Appendix F. Transport and Traffic Impact Assessment

Vales Point Solar

Delta Electricity

Traffic and Transport Impact Assessment

IA155900_05 | Revision 1

13 December 2017

Vales Point Solar

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Project Manager:	Thomas Muddle
Author:	Stephen Read
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Jacobs Group (Australia) Pty Limited
ABN 37 001 024 095
Level 7, 177 Pacific Highway
North Sydney NSW 2060 Australia
PO Box 632 North Sydney
NSW 2059 Australia

T +61 2 9928 2100
F +61 2 9928 2500
www.jacobs.com

Document history and status

Revision	Date	Description	By	Review	Approved
0	9/8/ 2017	Draft Report for review	S.Read	I Smith	09/08/2017
1	12/12/ 2017	Report updated with cumulative impacts	S.Read	I Smith	13/12/2017

Contents

Glossary of terms and acronyms

Term / acronym	Meaning
AADT	Annual average daily traffic
ATC	Automatic Traffic Count
Delta	Sunset Power International Pty Ltd trading as Delta Electricity
DoS	Degree of saturation
DPE	NSW Department of Planning and Environment
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979
LEP	Local Environment Plan
LGA	Local Government Area
LoS	Level of service
PCU	Passenger car units
REF	Review of Environmental Factors
RMS	NSW Roads and Maritime Services
Roads and Maritime	NSW Roads and Maritime Services
Sidra Intersection	Intersection traffic modelling software
SEARs	Secretary's environmental assessment requirements
SSD	State Significant Development
TfNSW	Transport for NSW
VPH	Vehicles per hour

1. Introduction

Sunset Power International Pty Ltd trading as Delta Electricity (Delta) are seeking to develop a large scale solar photovoltaic generation facility and associated infrastructure in the local government areas (LGA) of Lake Macquarie City and the Central Coast (the project). The project would be located within the land holding of the existing Vales Point Power Station and specifically on the rehabilitated area of the Vales Point Ash Dam (VPAD) The project is a State significant development (SSD) under the *State Environmental Planning Policy (State and Regional Development) 2011*. As a SSD, an application for the project is required to be submitted under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979*. The NSW Minister for Planning (or the Minister's delegate) is the consent authority.

The project area covers approximately 80 hectares (Ha) of land. Key components of the project are:

- Construction and operation of up to 55 megawatt (MW) capacity solar facility delivering an annual output of approximately 110 gigawatt hours (GWh);
- Installation of approximately 220,000 solar panel modules supported by either steel piles or concrete ballasted footings;
- Installation of ancillary electrical control equipment and switchyard for distribution;
- Connection to the National Electricity Market (NEM) via a short 33 kV transmission line (mainly overhead with some underground cabling) to the Vales Point Zone Substation;
- Approximately 100 full time equivalent (FTE) jobs during a 12 to 18 month construction program; and
- An estimated 30 year design life with ongoing employment for up to five people.

1.1 Locality

The project is to be located on existing rehabilitated areas of the Vales Point Ash Dam (VPAD) associated with the operation of the Vales Point Power Station as shown in **Error! Reference source not found.**. The Ash Dam extends across the LGA boundary of Lake Macquarie City and Central Coast. The project site is entirely within the existing property boundary of the Vales Point Power Station. The proposed project would connect to the existing Ausgrid substation located on the corner of Ruttleys Road and Construction Road to the north of the ash dam site.

The Vales Point coal fired power station and Vales Point Ash Dam (VPAD) are located at the southern end of Lake Macquarie on the NSW Central Coast. The station is owned and operated by Delta and has an installed capacity of 1320 MW. The VPAD consists of a series of operational and closed landfill cells. The closed cells, or ponds, have been capped with soil and rehabilitated with grasses. The rehabilitated area is relatively flat and provides a substantial area for the construction of a utility scale solar field.

The VPAD is located in the southern section of the Vales Point Power Station property. The proposed project will be sited on the rehabilitated areas of the VPAD situated west of the Pacific Highway with a northern boundary at Ruttleys Road. To the east of the site is Mannering Bay which is a natural water body that flows into Lake Macquarie. The southern boundary of the VPAD is Wyee Road, at Doyalson.

Primary access to the project is proposed to use the existing VPAD access off Ruttleys Road, Mannering Park, which is located within the Central Coast Council (LGAs) and approximately 35 kilometres south of Newcastle (see Figure 1.1). A secondary existing access point is available directly off the Pacific Highway in Doyalson.

1.2 Report Scope

Jacobs has been commissioned by Delta Electricity to prepare a traffic and transport assessment for the proposed solar photovoltaic power generation facility at Vales Point. This report assesses the existing traffic and transport conditions, description of the proposed development and assessment of the impact of the development on the transport network.

Figure 1.1 | Site location

1.3 Report Structure

This report has the following structure:

- Section 2 Existing Conditions – Summarises the existing transport context of the site;
- Section 3 Proposal – Provides a description of the projects;
- Section 4 Traffic Impacts – Analysis of the impacts the development will have on the transport network; and
- Section 5 Conclusion – Summarises the findings of the study.

2. Existing Conditions

2.1 Existing development

The VPAD is an industrial site with light and heavy vehicle movements generated from various operational activities, including ongoing ash dam capping and rehabilitation works, trucks associated with the export of recycled ash products and power station staff generated traffic.

The ash dam capping and rehabilitation works include trucks delivering virgin excavated natural material (VENM) and excavated natural material (ENM) for the purpose of progressively covering the completed ash storage areas. Trucks enter at either the Ruttleys Road or Pacific Highway entrance, traverse the ash dam in a uniform direction and all vehicles exit the site via Ruttleys Road and return in an easterly direction to the Pacific Highway. Existing truck movements average 5 trucks per hour with a peak 10 trucks per hour.

Generally, trucks associated with the export of recycled ash products and light vehicles enter and exit the ash dam via Ruttleys Road to access the ash reclamation area and the ash dam administration building in the northern section of the ash dam. Truck movements for the export of ash products are irregular and typically average five trucks per day and the staff generated traffic is equivalent to eight full time employees.

It is also noted that the Lake Coal haulage route for the transportation of coal produced at the Chain Valley Bay Mine to the Port Waratah loader at Carrington East, via the M1 motorway, also utilises the section of Ruttleys Road from Construction Road in an easterly direction to the Pacific Highway. Lake Coal has approval for up to 270 trucks per day with loading hours between 5:30am-5:30pm and trucks on the road network until 6:30pm (a 13 hour operational day). This corresponds to an average of 21 trucks per hour with 32 trucks per peak hour (only 16 trucks per hour during peak traffic periods).

Delta has engaged with stakeholders on local traffic matters over many years through the community reference group (CARE Forum). The community have expressed a preference to minimise truck movements along Ruttleys Road where possible. This provides an incentive to maximise truck entry movements from the Pacific Highway although it is acknowledged that it may be more practical for some delivery trucks to enter the site via Ruttleys Road. It is proposed that regardless of the entry point, all trucks continue to exit the site via Ruttleys Road and return in an easterly direction to the Pacific Highway.

2.2 Road Network

The **Pacific Highway** is a state road with a sign posted speed limit of 80 km/h in the vicinity of the site. It is two lanes in each direction on a divided carriageway. The highway carries an Annual Average Daily Traffic (AADT) of approximately 14,000 vehicles per day and it is an approved road for 26m B-Double vehicles. The site is located west of the highway and has direct access from the highway via a left-in only intersection.

Ruttleys Road is a local collector road with generally one lane in each direction on an undivided carriageway. The road carries an AADT of approximately 6,000 vehicles per day. The sign posted speed limit of Ruttleys Road in the vicinity of the site is 80km/h. The site has a direct access from Ruttleys Road via a cross intersection. The section between Pacific Highway and approximately 400m north of the site's access on Ruttleys Road is a an approved B-double route for 26m B-Doubles.

2.3 Access

The site has existing access from Pacific Highway and Ruttleys Road as illustrated in Figure 2.1.

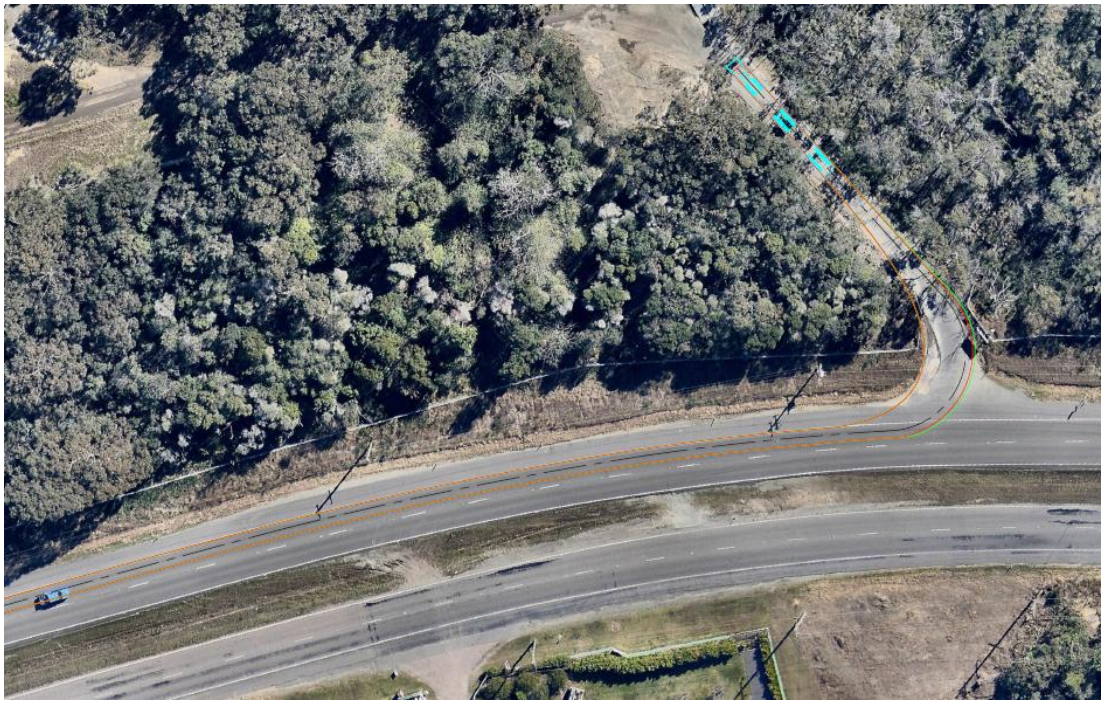
Figure 2.1 : Access Locations

All light and heavy vehicles leave the Ash Dam site via Ruttleys Road, where they either head west towards Wyee or south to the Pacific Highway and the traffic signal-controlled intersection. The VPAD entry and exit is via a single lane road that creates a pinch point between trucks exiting and entering the site. The current Ruttleys Road access arrangements are illustrated in Figure 2.2.

Figure 2.2 : Existing Ruttleys Road Access Arrangement

Access to the VPAD is available directly from the Pacific Highway via an existing in-only access located approximately450m west of the intersection with Ruttleys Road. No dedicated turn lane is currently provided and Heavy vehicles entering the site are currently required to turn out of the northbound travel lane. The current Pacific Highway access arrangement is illustrated in Figure 2.3.

Figure 2.3 : Existing Pacific Highway Access Arrangement

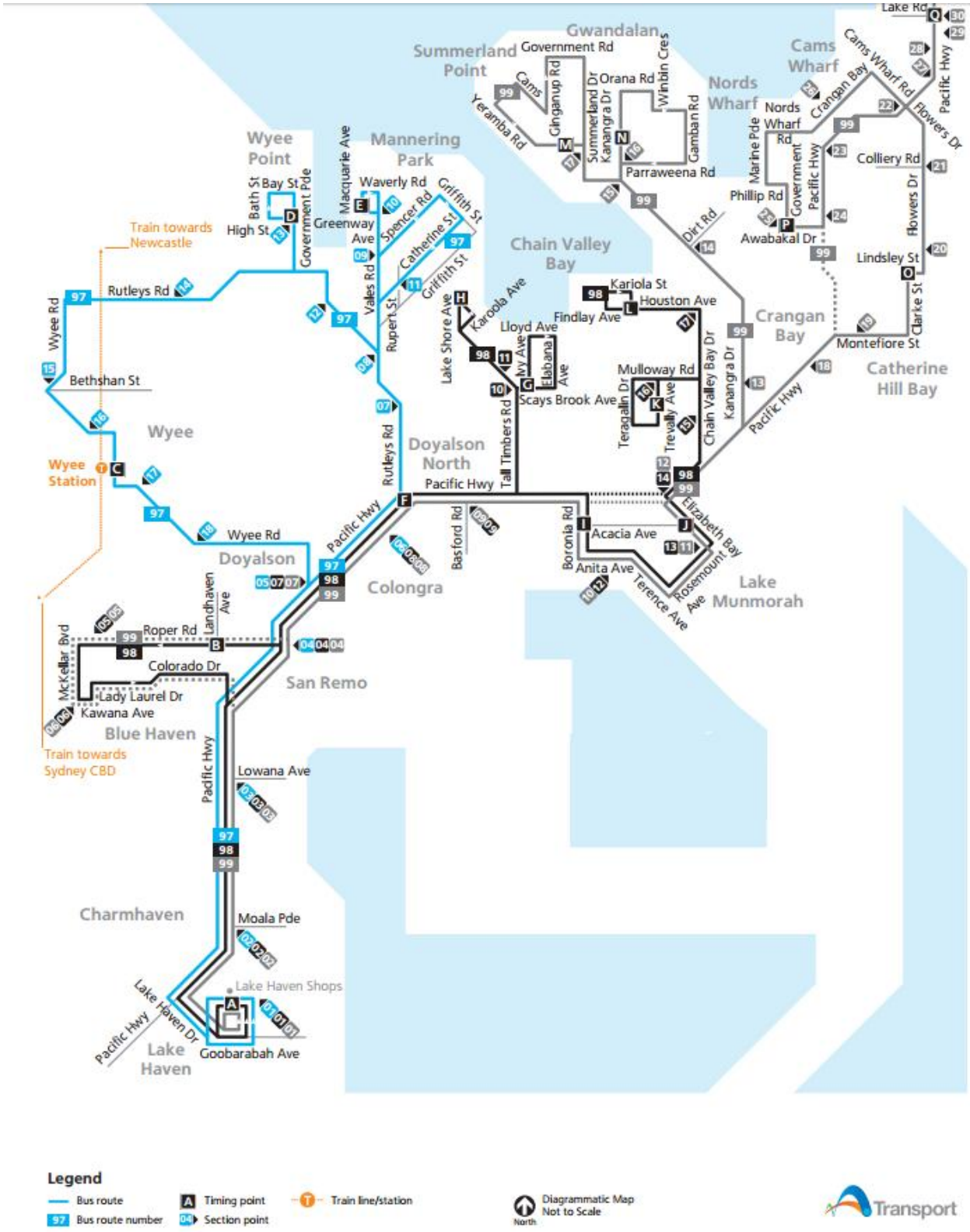


Source: Cardno

2.4 Existing Bus Routes

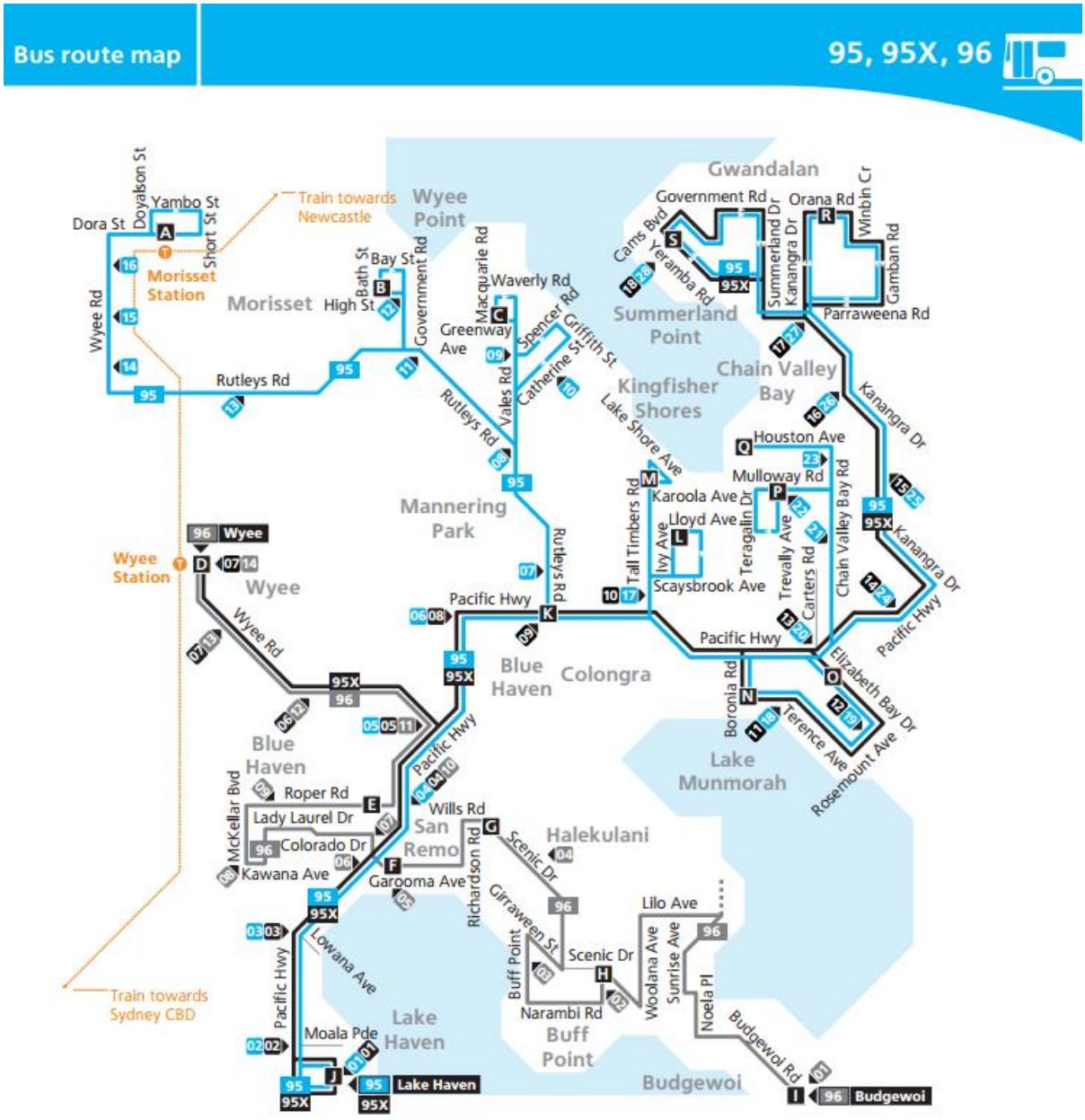
Bus routes 95, 95X, 97, 98 and 99 operate on the Pacific Highway in the vicinity of the site. The buses are operated by Busways and have 30 to 60 minute frequency during peak periods. Bus routes 95 and 97 operate along the Ruttleys Road corridor. There are bus stops located approximately 90m south of the site's access on Pacific Highway and approximately 45m south of the intersection of Ruttleys Road. Bus network maps are provided in and Figure 2.4 and 2.4.

Figure 2.4 : Bus maps - Routes 97, 98 and 99



Source: TfNSW (Busways), 2016

Figure 2.5 : Bus maps - Routes 95, 95X and 96



Source: TfNSW (Busways), 2016

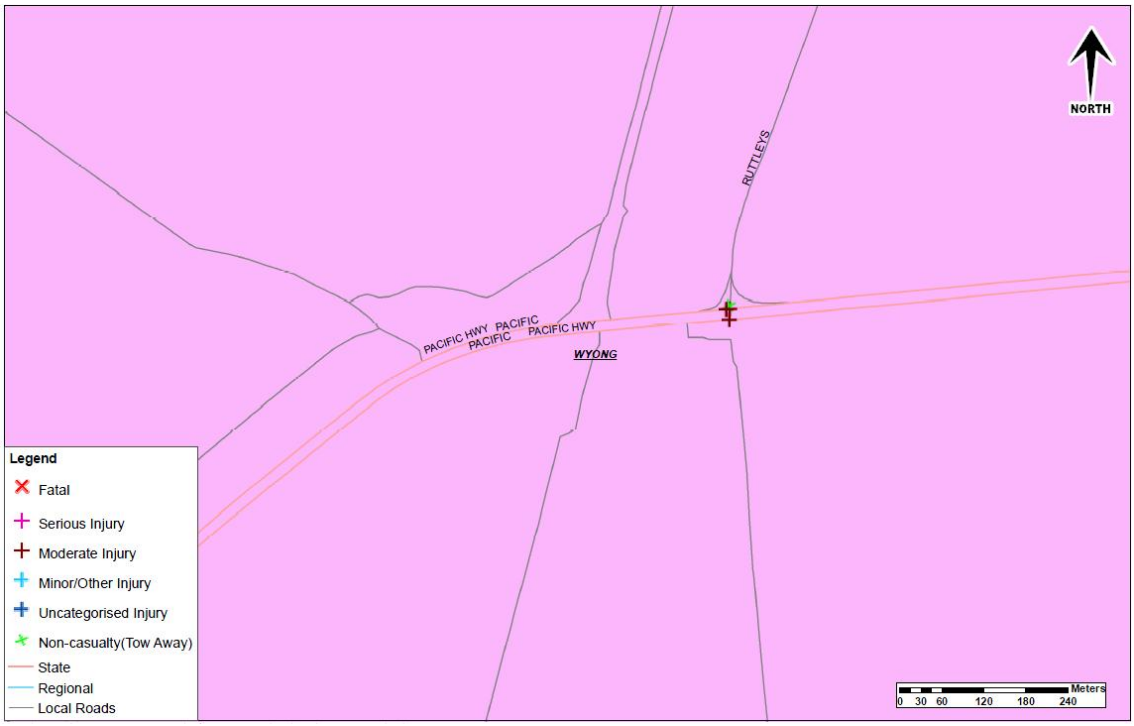
2.5 Road Safety Assessment

Crash analysis of the Pacific Highway and Ruttleys Road has been undertaken using Roads and Maritime's crash statistics data. The five year data covers January 2011 to December 2015. The data shows that:

- A total of four crashes (injury) occurred on the Pacific Highway near the intersection at Ruttleys Road. Of these, two of them were rear-end type crashes, one a right-turning related collision and one an off-carriageway type crash (see Figure 2.6); and
- On Ruttleys Road, there were a total of eight crashes, including one fatal crash and two injury crashes. The fatal crash occurred immediately north of the Ruttleys Road site access and was an 'off carriageway and hit an object' type crash. Of the crashes, 37.5% crashes were reported as speed related and 12.5% were related to fatigue (see Figure 2.7). None of the reported crashes were directly related to the ash dam egress intersection with Ruttleys Road.

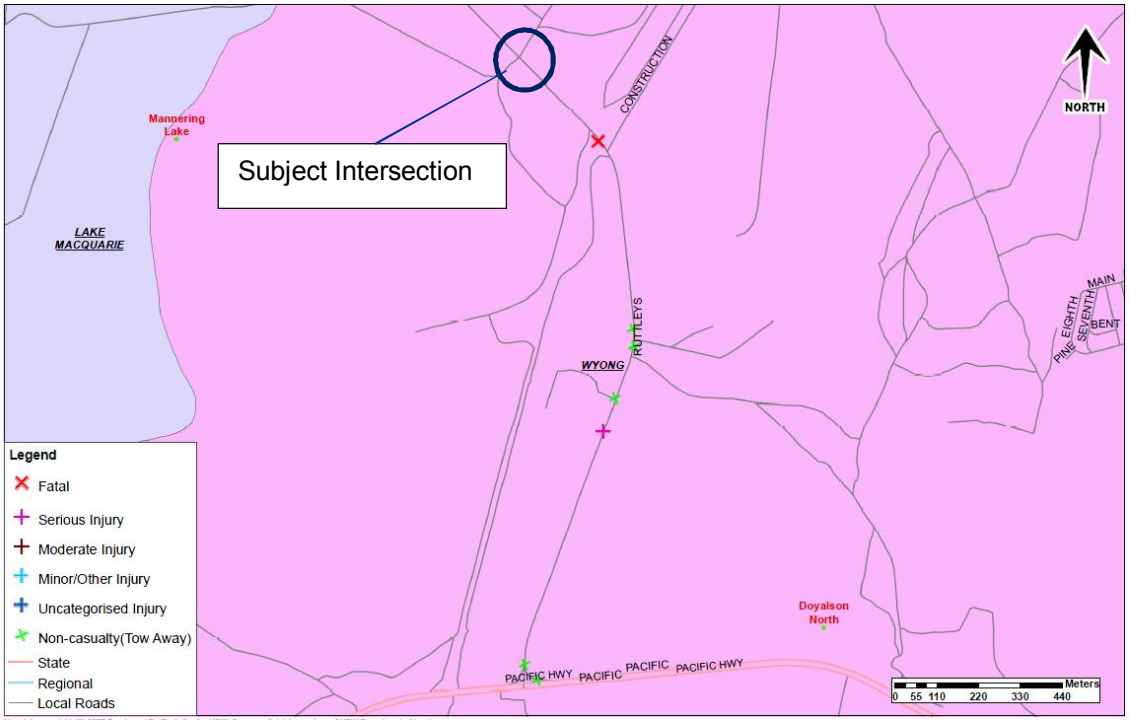
It has been noted from media reports that in addition the recorded fatality more recent fatal crashes have occurred on Ruttleys Road that are outside the database records ending December 2015. It has been reported in the Daily Telegraph December 2016 that there was a fatal crash in November 2016 and another crash in March 2016 on Ruttleys Road. The precise locations are uncertain.

Figure 2.6: Crashes on Pacific Highway near Ruttleys Road



Source: Roads and Maritimes, 2016

Figure 2.7: Crashes on Ruttleys Road, between Pacific Highway and north of site's access



Source: Roads and Maritimes, 2016

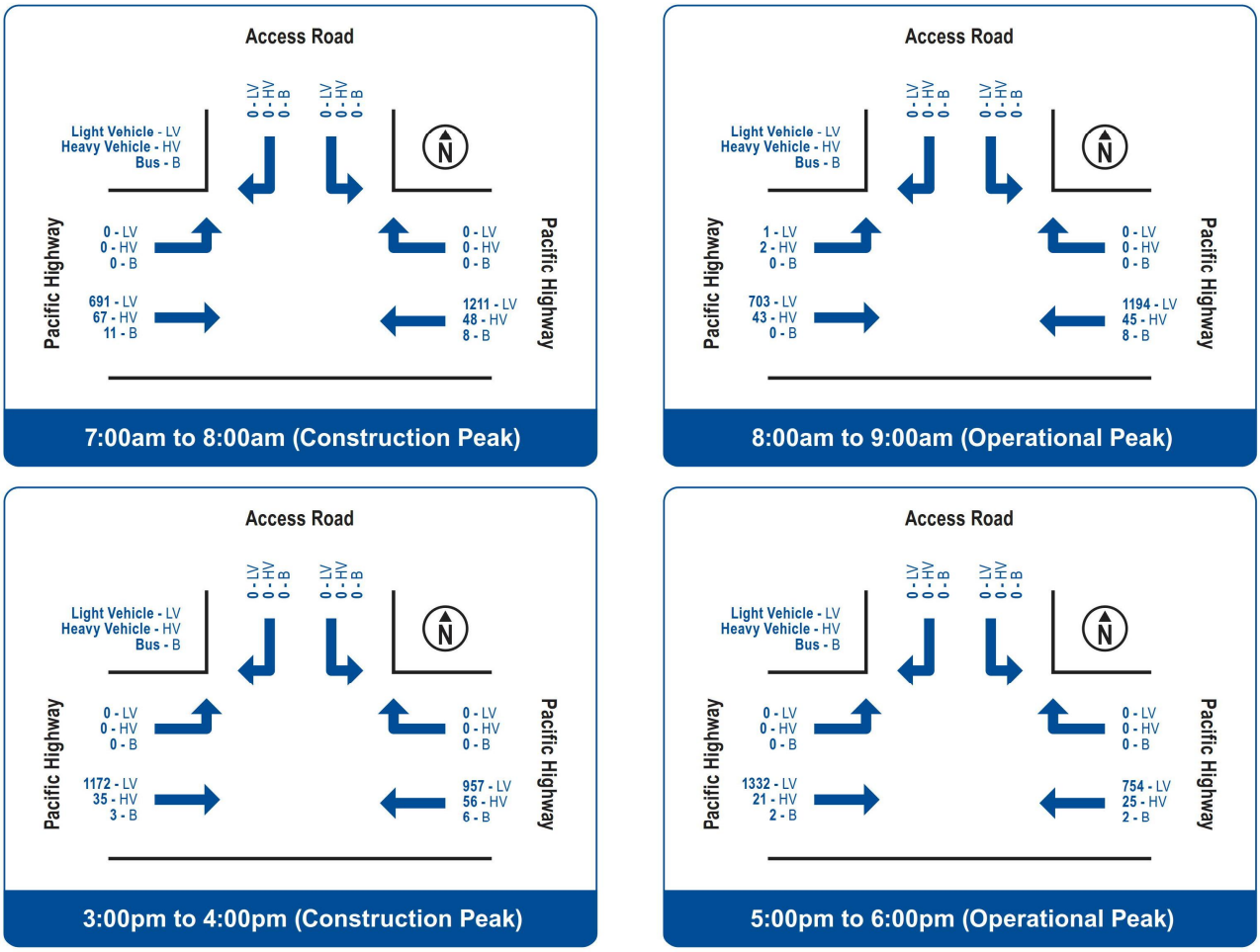
2.6 Traffic Volumes

Intersection counts were undertaken on 31 October 2016 at the following sites:

- Pacific Highway and access road;
- Ruttleys Road / Pacific Highway intersection; and
- Ruttleys Road access road intersection.

The counts covered a time period from 6:00am until 6:00pm. The traffic volumes for the key time periods being assessed are shown in Figure 2.7, Figure 2.9 and Figure 2.10. The figures show the traffic volumes to during the peak period for construction vehicles and the peak period for the site operation.

Figure 2.8 : Pacific Highway / Access Road



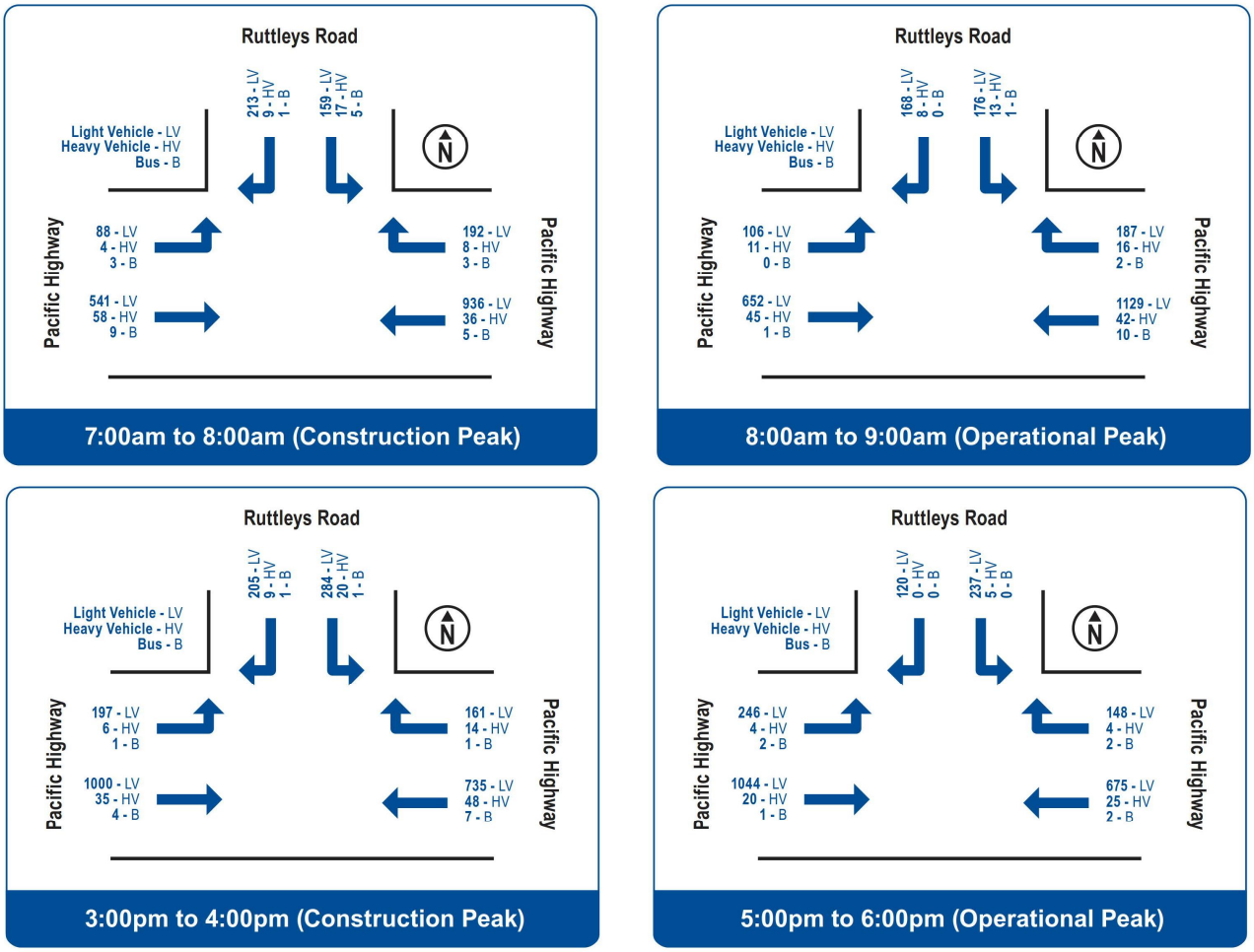
Source: Jacobs (using Matrix traffic counts, Oct 2016)

The survey indicates that the Pacific Highway, south-west of Ruttleys Road carries approximately:

- 800 veh/hr eastbound and 1300 veh/hr westbound during morning peak hour (7:00am – 8:00am); and
- 1350 veh/hr eastbound and 970 veh/hr westbound during the evening peak hour (4:00pm – 5:00pm).

Five percent of the vehicles are heavy vehicles. It is noted that no vehicles accessed the site via the Pacific Highway access during peak traffic periods but that they were recorded in the period from 9:00am until 10:30am.

Figure 2.9 : Existing traffic volume at Ruttleys Road / Pacific Highway intersection

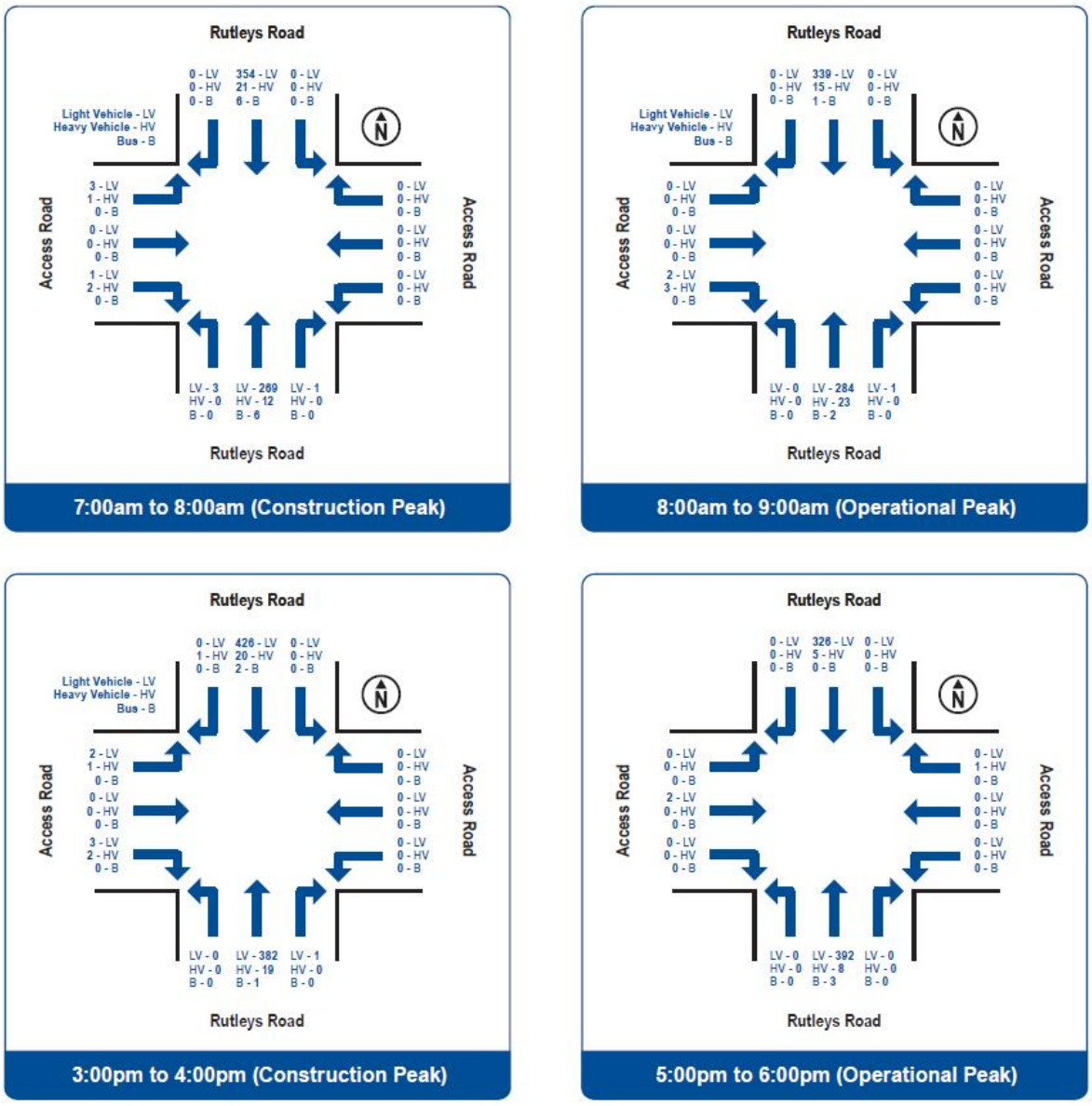


Source: Jacobs (using Matrix traffic counts, Oct 2016)

Traffic volumes at the Pacific Highway and Ruttleys Road are presented in Figure 2.9. The volumes on Ruttleys Road were approximately:

- 410 veh/hr southbound, 320 veh/hr northbound during the morning peak hour; and
- 430 veh/hr southbound, 420 veh/hr northbound during the evening peak hour.

Figure 2.10 : Existing traffic volume at Ruttleys Road / site access



Source: Jacobs (using Matrix traffic counts, Oct 2016)

Traffic volumes at the Ruttleys Road / Site Access are presented in Figure 2.10. Ruttleys Road, near the site's access point carries:

- 320 veh/hr northbound and 400 veh/hr southbound during the morning peak hour; and
- 420 veh/hr northbound and 440 veh/hr southbound during the evening peak hour.

At Ruttleys Road there were 10 trips into and out of the site during morning peak hour and 10 trips into and out of the site during the evening peak hour. This included 3 heavy vehicle trips in the morning peak and 5 heavy vehicle trips in the evening peak hour.

3. Project Traffic

The following section describes the project traffic as well as increases in traffic volumes and vehicular access arrangements \associated with the proposal. When completed the site would generate only a small amount of traffic for the estimated five staff.

3.1 Ultimate site configuration

When completed the site will employ up to five workers to maintain and run the facility. There may be occasional deliveries of plant and equipment though this is likely to be less than once a month.

3.2 Construction Stage

During construction the site will generate trucks and equipment as well as construction staff. Construction is likely to take up to 18 months. At peak construction times there are likely to be up to 100 workers on site.

3.3 Vehicular Access

The proposed access will make use of the existing access intersection on Ruttleys Road for light vehicles. During construction heavy vehicles will be able to enter the site from the Pacific Highway access and leave via Ruttleys Road.

4. Traffic Impacts

4.1 Traffic Generation

4.1.1 Construction Phase

The temporary construction phase is likely to occur over a period of 12 – 18 months. During the construction phase there is expected to be up to 100 workers and up to 18 heavy vehicle movements per day. At other times there are likely to be much fewer workers and therefore a smaller impact on traffic.

Heavy vehicle movements are assumed to be distributed throughout the day. A conservative assumption of three (3) trucks entering and leaving at the same time has been adopted for this assessment.

In the peak period for the site it is assumed that 90% of the light vehicles will arrive in the morning between 7:00am and 8:00am and leave the site between 3:00pm and 4:00pm. The estimated traffic generation during the peak hours is shown in Table 4.1.

Table 4.1 : Construction Traffic Generation

	Morning Peak Period 7:00am – 8:00am		Evening Peak (construction) 3:00pm – 4:00pm	
	In	Out	In	Out
Light Vehicles	90	-	-	90
Heavy Vehicles	3	3	3	3
Total	**93**	**3**	**3**	**93**

4.1.2 Operational Phase

It is expected that the solar farm will operate for 30 years and have a staff of 5 people. Occasional heavy vehicles may access the site. The expected traffic generation during the peak hours is shown in Table 4.2.

Table 4.2 : Operational Traffic Generation

	Morning Peak Period 8:00am – 9:00am		Evening Peak (construction) 5:00pm – 6:00pm	
	In	Out	In	Out
Light Vehicles	5	-	-	5
Heavy Vehicles	-	-	-	-
Total	**5**	**-**	**-**	**5**

4.2 Background Traffic Growth

To determine the future traffic growth, the historic traffic growth rates have been analysed. Traffic volumes from RMS permanent count stations are available for locations on the Pacific Highway north and south of the study area. These locations are south of the Motorway Link at Blue Haven and south of the Lake Macquarie Bridge, Swansea. The historic traffic volumes are shown in Table 4.3.

Table 4.3 : Historical traffic volumes AADT

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% Growth Per year
05012	15,355	-	15,795	16,207	16,504	16,774	17,745	17,987	-	-	18,403	1.8%
05002	-	-	-	-	-	17,127	17,562	17,784	17,844	18,558	18,420	1.3%

Traffic volumes in the area have grown by some 1.8% to 1.3% per year linear growth. An assumed growth rate of 1.5% across the study area has been adopted for this assessment.

An increase in activity associated with the Ash Dam Capping project has been assumed with10 heavy vehicles entering and leaving the site during the peak periods adopted for this assessment.

4.3 Traffic Assignment

Traffic assignment to the site during has been assumed to be:

- 50% from and to the Pacific Highway North;
- 40% from and to the Pacfic Highway South; and
- 10% from to the north via Ruttleys Road.

The assumed assignment routes are shown in Figure 4.1.

Figure 4.1 : Assumed Traffic Assignment

4.4 Intersection Performance

The key intersections have been modelled using Sidra Intersection. The following section provides the results of the analysis for the construction period, operational period and a 10 year horizon year.

The assessment of intersection performance is based on criteria outlined in and defined in the *Guide to Traffic Generating Developments* (Roads and Traffic Authority 2002). The average delay assessed for signalised intersections is for all movements, and for priority (sign-controlled) intersections is for the worst movement, and is expressed in seconds per vehicle.

Table 4.4 : Level of Service (LoS) criteria for intersections

LoS	Average delay per vehicle (seconds / vehicle)	Traffic signals and roundabouts	Give way and stop signs
A	Less than 15	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity, and accident study required
E	57 to 70	At capacity; at signals, incidents will cause delays. Roundabouts require other control mode	At capacity, requires other control mode
F	Over 70	Extra capacity required	Extreme delay, traffic signal or other major treatment required

Source: Guide to Traffic Generating Developments (RMS, version 2.2, 2002)

4.4.1 Construction Period Intersection Analysis

The results for the construction period are presented in Table 4.5. The results indicate that all intersection would operate with acceptable levels of service during the construction peak periods. The Ruttleys Road Access has acceptable delay based on the worst movement and through movements on Ruttleys Road have minimal delay as a result of the increase in traffic.

Table 4.5 : Sidra Results for Construction Period

	LoS	Average Delay (sec)	Queue Length (m)	Approach
Pacific Highway / Ruttleys Road				
2017 Construction Peak 7:00-8:00am (Base)	A	12	51	West
2017 Construction Peak 7:00-8:00am (Construction Traffic)	A	13	58	West
2017 Construction Peak 3:00-4:00pm (Base)	B	16	109	West
2017 Construction Peak 3:00-4:00pm (Construction Traffic)	B	17	109	West
Pacific Highway / Access Road				
2017 Construction Peak 7:00-8:00am (Base)	A	6	-	-
2017 Construction Peak 7:00-8:00am	A	6	-	-

	LoS	Average Delay (sec)	Queue Length (m)	Approach
(Construction Traffic)				
2017 Construction Peak 3:00-4:00pm (Base)	A	6	-	-
2017 Construction Peak 3:00-4:00pm (Construction Traffic)	A	6	-	-
Ruttleys Road / Access Road				
2017 Construction Peak 7:00-8:00am (Base)	B	27	2	South West
2017 Construction Peak 7:00-8:00am (Construction Traffic)	C	31	2	South West
2017 Construction Peak 3:00-4:00pm (Base)	C	33	3	South West
2017 Construction Peak 3:00-4:00pm (Construction Traffic)	C	29	17	South West

**Level of Service is based on the delay of the worst movement for priority intersections.*

4.4.2 Operational Period Intersection Analysis

The assessment of the operational period has been based on staff arriving and leaving during standard working hours of 8:00am – 5:00pm. The modelling results shown in Table 4.6 indicate that the operational traffic would have minimal impact on the road network with all intersections likely to operate with acceptable levels of delay.

Table 4.6 : Sidra Results for Operational Period 2017

	LoS	Average Delay (sec)	Queue Length (m)	Approach
Pacific Highway / Ruttleys Road				
2017 Operational Peak 8:00-9:00am (Base)	A	13	67	West
2017 Operational Peak 8:00-9:00am (With Development Traffic)	A	13	67	West
2017 Operational Peak 5:00-6:00pm (Base)	A	12	90	West
2017 Operational Peak 5:00-6:00pm (With Development Traffic)	B	12	90	West
Pacific Highway / Access Road				
2017 Operational Peak 8:00-9:00am (Base)	A	7	-	-
2017 Operational Peak 8:00-9:00am (With Development Traffic)	A	7	-	-
2017 Operational Peak 5:00-6:00pm (Base)	A	6	-	-

	LoS	Average Delay (sec)	Queue Length (m)	Approach
2017 Operational Peak 5:00-6:00pm (With Development Traffic)	A	6	-	-
Ruttleys Road / Access Road				
2017 Operational Peak 8:00-9:00am (Base)	B	25	1	South West
2017 Operational Peak 8:00-9:00am (With Development Traffic)	B	26	1	South West
2017 Operational Peak 5:00-6:00pm (Base)	B	16	1	South West
2017 Operational Peak 5:00-6:00pm (With Development Traffic)	B	16	1	South West

**Level of Service is based on the delay of the worst movement for priority intersections.*

4.4.3 Operational Period 2027 Intersection Analysis

Future traffic volumes have been forecast based on the historical traffic growth in the area. The modelling results are shown in Table 4.7. The results indicate that all intersections would operate at acceptable levels of delay. Compared to 2017 results the modelling indicates that an increase in delay at the Ruttleys Road access due to increases in background traffic however the level of service is acceptable at 'C' for the worst movement.

Table 4.7 : Sidra Results for Operational Period 2027

	LoS	Average Delay (sec)	Queue Length (m)	Approach
Pacific Highway / Ruttleys Road				
2027 Operational Peak 8:00-9:00am (Base)	A	13	83	West
2027 Operational Peak 8:00-9:00am (With Development Traffic)	A	13	83	West
2027 Operational Peak 5:00-6:00pm (Base)	B	15	124	West
2027 Operational Peak 5:00-6:00pm (With Development Traffic)	B	15	124	West
Pacific Highway / Access Road				
2027 Operational Peak 8:00-9:00am (Base)	A	7	-	-
2027 Operational Peak 8:00-9:00am (With Development Traffic)	A	7	-	-
2027 Operational Peak 5:00-6:00pm (Base)	A	6	-	-
2027 Operational Peak 5:00-6:00pm (With Development Traffic)	A	6	-	-

	LoS	Average Delay (sec)	Queue Length (m)	Approach
Ruttleys Road / Access Road				
2027 Operational Peak 8:00-9:00am (Base)	C	33	3	South West
2027 Operational Peak 8:00-9:00am (With Development Traffic)	C	33	3	South West
2027 Operational Peak 5:00-6:00pm (Base)	B	20	2	South West
2027 Operational Peak 5:00-6:00pm (With Development Traffic)	B	20	2	South West

**Level of Service is based on the delay of the worst movement for priority intersections.*

4.5 Cumulative Impacts

There are currently no publicly approved or committed major developments in the area that would contribute to a cumulative traffic impact on the road network surrounding the proposal with the exception of increases in activity associated with the Ash Dam capping project which has been accounted for in this assessment. At the moment the number of heavy vehicle movements is approximately 3 trucks per hour. For the traffic impact assessment an increase of 10 trucks entering and 10 trucks leaving per hour has been assumed in intersection modelling documented in Section 4.4.

The Chain Valley Bay Colliery has approval to export coal from the site by truck for export. It is understood that this does not currently occur. However, the site has approval for 32 truck movements per hour in the peak. An additional scenario has been tested in Sidra for the peak period during construction when the most vehicles will be generated by the site.

Table 4.8 : Sidra Results for Cummulative Impacts During Construction

	LoS	Average Delay (sec)	Queue Length (m)	Approach
Pacific Highway / Ruttleys Road				
2017 Construction Peak 7:00-8:00am (Base)	A	12	51	West
2017 Construction Peak 8:00-9:00am (Construction Traffic)	A	13	58	West
2017 Construction Peak 3:00-4:00pm (Base)	B	16	109	West
2017 Construction Peak 3:00-4:00pm (Construction Traffic)	B	19	123	West

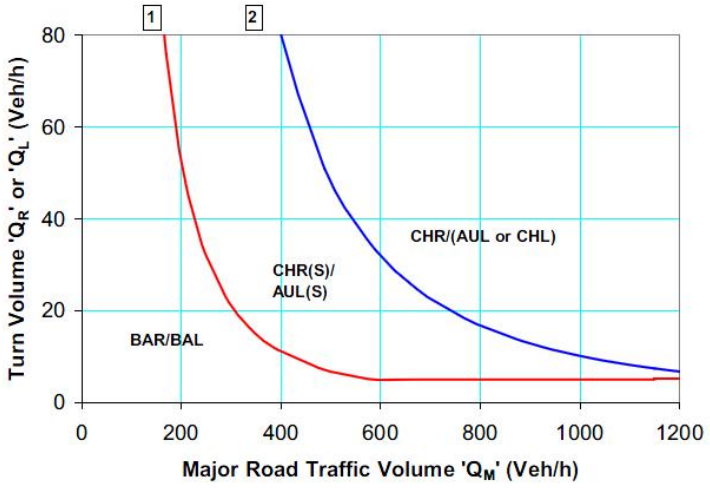
The results indicate that the additional 32 truck movements per hour combined with the construction traffic volumes would have minimal impact on the traffic performance. The cumulative impacts are expected to also be minimal during the other scenarios.

4.6 Road Safety

The need for an auxiliary left turn lane at the Pacific Highway access has been assessed in accordance with the warrants provided in Austroads Guide to Road Design – Part 4A as illustrated in Figure 4.2. The warrant for the left turn lane is based on the following:

- The flow in the through lane adjacent to the left turn is greater than 600 veh/hr in the evening peak – that is 1350 over 2 lanes;
- The proposed maximum number of turning vehicles would be 3 veh/hr; and
- The speed limit of Pacific Highway is 80 km/h (<100 km/h).

Figure 4.2 : Austroads Guide to Road Design Warrants



(b) Design speed < 100 km/h

Source: Arndt and Troutbeck (2006).

During construction, the access from the Pacific Highway with the assumed increase from the proposed development alone would not meet the Austroads warrant for a short left turn lane. However, with cumulative impacts of potential increase in rate of ash dam capping, the volume of heavy vehicles turning left may exceed the warrant for a short left turn lane in the evening peak period.

It has been noted that there have been a number of fatal crashes on Ruttleys Road as well as crashes involving serious injuries. From the data there do not appear to be any crashes associated with the intersection of the ash dam egress road and Ruttleys Road. The Ruttleys Road intersection is designed to a standard suitable for heavy vehicle movements.

The forecast increase in vehicle movements associated with the construction and operation of the project is unlikely to have a significant impact on road safety. It is recommended that road safety is monitored as part of ongoing traffic management. Consultation with Central Coast Council indicates that any improvement to road safety would be welcomed. Although not considered required to facilitate construction of the project, safety and access improvements to the Ruttleys Road site access are proposed.

4.7 Public Transport and Active Transport

The proposed development will have minimal impact on the existing public transport services and active transport.

5. Mitigation Measures

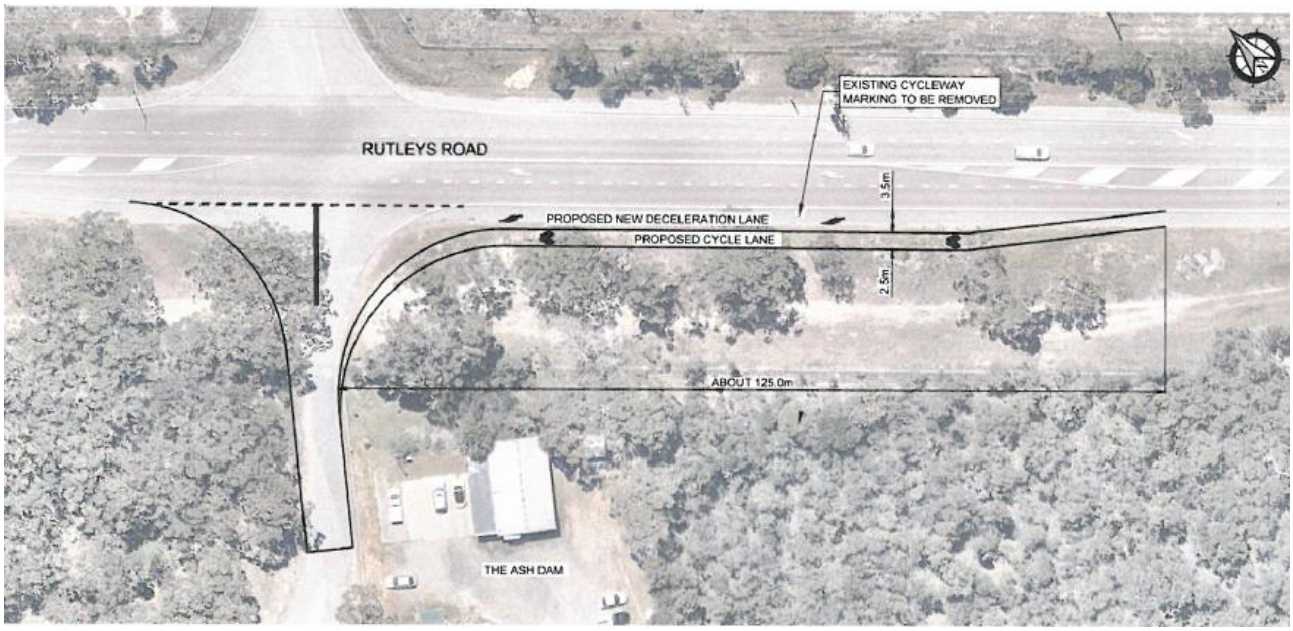
The operational stage will have minimal impact on the road network and therefore no mitigation measures are be required to facilitate operational traffic movement.

During construction, the access from the Pacific Highway with the assumed increase from the proposed development alone would not meet the Austroads warrant for a short left turn lane. However with cumulative impacts of the capping works, the volume of heavy vehicles turning left may exceed the warrant for a short left turn lane in the evening peak period. The following mitigation measures are recommended:

- A construction traffic and access management plan should be developed and implemented for the project and include a driver code of conduct;
- Upgrade access to the site from the pacific highway in consultation with Roads and Maritime Services to include a short left turn lane prior to use of this access associated with the project; and
- Upgrade site access from Ruttley Road in consultation with Central Coast Council to improve access and egress efficiency in a manner that does not reduce road safety.

Concept designs for the proposed access upgrades are shown in Figure 5.1 and Figure 5.2.

Figure 5.1 : Proposed Intersection Upgrade at Ruttleys Road / Site Access



Source: ADW Johnson

Figure 5.2 : Proposed Access Upgrade at Pacific Highway / Site Access

Source: Cardno

6. Conclusion

The focus of the traffic impact assessment is to continue to provide safe vehicle access to the VPAD and to ensure additional vehicle movements do not impact the flow of traffic on Ruttleys Road and do not affect the efficiency (level of service) of the intersection of Ruttleys Road and the Pacific Highway. The assessment found:

- The project would have minimal impact on the existing public transport services and active transport;
- The forecast number of vehicle movements is unlikely to have a significant impact on road safety;
- The construction of the project on its own does not warrant intersection upgrades but that considering the potential for increased rate of capping and existing safety issues means that upgrades could be beneficial; and
- The operational stage will have minimal impact on the road network.

The specific findings of the study are:

- The construction activity is likely to generate up to 90 light vehicles and 3 heavy vehicles per hour during peak periods;
- The operational stage is forecast to generate five vehicles per hour during peak periods;
- Background traffic volumes are forecast to increase at 1.5% per year (linear growth)
- The impact on the road network during construction is expected to be minimal with the key intersection at the Pacific Highway / Ruttleys Road operating at levels of service ‘A’ and ‘B’ for the morning and evening peak;
- The forecast additional 5 vehicles per hour during the peak periods when the site is operational will have minimal impact on the road network performance in 2017 and 2027;
- Ruttleys Road has a significant crash history, however none of the crashes recorded were related to the access road intersections. The proposed increase in traffic volumes as a result of the development are unlikely to impact road safety; and
- The site access from Ruttleys Road and the Pacific Highway are proposed to be modified to allow for a left turn in deceleration lane.

The results of the assessment indicate that all intersection would continue to operate with acceptable levels of service during the construction peak periods. The Ruttleys Road Access would have acceptable delay based on the worst movement and through movements on Ruttleys Road have minimal delay as a result of the increase in traffic. The assessment indicates only a minor difference to the delay at the intersection of Ruttleys Road and the Pacific Highway with the Level of Service remaining the same.

References

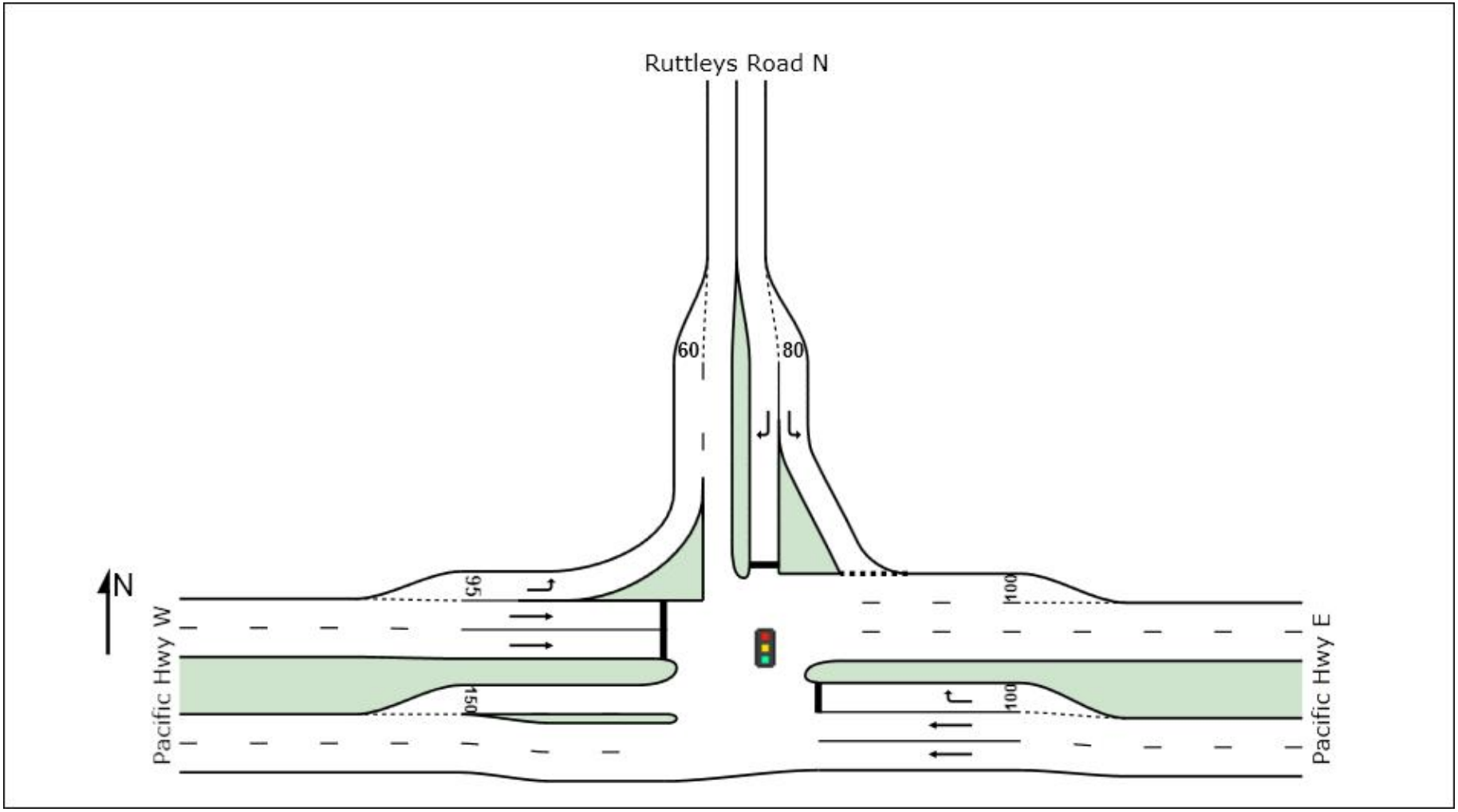
Austroads (2009) *Guide to Road Design, Park 4A: Unsignalised and Signalised Intersections*, Austroads, August 2009

Roads and Traffic Authority (2002) *Roads and Traffic Authority Guide to Traffic Generating Developments - version 2.2*, October 2002

Austroads (2009b) *Austroads Guide to Traffic Management Part 12: Traffic Impacts of Developments*, Austroads, August 2009

Appendix A. Sidra Model Outputs

Pacific Hwy/Ruttleys Road – Layout



Pacific Hwy/Ruttleys Road – Movement Summaries

2017 AM Construction Base Pacific Hwy / Ruttleys Rd

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1023	3.7	0.269	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
6	R2	211	4.0	0.777	29.5	LOS C	4.7	34.1	1.00	0.91	47.7
Approach		1234	3.8	0.777	5.1	LOS A	4.7	34.1	0.17	0.16	78.1
North: Ruttleys Road N											
7	L2	185	9.7	0.179	10.3	LOS A	1.3	9.8	0.51	0.70	61.6
9	R2	234	4.1	0.740	27.3	LOS B	5.0	36.4	1.00	0.90	48.7
Approach		419	6.5	0.740	19.8	LOS B	5.0	36.4	0.78	0.81	53.7
West: Pacific Hwy W											
10	L2	97	4.3	0.054	8.3	LOS A	0.0	0.0	0.00	0.62	69.5
11	T1	631	9.7	0.764	19.2	LOS B	6.7	51.2	0.99	0.92	61.2
Approach		727	9.0	0.764	17.7	LOS B	6.7	51.2	0.86	0.88	62.2
All Vehicles		2380	5.8	0.777	11.5	LOS A	6.7	51.2	0.49	0.49	67.4

2017 AM Construction Pacific Hwy / Ruttleys Rd

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1071	3.5	0.281	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
6	R2	258	3.3	0.812	29.8	LOS C	5.9	42.4	1.00	0.95	47.6
Approach		1328	3.5	0.812	5.8	LOS A	5.9	42.4	0.19	0.18	76.6
North: Ruttleys Road N											
7	L2	185	9.7	0.171	10.0	LOS A	1.2	8.9	0.48	0.70	62.0
9	R2	234	4.1	0.740	27.3	LOS B	5.0	36.4	1.00	0.90	48.7
Approach		419	6.5	0.740	19.6	LOS B	5.0	36.4	0.77	0.81	53.8
West: Pacific Hwy W											
10	L2	135	3.1	0.074	8.3	LOS A	0.0	0.0	0.00	0.62	69.9
11	T1	631	9.7	0.859	24.0	LOS B	7.6	58.0	1.00	1.01	56.6
Approach		765	8.5	0.859	21.2	LOS B	7.6	58.0	0.82	0.94	58.6
All Vehicles		2513	5.5	0.859	12.8	LOS A	7.6	58.0	0.48	0.52	65.8

2017 AM Operation Base Pacific Hwy / Ruttleys Rd

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1233	3.6	0.323	0.0	LOS A	0.0	0.0	0.00	0.00	89.8
6	R2	245	19.7	0.861	33.1	LOS C	6.0	49.5	1.00	1.01	43.3
Approach		1478	6.3	0.861	5.5	LOS A	6.0	49.5	0.17	0.17	76.2
North: Ruttleys Road N											
7	L2	199	6.9	0.188	10.3	LOS A	1.4	10.3	0.51	0.71	62.4
9	R2	185	4.5	0.687	27.3	LOS B	3.9	28.5	0.99	0.86	48.7
Approach		384	5.8	0.687	18.5	LOS B	3.9	28.5	0.75	0.78	54.9
West: Pacific Hwy W											
10	L2	123	9.4	0.071	8.4	LOS A	0.0	0.0	0.00	0.62	67.9
11	T1	734	6.5	0.871	24.3	LOS B	9.1	67.1	1.00	1.03	56.3
Approach		857	6.9	0.871	22.0	LOS B	9.1	67.1	0.86	0.97	57.8
All Vehicles		2719	6.4	0.871	12.6	LOS A	9.1	67.1	0.47	0.51	65.9

2017 AM Operation Pacific Hwy / Ruttleys Rd

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1233	3.6	0.323	0.0	LOS A	0.0	0.0	0.00	0.00	89.8
6	R2	249	19.4	0.874	34.0	LOS C	6.3	51.3	1.00	1.03	42.9
Approach		1482	6.3	0.874	5.8	LOS A	6.3	51.3	0.17	0.17	75.8
North: Ruttleys Road N											
7	L2	199	6.9	0.188	10.3	LOS A	1.4	10.3	0.51	0.71	62.4
9	R2	185	4.5	0.687	27.3	LOS B	3.9	28.5	0.99	0.86	48.7
Approach		384	5.8	0.687	18.5	LOS B	3.9	28.5	0.75	0.78	54.9
West: Pacific Hwy W											
10	L2	126	9.2	0.072	8.4	LOS A	0.0	0.0	0.00	0.62	68.0
11	T1	734	6.5	0.871	24.3	LOS B	9.1	67.1	1.00	1.03	56.3
Approach		860	6.9	0.871	22.0	LOS B	9.1	67.1	0.85	0.97	57.8
All Vehicles		2726	6.4	0.874	12.7	LOS A	9.1	67.1	0.47	0.51	65.8

2027 AM Operation Base Pacific Hwy / Ruttleys Rd

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1417	3.6	0.372	0.1	LOS A	0.0	0.0	0.00	0.00	89.8
6	R2	282	19.8	0.788	32.7	LOS C	7.7	62.7	1.00	0.93	43.5
Approach		1699	6.3	0.788	5.5	LOS A	7.7	62.7	0.17	0.15	76.3
North: Ruttleys Road N											
7	L2	228	6.9	0.222	11.3	LOS A	2.2	16.4	0.52	0.71	61.3
9	R2	213	4.5	0.844	36.6	LOS C	6.2	44.9	1.00	0.97	43.3
Approach		441	5.7	0.844	23.5	LOS B	6.2	44.9	0.75	0.84	51.1
West: Pacific Hwy W											
10	L2	142	9.6	0.082	8.4	LOS A	0.0	0.0	0.00	0.62	67.8
11	T1	844	6.5	0.806	22.9	LOS B	11.3	83.5	0.99	0.95	57.6
Approach		986	6.9	0.806	20.8	LOS B	11.3	83.5	0.85	0.90	58.9
All Vehicles		3126	6.4	0.844	12.8	LOS A	11.3	83.5	0.46	0.49	65.6

2027 AM Operation Pacific Hwy / Ruttleys Rd

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1417	3.6	0.372	0.1	LOS A	0.0	0.0	0.00	0.00	89.8
6	R2	287	19.4	0.801	33.2	LOS C	7.9	64.6	1.00	0.94	43.3
Approach		1704	6.2	0.801	5.6	LOS A	7.9	64.6	0.17	0.16	76.0
North: Ruttleys Road N											
7	L2	228	6.9	0.222	11.3	LOS A	2.2	16.4	0.52	0.71	61.3
9	R2	213	4.5	0.844	36.6	LOS C	6.2	44.9	1.00	0.97	43.3
Approach		441	5.7	0.844	23.5	LOS B	6.2	44.9	0.75	0.84	51.1
West: Pacific Hwy W											
10	L2	145	9.4	0.083	8.4	LOS A	0.0	0.0	0.00	0.62	67.9
11	T1	844	6.5	0.806	22.9	LOS B	11.3	83.5	0.99	0.95	57.6
Approach		989	6.9	0.806	20.8	LOS B	11.3	83.5	0.84	0.90	58.9
All Vehicles		3135	6.4	0.844	12.9	LOS A	11.3	83.5	0.46	0.49	65.5

2017 PM Construction Base Pacific Hwy / Ruttleys Rd

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	824	6.1	0.220	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
6	R2	184	8.0	0.749	34.0	LOS C	5.0	37.2	1.00	0.89	44.5
Approach		1008	6.5	0.749	6.2	LOS A	5.0	37.2	0.18	0.16	75.7
North: Ruttleys Road N											
7	L2	308	3.1	0.325	12.8	LOS A	3.7	26.5	0.61	0.74	60.7
9	R2	237	8.9	0.848	36.5	LOS C	6.9	52.1	1.00	0.99	42.8
Approach		545	5.6	0.848	23.1	LOS B	6.9	52.1	0.78	0.85	51.4
West: Pacific Hwy W											
10	L2	214	3.0	0.117	8.3	LOS A	0.0	0.0	0.00	0.62	70.0
11	T1	1089	3.4	0.840	23.0	LOS B	15.1	109.1	0.99	0.99	57.5
Approach		1303	3.3	0.840	20.6	LOS B	15.1	109.1	0.82	0.93	59.3
All Vehicles		2857	4.9	0.848	16.0	LOS B	15.1	109.1	0.59	0.64	62.2

2017 PM Construction Pacific Hwy / Ruttleys Rd

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	824	6.1	0.220	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
6	R2	184	8.0	0.874	39.7	LOS C	5.6	41.6	1.00	0.99	41.6
Approach		1008	6.5	0.874	7.3	LOS A	5.6	41.6	0.18	0.18	74.1
North: Ruttleys Road N											
7	L2	356	2.7	0.374	13.0	LOS A	4.4	31.3	0.63	0.75	60.7
9	R2	275	7.7	0.867	37.2	LOS C	8.2	61.4	1.00	1.02	42.6
Approach		631	4.8	0.867	23.5	LOS B	8.2	61.4	0.79	0.87	51.2
West: Pacific Hwy W											
10	L2	214	3.0	0.117	8.3	LOS A	0.0	0.0	0.00	0.62	70.0
11	T1	1089	3.4	0.840	23.0	LOS B	15.1	109.1	0.99	0.99	57.5
Approach		1303	3.3	0.840	20.6	LOS B	15.1	109.1	0.82	0.93	59.3
All Vehicles		2942	4.7	0.874	16.6	LOS B	15.1	109.1	0.60	0.66	61.4

2017 PM Operation Base Pacific Hwy / Ruttleys Rd

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	737	3.6	0.193	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
6	R2	160	2.6	0.731	34.3	LOS C	4.3	30.9	1.00	0.87	45.1
Approach		897	3.4	0.731	6.1	LOS A	4.3	30.9	0.18	0.15	76.4
North: Ruttleys Road N											
7	L2	249	0.0	0.260	12.5	LOS A	3.0	20.7	0.61	0.75	61.9
9	R2	132	4.0	0.607	32.2	LOS C	3.4	24.5	0.99	0.82	45.8
Approach		381	1.4	0.607	19.3	LOS B	3.4	24.5	0.74	0.77	55.2
West: Pacific Hwy W											
10	L2	263	1.6	0.143	8.2	LOS A	0.0	0.0	0.00	0.62	70.5
11	T1	1120	1.9	0.727	15.4	LOS B	12.6	89.4	0.90	0.83	65.3
Approach		1383	1.8	0.727	14.0	LOS A	12.6	89.4	0.73	0.79	66.2
All Vehicles		2661	2.3	0.731	12.1	LOS A	12.6	89.4	0.55	0.57	67.3

2017 PM Operation Pacific Hwy / Ruttleys Rd

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	737	3.6	0.193	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
6	R2	160	2.6	0.731	34.3	LOS C	4.3	30.9	1.00	0.87	45.1
Approach		897	3.4	0.731	6.1	LOS A	4.3	30.9	0.18	0.15	76.4
North: Ruttleys Road N											
7	L2	253	0.0	0.263	12.5	LOS A	3.0	21.0	0.61	0.75	61.9
9	R2	134	3.9	0.617	32.2	LOS C	3.4	24.9	0.99	0.82	45.7
Approach		386	1.4	0.617	19.3	LOS B	3.4	24.9	0.74	0.77	55.2
West: Pacific Hwy W											
10	L2	263	1.6	0.143	8.2	LOS A	0.0	0.0	0.00	0.62	70.5
11	T1	1120	1.9	0.727	15.4	LOS B	12.6	89.4	0.90	0.83	65.3
Approach		1383	1.8	0.727	14.0	LOS A	12.6	89.4	0.73	0.79	66.2
All Vehicles		2666	2.3	0.731	12.1	LOS A	12.6	89.4	0.55	0.57	67.3

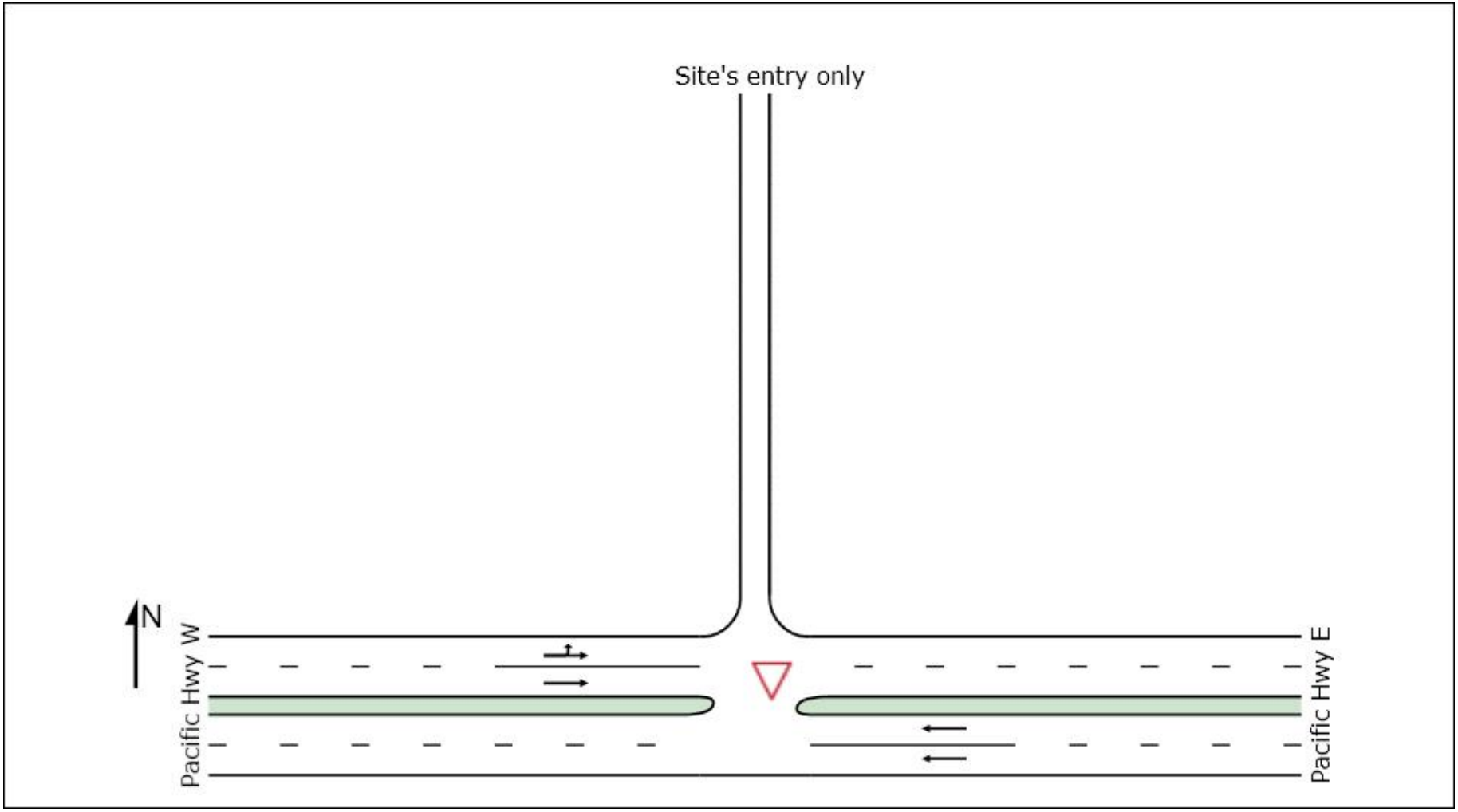
2027 PM Operation Base Pacific Hwy / Ruttleys Rd

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	847	3.6	0.222	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
6	R2	184	2.9	0.843	37.6	LOS C	5.4	38.4	1.00	0.95	43.3
Approach		1032	3.5	0.843	6.7	LOS A	5.4	38.4	0.18	0.17	75.4
North: Ruttleys Road N											
7	L2	287	0.0	0.333	14.0	LOS A	3.9	27.0	0.67	0.75	60.4
9	R2	152	4.2	0.700	33.3	LOS C	4.0	29.2	1.00	0.86	45.1
Approach		439	1.4	0.700	20.7	LOS B	4.0	29.2	0.78	0.79	54.1
West: Pacific Hwy W											
10	L2	303	1.7	0.165	8.2	LOS A	0.0	0.0	0.00	0.62	70.4
11	T1	1288	1.9	0.836	20.8	LOS B	17.4	124.0	0.97	0.97	59.6
Approach		1592	1.9	0.836	18.4	LOS B	17.4	124.0	0.78	0.90	61.4
All Vehicles		3062	2.3	0.843	14.8	LOS B	17.4	124.0	0.58	0.64	64.1

2027 PM Operation Pacific Hwy / Ruttleys Rd

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	847	3.6	0.222	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
6	R2	184	2.9	0.843	37.6	LOS C	5.4	38.4	1.00	0.95	43.3
Approach		1032	3.5	0.843	6.7	LOS A	5.4	38.4	0.18	0.17	75.4
North: Ruttleys Road N											
7	L2	291	0.0	0.337	14.0	LOS A	3.9	27.4	0.67	0.76	60.3
9	R2	164	10.3	0.791	35.4	LOS C	4.6	35.0	1.00	0.92	43.1
Approach		455	3.7	0.791	21.7	LOS B	4.6	35.0	0.79	0.81	52.8
West: Pacific Hwy W											
10	L2	303	1.7	0.165	8.2	LOS A	0.0	0.0	0.00	0.62	70.4
11	T1	1288	1.9	0.836	20.8	LOS B	17.4	124.0	0.97	0.97	59.6
Approach		1592	1.9	0.836	18.4	LOS B	17.4	124.0	0.78	0.90	61.4
All Vehicles		3078	2.7	0.843	15.0	LOS B	17.4	124.0	0.58	0.64	63.8

Pacific Hwy/ Site Access – Layout



Pacific Hwy/ Site Access – Movement Summaries

2017 AM Construction Base Pacific Hwy / Site Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1325	3.8	0.348	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1325	3.8	0.348	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Pacific Hwy W											
10	L2	11	100.0	0.221	6.1	LOS A	0.0	0.0	0.00	0.03	55.7
11	T1	798	8.8	0.221	0.0	LOS A	0.0	0.0	0.00	0.01	59.9
Approach		808	10.0	0.221	0.2	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2134	6.2	0.348	0.0	NA	0.0	0.0	0.00	0.01	59.9

2017 AM Construction Pacific Hwy / Site Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1325	3.8	0.348	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1325	3.8	0.348	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Pacific Hwy W											
10	L2	14	100.0	0.223	6.1	LOS A	0.0	0.0	0.00	0.04	55.7
11	T1	798	8.8	0.223	0.0	LOS A	0.0	0.0	0.00	0.02	59.9
Approach		812	10.4	0.223	0.2	NA	0.0	0.0	0.00	0.02	59.8
All Vehicles		2137	6.3	0.348	0.0	NA	0.0	0.0	0.00	0.01	59.9

2017 AM Operation Base Pacific Hwy / Site Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1304	3.6	0.342	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1304	3.6	0.342	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Pacific Hwy W											
10	L2	14	92.3	0.215	6.6	LOS A	0.0	0.0	0.00	0.02	53.9
11	T1	785	5.8	0.215	0.0	LOS A	0.0	0.0	0.00	0.01	59.9
Approach		799	7.2	0.215	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2103	5.0	0.342	0.0	NA	0.0	0.0	0.00	0.00	59.9

2017 AM Operation Pacific Hwy / Site Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1304	3.6	0.342	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1304	3.6	0.342	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Pacific Hwy W											
10	L2	14	92.3	0.215	6.6	LOS A	0.0	0.0	0.00	0.02	53.9
11	T1	785	5.8	0.215	0.0	LOS A	0.0	0.0	0.00	0.01	59.9
Approach		799	7.2	0.215	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2103	5.0	0.342	0.0	NA	0.0	0.0	0.00	0.00	59.9

2027 AM Operation Base Pacific Hwy / Site Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1500	3.6	0.394	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1500	3.6	0.394	0.1	NA	0.0	0.0	0.00	0.00	59.9
West: Pacific Hwy W											
10	L2	16	93.3	0.247	6.6	LOS A	0.0	0.0	0.00	0.02	53.9
11	T1	902	5.7	0.247	0.0	LOS A	0.0	0.0	0.00	0.01	59.9
Approach		918	7.2	0.247	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2418	5.0	0.394	0.0	NA	0.0	0.0	0.00	0.00	59.9

2027 AM Operation Pacific Hwy / Site Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1500	3.6	0.394	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1500	3.6	0.394	0.1	NA	0.0	0.0	0.00	0.00	59.9
West: Pacific Hwy W											
10	L2	16	93.3	0.247	6.6	LOS A	0.0	0.0	0.00	0.02	53.9
11	T1	902	5.7	0.247	0.0	LOS A	0.0	0.0	0.00	0.01	59.9
Approach		918	7.2	0.247	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2418	5.0	0.394	0.0	NA	0.0	0.0	0.00	0.00	59.9

2017 PM Construction Base Pacific Hwy / Site Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1066	5.5	0.283	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1066	5.5	0.283	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Pacific Hwy W											
10	L2	11	100.0	0.337	6.1	LOS A	0.0	0.0	0.00	0.02	55.8
11	T1	1271	2.9	0.337	0.0	LOS A	0.0	0.0	0.00	0.01	59.9
Approach		1281	3.7	0.337	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2347	4.5	0.337	0.0	NA	0.0	0.0	0.00	0.01	59.9

2017 PM Construction Pacific Hwy / Site Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1066	5.5	0.283	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		1066	5.5	0.283	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Pacific Hwy W											
10	L2	14	100.0	0.338	6.1	LOS A	0.0	0.0	0.00	0.02	55.7
11	T1	1271	2.9	0.338	0.0	LOS A	0.0	0.0	0.00	0.01	59.9
Approach		1284	3.9	0.338	0.2	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2351	4.7	0.338	0.0	NA	0.0	0.0	0.00	0.01	59.9

2017 PM Operation Base Pacific Hwy / Site Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	820	3.2	0.215	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		820	3.2	0.215	0.0	NA	0.0	0.0	0.00	0.00	60.0
West: Pacific Hwy W											
10	L2	11	100.0	0.373	6.1	LOS A	0.0	0.0	0.00	0.02	55.8
11	T1	1423	1.5	0.373	0.0	LOS A	0.0	0.0	0.00	0.01	59.9
Approach		1434	2.2	0.373	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2254	2.6	0.373	0.0	NA	0.0	0.0	0.00	0.01	59.9

2017 PM Operation Pacific Hwy / Site Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	820	3.2	0.215	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		820	3.2	0.215	0.0	NA	0.0	0.0	0.00	0.00	60.0
West: Pacific Hwy W											
10	L2	11	100.0	0.373	6.1	LOS A	0.0	0.0	0.00	0.02	55.8
11	T1	1423	1.5	0.373	0.0	LOS A	0.0	0.0	0.00	0.01	59.9
Approach		1434	2.2	0.373	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2254	2.6	0.373	0.0	NA	0.0	0.0	0.00	0.01	59.9

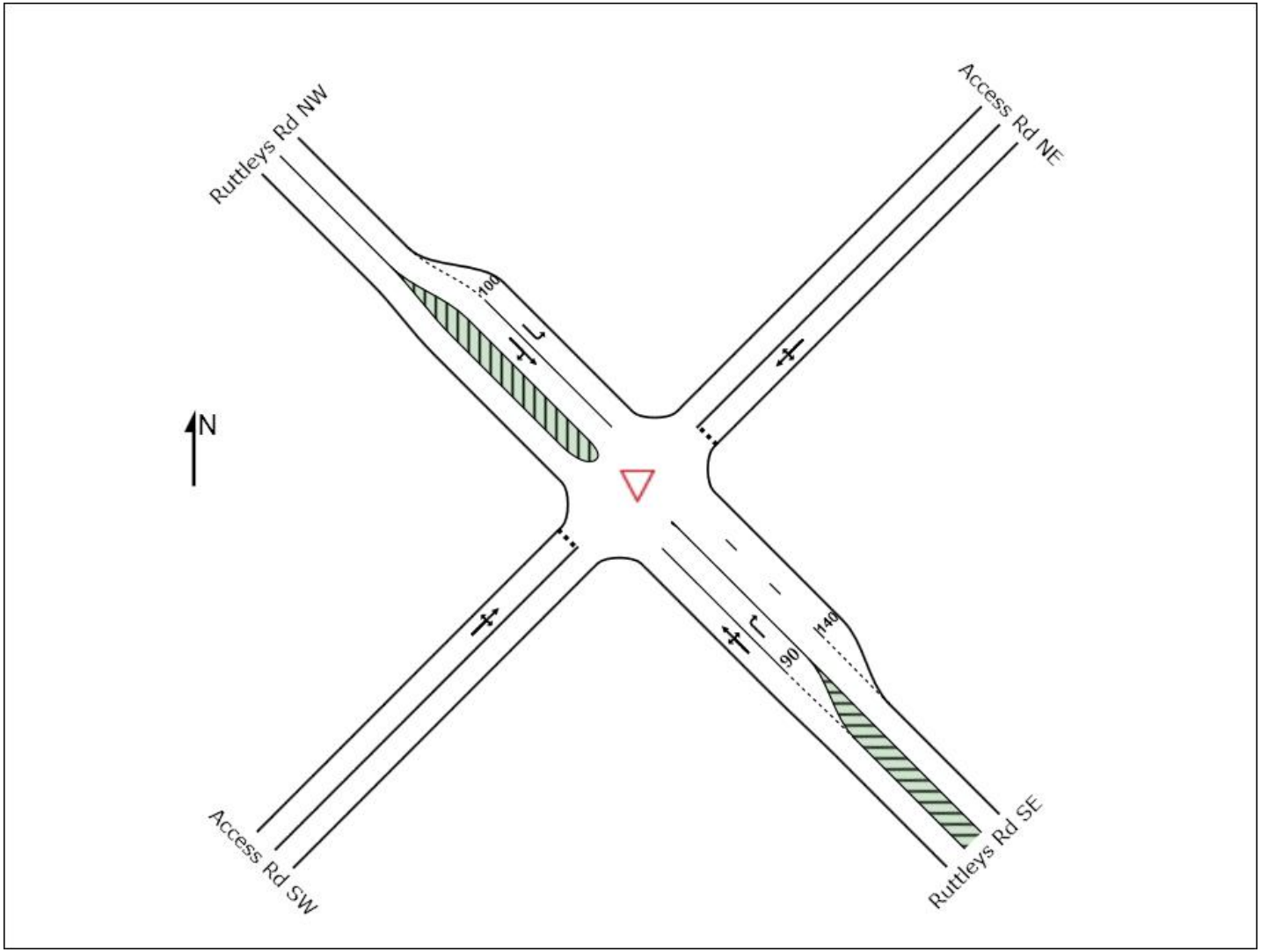
2027 PM Operation Base Pacific Hwy / Site Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	967	5.7	0.257	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		967	5.7	0.257	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Pacific Hwy W											
10	L2	11	100.0	0.435	6.1	LOS A	0.0	0.0	0.00	0.01	55.8
11	T1	1661	1.5	0.435	0.0	LOS A	0.0	0.0	0.00	0.01	59.8
Approach		1672	2.1	0.435	0.1	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2639	3.4	0.435	0.0	NA	0.0	0.0	0.00	0.00	59.9

2027 PM Operation Pacific Hwy / Site Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	943	3.2	0.247	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		943	3.2	0.247	0.0	NA	0.0	0.0	0.00	0.00	59.9
West: Pacific Hwy W											
10	L2	13	100.0	0.436	6.1	LOS A	0.0	0.0	0.00	0.02	55.8
11	T1	1661	1.5	0.436	0.0	LOS A	0.0	0.0	0.00	0.01	59.8
Approach		1674	2.2	0.436	0.2	NA	0.0	0.0	0.00	0.01	59.8
All Vehicles		2617	2.6	0.436	0.0	NA	0.0	0.0	0.00	0.01	59.9

Ruttleys Road/ Site Access – Layout



Ruttleys Road/ Site Access – Movement Summaries

2017 AM Construction Base Ruttleys Rd / Access Road

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Ruttleys Rd SE											
21	L2	3	0.0	0.158	6.9	LOS A	0.0	0.0	0.00	0.01	74.5
22	T1	296	4.3	0.158	0.0	LOS A	0.0	0.0	0.00	0.01	79.8
23	R2	1	0.0	0.001	8.5	LOS A	0.0	0.0	0.44	0.58	53.1
Approach		300	4.2	0.158	0.1	NA	0.0	0.0	0.00	0.01	79.6
NorthEast: Access Rd NE											
24	L2	1	0.0	0.007	6.3	LOS A	0.0	0.2	0.59	0.65	49.8
25	T1	1	0.0	0.007	11.1	LOS A	0.0	0.2	0.59	0.65	43.6
26	R2	1	0.0	0.007	14.1	LOS A	0.0	0.2	0.59	0.65	49.7
Approach		3	0.0	0.007	10.5	LOS A	0.0	0.2	0.59	0.65	47.5
NorthWest: Ruttleys Rd NW											
27	L2	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	65.4
28	T1	395	5.6	0.211	0.0	LOS A	0.0	0.1	0.00	0.00	79.9
29	R2	1	0.0	0.211	7.9	LOS A	0.0	0.1	0.00	0.00	60.2
Approach		397	5.6	0.211	0.0	NA	0.0	0.1	0.00	0.00	79.8
SouthWest: Access Rd SW											
30	L2	15	78.6	0.046	7.9	LOS A	0.2	1.8	0.53	0.69	37.9
31	T1	1	0.0	0.046	11.5	LOS A	0.2	1.8	0.53	0.69	43.7
32	R2	3	66.7	0.046	26.8	LOS B	0.2	1.8	0.53	0.69	39.1
Approach		19	72.2	0.046	11.2	LOS A	0.2	1.8	0.53	0.69	38.4
All Vehicles		719	6.7	0.211	0.4	NA	0.2	1.8	0.02	0.03	77.3

2017 AM Construction Ruttleys Rd / Access Road

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Ruttleys Rd SE											
21	L2	88	0.0	0.204	6.9	LOS A	0.0	0.0	0.00	0.15	72.2
22	T1	296	4.3	0.204	0.0	LOS A	0.0	0.0	0.00	0.15	77.1
23	R2	1	0.0	0.001	8.5	LOS A	0.0	0.0	0.44	0.58	53.1
Approach		385	3.3	0.204	1.6	NA	0.0	0.0	0.00	0.15	75.8
NorthEast: Access Rd NE											
24	L2	1	0.0	0.008	6.3	LOS A	0.0	0.2	0.61	0.66	49.3
25	T1	1	0.0	0.008	12.9	LOS A	0.0	0.2	0.61	0.66	43.3
26	R2	1	0.0	0.008	14.5	LOS A	0.0	0.2	0.61	0.66	49.2
Approach		3	0.0	0.008	11.2	LOS A	0.0	0.2	0.61	0.66	47.1
NorthWest: Ruttleys Rd NW											
27	L2	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	65.4
28	T1	395	5.6	0.218	0.1	LOS A	0.1	0.8	0.03	0.02	79.4
29	R2	11	0.0	0.218	8.4	LOS A	0.1	0.8	0.03	0.02	59.9
Approach		406	5.4	0.218	0.3	NA	0.1	0.8	0.03	0.02	78.7
SouthWest: Access Rd SW											
30	L2	18	82.4	0.055	8.0	LOS A	0.2	2.2	0.53	0.70	37.4
31	T1	1	0.0	0.055	12.6	LOS A	0.2	2.2	0.53	0.70	43.6
32	R2	3	66.7	0.055	30.5	LOS C	0.2	2.2	0.53	0.70	39.0
Approach		22	76.2	0.055	11.4	LOS A	0.2	2.2	0.53	0.70	37.9
All Vehicles		817	6.3	0.218	1.3	NA	0.2	2.2	0.03	0.10	75.0

2017 AM Operation Base Ruttleys Rd / Access Road

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Ruttleys Rd SE											
21	L2	1	0.0	0.174	6.9	LOS A	0.0	0.0	0.00	0.00	74.6
22	T1	323	7.5	0.174	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
23	R2	1	0.0	0.001	8.4	LOS A	0.0	0.0	0.42	0.58	53.2
Approach		325	7.4	0.174	0.1	NA	0.0	0.0	0.00	0.00	79.7
NorthEast: Access Rd NE											
24	L2	1	0.0	0.007	6.2	LOS A	0.0	0.2	0.58	0.64	49.8
25	T1	1	0.0	0.007	11.1	LOS A	0.0	0.2	0.58	0.64	43.7
26	R2	1	0.0	0.007	14.1	LOS A	0.0	0.2	0.58	0.64	49.7
Approach		3	0.0	0.007	10.5	LOS A	0.0	0.2	0.58	0.64	47.6
NorthWest: Ruttleys Rd NW											
27	L2	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	65.4
28	T1	373	4.2	0.197	0.0	LOS A	0.0	0.1	0.00	0.00	79.9
29	R2	1	0.0	0.197	8.0	LOS A	0.0	0.1	0.00	0.00	60.2
Approach		375	4.2	0.197	0.0	NA	0.0	0.1	0.00	0.00	79.8
SouthWest: Access Rd SW											
30	L2	12	90.9	0.055	8.7	LOS A	0.2	2.2	0.58	0.76	35.6
31	T1	1	0.0	0.055	11.6	LOS A	0.2	2.2	0.58	0.76	42.4
32	R2	5	60.0	0.055	25.3	LOS B	0.2	2.2	0.58	0.76	38.9
Approach		18	76.5	0.055	13.8	LOS A	0.2	2.2	0.58	0.76	36.9
All Vehicles		721	7.4	0.197	0.4	NA	0.2	2.2	0.02	0.03	77.3

2017 AM Operation Ruttleys Rd / Access Road

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Ruttleys Rd SE											
21	L2	8	0.0	0.178	6.9	LOS A	0.0	0.0	0.00	0.02	74.3
22	T1	323	7.5	0.178	0.0	LOS A	0.0	0.0	0.00	0.02	79.6
23	R2	1	0.0	0.001	8.4	LOS A	0.0	0.0	0.42	0.58	53.2
Approach		333	7.3	0.178	0.2	NA	0.0	0.0	0.00	0.02	79.3
NorthEast: Access Rd NE											
24	L2	1	0.0	0.007	6.2	LOS A	0.0	0.2	0.58	0.64	49.8
25	T1	1	0.0	0.007	11.3	LOS A	0.0	0.2	0.58	0.64	43.6
26	R2	1	0.0	0.007	14.2	LOS A	0.0	0.2	0.58	0.64	49.7
Approach		3	0.0	0.007	10.5	LOS A	0.0	0.2	0.58	0.64	47.5
NorthWest: Ruttleys Rd NW											
27	L2	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	65.4
28	T1	373	4.2	0.198	0.0	LOS A	0.0	0.1	0.01	0.00	79.9
29	R2	2	0.0	0.198	8.1	LOS A	0.0	0.1	0.01	0.00	60.1
Approach		376	4.2	0.198	0.1	NA	0.0	0.1	0.01	0.01	79.7
SouthWest: Access Rd SW											
30	L2	12	90.9	0.055	8.7	LOS A	0.2	2.2	0.58	0.77	35.6
31	T1	1	0.0	0.055	11.7	LOS A	0.2	2.2	0.58	0.77	42.4
32	R2	5	60.0	0.055	25.6	LOS B	0.2	2.2	0.58	0.77	38.9
Approach		18	76.5	0.055	13.8	LOS A	0.2	2.2	0.58	0.77	36.9
All Vehicles		729	7.4	0.198	0.5	NA	0.2	2.2	0.02	0.03	77.1

2027 AM Operation Base Ruttleys Rd / Access Road

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Ruttleys Rd SE											
21	L2	1	0.0	0.200	6.9	LOS A	0.0	0.0	0.00	0.00	74.6
22	T1	372	7.4	0.200	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
23	R2	1	0.0	0.001	8.7	LOS A	0.0	0.0	0.45	0.59	53.0
Approach		374	7.3	0.200	0.1	NA	0.0	0.0	0.00	0.00	79.8
NorthEast: Access Rd NE											
24	L2	1	0.0	0.009	6.5	LOS A	0.0	0.2	0.65	0.69	48.6
25	T1	1	0.0	0.009	13.4	LOS A	0.0	0.2	0.65	0.69	42.7
26	R2	1	0.0	0.009	17.2	LOS B	0.0	0.2	0.65	0.69	48.5
Approach		3	0.0	0.009	12.3	LOS A	0.0	0.2	0.65	0.69	46.4
NorthWest: Ruttleys Rd NW											
27	L2	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	65.4
28	T1	428	4.2	0.227	0.0	LOS A	0.0	0.1	0.00	0.00	79.9
29	R2	1	0.0	0.227	8.4	LOS A	0.0	0.1	0.00	0.00	60.2
Approach		431	4.2	0.227	0.0	NA	0.0	0.1	0.00	0.00	79.8
SouthWest: Access Rd SW											
30	L2	14	92.3	0.072	9.5	LOS A	0.2	2.8	0.63	0.80	34.8
31	T1	1	0.0	0.072	14.0	LOS A	0.2	2.8	0.63	0.80	41.4
32	R2	5	60.0	0.072	33.0	LOS C	0.2	2.8	0.63	0.80	38.0
Approach		20	78.9	0.072	15.9	LOS B	0.2	2.8	0.63	0.80	35.9
All Vehicles		827	7.4	0.227	0.5	NA	0.2	2.8	0.02	0.03	77.3

2027 AM Operation Ruttleys Rd / Access Road

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Ruttleys Rd SE											
21	L2	9	0.0	0.205	6.9	LOS A	0.0	0.0	0.00	0.02	74.3
22	T1	372	7.4	0.205	0.0	LOS A	0.0	0.0	0.00	0.02	79.6
23	R2	1	0.0	0.001	8.7	LOS A	0.0	0.0	0.45	0.59	53.0
Approach		382	7.2	0.205	0.2	NA	0.0	0.0	0.00	0.02	79.3
NorthEast: Access Rd NE											
24	L2	1	0.0	0.009	6.5	LOS A	0.0	0.2	0.65	0.69	48.6
25	T1	1	0.0	0.009	13.6	LOS A	0.0	0.2	0.65	0.69	42.7
26	R2	1	0.0	0.009	17.2	LOS B	0.0	0.2	0.65	0.69	48.4
Approach		3	0.0	0.009	12.4	LOS A	0.0	0.2	0.65	0.69	46.4
NorthWest: Ruttleys Rd NW											
27	L2	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	65.4
28	T1	428	4.2	0.227	0.0	LOS A	0.0	0.2	0.01	0.00	79.9
29	R2	2	0.0	0.227	8.5	LOS A	0.0	0.2	0.01	0.00	60.1
Approach		432	4.1	0.227	0.1	NA	0.0	0.2	0.01	0.00	79.7
SouthWest: Access Rd SW											
30	L2	14	92.3	0.073	9.5	LOS A	0.2	2.8	0.64	0.80	34.7
31	T1	1	0.0	0.073	14.1	LOS A	0.2	2.8	0.64	0.80	41.3
32	R2	5	60.0	0.073	33.4	LOS C	0.2	2.8	0.64	0.80	38.0
Approach		20	78.9	0.073	16.0	LOS B	0.2	2.8	0.64	0.80	35.8
All Vehicles		837	7.3	0.227	0.6	NA	0.2	2.8	0.02	0.03	77.1

2017 PM Construction Base Ruttleys Rd / Access Road

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Ruttleys Rd SE											
21	L2	1	0.0	0.224	6.9	LOS A	0.0	0.0	0.00	0.00	74.6
22	T1	422	4.7	0.224	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
23	R2	1	0.0	0.001	9.0	LOS A	0.0	0.0	0.48	0.59	52.8
Approach		424	4.7	0.224	0.1	NA	0.0	0.0	0.00	0.00	79.8
NorthEast: Access Rd NE											
24	L2	1	0.0	0.010	6.8	LOS A	0.0	0.2	0.70	0.73	47.4
25	T1	1	0.0	0.010	15.6	LOS B	0.0	0.2	0.70	0.73	41.8
26	R2	1	0.0	0.010	20.2	LOS B	0.0	0.2	0.70	0.73	47.3
Approach		3	0.0	0.010	14.2	LOS A	0.0	0.2	0.70	0.73	45.4
NorthWest: Ruttleys Rd NW											
27	L2	1	100.0	0.001	7.9	LOS A	0.0	0.0	0.00	0.63	51.7
28	T1	469	4.5	0.249	0.0	LOS A	0.0	0.1	0.00	0.00	79.9
29	R2	1	0.0	0.249	8.8	LOS A	0.0	0.1	0.00	0.00	60.2
Approach		472	4.7	0.249	0.0	NA	0.0	0.1	0.00	0.00	79.8
SouthWest: Access Rd SW											
30	L2	14	84.6	0.074	9.9	LOS A	0.2	2.7	0.66	0.82	35.3
31	T1	1	0.0	0.074	16.4	LOS B	0.2	2.7	0.66	0.82	41.1
32	R2	5	40.0	0.074	32.8	LOS C	0.2	2.7	0.66	0.82	40.3
Approach		20	68.4	0.074	16.3	LOS B	0.2	2.7	0.66	0.82	36.8
All Vehicles		919	6.1	0.249	0.4	NA	0.2	2.7	0.02	0.02	77.6

2017 PM Construction Ruttleys Rd / Access Road

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Ruttleys Rd SE											
21	L2	1	0.0	0.224	6.9	LOS A	0.0	0.0	0.00	0.00	74.6
22	T1	422	4.7	0.224	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
23	R2	1	0.0	0.001	9.0	LOS A	0.0	0.0	0.48	0.59	52.8
Approach		424	4.7	0.224	0.1	NA	0.0	0.0	0.00	0.00	79.8
NorthEast: Access Rd NE											
24	L2	1	0.0	0.010	6.8	LOS A	0.0	0.2	0.70	0.74	47.4
25	T1	1	0.0	0.010	15.6	LOS B	0.0	0.2	0.70	0.74	41.7
26	R2	1	0.0	0.010	20.5	LOS B	0.0	0.2	0.70	0.74	47.3
Approach		3	0.0	0.010	14.3	LOS A	0.0	0.2	0.70	0.74	45.3
NorthWest: Ruttleys Rd NW											
27	L2	1	100.0	0.001	7.9	LOS A	0.0	0.0	0.00	0.63	51.7
28	T1	469	4.5	0.249	0.0	LOS A	0.0	0.1	0.00	0.00	79.9
29	R2	1	0.0	0.249	8.8	LOS A	0.0	0.1	0.00	0.00	60.2
Approach		472	4.7	0.249	0.0	NA	0.0	0.1	0.00	0.00	79.8
SouthWest: Access Rd SW											
30	L2	23	50.0	0.482	13.9	LOS A	2.2	16.9	0.84	1.05	35.4
31	T1	1	0.0	0.482	23.4	LOS B	2.2	16.9	0.84	1.05	36.9
32	R2	91	2.3	0.482	28.8	LOS C	2.2	16.9	0.84	1.05	40.9
Approach		115	11.9	0.482	25.8	LOS B	2.2	16.9	0.84	1.05	39.6
All Vehicles		1014	5.5	0.482	3.0	NA	2.2	16.9	0.10	0.12	71.4

2017 PM Operation Base Ruttleys Rd / Access Road

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Ruttleys Rd SE											
21	L2	1	0.0	0.219	6.9	LOS A	0.0	0.0	0.00	0.00	74.6
22	T1	421	2.0	0.219	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
23	R2	1	0.0	0.001	8.2	LOS A	0.0	0.0	0.40	0.57	53.2
Approach		423	2.0	0.219	0.1	NA	0.0	0.0	0.00	0.00	79.8
NorthEast: Access Rd NE											
24	L2	1	100.0	0.009	8.6	LOS A	0.0	0.3	0.62	0.68	40.7
25	T1	1	0.0	0.009	12.4	LOS A	0.0	0.3	0.62	0.68	42.8
26	R2	1	0.0	0.009	15.8	LOS B	0.0	0.3	0.62	0.68	48.6
Approach		3	33.3	0.009	12.4	LOS A	0.0	0.3	0.62	0.68	43.8
NorthWest: Ruttleys Rd NW											
27	L2	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	65.4
28	T1	348	1.5	0.181	0.0	LOS A	0.0	0.1	0.00	0.00	79.9
29	R2	1	0.0	0.181	8.5	LOS A	0.0	0.1	0.00	0.00	60.2
Approach		351	1.5	0.181	0.1	NA	0.0	0.1	0.00	0.00	79.8
SouthWest: Access Rd SW											
30	L2	11	100.0	0.033	10.0	LOS A	0.1	1.3	0.56	0.71	41.5
31	T1	2	0.0	0.033	12.8	LOS A	0.1	1.3	0.56	0.71	43.6
32	R2	1	0.0	0.033	15.9	LOS B	0.1	1.3	0.56	0.71	49.6
Approach		14	76.9	0.033	11.0	LOS A	0.1	1.3	0.56	0.71	42.3
All Vehicles		791	3.2	0.219	0.3	NA	0.1	1.3	0.01	0.02	78.3

2017 PM Operation Ruttleys Rd / Access Road

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Ruttleys Rd SE											
21	L2	3	0.0	0.220	6.9	LOS A	0.0	0.0	0.00	0.00	74.5
22	T1	421	2.0	0.220	0.0	LOS A	0.0	0.0	0.00	0.00	79.8
23	R2	1	0.0	0.001	8.2	LOS A	0.0	0.0	0.40	0.57	53.2
Approach		425	2.0	0.220	0.1	NA	0.0	0.0	0.00	0.01	79.7
NorthEast: Access Rd NE											
24	L2	1	100.0	0.009	8.6	LOS A	0.0	0.3	0.62	0.68	40.7
25	T1	1	0.0	0.009	12.4	LOS A	0.0	0.3	0.62	0.68	42.8
26	R2	1	0.0	0.009	15.8	LOS B	0.0	0.3	0.62	0.68	48.6
Approach		3	33.3	0.009	12.4	LOS A	0.0	0.3	0.62	0.68	43.8
NorthWest: Ruttleys Rd NW											
27	L2	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	65.4
28	T1	348	1.5	0.181	0.0	LOS A	0.0	0.1	0.00	0.00	79.9
29	R2	1	0.0	0.181	8.5	LOS A	0.0	0.1	0.00	0.00	60.2
Approach		351	1.5	0.181	0.1	NA	0.0	0.1	0.00	0.00	79.8
SouthWest: Access Rd SW											
30	L2	11	100.0	0.049	10.1	LOS A	0.2	1.8	0.60	0.77	40.8
31	T1	2	0.0	0.049	12.9	LOS A	0.2	1.8	0.60	0.77	42.9
32	R2	5	0.0	0.049	16.1	LOS B	0.2	1.8	0.60	0.77	48.8
Approach		18	58.8	0.049	12.3	LOS A	0.2	1.8	0.60	0.77	43.1
All Vehicles		797	3.2	0.220	0.4	NA	0.2	1.8	0.02	0.02	78.0

2027 PM Operation Base Ruttleys Rd / Access Road

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Ruttleys Rd SE											
21	L2	1	0.0	0.252	6.9	LOS A	0.0	0.0	0.00	0.00	74.5
22	T1	484	2.0	0.252	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
23	R2	1	0.0	0.001	8.5	LOS A	0.0	0.0	0.43	0.58	53.1
Approach		486	1.9	0.252	0.1	NA	0.0	0.0	0.00	0.00	79.8
NorthEast: Access Rd NE											
24	L2	1	100.0	0.011	9.5	LOS A	0.0	0.3	0.68	0.74	39.6
25	T1	1	0.0	0.011	15.2	LOS B	0.0	0.3	0.68	0.74	41.6
26	R2	1	0.0	0.011	19.6	LOS B	0.0	0.3	0.68	0.74	47.1
Approach		3	33.3	0.011	14.9	LOS B	0.0	0.3	0.68	0.74	42.5
NorthWest: Ruttleys Rd NW											
27	L2	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	65.4
28	T1	401	1.6	0.209	0.0	LOS A	0.0	0.1	0.00	0.00	79.9
29	R2	1	0.0	0.209	9.0	LOS A	0.0	0.1	0.00	0.00	60.2
Approach		403	1.6	0.209	0.1	NA	0.0	0.1	0.00	0.00	79.8
SouthWest: Access Rd SW											
30	L2	11	100.0	0.039	11.4	LOS A	0.1	1.5	0.62	0.77	40.6
31	T1	2	0.0	0.039	15.7	LOS B	0.1	1.5	0.62	0.77	42.7
32	R2	1	0.0	0.039	19.8	LOS B	0.1	1.5	0.62	0.77	48.5
Approach		14	76.9	0.039	12.8	LOS A	0.1	1.5	0.62	0.77	41.5
All Vehicles		906	3.0	0.252	0.3	NA	0.1	1.5	0.01	0.02	78.5

2027 PM Operation Ruttleys Rd / Access Road

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Ruttleys Rd SE											
21	L2	1	0.0	0.252	6.9	LOS A	0.0	0.0	0.00	0.00	74.5
22	T1	484	2.0	0.252	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
23	R2	1	0.0	0.001	8.5	LOS A	0.0	0.0	0.43	0.58	53.1
Approach		486	1.9	0.252	0.1	NA	0.0	0.0	0.00	0.00	79.8
NorthEast: Access Rd NE											
24	L2	1	100.0	0.011	9.5	LOS A	0.0	0.3	0.68	0.74	39.6
25	T1	1	0.0	0.011	15.2	LOS B	0.0	0.3	0.68	0.74	41.6
26	R2	1	0.0	0.011	19.7	LOS B	0.0	0.3	0.68	0.74	47.0
Approach		3	33.3	0.011	14.9	LOS B	0.0	0.3	0.68	0.74	42.5
NorthWest: Ruttleys Rd NW											
27	L2	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	65.4
28	T1	401	1.6	0.209	0.0	LOS A	0.0	0.1	0.00	0.00	79.9
29	R2	1	0.0	0.209	9.0	LOS A	0.0	0.1	0.00	0.00	60.2
Approach		403	1.6	0.209	0.1	NA	0.0	0.1	0.00	0.00	79.8
SouthWest: Access Rd SW											
30	L2	13	100.0	0.069	11.5	LOS A	0.2	2.4	0.67	0.83	39.8
31	T1	2	0.0	0.069	16.0	LOS B	0.2	2.4	0.67	0.83	41.8
32	R2	6	0.0	0.069	20.1	LOS B	0.2	2.4	0.67	0.83	47.3
Approach		21	60.0	0.069	14.6	LOS B	0.2	2.4	0.67	0.83	42.0
All Vehicles		914	3.2	0.252	0.4	NA	0.2	2.4	0.02	0.02	77.9

Cumulative Impacts at Ruttleys Road / Pacific Highway

2017 AM Construction Peak

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	1071	3.5	0.281	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
6	R2	275	9.2	0.768	28.6	LOS C	6.1	46.2	1.00	0.94	47.4
Approach		1345	4.7	0.768	5.9	LOS A	6.1	46.2	0.20	0.19	75.9
North: Ruttleys Road N											
7	L2	202	17.2	0.195	10.1	LOS A	1.3	10.5	0.49	0.70	59.9
9	R2	234	4.1	0.863	32.4	LOS C	5.7	41.3	1.00	1.01	45.6
Approach		436	10.1	0.863	22.1	LOS B	5.7	41.3	0.76	0.87	51.3
West: Pacific Hwy W											
10	L2	135	3.1	0.074	8.3	LOS A	0.0	0.0	0.00	0.62	69.9
11	T1	631	9.7	0.859	24.0	LOS B	7.6	58.0	1.00	1.01	56.6
Approach		765	8.5	0.859	21.2	LOS B	7.6	58.0	0.82	0.94	58.6
All Vehicles		2546	6.8	0.863	13.2	LOS A	7.6	58.0	0.49	0.53	64.8

2017 PM Construction Peak

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Pacific Hwy E											
5	T1	824	6.1	0.220	0.0	LOS A	0.0	0.0	0.00	0.00	89.9
6	R2	201	15.7	0.860	38.7	LOS C	6.0	47.7	1.00	0.99	41.1
Approach		1025	8.0	0.860	7.6	LOS A	6.0	47.7	0.20	0.19	72.9
North: Ruttleys Road N											
7	L2	373	7.1	0.393	13.0	LOS A	4.5	33.3	0.62	0.74	59.6
9	R2	275	7.7	0.867	37.2	LOS C	8.2	61.4	1.00	1.02	42.6
Approach		647	7.3	0.867	23.2	LOS B	8.2	61.4	0.78	0.86	51.0
West: Pacific Hwy W											
10	L2	214	3.0	0.117	8.3	LOS A	0.0	0.0	0.00	0.62	70.0
11	T1	1089	3.4	0.892	28.9	LOS C	17.1	123.4	1.00	1.07	52.6
Approach		1303	3.3	0.892	25.5	LOS B	17.1	123.4	0.84	1.00	54.9
All Vehicles		2976	5.8	0.892	18.8	LOS B	17.1	123.4	0.60	0.69	58.9