0.1	C*	12
Right	25	0.301	67.0	E	17	33	0.314	56.0	D	17
Approach	**824**	**0.419**	**2.1**	**A**	**17**	**832**	**0.419**	**2.3**	**A**	**17**
Little Forest Road										
Left	31	0.031	4.2	A	2	34	0.034	4.2	A	2
Right	14	1.026	268.7	F	31	16	0.996	291.0	F	31
Approach	**45**	**1.000**	**70.5**	**F**	**31**	**50**	**1.000**	**78.5**	**F**	**31**
New Illawarra Road (southern approach)										
Left	14	0.013	11.7	A	0	21	0.017	11.1	A	0
Through	1204	0.631	0.0	A	0	1204	0.631	0.0	A	0
Approach	**1218**	**0.631**	**0.1**	**A**	**0**	**1225**	**0.631**	**0.2**	**A**	**0**
All Vehicles	**2087**	**1.026**	**2.4**		**31**	**2107**	**0.996**	**2.9**		**31**

* Following LoS based on density for continuous movements

In 2025 during the AM peak period the intersection of Little Forest Road with New Illawarra Road will operate well for through traffic on New Illawarra Road. The right turn movement from Little Forest Road into New Illawarra Road operates at LoS 'F' with and without development traffic. The right turn movement from New Illawarra Road into Little Forest Road is expected to operate at LoS 'E' with delays of approximately 67 seconds under the background traffic scenario and LoS 'D' with delays of approximately 56 seconds with the AWT operational traffic. The maximum queue length will be minimal and will not exceed the 175 metres provided. Both right turn movement delays are experienced by low numbers of vehicles.

There is minimal impact on this intersection during the AM peak period as a result of the AWT operational traffic.

Table 6.23 Little Forest Road/New Illawarra Road - Intersection Performance 2025 PM Peak Hour

Movement Description	Background Traffic Only					Background + AWT Operational Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road (northern approach)										
Through	1189	0.622	0.2	D*	18	1189	0.622	8.9	D*	18
Right	14	0.065	28.6	C	4	17	0.083	29.5	C	5
Approach	**1203**	**0.621**	**0.5**	**A**	**4**	**1206**	**0.621**	**9.2**	**A**	**5**
Little Forest Road										
Left	15	0.013	4.1	A	1	24	0.019	3.9	A	1
Right	7	0.167	63.2	E	5	14	0.187	40.8	C	5
Approach	**22**	**0.167**	**22.9**	**B**	**5**	**38**	**0.186**	**17.5**	**B**	**5**
New Illawarra Road (southern approach)										
Left	6	0.005	11.4	A	0	9	0.008	11.3	A	0
Through	792	0.420	0.0	A	0	792	0.420	0.0	A	0
Approach	**798**	**0.420**	**0.1**	**A**	**0**	**801**	**0.420**	**0.1**	**A**	**0**
All Vehicles	**2023**	**0.622**	**0.6**		**5**	**1045**	**0.622**	**5.8**		**5**

* Following LoS based on density for continuous movements

In 2025 during the PM peak period the intersection of Little Forest Road with New Illawarra Road will generally operate well for all movements. There is minimal impact on this intersection during the PM peak period as a result of the AWT operational traffic. It must be noted that the LoS for the right turn movement from Little Forest Road improves with the addition of the AWT traffic due to the decrease in the proportion of heavy vehicles. This is because the delays for light vehicles are less than heavy vehicles and hence the average delays are reduced.

Heathcote Road/New Illawarra Road

The Heathcote Road with New Illawarra Road intersection was modelled as a signalised intersection as discussed in Section 6.5.1. Table 6.24 to Table 6.25 present a summary of the results of the 2025 intersection performance analysis for the AM and PM peak hours respectively.

Table 6.24 New Illawarra Road/Heathcote Road - Intersection Performance 2025 AM Peak Hour

Movement Description	Background Traffic Only					Background + AWT Operational Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road										
Left	695	0.411	13.8	A	133	695	0.413	13.9	A	134
Right	891	1.000	46.6	D	167	895	1.000	46.6	D	167
Approach	**1586**	**1.000**	**26.4**	**B**	**167**	**1590**	**1.000**	**26.3**	**B**	**167**
Heathcote Road (western approach)										
Left	361	0.247	9.9	A	14	362	0.248	9.9	A	14
Through	456	0.917	85.6	F	283	457	0.920	86.8	F	286
Approach	**817**	**0.917**	**52.2**	**D**	**283**	**819**	**0.920**	**52.8**	**D**	**286**
Heathcote Road (eastern approach)										
Through	334	0.273	9.9	A	13	337	0.276	9.9	A	14
Right	394	0.900	76.4	F	149	394	0.900	76.4	F	149
Approach	**728**	**0.900**	**45.9**	**D**	**149**	**731**	**0.900**	**45.7**	**D**	**149**
All Vehicles	**3131**	**1.000**	**37.6**	**C**	**283**	**3140**	**1.000**	**37.7**	**C**	**286**

In 2025 during the AM peak period the intersection of Heathcote Road with New Illawarra Road will operate at LoS 'C' when analysed as a signalised intersection with and without development with average delays of 37.6 seconds and 37.7 seconds, respectively. The eastbound through movement on Heathcote Road operates at LoS 'F' and the queue on New Illawarra Road will extend beyond the left turn slip lane with and without development.

There is minimal impact on this intersection during the AM peak period as a result of the AWT operational traffic.

Table 6.25 New Illawarra Road/Heathcote Road - Intersection Performance 2025 PM Peak Hour

Movement Description	Background Traffic Only					Background + AWT Operational Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road										
Left	337	0.151	5.7	A	23	337	0.151	5.7	A	23
Right	459	0.866	40.2	C	87	461	0.873	40.8	C	89
Approach	**796**	**0.867**	**25.6**	**B**	**87**	**798**	**0.873**	**26**	**B**	**89**
Heathcote Road (western approach)										
Left	884	0.643	10.8	A	50	887	0.644	10.8	A	50
Through	314	0.878	45.4	D	94	317	0.888	46.6	D	96
Approach	**1198**	**0.878**	**19.9**	**B**	**94**	**1204**	**0.888**	**20.2**	**B**	**96**
Heathcote Road (eastern approach)										
Through	340	0.283	10.4	A	14	341	0.284	10.4	A	14
Right	656	0.834	26.4	B	105	656	0.834	26.4	B	105
Approach	**996**	**0.834**	**21.0**	**B**	**105**	**997**	**0.834**	**21.0**	**B**	**105**
All Vehicles	**2990**	**0.878**	**21.8**	**B**	**105**	**2999**	**0.888**	**22.0**	**B**	**105**

In 2025 during the PM peak period the intersection of Heathcote Road with New Illawarra Road will generally operate well for all movements. There is minimal impact on this intersection during the PM peak period as a result of the AWT operational traffic.

6.5.4 2035 Intersection Performance

The intersections of New Illawarra Road with Little Forest Road and Heathcote Road with New Illawarra Road were assessed for the forecast year of 2035 for AM and PM peak hours with background traffic growth only and with AWT operational traffic.

Full movement summary results are presented in Appendix H for the 2035 background traffic only and Appendix I for the 2035 background plus AWT operational traffic.

Little Forest Road/New Illawarra Road

Table 6.26 and Table 6.27 present a summary of the results of the 2035 intersection performance analysis for of the intersection of New Illawarra Road with Little Forest Road for the AM and PM peak hours respectively.

Table 6.26 Little Forest Road/New Illawarra Road - Intersection Performance 2035 AM Peak Hour

Movement Description	Background Traffic Only					Background + AWT Operational Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road (northern approach)										
Through	972	0.509	0.1	C*	14	972	0.509	0.1	C*	14
Right	25	0.581	159.5	F	32	33	0.579	123.5	F	31
Approach	**997**	**0.584**	**4.1**	**A**	**32**	**1005**	**0.582**	**4.2**	**A**	**31**
Little Forest Road										
Left	31	0.028	4.2	A	1	34	0.031	4.2	A	2
Right	14	1.000	701.0	F	36	16	1.000	767.4	F	36
Approach	**45**	**1.000**	**221.0**	**F**	**36**	**50**	**1.000**	**248.4**	**F**	**36**
New Illawarra Road (southern approach)										
Left	14	0.013	11.7	A	0	21	0.017	11.1	A	0
Through	1468	0.770	0.0	A	0	1468	0.770	0.0	A	0
Approach	**1482**	**0.770**	**0.1**	**A**	**0**	**1489**	**0.770**	**0.2**	**A**	**0**
All Vehicles	**2524**	**1.000**	**5.6**		**36**	**2544**	**1.000**	**6.6**		**36**

* Following LoS based on density for continuous movements

In 2035 during the AM peak period the intersection of Little Forest Road with New Illawarra Road will operate well for through traffic on New Illawarra Road. The right turn movements from Little Forest Road into New Illawarra Road and from New Illawarra Road into Little Forest Road operate at LoS 'F' with and without development traffic. The maximum queue length will be minimal and will not exceed the 175 metres provided. Both right turn movement delays are experienced by low numbers of vehicles.

There is minimal impact on this intersection during the AM peak period as a result of the AWT operational traffic.

Table 6.27 Little Forest Road/New Illawarra Road - Intersection Performance 2035 PM Peak Hour

Movement Description	Background Traffic Only					Background + AWT Operational Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road (northern approach)										
Through	1449	0.757	0.3	D*	21	1449	0.757	9.0	D*	21
Right	14	0.095	37.3	C	5	17	0.121	38.8	C	7
Approach	**1463**	**0.757**	**0.7**	**A**	**5**	**1466**	**0.757**	**9.3**	**A**	**7**
Little Forest Road										
Left	15	0.013	4.1	A	1	24	0.019	3.9	A	1
Right	7	0.259	113.0	F	8	14	0.269	65.2	E	8
Approach	**22**	**0.264**	**38.7**	**C**	**8**	**38**	**0.268**	**26.5**	**B**	**8**
New Illawarra Road (southern approach)										
Left	6	0.005	11.4	A	0	9	0.008	11.3	A	0
Through	964	0.511	0.0	A	0	964	0.511	0.0	A	0
Approach	**970**	**0.511**	**0.1**	**A**	**0**	**973**	**0.511**	**0.1**	**A**	**0**
All Vehicles	**2455**	**0.757**	**0.8**		**8**	**2477**	**0.757**	**6.0**		**8**

* Following LoS based on density for continuous movements

In 2035 during the PM peak period the intersection of Little Forest Road with New Illawarra Road will generally operate well for all movements. Vehicles turning right from Little Forest Road into New Illawarra Road will experience delays with a LoS 'F' when only background traffic is considered. When the AWT operational traffic is added the LoS for the right turn movement from Little Forest Road improves due to the decrease in the proportion of heavy vehicles. This is because the delays for light vehicles are less than heavy vehicles and hence the average delays are reduced. The impact on the other movements in the intersection is minimal during the PM peak period as a result of the AWT operational traffic.

Heathcote Road/New Illawarra Road

The Heathcote Road with New Illawarra Road intersection was modelled as a signalised intersection as discussed in Section 6.5.1. Table 6.28 to Table 6.29 present a summary of the results of the 2035 intersection performance analysis for the AM and PM peak hours respectively.

Table 6.28 New Illawarra Road/Heathcote Road - Intersection Performance 2035 AM Peak Hour

Movement Description	Background Traffic Only					Background + AWT Operational Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road										
Left	847	0.620	20.1	B	232	847	0.625	20.2	B	234
Right	1086	1.000	51.5	D	167	1090	1.000	52.1	D	167
Approach	**1933**	**1.000**	**29.1**	**C**	**232**	**1937**	**1.000**	**29.3**	**C**	**234**
Heathcote Road (western approach)										
Left	441	0.302	9.9	A	18	442	0.303	9.9	A	18
Through	557	0.981	118.2	F	426	558	0.984	120.8	F	433
Approach	**998**	**0.981**	**70.3**	**E**	**426**	**1000**	**0.983**	**71.8**	**F**	**433**
Heathcote Road (eastern approach)										
Through	406	0.331	9.9	A	17	409	0.334	9.9	A	17
Right	480	1.001	107.3	F	231	480	0.959	86.8	F	201
Approach	**886**	**1.001**	**62.7**	**E**	**231**	**889**	**0.959**	**51.4**	**D**	**201**
All Vehicles	**3817**	**1.001**	**47.7**	**D**	**426**	**3826**	**1.000**	**45.5**	**D**	**433**

In 2035 during the AM peak period the intersection of Heathcote Road with New Illawarra Road will operate at LoS 'D' when analysed as a signalised intersection with and without development with average delays of 47.7 seconds and 45.5 seconds, respectively. The eastbound through movement on Heathcote Road and the right turn movement from Heathcote Road into New Illawarra Road operate at LoS 'F'. The queue on New Illawarra Road will extend beyond the left turn slip lane with and without development.

There is minimal impact on this intersection during the AM peak period as a result of the AWT operational traffic.

Table 6.29 New Illawarra Road/Heathcote Road - Intersection Performance 2035 PM Peak Hour

Movement Description	Background Traffic Only					Background + AWT Operational Traffic				
	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)	Demand Flow (veh/h)	Degree of Sat'n (Ds)	Avg. Delay (sec)	LoS	95% Back of Queue (m)
New Illawarra Road										
Left	412	0.174	8.4	A	49	412	0.175	8.4	A	49
Right	560	1.000	57.9	E	167	562	1.000	58.1	E	167
Approach	**972**	**1.000**	**36**	**C**	**167**	**974**	**1.000**	**35.9**	**C**	**167**
Heathcote Road (western approach)										
Left	1077	0.732	10.5	A	69	1082	0.736	10.5	A	69
Through	382	0.895	75.9	F	202	385	0.903	77.8	F	208
Approach	**1459**	**0.895**	**27.6**	**B**	**202**	**1467**	**0.903**	**28.2**	**B**	**208**
Heathcote Road (eastern approach)										
Through	414	0.339	10.0	A	17	415	0.341	10.0	A	17
Right	798	0.977	79.0	F	358	798	0.977	79.0	F	358
Approach	**1212**	**0.977**	**55.5**	**D**	**358**	**1213**	**0.977**	**55.4**	**D**	**358**
All Vehicles	**3643**	**1.000**	**39.1**	**C**	**358**	**3654**	**1.000**	**39.3**	**C**	**358**

In 2035 during the PM peak period the intersection of Heathcote Road with New Illawarra Road will operate at LoS C when analysed as a signalised intersection with and without development with average delays of 39.1 seconds and 39.3 seconds, respectively. The eastbound through movement on Heathcote Road and the right turn movement from Heathcote Road into New Illawarra Road operate at LoS F. The right turn movement from New Illawarra Road into Heathcote Road operates at LoS E and the queue on New Illawarra Road will extend beyond the left turn slip lane with and without development.

There is minimal impact on this intersection during the AM peak period as a result of the AWT operational traffic.

6.5.5 Overview

Little Forest Road/New Illawarra Road

In all future scenarios (2018, 2025 and 2035 with and without cumulative development traffic) at the intersection of Little Forest Road with New Illawarra Road the through traffic on New Illawarra Road operates freely with minimal delays.

In the AM peak period the low volume right turn movements from Little Forest Road into New Illawarra Road and from New Illawarra Road into Little Forest Road will experience delays but have short queue lengths. Queue lengths will not exceed available storage areas. The delays worsen in future scenarios due to the increasing through traffic volumes on New Illawarra Road.

There are minimal delays experienced in the PM peak period in 2018, 2035 and 2025 for vehicles turning right into Little Forest Road from New Illawarra Road. However, vehicles turning right from Little Forest Road into New Illawarra Road will experience notable delays with small queue lengths due to the low volumes.

The additional AWT operational traffic entering these intersections is very low in comparison to the background traffic and will not result in any notable changes in the intersection operating characteristics. It was also noted that when the AWT operational traffic is added the LoS for the right turn movement from Little Forest Road improves due to the decrease in the proportion of heavy vehicles. This is because the delays for light vehicles are less than heavy vehicles and hence the average delays are reduced.

Heathcote Road/New Illawarra Road

In all future scenarios the intersection of Heathcote Road with New Illawarra Road operates within capacity. In the AM peak period the overall intersection will operate at LoS C in 2018 and 2025 but operate at LoS D in 2035. In the PM peak period the overall intersection will operate at LoS B in 2018 and 2025 but operate at LoS C in 2035.

The eastbound through movements on Heathcote Road will experience significant delays in the AM peak period under all scenarios and in the PM peak period by 2035. Significant delays will also experienced by the right-turn movement from Heathcote Road eastern approach into New Illawarra Road during the AM peak period in 2025 and 2035 and during the PM peak period by 2035.

The additional AWT operational traffic entering these intersections is very low in comparison to the background traffic and will not result in any notable changes in the intersection operating characteristics.

6.6 SUSTAINABLE TRANSPORT OPPORTUNITIES

The additional number of staff at the LHWRC as a result of the AWT facility is relatively low (69 employees). The start and finish times and the limited non-car based transport opportunities due to the isolated nature of the site mean that there are limited opportunities for staff to access the site via sustainable transport modes.

6.7 INTERNAL TRAFFIC

It has been advised by WSN that up to 40% of the waste delivered to AWT facility will be non-treatable waste. This waste cannot be processed in the AWT facility and will be transferred to the LHWRC landfill area via the internal road network and Little Forest Road up to 2025. After 2025 this residual waste will be transported off-site and has been considered in the external traffic impact assessment. Thus, any transfer from the AWT facility to the LHWRC landfill area does not impact the external roads prior to 2025. Approximately one to two trucks per hour (40% of 4 trucks per hour) will transfer non-treatable wastes to the landfill area internally up to 2024.

6.8 RECOMMENDED MITIGATION MEASURES

No mitigation measures are required on the external road network as a result of the projected traffic impacts of the proposed AWT facility operations.

7.0 PROPOSED ACCESSIBILITY AND PARKING DEMAND

7.1 PARKING DEMAND

The parking demand for the proposed AWT facility and WSN Truck Parking Area is detailed below. These numbers exclude vehicles only delivering waste and leaving the site within an hour.

7.1.1 Existing LHWRC Landfill and Recycling Services and Energy Developments (EDL)

The staff numbers servicing the landfill and recycling services will not change in the future. It is also expected that there will be no increase in the number of visitors to the site. Currently there is a total of approximately 43 staff with sufficient spaces provided to accommodate this number of vehicles.

The operation of the existing EDL facility is not expected to differ from the existing and therefore the existing parking supply is considered adequate to meet the parking demand.

Overall the parking demand for the existing LHWRC is not expected to increase and the parking demand will remain as it currently is. The parking supply is adequate to meet the existing and future parking demand.

7.1.2 AWT Facility Employee Parking Demand

With the operation of the proposed AWT facility up to an additional 69 staff will be employed at the AWT facility over a typical operating weekday. However, the number of staff represents the total employment by the facility on a day and not all staff will be on-site at the same time.

It has been assumed that staff members arrive and depart within 30 minutes of their shift and 100% of AWT staff will drive to work. The AWT facility employee parking demand by time of day is summarised in Table 7.1 based on shift times and staffing levels provided in Section 4.4.

Table 7.1 AWT Facility Employee Parking Demand

Time of Day	AWT Facility Employee Parking Demand				Proposed No. of Spaces Provided	Potential No. of Available Spaces
	Control Room	Waste Receival & Processing	Admin.	TOTAL *		
5.00am – 8.00am	2	30	0	**32**	72	40
8.00am – 12.30pm	2	30	10	**42**		30
12.30pm – 1.30pm	2	55	10	**67**		5
1.30pm – 4.00pm	2	25	10	**37**		35
4.00pm – 5.00pm	2	25	0	**27**		45
5.00pm – 9.00pm	2	25	0	**27**		45
9.00pm – 5.00am	2	0	0	**2**		70

* The total parking demand represents peak parking demand during the time period.

The maximum number of AWT staff on site at any given time is 67 staff, hence the maximum employee parking demand is for 67 spaces. This would occur for only short periods of time around 1pm when the 'waste receival and processing' staff are changing shifts.

The proposed AWT concept layout shown in Figure 4.2 indicates that 72 vehicle parking spaces will be provided on site. The number of available parking spaces for visitor parking is also shown in Table 7.1. At a minimum, 5 visitor parking spaces will be available, for very short periods. At other times between 30 and 70 spaces will be available.

7.1.3 DCP Parking Requirements

Sutherland Shire Council Development Control Plan 2006 (DCP 2006) does not specify a minimum off-street parking requirement for this type of facility. The only similar Land Use/Type of Development specified in DCP 2006 is "Industrial". The minimum parking requirement stated in the DCP for "Industrial" land uses is as follows:

- 1 space per 100m^2 gross floor area (GFA), with a minimum of 2 spaces for each industrial unit.
- 1 space per 30m^2 GFA for ancillary office space.
- 1 space per 30m^2 GFA for ancillary shop/retail space.

The total gross floor area of the receival hall and processing building is 6,195m^2. According to DCP 2006, a minimum of 62 car parking spaces are therefore required to be provided on-site.

The proposed AWT facility is not a typical industrial land use/development, the actual empirical parking demand should be used to determine the parking requirement. It has been estimated the parking demand for the AWT facility would be 72 parking spaces, which includes 5 visitor parking spaces (as detailed in Section 7.1.2).

7.2 CAR PARK DESIGN

The proposed on site car park shown in Figure 4.2 is provided at-grade adjacent at the northern end of the site near the entrance to the site off the proposed new internal access road. The proposed car park layout is a broad concept design at this stage and cannot be fully reviewed at this stage based on Roads and Traffic Authority Guide to Traffic Generating Developments, AS2890.1:2004 and AS2890.2:2002 requirements. Sutherland Shire Council Development Control Plan (DCP) 2006 refers parking design to AS2890.1 (as amended) which is AS2890.1:2004.

7.2.1 Parking Modules

Employee parking within the site is categorised as Class 1 according to Australian Standards 2890.1:2004 Table 1.1. The AS2890.1:2004 states that:

- For 90 degree bays, the minimum bay dimension shall be 2400mm x 5400mm with an aisle width of 6200mm (AS2890.1:2004 Figure 2.2).
- If the side boundary of a parking bay is a wall or fence, or if there are obstructions, such as columns placed so as to restrict door opening, 300mm shall be added to the width of the space.

Parking modules indicated on drawing 21-17777-SK2002 are approximately 2600mm x 5500mm which exceed minimum requirements in AS2890.1:2004.

7.2.2 Parking Aisles

Parking aisles are not indicated on the concept design drawing 21-17777-SK002 for the employee car park. The detailed design plans to be provided should provide a minimal width of 6200mm for the parking aisles in compliance with the AS2890.1:2004. This design can be achieved by proposing a painted central median island with appropriate line markings for the employee car park. This will delineate movement of vehicles through the car park to avoid confusion and potential impacts.

7.2.3 Access Driveways

Access facility provided on the site is categorised as Category 1 according to AS2890.1:2004 Table 3.1. The AS2890.1:2004 states that:

- For Category 1, the entry and exit combined width shall be 3000mm to 5500mm.
- If driveway is separate, both entry and exit widths should be 3000mm minimum.
- The entry/exit points need to be clearly delineated through line marking and signage to ensure smooth, safe traffic flow.

The entry and exit driveway indicated on drawing 21-17777-SK001 is nominated to be 4000mm which complies with AS2890.1:2004.

The entry/exit points need to be clearly delineated through line marking and signage to ensure smooth, safe traffic flow.

Appropriate street lighting shall be provided at the driveway entry/exit in order to provide adequate visibility at night.

The entering sight distance required for 40km/h is 100 metres for a passenger car. The sight distance for a car driver is used because the requirements are more stringent than trucks where the truck driver is more elevated.

The sight distance is adjusted for gradients. A six percent gradient requires an adjustment of two metres to the sight distance.

7.2.4 Splay at Kerbline

In Table 6.1 of the RTA Guide to Traffic Developments recommends 500mm of splay at kerbline of the access driveway on each side. The access driveway indicated on drawing 21-17777-SK001 should have a minimum 500mm of splay as recommended by the RTA. Splay should be provided in the form of kerb returns.

7.3 INTERNAL ROAD NETWORK

As described in Section 4.5 there are proposed changes to the internal road network and access to specific sites. The primary change is the provision of a new access road running off Little Forest Road, as shown in Figure 4.1 and Figure 4.2, providing access to the proposed AWT facility, the proposed WSN truck parking area, the relocated PCYC mini-bike facility and the existing EDL site.

7.3.1 Access to the Proposed AWT Site

The proposed internal road will be constructed to provide access to the proposed AWT facility. Vehicles accessing the AWT facility will travel via the new internal road off Little Forest Road, turning left at the proposed AWT access, some 90 metres west of Little Forest Road. Light vehicles will turn left into the car park prior to the weighbridge. Heavy vehicles will proceed straight ahead through the weighbridge before arriving at the main facility site.

Outbound heavy vehicles will travel past the weighbridge, turn right into the new internal road and then right into Little Forest Road to the intersection with New Illawarra Road. Light vehicles will give-way to heavy vehicles before turning right onto the internal access road. All vehicles are to enter and exit the site in a forward direction and are to be wholly contained within the site before being required to stop. The proposed vehicle routes are shown in Figure 4.1.

Based on drawings 21-17777-SK002 and 21-17777-SK003 (provided in Appendix J), swept path analyses undertaken by GHD have shown that there are no major issues for heavy vehicles utilising the inbound and outbound routes to the site as described above. Minor conflicts may arise for 2 passing semi-trailers turning at the corner located approximately 50 metres southwest of the weighbridge. However, the possibility of conflicts at this location will be minimal due to the low number of semi-trailers accessing the site at low speeds during peak hours.

Drawing 21-17777-SK003 also revealed that sufficient circulating area is provided within the site facility for semi-trailers to enter and exit the receival hall.

7.3.2 AWT Weighbridge

A second weighbridge is proposed for the LHWRC off the new internal road leading to the AWT facility, located approximately 70 metres southwest of the internal access road (around 35 metres southwest of the employee car park). This weighbridge will serve the AWT facility only. The AWT facility can accommodate a maximum of four delivery vehicles at one time. Deliveries will typically be made by 10 tonne capacity compactor vehicles with maximum vehicle length of approximately 10 metres. The general turnaround time (from weighbridge to exit) is estimated to be 10-15 minutes, with a maximum turnaround of 25 minutes. Based on the annual tonnages, vehicle capacity and operating times an average of 39 vehicles per day / 4 vehicles per hour is anticipated to deliver to the site.

The weighbridge is located approximately 35 metres from Little Forest Road, hence can provide queuing for up to three 10 metre vehicles in addition to two vehicles on the weighbridge. This is expected to be sufficient for the needs of the AWT facility, given that the weighbridge will have a capacity of approximately 60 trucks per hour. Furthermore additional queuing capacity is provided after the weighbridge prior to the delivery area.

7.3.3 Access to the Relocated PCYC Mini-bike Facility

As discussed previously, the PCYC mini-bike facility will be relocated to a new site within LHWRC and hence access and egress to the mini-bike facility will change. Currently access to the existing site is provided directly off Little Forest Road. The PCYC operates mainly on a Sunday when commercial waste truck volumes to LHWRC are lowest and no commercial waste vehicles are operating at the AWT facility. When the mini-bike facility is not operating, the facility is closed and the gate locked. All vehicles accessing the mini-bike facility are passenger cars (often with trailers).

The new internal road will provide access to the relocated PCYC facility west of the entrance to the AWT facility. Inbound PCYC vehicles will turn left into the internal road from Little Forest Road and continue west towards the PCYC facility. Outbound PCYC vehicles will be required to give-way (via a stop sign and stop line painted on the access road) to vehicles exiting the AWT site before proceeding to Little Forest Road.

7.3.4 Access to the Energy Development (EDL) Site

Access and egress to the existing EDL site will be re-directed off the proposed new internal access road. Currently access is gained to the site directly off Little Forest Road. The proposed entrance/exit to the EDL site will be relocated approximately 80 metres west of Little Forest Road. Inbound EDL vehicles will turn left into the internal road from Little Forest Road and the turn right into the EDL facility. Outbound EDL vehicles will be required to give-way (via a stop sign and stop line painted on the access driveway) to vehicles exiting the AWT site before proceeding to Little Forest Road.

The construction of the new internal road will not significantly affect access or egress to the EDL site.

7.3.5 Access to the Proposed WSN truck Parking Area

Access and egress to the proposed WSN truck parking area will also be provided at the western end of the proposed new internal road, similar to the PCYC facility.

7.3.6 New Internal Road Capacity

The new internal road should provide a sealed two-lane carriageway with a minimum lane width of 3.5 metres in each direction with double barrier line markings and raised pavement markers. A road shoulder is required of at least 1 metre. The width of the shoulder is dependent upon the cross-fall from the edge of the shoulder to the boundary of the road corridor. If the cross-fall is steep, then the shoulder needs to be wider.

The speed limit should be no more than 40km/h, to coincide with the existing speed limit on Little Forest Road.

Traffic volumes on Little Forest Road have been estimated in Sections 3.8.2, 5.1.5, 6.2 and 6.3.5 of this report. A summary of the projected volumes on Little Forest Road (west of New Illawarra Road is provided in Table 7.2. The highest traffic volumes (148 vehicles per hour) are expected during construction of the AWT facility.

Table 7.2 Forecast Traffic Volumes on Little Forest Road

Year	Traffic Direction	Base Traffic (no development)		Traffic (with development)[21]	
		AM Peak	PM Peak	AM Peak	PM Peak
2008	Southbound	45	21	65	65
	Northbound	39	19	83	39
	Total	**84**	**40**	**148**	**104**
2018	Southbound	45	21	49	37
	Northbound	39	19	53	25
	Total	**84**	**40**	**102**	**62**
2025/ 2035	Southbound	45	21	50	38
	Northbound	39	19	54	26
	Total	**84**	**40**	**104**	**64**

The capacity of the internal road would be similar to Little Forest Road (some 500 vehicles per hour - refer to Section 3.9). The internal hourly traffic volumes along this proposed road are expected to be significantly less than the capacity of the road.

7.3.7 Internal Intersections

As a result of the provision of the proposed new internal access road several new internal intersections will be required:

- Little Forest Road with the new internal access road.
- New internal access road with entry to EDL and AWT facilities.
- At the end of the new internal road leading to the relocated PCYC mini-bike facility and the proposed WSN truck parking area.

The design and layout of the intersections will need to consider the following matters and meet relevant Australian Standards:

- The manoeuvrability of trucks through the intersection.
- Adequate Entering Sight Distance (ESD) for a design speed of 40km/h for the road[22] taking into account gradient for all traffic movements.
- Gradient of less than six percent (at the lower end of the gradient requirement).

[21] 2008 traffic with development represent construction traffic

[22] The ESD required for a 40km/h road is 100 metres for a passenger car. The sight distance for a car driver is used because the requirements are more restrictive than trucks as the truck driver is more elevated and therefore truck drivers have an improved sight line. Requirements for sight distance are adjusted to account for gradients. For example, a six percent up gradient requires an adjustment of two metres to the sight distance.

Intersection of Little Forest Road with New Internal Access Road

It is proposed to provide an unsignalised priority controlled T-junction at the intersection of Little Forest Road with the new internal access road. Peak traffic volumes on both Little Forest Road and the new proposed road are expected to be relatively low and the priority controlled intersection is expected to accommodate the through and turning traffic movements.

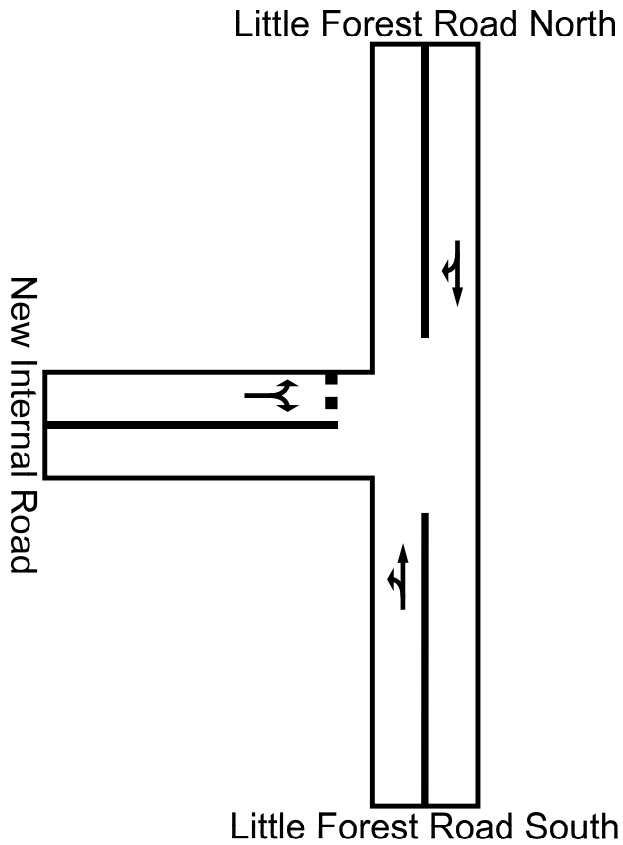
A single traffic lane on each approach to the intersection is considered adequate. Deceleration and acceleration lanes are not required at the intersection approaches. The width and alignment of the intersection arms will need to accommodate the swept paths of an articulated truck.

A roundabout at the intersection of Little Forest Road and the new internal road is not considered appropriate because:

- The majority of traffic throughout a typical day is truck movements and there are safety issues for a trucks travelling through a roundabout and over the roundabout island.
- The high number of trucks travelling through this intersection would require additional pavement strengthening to accommodate the truck turning movements. The pavement strengthening would be at considerable cost.

A concept layout of the intersection of Little Forest Road with the New Internal Road is presented in Figure 7.1 subject to detailed design. It is proposed that the new internal access road be provided with a "give way" sign at the intersection with Little Forest Road.

Figure 7.1 Concept Layout of Little Forest Road with the New Internal Access Road



Intersection of New Internal Access Road and EDL/AWT Access Roads

The final form of control to be provided at the junction of the new internal access road and the separate accesses to the EDL site and the AWT site are yet to be determined. It is generally proposed that unsignalised priority-controlled T-junctions are proposed for both intersections at New Internal Road/AWT facility access and New Internal Road/EDL facility access. It is proposed to provide priority to vehicles accessing the AWT site by having eastbound through traffic on the access road and exiting traffic from the EDL site yielding to the AWT traffic via stop signs on the approaches.

If staggered t-intersections are provided sufficient separation between the intersections should be provided to reduce vehicles conflicts and to provide adequate sight distances at both the intersections. Alternatively the accesses could be aligned and a four-way intersection be provided.

Peak traffic volumes accessing the AWT and EDL facilities from the new proposed road are expected to be relatively low and the priority controlled intersections is expected to accommodate the through and turning traffic movements.

A single traffic lane on each approach to the intersection is considered adequate. Deceleration and acceleration lanes are not required at the intersection approaches. The width and alignment of the intersection arms will need to accommodate the swept paths of an articulated truck.

Intersection of New Internal Access Road and PCYC Mini-bike Facility/WSN Truck Parking Area

The form of control to be provided at the junction of the new proposed road and the access to the PCYC Mini-bike Facility/WSN Truck Parking Area is yet to be determined. A roundabout may be considered at this junction. The design of the three-leg roundabout would need to consider manoeuvring of trucks through the intersection and hence the radius of the circulating lane needs to be adequate for the maximum truck size.

A single-lane circulating roundabout would be considered adequate based on the estimated peak traffic volumes entering this intersection expected to be approximately 40 trucks in any given hour on a weekday (refer to Section 6.3.2). The capacity of a single lane roundabout is approximately 1500 cars or about 500 trucks in an hour. Hence there will sufficient capacity at the roundabout to accommodate the expected traffic volumes.

The approval of this intersection is subject to a separate development application and is technically unrelated to the AWT Facility application.

8.0 CONCLUSIONS

The following conclusions are made based on the above traffic and parking investigations:

1. Overall, the road network and the associated intersections surrounding LHWRC currently perform adequately, generally being able to carry the existing traffic volumes:
   a. Existing mid-block capacity is sufficient but approaching capacity (based on v/c ratios) for westbound traffic on Heathcote Road, east of New Illawarra Road during the morning peak periods.
   b. Delays are experienced by right turning vehicles exiting Little Forest Road onto New Illawarra Road during the AM peak period; however these are only experienced by a very low number of vehicles.
   c. The intersection of Heathcote Road/ New Illawarra Road experiences significant delays for right turning vehicles from New Illawarra Road. Additional intersection capacity would be required to address this issue.
2. The intersection of Heathcote Road/New Illawarra Road has experienced a high number of crashes over a five year period between 2003 and 2007 inclusive. The RTA has recently undertaken a review of this intersection and has recommended that traffic signals be installed at this location.
3. There are currently limited opportunities for non-car based transport options to the LHWRC site.
4. Traffic generation during construction of the AWT facility is expected to be approximately 64 vehicle trips per hour during both peak periods. During the AM peak period this will result in exacerbation of the problematic right turn movements identified in 1b and 1c above. However, the impact of the additional construction traffic on the road network surrounding the site will be short term covering the construction period. The construction period is likely to span a 12 to 18 month period.
5. Background traffic growth of 2% per annum was assumed to the forecast years of 2018, 2025 and 2035. The PM peak was generally less critical for the operation of the key intersections and surrounding road network.
6. Traffic generation during operation of the AWT facility pre-2025 (when AWT residual is deposited at the LHWRC landfill) is expected to be approximately 216 vehicles per day, 18 vehicles per hour (two-way) during AM peak periods and 22 vehicles per hour (two-way) during PM peak periods.
7. Traffic generation during operation of the AWT facility post-2025 (when AWT residual is deposited off-site) is expected to be approximately 230 vehicles per day, 20 vehicles per hour (two-way) during AM peak periods and 24 vehicles per hour (two-way) during PM peak periods.
8. The WSN Truck parking area is expected to generate up to 160 additional vehicle movements per day. There will be no additional vehicle movements during the AM and PM peak periods.
9. The relocated PCYC facility is not expected to generate any additional vehicular traffic on a daily basis or during AM and PM peak periods.
10. The assessment of additional traffic generation during peak periods only applies to AWT traffic as the relocated PCYC an proposed WSN Truck parking area are not expected generate additional traffic during peak periods.

11. The peak hour mid-block capacity assessment shows that sections of New Illawarra Road will be approaching capacity in 2018 and exceeding effective capacity beyond 2025. Beyond 2025 traffic volumes on New Illawarra Road will be at capacity in the northbound direction during the AM peak and the southbound direction during the PM peak.
12. Westbound traffic on Heathcote Road east of New Illawarra Road in the AM peak will operate at LoS D in 2018, Los E in 2025 and LoS F in 2035. Eastbound traffic on Heathcote Road east of New Illawarra Road in the PM peak will operate at LoS D in 2018, Los E in 2025 and LoS F in 2035. In 2035 westbound traffic on Heathcote Road west of New Illawarra Road will be operating at LoS D during the AM peaks.
13. The AWT facility development traffic represents very low proportions of the background peak period traffic volumes and does not result in any significant change in peak mid-block carriageway v/c ratio or LoS.
14. The additional traffic from the proposed AWT facility is expected to have minimal additional congestion impacts on the intersection of New Illawarra Road with Little Forest Road for the future peak hours. Delays will only be experienced by vehicles turning right into or out of the site. These delays will increase over time as through traffic volumes increase. However, although the delays may be significant queue lengths will be short and can be accommodated within storage facilities provided.
15. The intersection of Heathcote Road with New Illawarra Road will be upgraded to traffic signals as detailed in RTA planned works. The additional development traffic in 2018 will not significantly affect the intersection performance. The results show that the intersection will generally operate satisfactorily in 2025 and 2035; however significant delays will be experienced by vehicles turning right to/from New Illawarra Rd, as well as vehicles travelling eastbound along Heathcote Rd during the AM peak in 2025 and during both peak periods in 2035.
16. The trip generation from the AWT and the WSN waste collection service trucks is relatively low and can be accommodated by the internal road network and intersections.
17. The current and future trip generation from the existing landfill and recycling services is not anticipated to change.
18. Access and egress to the existing landfill, waste and recycling services will not change.
19. Access and egress to the proposed AWT facility, proposed WSN truck parking area, the relocated PCYC and EDL site will be provided via a new internal access road and intersections. The proposed access and egress arrangements will accommodate traffic to and from these areas without compromising on accessibility.
20. The new internal intersections will be able to accommodate the expected traffic volumes and nor will there be significant congestion or delays.
21. The mid-block traffic volumes are within the carrying capacity of the new internal access road and Little Forest Road capacity.
22. The proposed second weighbridge for the AWT facility will be able to accommodate the expected AWT traffic.
23. The 72 parking spaces proposed will be sufficient to accommodate potential demand for parking at the proposed AWT facility, including visitor parking demand.
24. The proposed AWT car park will be designed to meet Australian Standards.
25. The location of the LHWRC and the lack of provision of sustainable transport options to the site generally preclude staff and visitor using other than a private motorised vehicle.