



# **SUEZ Recycling and Recovery Pty Ltd**

## **Lucas Heights Resource Recovery Park Intersection Safety Review**

January 2021

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# 1. Introduction

## 1.1 Background

The relocation and expansion of the existing garden organics (GO) facility at Lucas Heights Resource Recovery Centre was approved on 23 January 2017 under SSD 6835. GHD was commissioned by SUEZ Recycling and Recovery (SUEZ) to prepare an Intersection Safety Review for the redevelopment of the GO facility to comply with Conditions C49 and C50 of the Consent.

GHD has prepared a Statement of Environmental Effects (SEE) for a modification to this approval, which involves improvements to the organics processing technology. This will shortly be lodged with the Department of Planning, Infrastructure and Energy (DPIE).

Based on consultation with SUEZ, the intersection safety review is based on the modified design for the GO facility, assuming that the modification has been approved. The GO facility will be constructed before the Advanced Resource Recovery Treatment Facility (ARRT) facility. SUEZ intends to submit both the SEE for the modification and intersection safety review to DPIE for approval concurrently.

### 1.1.1 Proposed development

The construction activities associated with the GO facility include the following:

- GO Facility West: earthworks (per the GHD design Drawing No. 12510136-C001-009), construction of hardstand, internal access road, water and leachate infrastructure, waste receipt and sorting areas and compost bunkers and storage areas, Mill Creek rehabilitation.
- GO Facility East: relocation works within Area 2 and 3 of the GO facility area.

The SSD 6835 approved consent conditions include the Condition C49 under the section "Transport and Access". This condition states the following:

*The Applicant shall conduct a safety review of the Little Forest Road and New Illawarra Road intersection in the years 2020 and 2025 to ensure the on-going safe and efficient performance of the intersection. The safety reviews shall be prepared to the satisfaction of the Secretary and shall:*

- a) Be prepared by an independent traffic expert;*
- b) Be undertaken in consultation with Council and RMS and in accordance with relevant guidelines;*
- c) Be approved by the Secretary and RMS, by the end of 2020 and 2025;*
- d) Analyse vehicle movements and delays during peak periods;*
- e) Establish intersection performance and the need for any intersection upgrade works; and*
- f) Include a program for implementation of intersection upgrade works, if required.*

This report provides an intersection safety review in accordance with Condition 49 of SSD 6835 approved consent conditions. Record of consultation with Council and RMS is provided as Appendix C.

## **1.2 Purpose of this report**

The Intersection Safety Review has been prepared to address the requirements of the Development Consent (SSD 6835) Condition 49.

### **1.2.1 Scope of work**

An Intersection Safety Review is undertaken at the site access (Little Forest Road) and New Illawarra Road to ensure the on-going safe and efficient performance of the intersection. The review is conducted for the years 2020 and 2025 include the following:

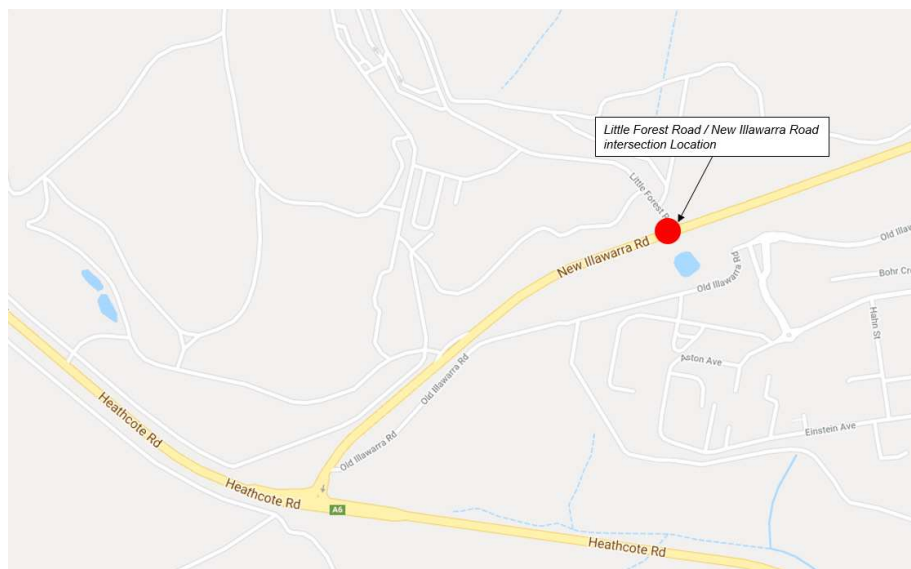
- An assessment of crash statistics and identify road safety implications in the vicinity of the site.
- Assessment of intersection performance and identifying the need for any intersection upgrade. This includes traffic modelling using SIDRA 8 to determine the operational performance level of the existing identified intersection. The evaluation is based on the traffic counts undertaken for the weekday AM and PM peak periods on Thursday 22 October 2020.
- Determine the operation performance of the existing intersection configuration in a future year scenario (2025), by undertaking traffic modelling using SIDRA 8.
- Assessment of existing intersection (i.e. in terms location and configuration) based upon aerial imagery. The analysis is based on Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections which outlines the desirable intersection treatments.
- Review of site access intersection configuration with respect of intersection sight distance based on Google Street view.

## **1.3 Site location**

The site is accessed via Little Forest Road and New Illawarra Road intersection at Lucas Heights. The intersection locations are shown in Figure 1-1 and Figure 1-2. The intersection is a give-way priority control, channelised intersection with designated right and left turns. Little Forest and New Illawarra Road has the following key features outlined in Table 1-1.





**Figure 1-1 Intersection Location – New Illawarra Road / Little Forest Road**




**Figure 1-2 Intersection Location – New Illawarra Road / Little Forest Road**



**Table 1-1 Little Forest and New Illawarra Road key features**

Road	Key Features
Little Forest Road	<p>A two-way road consisting of one lane in each direction divided by a median. Designated right and left turn provided approaching the intersection. The speed limit on Little Forest Road is 40 km/h.</p>  <p><b>Figure 1-3 Little Forest Road approaching the intersection</b></p> <p><i>Source Google Maps 2020</i></p>
New Illawarra Road A6 (East)	<p>A two-way road consisting of generally one lane in each direction divided by double solid line (BB line). Designated right turn lane provided approaching the intersection from the east. The speed limit at New Illawarra Road (East) is 80 km/h.</p>  <p><b>Figure 1-4 New Illawarra Road East of Little Forest Road looking east</b></p> <p><i>Source Google Maps 2020</i></p>

Road	Key Features
New Illawarra Road A6 (West)	<p>A two-way road consisting of generally one lane in each direction divided by double solid line (BB line). Designated left turn lane provided approaching the intersection from the west. The speed limit at New Illawarra Road (West) is 80 km/h.</p>  <p><b>Figure 1-5 New Illawarra Road West of Little Forest Road looking east</b></p> <p><i>Source Google Maps 2020</i></p>



## **1.4 Disclaimer**

This report: has been prepared by GHD for SUEZ Recycling and Recovery Pty Ltd and may only be used and relied on by SUEZ Recycling and Recovery Pty Ltd for the purpose agreed between GHD and the SUEZ Recycling and Recovery Pty Ltd as set out in Section 1.2.1 of this report.

GHD otherwise disclaims responsibility to any person other than SUEZ Recycling and Recovery Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report Section 1.5 GHD disclaims liability arising from any of the assumptions being incorrect

## **1.5 Assumptions**

- This Intersection Safety Review was developed as a desktop assessment of the Project. No site inspection was undertaken.
- Traffic turning count surveys were undertaken for Weekday AM peak and weekday PM peak on Thursday, 22 October 2020.
- SIDRA 8 traffic modelling has been undertaken for the intersection in the year 2020 which have been calibrated base on queues from survey videos provided by Matrix Traffic and Transport Data Pty Ltd.
- A high-level assessment of sight distances was undertaken using Google maps and Google street view imagery, as no site investigations were undertaken for this study. This approach was undertaken in order to gain a broad understanding of sight distance constraints (if any).
- Intersection treatment warrants were assessed based on the maximum peak hour traffic counts during the AM and PM survey periods.
- Future traffic capacity was analysed using SIDRA 8 by assuming a traffic growth of one percent per annum along Little Forest Road and New Illawarra Road as agreed with the Council.
- No parking surveys were undertaken.

## 1.6 Report structure

The remaining sections of this report are structured as follows:

- **Section 2 – Method:** describes the assessment criteria and steps undertaken in the Intersection Safety Review.
- **Section 3 – Traffic counts:** provides a summary of peak hour identification and peak hour traffic during AM and PM peak hour at the intersection of Little Forest Road / New Illawarra Highway (GO facility site access).
- **Section 4 – Traffic assessment:** reports intersection capacity assessment for base 2020 and future 2025 scenarios.
- **Section 5 – Intersection safety assessment:** describes the assessment of crashes, sight distance and intersection treatment warrants.
- **Section 6 – Summary and conclusion:** presents a summary and conclusion of the key findings of this study and recommendations.

## 2. Method

This section outlines the method and evaluation criteria used in the assessment of the project.

### 2.1 Method of assessment

This study has been undertaken with reference to the *Guide to Traffic Generating Development* (Roads and Maritime 2002). While not mandatory, the Guide provides a process and methodology to undertake traffic studies associated with accessing impacts on proposed developments. The traffic operation assessment process outlined in the Guide identifies the operating characteristics which need to be compared with agreed performance criteria.

The Guide states that existing daily traffic volumes on roads adjacent to a proposed development should be compared with estimated daily traffic volumes. This enables the functions of roads in the overall hierarchy of roads to be reviewed in the context of the proposed development.

The assessment criteria adopted for this report is outlined in the following section.

#### 2.1.1 Intersection assessment criteria

The performance of the existing road network is largely dependent on the operating performance of key intersections, which are critical capacity control points on the road network. The SIDRA 8 intersection modelling software was used to assess the proposed peak hour operating performance of intersections on the surrounding road network.

The criteria for evaluating the operational performance of intersections is provided by the *Guide to Traffic Generating Developments* (Roads and Maritime Services, 2002) and reproduced in Table 2-1. The criteria for evaluating the operational performance of intersections is based on a qualitative measure (i.e. Level of Services), which is applied to each band of average vehicle delay.

**Table 2-1 Level of services criteria for intersections**

Level of Service	Average Delay per Vehicle (seconds/veh)	Traffic Signals, Roundabouts	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control modes	At capacity, requires other control mode
F	> 70	Over Capacity Unstable operation	Over Capacity Unstable operation

Source: *Guide to Traffic Generating Developments* (Roads and Maritime Services 2002)

### **2.1.2 Intersection safety criteria**

This section includes the methodology used in undertaking safety review for the intersection.

#### **Crash analysis**

The crash assessment on the roads in the proximity of the site is undertaken using Transport for NSW (TfNSW) Centre for Road Safety website for the five-year period (2015 – 2019).

The TfNSW Definitions and notes to support road crash data, Guideline 2019 was used in undertaking crash assessment.

According to the guideline the crash statistics are confined to crashes that conform to the national guidelines for reporting and classifying road vehicle crashes. The guidelines include crashes that meet all of these criteria:

- Were reported to the police.
- Occurred on a road open to the public.
- Involved at least one moving road vehicle.
- Involved at least one person being killed or injured or at least one motor vehicle being towed away.

#### **Intersection sight distance assessment criteria**

The assessment of traffic sight distance identifies whether there is adequate longitudinal sight distance at the intersection to allow drivers approaching and exiting the intersection to have sufficient sight distance to avoid potential conflicts. The required sight distance for intersection is provided in *Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections* (Austroads, 2017).

The types of sight distance that must be provided in the design of all intersections include:

- Approach sight distance (ASD).
- Safe intersection sight distance (SISD).

#### **Intersection treatment warrant Criteria**

The warrants focus on safety performance outcomes of the intersection. The intersection warrants were assessed in reference to Austroads *Guide to Traffic Management – Part 6: Interchanges, Intersections and Crossing Management (2020)* which provides guidance on the preferred intersection design based on traffic volumes. *The guide includes* three graphs for the selection of turn treatments on roads based on design speed.

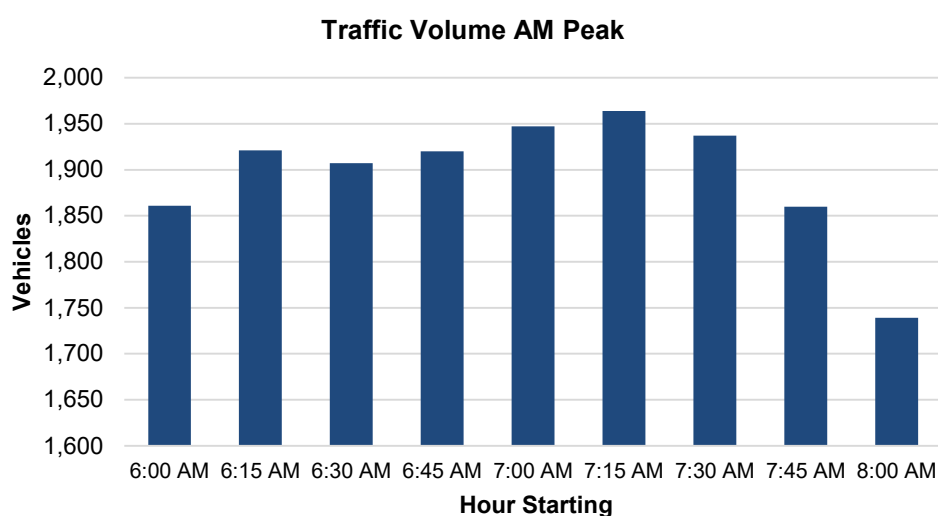
### 3. Traffic counts

GHD commissioned Matrix Traffic and Transport Data Pty Ltd to undertake intersection counts at Little Forest Road / New Illawarra intersection, on Thursday 22 October 2020 during the following hours:

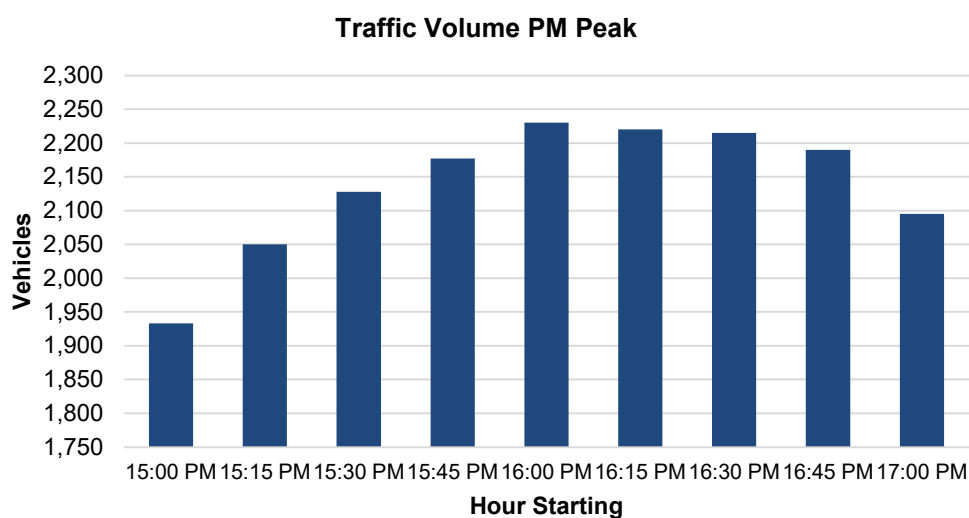
- 6:00 am - 9:00 am.
- 3:00 pm - 6:00 pm.

As shown in Figure 3-1 and Figure 3-2, the survey conducted for the intersection traffic indicates that:

- The weekday morning peak traffic volume peak occurs between 7:15 am to 8:15 am.
- The weekday afternoon peak traffic volume peak occurs between 4:00 pm to 5:00 pm.



**Figure 3-1 AM peak traffic volume**



**Figure 3-2 PM peak traffic volume**



The intersection counts at each leg of intersection is summarised during AM and PM peak hour in Table 3-1.

**Table 3-1 Intersection traffic volume – AM and PM peaks**

Location	AM Peak			PM Peak		
	Light vehicles	Heavy vehicles	% heavy vehicles	Light vehicles	Heavy vehicles	% heavy vehicles
New Illawarra Road (East)	806	84	9%	1,239	58	4%
Little Forest Road	9	28	76%	25	3	11%
New Illawarra Road (West)	950	87	8%	861	44	5%
Total	1,765	199	10%	2,125	105	5%

## 4. Traffic assessment

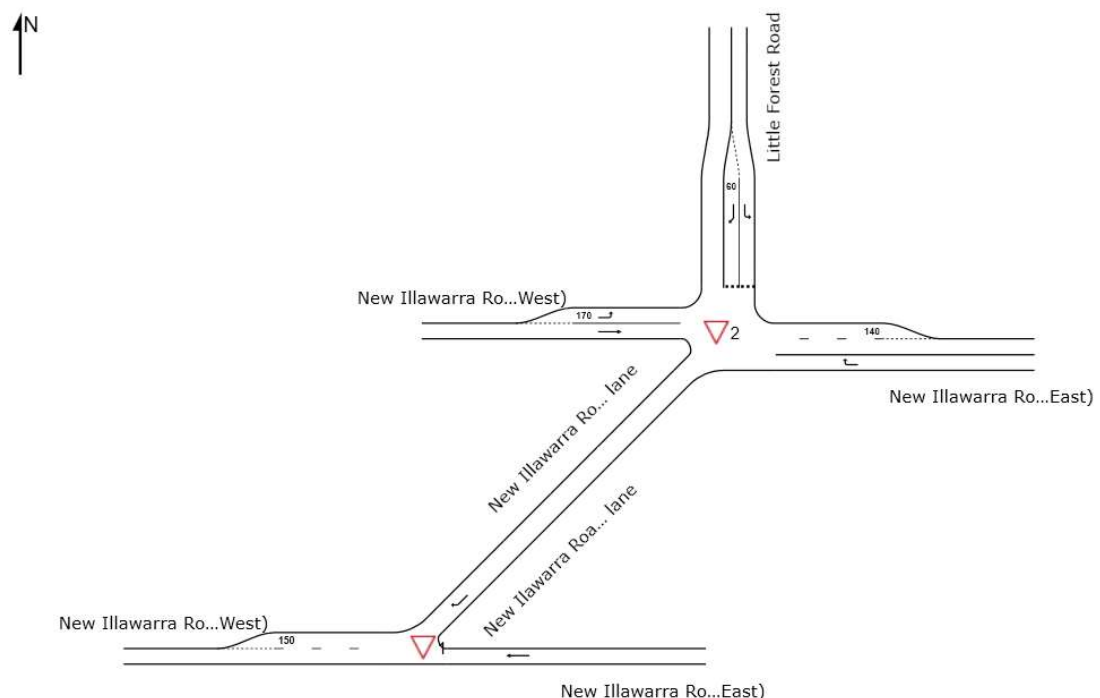
### 4.1 2020 Base intersection capacity assessment

The base 2020 traffic models were developed using the AM and PM peak hour survey data. Existing traffic flows at Little Forest Road and New Illawarra Road intersection was analysed using SIDRA 8 to obtain the current operational performance of the intersection with comparison to intersection assessment criteria outlined in

The existing geometrical layout is diagrammatically shown in Figure 4-1 and Figure 4-2 based on the SIDRA model analysis and google satellite image, respectively. The traffic turn movement figures for base 2020 are shown in Figure 4-3 and Figure 4-4 during AM and PM peak periods, respectively. The SIDRA models were calibrated based on survey queues and traffic count survey videos, as outlined in Table 4-1.

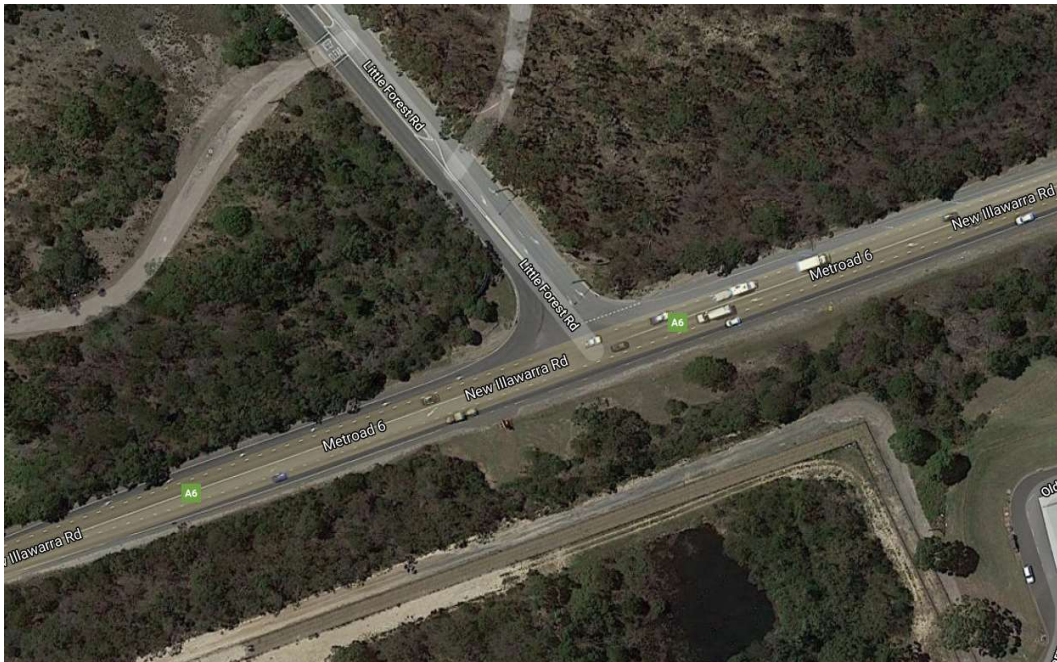
The SIDRA intersection assessment on existing base 2020 AM and PM peak traffic flows results are summarised in Table 4-2 and Table 4-3, respectively.

The base SIDRA modelling results indicate that the intersection performs with a satisfactory level of service (LoS C) during AM peak with a maximum delay of 43 seconds for the worst turn movement (right turn from Little Forest Road onto New Illawarra Highway). The SIDRA result indicates a maximum of 8 m queue at the intersection, which is similar to site survey videos. During the PM peak, the intersection has acceptable delays (LoS B) with a maximum queue of 2 m and a maximum average delay of 18 seconds.



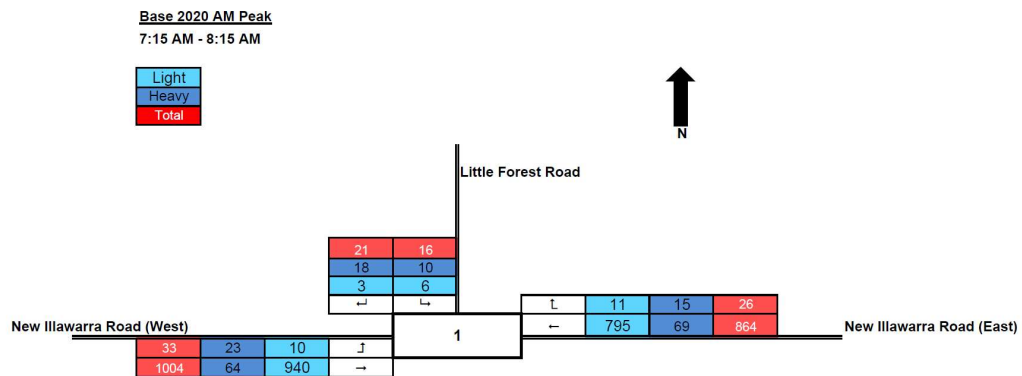
**Figure 4-1 Little Forest and New Illawarra Road SIDRA intersection layout**

Source: SIDRA 8.0 Base model layout

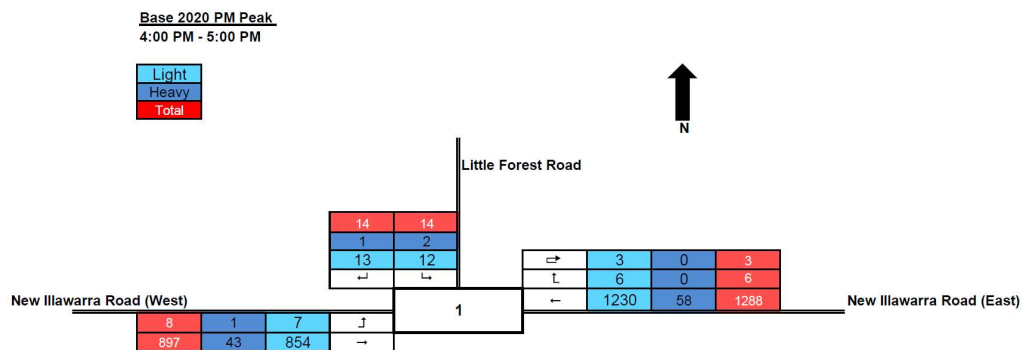


**Figure 4-2 Little Forest and New Illawarra Road aerial image**

Source: Google maps, 2020



**Figure 4-3 Base 2020 AM peak vehicle turn movements**



**Figure 4-4 Base 2020 AM peak vehicle turn movements**

**Table 4-1 Weekday AM and PM queue comparison (vehicles)**

Location	AM Peak - Queue (veh)			PM Peak - Queue (veh)		
	Survey	SIDRA (95th %)	Difference	Survey	SIDRA (95th %)	Difference
East: New Illawarra Road (Right turn)	3	1	2	2	0	2
North: Little Forest Road (Right turn)	3	1	2	3	0	3
North: Little Forest Road (Left Turn)	3	0	3	2	0	2

**Table 4-2 2020 base intersection operation – weekday AM peak hour**

Intersection Movement	AM Peak			
	DoS	Average Delay (s)	Level of Service	95% Back of Queue (m)
East: New Illawarra Road (Right turn)	0.14	26	LOS B	5
East: New Illawarra Road (Through)	0.49	0	LOS A	0
West: New Illawarra Road (left turn)	0.03	8	LOS A	0
West: New Illawarra Road (Through)	0.56	0	LOS A	0
North: Little Forest Road (Left turn)	0.05	12	LOS A	1
North: Little Forest Road (Right turn) + New Illawarra Road right turn exit lane	0.23	43	LOS C	8
Intersection Movement (all vehicles)	0.56	43	LOS C	8

**Table 4-3 2020 base intersection operation – weekday PM peak hour**

Intersection Movement	AM Peak			
	DoS	Average Delay (s)	Level of Service	95% Back of Queue (m)
East: New Illawarra Road (Right turn)	0.01	13	LOS A	0
East: New Illawarra Road (Through)	0.72	0	LOS A	0
West: New Illawarra Road (left turn)	0.01	7	LOS A	0
West: New Illawarra Road (Through)	0.50	0	LOS A	0
North: Little Forest Road (Left turn)	0.07	18	LOS B	2
North: Little Forest Road (Right turn) + New Illawarra Road right turn exit lane	0.05	13	LOS A	1
Intersection Movement (all vehicles)	0.72	18	LOS B	2

**Notes:**

- The average delay for priority-controlled intersections is selected from the movement on the approach with the highest average delay.
- The level of service for priority-controlled intersections is based on the highest average delay per vehicle for the most critical movement.
- The degree of saturation is defined as the ratio of the arrival flow (demand) to the capacity of each approach.
- Average delay is given in seconds per vehicle.

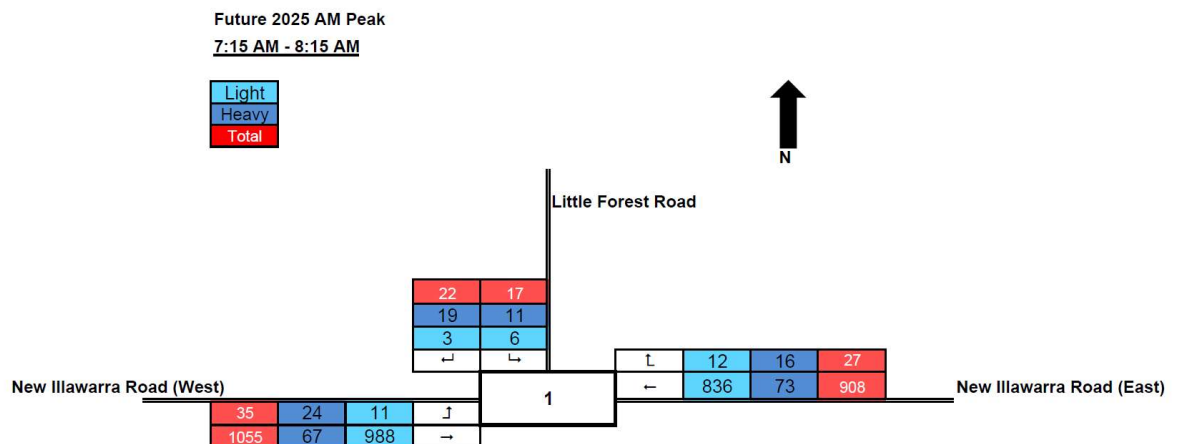
## 4.2 2025 Future intersection capacity assessment

Future traffic growth was estimated for 2025, allowing five year future growth. An assumed annual linear growth rate of one percent per annum was applied to movements along New Illawarra Road and Little Forest Road. The future 2020 traffic turn movement figures for the year 2025 during AM and PM peak hours are shown in Figure 4-5 and Figure 4-6 respectively. Intersection capacity was assessed for future 2025 scenario at Little Forest Road and New Illawarra Road intersection using SIDRA 8.

SIDRA modelling results for the year 2025 are summarised in Table 4-4 and Table 4-5 for the AM and PM peak periods respectively. The results indicate that the longest delays occur at Little Forest Road right turn movement during AM peak hour with an average delay of 54 seconds. As a result of this delay, the intersection is expected to perform at near capacity (LoS D) during AM peak hour, however the remaining turn movements remain within an acceptable level of service. A maximum of one vehicle queue (11 m) was observed during AM peak hour while 2 m long queues were observed during PM peak.

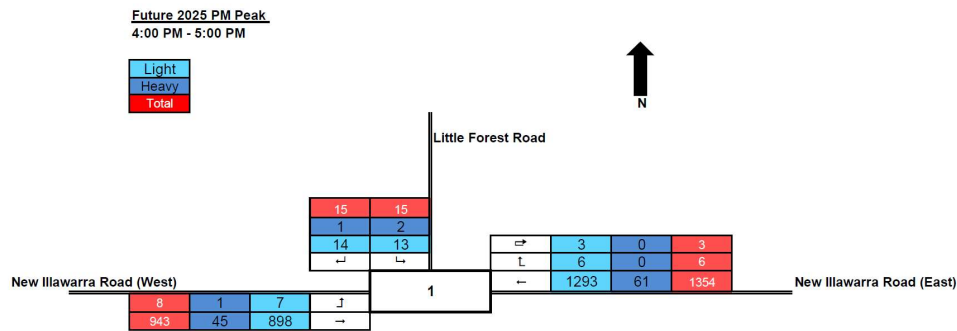
During PM peak hour the longest delays are expected to occur at Little Forest Road left turn movement with an average delay of 20 seconds. The intersection is expected to have an acceptable performance (LoS B) during PM peak hour.

Based on these results, the intersection is expected to perform well within the acceptable capacity at the year 2025 during AM and PM. Therefore, no intersection upgrade is recommended.



**Figure 4-5 Future 2025 AM peak vehicle turn movements**





**Figure 4-6 Future 2025 PM peak vehicle turn movements**

**Table 4-4 2025 intersection operations – weekday AM peak hour**

Intersection Movement	AM Peak			
	DoS	Average Delay (s)	Level of Service	95% Back of Queue (m)
East: New Illawarra Road (Right turn)	0.17	30	LOS C	6
East: New Illawarra Road (Through)	0.52	0	LOS A	0
West: New Illawarra Road (left turn)	0.03	8	LOS A	0
West: New Illawarra Road (Through)	0.59	0	LOS A	0
North: Little Forest Road (Left turn)	0.06	14	LOS A	2
North: Little Forest Road (Right turn) + New Illawarra Road right turn exit lane	0.29	54	LOS D	11
Intersection Movement (all vehicles)	0.59	54	LOS D	11

**Table 4-5 2025 intersection operations – weekday PM peak hour**

Intersection Movement	AM Peak			
	DoS	Average Delay (s)	Level of Service	95% Back of Queue (m)
East: New Illawarra Road (Right turn)	0.01	14	LOS A	0
East: New Illawarra Road (Through)	0.75	0	LOS A	0
West: New Illawarra Road (left turn)	0.01	7	LOS A	0
West: New Illawarra Road (Through)	0.53	0	LOS A	0
North: Little Forest Road (Left turn)	0.08	20	LOS B	2
North: Little Forest Road (Right turn) + New Illawarra Road right turn exit lane	0.06	14	LOS A	0
Intersection Movement (all vehicles)	0.75	20	LOS B	2

**Notes:**

- The average delay for priority-controlled intersections is selected from the movement on the approach with the highest average delay.
- The level of service for priority-controlled intersections is based on the highest average delay per vehicle for the most critical movement.
- The degree of saturation is defined as the ratio of the arrival flow (demand) to the capacity of each approach.
- Average delay is given in seconds per vehicle.

## 5. Intersection safety assessment

### 5.1 Crash analysis

A review of crash data on the roads in the proximity of the site using the Transport for NSW Centre for Road Safety website has been undertaken for the five-year period (2015 – 2019). The crash data summary is given for the following locations in the vicinity of the site:

- Little Forest Road / New Illawarra Road.
- New Illawarra Road (between Bangor Bypass and Little Forest).
- New Illawarra Road (between Little Forest Road and Heathcote Road).
- Little Forest Road.
- Heathcote Road.

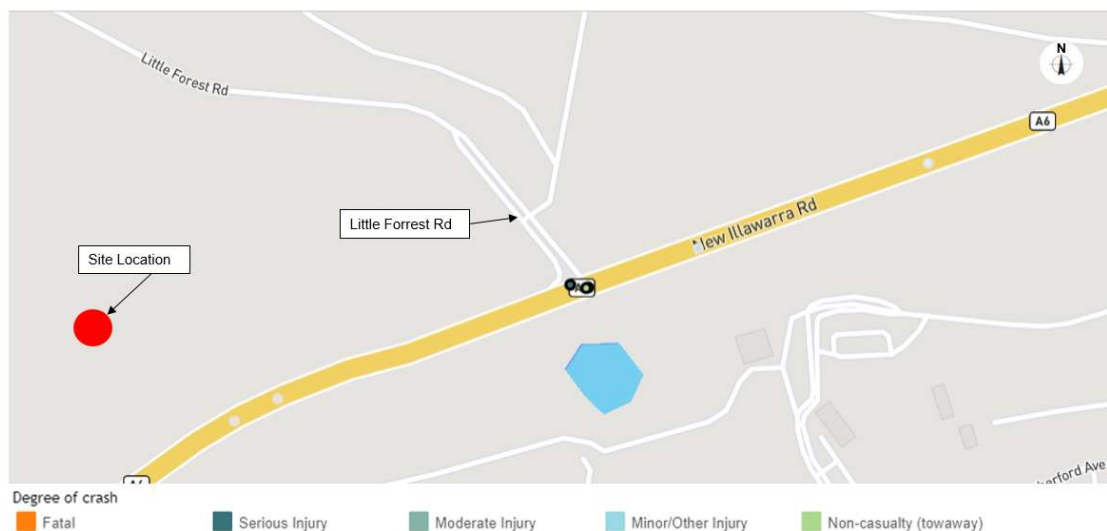
It is noted that while a crash review of the surrounding road has been undertaken, such crashes may not be directly related to the subject site, with the exception of Little Forest Road / New Illawarra Road intersection (refer section 5.1.1) which provide access to the subject site.

#### 5.1.1 Little Forest Road / New Illawarra Road

In total, three crashes occurred between 2015 and 2019 at Little Forest Road and New Illawarra Road intersection as shown in Figure 5-1 and are summarised as follows:

- One off carriageway left on right ben crash occurred at T-Junction resulting in serious injury.
- One rear end with no casualty.
- One struck an object on the carriageway.
- All crashes at this intersection occurred during day light hours.

It is considered that there is a low incidence of crashes at this intersection, which provides access to the subject site.

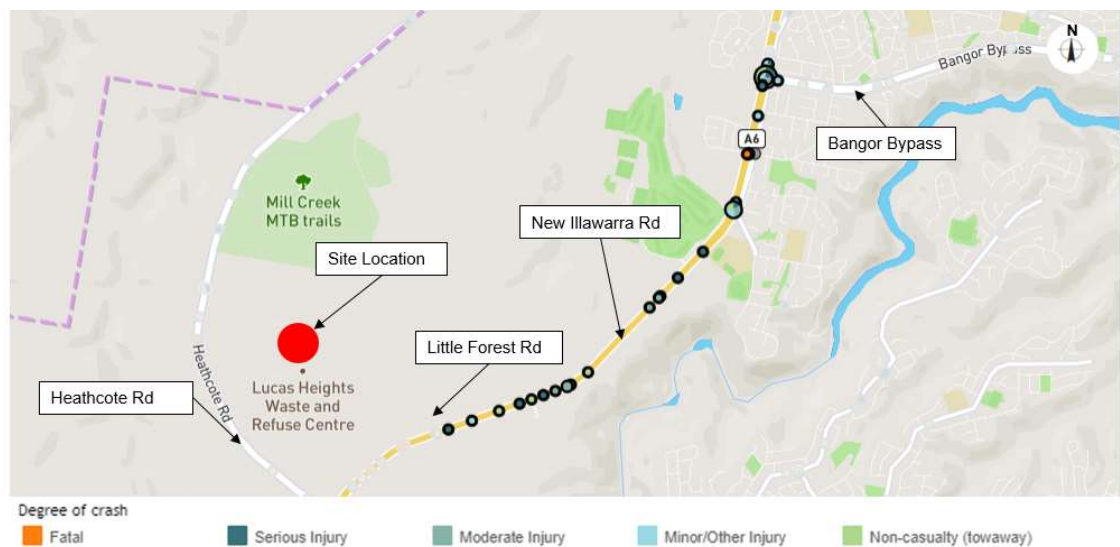


**Figure 5-1 Crashes map location: Little Forest Road / New Illawarra Road intersection**

### 5.1.2 New Illawarra Road (between Bangor Bypass and Little Forest Road)

In total 51 crashes have occurred on New Illawarra Road between Bangor Bypass and Little Forest Road in five year period (2015-2019) as shown in Figure 5-2. These are summarised as follows:

- Sixteen crashes occurred at intersection of Bangor Bypass and New Illawarra Road, 56 percent of these crashes were rear end crashes and 25 percent of these crashes were right through crashes. Five of these crashes involved serious injury.
- Twenty-three crashes occurred on New Illawarra Road (excluding intersection crashes). Sixty-five percent of these crashes were rear end crashes and seventeen percent were left head on crashes.
- Six head on crashes.
- Two right near crashes.
- Four off path on straight crashes.
- The severity of crashes included 15 serious injuries, 2 fatal and 11 moderate injuries.



**Figure 5-2 Crashes map location: New Illawarra Road between Bangor bypass and Little Forest Road**

### 5.1.3 New Illawarra Road between Little Forest Road and Heathcote Road

In total 20 crashes have occurred on New Illawarra Road between Little Forest Road and Heathcote Road in five year period (2015-2019) as shown in Figure 5-3. These are summarised as follows:

- Nine of crashes occurred at T-junction of Heathcote Road and New Illawarra Road and Three crashes occurred at T-Junction of Little Forrest and New Illawarra Road.
- Thirteen crashes occurred on day light, four in dusk, two in dawn and one in darkness.
- Eleven crashes were rear end crashes which included one fatal crash.
- Two crashes were head on, both of which were fatal crashes.
- One crash was off road into object.
- The severity of all crashes in this section of roadway including three fatal, one serious injury, seven moderate injuries and four non-casualty and five minor injuries.



**Figure 5-3 Crashes map location: New Illawarra Road between Little Forest Road and Heathcote Road**

### 5.1.4 Little Forest Road

No crash was recorded along Little Forest Road in five year period (2015-2019).

### 5.1.5 Heathcote Road

In total, 24 crashes were recorded on Heathcote Road for a distance of 5.4 km north of New Illawarra Road intersection in five year period (2015-2019) as shown in Figure 5-4. These are summarised as follows:

- Eight crashes were rear end.
- Two crashes were head on collision both of which were fatal.
- Two crashes were while overtaking another vehicle.
- Six crashes were off path on straight.
- The severity of crashes included two fatal, three serious and eight moderate injury crashes.



**Figure 5-4 Crashes map location: Heathcote Road**

## 5.2 Sight distance

An assessment of traffic sight distance has been undertaken for the intersection of Little Forest Road / New Illawarra Road to determine whether there is adequate longitudinal sight distance at the intersection to allow drivers approaching and exiting the intersection to have sufficient sight distance to avoid potential conflicts.

This assessment has been undertaken based on a desktop assessment only, using Google Maps and Google Street view. No plans have been provided for the review. It should be noted that the actual sight distances observed on site may differ from the Google images, which may be outdated as a result of new vegetation and changes to the road environment, or distortion of distance associated with the streeview photography, etc.

### **Approach Sight Distance (ASD)**

The required sight distances for the Little Forest Road and new Illawarra Road has been derived from the *Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections* (Austroads, 2017) which specifies the following: *Approach Sight Distance (ASD)*. This is the minimum requirement on minor roads to provide the driver of a vehicle adequate sight distance to observe the road layout and approaching intersection and provide sufficient time to react and stop if necessary before entering the conflict area. Approach sight distance is measured from driver eye height (1.10 m to 0.0 m or the road surface). As shown in Table 5-1, the observed sight distanced provides the minimum approach sight distance requirement minor road approach along Little Forest Road towards New Illawarra Road.



**Table 5-1 Approach Sight distance requirements for cars – New Illawarra Road and Little Forest Road**

Location	Design Speed (km/h)	ASD (minimum requirement)	
		Required (m) *	Observed distance (m) (direction towards access)
Little Forest Road	40	40	80 (southbound)

(\*) based on level terrain and reaction time of 2 seconds

Source: Austroads Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections (2017)

### Safe intersection sight distance (SISD)

The Safe Intersection Sight Distance (SISD) provides sufficient sight distance for a driver of a vehicle on the major road to observe the vehicle from the minor road approach moving into a collision situation and to decelerate to stop before reaching the collision point (if required). SISD is measured from the driver's eye height of 1.10 m to 1.25 m top of the car (object height).

Table 5-2 provides a summary of the sight distance requirements for the Little Forest Road and New Illawarra Road intersection and observed sight distance based on google street view imagery. As shown, the measured sight distance provides the minimum sight distance requirement for the east and west approaches along New Illawarra Road from Little Forest Road.

**Table 5-2 Safe intersection Sight distance requirements for cars – New Illawarra Road and Little Forest Road**

Location	Design Speed (km/h)	SISD (minimum requirement)	
		Required (m)	Observed distance (m) (direction from access)
New Illawarra Road	80	181	180 (eastbound) 270 (westbound)

(\*) based on level terrain and reaction time of 2 seconds

Source: Austroads Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections (2017)

## 5.3 Intersection treatment warrant criteria

This section provides detail on the recommended intersection treatment for Little Forest Road and New Illawarra Road intersection. The assessment has been undertaken based on existing traffic volumes outlined in Section 3.

Austroads provides guidance on the preferred intersection design based on traffic volumes. Figure 5-5 has been sourced from the Austroads *Guide to Traffic Management – Part 6: Interchanges, Intersections and Crossing Management (2020)* - Figure 3.25. This figure contains three graphs for the selection of turn treatments on roads with design speed. The warrants focus on safety performance outcomes.

For the purpose of this assessment the graph for a speed of 70 km/h to 100 km/h has been used. Both the left turn and right turn movements at each intersection have been considered as part of this assessment. However, only the most critical movements at the intersections are discussed in the following sections. The turn volumes are calculated based on the maximum conflicting volumes. In this case the AM peak has been adopted for a worst case scenario.

The traffic survey outlines that during the AM peak hour:

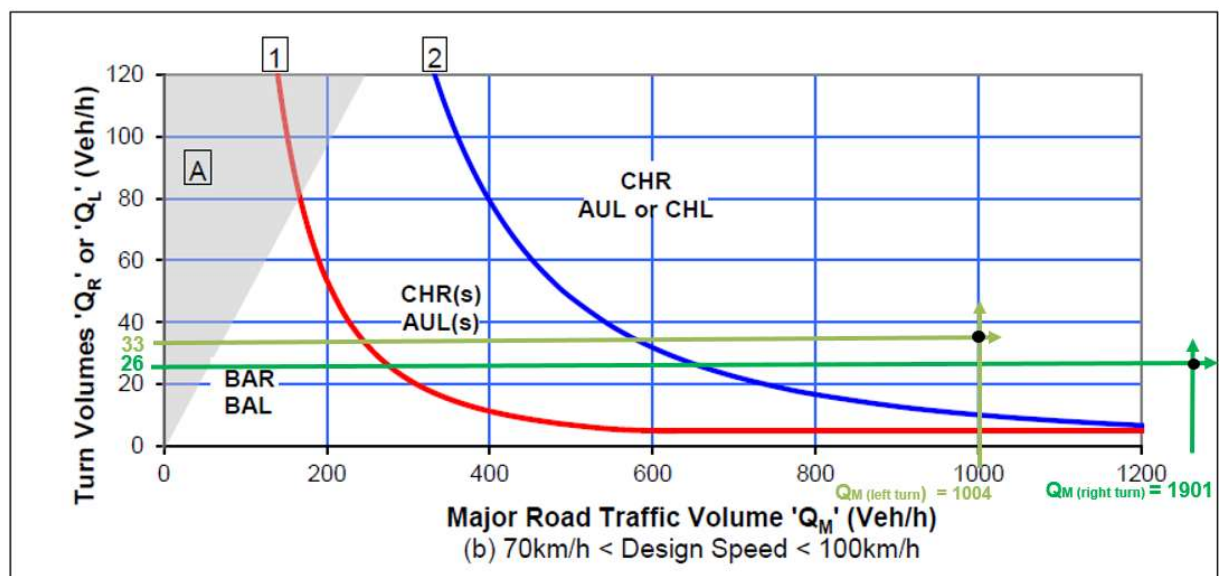
- 26 vehicles turn right from New Illawarra Road into Little Forest Road with three conflicting movements totalling 1,901 vehicles.

33 vehicles turn left from New Illawarra Road into Little Forest Road with one conflicting movements totalling 1,004 vehicles.

The warrant indicates that based on the existing traffic volumes, the following turn treatments are appropriate for this intersection along the major road:

- Channelised Right (CHR).
- Auxiliary Left (AUL) or Channelised Left (CHL).

The existing intersection layout has a channelised right turn lane and auxiliary left turn lane on New Illawarra Road on approach to Little Forest Road, thus no proposed upgrade is required based on these warrants.



**Figure 5-5 Warrants for turn treatments on New Illawarra Road right turn (design speed >100 km/h)**

\*Note - BAR = Rural basic right turn; BAL = Basic left turn; CHR = Channelised right turn; AUL = Auxiliary left turn; CHL = Channelised left turn; (s) = short

Source: Austroads Guide to Traffic Management – Part 6: Interchanges, Intersections and Crossing Management - Figure 3.25 (2020, page 56)

## 5.4 Parking

SUEZ has advised that parking of vehicles (notably on the weekends) occur along Little Forest Road, near the intersection with New Illawarra Road. This is associated with bicycle use on the nearby bike tracks. This unrestricted parking is a potential safety issue. However, SUEZ has advised that Sutherland Shire Council has plans to provide dedicated car parking facility for the bike tracks, which is expected to mitigate this issue.

## 6. Summary and conclusion

### 6.1 Summary of key findings

The following are a summary of key findings:

#### 6.1.1 Crash assessment

A total of 51 crashes have occurred on New Illawarra Road between Bangor Bypass and Little Forest Road in five year period (2015-2019). A large proportion of these crashes (53 percent) were rear end crashes. Sixteen crashes occurred at Bangor Bypass and New Illawarra Road intersection and twenty-three occurred on New Illawarra Road.

A total of three crashes occurred at New Illawarra and Little Forest Road intersection providing access to the subject site. One of the crashes was off carriageway left on right bend crash which involved serious injury.

#### 6.1.2 Sight distance

An assessment of intersection sight distance has been undertaken for the intersection of Little Forest Road / New Illawarra Road to determine whether there is adequate longitudinal sight distance at the intersection to allow drivers approaching and exiting the intersection have sufficient sight distance to avoid potential conflicts.

The measured sight distance based on google street view imagery indicates that the minimum sight distance requirement for the east and west approaches at New Illawarra Road have been met. However, trees and vegetation could potentially restrict the visibility of vehicles approaching and exiting the intersection. Maintenance of such obstructions should be monitored.

#### 6.1.3 Intersection warrant assessment

The recommended intersection treatment for Little Forest Road and New Illawarra intersection was identified in reference to Austroads *Guide to Traffic Management – Part 6: Interchanges, Intersections and Crossing Management (2020)*. The assessment has been undertaken based on existing traffic volumes outlined in Section 3. The Major Road Traffic Volume ( $Q_M$ ) for right turn and left turn movements at New Illawarra Road was found to be 1,901 vehicles and 1,004 vehicles respectively during the AM peak (worst case). The warrant indicates that based on the existing traffic volume, CHR and AUL or CHL turn treatment is appropriate for this intersection. The existing intersection layout has CHR and AUL treatments, thus no proposed upgrade is required.

#### 6.1.4 Traffic assessment

Base 2020 traffic models were developed using the AM and PM peak hour survey data. Existing traffic flows at Little Forest Road and New Illawarra Road intersection was analysed using SIDRA 8 to obtain the current operation of the intersection.

The base SIDRA modelling results indicate that the intersection performs with a satisfactory level of service (LoS C) during AM peak with a maximum delay of 43 seconds for the worst turn movement (right turn from Little Forest Road onto New Illawarra Highway). The SIDRA result indicates a maximum of 8 m queue at the intersection, which is similar to site survey videos. During the PM peak, the intersection has acceptable delays (LoS B) with a maximum queue of 2 m and a maximum average delay of 18 seconds.

Future traffic growth was estimated for 2025, allowing five year future growth. An assumed annual linear growth rate of one percent per annum was applied to movements along New Illawarra Road and Little Forest Road. The results indicate that the longest delays occur at Little Forest Road right turn movement during AM peak hour with an average delay of 54 seconds. As a result of this delay, the intersection is expected to perform at near capacity (LoS D) during AM peak hour, however the remaining turn movements remain within an acceptable level of service. A maximum of one vehicle queue (11 m) was observed during AM peak hour while 2 m long queues were observed during PM peak.

During PM peak hour the longest delays are expected to occur at Little Forest Road left turn movement with an average delay of 20 seconds. The intersection is expected to have an acceptable performance (LoS B) during PM peak hour.

Based on these results, the intersection is expected to perform well within the acceptable capacity at the year 2025 during AM and PM. Therefore, no intersection upgrade is recommended.

## **6.2 Conclusion**

In conclusion, the intersection of New Illawarra Road / Little Forest Road, under the existing condition and future condition year 2025, are within acceptable operational capacity limits. It is recommended that an intersection capacity assessment to be undertaken at year 2025. The safety assessment of intersection has given consideration to the recorded crash history of three crashes in the past five years (which is considered low occurrence), intersection sight distance requirements (which are in alignment with design guidelines) and intersection treatment warrants (which currently align with design guidelines).

Based on traffic and safety assessment outlined in this report, no future upgrade of intersection is required.

# Appendices



## **Appendix A** - SIDRA Results

# MOVEMENT SUMMARY

Site: 1 [Base\_2020\_AM\_New Illawarra Road and Little Forest Road - Stage 1]

Network: N101  
[Base\_2020\_AM\_New Illawarra Road and Little Forest Road]

Base\_2020\_AM\_New Illawarra Road and Little Forest Road - Stage 1  
Site Category: Base\_2020\_AM  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
East: New Illawarra Road (East)														
8	T1	909	8.0	909	8.0	0.491	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		909	8.0	909	8.0	0.491	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.7
NorthEast: New Illawarra Road right turn exit lane														
32a	R1	22	85.7	22	85.7	0.017	1.5	LOS A	0.0	0.0	0.00	0.46	0.00	34.8
Approach		22	85.7	22	85.7	0.017	1.5	NA	0.0	0.0	0.00	0.46	0.00	34.8
All Vehicles		932	9.8	932	9.8	0.491	0.1	NA	0.0	0.0	0.00	0.01	0.00	78.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

Site: 2 [Base\_2020\_AM\_New Illawarra Road and Little Forest Road - Stage 2]

Network: N101  
[Base\_2020\_AM\_New Illawarra Road and Little Forest Road]

Base\_2020\_AM\_New Illawarra Road and Little Forest Road - Stage 2  
Site Category: Base\_2020\_AM  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
East: New Illawarra Road (East)														
12	R2	27	57.7	27	57.7	0.136	26.2	LOS B	0.5	4.8	0.87	0.95	0.87	31.2
Approach		27	57.7	27	57.7	0.136	26.2	NA	0.5	4.8	0.87	0.95	0.87	31.2
North: Little Forest Road														
1	L2	17	62.5	17	62.5	0.048	11.9	LOS A	0.1	1.4	0.75	0.86	0.75	33.1
3a	R1	22	85.7	22	85.7	0.216	41.0	LOS C	0.7	8.3	0.92	0.97	0.98	21.3
Approach		39	75.7	39	75.7	0.216	28.4	LOS B	0.7	8.3	0.85	0.92	0.88	26.0
West: New Illawarra Road (West)														
4	L2	35	69.7	35	69.7	0.028	8.2	LOS A	0.0	0.0	0.00	0.63	0.00	47.8
8	T1	1057	6.4	1057	6.4	0.564	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.6
Approach		1092	8.4	1092	8.4	0.564	0.4	NA	0.0	0.0	0.00	0.02	0.00	77.2
All Vehicles		1158	11.8	1158	11.8	0.564	1.9	NA	0.7	8.3	0.05	0.07	0.05	70.8

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

# MOVEMENT SUMMARY

Site: 1 [Base\_2020\_PM\_New Illawarra Road and Little Forest Road - Stage 1]

Network: N101  
[Base\_2020\_PM\_New Illawarra Road and Little Forest Road]

Base\_2020\_PM\_New Illawarra Road and Little Forest Road - Stage 1  
Site Category: Base\_2020\_PM  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
East: New Illawarra Road (East)														
8	T1	1356	4.5	1356	4.5	0.716	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	79.3
Approach		1356	4.5	1356	4.5	0.716	0.2	NA	0.0	0.0	0.00	0.00	0.00	79.3
NorthEast: New Illawarra Road right turn exit lane														
32a	R1	15	7.1	15	7.1	0.008	1.5	LOS A	0.0	0.0	0.00	0.45	0.00	61.3
Approach		15	7.1	15	7.1	0.008	1.5	NA	0.0	0.0	0.00	0.45	0.00	61.3
All Vehicles		1371	4.5	1371	4.5	0.716	0.2	NA	0.0	0.0	0.00	0.00	0.00	79.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

Site: 2 [Base\_2020\_PM\_New Illawarra Road and Little Forest Road - Stage 2]

Network: N101  
[Base\_2020\_PM\_New Illawarra Road and Little Forest Road]

Base\_2020\_PM\_New Illawarra Road and Little Forest Road - Stage 2  
Site Category: Base\_2020\_PM  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
East: New Illawarra Road (East)														
12	R2	6	0.0	6	0.0	0.012	12.8	LOS A	0.0	0.3	0.70	0.78	0.70	37.6
Approach		6	0.0	6	0.0	0.012	12.8	NA	0.0	0.3	0.70	0.78	0.70	37.6
North: Little Forest Road														
1	L2	15	14.3	15	14.3	0.066	18.0	LOS B	0.2	1.6	0.81	0.90	0.81	31.9
3a	R1	15	7.1	15	7.1	0.040	11.0	LOS A	0.1	1.0	0.74	0.83	0.74	32.3
Approach		29	10.7	29	10.7	0.066	14.5	LOS B	0.2	1.6	0.78	0.87	0.78	32.1
West: New Illawarra Road (West)														
4	L2	8	12.5	8	12.5	0.005	7.2	LOS A	0.0	0.0	0.00	0.63	0.00	61.4
8	T1	944	4.8	944	4.8	0.499	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		953	4.9	953	4.9	0.499	0.1	NA	0.0	0.0	0.00	0.01	0.00	79.4
All Vehicles		988	5.0	988	5.0	0.499	0.7	NA	0.2	1.6	0.03	0.04	0.03	75.9

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

# MOVEMENT SUMMARY

Site: 1 [Future\_2025\_AM\_New Illawarra Road and Little Forest Road - Stage 1]

Network: N101  
[Future\_2025\_AM\_New Illawarra Road and Little Forest Road]

Future\_2025\_AM\_New Illawarra Road and Little Forest Road - Stage 1  
Site Category: Future\_2025\_AM  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
East: New Illawarra Road (East)														
8	T1	957	8.0	957	8.0	0.516	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		957	8.0	957	8.0	0.516	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.7
NorthEast: New Illawarra Road right turn exit lane														
32a	R1	23	86.4	23	86.4	0.018	1.5	LOS A	0.0	0.0	0.00	0.46	0.00	34.6
Approach		23	86.4	23	86.4	0.018	1.5	NA	0.0	0.0	0.00	0.46	0.00	34.6
All Vehicles		980	9.9	980	9.9	0.516	0.1	NA	0.0	0.0	0.00	0.01	0.00	78.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

Site: 2 [Future\_2025\_AM\_New Illawarra Road and Little Forest Road - Stage 2]

Network: N101  
[Future\_2025\_AM\_New Illawarra Road and Little Forest Road]

Future\_2025\_AM\_New Illawarra Road and Little Forest Road - Stage 2  
Site Category: Future\_2025\_AM  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
East: New Illawarra Road (East)														
12	R2	29	57.1	29	57.1	0.172	30.0	LOS C	0.6	6.0	0.90	0.96	0.91	29.8
Approach		29	57.1	29	57.1	0.172	30.0	NA	0.6	6.0	0.90	0.96	0.91	29.8
North: Little Forest Road														
1	L2	18	64.7	18	64.7	0.059	13.5	LOS A	0.2	1.8	0.79	0.88	0.79	32.4
3a	R1	23	86.4	23	86.4	0.275	52.0	LOS D	0.9	10.6	0.94	1.00	1.03	18.9
Approach		41	76.9	41	76.9	0.275	35.2	LOS C	0.9	10.6	0.87	0.95	0.93	24.0
West: New Illawarra Road (West)														
4	L2	37	68.6	37	68.6	0.030	8.2	LOS A	0.0	0.0	0.00	0.63	0.00	48.0
8	T1	1111	6.4	1111	6.4	0.593	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.6
Approach		1147	8.3	1147	8.3	0.593	0.4	NA	0.0	0.0	0.00	0.02	0.00	77.2
All Vehicles		1218	11.8	1218	11.8	0.593	2.3	NA	0.9	10.6	0.05	0.07	0.05	70.0

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



# MOVEMENT SUMMARY

Site: 1 [Future\_2025\_PM\_New Illawarra Road and Little Forest Road - Stage 1 ]

Network: N101  
[Future\_2025\_PM\_New Illawarra Road and Little Forest Road]

Future\_2025\_PM\_New Illawarra Road and Little Forest Road - Stage 1  
Site Category: Future\_2025\_PM  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
East: New Illawarra Road (East)														
8	T1	1425	4.5	1425	4.5	0.752	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	79.1
Approach		1425	4.5	1425	4.5	0.752	0.3	NA	0.0	0.0	0.00	0.00	0.00	79.1
NorthEast: New Illawarra Road right turn exit lane														
32a	R1	16	6.7	16	6.7	0.008	1.5	LOS A	0.0	0.0	0.00	0.45	0.00	61.6
Approach		16	6.7	16	6.7	0.008	1.5	NA	0.0	0.0	0.00	0.45	0.00	61.6
All Vehicles		1441	4.5	1441	4.5	0.752	0.3	NA	0.0	0.0	0.00	0.00	0.00	79.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: GHD SERVICES PTY LTD | Processed: Thursday, 19 November 2020 2:08:54 PM

Project: \\ghdnet\ghd\AU\Sydney\Projects\21\12534605\Tech\Design\Traffic\SIDRA Modelling\Base 2020 & Future 2025 SIDRA V3.sip8

## MOVEMENT SUMMARY

Site: 2 [Future\_2025\_PM\_New Illawarra Road and Little Forest Road - Stage 2]

Network: N101  
[Future\_2025\_PM\_New Illawarra Road and Little Forest Road]

Future\_2025\_PM\_New Illawarra Road and Little Forest Road - Stage 2  
Site Category: Future\_2025\_PM  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows		Arrival Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Back of Queue Distance	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total veh/h	HV %	Total veh/h	HV %	v/c	sec		veh	m				km/h
East: New Illawarra Road (East)														
12	R2	6	0.0	6	0.0	0.013	13.5	LOS A	0.0	0.3	0.73	0.80	0.73	37.2
Approach		6	0.0	6	0.0	0.013	13.5	NA	0.0	0.3	0.73	0.80	0.73	37.2
North: Little Forest Road														
1	L2	16	13.3	16	13.3	0.081	20.3	LOS B	0.2	1.9	0.84	0.91	0.84	31.1
3a	R1	16	6.7	16	6.7	0.047	12.1	LOS A	0.2	1.2	0.77	0.85	0.77	31.7
Approach		32	10.0	32	10.0	0.081	16.2	LOS B	0.2	1.9	0.80	0.88	0.80	31.3
West: New Illawarra Road (West)														
4	L2	8	12.5	8	12.5	0.005	7.2	LOS A	0.0	0.0	0.00	0.63	0.00	61.4
8	T1	993	4.8	993	4.8	0.525	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		1001	4.8	1001	4.8	0.525	0.2	NA	0.0	0.0	0.00	0.01	0.00	79.4
All Vehicles		1039	5.0	1039	5.0	0.525	0.7	NA	0.2	1.9	0.03	0.04	0.03	75.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

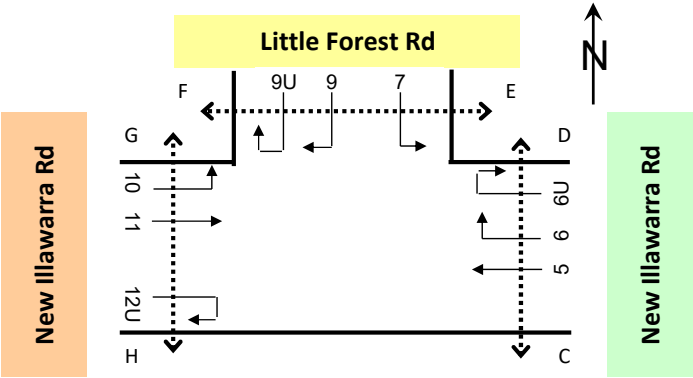
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

## **Appendix B** - Traffic Survey data 2020

Job No. : N6006  
Client : GHD  
Suburb : Lucas Heights  
Location : 1. Little Forest Rd / New Illawarra Rd

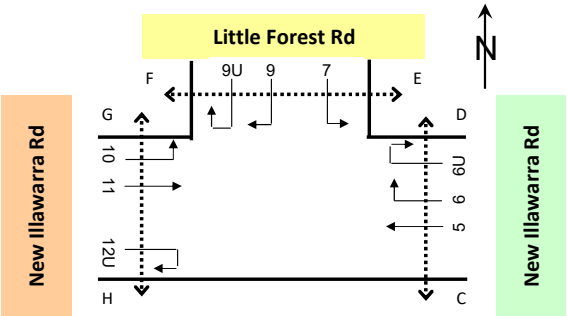
Day/Date : Thursday, 22nd Octoer 2020  
Weather : Fine  
Description : Classified Intersection Count  
: Peak Hour Summary



Approach		New Illawarra Rd					Little Forest Rd					New Illawarra Rd					Grand Total
Time Period		Cars	Rigid	Articulat	Buses	Total	Cars	Rigid	Articulat	Buses	Total	Cars	Rigid	Articulat	Buses	Total	
AM 7:15 to 8:15		806	63	14	9	892	9	23	7	0	39	950	69	13	5	1,037	
PM 16:00 to 17:00		1,239	50	6	2	1,297	25	3	0	0	28	861	36	2	6	905	

Approach		New Illawarra Rd					Little Forest Rd					New Illawarra Rd					Grand Total
Time Period		Cars	Rigid	Articulat	Buses	Total	Cars	Rigid	Articulat	Buses	Total	Cars	Rigid	Articulat	Buses	Total	
6:00 to 7:00		771	67	7	0	845	16	15	4	0	35	895	75	11	0	981	
6:15 to 7:15		820	63	4	0	887	18	16	3	0	37	909	76	12	0	997	
6:30 to 7:30		798	54	9	1	862	17	20	1	0	38	915	78	14	0	1,007	
6:45 to 7:45		838	47	10	5	900	13	15	1	0	29	908	69	13	1	991	
7:00 to 8:00		850	51	11	7	919	9	21	5	0	35	913	70	8	3	994	
7:15 to 8:15		806	63	14	9	892	9	23	7	0	39	950	69	13	5	1,037	
7:30 to 8:30		799	76	11	8	894	10	26	8	0	44	920	67	10	6	1,003	
7:45 to 8:45		750	81	9	5	845	9	31	10	0	50	894	56	12	7	969	
8:00 to 9:00		696	82	7	7	792	11	33	7	0	51	825	53	16	5	899	
AM Totals		2,317	200	25	14	2,556	36	69	16	0	121	2,633	198	35	8	2,874	
15:00 to 16:00		1,030	60	5	5	1,100	36	11	1	0	48	748	30	5	2	785	
15:15 to 16:15		1,105	44	5	4	1,158	40	8	0	0	48	811	29	2	2	844	
15:30 to 16:30		1,164	43	5	2	1,214	38	7	0	0	45	830	31	2	6	869	
15:45 to 16:45		1,195	45	7	3	1,250	30	6	0	0	36	849	33	2	7	891	
16:00 to 17:00		1,239	50	6	2	1,297	25	3	0	0	28	861	36	2	6	905	
16:15 to 17:15		1,244	50	5	2	1,301	28	2	0	0	30	850	29	5	5	889	
16:30 to 17:30		1,230	49	4	2	1,285	23	0	0	0	23	874	28	4	1	907	
16:45 to 17:45		1,230	40	4	1	1,275	20	0	0	0	20	871	21	3	0	895	
17:00 to 18:00		1,196	33	7	0	1,236	21	0	0	0	21	818	17	3	0	838	
PM Totals		3,465	143	18	7	3,633	82	14	1	0	97	2,427	83	10	8	2,528	

Job No. : N6006  
Client : GHD  
Suburb : Lucas Heights  
Location : 1. Little Forest Rd / New Illawarra Rd  
  
Day/Date : Thursday, 22nd October 2020  
Weather : Fine  
Description : Classified Intersection Count  
: 15 mins Data



	Class 1	Class 2	Class 3	Class 4	Ped Class 1	Ped Class 2
Classifications	Cars	Rigid	Articulated	Buses	Peds	Cyclists

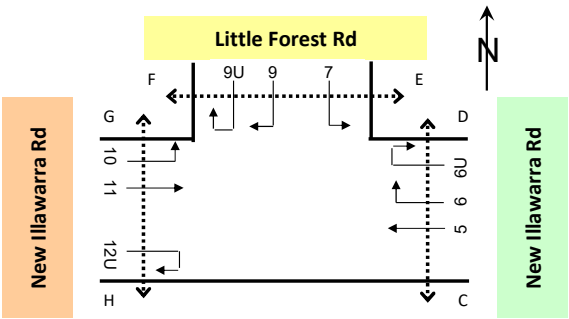
Approach	Direction	Time Period	New Illawarra Rd														
			Direction 5 (Through)					Direction 6 (Right Turn)					Direction 6U (U Turn)				
			Cars	Rigid	Articulated	Buses	Total	Cars	Rigid	Articulated	Buses	Total	Cars	Rigid	Articulated	Buses	Total
Approach 1	Direction 1	6:00 to 6:15	158	9	3	0	170	2	2	2	0	6	0	0	0	0	0
		6:15 to 6:30	216	15	0	0	231	2	4	0	0	6	1	0	0	0	1
		6:30 to 6:45	188	19	1	0	208	5	3	0	0	8	0	0	0	0	0
		6:45 to 7:00	197	12	1	0	210	2	3	0	0	5	0	0	0	0	0
		7:00 to 7:15	209	6	2	0	217	0	1	0	0	1	0	0	0	0	0
		7:15 to 7:30	195	10	1	1	207	2	0	4	0	6	0	0	0	0	0
		7:30 to 7:45	229	13	0	4	246	4	2	2	0	8	0	0	0	0	0
		7:45 to 8:00	209	16	2	2	229	2	3	0	0	5	0	0	0	0	0
		8:00 to 8:15	162	16	4	2	184	3	3	1	0	7	0	0	0	0	0
		8:15 to 8:30	190	17	1	0	208	0	6	1	0	7	0	0	0	0	0
		8:30 to 8:45	178	13	0	1	192	6	7	0	0	13	0	0	0	0	0
		8:45 to 9:00	154	17	0	4	175	3	3	0	0	6	0	0	0	0	0
		AM Totals	2,285	163	15	14	2,477	31	37	10	0	78	1	0	0	0	1
		15:00 to 15:15	236	25	3	1	265	7	1	0	0	8	0	0	0	0	0
		15:15 to 15:30	239	11	1	2	253	9	2	0	0	11	1	0	0	0	1
		15:30 to 15:45	261	11	0	0	272	6	1	0	0	7	0	0	0	0	0
Approach 2	Direction 2	15:45 to 16:00	266	8	1	2	277	4	1	0	0	5	1	0	0	0	1
		16:00 to 16:15	317	10	3	0	330	0	0	0	0	0	1	0	0	0	1
		16:15 to 16:30	306	12	1	0	319	2	0	0	0	2	0	0	0	0	0
		16:30 to 16:45	295	14	2	1	312	3	0	0	0	3	0	0	0	0	0
		16:45 to 17:00	312	14	0	1	327	1	0	0	0	1	2	0	0	0	2
		17:00 to 17:15	322	10	2	0	334	1	0	0	0	1	0	0	0	0	0
		17:15 to 17:30	293	11	0	0	304	0	0	0	0	0	1	0	0	0	1
		17:30 to 17:45	297	5	2	0	304	1	0	0	0	1	0	0	0	0	0
		17:45 to 18:00	281	7	3	0	291	0	0	0	0	0	0	0	0	0	0
		PM Totals	3,425	138	18	7	3,588	34	5	0	0	39	6	0	0	0	6

Approach	Little Forest Rd										New Illawarra Rd																					
Direction	Direction 7 (Left Turn)						Direction 9 (Right Turn)					Direction 9U (U Turn)					Direction 10 (Left Turn)					Direction 11 (Through)						Direction 12U (U Turn)				
Time Period	Cars	Rigid	Articulat	Buses	Total		Cars	Rigid	Articulat	Buses	Total	Cars	Rigid	Articulat	Buses	Total	Cars	Rigid	Articulat	Buses	Total	Cars	Rigid	Articulat	Buses	Total		Cars	Rigid	Articulat	Buses	Total
6:00 to 6:15	2	1	1	0	4		0	1	0	0	0	6	2	0	0	8	182	13	1	0	196	0	0	0	0	0		0	0	0	0	0
6:15 to 6:30	2	1	2	0	5		0	1	1	0	2	6	2	0	0	8	221	10	2	0	233	0	0	0	0	0		0	0	0	0	0
6:30 to 6:45	4	6	0	0	10		1	2	0	0	3	6	1	0	0	7	239	27	2	0	268	0	0	0	0	0		0	0	0	0	0
6:45 to 7:00	7	2	0	0	9		0	1	0	0	1	2	2	2	0	6	233	18	4	0	255	0	0	0	0	0		0	0	0	0	0
7:00 to 7:15	3	1	0	0	4		1	2	0	0	3	1	2	0	0	3	201	14	2	0	217	0	0	0	0	0		0	0	0	0	0
7:15 to 7:30	1	3	1	0	5		0	3	0	0	3	2	3	1	0	6	231	11	3	0	245	0	0	0	0	0		0	0	0	0	0
7:30 to 7:45	0	1	0	0	1		1	2	0	0	3	2	7	0	0	9	236	12	1	1	250	0	0	0	0	0		0	0	0	0	0
7:45 to 8:00	2	1	4	0	7		1	8	0	0	9	5	5	1	0	11	235	16	0	2	253	0	0	0	0	0		0	0	0	0	0
8:00 to 8:15	3	1	1	0	5		1	4	1	0	6	1	5	1	0	7	238	10	6	2	256	0	0	0	0	0		0	0	0	0	0
8:15 to 8:30	2	4	1	0	7		0	5	1	0	6	2	3	1	0	6	201	9	0	1	211	0	0	0	0	0		0	0	0	0	0
8:30 to 8:45	0	3	0	0	3		0	5	2	0	7	4	3	1	0	8	208	5	2	2	217	0	0	0	0	0		0	0	0	0	0
8:45 to 9:00	2	6	0	0	8		3	5	1	0	9	2	3	3	0	8	169	15	2	0	186	0	0	0	0	0		0	0	0	0	0
AM Totals	28	30	10	0	68		8	39	6	0	53	39	38	10	0	87	2,594	160	25	8	2,787	0	0	0	0	0		0	0	0	0	0
15:00 to 15:15	2	3	0	0	5		1	1	1	0	3	1	0	0	0	1	142	10	3	1	156	0	0	0	0	0		0	0	0	0	0
15:15 to 15:30	2	3	0	0	5		9	0	0	0	9	1	0	0	0	1	185	7	1	0	193	0	0	0	0	0		0	0	0	0	0
15:30 to 15:45	6	1	0	0	7		9	0	0	0	9	2	0	0	0	2	192	9	1	0	202	0	0	0	0	0		0	0	0	0	0
15:45 to 16:00	5	1	0	0	6		2	2	0	0	4	1	0	0	0	1	224	4	0	1	229	0	0	0	0	0		0	0	0	0	0
16:00 to 16:15	2	1	0	0	3		5	0	0	0	5	2	0	0	0	2	204	9	0	1	214	0	0	0	0	0		0	0	0	0	0
16:15 to 16:30	4	1	0	0	5		5	1	0	0	6	1	1	0	0	2	204	8	1	4	217	0	0	0	0	0		0	0	0	0	0
16:30 to 16:45	4	0	0	0	4		3	0	0	0	3	1	0	0	0	1	212	11	1	1	225	0	0	0	0	0		0	0	0	0	0
16:45 to 17:00	2	0	0	0	2		0	0	0	0	0	3	0	0	0	3	234	7	0	0	241	0	0	0	0	0		0	0	0	0	0
17:00 to 17:15	7	0	0	0	7		3	0	0	0	3	2	0	0	0	2	193	2	3	0	198	0	0	0	0	0		0	0	0	0	0
17:15 to 17:30	3	0	0	0	3		1	0	0	0	1	0	0	0	0	0	229	8	0	0	237	0	0	0	0	0		0	0	0	0	0
17:30 to 17:45	1	0	0	0	1		3	0	0	0	3	0	0	0	0	0	210	4	0	0	214	0	0	0	0	0		0	0	0	0	0
17:45 to 18:00	1	0	0	0	1		2	0	0	0	2	0	0	0	0	0	184	3	0	0	187	0	0	0	0	0		0	0	0	0	0
PM Totals	39	10	0	0	49		43	4	1	0	48	14	1	0	0	15	2,413	82	10	8	2,513	0	0	0	0	0		0	0	0	0	0

Job No. : N6006  
Client : GHD  
Suburb : Lucas Heights  
Location : 1. Little Forest Rd / New Illawarra Rd

Day/Date : Thursday, 22nd October 2020  
Weather : Fine  
Description : Classified Intersection Count

: Hourly Summary

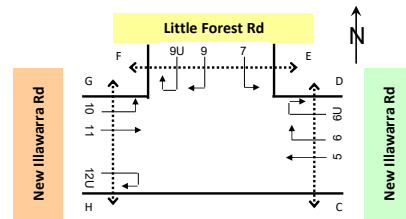


Approach	New Illawarra Rd														
Direction															
Time Period															
6:00 to 7:00	Direction 5 (Through)					Direction 6 (Right Turn)					Direction 6U (U Turn)				
6:15 to 7:15	Cars	Rigid	Articulat	Buses	Total	Cars	Rigid	Articulat	Buses	Total	Cars	Rigid	Articulat	Buses	Total
6:30 to 7:30	759	55	5	0	819	11	12	2	0	25	1	0	0	0	1
6:45 to 7:45	810	52	4	0	866	9	11	0	0	20	1	0	0	0	1
7:00 to 8:00	789	47	5	1	842	9	7	4	0	20	0	0	0	0	0
7:15 to 8:15	830	41	4	5	880	8	6	6	0	20	0	0	0	0	0
7:30 to 8:30	842	45	5	7	899	8	6	6	0	20	0	0	0	0	0
7:45 to 8:45	795	55	7	9	866	11	8	7	0	26	0	0	0	0	0
8:00 to 9:00	790	62	7	8	867	9	14	4	0	27	0	0	0	0	0
AM Totals	739	62	7	5	813	11	19	2	0	32	0	0	0	0	0
15:00 to 16:00	684	63	5	7	759	12	19	2	0	33	0	0	0	0	0
15:15 to 16:15	2,285	163	15	14	2,477	31	37	10	0	78	1	0	0	0	1
15:30 to 16:30	1,002	55	5	5	1,067	26	5	0	0	31	2	0	0	0	2
15:45 to 16:45	1,083	40	5	4	1,132	19	4	0	0	23	3	0	0	0	3
16:00 to 17:00	1,150	41	5	2	1,198	12	2	0	0	14	2	0	0	0	2
16:15 to 17:15	1,184	44	7	3	1,238	9	1	0	0	10	2	0	0	0	2
16:30 to 17:30	1,230	50	6	2	1,288	6	0	0	0	6	3	0	0	0	3
16:45 to 17:45	1,235	50	5	2	1,292	7	0	0	0	7	2	0	0	0	2
17:00 to 18:00	1,222	49	4	2	1,277	5	0	0	0	5	3	0	0	0	3
PM Totals	1,224	40	4	1	1,269	3	0	0	0	3	3	0	0	0	3
	1,193	33	7	0	1,233	2	0	0	0	2	1	0	0	0	1
	3,425	138	18	7	3,588	34	5	0	0	39	6	0	0	0	6



Approach	Little Forest Rd										New Illawarra Rd																					
Direction	Direction 7 (Left Turn)						Direction 9 (Right Turn)					Direction 9U (U Turn)					Direction 10 (Left Turn)					Direction 11 (Through)						Direction 12U (U Turn)				
Time Period	Cars	Rigid	Articulat	Buses	Total		Cars	Rigid	Articulat	Buses	Total	Cars	Rigid	Articulat	Buses	Total	Cars	Rigid	Articulat	Buses	Total	Cars	Rigid	Articulat	Buses	Total		Cars	Rigid	Articulat	Buses	Total
6:00 to 7:00	15	10	3	0	28		1	5	1	0	7	0	0	0	0	0	20	7	2	0	29	875	68	9	0	952		0	0	0	0	0
6:15 to 7:15	16	10	2	0	28		2	6	1	0	9	0	0	0	0	0	15	7	2	0	24	894	69	10	0	973		0	0	0	0	0
6:30 to 7:30	15	12	1	0	28		2	8	0	0	10	0	0	0	0	0	11	8	3	0	22	904	70	11	0	985		0	0	0	0	0
6:45 to 7:45	11	7	1	0	19		2	8	0	0	10	0	0	0	0	0	7	14	3	0	24	901	55	10	1	967		0	0	0	0	0
7:00 to 8:00	6	6	5	0	17		3	15	0	0	18	0	0	0	0	0	10	17	2	0	29	903	53	6	3	965		0	0	0	0	0
7:15 to 8:15	6	6	6	0	18		3	17	1	0	21	0	0	0	0	0	10	20	3	0	33	940	49	10	5	1,004		0	0	0	0	0
7:30 to 8:30	7	7	6	0	20		3	19	2	0	24	0	0	0	0	0	10	20	3	0	33	910	47	7	6	970		0	0	0	0	0
7:45 to 8:45	7	9	6	0	22		2	22	4	0	28	0	0	0	0	0	12	16	4	0	32	882	40	8	7	937		0	0	0	0	0
8:00 to 9:00	7	14	2	0	23		4	19	5	0	28	0	0	0	0	0	9	14	6	0	29	816	39	10	5	870		0	0	0	0	0
AM Totals	28	30	10	0	68		8	39	6	0	53	0	0	0	0	0	39	38	10	0	87	2,594	160	25	8	2,787		0	0	0	0	0
15:00 to 16:00	15	8	0	0	23		21	3	1	0	25	0	0	0	0	0	5	0	0	0	5	743	30	5	2	780		0	0	0	0	0
15:15 to 16:15	15	6	0	0	21		25	2	0	0	27	0	0	0	0	0	6	0	0	0	6	805	29	2	2	838		0	0	0	0	0
15:30 to 16:30	17	4	0	0	21		21	3	0	0	24	0	0	0	0	0	6	1	0	0	7	824	30	2	6	862		0	0	0	0	0
15:45 to 16:45	15	3	0	0	18		15	3	0	0	18	0	0	0	0	0	5	1	0	0	6	844	32	2	7	885		0	0	0	0	0
16:00 to 17:00	12	2	0	0	14		13	1	0	0	14	0	0	0	0	0	7	1	0	0	8	854	35	2	6	897		0	0	0	0	0
16:15 to 17:15	17	1	0	0	18		11	1	0	0	12	0	0	0	0	0	7	1	0	0	8	843	28	5	5	881		0	0	0	0	0
16:30 to 17:30	16	0	0	0	16		7	0	0	0	7	0	0	0	0	0	6	0	0	0	6	868	28	4	1	901		0	0	0	0	0
16:45 to 17:45	13	0	0	0	13		7	0	0	0	7	0	0	0	0	0	5	0	0	0	5	866	21	3	0	890		0	0	0	0	0
17:00 to 18:00	12	0	0	0	12		9	0	0	0	9	0	0	0	0	0	2	0	0	0	2	816	17	3	0	836		0	0	0	0	0
PM Totals	39	10	0	0	49		43	4	1	0	48	0	0	0	0	0	14	1	0	0	15	2,413	82	10	8	2,513		0	0	0	0	0

**Day/Date** : Thursday, 22nd October 2020  
**Weather** : Fine  
**Description** : Classified Intersection Count  
: Pedestrian Data

[illegible]

## **Appendix C** - Consultation

## Laura Yum

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**From:** Tanmila Islam <Tanmila.SAMIN.ISLAM@transport.nsw.gov.au>  
**Sent:** Tuesday, 15 December 2020 11:41 AM  
**To:** Laura Yum  
**Cc:** Brendan Pegg  
**Subject:** RE: SYD14/01464/09 - GO Facility Intersection Safety Review - Lucas Heights Resource Recovery Park - New Illawara Road, Lucas Heights - SSD 6835 MOD 1 (fA9360115)

Hi Laura,  
TfNSW have reviewed the submitted Intersection Safety Review and have noted it.

Regarding the sight distance assessment, a physical inspection would have been preferred over a desktop assessment. However, we understand that a contingency statement has been provided. And will not request further assessment.

We have no further comments or objections to this report.

Regards,

Tanmila Samin Islam  
Network & Safety Officer - South East Precinct Greater Sydney Division T 02 8849 2719 M 0419038859

-----Original Message-----

**From:** Brendan Pegg  
**Sent:** Monday, 7 December 2020 7:46 PM  
**To:** Tanmila Islam <Tanmila.SAMIN.ISLAM@transport.nsw.gov.au>  
**Subject:** SYD14/01464/09 - GO Facility Intersection Safety Review - Lucas Heights Resource Recovery Park - New Illawara Road, Lucas Heights - SSD 6835 MOD 1 (fA9360115)

Hi Tanmila,

Please find attached the CPTMP for your review and comment. Please send any comments back directly to the consultant.

Kind regards,

Brendan Pegg  
Senior Land Use Planner  
Planning and Programs  
Greater Sydney  
Transport for NSW

M 0427 983 135

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## Laura Yum

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**From:** Clayton Wills <CWills@ssc.nsw.gov.au>  
**Sent:** Monday, 18 January 2021 3:01 PM  
**To:** LC Chiang (InTouch)  
**Cc:** Greg Holding; Ian Drinnan  
**Subject:** RE: Intersection Safety Review - Little Forest Road and New Illawarra Road

Hi LC,

I have no further comments in relation to the report.

Regards

**SUTHERLANDSHIRE**



### Clayton Wills

Traffic Engineer | Traffic & Public Domain Services

T 9710 0132

[cwills@ssc.nsw.gov.au](mailto:cwills@ssc.nsw.gov.au)

[sutherlandshire.nsw.gov.au](https://sutherlandshire.nsw.gov.au)

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[39/https://projectsportal.ghd.com/sites/pp15\\_01/lucasheights2develop/ProjectDocs/12534605 - Lucas Heights 2 GO Facility - Construction Management Plans - Intersection Safety Review Draft V2.docx](https://projectsportal.ghd.com/sites/pp15_01/lucasheights2develop/ProjectDocs/12534605 - Lucas Heights 2 GO Facility - Construction Management Plans - Intersection Safety Review Draft V2.docx)

#### Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	E. Mia	S. Clarke	On file	David Gamble	On file	3/12/2020
1	E Mia	S Clarke	On file	Adrian Roberts	On file	18/01/2021

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