# West Culburra Subdivision Development
# Transport and Accessibility Impact Assessment
# Addendum Report

transportation planning, design and delivery

12S1231000 01/10/13

GTAconsultants

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# Transport and Accessibility Impact Assessment

# Addendum Report

Issue: A 01/10/13

Client: Reality Realizations Pty Ltd
Reference: 12S1231000
GTA Consultants Office: NSW

**Quality Record**

| Issue | Date | Description | Prepared By | Checked By | Approved By | Signed |
|---|---|---|---|---|---|---|
| A | 01/10/13 | Final | Justin Murphy | Ken Hollyoak | Ken Hollyoak |  |



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# 1. Introduction

## 1.1 Background

The West Culburra development involves a mixed use subdivision development over approximately 110 hectares (ha) on land bounded to the north by the Crookhaven River, Lake Woollumboola and the existing urban area of Culburra to the east, Jervis Bay National Park to the south and Coonamia Road to the west.

A major project application (no. 09_0088) was lodged with the NSW Department of Planning and Infrastructure (DoPI) in April 2010 seeking approval for the Concept Plan under Part 3A of the Environmental Planning and Assessment Act 1979.

GTA Consultants was commissioned by Reality Realizations Pty Ltd in May 2012 to undertake a Transport and Accessibility Impact Assessment for the proposed West Culburra subdivision development and in particular to address Section 5 (Traffic and Access) of the Director-General's Environmental Assessment Requirements (DGR's) dated 27 May 2010.

The exhibition of the Environmental Assessment (EA) for the project ended on 07 June 2013. As outlined in correspondence from the Department of Planning and Infrastructure (DoPI) dated 02 July 2013, the application for the project is due to be transitioned to State Significant Development (SSD) and as such a Response to Submissions is required by 01 October 2013.

GTA Consultants was commissioned by Reality Realizations in August 2013 to address the submission comments related to transport and accessibility made by Roads and Maritime Services (RMS) and to prepare an addendum report documenting our findings and recommendations.

Table 1.1 lists the comments made by RMS and the corresponding sections of the report where these are addressed. A copy of the correspondence dated 07 June 2013 is contained in vii.

**Table 1.1: RMS Submission Comments and Relevant Report Sections**

| **Roads and Maritime Services (letter dated 07 June 2013 - Appendix A)** | **Addressed in:** |
|---|---|
| *RMS notes the traffic generation resulting from the development of the site is estimate to be 573 vehicle movements in the peak hour as per Section 7.1.1 of GTA Consultant's Traffic Impact Assessment.* | Section 2 |
| *RMS has undertaken further analysis using SIDRA to assess the likely impacts of full development of the subject site on the intersection of the Princes Highway and Kalandar Street. This assessment, based on the Friday AM 120th highest hour, indicated the Average Delay would increase from the current 86.4 seconds for all vehicles to 145.2 seconds for all vehicles. The analysis indicated that the Degree of Saturation would increase from the current 1.049 for all vehicles to 1.175. The long term impact of the development has not been assessed.*<br><br>*The above analysis indicated that the subject development will likely have a very significant on the intersection of the Princes Highway and Kalandar Street. The proponent should identify suitable infrastructure required to ameliorate these impacts on the network as a result of the subject development. These should be submitted to the Department and forwarded to RMS for comment.* | Section 3 |

| Roads and Maritime Services (letter dated 07 June 2013 - Appendix A) | Addressed in: |
|---|---|
| *The proponent should carry out further traffic analysis based on full development of the site. The analysis should include 10 year projected traffic volumes including background traffic growth and likely traffic volumes with and without the development. The impacts on the network of full development of the site should be assessed prior to determination of the project application for concept approval.* | Section 3.2 |
| *RMS notes there are a number of signalised intersections on the Princes Highway north of Kalandar Street. For accurate representation of the likely impacts of subject development on the highway, the proponent should undertake corridor modelling with the use of a program such as LinSig to include the coordinated nature of intersections at this location in the traffic analysis.* | Section 3.4 |
| *RMS is responsible for all permanent speed zoning in NSW regardless of the classification of the road. RMS objects to the suggested speed zone change on Culburra Road. Speed zones should be intuitive to the driver, with the road environment and adjacent land uses effectively informing the driver of the speed zone. On this basis, RMS considers that the existing 100km/hr speed zone at this location is appropriate and should be maintained. Without appropriate changes to the road environment along the relevant section Culburra Road, a lower speed zone would likely lead to compliance and enforcement issues.* | Section 4 |
| *Council should seek to reduce the number of access points to Culburra Road where possible. All access to stage 5 should be via the roundabout and the new collector road if possible. Research indicates that increased access density correlates highly with increased crash rate, and on this basis, accesses should be consolidated wherever possible.* | Section 5 |
| *The proponent should ensure that that Safe Intersection Sight Distance is available at all new intersections in accordance with Austroads Guide to Road Design Part 4a: Unsignalised and Signalised Intersections Table 3.2, in both directions.* | Section 6 |

Following the letter from RMS dated 07 June 2013, GTA Consultants liaised with RMS to seek clarification on the issues raised. Subsequent comments made by the RMS and the corresponding sections of the report where these are addressed are listed in Table 1.2.

**Table 1.2: RMS Submission Comments and Relevant Report Sections**

| Roads and Maritime Services (letter dated 18 September 2013 - Appendix A) | Addressed in: |
|---|---|
| *RMS advises that it currently has no upgrades planned for the intersection of the Princes Highway and Kalandar Street or north of Kinghorne Street in this vicinity.* | Section 3.3 |
| *RMS accepts the distribution assignment used to analyse the proportion of traffic generated by the subject development leaving the Culburra area and travelling west to the Princes Highway. However, this analysis should include the full development including the Stage 6 Industrial lots.* | Section 3 |
| *RMS supports the proposed assessment of the site at full development and a 10* | Section 3.2 |

| Roads and Maritime Services (letter dated 18 September 2013 - Appendix A) | Addressed in: |
|---|---|
| *year projected scenario with and without the development. The proponent should identify suitable infrastructure to ameliorate any impacts on the network as result of the total development.* | |
| *RMS notes the distance between the intersection of the Princes Highway and Kalandar Street and the nearest signalised intersection at Plunkett Street, Nowra. Given this, further corridor modelling using LinSig is not deemed to be necessary.* | Section 3.4 |
| *RMS generally does not support the construction of roundabouts within speed zoned above 80km/hr. The proponent should determine an appropriate junction treatment at the intersection of the Princes Highway and the new collector road to allow safe access into and out of the development within the existing speed zone. In this regard, refer to Figure 4.9: Warrants for turn treatments on the major road at Unsignalised intersections, in Austroads Guide to Road Design – Part 4A: Unsignalised and signalised Intersections. RMS is unlikely to support a speed zone reduction at this location* | Section 4 |

## 1.2 References

In preparing this report, reference has been made to the following:

- West Culburra Subdivision development Transport and Accessibility Impact Assessment, GTA Consultants, 2013
- Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections, 2010
- Correspondence from RMS dated 07 June 2013, 12 September 2013 and 18 September 2013 (vii)
- Nowra CBD Master Plan, Arup, 2011
- Nowra CBD Transport Strategy, Eppell Olsen and Partners, 2003
- Other documents referenced in the report.

# 2. Traffic Generation

## 2.1 Traffic Generation

Traffic generation estimates for the proposed development would usually be sourced from the *Guide to Traffic Generating Developments* (RMS, 2002). Application of the traffic generation rates contained in the RMS Guide results in an estimated traffic generation of 573 vehicle movements in a weekday peak hour as detailed in Section 7.1.1 of GTA Consultants Transport and Accessibility Impact Assessment.

Based on empirical traffic generation rates for the established areas of Culburra as supplied by Shoalhaven City Council's Traffic and Transport Unit, the residential component of the development (stages 2-5) is expected to generate up to 158 vehicle movements on the regional road network (west of Culburra) in the peak hour following full site development as summarised in Table 2.1.

**Table 2.1: Estimated Development Traffic Generation – Residential Stages (Stages 2-5)**

| Peak Hour Scenario | Traffic Generation Rate (Shoalhaven City Council) | Proposed Residential Dwellings (Stages 2-5) | Traffic Generation Estimates (vehicles) |
|---|---|---|---|
| Friday AM | 0.22 | 685 | 151 |
| Friday PM | 0.21 | | 144 |
| Saturday | 0.23 | | 158 |

Given the existing traffic generating characteristics of Culburra and the proportion of dedicated housing for the over 55 aged group proposed as part of the development, the adoption of the Culburra specific empirical traffic generation estimates is considered appropriate for use for intersection assessments. In correspondence dated 12 September 2013 RMS provided confirmation that the use of the empirical traffic generation rates for the intersection assessments is appropriate.

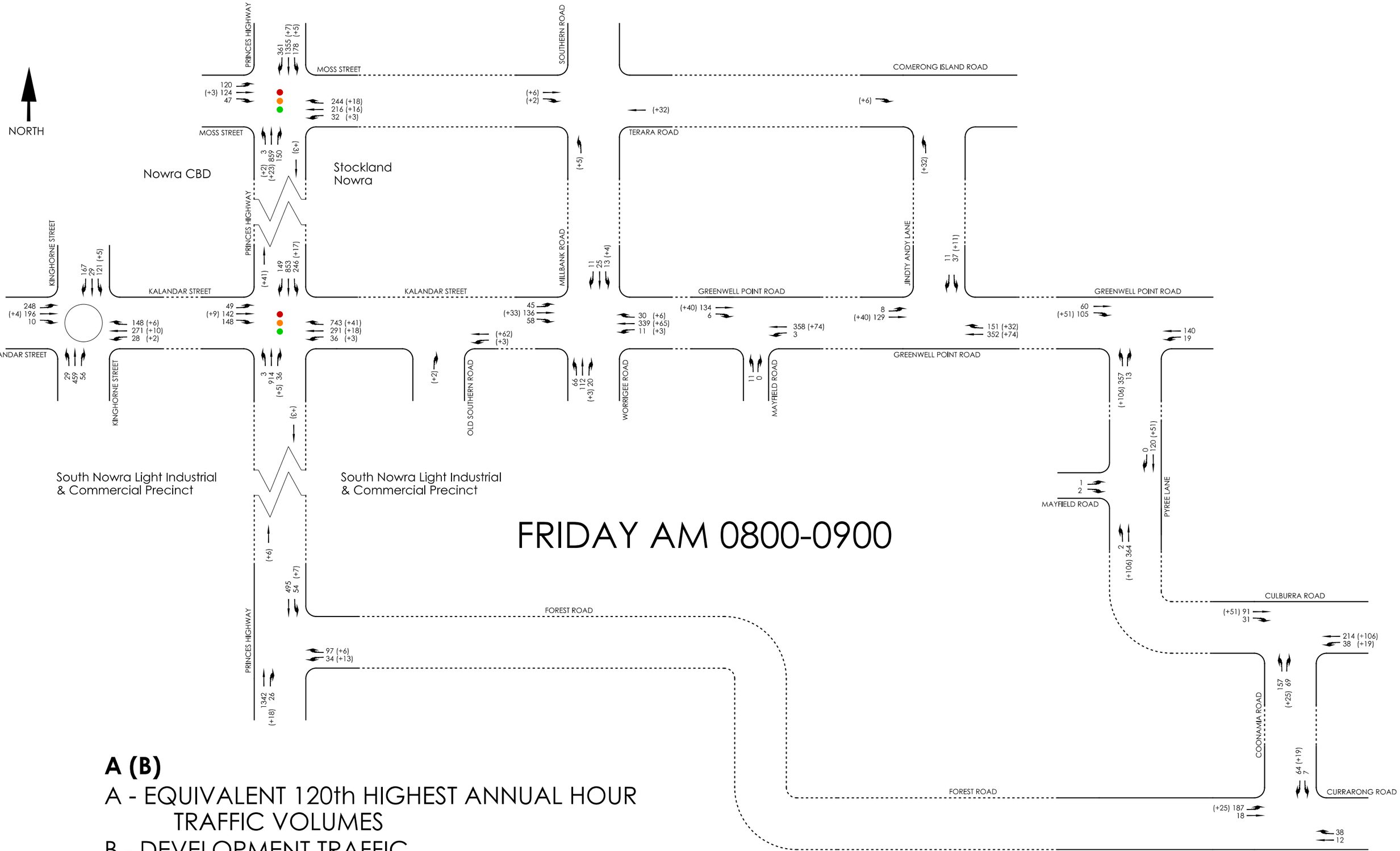
Further correspondence from RMS dated 18 September 2013 noted that traffic generated by the 28 industrial lots (stage 6) should be included in the intersection assessments. Table 2.2 summarises the estimated traffic generation of all development stages.

**Table 2.2: Estimated Development Traffic Generation – All Development Stages**

| Peak Hour Scenario | Traffic Generation Estimates (vehicles) | | |
|---|---|---|---|
| | Residential (Stages 2-5) | Industrial (Stage 6) | Total |
| Friday AM | 151 | 48 | 199 |
| Friday PM | 144 | 48 | 192 |
| Saturday | 158 | 0 | 158 |

As shown in Table 2.2, with the addition of the stage 6 industrial traffic, it is expected that the West Culburra subdivision development will generate 199, 192 and 158 vehicle movements on the regional road network (west of Culburra) during the respective Friday AM, Friday PM and Saturday peak hours on the regional road network (west of Culburra). It is anticipated that the stage 6 industrial lots will not generate any traffic during the Saturday peak hour (1200-1300).

Figure 2.1 and Figure 2.2 show the estimated increase in turning movements on the surrounding road network following full site development during the respective Friday AM and PM peak hours including traffic generated by the stage 6 industrial lots.

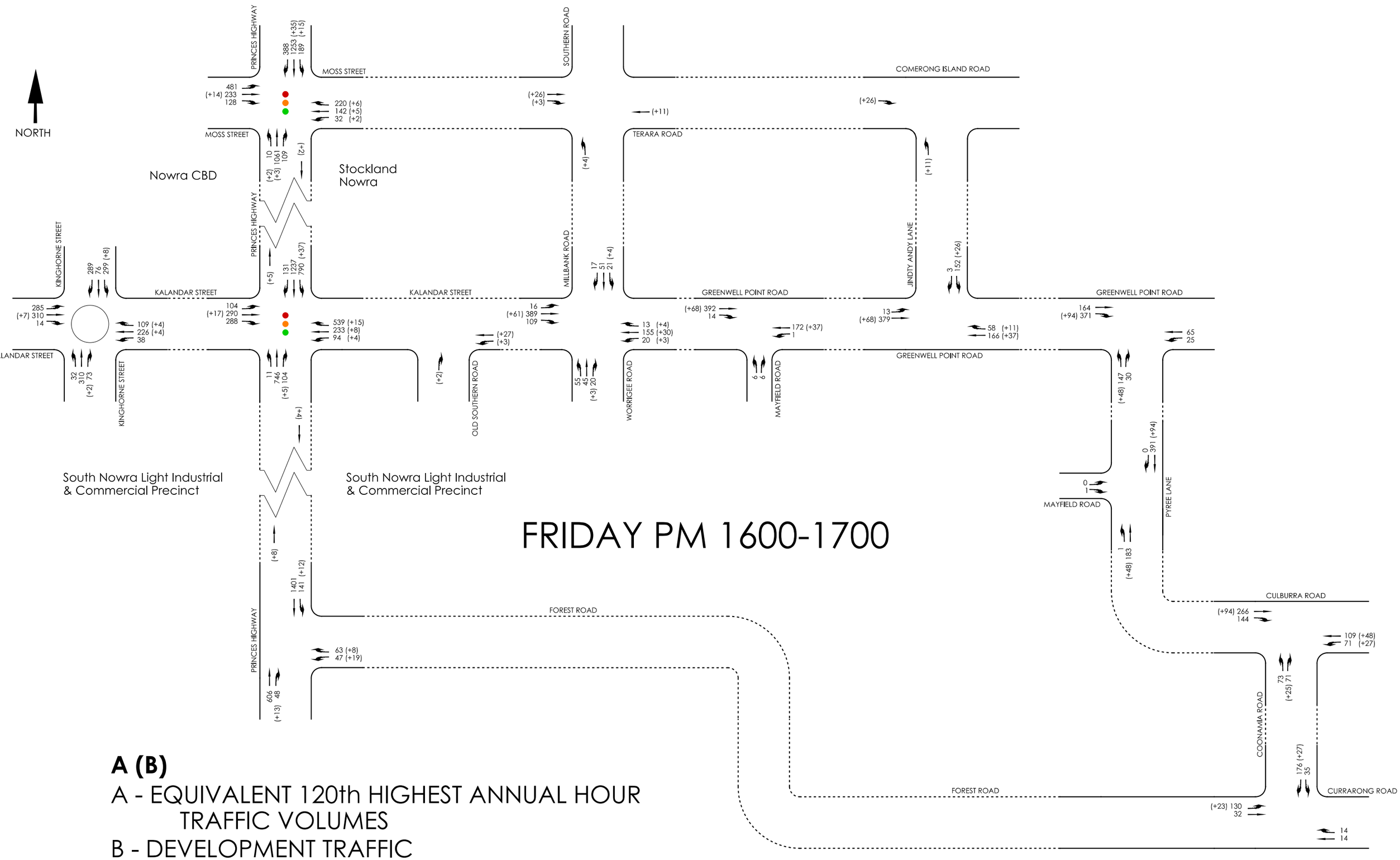



# FRIDAY AM 0800-0900

**A (B)**

A - EQUIVALENT 120th HIGHEST ANNUAL HOUR TRAFFIC VOLUMES

B - DEVELOPMENT TRAFFIC




# FRIDAY PM 1600-1700

**A (B)**

A - EQUIVALENT 120th HIGHEST ANNUAL HOUR TRAFFIC VOLUMES

B - DEVELOPMENT TRAFFIC

# 3. Traffic Impact

Assessment of the traffic impact of the proposed development on the relevant intersections was undertaken with SIDRA INTERSECTION[1] using 120th equivalent highest annual hour (HH) traffic volumes to account for the seasonal growth in traffic in the region. It is noted that the 120th HH represents peak hour volumes within the highest 1% of a year. Detailed results are contained in Appendix B.

## 3.1 Full Site Development (at completion)

Table 3.1 presents a summary of intersection operating conditions at the completion of full site development. Full results are contained in Appendix B. It is anticipated that the stage 6 industrial component of the development would not generate any traffic during the Saturday peak hour. As such, the results for the Saturday peak hour contained in Table 3.1 are unchanged from the future operating conditions presented in Table 7.11 of the Transport and Accessibility Impact Assessment prepared by GTA Consultants.

Table 3.1 shows that, under equivalent 120th HH traffic volumes with the addition of traffic generated by the development:

- the priority controlled intersections operate well with minimal delays and queues on all approaches during the three respective peak periods
- the Princes Highway intersections at Kalandar Street and Moss Street experience significant delays particularly during the Friday AM and Friday PM peak periods. However there is no significant change to the intersection Level of Service with the addition of development traffic.
- the addition of traffic generated by the Stage 6 industrial component has a negligible impact on the future operating conditions of the surveyed intersections.

[1] Program used under license from Akcelik & Associates Pty Ltd.

**Table 3.1: Future Operating Conditions – Full Site Development (Equivalent 120th HH plus Development Traffic)**

| Intersection | Peak | Degree of Saturation (DOS) | Delay (sec) | 95th Percentile Queue (m) | Level of Service (LOS) |
|---|---|---|---|---|---|
| Culburra Road/ Coonamia Road | Friday AM | 0.235 | 6.3 | 6 | NA |
| | Friday PM | 0.196 | 6.0 | 6 | NA |
| | Saturday | 0.177 | 6.4 | 5 | NA |
| Culburra Road/ Mayfield Road | Friday AM | 0.255 | 0.9 | 6 | NA |
| | Friday PM | 0.266 | 1.2 | 16 | NA |
| | Saturday | 0.173 | 1.0 | 9 | NA |
| Greenwell Point Road/ Pyree Lane | Friday AM | 0.367 | 10.1 | 14 | NA |
| | Friday PM | 0.728 | 12.7 | 75 | NA |
| | Saturday | 0.307 | 8.4 | 10 | NA |
| Greenwell Point Road/ Jindy Andy Lane | Friday AM | 0.297 | 3.7 | 10 | NA |
| | Friday PM | 0.278 | 4.5 | 8 | NA |
| | Saturday | 0.218 | 3.8 | 6 | NA |
| Greenwell Point Road/ Mayfield Road | Friday AM | 0.241 | 2.3 | 13 | NA |
| | Friday PM | 0.274 | 2.8 | 27 | NA |
| | Saturday | 0.183 | 2.5 | 18 | NA |
| Greenwell Point Road/ Millbank Road/ Worrigee Road | Friday AM | 0.464 | 7.7 | 18 | NA |
| | Friday PM | 0.283 | 6.3 | 8 | NA |
| | Saturday | 0.163 | 5.6 | 4 | NA |
| Princes Highway/ Kalandar Street | Friday AM | 1.082 | 100.7 | 465 | F |
| | Friday PM | 1.143 | 130.2 | 502 | F |
| | Saturday | 0.983 | 67.6 | 415 | E |
| Coonamia Road/ Currarong Road/ Forest Road | Friday AM | 0.132 | 12.2 | 4 | NA |
| | Friday PM | 0.293 | 12.4 | 10 | NA |
| | Saturday | 0.238 | 12.4 | 8 | NA |
| Kalandar Street/ Kinghorne Street | Friday AM | 0.741 | 15.8 | 73 | B |
| | Friday PM | 0.789 | 16.3 | 83 | B |
| | Saturday | 0.377 | 9.9 | 18 | A |
| Princes Highway/ Forest Road | Friday AM | 0.739 | 2.3 | 6 | NA |
| | Friday PM | 0.766 | 6.4 | 22 | NA |
| | Saturday | 0.598 | 3.8 | 15 | NA |
| Princes Highway/ Moss Street | Friday AM | 1.069 | 110.1 | 477 | F |
| | Friday PM | 1.243 | 224.2 | 798 | F |
| | Saturday | 0.873 | 48.3 | 199 | D |

## 3.2 10 Year Modelling Scenarios

### 3.2.1 Background Traffic Growth

The Review of Environmental Factors (REF) for the Princes Highway upgrade at South Nowra was completed in November 2009 and estimated a 2.5% linear growth rate in traffic volumes on this section of the Princes Highway up to 2028.

The application of a 2.5% linear growth rate for the Princes Highway for an equivalent 120th HH traffic scenario is however considered to be unrealistic. It is unlikely that there is sufficient capacity available on the Princes Highway to realistically accommodate such growth.

The West Culburra Subdivision development is anticipated to be the largest source of traffic growth in Culburra and most likely in the area between Culburra and the Princes Highway. As such, no growth rate has been applied to traffic east of the Princes Highway for the full site development + 10 years scenario. A 1% linear growth has been applied to traffic west of the Princes Highway.

In summary, the following growth rates have been applied to background traffic for the full site development + 10 years scenario:

- Princes Highway – 1% linear growth
- West of Princes Highway – 1% linear growth
- East of Princes Highway – 2% linear growth.

This application of these background traffic growth rates affects the following four intersections included in GTA Consultants Transport and Accessibility Impact Assessment:

- Princes Highway/ Kalandar Street
- Kalandar Street/ Kinghorne Street
- Princes Highway/ Forest Road
- Princes Highway/Moss Street.

The remaining seven intersections are not subject to background traffic growth and as such 10 year modelling is unnecessary.

### 3.2.2 Without Development Traffic

Table 3.2 presents a summary of intersection operating conditions under 120th HH traffic volumes including 10 year background traffic growth without development traffic. Detailed results are contained in Appendix B.

**Table 3.2: 10 Year Operating Conditions (Equivalent 120th HH – No Development Traffic)**

| Intersection | Peak | Degree of Saturation (DOS) | Delay (sec) | 95th Percentile Queue (m) | Level of Service (LOS) |
|---|---|---|---|---|---|
| Princes Highway/ Kalandar Street | Friday AM | 1.048 | 89.2 | 444 | F |
| | Friday PM | 1.147 | 160.0 | 706 | F |
| | Saturday | 0.982 | 73.5 | 496 | F |
| Kalandar Street/ Kinghorne Street | Friday AM | 0.882 | 22.6 | 126 | B |
| | Friday PM | 0.910 | 22.9 | 147 | B |
| | Saturday | 0.421 | 10.1 | 21 | A |
| Princes Highway/ Forest Road | Friday AM | 0.813 | 2.0 | 6 | NA |
| | Friday PM | 0.873 | 6.8 | 27 | NA |
| | Saturday | 0.657 | 3.4 | 16 | NA |
| Princes Highway/ Moss Street | Friday AM | 1.020 | 92.0 | 466 | F |
| | Friday PM | 1.274 | 237.3 | 976 | F |
| | Saturday | 0.846 | 49.1 | 225 | D |

### 3.2.3 With Development Traffic

Table 3.3 presents a summary of intersection operating conditions under 120th HH traffic volumes including 10 year background traffic growth with development traffic. Detailed results are contained in Appendix B.

**Table 3.3: 10 Year Operating Conditions (Equivalent 120th HH – plus Development Traffic)**

| Intersection | Peak | Degree of Saturation (DOS) | Delay (sec) | 95th Percentile Queue (m) | Level of Service (LOS) |
|---|---|---|---|---|---|
| Princes Highway/ Kalandar Street | Friday AM | 1.085 | 102.8 | 512 | F |
| | Friday PM | 1.179 | 168.4 | 706 | F |
| | Saturday | 0.985 | 78.4 | 496 | F |
| Kalandar Street/ Kinghorne Street | Friday AM | 0.896 | 23.9 | 135 | B |
| | Friday PM | 0.926 | 24.6 | 161 | B |
| | Saturday | 0.424 | 10.1 | 21 | A |
| Princes Highway/ Forest Road | Friday AM | 0.813 | 2.3 | 7 | NA |
| | Friday PM | 1.025 | 11.4 | 50 | NA |
| | Saturday | 0.657 | 4.2 | 19 | NA |
| Princes Highway/ Moss Street | Friday AM | 1.133 | 134.2 | 635 | F |
| | Friday PM | 1.400 | 312.1 | 1108 | F |
| | Saturday | 0.958 | 55.1 | 257 | D |

A comparison of intersection performance results shown in Table 3.2 and Table 3.3 indicates that the additional traffic generated by the development would result in a minor increase in vehicle delay in a 10 year scenario at the surveyed intersections. The intersection's Level of Service under a 10 year scenario are unchanged with or without the addition of development traffic.

## 3.3 Princes Highway/ Kalandar Street Intersection

The RMS raised specific concerns of the impact of development traffic on the Princes Highway/ Kalandar Street intersection. This Section discusses the impact of development traffic on this intersection in detail.

### 3.3.1 Existing Operation

Considering the 10 year modelling results presented above, Table 3.4 presents detailed results of the existing operation of the Princes Highway/Kalandar Street intersection using 120th HH traffic volumes.

**Table 3.4: Princes Highway/ Kalandar Street Intersection – Existing Operating Conditions (Equivalent 120th Highest Annual Hour)**

| Peak | Leg | Degree of Saturation (DOS) | Delay (sec) | 95th Percentile Queue (m) | Level of Service (LOS) |
|---|---|---|---|---|---|
| Friday AM | Princes Highway (south) | 1.049 | 110.6 | 363 | F |
| | Kalandar Street (east) | 1.039 | 122.6 | 403 | F |
| | Princes Highway (north) | 1.042 | 43.1 | 181 | D |
| | Kalandar Street (west) | 0.700 | 63.7 | 93 | E |
| | **All Vehicles** | **1.049** | **86.4** | **403** | **F** |
| Friday PM | Princes Highway (south) | 1.038 | 108.9 | 281 | F |
| | Kalandar Street (east) | 1.065 | 141.9 | 335 | F |
| | Princes Highway (north) | 109.9 | 109.9 | 558 | F |
| | Kalandar Street (west) | 1.101 | 135.2 | 389 | F |
| | **All Vehicles** | **1.101** | **119.6** | **558** | **F** |
| Saturday | Princes Highway (south) | 0.966 | 64.8 | 230 | E |
| | Kalandar Street (east) | 0.968 | 90.3 | 248 | F |
| | Princes Highway (north) | 0.961 | 50.2 | 389 | D |
| | Kalandar Street (west) | 0.771 | 67.3 | 105 | E |
| | **All Vehicles** | **0.968** | **63.3** | **389** | **E** |

On the basis of this assessment, under equivalent 120th HH traffic volumes the Princes Highway/Kalandar Street intersection is already overcapacity during the existing Friday AM and PM peak periods. It is clear that the intersection experiences significant delays during the three peak periods assessed. Significant queues are experienced on the southern and eastern approaches during the Friday AM peak period and on all approaches during the Friday PM peak period.

### 3.3.2 Full Site Development

#### RMS Analysis

RMS undertook additional SIDRA analysis of the Princes Highway/ Kalandar Street intersection to assess the impact of full site development during the Friday AM 120th HH. This analysis indicated an increase in Average Delay from the current 86.4 seconds for all vehicles to 145.2 seconds for all vehicles. In correspondence dated 12 September 2013 (vii), RMS confirmed that this additional

analysis utilised the RMS Guide traffic generation estimate of 573 vehicle movements rather than the Culburra specific empirical traffic generation estimate of 158 vehicle movements.

As mentioned in Section 2, correspondence from RMS dated 12 September 2013 (vii), confirmed that use of the empirical traffic generation rates for the intersection assessments is appropriate.

### GTA Consultants Analysis

A summary of the total traffic flows at the intersection and increase of development traffic at the intersection for the three peak periods is shown in Table 3.5.

**Table 3.5: Princes Highway/Kalandar Street Intersection – Traffic Flow Summary**

| Peak Period | Equivalent 120th HH Intersection Flow (vehicles – all movements) | Additional Development Traffic Flow at Intersection | |
|---|---|---|---|
| | | Vehicles (all movements) | Increase on 120th HH Flows |
| Friday AM | 3610 | 92 | 2.5% |
| Friday PM | 4567 | 86 | 1.9% |
| Saturday | 4089 | 41 | 1.0% |

As shown in Table 3.5, the addition of development traffic represents a negligible increase of traffic at the intersection comprising 2.5%, 1.9% and 1.0% of the 120th HH traffic flows for the Friday AM, PM and Saturday peak periods respectively.

Table 3.6 presents detailed results of intersection operating conditions under 120th HH traffic volumes following full site development. Detailed results of the SIDRA analysis are contained in Appendix B.

**Table 3.6: Princes Highway/ Kalandar Street Intersection – Future Operating Conditions with Full Site Development (Equivalent 120th Highest Annual Hour)**

| Peak | Leg | Degree of Saturation (DOS) | Delay (sec) | 95th Percentile Queue (m) | Level of Service (LOS) |
|---|---|---|---|---|---|
| Friday AM | Princes Highway (south) | 1.082 | 134.4 | 395 | F |
| | Kalandar Street (east) | 1.072 | 147.0 | 465 | F |
| | Princes Highway (north) | 1.042 | 43.6 | 185 | D |
| | Kalandar Street (west) | 0.719 | 64.7 | 96 | E |
| | **All Vehicles** | **1.082** | **100.7** | **465** | **F** |
| Friday PM | Princes Highway (south) | 1.114 | 143.2 | 300 | F |
| | Kalandar Street (east) | 1.124 | 185.2 | 378 | F |
| | Princes Highway (north) | 1.081 | 95.7 | 502 | F |
| | Kalandar Street (west) | 1.143 | 151.8 | 412 | F |
| | **All Vehicles** | **1.143** | **130.2** | **502** | **F** |
| Saturday | Princes Highway (south) | 0.983 | 69.4 | 240 | E |
| | Kalandar Street (east) | 0.968 | 90.0 | 257 | F |
| | Princes Highway (north) | 0.981 | 56.7 | 415 | E |
| | Kalandar Street (west) | 0.781 | 67.7 | 107 | E |
| | **All Vehicles** | **0.983** | **67.6** | **415** | **E** |

As shown in Table 3.6, the addition of development traffic to the intersection results in negligible increase in delay and does not a have a significant impact on the intersection Level of Service (LOS).

### 3.3.3 Full Site Development + 10 Years

Future year SIDRA modelling was undertaken for a scenario 10 years after full site development.

Table 3.7summarises the presents a summary of intersection operating conditions under 120th HH traffic volumes including 10 year background traffic growth without development traffic while Table 3.8 presents a summary of intersection operating conditions with development traffic. Detailed results of the SIDRA analysis are contained in Appendix B.

**Table 3.7: Princes Highway/ Kalandar Street Intersection – Future Operating Conditions (Equivalent 120th HH – without Development Traffic)**

| Peak | Leg | Degree of Saturation (DOS) | Delay (sec) | 95th Percentile Queue (m) | Level of Service (LOS) |
|---|---|---|---|---|---|
| Friday AM | Princes Highway (south) | 1.032 | 102.9 | 412 | F |
| | Kalandar Street (east) | 1.048 | 135.8 | 444 | F |
| | Princes Highway (north) | 1.019 | 44.3 | 220 | D |
| | Kalandar Street (west) | 0.826 | 79.4 | 117 | F |
| | **All Vehicles** | **1.048** | **89.2** | **444** | **F** |
| Friday PM | Princes Highway (south) | 1.142 | 187.3 | 425 | F |
| | Kalandar Street (east) | 1.147 | 213.6 | 427 | F |
| | Princes Highway (north) | 1.141 | 127.4 | 706 | F |
| | Kalandar Street (west) | 1.136 | 163.6 | 498 | F |
| | **All Vehicles** | **1.147** | **160.0** | **706** | **F** |
| Saturday | Princes Highway (south) | 0.966 | 83.4 | 319 | F |
| | Kalandar Street (east) | 0.955 | 91.0 | 262 | F |
| | Princes Highway (north) | 0.982 | 58.5 | 496 | E |
| | Kalandar Street (west) | 0.907 | 86.2 | 139 | F |
| | **All Vehicles** | **0.982** | **73.5** | **496** | **F** |

**Table 3.8: Princes Highway/ Kalandar Street Intersection – Future Operating Conditions (Equivalent 120th HH – 10 years plus Development Traffic)**

| Peak | Leg | Degree of Saturation (DOS) | Delay (sec) | 95th Percentile Queue (m) | Level of Service (LOS) |
|---|---|---|---|---|---|
| Friday AM | Princes Highway (south) | 1.058 | 120.7 | 439 | F |
| | Kalandar Street (east) | 1.085 | 163.1 | 512 | F |
| | Princes Highway (north) | 1.019 | 44.9 | 225 | D |
| | Kalandar Street (west) | 0.846 | 81.3 | 122 | F |
| | **All Vehicles** | **1.085** | **102.8** | **512** | **F** |
| Friday PM | Princes Highway (south) | 1.170 | 202.1 | 425 | F |
| | Kalandar Street (east) | 1.148 | 214.4 | 443 | F |
| | Princes Highway (north) | 1.141 | 130.4 | 706 | F |
| | Kalandar Street (west) | 1.179 | 189.5 | 560 | F |
| | **All Vehicles** | **1.179** | **168.4** | **706** | **F** |
| Saturday | Princes Highway (south) | 0.983 | 92.3 | 339 | F |
| | Kalandar Street (east) | 0.985 | 104.6 | 293 | F |
| | Princes Highway (north) | 0.982 | 58.2 | 496 | E |
| | Kalandar Street (west) | 0.918 | 86.7 | 143 | F |
| | **All Vehicles** | **0.985** | **78.4** | **496** | **F** |

A comparison of intersection performance results shown in Table 3.7 and Table 3.8 indicates that the additional traffic generated by the full development would result in relatively minor increase in delays. The intersection Level of Service is unchanged with the addition of traffic generated by the development over 10 year scenarios.

### 3.3.4 Traffic Impact Summary

A summary of intersection operating conditions under equivalent 120th HH for existing, full site development and 10 years after development is presented in Table 3.9.

**Table 3.9: Princes Highway/ Kalandar Street - Intersection Operating Conditions Summary – All Vehicles (Equivalent 120th Highest Annual Hour)**

| Peak | Scenario | Degree of Saturation (DOS) | Delay (sec) | 95th Percentile Queue (m) | Level of Service (LOS) |
|---|---|---|---|---|---|
| Friday AM | Existing | 1.049 | 86.4 | 403 | F |
| | Full Site Development | 1.082 | 100.8 | 465 | F |
| | Existing + 10 Years | 1.048 | 89.2 | 444 | F |
| | Full Site Development + 10 Years | 1.085 | 102.8 | 512 | F |
| Friday PM | Existing | 1.101 | 119.6 | 558 | F |
| | Full Site Development | 1.143 | 130.2 | 502 | F |
| | Existing + 10 Years | 1.147 | 160.0 | 706 | F |
| | Full Site Development + 10 Years | 1.179 | 168.4 | 706 | F |
| Saturday | Existing | 0.968 | 63.3 | 389 | E |
| | Full Site Development | 0.983 | 67.6 | 415 | E |
| | Existing + 10 Years | 0.982 | 73.5 | 496 | F |
| | Full Site Development + 10 Years | 0.985 | 78.4 | 496 | F |

### 3.3.5 Intersection Improvements

The RMS submission to DoPI recommended that suitable infrastructure be identified to ameliorate the impacts of traffic generated by the development at the intersection. As demonstrated by the SIDRA results above, the intersection currently operates overcapacity in the Friday AM and PM peak periods under 120th HH traffic volumes without the traffic generated by the development. Improvements are needed at the intersection irrespective of what development occurs at Culburra.

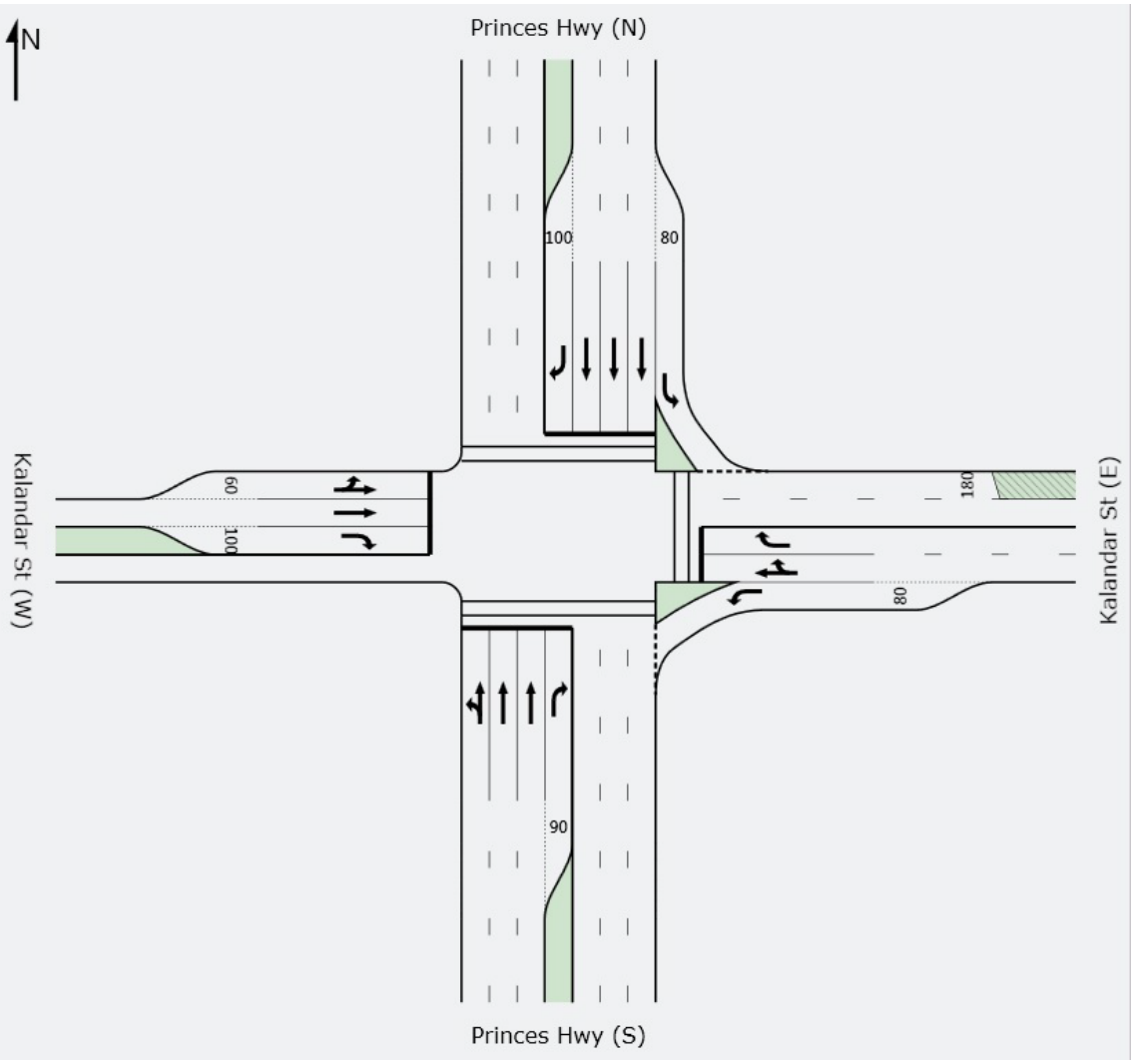
In correspondence dated 18 September 2012 RMS confirmed that it currently has no upgrades planned for the Princes Highway/ Kalandar Street intersection or along the Princes Highway corridor in Nowra north of Kinghorne Street.

Given this, GTA Consultants undertook a desktop investigation to identify potential improvements to increase capacity at the intersection. Under existing 120th HH traffic volumes, the following improvements were identified and incorporated into the SIDRA model to provide a significant improvement in intersection Level of Service (LOS D or better):

- **Kalandar Street (eastern approach)** – provision of an additional, dedicated left-turn slip lane
- **Kalandar Street (western approach)** – provision of a dedicated right turn lane and an additional, dedicated through-lane
- **Princes Highway (northern and southern approaches)** – removal of the concrete medians and provision of an additional through-lane in each direction

The layout of the Princes Highway/ Kalandar Street Intersection incorporating these changes is shown in Figure 3.1.

**Figure 3.1: Princes Highway/ Kalandar Street Intersection – potential layout**



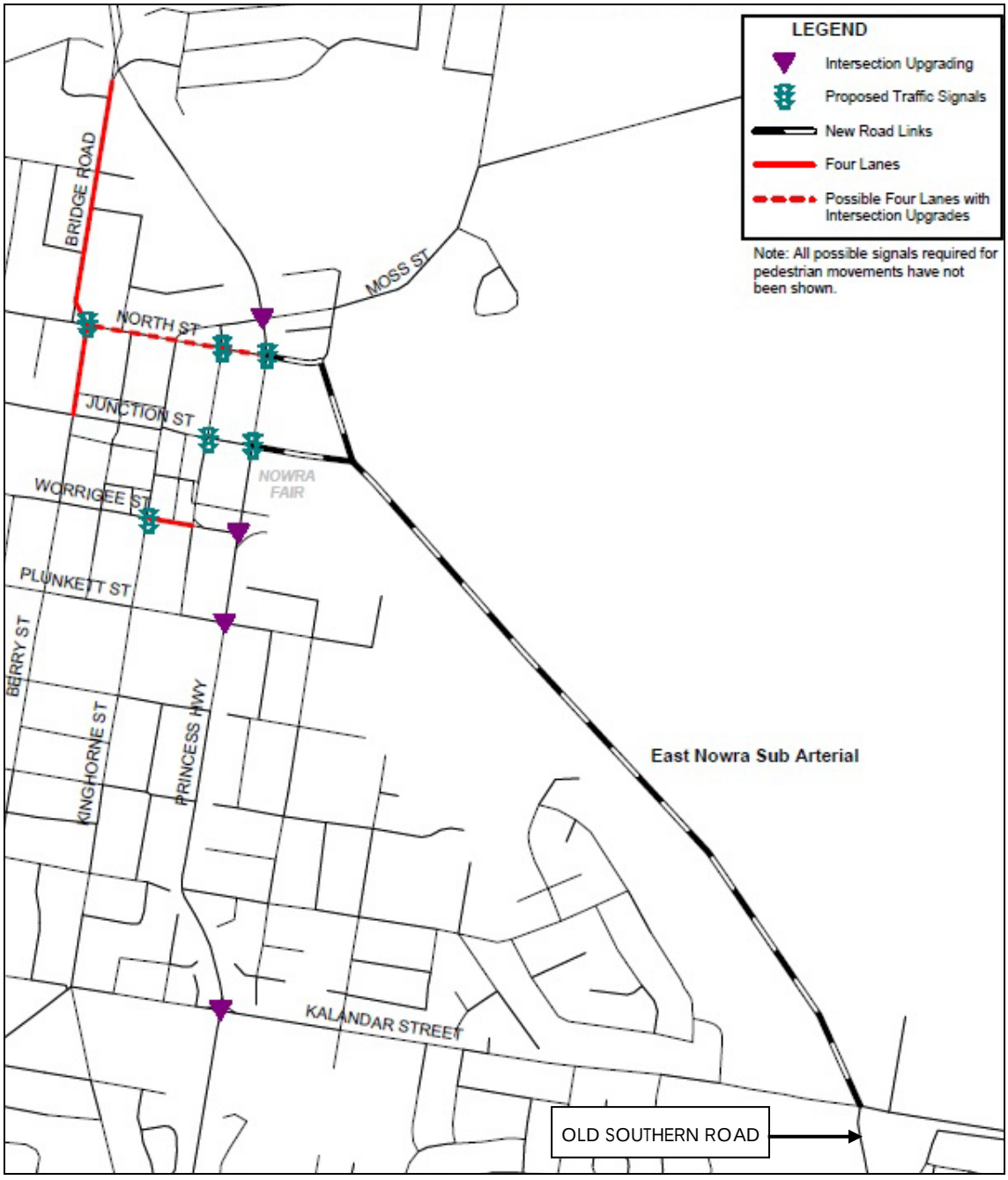

Significant improvements are therefore required at the intersection to reduce delays and provide a LOS D or better under existing 120th HH equivalent traffic volumes. The most critical improvement required is increasing the capacity of the Princes Highway to three lanes in each direction. This increase in capacity would be required beyond the intersection approaches to ensure there is sufficient upstream and downstream capacity.

The capacity issues at the Princes Highway/ Kalandar Street intersection are part of a wider traffic congestion problem along the Princes Highway in Nowra and any improvements need to be considered in the broader context of traffic improvements in Nowra.

### 3.3.6 East Nowra Sub-Arterial (ENSA)

Whilst RMS has suggested that no road improvements are planned in the immediate future, an East Nowra Sub-Arterial (ENSA) road link has been proposed for over 10 years to provide a north-south road link east of the Princes Highway which connects Kalandar Street at Old Southern Road with North Street and Junction Street. The ENSA is intended to alleviate traffic congestion on Kalandar Street, the Princes Highway and on rural lanes east of Nowra. An indicative alignment of the ENSA is shown in Figure 3.2.

**Figure 3.2: East Nowra Sub-Arterial (ENSA) Alignment**




Source: Nowra CBD Transport Strategy, 2003 (Eppell Olsen and Partners)

It is anticipated that the ENSA would reduce traffic volumes on the Princes Highway through Nowra CBD and Kalandar Street and alleviate congestion at the Princes Highway/Kalandar Street intersection.

The Nowra CBD Master Plan (Arup, 2011) states that RMS and Shoalhaven City Council support the need for ENSA and the associated works required along the Princes Highway, however there is no funding commitment to build the road at this stage by either party.

Given the significant improvements required at the Princes Highway/ Kalandar Street intersection and along the Princes Highway in the vicinity of the intersection, the ENSA arguably represents an alternative which would have greater strategic benefit.

## 3.4 Princes Highway Corridor Modelling

The RMS' submission to DoPI noted the signalised intersections on the Princes Highway north of Kalandar Street and requested that corridor modelling be undertaken using LinSig software or similar.

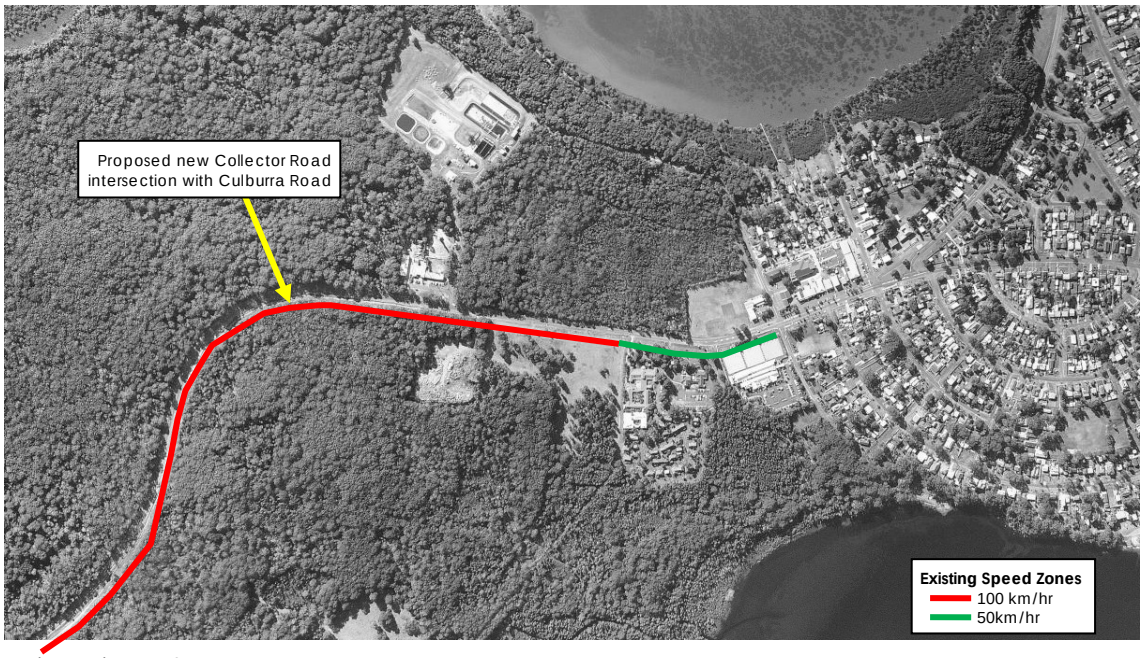
The West Culburra Subdivision development is approximately 20km from Nowra. SIDRA modelling was undertaken for the two Princes Highway intersections in Nowra most likely to be utilised by development traffic; Moss Street and Kalandar Street. These intersections are approximately 1.7km apart and two signalised intersections (Worrigee Street and Plunkett Street) are located between them.

Following discussions with RMS it was confirmed in correspondence dated 18 September 2013 that corridor modelling was unnecessary. A copy of the correspondence is contained in Appendix A.

# 4. Culburra Road Speed Zoning

The main access to the development site was proposed via a roundabout on Culburra Road at the eastern end of new Collector Road. A 100km/hr speed zone is currently in place on Culburra Road in the vicinity of the proposed Collector Road intersection. A reduction in the speed zone to 50km/hr was proposed for all approaches to the proposed roundabout. Figure 4.1 shows the existing speed zoning in the vicinity of the development site and the indicative location of the proposed roundabout.

**Figure 4.1: Culburra Road – Existing Speed Zoning**




Background Image Source: NearMap

RMS is responsible for all permanent speed zoning in NSW regardless of the classification of the road. RMS does not support a reduction in the speed zone on Culburra Road and considers the existing 100km/hr speed zone on this section of Culburra Road to be appropriate.

On this basis, whilst GTA considers that the roundabout proposal is acceptable, an alternative junction treatment has been proposed at the intersection with further details contained in Section 5.

# 5. Access to Culburra Road

A new Collector Road is proposed to provide access to Stages 3, 4 and 5 with two connections to Culburra Road. The eastern access will be the primary means of accessing Stages 3, 4 and 5. It is understood that the western access to the development will not be provided at this stage. The location of the western access is anticipated to be in the vicinity of the existing unsealed access track.

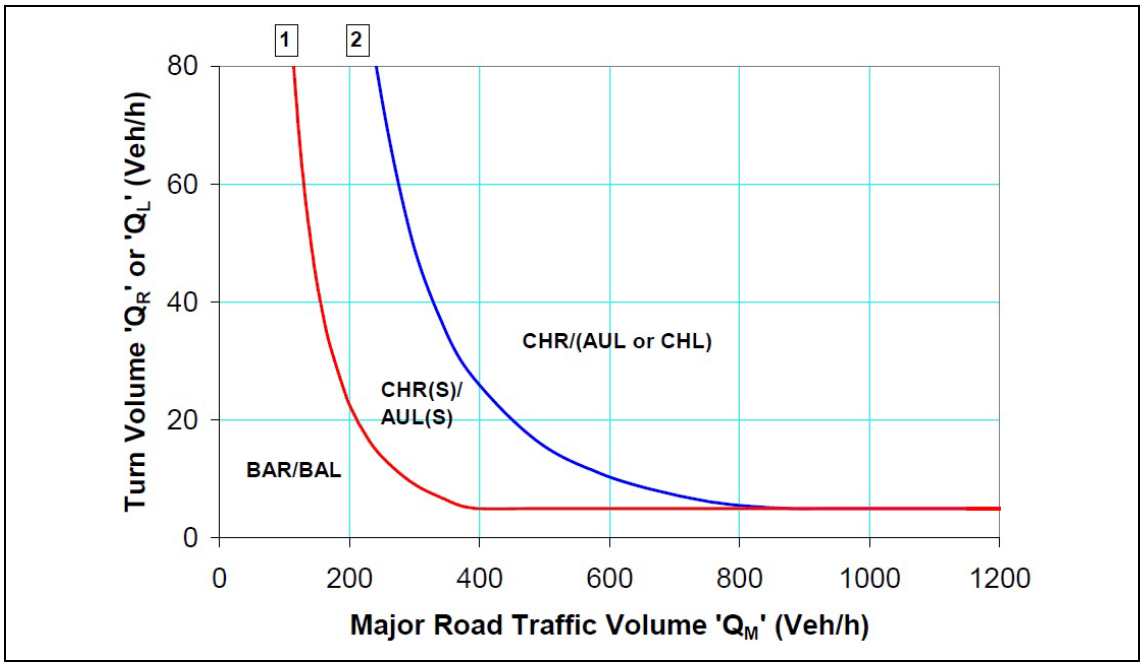
RMS generally does not support roundabouts within speed zones above 80km/hr and has stipulated that an appropriate junction treatment at the Princes Highway/ Collector Road should be proposed to allow safe access into and out of the development within the existing 100km/hr speed zone.

RMS has stipulated that Council seek to reduce the number of access points to Culburra Road and stipulated that all access to stage 6 (industrial) be via the Collector Road/Culburra Road intersection.

## 5.1 Warrants for Turn Treatments

Figure 5.1 shows the warrants for turn treatments for roads with a design speed of greater than or equal to 100km/hr taken from *Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections*.

**Figure 5.1: Warrants for turn treatments on the major road at unsignalised intersections (Design speed ≥ 100km/hr)**




Source: Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections, 2010 (Figure 4.9a, pg. 46)

It is anticipated that until the western connection to Culburra Road is established, the eastern intersection of the new Collector Road and Culburra Road will be the sole vehicular access point to development land units 3, 4 and 5.

The traffic volume on Culburra Road 10 years after development is estimated to be in excess of 500 vehicles per hour (vph).

The y-axis 'Turn Volume' on Figure 5.1 refers to the major road turning volumes, i.e. vehicles turning from Culburra Road into the new Collector Road which are estimated to be in excess of 80 vph 10 years after full-site development.

### 5.1.1 Geometric Requirements

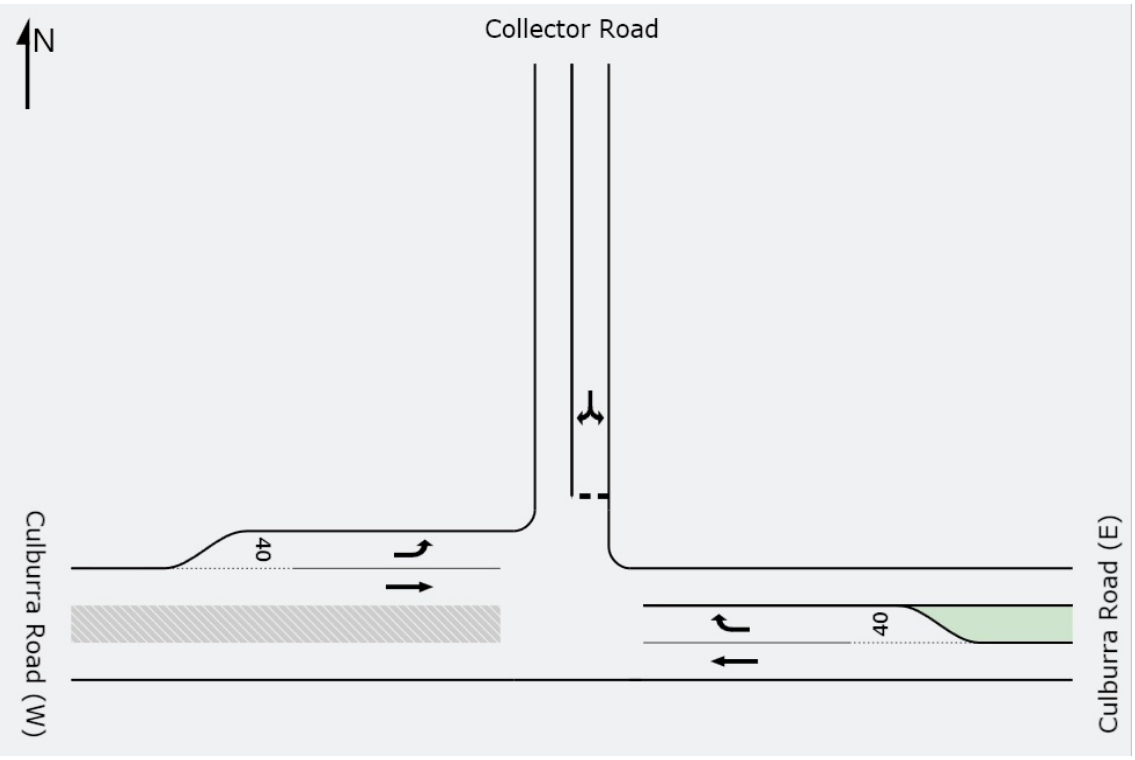
Based on the estimated traffic volumes, Figure 5.1 indicates that for an unsignalised intersection a channelised T-junction with a full length right-turn treatment on the major road (CHR) is warranted with either an auxiliary left-turn lane (AUL) treatment or channelised left-turn lane (CHL) on the major road.

Based on Table 7.1 and Table 8.2 of *Austroads Guide to Road Design Part 4A* and the existing 100km/hr speed zone on Culburra Road, the major road left and right turn lanes are required to be a minimum of 40m long with a 30m taper. There are no numerical warrants for the provision of acceleration lanes.

### 5.1.2 Schematic Layout

Figure 5.2 shows a schematic layout of a priority controlled intersection treatment at the Culburra Road/Collector Road (east) intersection with left and right turn lanes on Culburra Road.

**Figure 5.2: Culburra Road/Collector Road – priority controlled intersection schematic layout**




## 5.2 Intersection Operation

An assessment of the operation of the priority controlled intersection treatment was undertaken using SIDRA. This analysis indicates that the intersection would operate satisfactorily with minimal queues and delays on all approaches with the addition of development traffic.

The traffic flows used were as per the previous assessment undertaken of a roundabout treatment at the intersection, however additional traffic generated by the stage 6 industrial lots was added for the Friday AM and PM peak periods.

The analysis results are summarised in Table 5.1 with full results contained in Appendix B.

**Table 5.1: Culburra Road/new Collector Road (east) - Intersection Operating Conditions Summary (Full Site Development)**

| Peak | Leg | Degree of Saturation (DOS) | Delay (sec) | 95th Percentile Queue (m) | Level of Service (LOS) |
|---|---|---|---|---|---|
| Friday AM | East | 0.144 | 4.1 | 3 | N/A |
| | North | 0.364 | 9.4 | 13 | A |
| | West | 0.111 | 2.1 | 0 | N/A |
| Friday PM | East | 0.316 | 9.7 | 11 | N/A |
| | North | 0.333 | 15.1 | 11 | B |
| | West | 0.190 | 0.4 | 0 | N/A |
| Saturday | East | 0.186 | 6.5 | 5 | N/A |
| | North | 0.219 | 8.8 | 6 | A |
| | West | 0.125 | 0.1 | 0 | N/A |

As shown in Table 5.1, this alternative priority controlled treatment at the intersection of Culburra Road and the new Collector Road intersection with left and right turn lanes on Culburra Road would operate will with minimal queues and delays on all approaches.

# 6. Sight Distance Assessment

The safe intersection sight distance (SISD) criteria are outlined in Table 3.2 of Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections. Based on a 100km/hr design speed and a reaction time of 2.5 seconds, the Approach Sight Distance (ASD) for vehicles on Culburra Road is 262 metres. Based on a design speed of 50km/hr and a reaction time of 2.0 seconds, the ASD for vehicles on the new Collector Road is 55 metres.

An assessment of the location of the proposed Collector Road intersection with Culburra Road indicates that the required ASD as stipulated in Table 3.2 of Austroads Guide to Road Design – Part 4A can be achieved on all approaches.

# 7. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

i Based on empirical traffic generation rates for the established areas of Culburra as supplied by Shoalhaven City Council's Traffic and Transport Unit, the proposed development is expected to generate up to 199 vehicle movements on the regional road network (west of Culburra) in the peak hour following full site development (including traffic generated by the stage 6 industrial lots). The adoption of this estimate for use for intersection assessments is considered appropriate.

ii SIDRA analysis of the Princes Highway/ Kalandar Street intersection indicates that significant delays are currently experienced during peak periods and that further capacity improvements are required, regardless of what development occurs at Culburra.

iii The addition of development traffic at the Princes Highway/ Kalandar Street has a negligible impact on vehicle delay and does not affect the intersection Level of Service.

iv RMS has confirmed that it currently has no upgrades planned for the Princes Highway/ Kalandar Street intersection or north of Kinghorne Street.

v Significant improvements are required at the Princes Highway/ Kalandar Street intersection to reduce delays currently experienced under existing equivalent 120$^{th}$ HH traffic volumes. Increases in capacity upstream and downstream of this intersection would also be required to improve intersection performance.

vi The East Nowra Sub-Arterial (ENSA) road link may be a viable alternative to upgrading the Princes Highway/Kalandar Street intersection and provide benefits at a regional scale by reducing traffic on the Princes Highway and Kalandar Street.

vii RMS does not support the use of a roundabout within speed zones above 80km/hr. As such the proposed roundabout at the intersection of the new Collector Road with Culburra Road is not supported by RMS.

viii Based on the estimated traffic volumes at the Culburra Road/ new Collector Rod intersection and the existing 100km/hr speed zone on Culburra Road remaining, an alternative channelised T-junction with a full length right-turn treatment on the major road (CHR) is warranted in line with Figure 4.9 *Austroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections*.

ix An assessment of the location of the proposed Collector Road intersection with Culburra Road indicates that the required ASD as stipulated in Table 3.2 of Austroads Guide to Road Design – Part 4A can be achieved on all approaches.

# Appendix A



## Correspondence from RMS

Our Ref: STH10/00063/03
Contact: Andrea Boes 4221 2771
Your Ref: MP09_0088 File: 10/06041-2

Transport Roads & Maritime Services

The General Manager
Department of Planning & Infrastructure
GPO Box 39
Sydney NSW 2001

Attention: Sarah Waterworth

**SHOALHAVEN CITY COUNCIL – MAJOR PROJECT 09_0088 – MIXED USE SUBDIVISION, WEST CULBURRA – EXHIBITION OF EA FOR CONCEPT PLAN**

Dear Sir/Madam

Reference is made to your letter dated 17 April 2013 regarding the subject project application forwarded to Roads and Maritime Services (RMS) for consideration.

RMS has reviewed the submitted information and has concerns regarding the additional traffic generated by the subject development and the increased pressure on the classified road network. In this regard, RMS offers the following comments for the Department's consideration:

- RMS notes the traffic generation resulting from the full development of the site is estimated to be 573 vehicle movements in the peak hour as per Section 7.1.1 of GTA Consultant's *Traffic Impact Assessment*.
- RMS has undertaken further analysis using SIDRA to assess the likely impacts of full development of the subject site on the intersection of the Princes Highway and Kalandar Street. This assessment, based on the Friday AM 120$^{th}$ highest hour, indicated that the Average Delay would increase from the current 86.4 seconds for all vehicles to 145.2 seconds for all vehicles. The analysis indicated that the Degree of Saturation would increase from the current 1.049 for all vehicles to 1.175. The long term impact of the development on the road network has not been assessed.
- The above analysis indicated that the subject development will likely have a very significant impact on the intersection of the Princes Highway and Kalandar Street. The proponent should identify suitable infrastructure required to ameliorate these impacts on the network as a result of the subject development. These should be submitted to the Department and forwarded to RMS for comment.

- The proponent should carry out further traffic analysis based on full development of the site. The analysis should include 10 year projected traffic volumes including background traffic growth and likely traffic volumes with and without the development. The impacts on the network of full development of the site should be assessed prior to determination of the project application for concept approval.
- RMS notes there are a number of signalised intersections on the Princes Highway north of Kalandar Street. For accurate representation of the likely impacts of the subject development on the highway, the proponent should undertake corridor modelling with the use of a program such as LinSig to include the coordinated nature of intersections at this location in the traffic analysis.
- RMS is responsible for all permanent speed zoning in NSW regardless of the classification of the road. RMS objects to the suggested speed zone change on Culburra Road. Speed zones should be intuitive to the driver, with the road environment and adjacent land uses effectively informing the driver of the speed zone. On this basis, RMS considers that the existing 100km/hr speed zone at this location is appropriate and should be maintained. Without appropriate changes to the road environment along the relevant section of Culburra Road, a lower speed zone would likely lead to compliance and enforcement issues.
- Council should seek to reduce the number of access points to Culburra Road where possible. All access to stage 5 should be via the roundabout and the new collector road if possible. Research indicates that increased access density correlates highly with increased crash rates, and on this basis, accesses should be consolidated wherever possible.
- The proponent should ensure that Safe Intersection Sight Distance is available at all new intersections in accordance with Austroads *Guide to Road Design Part 4a: Unsignalised and Signalised Intersections* Table 3.2, in both directions.

If you have any questions please contact Andrea Boes on 02 4221 2771.

Yours faithfully

07 JUN 2013

Brian Lefoe
Road Safety and Traffic Manager
Network Management, Southern Region

Cc – The General Manager, Shoalhaven City Council (via email)

## Justin Murphy

**From:** BOES Andrea R <Andrea.BOES@rms.nsw.gov.au>
**Sent:** Thursday, 12 September 2013 3:38 PM
**To:** Justin Murphy
**Cc:** mark.schofield@planning.nsw.gov.au; council@shoalhaven.nsw.gov.au
**Subject:** RE: West Culburra Subdivision Development (Major Project 09_0088, RMS Ref: STH10/00063)

Hi Justin

As per our conversation today, please find following RMS' comments in response to your email of 3 September 2013.

- RMS notes the traffic generation resulting from the development of the site is estimate to be 573 vehicle movements in the peak hour as per Section 7.1.1 of GTA Consultant's Traffic Impact Assessment.

Based on empirical traffic generation rates for the established areas of Culburra as supplied by Shoalhaven City Council's Traffic and Transport Unit, the proposed development is expected to generate up to 158 vehicle movements on the regional road network (west of Culburra) in the peak hour following full site development. Given the existing traffic generating characteristics of Culburra and the proportion of dedicated housing for the over 55 aged group proposed as part of the development, we consider that the adoption of the Culburra specific empirical traffic generation should be used in the intersection assessments not the 573 vehicles suggested by RMS.

RMS agrees with this approach.

- RMS has undertaken further analysis using SIDRA to access the likely impacts of full development of the subject site on the intersection of the Princes Highway and Kalandar Street. This assessment, based on the Friday AM 120th highest hour, indicated the Average Delay would increase from the current 86.4 seconds for all vehicles to 145.2 seconds for all vehicles. The analysis indicated that the Degree of Saturation would increase from the current 1.049 for all vehicles to 1.175. The long term impact of the development has not been assessed.

It is assumed that the additional SIDRA analysis undertaken by RMS for the Friday AM 120th highest hour utilised RTA's development traffic generation estimate of 573 vehicle movements in the peak hour. Can you please confirm whether this is the case.

Yes.

- The above analysis indicated that the subject development will likely have a very significant impact on the intersection of the Princes Highway and Kalandar Street. The proponent should identify suitable infrastructure required to ameliorate these impacts on the network as a result of the subject development. These should be submitted to the Department and forwarded to RMS for comment.

SIDRA analysis of the Princes Highway/ Kalandar Street intersection indicates that significant delays are currently experienced during peak periods and that further capacity improvements are required, regardless of what development occurs at Culburra. Any infrastructure improvements identified by GTA at this intersection needs to be commensurate with RMS proposals along the Princes Highway corridor. Can you please confirm whether RMS are proposing any improvements along the Princes Highway in Nowra north of Kinghorne Street and in particular at the Kalandar Street intersection.

RMS advises that it currently has no upgrades planned for the intersection of the Princes Highway and Kalandar Street or north of Kinghorne Street in this vicinity.

- The proponent should carry out further traffic analysis based on full development of the site. The analysis should include 10 year projected traffic volumes including background traffic growth and likely traffic volumes with and without the development. The impacts on the network of full development of the site should be assessed prior to determination of the project application for concept approval.

The future year traffic modelling undertaken by GTA was for full development of the site (estimated to be approx. 8 years after commencement). It is understood that the West Culburra subdivision development will be the major source of growth in the Culburra area over the next 10 years and also the major source of growth in the area between Culburra and the Princes Highway over the same period. Any modelling of the Kalandar Street intersection 10 years after opening would simply show the intersection continuing to operate overcapacity.

Once potential improvements at the Kalandar Street intersection are known, it would then be appropriate to assess a full site development + 10 year scenario.

RMS supports this approach.

- RMS notes there are a number of signalised intersections on the Princes Highway north of Kalandar Street. For accurate representation of the likely impacts of subject development on the highway, the proponent should undertake corridor modelling with the use of a program such as LinSig to include the coordinated nature of intersections at this location in the traffic analysis.

The West Culburra Subdivision development is approximately 20km from Nowra. GTA undertook SIDRA modelling of the two Princes Highway intersections in Nowra most likely to be utilised by development traffic; Moss Street and Kalandar Street. These intersections are approximately 1.7km apart and two signalised intersections (Worrigee Street and Plunkett Street) are located between them. Given the significant distance between these intersections, can RMS please confirm whether corridor modelling using LinSig software or similar is required?

RMS notes the distance between the intersection of the Princes Highway and Kalandar Street and the nearest signalised intersection at Plunkett Street. Given this, further corridor modelling using LinSig is not deemed to benecessary.

- RMS is responsible for all permanent speed zoning in NSW regardless of the classification of the road. RMS objects to the suggested speed zone change on Culburra Road. Speed zones should be intuitive to the driver, with the road environment and adjacent land uses effectively informing the driver of the speed zone. On this bases, RMS considers that the existing 100km/hr speed zone at this location is appropriate and should be maintained. Without appropriate changes to the road environment along the relevant section Culburra Road, a lower speed zone would likely lead to compliance and enforcement issues

The main access to the development is proposed via a new roundabout at the eastern intersection of the new Collector Road and Culburra Road. The reduced speed limit on approach to the roundabout was deemed appropriate and then this was to be maintained from the roundabout to Culburra to prevent a short 100km/h speed zone between the 50km/h speed zone at the roundabout and the entrance to Culburra Road (a length of approx. 700m). On this basis, can you please clarify whether RMS considers the existing 100km/h speed zone on this section of Culburra Road appropriate.

RMS does not support roundabouts within speed zones above 80km/hr. The proponent should determine an appropriate junction treatment at the intersection of the Princes Highway and the new collector road to allow safe access into and out of the development within the existing speed zone. In this regard, refer to Figure 4.9: Warrants for turn treatments on the major road at unsignalised intersections, in Austroads *Guide to Road Design - Part 4A: Unsignalised and Signalised Intersections.* RMS is unlikely to support a speed zone reduction at this location.

If you have any questions please do not hesitate to contact me on 4221 2771.

Regards

**Andrea Boes**
Development Assessment Officer

Road Safety & Traffic Management
Network Management | Southern Region
**T** 02 4221 2771 **F** 02 4221 2777

**From:** Justin Murphy - GTA Consultants [mailto:Justin.Murphy@gta.com.au]
**Sent:** Tuesday, 3 September 2013 6:08 PM
**To:** MILLET Chris P
**Cc:** Ken Hollyoak - GTA Consultants
**Subject:** West Culburra Subdivision Development (major project 09_0088)

Hi Chris,

Following our conversation this morning and in preparation for our meeting on Monday 16 September, we would like clarification on some of the comments made in the RMS letter dated 07 June 2013 (attached):

- **RMS notes the traffic generation resulting from the development of the site is estimate to be 573 vehicle movements in the peak hour as per Section 7.1.1 of GTA Consultant's Traffic Impact Assessment.**

Based on empirical traffic generation rates for the established areas of Culburra as supplied by Shoalhaven City Council's Traffic and Transport Unit, the proposed development is expected to generate up to 158 vehicle movements on the regional road network (west of Culburra) in the peak hour following full site development. Given the existing traffic generating characteristics of Culburra and the proportion of dedicated housing for the over 55 aged group proposed as part of the development, we consider that the adoption of the Culburra specific empirical traffic generation should be used in the intersection assessments not the 573 vehciles suggested by RMS.

- **RMS has undertaken further analysis using SIDRA to access the likely impacts of full development of the subject site on the intersection of the Princes Highway and Kalandar Street. This assessment, based on the Friday AM 120th highest hour, indicated the Average Delay would increase from the current 86.4 seconds for all vehicles to 145.2 seconds for all vehicles. The analysis indicated that the Degree of Saturation would increase from the current 1.049 for all vehicles to 1.175. The long term impact of the development has not been assessed.**

It is assumed that the additional SIDRA analysis undertaken by RMS for the Friday AM 120th highest hour utilised RTA's development traffic generation estimate of 573 vehicle movements in the peak hour. Can you please confirm whether this is the case.

- **The above analysis indicated that the subject development will likely have a very significant impact on the intersection of the Princes Highway and Kalandar Street. The proponent should identify suitable infrastructure required to ameliorate these impacts on the network as a result of the subject development. These should be submitted to the Department and forwarded to RMS for comment.**

SIDRA analysis of the Princes Highway/ Kalandar Street intersection indicates that significant delays are currently experienced during peak periods and that further capacity improvements are required, regardless of what development occurs at Culburra. Any infrastructure improvements identified by GTA at this intersection needs to be commensurate with RMS proposals along the Princes Highway corridor. Can you please confirm whether RMS are proposing any improvements along the Princes Highway in Nowra north of Kinghorne Street and in particular at the Kalandar Street intersection.

- **The proponent should carry out further traffic analysis based on full development of the site. The analysis should include 10 year projected traffic volumes including background traffic growth and likely traffic volumes with and without the development. The impacts on the network of full development of the site should be assessed prior to determination of the project application for concept approval.**

The future year traffic modelling undertaken by GTA was for full development of the site (estimated to be approx. 8 years after commencement). It is understood that the West Culburra subdivision development will be the major source of growth in the Culburra area over the next 10 years and also the major source of growth in the area between Culburra and the Princes Highway over the same period. Any modelling of the Kalandar Street intersection 10 years after opening would simply show the intersection continuing to operate overcapacity.

Once potential improvements at the Kalandar Street intersection are known, it would then be appropriate to assess a full site development + 10 year scenario.

- **RMS notes there are a number of signalised intersections on the Princes Highway north of Kalandar Street. For accurate representation of the likely impacts of subject development on the highway, the proponent should undertake corridor modelling with the use of a program such as LinSig to include the coordinated nature of intersections at this location in the traffic analysis.**

The West Culburra Subdivision development is approximately 20km from Nowra. GTA undertook SIDRA modelling of the two Princes Highway intersections in Nowra most likely to be utilised by development traffic; Moss Street and Kalandar Street. These intersections are approximately 1.7km apart and two signalised intersections (Worrigee Street and Plunkett Street) are located between them. Given the significant distance between these intersections, can RMS please confirm whether corridor modelling using LinSig software or similar is required?

- **RMS is responsible for all permanent speed zoning in NSW regardless of the classification of the road. RMS objects to the suggested speed zone change on Culburra Road. Speed zones should be intuitive to the driver, with the road environment and adjacent land uses effectively informing the driver of the speed zone. On this bases, RMS considers that the existing 100km/hr speed zone at this location is appropriate and should be maintained. Without appropriate changes to the road environment along the relevant section Culburra Road, a lower speed zone would likely lead to compliance and enforcement issues**

The main access to the development is proposed via a new roundabout at the eastern intersection of the new Collector Road and Culburra Road. The reduced speed limit on approach to the roundabout was deemed appropriate and then this was to be maintained from the roundabout to Culburra to prevent a short 100km/h speed zone between the 50km/h speed zone at the roundabout and the entrance to Culburra Road (a length of approx. 700m). On this basis, can you please clarify whether RMS considers the existing 100km/h speed zone on this section of Culburra Road appropriate.

Let me know if you have any queries with the above or would like to discuss.

Regards.

Justin Murphy
Project Manager - Traffic & Transport
GTA Consultants
02 8448 1800
0434 676 461
Level 6, 15 Help Street, Chatswood, NSW, 2067
www.gta.com.au



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**From:** Justin Murphy
**Sent:** Thursday, 29 August 2013 3:32 PM
**To:** Chris Millet (christopher_millet@rta.nsw.gov.au)
**Cc:** Ken Hollyoak
**Subject:** West Culburra Subdivision Development (major project 09_0088)

Hi Chris,

We recently received RMS' comments (attached) on the transport impact assessment undertaken by GTA on the above project.

Before we proceed further, I wonder if it would be possible if my colleague Ken Hollyoak and I could come and discuss these issues with you in Wollongong.

I spoke with Brian Lefoe this afternoon in relation to the project and he suggested I contact you.

Both Ken and I are available every day next week except Monday. Do you have any time available to meet?

If you have any further queries, or would like to discuss, please don't hesitate to contact me.

Kind Regards.

Justin Murphy
Project Manager - Traffic & Transport
GTA Consultants
02 8448 1800
0434 676 461
Level 6, 15 Help Street, Chatswood, NSW, 2067
www.gta.com.au

Our Ref: STH10/00063/04
Contact: Andrea Boes 4221 2771
Your Ref: 12S1231000

Transport Roads & Maritime Services

GTA Consultants
Level 6, 15 Help Street
Chatswood NSW 2067

Attention: Justin Murphy

**SHOALHAVEN CITY COUNCIL – MAJOR PROJECT 09_0088 – WEST CULBURRA MIXED USE SUBDIVISION – FURTHER COMMENTS - EXHIBITION OF EA**

Dear Sir/Madam

Reference is made to your email of 3 September 2013 regarding the project application forwarded to Roads and Maritime Services (RMS) for consideration.

RMS has reviewed the additional information provided and offers the following comments for your consideration:

- RMS advises that it currently has no upgrades planned for the intersection of the Princes Highway and Kalandar Street or north of Kinghorne Street in this vicinity.
- RMS accepts the distribution assignment used to analyse the proportion of traffic generated by the subject development leaving the Culburra area and travelling west to the Princes Highway. However, this analysis should include the full development including the Stage 6 Industrial lots.
- RMS supports the proposed assessment of the site at full development and a 10 year projected scenario with and without the development. The proponent should identify suitable infrastructure to ameliorate any impacts on the network as a result of the total development.
- RMS notes the distance between the intersection of the Princes Highway and Kalandar Street and the nearest signalised intersection at Plunkett Street, Nowra. Given this, further corridor modelling using LinSig is not deemed to be necessary.
- RMS generally does not support the construction of roundabouts within speed zones above 80km/hr. The proponent should determine an appropriate junction treatment at the intersection of the Princes Highway and the new collector road to allow safe access into and out of the development within the existing speed zone. In this regard, refer to Figure 4.9: Warrants for turn treatments on the major road at Unsignalised intersections, in Austroads *Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections.* RMS is unlikely to support a speed zone reduction at this location.

**Roads & Maritime Services**

Level 4, Southern Regional Office, 90 Crown Street, Wollongong NSW 2500 | PO Box 477 Wollongong East NSW 2520
**T** 02 4221 2460 | **F** 02 4221 2777 | **www.rmservices.nsw.gov.au** |

If you have any questions please contact Andrea Boes on 4221 2771.

Yours faithfully

Brian Lefoe
Road Safety and Traffic Manager
Network Management, Southern Region

18 SEP 2013

**Roads & Maritime Services**

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# Appendix B

## SIDRA INTERSECTION Results

# MOVEMENT SUMMARY

**Site: 7. Princes Hwy-Kalandar (Ex Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Kalandar Street
Friday AM (0800-0900) - Equivalent 120th HH
Existing
Signals - Fixed Time  Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 3 | 0.0 | 1.049 | 103.7 | LOS F | 39.3 | 288.0 | 1.00 | 1.17 | 16.8 |
| 2 | T | 962 | 5.6 | 1.049 | 111.7 | LOS F | 49.4 | 362.6 | 1.00 | 1.25 | 15.6 |
| 3 | R | 38 | 0.0 | 0.459 | 81.6 | LOS F | 2.6 | 18.3 | 1.00 | 0.73 | 19.2 |
| Approach | | 1003 | 5.3 | 1.049 | 110.6 | LOS F | 49.4 | 362.6 | 1.00 | 1.23 | 15.7 |
| East: Kalandar St (E) | | | | | | | | | | | |
| 4 | L | 38 | 9.4 | 1.039 | 115.9 | LOS F | 51.4 | 370.2 | 1.00 | 1.23 | 10.7 |
| 5 | T | 306 | 3.1 | 1.039 | 106.6 | LOS F | 51.4 | 370.2 | 1.00 | 1.23 | 10.1 |
| 6 | R | 782 | 2.9 | 1.039 | 129.2 | LOS F | 56.2 | 403.3 | 1.00 | 1.21 | 9.7 |
| Approach | | 1126 | 3.1 | 1.039 | 122.6 | LOS F | 56.2 | 403.3 | 1.00 | 1.22 | 9.8 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 259 | 7.3 | 0.261 | 9.2 | LOS A | 0.8 | 5.7 | 0.07 | 0.64 | 53.4 |
| 8 | T | 898 | 7.3 | 0.734 | 40.8 | LOS C | 24.3 | 180.8 | 0.88 | 0.78 | 29.9 |
| 9 | R | 157 | 11.3 | 1.042 | 112.3 | LOS F | 12.0 | 91.7 | 1.00 | 1.09 | 15.2 |
| Approach | | 1314 | 7.8 | 1.042 | 43.1 | LOS D | 24.3 | 180.8 | 0.74 | 0.79 | 29.1 |
| West: Kalandar St (W) | | | | | | | | | | | |
| 10 | L | 52 | 13.6 | 0.700 | 65.8 | LOS E | 9.0 | 66.1 | 0.95 | 0.90 | 19.0 |
| 11 | T | 149 | 1.6 | 0.700 | 57.2 | LOS E | 12.8 | 92.9 | 0.97 | 0.86 | 18.0 |
| 12 | R | 156 | 5.3 | 0.700 | 69.3 | LOS E | 12.8 | 92.9 | 1.00 | 0.85 | 17.9 |
| Approach | | 357 | 4.9 | 0.700 | 63.7 | LOS E | 12.8 | 92.9 | 0.98 | 0.86 | 18.1 |
| All Vehicles | | 3800 | 5.5 | 1.049 | 86.4 | LOS F | 56.2 | 403.3 | 0.91 | 1.04 | 16.8 |

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

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 53 | 45.6 | LOS E | 0.2 | 0.2 | 0.82 | 0.82 |
| P3 | Across E approach | 53 | 37.0 | LOS D | 0.2 | 0.2 | 0.74 | 0.74 |
| P5 | Across N approach | 53 | 61.6 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| All Pedestrians | | 159 | 48.1 | LOS E | | | 0.84 | 0.84 |

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

# MOVEMENT SUMMARY

**Site: 7. Princes Hwy-Kalandar (Ex Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Kalandar Street
Friday PM (1600-1700) - Equivalent 120th HH
Existing
Signals - Fixed Time  Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 12 | 0.0 | 1.038 | 100.6 | LOS F | 29.4 | 210.2 | 1.00 | 1.12 | 17.2 |
| 2 | T | 785 | 2.6 | 1.038 | 107.4 | LOS F | 39.3 | 281.0 | 1.00 | 1.20 | 16.1 |
| 3 | R | 109 | 1.4 | 1.004 | 120.5 | LOS F | 9.8 | 69.4 | 1.00 | 1.08 | 14.3 |
| Approach | | 906 | 2.4 | 1.038 | 108.9 | LOS F | 39.3 | 281.0 | 1.00 | 1.18 | 15.8 |
| East: Kalandar St (E) | | | | | | | | | | | |
| 4 | L | 99 | 1.5 | 1.065 | 132.7 | LOS F | 42.9 | 306.0 | 1.00 | 1.27 | 9.5 |
| 5 | T | 245 | 2.4 | 1.065 | 123.7 | LOS F | 42.9 | 306.0 | 1.00 | 1.27 | 8.9 |
| 6 | R | 567 | 1.8 | 1.065 | 151.3 | LOS F | 47.2 | 335.4 | 1.00 | 1.26 | 8.5 |
| Approach | | 912 | 2.0 | 1.065 | 141.9 | LOS F | 47.2 | 335.4 | 1.00 | 1.26 | 8.7 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 815 | 1.1 | 1.000[3] | 35.7 | LOS C | 18.5 | 130.6 | 0.21 | 0.77 | 32.5 |
| 8 | T | 1318 | 3.1 | 1.100 | 162.7 | LOS F | 77.6 | 557.9 | 1.00 | 1.54 | 11.6 |
| 9 | R | 138 | 5.4 | 0.587 | 44.5 | LOS D | 6.1 | 44.8 | 0.99 | 0.79 | 28.6 |
| Approach | | 2272 | 2.5 | 1.100 | 109.9 | LOS F | 77.6 | 557.9 | 0.71 | 1.22 | 15.7 |
| West: Kalandar St (W) | | | | | | | | | | | |
| 10 | L | 109 | 9.5 | 1.000[3] | 56.8 | LOS E | 13.7 | 99.1 | 0.93 | 0.90 | 21.0 |
| 11 | T | 305 | 0.0 | 1.101 | 113.6 | LOS F | 55.2 | 388.8 | 0.97 | 1.13 | 11.0 |
| 12 | R | 303 | 1.0 | 1.101 | 185.3 | LOS F | 55.2 | 388.8 | 1.00 | 1.41 | 8.1 |
| Approach | | 718 | 1.9 | 1.101 | 135.2 | LOS F | 55.2 | 388.8 | 0.97 | 1.22 | 10.2 |
| All Vehicles | | 4807 | 2.3 | 1.101 | 119.6 | LOS F | 77.6 | 557.9 | 0.86 | 1.22 | 13.4 |

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

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 53 | 53.3 | LOS E | 0.2 | 0.2 | 0.89 | 0.89 |
| P3 | Across E approach | 53 | 38.5 | LOS D | 0.2 | 0.2 | 0.76 | 0.76 |
| P5 | Across N approach | 53 | 53.3 | LOS E | 0.2 | 0.2 | 0.89 | 0.89 |
| All Pedestrians | | 159 | 48.4 | LOS E | | | 0.84 | 0.84 |

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

# MOVEMENT SUMMARY

**Site: 7. Princes Hwy-Kalandar (Ex Sat-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Kalandar Street
Saturday - Equivalent 120th HH
Existing
Signals - Fixed Time  Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 5 | 25.0 | 0.872 | 74.6 | LOS F | 32.0 | 229.4 | 0.99 | 0.98 | 21.9 |
| 2 | T | 960 | 2.6 | 0.872 | 60.0 | LOS E | 32.0 | 229.4 | 0.99 | 0.96 | 23.9 |
| 3 | R | 116 | 4.5 | 0.966 | 104.3 | LOS F | 9.6 | 69.5 | 1.00 | 1.03 | 16.0 |
| Approach | | 1081 | 2.9 | 0.966 | 64.8 | LOS E | 32.0 | 229.4 | 0.99 | 0.97 | 22.8 |
| East: Kalandar St (E) | | | | | | | | | | | |
| 4 | L | 89 | 0.0 | 0.968 | 87.7 | LOS F | 35.3 | 248.4 | 1.00 | 1.15 | 13.4 |
| 5 | T | 211 | 0.6 | 0.968 | 78.7 | LOS F | 35.3 | 248.4 | 1.00 | 1.15 | 12.6 |
| 6 | R | 543 | 1.0 | 0.968 | 95.1 | LOS F | 35.3 | 248.4 | 1.00 | 1.09 | 12.5 |
| Approach | | 843 | 0.8 | 0.968 | 90.3 | LOS F | 35.3 | 248.4 | 1.00 | 1.12 | 12.6 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 496 | 0.3 | 0.507 | 9.3 | LOS A | 2.0 | 14.2 | 0.08 | 0.65 | 53.1 |
| 8 | T | 1386 | 1.0 | 0.961 | 65.3 | LOS E | 55.2 | 389.4 | 1.00 | 1.11 | 22.6 |
| 9 | R | 91 | 11.6 | 0.482 | 42.7 | LOS D | 3.4 | 26.4 | 0.98 | 0.77 | 29.4 |
| Approach | | 1973 | 1.3 | 0.961 | 50.2 | LOS D | 55.2 | 389.4 | 0.77 | 0.98 | 26.6 |
| West: Kalandar St (W) | | | | | | | | | | | |
| 10 | L | 66 | 2.0 | 0.771 | 70.3 | LOS E | 10.8 | 76.1 | 0.96 | 0.96 | 18.0 |
| 11 | T | 168 | 0.0 | 0.771 | 61.7 | LOS E | 15.0 | 105.2 | 0.98 | 0.92 | 17.1 |
| 12 | R | 173 | 0.8 | 0.771 | 71.6 | LOS F | 15.0 | 105.2 | 1.00 | 0.88 | 17.5 |
| Approach | | 407 | 0.6 | 0.771 | 67.3 | LOS E | 15.0 | 105.2 | 0.98 | 0.91 | 17.4 |
| All Vehicles | | 4304 | 1.5 | 0.968 | 63.3 | LOS E | 55.2 | 389.4 | 0.89 | 1.00 | 21.5 |

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

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 53 | 53.3 | LOS E | 0.2 | 0.2 | 0.89 | 0.89 |
| P3 | Across E approach | 53 | 32.7 | LOS D | 0.1 | 0.1 | 0.70 | 0.70 |
| P5 | Across N approach | 53 | 61.6 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| All Pedestrians | | 159 | 49.2 | LOS E | | | 0.85 | 0.85 |

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

# MOVEMENT SUMMARY

**Site: 1. Culburra -Coonamia (Future Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Culburra Road-Coonamia Road
Friday AM (0800-0900) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Coonamia Rd | | | | | | | | | | | |
| 1 | L | 165 | 0.0 | 0.235 | 14.5 | LOS B | 0.8 | 5.6 | 0.46 | 0.80 | 61.0 |
| 3 | R | 99 | 6.5 | 0.206 | 17.9 | LOS B | 0.8 | 6.1 | 0.56 | 0.87 | 56.9 |
| Approach | | 264 | 2.4 | 0.235 | 15.8 | LOS B | 0.8 | 6.1 | 0.50 | 0.82 | 59.4 |
| East: Culburra Rd (E) | | | | | | | | | | | |
| 4 | L | 60 | 2.9 | 0.033 | 11.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.74 | 63.3 |
| 5 | T | 337 | 3.7 | 0.177 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| Approach | | 397 | 3.6 | 0.177 | 1.7 | NA | 0.0 | 0.0 | 0.00 | 0.11 | 76.6 |
| West: Culburra Rd (W) | | | | | | | | | | | |
| 11 | T | 149 | 12.3 | 0.083 | 0.0 | X | X | X | X | 0.00 | 80.0 |
| 12 | R | 33 | 3.6 | 0.034 | 13.2 | LOS A | 0.1 | 0.9 | 0.43 | 0.72 | 61.1 |
| Approach | | 182 | 10.8 | 0.083 | 2.4 | NA | 0.1 | 0.9 | 0.08 | 0.13 | 75.4 |
| All Vehicles | | 843 | 4.8 | 0.235 | 6.3 | NA | 0.8 | 6.1 | 0.17 | 0.34 | 70.2 |

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

 

# MOVEMENT SUMMARY

**Site: 1. Culburra -Coonamia (Future Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Culburra Road-Coonamia Road
Friday PM (1600-1700) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Coonamia Rd | | | | | | | | | | | |
| 1 | L | 77 | 7.7 | 0.109 | 13.9 | LOS A | 0.3 | 2.3 | 0.33 | 0.72 | 62.6 |
| 3 | R | 101 | 2.0 | 0.195 | 16.8 | LOS B | 0.8 | 5.6 | 0.54 | 0.85 | 57.9 |
| Approach | | 178 | 4.5 | 0.195 | 15.6 | LOS B | 0.8 | 5.6 | 0.45 | 0.79 | 59.8 |
| East: Culburra Rd (E) | | | | | | | | | | | |
| 4 | L | 103 | 2.0 | 0.056 | 11.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.74 | 63.3 |
| 5 | T | 165 | 2.6 | 0.086 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| Approach | | 268 | 2.4 | 0.086 | 4.4 | NA | 0.0 | 0.0 | 0.00 | 0.28 | 72.1 |
| West: Culburra Rd (W) | | | | | | | | | | | |
| 11 | T | 379 | 1.1 | 0.196 | 0.0 | X | X | X | X | 0.00 | 79.9 |
| 12 | R | 152 | 3.9 | 0.137 | 12.7 | LOS A | 0.6 | 4.1 | 0.37 | 0.72 | 61.4 |
| Approach | | 531 | 1.9 | 0.196 | 3.7 | NA | 0.6 | 4.1 | 0.11 | 0.21 | 73.1 |
| All Vehicles | | 977 | 2.5 | 0.196 | 6.0 | NA | 0.8 | 5.6 | 0.14 | 0.33 | 70.1 |

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

 

# MOVEMENT SUMMARY

**Site: 2. Culburra-Mayfield (Future Fri AM-120th HH)**

Culburra Road-Mayfield Road
Friday AM (0800-0900) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Culburra Road (S) | | | | | | | | | | | |
| 1 | L | 2 | 0.0 | 0.255 | 10.1 | LOS A | 0.0 | 0.0 | 0.00 | 1.73 | 57.1 |
| 2 | T | 495 | 0.0 | 0.255 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| Approach | | 497 | 0.0 | 0.255 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 79.9 |
| North: Culburra Road (N) | | | | | | | | | | | |
| 8 | T | 180 | 0.0 | 0.094 | 2.8 | LOS A | 0.9 | 6.0 | 0.59 | 0.00 | 62.7 |
| 9 | R | 1 | 0.0 | 0.094 | 13.0 | LOS A | 0.9 | 6.0 | 0.59 | 1.31 | 60.3 |
| Approach | | 181 | 0.0 | 0.094 | 2.8 | NA | 0.9 | 6.0 | 0.59 | 0.01 | 62.7 |
| West: Mayfield Road | | | | | | | | | | | |
| 10 | L | 1 | 0.0 | 0.009 | 17.0 | LOS B | 0.0 | 0.2 | 0.63 | 0.70 | 43.8 |
| 12 | R | 2 | 0.0 | 0.009 | 17.0 | LOS B | 0.0 | 0.2 | 0.63 | 0.80 | 44.0 |
| Approach | | 3 | 0.0 | 0.009 | 17.0 | LOS B | 0.0 | 0.2 | 0.63 | 0.77 | 43.9 |
| All Vehicles | | 681 | 0.0 | 0.255 | 0.9 | NA | 0.9 | 6.0 | 0.16 | 0.01 | 74.2 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

 

# MOVEMENT SUMMARY



Culburra Road-Mayfield Road
Friday PM (1600-1700) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Culburra Road (S) | | | | | | | | | | | |
| 1 | L | 1 | 0.0 | 0.129 | 10.1 | LOS A | 0.0 | 0.0 | 0.00 | 1.73 | 57.1 |
| 2 | T | 243 | 4.6 | 0.129 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| Approach | | 244 | 4.6 | 0.129 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 79.9 |
| North: Culburra Road (N) | | | | | | | | | | | |
| 8 | T | 511 | 1.8 | 0.266 | 1.4 | LOS A | 2.2 | 15.6 | 0.47 | 0.00 | 65.6 |
| 9 | R | 1 | 0.0 | 0.266 | 11.6 | LOS A | 2.2 | 15.6 | 0.47 | 1.39 | 60.7 |
| Approach | | 512 | 1.8 | 0.266 | 1.4 | NA | 2.2 | 15.6 | 0.47 | 0.00 | 65.6 |
| West: Mayfield Road | | | | | | | | | | | |
| 10 | L | 1 | 0.0 | 0.035 | 64.1 | LOS E | 0.1 | 1.0 | 0.84 | 0.63 | 23.7 |
| 12 | R | 1 | 100.0 | 0.035 | 69.5 | LOS E | 0.1 | 1.0 | 0.84 | 0.96 | 26.3 |
| Approach | | 2 | 50.0 | 0.035 | 66.8 | LOS E | 0.1 | 1.0 | 0.84 | 0.80 | 25.1 |
| All Vehicles | | 758 | 2.8 | 0.266 | 1.2 | NA | 2.2 | 15.6 | 0.32 | 0.01 | 69.2 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 3. Greenwell Pt-Pyree (Future Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Greenwell Point Road-Pyree Lane
Friday AM (0800-0900) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Pyreen Ln | | | | | | | | | | | |
| 1 | L | 487 | 1.9 | 0.266 | 11.2 | X | X | X | X | 0.69 | 58.8 |
| 3 | R | 14 | 8.3 | 0.020 | 13.0 | LOS A | 0.1 | 0.6 | 0.34 | 0.69 | 56.9 |
| Approach | | 501 | 2.1 | 0.266 | 11.2 | LOS A | 0.1 | 0.6 | 0.01 | 0.69 | 58.8 |
| East: Greenwell Pt Rd (E) | | | | | | | | | | | |
| 4 | L | 20 | 66.7 | 0.094 | 14.9 | LOS B | 0.0 | 0.0 | 0.00 | 1.42 | 58.9 |
| 5 | T | 147 | 5.6 | 0.094 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| Approach | | 167 | 12.9 | 0.094 | 1.8 | NA | 0.0 | 0.0 | 0.00 | 0.17 | 76.8 |
| West: Greenwell Pt Rd (W) | | | | | | | | | | | |
| 11 | T | 63 | 5.6 | 0.034 | 0.0 | X | X | X | X | 0.00 | 80.0 |
| 12 | R | 164 | 7.4 | 0.367 | 19.1 | LOS B | 1.9 | 14.0 | 0.63 | 0.95 | 49.6 |
| Approach | | 227 | 6.9 | 0.367 | 13.8 | LOS A | 1.9 | 14.0 | 0.46 | 0.68 | 55.5 |
| All Vehicles | | 896 | 5.3 | 0.367 | 10.1 | NA | 1.9 | 14.0 | 0.12 | 0.59 | 60.6 |

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 3. Greenwell Pt-Pyree (Future Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Greenwell Point Road-Pyree Lane
Friday PM (1600-1700) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Pyreen Ln | | | | | | | | | | | |
| 1 | L | 205 | 5.8 | 0.115 | 11.3 | X | X | X | X | 0.69 | 58.9 |
| 3 | R | 32 | 0.0 | 0.039 | 11.5 | LOS A | 0.2 | 1.1 | 0.23 | 0.68 | 58.0 |
| Approach | | 237 | 5.0 | 0.115 | 11.4 | LOS A | 0.2 | 1.1 | 0.03 | 0.69 | 58.7 |
| East: Greenwell Pt Rd (E) | | | | | | | | | | | |
| 4 | L | 26 | 0.0 | 0.050 | 10.9 | LOS A | 0.0 | 0.0 | 0.00 | 1.07 | 58.9 |
| 5 | T | 68 | 4.3 | 0.050 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| Approach | | 95 | 3.1 | 0.050 | 3.0 | NA | 0.0 | 0.0 | 0.00 | 0.30 | 72.9 |
| West: Greenwell Pt Rd (W) | | | | | | | | | | | |
| 11 | T | 173 | 1.7 | 0.090 | 0.0 | X | X | X | X | 0.00 | 80.0 |
| 12 | R | 489 | 1.5 | 0.728 | 19.7 | LOS B | 10.6 | 75.2 | 0.74 | 0.98 | 48.7 |
| Approach | | 662 | 1.6 | 0.728 | 14.6 | LOS B | 10.6 | 75.2 | 0.54 | 0.73 | 54.3 |
| All Vehicles | | 994 | 2.5 | 0.728 | 12.7 | NA | 10.6 | 75.2 | 0.37 | 0.68 | 56.7 |

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 4. Greenwell Pt-Jindy Andy (Future Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Greenwell Point Road-Jindy Andy Lane
Friday AM (0800-0900) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| North East: Greenwell Point Road (NE) | | | | | | | | | | | |
| 25 | T | 448 | 4.8 | 0.237 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| 26 | R | 193 | 0.7 | 0.297 | 11.2 | LOS A | 1.4 | 9.6 | 0.47 | 0.74 | 45.9 |
| Approach | | 641 | 3.6 | 0.297 | 3.4 | NA | 1.4 | 9.6 | 0.14 | 0.22 | 66.5 |
| North West: Jindy Andy Lane | | | | | | | | | | | |
| 27 | L | 51 | 3.0 | 0.051 | 12.0 | LOS A | 0.2 | 1.3 | 0.30 | 0.69 | 57.2 |
| 29 | R | 12 | 30.0 | 0.090 | 39.8 | LOS C | 0.3 | 2.5 | 0.84 | 0.96 | 35.7 |
| Approach | | 62 | 8.1 | 0.090 | 17.2 | LOS B | 0.3 | 2.5 | 0.40 | 0.74 | 51.5 |
| South West: Greenwell Point Road (SW) | | | | | | | | | | | |
| 30 | L | 8 | 42.9 | 0.102 | 13.5 | LOS A | 0.0 | 0.0 | 0.00 | 1.48 | 58.9 |
| 31 | T | 178 | 8.7 | 0.102 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| Approach | | 186 | 10.2 | 0.102 | 0.6 | NA | 0.0 | 0.0 | 0.00 | 0.07 | 78.8 |
| All Vehicles | | 889 | 5.3 | 0.297 | 3.7 | NA | 1.4 | 9.6 | 0.13 | 0.23 | 67.4 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 4. Greenwell Pt-Jindy Andy (Future Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Greenwell Point Road-Jindy Andy Lane
Friday AM (1600-1700) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| North East: Greenwell Point Road (NE) | | | | | | | | | | | |
| 25 | T | 214 | 5.9 | 0.114 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| 26 | R | 73 | 2.4 | 0.210 | 17.5 | LOS B | 0.8 | 5.7 | 0.67 | 0.90 | 40.5 |
| Approach | | 286 | 5.0 | 0.210 | 4.4 | NA | 0.8 | 5.7 | 0.17 | 0.23 | 65.4 |
| North West: Jindy Andy Lane | | | | | | | | | | | |
| 27 | L | 187 | 1.9 | 0.278 | 14.9 | LOS B | 1.2 | 8.2 | 0.55 | 0.89 | 53.9 |
| 29 | R | 3 | 0.0 | 0.012 | 22.4 | LOS B | 0.0 | 0.3 | 0.71 | 0.85 | 46.1 |
| Approach | | 191 | 1.8 | 0.278 | 15.0 | LOS B | 1.2 | 8.2 | 0.56 | 0.89 | 53.7 |
| South West: Greenwell Point Road (SW) | | | | | | | | | | | |
| 30 | L | 14 | 11.1 | 0.252 | 11.6 | LOS A | 0.0 | 0.0 | 0.00 | 1.37 | 58.9 |
| 31 | T | 471 | 1.9 | 0.252 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| Approach | | 484 | 2.1 | 0.252 | 0.3 | NA | 0.0 | 0.0 | 0.00 | 0.04 | 79.2 |
| All Vehicles | | 961 | 2.9 | 0.278 | 4.5 | NA | 1.2 | 8.2 | 0.16 | 0.26 | 68.6 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 5. Greenwell Pt-Mayfield (Future Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Greenwell Point Road-Mayfield Road
Friday AM (0800-0900) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South East: Mayfield Road | | | | | | | | | | | |
| 21 | L | 12 | 0.0 | 0.020 | 12.5 | LOS A | 0.1 | 0.5 | 0.49 | 0.72 | 47.8 |
| 23 | R | 1 | 0.0 | 0.020 | 12.5 | LOS A | 0.1 | 0.5 | 0.49 | 0.82 | 47.9 |
| Approach | | 13 | 0.0 | 0.020 | 12.5 | LOS A | 0.1 | 0.5 | 0.49 | 0.73 | 47.8 |
| North East: Greenwell Point Road (NE) | | | | | | | | | | | |
| 24 | L | 3 | 0.0 | 0.241 | 10.1 | LOS A | 0.0 | 0.0 | 0.00 | 1.73 | 57.1 |
| 25 | T | 455 | 3.8 | 0.241 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| Approach | | 458 | 3.7 | 0.241 | 0.1 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 79.8 |
| South West: Greenwell Point Road (SW) | | | | | | | | | | | |
| 31 | T | 183 | 9.2 | 0.114 | 6.7 | LOS A | 1.7 | 13.0 | 0.76 | 0.00 | 58.7 |
| 32 | R | 6 | 0.0 | 0.114 | 16.9 | LOS B | 1.7 | 13.0 | 0.76 | 1.17 | 56.0 |
| Approach | | 189 | 8.9 | 0.114 | 7.0 | NA | 1.7 | 13.0 | 0.76 | 0.04 | 58.6 |
| All Vehicles | | 660 | 5.1 | 0.241 | 2.3 | NA | 1.7 | 13.0 | 0.23 | 0.03 | 71.5 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 5. Greenwell Pt-Mayfield (Future Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Greenwell Point Road-Mayfield Road
Friday PM (1600-1700) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South East: Mayfield Road | | | | | | | | | | | |
| 21 | L | 6 | 0.0 | 0.045 | 19.7 | LOS B | 0.1 | 1.1 | 0.57 | 0.64 | 41.8 |
| 23 | R | 6 | 25.0 | 0.045 | 21.0 | LOS B | 0.1 | 1.1 | 0.57 | 0.89 | 41.9 |
| Approach | | 13 | 12.5 | 0.045 | 20.3 | LOS B | 0.1 | 1.1 | 0.57 | 0.77 | 41.9 |
| North East: Greenwell Point Road (NE) | | | | | | | | | | | |
| 24 | L | 1 | 0.0 | 0.118 | 10.1 | LOS A | 0.0 | 0.0 | 0.00 | 1.73 | 57.1 |
| 25 | T | 220 | 5.7 | 0.118 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| Approach | | 221 | 5.7 | 0.118 | 0.0 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 79.9 |
| South West: Greenwell Point Road (SW) | | | | | | | | | | | |
| 31 | T | 484 | 1.4 | 0.274 | 3.2 | LOS A | 3.8 | 26.6 | 0.66 | 0.00 | 61.0 |
| 32 | R | 15 | 0.0 | 0.274 | 13.4 | LOS A | 3.8 | 26.6 | 0.66 | 1.17 | 60.2 |
| Approach | | 499 | 1.4 | 0.274 | 3.5 | NA | 3.8 | 26.6 | 0.66 | 0.03 | 61.0 |
| All Vehicles | | 733 | 2.9 | 0.274 | 2.8 | NA | 3.8 | 26.6 | 0.46 | 0.04 | 65.1 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 6. Greenwell Pt-Millbank-Worrigee (Future Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Greenwell Point Road-Millbank Road-Worrigee Road
Friday AM (0800-0900) - Equivalent 120th HH
Future - Full Site Development
Stop (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Worrigee Road | | | | | | | | | | | |
| 1 | L | 69 | 5.1 | 0.464 | 23.8 | LOS B | 2.5 | 18.3 | 0.73 | 1.13 | 40.3 |
| 2 | T | 118 | 3.0 | 0.464 | 22.4 | LOS B | 2.5 | 18.3 | 0.73 | 1.11 | 38.2 |
| 3 | R | 24 | 0.0 | 0.093 | 23.8 | LOS B | 0.3 | 2.2 | 0.73 | 1.00 | 40.0 |
| Approach | | 212 | 3.3 | 0.464 | 23.0 | LOS B | 2.5 | 18.3 | 0.73 | 1.10 | 39.1 |
| East: Greenwell Point Road (E) | | | | | | | | | | | |
| 4 | L | 15 | 0.0 | 0.230 | 10.1 | LOS A | 0.0 | 0.0 | 0.00 | 1.64 | 57.1 |
| 5 | T | 425 | 3.0 | 0.230 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| 6 | R | 38 | 7.4 | 0.034 | 11.4 | LOS A | 0.1 | 1.0 | 0.33 | 0.68 | 55.1 |
| Approach | | 478 | 3.2 | 0.230 | 1.2 | NA | 0.1 | 1.0 | 0.03 | 0.10 | 76.7 |
| North: Millbank Road | | | | | | | | | | | |
| 7 | L | 18 | 16.7 | 0.036 | 14.1 | LOS A | 0.1 | 0.6 | 0.33 | 0.86 | 48.0 |
| 8 | T | 26 | 13.6 | 0.155 | 25.4 | LOS B | 0.6 | 4.2 | 0.77 | 1.00 | 36.6 |
| 9 | R | 12 | 0.0 | 0.155 | 25.6 | LOS B | 0.6 | 4.2 | 0.77 | 1.00 | 38.9 |
| Approach | | 56 | 11.8 | 0.155 | 21.8 | LOS B | 0.6 | 4.2 | 0.62 | 0.96 | 40.4 |
| West: Greenwell Point Road (W) | | | | | | | | | | | |
| 10 | L | 47 | 7.5 | 0.123 | 10.4 | LOS A | 0.0 | 0.0 | 0.00 | 1.30 | 57.1 |
| 11 | T | 178 | 9.1 | 0.123 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| 12 | R | 61 | 5.8 | 0.069 | 12.6 | LOS A | 0.3 | 1.9 | 0.47 | 0.76 | 53.9 |
| Approach | | 286 | 8.1 | 0.123 | 4.4 | NA | 0.3 | 1.9 | 0.10 | 0.38 | 69.2 |
| All Vehicles | | 1032 | 5.1 | 0.464 | 7.7 | NA | 2.5 | 18.3 | 0.22 | 0.43 | 60.6 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 6. Greenwell Pt-Millbank-Worrigee (Future Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Greenwell Point Road-Millbank Road-Worrigee Road
Friday PM (1600-1700) - Equivalent 120th HH
Future - Full Site Development
Stop (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Worrigee Road | | | | | | | | | | | |
| 1 | L | 58 | 0.0 | 0.227 | 18.2 | LOS B | 0.9 | 6.0 | 0.52 | 0.85 | 43.8 |
| 2 | T | 47 | 0.0 | 0.227 | 17.0 | LOS B | 0.9 | 6.0 | 0.52 | 1.00 | 41.7 |
| 3 | R | 24 | 5.3 | 0.121 | 29.0 | LOS C | 0.4 | 3.0 | 0.80 | 1.00 | 37.1 |
| Approach | | 129 | 1.0 | 0.227 | 19.8 | LOS B | 0.9 | 6.0 | 0.57 | 0.93 | 41.6 |
| East: Greenwell Point Road (E) | | | | | | | | | | | |
| 4 | L | 24 | 7.1 | 0.117 | 10.4 | LOS A | 0.0 | 0.0 | 0.00 | 1.49 | 57.1 |
| 5 | T | 195 | 5.5 | 0.117 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| 6 | R | 18 | 0.0 | 0.021 | 12.5 | LOS A | 0.1 | 0.5 | 0.49 | 0.73 | 53.7 |
| Approach | | 237 | 5.2 | 0.117 | 2.0 | NA | 0.1 | 0.5 | 0.04 | 0.21 | 74.8 |
| North: Millbank Road | | | | | | | | | | | |
| 7 | L | 26 | 0.0 | 0.052 | 14.7 | LOS B | 0.1 | 0.9 | 0.49 | 0.92 | 46.7 |
| 8 | T | 54 | 2.8 | 0.283 | 26.5 | LOS B | 1.1 | 8.0 | 0.80 | 1.04 | 35.6 |
| 9 | R | 18 | 0.0 | 0.283 | 27.4 | LOS B | 1.1 | 8.0 | 0.80 | 1.04 | 37.9 |
| Approach | | 98 | 1.5 | 0.283 | 23.5 | LOS B | 1.1 | 8.0 | 0.72 | 1.00 | 38.7 |
| West: Greenwell Point Road (W) | | | | | | | | | | | |
| 10 | L | 17 | 0.0 | 0.253 | 10.1 | LOS A | 0.0 | 0.0 | 0.00 | 1.64 | 57.1 |
| 11 | T | 474 | 0.7 | 0.253 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 80.0 |
| 12 | R | 115 | 1.3 | 0.099 | 11.1 | LOS A | 0.4 | 2.8 | 0.33 | 0.69 | 55.1 |
| Approach | | 605 | 0.8 | 0.253 | 2.4 | NA | 0.4 | 2.8 | 0.06 | 0.18 | 73.6 |
| All Vehicles | | 1069 | 1.9 | 0.283 | 6.3 | NA | 1.1 | 8.0 | 0.18 | 0.35 | 63.2 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 7. Princes Hwy-Kalandar (Future Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Kalandar Street
Friday AM (0800-0900) - Equivalent 120th HH
Future - Full Site Development
Signals - Fixed Time  Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 3 | 0.0 | 1.082 | 128.4 | LOS F | 44.0 | 322.3 | 1.00 | 1.22 | 14.1 |
| 2 | T | 962 | 5.6 | 1.082 | 136.7 | LOS F | 53.8 | 394.6 | 1.00 | 1.32 | 13.4 |
| 3 | R | 42 | 0.0 | 0.510 | 81.9 | LOS F | 2.9 | 20.4 | 1.00 | 0.74 | 19.2 |
| Approach | | 1007 | 5.3 | 1.082 | 134.4 | LOS F | 53.8 | 394.6 | 1.00 | 1.30 | 13.5 |
| East: Kalandar St (E) | | | | | | | | | | | |
| 4 | L | 41 | 9.4 | 1.072 | 140.4 | LOS F | 60.2 | 433.4 | 1.00 | 1.31 | 9.1 |
| 5 | T | 325 | 3.1 | 1.072 | 131.1 | LOS F | 60.2 | 433.4 | 1.00 | 1.31 | 8.5 |
| 6 | R | 825 | 2.9 | 1.072 | 153.6 | LOS F | 64.8 | 465.1 | 1.00 | 1.28 | 8.4 |
| Approach | | 1192 | 3.1 | 1.072 | 147.0 | LOS F | 64.8 | 465.1 | 1.00 | 1.29 | 8.4 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 277 | 7.3 | 0.279 | 9.2 | LOS A | 0.8 | 6.2 | 0.07 | 0.64 | 53.4 |
| 8 | T | 898 | 7.3 | 0.751 | 42.2 | LOS C | 24.8 | 184.6 | 0.90 | 0.79 | 29.4 |
| 9 | R | 157 | 11.3 | 1.042 | 112.3 | LOS F | 12.0 | 92.4 | 1.00 | 1.09 | 15.2 |
| Approach | | 1332 | 7.8 | 1.042 | 43.6 | LOS D | 24.8 | 184.6 | 0.74 | 0.80 | 29.0 |
| West: Kalandar St (W) | | | | | | | | | | | |
| 10 | L | 52 | 13.6 | 0.719 | 67.4 | LOS E | 9.4 | 68.8 | 0.96 | 0.91 | 18.7 |
| 11 | T | 159 | 1.6 | 0.719 | 58.6 | LOS E | 13.3 | 96.3 | 0.97 | 0.87 | 17.7 |
| 12 | R | 156 | 5.3 | 0.719 | 69.9 | LOS E | 13.3 | 96.3 | 1.00 | 0.86 | 17.8 |
| Approach | | 366 | 4.9 | 0.719 | 64.7 | LOS E | 13.3 | 96.3 | 0.98 | 0.87 | 17.9 |
| All Vehicles | | 3897 | 5.4 | 1.082 | 100.7 | LOS F | 64.8 | 465.1 | 0.91 | 1.08 | 14.9 |

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

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 53 | 44.8 | LOS E | 0.2 | 0.2 | 0.81 | 0.81 |
| P3 | Across E approach | 53 | 37.8 | LOS D | 0.2 | 0.2 | 0.75 | 0.75 |
| P5 | Across N approach | 53 | 61.6 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| All Pedestrians | | 159 | 48.1 | LOS E | | | 0.84 | 0.84 |

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

# MOVEMENT SUMMARY

**Site: 7. Princes Hwy-Kalandar (Future Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Kalandar Street
Friday PM (1600-1700) - Equivalent 120th HH
Future - Full Site Development
Signals - Fixed Time  Cycle Time = 125 seconds (Optimum Cycle Time - Minimum Delay)

## Movement Performance - Vehicles

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 12 | 0.0 | 1.081 | 129.8 | LOS F | 33.1 | 236.8 | 1.00 | 1.20 | 14.0 |
| 2 | T | 785 | 2.6 | 1.081 | 135.9 | LOS F | 41.9 | 300.0 | 1.00 | 1.30 | 13.4 |
| 3 | R | 115 | 1.4 | 1.114 | 194.3 | LOS F | 13.1 | 92.8 | 1.00 | 1.24 | 9.6 |
| Approach | | 912 | 2.4 | 1.114 | 143.2 | LOS F | 41.9 | 300.0 | 1.00 | 1.29 | 12.8 |
| East: Kalandar St (E) | | | | | | | | | | | |
| 4 | L | 103 | 1.5 | 1.124 | 176.9 | LOS F | 50.7 | 361.5 | 1.00 | 1.44 | 7.4 |
| 5 | T | 254 | 2.4 | 1.124 | 167.9 | LOS F | 50.7 | 361.5 | 1.00 | 1.44 | 6.9 |
| 6 | R | 583 | 1.8 | 1.124 | 194.1 | LOS F | 53.2 | 378.4 | 1.00 | 1.41 | 6.8 |
| Approach | | 940 | 2.0 | 1.124 | 185.2 | LOS F | 53.2 | 378.4 | 1.00 | 1.42 | 6.9 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 871 | 1.1 | 0.982 | 33.1 | LOS C | 18.5 | 130.6 | 0.22 | 0.78 | 33.8 |
| 8 | T | 1302 | 3.1 | 1.081 | 143.3 | LOS F | 69.8 | 501.5 | 1.00 | 1.50 | 12.9 |
| 9 | R | 138 | 5.4 | 0.576 | 41.9 | LOS C | 5.7 | 41.7 | 0.98 | 0.79 | 29.6 |
| Approach | | 2311 | 2.5 | 1.081 | 95.7 | LOS F | 69.8 | 501.5 | 0.70 | 1.19 | 17.4 |
| West: Kalandar St (W) | | | | | | | | | | | |
| 10 | L | 109 | 9.5 | 1.000[3] | 54.9 | LOS D | 13.7 | 99.2 | 0.95 | 0.90 | 21.5 |
| 11 | T | 323 | 0.0 | 1.143 | 125.4 | LOS F | 58.6 | 412.2 | 0.97 | 1.21 | 10.2 |
| 12 | R | 303 | 1.0 | 1.143 | 215.0 | LOS F | 58.6 | 412.2 | 1.00 | 1.56 | 7.1 |
| Approach | | 736 | 1.8 | 1.143 | 151.8 | LOS F | 58.6 | 412.2 | 0.98 | 1.31 | 9.2 |
| All Vehicles | | 4898 | 2.3 | 1.143 | 130.2 | LOS F | 69.8 | 501.5 | 0.86 | 1.27 | 12.5 |

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

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

## Movement Performance - Pedestrians

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 53 | 51.1 | LOS E | 0.2 | 0.2 | 0.90 | 0.90 |
| P3 | Across E approach | 53 | 36.1 | LOS D | 0.1 | 0.1 | 0.76 | 0.76 |
| P5 | Across N approach | 53 | 51.1 | LOS E | 0.2 | 0.2 | 0.90 | 0.90 |
| All Pedestrians | | 159 | 46.1 | LOS E | | | 0.86 | 0.86 |

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

# MOVEMENT SUMMARY

**Site: 8. Coonamia-Currarong-Forest (Future Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Coonamia Road- Currarong Road-Forest Road
Friday AM (0800-0900) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Currarong Road | | | | | | | | | | | |
| 5 | T | 13 | 0.0 | 0.042 | 1.0 | LOS A | 0.2 | 1.3 | 0.33 | 0.00 | 78.5 |
| 6 | R | 40 | 0.0 | 0.042 | 13.4 | LOS A | 0.2 | 1.3 | 0.33 | 0.77 | 68.2 |
| Approach | | 53 | 0.0 | 0.042 | 10.4 | NA | 0.2 | 1.3 | 0.33 | 0.59 | 70.5 |
| North: Coonamia Road | | | | | | | | | | | |
| 7 | L | 7 | 0.0 | 0.012 | 13.1 | LOS A | 0.0 | 0.2 | 0.23 | 0.68 | 67.5 |
| 9 | R | 87 | 1.8 | 0.127 | 14.3 | LOS A | 0.5 | 3.6 | 0.38 | 0.74 | 66.5 |
| Approach | | 95 | 1.6 | 0.127 | 14.3 | LOS A | 0.5 | 3.6 | 0.36 | 0.74 | 66.6 |
| West: Forest Road | | | | | | | | | | | |
| 10 | L | 223 | 1.8 | 0.132 | 12.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.79 | 69.1 |
| 11 | T | 19 | 6.3 | 0.132 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 242 | 2.1 | 0.132 | 11.7 | NA | 0.0 | 0.0 | 0.00 | 0.72 | 70.9 |
| All Vehicles | | 389 | 1.7 | 0.132 | 12.2 | NA | 0.5 | 3.6 | 0.13 | 0.71 | 69.7 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 8. Coonamia-Currarong-Forest (Future Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Coonamia Road- Currarong Road-Forest Road
Friday PM (1600-1700) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Currarong Road | | | | | | | | | | | |
| 5 | T | 15 | 0.0 | 0.020 | 0.7 | LOS A | 0.1 | 0.7 | 0.30 | 0.00 | 81.7 |
| 6 | R | 15 | 0.0 | 0.020 | 13.2 | LOS A | 0.1 | 0.7 | 0.30 | 0.86 | 69.4 |
| Approach | | 29 | 0.0 | 0.020 | 7.0 | NA | 0.1 | 0.7 | 0.30 | 0.43 | 75.2 |
| North: Coonamia Road | | | | | | | | | | | |
| 7 | L | 37 | 0.0 | 0.059 | 13.1 | LOS A | 0.1 | 0.9 | 0.22 | 0.69 | 67.6 |
| 9 | R | 214 | 4.0 | 0.293 | 14.4 | LOS A | 1.4 | 10.1 | 0.39 | 0.74 | 66.7 |
| Approach | | 251 | 3.4 | 0.293 | 14.2 | LOS A | 1.4 | 10.1 | 0.36 | 0.73 | 66.8 |
| West: Forest Road | | | | | | | | | | | |
| 10 | L | 163 | 5.4 | 0.109 | 13.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.83 | 69.1 |
| 11 | T | 34 | 4.3 | 0.109 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 197 | 5.2 | 0.109 | 10.8 | NA | 0.0 | 0.0 | 0.00 | 0.69 | 73.0 |
| All Vehicles | | 477 | 4.0 | 0.293 | 12.4 | NA | 1.4 | 10.1 | 0.21 | 0.70 | 69.8 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 9. Kalandar St-Kinghorne St (Future Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Kalandar Street-Kinghorne Street-Albatross Road
Friday AM (0800-0900) - Equivalent 120th HH
Future - Full Site Development
Roundabout

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Kinghorne Sttreet | | | | | | | | | | | |
| 1 | L | 31 | 7.7 | 0.722 | 20.0 | LOS B | 10.1 | 72.6 | 0.98 | 1.13 | 39.5 |
| 2 | T | 483 | 3.4 | 0.722 | 18.5 | LOS B | 10.1 | 72.6 | 0.98 | 1.12 | 39.7 |
| 3 | R | 59 | 0.0 | 0.722 | 23.3 | LOS B | 10.1 | 72.6 | 0.98 | 1.12 | 37.9 |
| Approach | | 573 | 3.3 | 0.722 | 19.1 | LOS B | 10.1 | 72.6 | 0.98 | 1.12 | 39.5 |
| East: Kalandar Street | | | | | | | | | | | |
| 4 | L | 327 | 7.5 | 0.437 | 7.9 | LOS A | 2.8 | 20.6 | 0.46 | 0.59 | 45.1 |
| 6 | R | 161 | 2.3 | 0.437 | 12.6 | LOS A | 2.8 | 20.6 | 0.46 | 0.78 | 42.0 |
| Approach | | 488 | 5.8 | 0.437 | 9.4 | LOS A | 2.8 | 20.6 | 0.46 | 0.65 | 44.0 |
| North: Kinghorne Street | | | | | | | | | | | |
| 7 | L | 133 | 3.7 | 0.333 | 8.8 | LOS A | 2.3 | 16.3 | 0.58 | 0.66 | 47.1 |
| 8 | T | 31 | 0.0 | 0.333 | 7.9 | LOS A | 2.3 | 16.3 | 0.58 | 0.63 | 47.1 |
| 9 | R | 176 | 3.4 | 0.333 | 12.0 | LOS A | 2.3 | 16.3 | 0.58 | 0.74 | 45.5 |
| Approach | | 339 | 3.2 | 0.333 | 10.4 | LOS A | 2.3 | 16.3 | 0.58 | 0.70 | 46.2 |
| South West: Albatross Road | | | | | | | | | | | |
| 30 | L | 261 | 4.5 | 0.741 | 20.3 | LOS B | 9.7 | 71.5 | 1.00 | 1.19 | 38.1 |
| 32 | R | 221 | 8.1 | 0.741 | 24.5 | LOS B | 9.7 | 71.5 | 1.00 | 1.20 | 36.9 |
| Approach | | 482 | 6.2 | 0.741 | 22.2 | LOS B | 9.7 | 71.5 | 1.00 | 1.20 | 37.5 |
| All Vehicles | | 1882 | 4.7 | 0.741 | 15.8 | LOS B | 10.1 | 72.6 | 0.78 | 0.94 | 40.9 |

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

# MOVEMENT SUMMARY

**Site: 9. Kalandar St-Kinghorne St (Future Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Kalandar Street-Kinghorne Street-Albatross Road
Friday AM (1600-1700) - Equivalent 120th HH
Future - Full Site Development
Roundabout

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Kinghorne Sttreet | | | | | | | | | | | |
| 1 | L | 34 | 0.0 | 0.584 | 15.5 | LOS B | 5.8 | 40.6 | 0.90 | 1.00 | 42.6 |
| 2 | T | 326 | 0.0 | 0.584 | 14.2 | LOS A | 5.8 | 40.6 | 0.90 | 0.99 | 42.8 |
| 3 | R | 79 | 0.0 | 0.584 | 19.2 | LOS B | 5.8 | 40.6 | 0.90 | 1.02 | 40.6 |
| Approach | | 439 | 0.0 | 0.584 | 15.2 | LOS B | 5.8 | 40.6 | 0.90 | 0.99 | 42.4 |
| East: Kalandar Street | | | | | | | | | | | |
| 4 | L | 282 | 0.0 | 0.446 | 8.9 | LOS A | 2.9 | 20.5 | 0.62 | 0.71 | 43.9 |
| 6 | R | 119 | 0.0 | 0.446 | 13.8 | LOS A | 2.9 | 20.5 | 0.62 | 0.84 | 40.9 |
| Approach | | 401 | 0.0 | 0.446 | 10.4 | LOS A | 2.9 | 20.5 | 0.62 | 0.75 | 42.9 |
| North: Kinghorne Street | | | | | | | | | | | |
| 7 | L | 323 | 0.0 | 0.783 | 15.8 | LOS B | 11.6 | 81.1 | 0.98 | 1.05 | 41.6 |
| 8 | T | 80 | 0.0 | 0.783 | 15.0 | LOS B | 11.6 | 81.1 | 0.98 | 1.04 | 41.7 |
| 9 | R | 304 | 0.0 | 0.783 | 18.9 | LOS B | 11.6 | 81.1 | 0.98 | 1.05 | 40.2 |
| Approach | | 707 | 0.0 | 0.783 | 17.0 | LOS B | 11.6 | 81.1 | 0.98 | 1.05 | 41.0 |
| South West: Albatross Road | | | | | | | | | | | |
| 30 | L | 300 | 0.0 | 0.789 | 17.5 | LOS B | 11.9 | 83.0 | 1.00 | 1.14 | 39.8 |
| 32 | R | 348 | 0.0 | 0.789 | 21.6 | LOS B | 11.9 | 83.0 | 1.00 | 1.14 | 38.4 |
| Approach | | 648 | 0.0 | 0.789 | 19.7 | LOS B | 11.9 | 83.0 | 1.00 | 1.14 | 39.1 |
| All Vehicles | | 2196 | 0.0 | 0.789 | 16.3 | LOS B | 11.9 | 83.0 | 0.91 | 1.01 | 40.9 |

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

# MOVEMENT SUMMARY

**Site: 10. Princes Hwy-Forest (Future Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Forest Road
Friday AM (0800-0900) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 2 | T | 1413 | 3.1 | 0.739 | 0.4 | X | X | X | X | 0.00 | 98.7 |
| 3 | R | 46 | 13.0 | 0.073 | 17.4 | LOS B | 0.3 | 2.1 | 0.57 | 0.84 | 56.6 |
| Approach | | 1459 | 3.4 | 0.739 | 0.9 | NA | 0.3 | 2.1 | 0.02 | 0.03 | 97.0 |
| South East: Forest Road (Median RT) | | | | | | | | | | | |
| 23 | R | 108 | 2.3 | 0.059 | 8.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| Approach | | 108 | 2.3 | 0.059 | 8.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| East: Forest Road | | | | | | | | | | | |
| 4 | L | 49 | 3.3 | 0.109 | 13.2 | LOS A | 0.3 | 2.1 | 0.54 | 0.82 | 51.3 |
| 6 | R | 108 | 2.3 | 0.233 | 15.2 | LOS B | 0.8 | 6.1 | 0.61 | 0.89 | 49.4 |
| Approach | | 158 | 2.6 | 0.233 | 14.5 | LOS B | 0.8 | 6.1 | 0.59 | 0.87 | 50.0 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 64 | 8.3 | 0.037 | 13.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.76 | 63.3 |
| 8 | T | 521 | 16.0 | 0.295 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 585 | 15.1 | 0.295 | 1.4 | NA | 0.0 | 0.0 | 0.00 | 0.08 | 95.3 |
| All Vehicles | | 2311 | 6.3 | 0.739 | 2.3 | NA | 0.8 | 6.1 | 0.05 | 0.13 | 88.9 |

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 10. Princes Hwy-Forest (Future Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Forest Road
Friday PM (1600-1700) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 2 | T | 638 | 6.0 | 0.340 | 0.1 | X | X | X | X | 0.00 | 99.8 |
| 3 | R | 64 | 2.9 | 0.466 | 49.1 | LOS D | 1.6 | 11.6 | 0.95 | 1.03 | 30.8 |
| Approach | | 702 | 5.7 | 0.466 | 4.6 | NA | 1.6 | 11.6 | 0.09 | 0.09 | 86.1 |
| South East: Forest Road (Median RT) | | | | | | | | | | | |
| 23 | R | 75 | 2.2 | 0.041 | 8.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| Approach | | 75 | 2.2 | 0.041 | 8.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| East: Forest Road | | | | | | | | | | | |
| 4 | L | 69 | 0.0 | 0.639 | 63.0 | LOS E | 2.3 | 16.2 | 0.97 | 1.09 | 26.8 |
| 6 | R | 75 | 2.2 | 0.766 | 81.4 | LOS F | 3.1 | 21.9 | 0.98 | 1.17 | 22.8 |
| Approach | | 144 | 1.2 | 0.766 | 72.5 | LOS F | 3.1 | 21.9 | 0.97 | 1.13 | 24.6 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 161 | 2.0 | 0.088 | 12.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.75 | 63.3 |
| 8 | T | 1475 | 2.0 | 0.766 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 1636 | 2.0 | 0.766 | 1.2 | NA | 0.0 | 0.0 | 0.00 | 0.07 | 95.8 |
| All Vehicles | | 2557 | 3.0 | 0.766 | 6.4 | NA | 3.1 | 21.9 | 0.08 | 0.16 | 79.2 |

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 11. Princes Hwy-Moss (Future Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Moss Street
Friday AM (0800-0900) - Equivalent 120th HH
Future - Full Site Development
Signals - Fixed Time  Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 5 | 0.0 | 0.974 | 100.6 | LOS F | 24.6 | 183.4 | 1.00 | 1.11 | 16.6 |
| 2 | T | 928 | 7.6 | 1.054 | 122.4 | LOS F | 32.7 | 243.9 | 1.00 | 1.22 | 14.6 |
| 3 | R | 158 | 3.7 | 0.982 | 109.7 | LOS F | 13.6 | 98.2 | 1.00 | 1.06 | 14.9 |
| Approach | | 1092 | 7.0 | 1.054 | 120.4 | LOS F | 32.7 | 243.9 | 1.00 | 1.20 | 14.6 |
| East: Moss St (E) | | | | | | | | | | | |
| 4 | L | 37 | 3.4 | 0.384 | 48.3 | LOS D | 4.0 | 29.0 | 0.81 | 0.77 | 25.3 |
| 5 | T | 244 | 4.1 | 1.029 | 107.3 | LOS F | 48.2 | 350.4 | 0.97 | 1.18 | 13.5 |
| 6 | R | 276 | 4.6 | 1.029 | 129.2 | LOS F | 48.2 | 350.4 | 1.00 | 1.29 | 13.4 |
| Approach | | 557 | 4.3 | 1.029 | 114.3 | LOS F | 48.2 | 350.4 | 0.97 | 1.21 | 13.9 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 197 | 5.0 | 1.000[3] | 55.7 | LOS D | 29.0 | 213.4 | 0.99 | 0.92 | 25.2 |
| 8 | T | 1479 | 6.8 | 1.069 | 122.0 | LOS F | 64.4 | 477.1 | 1.00 | 1.33 | 14.5 |
| 9 | R | 335 | 3.7 | 1.040 | 111.7 | LOS F | 27.1 | 195.8 | 1.00 | 1.13 | 14.7 |
| Approach | | 2011 | 6.1 | 1.069 | 113.8 | LOS F | 64.4 | 477.1 | 1.00 | 1.25 | 15.1 |
| West: Moss St (W) | | | | | | | | | | | |
| 10 | L | 126 | 10.3 | 0.268 | 22.5 | LOS B | 3.2 | 24.4 | 0.67 | 0.75 | 24.5 |
| 11 | T | 135 | 3.6 | 0.538 | 54.2 | LOS D | 11.1 | 81.6 | 0.96 | 0.79 | 10.1 |
| 12 | R | 49 | 11.9 | 0.538 | 62.0 | LOS E | 11.1 | 81.6 | 0.96 | 0.82 | 12.6 |
| Approach | | 311 | 7.6 | 0.538 | 42.5 | LOS D | 11.1 | 81.6 | 0.84 | 0.78 | 14.5 |
| All Vehicles | | 3969 | 6.2 | 1.069 | 110.1 | LOS F | 64.4 | 477.1 | 0.98 | 1.20 | 14.8 |

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

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 53 | 53.3 | LOS E | 0.2 | 0.2 | 0.89 | 0.89 |
| P3 | Across E approach | 53 | 40.8 | LOS E | 0.2 | 0.2 | 0.78 | 0.78 |
| P5 | Across N approach | 53 | 61.6 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| P7 | Across W approach | 53 | 56.0 | LOS E | 0.2 | 0.2 | 0.91 | 0.91 |
| All Pedestrians | | 212 | 53.0 | LOS E | | | 0.88 | 0.88 |

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

# MOVEMENT SUMMARY

**Site: 11. Princes Hwy-Moss (Future Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Moss Street
Friday PM (1600-1700) - Equivalent 120th HH
Future - Full Site Development
Signals - Fixed Time  Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 13 | 0.0 | 1.149 | 210.3 | LOS F | 42.7 | 306.5 | 1.00 | 1.43 | 8.8 |
| 2 | T | 1120 | 3.1 | 1.243 | 265.7 | LOS F | 59.6 | 428.5 | 1.00 | 1.64 | 7.7 |
| 3 | R | 115 | 0.0 | 1.191 | 266.0 | LOS F | 16.2 | 113.5 | 1.00 | 1.31 | 7.0 |
| Approach | | 1247 | 2.8 | 1.243 | 265.2 | LOS F | 59.6 | 428.5 | 1.00 | 1.61 | 7.6 |
| East: Moss St (E) | | | | | | | | | | | |
| 4 | L | 37 | 4.3 | 0.382 | 56.3 | LOS D | 4.1 | 29.1 | 0.87 | 0.77 | 23.2 |
| 5 | T | 155 | 0.0 | 1.026 | 104.3 | LOS F | 35.1 | 248.3 | 0.97 | 1.13 | 13.7 |
| 6 | R | 238 | 1.9 | 1.026 | 129.6 | LOS F | 35.1 | 248.3 | 1.00 | 1.28 | 13.4 |
| Approach | | 429 | 1.4 | 1.026 | 114.2 | LOS F | 35.1 | 248.3 | 0.98 | 1.18 | 14.0 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 215 | 3.7 | 1.000[3] | 62.2 | LOS E | 29.6 | 213.6 | 1.00 | 0.95 | 23.3 |
| 8 | T | 1525 | 3.5 | 1.238 | 245.0 | LOS F | 97.2 | 700.6 | 1.00 | 1.75 | 8.2 |
| 9 | R | 240 | 0.7 | 1.167 | 209.9 | LOS F | 27.8 | 195.8 | 1.00 | 1.29 | 8.7 |
| Approach | | 1979 | 3.0 | 1.238 | 220.9 | LOS F | 97.2 | 700.6 | 1.00 | 1.60 | 8.8 |
| West: Moss St (W) | | | | | | | | | | | |
| 10 | L | 160 | 1.2 | 0.330 | 19.1 | LOS B | 3.4 | 24.2 | 0.61 | 0.75 | 26.5 |
| 11 | T | 260 | 0.0 | 1.217 | 270.3 | LOS F | 113.3 | 798.1 | 1.00 | 1.75 | 2.5 |
| 12 | R | 135 | 1.1 | 1.217 | 277.7 | LOS F | 113.3 | 798.1 | 1.00 | 1.75 | 3.3 |
| Approach | | 901 | 0.8 | 1.217 | 229.1 | LOS F | 113.3 | 798.1 | 0.89 | 1.46 | 3.9 |
| All Vehicles | | 4557 | 2.3 | 1.243 | 224.2 | LOS F | 113.3 | 798.1 | 0.98 | 1.43 | 8.2 |

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

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 53 | 61.6 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| P3 | Across E approach | 53 | 44.0 | LOS E | 0.2 | 0.2 | 0.81 | 0.81 |
| P5 | Across N approach | 53 | 45.6 | LOS E | 0.2 | 0.2 | 0.82 | 0.82 |
| P7 | Across W approach | 53 | 56.0 | LOS E | 0.2 | 0.2 | 0.91 | 0.91 |
| All Pedestrians | | 212 | 51.8 | LOS E | | | 0.87 | 0.87 |

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

# MOVEMENT SUMMARY

**Site: 7. Princes Hwy-Kalandar (10 Year NO-DEV Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Kalandar Street
Friday AM (0800-0900) - Equivalent 120th HH
10 Years - No Development
Signals - Fixed Time  Cycle Time = 150 seconds (Practical Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 3 | 0.0 | 1.032 | 94.5 | LOS F | 42.7 | 313.4 | 1.00 | 1.15 | 18.1 |
| 2 | T | 1058 | 5.6 | 1.032 | 103.5 | LOS F | 56.2 | 412.0 | 1.00 | 1.21 | 16.5 |
| 3 | R | 38 | 0.0 | 0.340 | 85.2 | LOS F | 2.8 | 19.5 | 1.00 | 0.73 | 18.6 |
| Approach | | 1100 | 5.4 | 1.032 | 102.9 | LOS F | 56.2 | 412.0 | 1.00 | 1.19 | 16.6 |
| East: Kalandar St (E) | | | | | | | | | | | |
| 4 | L | 38 | 9.4 | 1.048 | 128.8 | LOS F | 57.4 | 413.3 | 1.00 | 1.23 | 9.8 |
| 5 | T | 306 | 3.1 | 1.048 | 119.6 | LOS F | 57.4 | 413.3 | 1.00 | 1.23 | 9.2 |
| 6 | R | 782 | 2.9 | 1.048 | 142.5 | LOS F | 61.9 | 443.8 | 1.00 | 1.20 | 9.0 |
| Approach | | 1126 | 3.1 | 1.048 | 135.8 | LOS F | 61.9 | 443.8 | 1.00 | 1.21 | 9.0 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 259 | 7.3 | 0.235 | 9.2 | LOS A | 0.9 | 6.4 | 0.07 | 0.64 | 53.4 |
| 8 | T | 988 | 7.3 | 0.762 | 43.1 | LOS D | 29.6 | 220.0 | 0.89 | 0.79 | 29.1 |
| 9 | R | 173 | 11.3 | 1.019 | 104.0 | LOS F | 12.8 | 98.5 | 1.00 | 1.06 | 16.1 |
| Approach | | 1419 | 7.8 | 1.019 | 44.3 | LOS D | 29.6 | 220.0 | 0.75 | 0.79 | 28.7 |
| West: Kalandar St (W) | | | | | | | | | | | |
| 10 | L | 57 | 13.6 | 0.826 | 82.9 | LOS F | 11.7 | 85.9 | 0.98 | 1.00 | 16.0 |
| 11 | T | 149 | 1.6 | 0.826 | 73.5 | LOS F | 16.1 | 117.2 | 0.98 | 0.96 | 15.2 |
| 12 | R | 171 | 5.3 | 0.826 | 83.5 | LOS F | 16.1 | 117.2 | 1.00 | 0.91 | 15.6 |
| Approach | | 378 | 5.1 | 0.826 | 79.4 | LOS F | 16.1 | 117.2 | 0.99 | 0.95 | 15.5 |
| All Vehicles | | 4023 | 5.6 | 1.048 | 89.2 | LOS F | 61.9 | 443.8 | 0.91 | 1.03 | 16.5 |

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

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 63 | 49.6 | LOS E | 0.2 | 0.2 | 0.81 | 0.81 |
| P3 | Across E approach | 63 | 38.2 | LOS D | 0.2 | 0.2 | 0.71 | 0.71 |
| P5 | Across N approach | 63 | 69.1 | LOS F | 0.3 | 0.3 | 0.96 | 0.96 |
| All Pedestrians | | 189 | 52.3 | LOS E | | | 0.83 | 0.83 |

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

# MOVEMENT SUMMARY

**Site: 7. Princes Hwy-Kalandar (10 Year NO-DEV PM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Kalandar Street
Friday PM (1600-1700) - Equivalent 120th HH
10 Years - No Development
Signals - Fixed Time  Cycle Time = 150 seconds (Practical Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

## Movement Performance - Vehicles

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 13 | 0.0 | 1.142 | 187.2 | LOS F | 46.8 | 334.7 | 1.00 | 1.28 | 10.2 |
| 2 | T | 864 | 2.6 | 1.142 | 195.4 | LOS F | 59.4 | 424.8 | 1.00 | 1.40 | 10.0 |
| 3 | R | 109 | 1.4 | 0.992 | 122.8 | LOS F | 10.4 | 73.5 | 1.00 | 1.04 | 14.1 |
| Approach | | 986 | 2.4 | 1.142 | 187.3 | LOS F | 59.4 | 424.8 | 1.00 | 1.36 | 10.3 |
| East: Kalandar St (E) | | | | | | | | | | | |
| 4 | L | 99 | 1.5 | 1.147 | 203.0 | LOS F | 56.0 | 399.0 | 1.00 | 1.40 | 6.5 |
| 5 | T | 245 | 2.4 | 1.147 | 194.0 | LOS F | 56.0 | 399.0 | 1.00 | 1.40 | 6.1 |
| 6 | R | 567 | 1.8 | 1.147 | 223.9 | LOS F | 60.0 | 426.9 | 1.00 | 1.37 | 6.0 |
| Approach | | 912 | 2.0 | 1.147 | 213.6 | LOS F | 60.0 | 426.9 | 1.00 | 1.38 | 6.1 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 832 | 1.1 | 0.864 | 14.4 | LOS A | 9.7 | 68.4 | 0.24 | 0.72 | 47.3 |
| 8 | T | 1432 | 3.1 | 1.141 | 201.6 | LOS F | 98.3 | 706.2 | 1.00 | 1.65 | 9.7 |
| 9 | R | 152 | 5.4 | 0.562 | 46.7 | LOS D | 7.3 | 53.8 | 0.97 | 0.80 | 27.8 |
| Approach | | 2416 | 2.6 | 1.141 | 127.4 | LOS F | 98.3 | 706.2 | 0.74 | 1.28 | 14.0 |
| West: Kalandar St (W) | | | | | | | | | | | |
| 10 | L | 120 | 9.5 | 1.000[3] | 57.0 | LOS E | 13.6 | 99.1 | 0.90 | 0.90 | 20.8 |
| 11 | T | 305 | 0.0 | 1.136 | 143.7 | LOS F | 70.7 | 497.7 | 0.96 | 1.18 | 9.1 |
| 12 | R | 333 | 1.0 | 1.136 | 220.2 | LOS F | 70.7 | 497.7 | 1.00 | 1.45 | 7.0 |
| Approach | | 759 | 1.9 | 1.136 | 163.6 | LOS F | 70.7 | 497.7 | 0.97 | 1.25 | 8.7 |
| All Vehicles | | 5072 | 2.3 | 1.147 | 160.0 | LOS F | 98.3 | 706.2 | 0.87 | 1.31 | 10.6 |

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

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

## Movement Performance - Pedestrians

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 63 | 59.9 | LOS E | 0.2 | 0.2 | 0.89 | 0.89 |
| P3 | Across E approach | 63 | 40.3 | LOS E | 0.2 | 0.2 | 0.73 | 0.73 |
| P5 | Across N approach | 63 | 55.5 | LOS E | 0.2 | 0.2 | 0.86 | 0.86 |
| All Pedestrians | | 189 | 51.9 | LOS E | | | 0.83 | 0.83 |

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

# MOVEMENT SUMMARY

**Site: 7. Princes Hwy-Kalandar (10 Year NO-DEV Sat-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Kalandar Street
Saturday - Equivalent 120th HH
10 Years - No Development
Signals - Fixed Time  Cycle Time = 150 seconds (Practical Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 6 | 25.0 | 0.945 | 95.9 | LOS F | 44.6 | 319.5 | 1.00 | 1.07 | 18.0 |
| 2 | T | 1056 | 2.6 | 0.945 | 80.1 | LOS F | 44.6 | 319.5 | 1.00 | 1.06 | 19.8 |
| 3 | R | 116 | 4.5 | 0.966 | 112.6 | LOS F | 10.5 | 76.1 | 1.00 | 1.01 | 15.1 |
| Approach | | 1178 | 2.9 | 0.966 | 83.4 | LOS F | 44.6 | 319.5 | 1.00 | 1.06 | 19.2 |
| East: Kalandar St (E) | | | | | | | | | | | |
| 4 | L | 89 | 0.0 | 0.955 | 88.0 | LOS F | 37.2 | 261.6 | 1.00 | 1.11 | 13.4 |
| 5 | T | 211 | 0.6 | 0.955 | 79.1 | LOS F | 37.2 | 261.6 | 1.00 | 1.11 | 12.6 |
| 6 | R | 543 | 1.0 | 0.955 | 96.1 | LOS F | 37.2 | 261.6 | 1.00 | 1.06 | 12.4 |
| Approach | | 843 | 0.8 | 0.955 | 91.0 | LOS F | 37.2 | 261.6 | 1.00 | 1.07 | 12.6 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 496 | 0.3 | 0.519 | 9.4 | LOS A | 2.3 | 16.1 | 0.08 | 0.65 | 52.9 |
| 8 | T | 1525 | 1.0 | 0.982 | 75.4 | LOS F | 70.2 | 495.7 | 1.00 | 1.13 | 20.6 |
| 9 | R | 100 | 11.6 | 0.421 | 43.5 | LOS D | 4.0 | 30.7 | 0.96 | 0.78 | 29.1 |
| Approach | | 2120 | 1.3 | 0.982 | 58.5 | LOS E | 70.2 | 495.7 | 0.78 | 1.00 | 24.3 |
| West: Kalandar St (W) | | | | | | | | | | | |
| 10 | L | 73 | 2.0 | 0.907 | 86.1 | LOS F | 13.9 | 97.9 | 0.99 | 1.01 | 15.4 |
| 11 | T | 168 | 0.0 | 0.907 | 78.9 | LOS F | 19.7 | 138.6 | 0.99 | 1.00 | 14.4 |
| 12 | R | 190 | 0.8 | 0.907 | 92.6 | LOS F | 19.7 | 138.6 | 1.00 | 0.99 | 14.4 |
| Approach | | 431 | 0.7 | 0.907 | 86.2 | LOS F | 19.7 | 138.6 | 1.00 | 1.00 | 14.6 |
| All Vehicles | | 4572 | 1.6 | 0.982 | 73.5 | LOS F | 70.2 | 495.7 | 0.90 | 1.03 | 19.5 |

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

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 63 | 57.2 | LOS E | 0.2 | 0.2 | 0.87 | 0.87 |
| P3 | Across E approach | 63 | 32.7 | LOS D | 0.2 | 0.2 | 0.66 | 0.66 |
| P5 | Across N approach | 63 | 69.1 | LOS F | 0.3 | 0.3 | 0.96 | 0.96 |
| All Pedestrians | | 189 | 53.0 | LOS E | | | 0.83 | 0.83 |

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

# MOVEMENT SUMMARY

**Site: 9. Kalandar St-Kinghorne St (10 year NO-DEV Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Kalandar Street-Kinghorne Street-Albatross Road
Friday AM (0800-0900) - Equivalent 120th HH
10 Years - No Development
Roundabout
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Kinghorne Sttreet | | | | | | | | | | | |
| 1 | L | 34 | 7.7 | 0.834 | 28.6 | LOS C | 16.1 | 116.0 | 1.00 | 1.35 | 34.2 |
| 2 | T | 531 | 3.4 | 0.834 | 27.1 | LOS B | 16.1 | 116.0 | 1.00 | 1.34 | 34.3 |
| 3 | R | 65 | 0.0 | 0.834 | 31.9 | LOS C | 16.1 | 116.0 | 1.00 | 1.34 | 33.1 |
| Approach | | 630 | 3.3 | 0.834 | 27.7 | LOS B | 16.1 | 116.0 | 1.00 | 1.34 | 34.2 |
| East: Kalandar Street | | | | | | | | | | | |
| 4 | L | 346 | 7.5 | 0.474 | 8.1 | LOS A | 3.2 | 23.3 | 0.50 | 0.61 | 44.8 |
| 6 | R | 171 | 2.3 | 0.474 | 12.8 | LOS A | 3.2 | 23.3 | 0.50 | 0.78 | 41.8 |
| Approach | | 518 | 5.8 | 0.474 | 9.7 | LOS A | 3.2 | 23.3 | 0.50 | 0.67 | 43.7 |
| North: Kinghorne Street | | | | | | | | | | | |
| 7 | L | 140 | 3.7 | 0.369 | 9.0 | LOS A | 2.6 | 18.5 | 0.62 | 0.69 | 46.9 |
| 8 | T | 34 | 0.0 | 0.369 | 8.1 | LOS A | 2.6 | 18.5 | 0.62 | 0.65 | 46.9 |
| 9 | R | 193 | 3.4 | 0.369 | 12.2 | LOS A | 2.6 | 18.5 | 0.62 | 0.76 | 45.3 |
| Approach | | 367 | 3.2 | 0.369 | 10.6 | LOS A | 2.6 | 18.5 | 0.62 | 0.72 | 46.1 |
| South West: Albatross Road | | | | | | | | | | | |
| 30 | L | 287 | 4.5 | 0.882 | 35.7 | LOS C | 17.0 | 125.5 | 1.00 | 1.49 | 30.0 |
| 32 | R | 239 | 8.1 | 0.882 | 39.9 | LOS C | 17.0 | 125.5 | 1.00 | 1.49 | 29.4 |
| Approach | | 526 | 6.2 | 0.882 | 37.6 | LOS C | 17.0 | 125.5 | 1.00 | 1.49 | 29.7 |
| All Vehicles | | 2040 | 4.6 | 0.882 | 22.6 | LOS B | 17.0 | 125.5 | 0.80 | 1.10 | 36.1 |

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

# MOVEMENT SUMMARY

**Site: 9. Kalandar St-Kinghorne St**
**(10 Year NO-DEV Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Kalandar Street-Kinghorne Street-Albatross Road
Friday PM (1600-1700) - Equivalent 120th HH
10 Years - No Development
Roundabout
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Kinghorne Sttreet | | | | | | | | | | | |
| 1 | L | 37 | 0.0 | 0.680 | 19.4 | LOS B | 8.1 | 57.0 | 0.98 | 1.13 | 39.6 |
| 2 | T | 359 | 0.0 | 0.680 | 18.1 | LOS B | 8.1 | 57.0 | 0.98 | 1.13 | 39.8 |
| 3 | R | 85 | 0.0 | 0.680 | 23.1 | LOS B | 8.1 | 57.0 | 0.98 | 1.14 | 38.0 |
| Approach | | 481 | 0.0 | 0.680 | 19.1 | LOS B | 8.1 | 57.0 | 0.98 | 1.13 | 39.4 |
| East: Kalandar Street | | | | | | | | | | | |
| 4 | L | 306 | 0.0 | 0.502 | 9.7 | LOS A | 3.6 | 25.1 | 0.67 | 0.76 | 43.6 |
| 6 | R | 126 | 0.0 | 0.502 | 14.5 | LOS B | 3.6 | 25.1 | 0.67 | 0.87 | 40.2 |
| Approach | | 432 | 0.0 | 0.502 | 11.1 | LOS A | 3.6 | 25.1 | 0.67 | 0.79 | 42.5 |
| North: Kinghorne Street | | | | | | | | | | | |
| 7 | L | 346 | 0.0 | 0.879 | 22.2 | LOS B | 17.9 | 125.5 | 1.00 | 1.24 | 37.0 |
| 8 | T | 88 | 0.0 | 0.879 | 21.4 | LOS B | 17.9 | 125.5 | 1.00 | 1.24 | 37.1 |
| 9 | R | 335 | 0.0 | 0.879 | 25.4 | LOS B | 17.9 | 125.5 | 1.00 | 1.24 | 36.0 |
| Approach | | 769 | 0.0 | 0.879 | 23.5 | LOS B | 17.9 | 125.5 | 1.00 | 1.24 | 36.5 |
| South West: Albatross Road | | | | | | | | | | | |
| 30 | L | 330 | 0.0 | 0.910 | 29.7 | LOS C | 21.0 | 146.8 | 1.00 | 1.45 | 32.6 |
| 32 | R | 375 | 0.0 | 0.910 | 33.9 | LOS C | 21.0 | 146.8 | 1.00 | 1.45 | 31.8 |
| Approach | | 705 | 0.0 | 0.910 | 31.9 | LOS C | 21.0 | 146.8 | 1.00 | 1.45 | 32.1 |
| All Vehicles | | 2386 | 0.0 | 0.910 | 22.9 | LOS B | 21.0 | 146.8 | 0.94 | 1.20 | 36.3 |

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

# MOVEMENT SUMMARY

**Site: 9. Kalandar St-Kinghorne St (10 Year NO-DEV Sat-120th HH)**

13S1231000 - West Culburra Subdivision
Kalandar Street-Kinghorne Street-Albatross Road
Saturday - Equivalent 120th HH
10 Years - No Development
Roundabout
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Kinghorne Sttreet | | | | | | | | | | | |
| 1 | L | 23 | 12.5 | 0.256 | 10.9 | LOS A | 1.6 | 11.6 | 0.63 | 0.76 | 47.2 |
| 2 | T | 178 | 1.6 | 0.256 | 9.1 | LOS A | 1.6 | 11.6 | 0.63 | 0.69 | 47.3 |
| 3 | R | 32 | 0.0 | 0.256 | 14.0 | LOS A | 1.6 | 11.6 | 0.63 | 0.82 | 44.4 |
| Approach | | 234 | 2.5 | 0.256 | 10.0 | LOS A | 1.6 | 11.6 | 0.63 | 0.71 | 46.8 |
| East: Kalandar Street | | | | | | | | | | | |
| 4 | L | 219 | 6.0 | 0.294 | 7.6 | LOS A | 1.6 | 11.7 | 0.40 | 0.57 | 45.5 |
| 6 | R | 105 | 1.4 | 0.294 | 12.4 | LOS A | 1.6 | 11.7 | 0.40 | 0.78 | 42.1 |
| Approach | | 324 | 4.5 | 0.294 | 9.2 | LOS A | 1.6 | 11.7 | 0.40 | 0.64 | 44.3 |
| North: Kinghorne Street | | | | | | | | | | | |
| 7 | L | 167 | 0.8 | 0.350 | 8.8 | LOS A | 2.3 | 16.4 | 0.57 | 0.67 | 47.2 |
| 8 | T | 23 | 0.0 | 0.350 | 7.9 | LOS A | 2.3 | 16.4 | 0.57 | 0.63 | 47.2 |
| 9 | R | 173 | 2.6 | 0.350 | 12.0 | LOS A | 2.3 | 16.4 | 0.57 | 0.75 | 45.5 |
| Approach | | 362 | 1.6 | 0.350 | 10.3 | LOS A | 2.3 | 16.4 | 0.57 | 0.70 | 46.4 |
| South West: Albatross Road | | | | | | | | | | | |
| 30 | L | 177 | 1.4 | 0.421 | 8.3 | LOS A | 3.0 | 21.2 | 0.61 | 0.65 | 47.1 |
| 32 | R | 257 | 1.7 | 0.421 | 12.5 | LOS A | 3.0 | 21.2 | 0.61 | 0.77 | 45.4 |
| Approach | | 434 | 1.6 | 0.421 | 10.8 | LOS A | 3.0 | 21.2 | 0.61 | 0.72 | 46.0 |
| All Vehicles | | 1355 | 2.4 | 0.421 | 10.1 | LOS A | 3.0 | 21.2 | 0.55 | 0.69 | 45.9 |

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

# MOVEMENT SUMMARY

**Site: 10. Princes Hwy-Forest (10 Year NO-DEV Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Forest Road
Friday AM (0800-0900) - Equivalent 120th HH
10 Years - No Development
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 2 | T | 1554 | 3.1 | 0.813 | 0.6 | X | X | X | X | 0.00 | 98.1 |
| 3 | R | 27 | 13.0 | 0.046 | 17.8 | LOS B | 0.2 | 1.3 | 0.58 | 0.84 | 56.0 |
| Approach | | 1581 | 3.3 | 0.813 | 0.9 | NA | 0.2 | 1.3 | 0.01 | 0.01 | 97.1 |
| South East: Forest Road (Median RT) | | | | | | | | | | | |
| 23 | R | 102 | 2.3 | 0.056 | 8.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| Approach | | 102 | 2.3 | 0.056 | 8.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| East: Forest Road | | | | | | | | | | | |
| 4 | L | 36 | 3.3 | 0.082 | 13.7 | LOS A | 0.2 | 1.6 | 0.56 | 0.83 | 50.8 |
| 6 | R | 102 | 2.3 | 0.230 | 15.6 | LOS B | 0.8 | 5.9 | 0.63 | 0.90 | 49.1 |
| Approach | | 138 | 2.6 | 0.230 | 15.1 | LOS B | 0.8 | 5.9 | 0.61 | 0.88 | 49.5 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 57 | 8.3 | 0.032 | 13.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.76 | 63.3 |
| 8 | T | 573 | 16.0 | 0.324 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 630 | 15.3 | 0.324 | 1.2 | NA | 0.0 | 0.0 | 0.00 | 0.07 | 96.1 |
| All Vehicles | | 2451 | 6.3 | 0.813 | 2.0 | NA | 0.8 | 5.9 | 0.04 | 0.10 | 90.2 |

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 10. Princes Hwy-Forest (10 Year NO-DEV Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Forest Road
Friday PM (1600-1700) - Equivalent 120th HH
10 Years - No Development
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 2 | T | 702 | 6.0 | 0.374 | 0.1 | X | X | X | X | 0.00 | 99.7 |
| 3 | R | 51 | 2.9 | 0.501 | 64.1 | LOS E | 1.7 | 11.9 | 0.96 | 1.03 | 25.4 |
| Approach | | 752 | 5.8 | 0.501 | 4.4 | NA | 1.7 | 11.9 | 0.06 | 0.07 | 86.6 |
| South East: Forest Road (Median RT) | | | | | | | | | | | |
| 23 | R | 66 | 2.2 | 0.036 | 8.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| Approach | | 66 | 2.2 | 0.036 | 8.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| East: Forest Road | | | | | | | | | | | |
| 4 | L | 49 | 0.0 | 0.644 | 85.6 | LOS F | 2.1 | 15.0 | 0.98 | 1.08 | 22.0 |
| 6 | R | 66 | 2.2 | 0.873 | 125.9 | LOS F | 3.8 | 27.4 | 0.99 | 1.24 | 16.8 |
| Approach | | 116 | 1.3 | 0.873 | 108.7 | LOS F | 3.8 | 27.4 | 0.98 | 1.17 | 18.7 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 148 | 2.0 | 0.081 | 12.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.75 | 63.3 |
| 8 | T | 1622 | 2.0 | 0.843 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 1771 | 2.0 | 0.843 | 1.1 | NA | 0.0 | 0.0 | 0.00 | 0.06 | 96.4 |
| All Vehicles | | 2705 | 3.0 | 0.873 | 6.8 | NA | 3.8 | 27.4 | 0.06 | 0.13 | 78.9 |

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 10. Princes Hwy-Forest (10 Year NO-DEV Sat-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Forest Road
Saturday - Equivalent 120th HH
10 Years - No Development
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 2 | T | 893 | 1.7 | 0.463 | 0.1 | X | X | X | X | 0.00 | 99.6 |
| 3 | R | 40 | 0.0 | 0.176 | 28.7 | LOS C | 0.6 | 4.0 | 0.87 | 0.97 | 43.1 |
| Approach | | 933 | 1.6 | 0.463 | 1.3 | NA | 0.6 | 4.0 | 0.04 | 0.04 | 95.5 |
| South East: Forest Road (Median RT) | | | | | | | | | | | |
| 23 | R | 88 | 0.0 | 0.048 | 8.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| Approach | | 88 | 0.0 | 0.048 | 8.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| East: Forest Road | | | | | | | | | | | |
| 4 | L | 45 | 0.0 | 0.254 | 30.6 | LOS C | 0.8 | 5.7 | 0.88 | 0.99 | 38.8 |
| 6 | R | 88 | 3.0 | 0.573 | 42.9 | LOS D | 2.2 | 15.7 | 0.93 | 1.09 | 33.2 |
| Approach | | 134 | 2.0 | 0.573 | 38.7 | LOS C | 2.2 | 15.7 | 0.91 | 1.05 | 34.9 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 125 | 0.0 | 0.067 | 12.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.75 | 63.3 |
| 8 | T | 1268 | 1.7 | 0.657 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 1393 | 1.6 | 0.657 | 1.1 | NA | 0.0 | 0.0 | 0.00 | 0.07 | 96.1 |
| All Vehicles | | 2548 | 1.6 | 0.657 | 3.4 | NA | 2.2 | 15.7 | 0.06 | 0.13 | 86.6 |

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 11. Princes Hwy-Moss (10 Year NO-DEV Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Moss Street
Friday AM (0800-0900) - Equivalent 120th HH
10 Years - No Development
Signals - Fixed Time  Cycle Time = 150 seconds (Practical Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 3 | 0.0 | 0.943 | 96.7 | LOS F | 26.9 | 200.4 | 1.00 | 1.05 | 17.2 |
| 2 | T | 995 | 7.6 | 1.020 | 109.8 | LOS F | 34.7 | 258.6 | 1.00 | 1.15 | 15.8 |
| 3 | R | 158 | 3.7 | 1.007 | 130.5 | LOS F | 15.7 | 113.3 | 1.00 | 1.07 | 12.9 |
| Approach | | 1156 | 7.1 | 1.020 | 112.6 | LOS F | 34.7 | 258.6 | 1.00 | 1.14 | 15.4 |
| East: Moss St (E) | | | | | | | | | | | |
| 4 | L | 34 | 3.4 | 0.378 | 54.1 | LOS D | 4.0 | 28.8 | 0.81 | 0.77 | 23.7 |
| 5 | T | 227 | 4.1 | 1.013 | 106.7 | LOS F | 46.7 | 339.3 | 0.97 | 1.12 | 13.5 |
| 6 | R | 257 | 4.6 | 1.013 | 126.0 | LOS F | 46.7 | 339.3 | 1.00 | 1.22 | 13.7 |
| Approach | | 518 | 4.3 | 1.013 | 112.8 | LOS F | 46.7 | 339.3 | 0.97 | 1.15 | 14.0 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 187 | 5.0 | 0.997 | 51.9 | LOS D | 28.9 | 212.6 | 0.89 | 0.94 | 26.4 |
| 8 | T | 1601 | 6.8 | 0.997 | 82.6 | LOS F | 62.9 | 465.6 | 0.98 | 1.11 | 19.3 |
| 9 | R | 386 | 3.7 | 1.000[3] | 98.4 | LOS F | 27.1 | 195.8 | 1.00 | 1.10 | 16.2 |
| Approach | | 2174 | 6.1 | 1.000 | 82.7 | LOS F | 62.9 | 465.6 | 0.97 | 1.09 | 19.1 |
| West: Moss St (W) | | | | | | | | | | | |
| 10 | L | 139 | 10.3 | 0.306 | 23.3 | LOS B | 3.7 | 28.2 | 0.66 | 0.76 | 24.0 |
| 11 | T | 131 | 3.6 | 0.602 | 63.0 | LOS E | 12.7 | 93.4 | 0.98 | 0.81 | 9.0 |
| 12 | R | 54 | 11.9 | 0.602 | 70.8 | LOS F | 12.7 | 93.4 | 0.98 | 0.82 | 11.3 |
| Approach | | 324 | 7.9 | 0.602 | 47.3 | LOS D | 12.7 | 93.4 | 0.84 | 0.79 | 13.5 |
| All Vehicles | | 4172 | 6.3 | 1.020 | 92.0 | LOS F | 62.9 | 465.6 | 0.97 | 1.09 | 16.9 |

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

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 63 | 59.0 | LOS E | 0.2 | 0.2 | 0.89 | 0.89 |
| P3 | Across E approach | 63 | 38.9 | LOS D | 0.2 | 0.2 | 0.72 | 0.72 |
| P5 | Across N approach | 63 | 69.1 | LOS F | 0.3 | 0.3 | 0.96 | 0.96 |
| P7 | Across W approach | 63 | 59.0 | LOS E | 0.2 | 0.2 | 0.89 | 0.89 |
| All Pedestrians | | 252 | 56.5 | LOS E | | | 0.86 | 0.86 |

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

# MOVEMENT SUMMARY

**Site: 11. Princes Hwy-Moss (10 Year NO-DEV Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Moss Street
Friday PM (1600-1700) - Equivalent 120th HH
10 Years - No Development
Signals - Fixed Time  Cycle Time = 150 seconds (Practical Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 12 | 0.0 | 1.139 | 207.0 | LOS F | 48.2 | 346.1 | 1.00 | 1.40 | 9.0 |
| 2 | T | 1229 | 3.1 | 1.232 | 262.6 | LOS F | 67.5 | 485.1 | 1.00 | 1.61 | 7.8 |
| 3 | R | 115 | 0.0 | 1.158 | 245.6 | LOS F | 16.1 | 112.4 | 1.00 | 1.25 | 7.5 |
| Approach | | 1355 | 2.8 | 1.232 | 260.7 | LOS F | 67.5 | 485.1 | 1.00 | 1.57 | 7.7 |
| East: Moss St (E) | | | | | | | | | | | |
| 4 | L | 34 | 4.3 | 0.411 | 64.3 | LOS E | 4.4 | 31.6 | 0.89 | 0.77 | 21.5 |
| 5 | T | 149 | 0.0 | 1.103 | 154.7 | LOS F | 43.7 | 309.3 | 0.97 | 1.24 | 10.3 |
| 6 | R | 232 | 1.9 | 1.103 | 194.9 | LOS F | 43.7 | 309.3 | 1.00 | 1.42 | 9.7 |
| Approach | | 415 | 1.4 | 1.103 | 169.8 | LOS F | 43.7 | 309.3 | 0.98 | 1.30 | 10.4 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 199 | 3.7 | 1.000[3] | 63.0 | LOS E | 29.6 | 213.6 | 0.96 | 0.95 | 23.1 |
| 8 | T | 1639 | 3.5 | 1.228 | 244.1 | LOS F | 109.6 | 790.6 | 0.99 | 1.68 | 8.2 |
| 9 | R | 261 | 0.7 | 1.116 | 170.2 | LOS F | 27.8 | 195.8 | 1.00 | 1.20 | 10.4 |
| Approach | | 2099 | 2.9 | 1.228 | 217.7 | LOS F | 109.6 | 790.6 | 0.99 | 1.55 | 8.9 |
| West: Moss St (W) | | | | | | | | | | | |
| 10 | L | 157 | 1.2 | 0.330 | 19.3 | LOS B | 3.3 | 23.4 | 0.58 | 0.74 | 26.4 |
| 11 | T | 245 | 0.0 | 1.274 | 325.8 | LOS F | 138.5 | 976.3 | 1.00 | 1.77 | 2.1 |
| 12 | R | 148 | 1.1 | 1.274 | 333.2 | LOS F | 138.5 | 976.3 | 1.00 | 1.77 | 2.8 |
| Approach | | 950 | 0.9 | 1.274 | 278.8 | LOS F | 138.5 | 976.3 | 0.88 | 1.48 | 3.3 |
| All Vehicles | | 4819 | 2.4 | 1.274 | 237.3 | LOS F | 138.5 | 976.3 | 0.98 | 1.40 | 8.0 |

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

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 63 | 69.1 | LOS F | 0.3 | 0.3 | 0.96 | 0.96 |
| P3 | Across E approach | 63 | 44.9 | LOS E | 0.2 | 0.2 | 0.77 | 0.77 |
| P5 | Across N approach | 63 | 48.0 | LOS E | 0.2 | 0.2 | 0.80 | 0.80 |
| P7 | Across W approach | 63 | 59.0 | LOS E | 0.2 | 0.2 | 0.89 | 0.89 |
| All Pedestrians | | 252 | 55.2 | LOS E | | | 0.86 | 0.86 |

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

# MOVEMENT SUMMARY

**Site: 11. Princes Hwy-Moss (10 Year NO-DEV Sat-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Moss Street
Saturday - Equivalent 120th HH
10 Years - No Development
Signals - Fixed Time  Cycle Time = 150 seconds (Practical Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 13 | 0.0 | 0.782 | 65.5 | LOS E | 26.9 | 192.8 | 0.95 | 0.92 | 23.1 |
| 2 | T | 1284 | 2.7 | 0.846 | 58.8 | LOS E | 31.4 | 224.7 | 0.97 | 0.90 | 24.2 |
| 3 | R | 104 | 0.0 | 0.526 | 78.6 | LOS F | 7.4 | 51.8 | 0.99 | 0.79 | 19.1 |
| Approach | | 1401 | 2.4 | 0.846 | 60.3 | LOS E | 31.4 | 224.7 | 0.97 | 0.89 | 23.8 |
| East: Moss St (E) | | | | | | | | | | | |
| 4 | L | 32 | 0.0 | 0.254 | 60.4 | LOS E | 2.7 | 19.2 | 0.86 | 0.74 | 22.2 |
| 5 | T | 80 | 0.0 | 0.681 | 62.2 | LOS E | 14.8 | 104.8 | 0.97 | 0.80 | 19.1 |
| 6 | R | 146 | 1.8 | 0.681 | 71.7 | LOS F | 14.8 | 104.8 | 1.00 | 0.84 | 20.1 |
| Approach | | 258 | 1.0 | 0.681 | 67.3 | LOS E | 14.8 | 104.8 | 0.97 | 0.81 | 20.0 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 115 | 2.3 | 0.741 | 43.3 | LOS D | 19.8 | 140.7 | 0.71 | 0.97 | 29.5 |
| 8 | T | 1433 | 1.5 | 0.741 | 36.7 | LOS C | 31.6 | 224.2 | 0.81 | 0.73 | 31.6 |
| 9 | R | 284 | 1.0 | 0.824 | 47.3 | LOS D | 12.9 | 91.0 | 1.00 | 0.89 | 26.8 |
| Approach | | 1832 | 1.5 | 0.824 | 38.8 | LOS C | 31.6 | 224.2 | 0.83 | 0.77 | 30.7 |
| West: Moss St (W) | | | | | | | | | | | |
| 10 | L | 342 | 0.0 | 0.722 | 26.2 | LOS B | 10.8 | 75.4 | 0.78 | 0.81 | 22.2 |
| 11 | T | 154 | 0.0 | 0.810 | 69.1 | LOS E | 19.9 | 140.2 | 1.00 | 0.92 | 8.3 |
| 12 | R | 113 | 1.3 | 0.810 | 76.5 | LOS F | 19.9 | 140.2 | 1.00 | 0.92 | 10.6 |
| Approach | | 609 | 0.2 | 0.810 | 46.4 | LOS D | 19.9 | 140.2 | 0.88 | 0.86 | 14.2 |
| All Vehicles | | 4100 | 1.6 | 0.846 | 49.1 | LOS D | 31.6 | 224.7 | 0.90 | 0.83 | 25.1 |

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

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 63 | 69.1 | LOS F | 0.3 | 0.3 | 0.96 | 0.96 |
| P3 | Across E approach | 63 | 34.0 | LOS D | 0.2 | 0.2 | 0.67 | 0.67 |
| P5 | Across N approach | 63 | 68.2 | LOS F | 0.3 | 0.3 | 0.95 | 0.95 |
| P7 | Across W approach | 63 | 47.2 | LOS E | 0.2 | 0.2 | 0.79 | 0.79 |
| All Pedestrians | | 252 | 54.6 | LOS E | | | 0.85 | 0.85 |

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

# MOVEMENT SUMMARY

**Site: 7. Princes Hwy-Kalandar (10 Year + DEV Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Kalandar Street
Friday AM (0800-0900) - Equivalent 120th HH
10 Years - With Development
Signals - Fixed Time  Cycle Time = 150 seconds (Practical Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 3 | 0.0 | 1.058 | 112.9 | LOS F | 46.8 | 343.2 | 1.00 | 1.19 | 15.7 |
| 2 | T | 1058 | 5.6 | 1.058 | 122.2 | LOS F | 59.9 | 439.3 | 1.00 | 1.27 | 14.6 |
| 3 | R | 42 | 0.0 | 0.378 | 85.5 | LOS F | 3.1 | 21.7 | 1.00 | 0.74 | 18.6 |
| Approach | | 1104 | 5.3 | 1.058 | 120.7 | LOS F | 59.9 | 439.3 | 1.00 | 1.25 | 14.7 |
| East: Kalandar St (E) | | | | | | | | | | | |
| 4 | L | 41 | 9.4 | 1.085 | 156.2 | LOS F | 67.0 | 482.9 | 1.00 | 1.31 | 8.3 |
| 5 | T | 325 | 3.1 | 1.085 | 146.9 | LOS F | 67.0 | 482.9 | 1.00 | 1.31 | 7.7 |
| 6 | R | 825 | 2.9 | 1.085 | 169.7 | LOS F | 71.3 | 511.5 | 1.00 | 1.27 | 7.7 |
| Approach | | 1192 | 3.1 | 1.085 | 163.1 | LOS F | 71.3 | 511.5 | 1.00 | 1.28 | 7.7 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 277 | 7.3 | 0.300 | 9.3 | LOS A | 1.0 | 7.1 | 0.07 | 0.64 | 53.3 |
| 8 | T | 988 | 7.3 | 0.777 | 44.5 | LOS D | 30.2 | 224.6 | 0.90 | 0.80 | 28.5 |
| 9 | R | 173 | 11.3 | 1.019 | 104.1 | LOS F | 12.9 | 99.2 | 1.00 | 1.06 | 16.1 |
| Approach | | 1437 | 7.8 | 1.019 | 44.9 | LOS D | 30.2 | 224.6 | 0.75 | 0.80 | 28.5 |
| West: Kalandar St (W) | | | | | | | | | | | |
| 10 | L | 57 | 13.6 | 0.846 | 85.2 | LOS F | 12.3 | 90.0 | 0.98 | 1.01 | 15.7 |
| 11 | T | 159 | 1.6 | 0.846 | 75.6 | LOS F | 16.8 | 122.1 | 0.99 | 0.98 | 14.9 |
| 12 | R | 171 | 5.3 | 0.846 | 85.1 | LOS F | 16.8 | 122.1 | 1.00 | 0.93 | 15.4 |
| Approach | | 387 | 5.0 | 0.846 | 81.3 | LOS F | 16.8 | 122.1 | 0.99 | 0.96 | 15.2 |
| All Vehicles | | 4120 | 5.5 | 1.085 | 102.8 | LOS F | 71.3 | 511.5 | 0.91 | 1.08 | 14.8 |

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

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 63 | 48.8 | LOS E | 0.2 | 0.2 | 0.81 | 0.81 |
| P3 | Across E approach | 63 | 38.9 | LOS D | 0.2 | 0.2 | 0.72 | 0.72 |
| P5 | Across N approach | 63 | 69.1 | LOS F | 0.3 | 0.3 | 0.96 | 0.96 |
| All Pedestrians | | 189 | 52.3 | LOS E | | | 0.83 | 0.83 |

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

# MOVEMENT SUMMARY

**Site: 7. Princes Hwy-Kalandar (10 Year + DEV PM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Kalandar Street
Friday PM (1600-1700) - Equivalent 120th HH
10 Years - With Development
Signals - Fixed Time  Cycle Time = 150 seconds (Practical Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 13 | 0.0 | 1.142 | 186.7 | LOS F | 47.1 | 336.9 | 1.00 | 1.28 | 10.2 |
| 2 | T | 864 | 2.6 | 1.142 | 195.2 | LOS F | 59.4 | 424.8 | 1.00 | 1.40 | 10.0 |
| 3 | R | 115 | 1.4 | 1.170 | 255.8 | LOS F | 16.4 | 116.3 | 1.00 | 1.26 | 7.6 |
| Approach | | 991 | 2.4 | 1.170 | 202.1 | LOS F | 59.4 | 424.8 | 1.00 | 1.38 | 9.7 |
| East: Kalandar St (E) | | | | | | | | | | | |
| 4 | L | 103 | 1.5 | 1.148 | 203.8 | LOS F | 57.9 | 412.4 | 1.00 | 1.40 | 6.5 |
| 5 | T | 254 | 2.4 | 1.148 | 194.8 | LOS F | 57.9 | 412.4 | 1.00 | 1.40 | 6.1 |
| 6 | R | 583 | 1.8 | 1.148 | 224.8 | LOS F | 62.3 | 442.6 | 1.00 | 1.37 | 6.0 |
| Approach | | 940 | 2.0 | 1.148 | 214.4 | LOS F | 62.3 | 442.6 | 1.00 | 1.38 | 6.1 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 871 | 1.1 | 0.924 | 27.6 | LOS B | 18.5 | 130.6 | 0.27 | 0.78 | 36.9 |
| 8 | T | 1432 | 3.1 | 1.141 | 201.6 | LOS F | 98.3 | 706.2 | 1.00 | 1.65 | 9.7 |
| 9 | R | 152 | 5.4 | 0.587 | 48.0 | LOS D | 7.5 | 54.8 | 0.98 | 0.80 | 27.3 |
| Approach | | 2455 | 2.5 | 1.141 | 130.4 | LOS F | 98.3 | 706.2 | 0.74 | 1.29 | 13.7 |
| West: Kalandar St (W) | | | | | | | | | | | |
| 10 | L | 120 | 9.5 | 1.000[3] | 56.8 | LOS E | 13.6 | 99.1 | 0.90 | 0.89 | 20.9 |
| 11 | T | 325 | 0.0 | 1.179 | 170.0 | LOS F | 79.6 | 560.0 | 0.96 | 1.26 | 7.9 |
| 12 | R | 333 | 1.0 | 1.179 | 256.5 | LOS F | 79.6 | 560.0 | 1.00 | 1.55 | 6.1 |
| Approach | | 779 | 1.9 | 1.179 | 189.5 | LOS F | 79.6 | 560.0 | 0.97 | 1.33 | 7.7 |
| All Vehicles | | 5165 | 2.3 | 1.179 | 168.4 | LOS F | 98.3 | 706.2 | 0.87 | 1.33 | 10.2 |

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

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 63 | 59.0 | LOS E | 0.2 | 0.2 | 0.89 | 0.89 |
| P3 | Across E approach | 63 | 40.3 | LOS E | 0.2 | 0.2 | 0.73 | 0.73 |
| P5 | Across N approach | 63 | 55.5 | LOS E | 0.2 | 0.2 | 0.86 | 0.86 |
| All Pedestrians | | 189 | 51.6 | LOS E | | | 0.83 | 0.83 |

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

# MOVEMENT SUMMARY

**Site: 7. Princes Hwy-Kalandar (10 Year + DEV Sat-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Kalandar Street
Saturday - Equivalent 120th HH
10 Years - With Development
Signals - Fixed Time  Cycle Time = 150 seconds (Practical Cycle Time)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 6 | 25.0 | 0.967 | 105.2 | LOS F | 47.2 | 338.5 | 1.00 | 1.12 | 16.7 |
| 2 | T | 1056 | 2.6 | 0.967 | 89.2 | LOS F | 47.2 | 338.5 | 1.00 | 1.11 | 18.4 |
| 3 | R | 118 | 4.5 | 0.983 | 119.3 | LOS F | 11.0 | 80.1 | 1.00 | 1.03 | 14.4 |
| Approach | | 1180 | 2.9 | 0.983 | 92.3 | LOS F | 47.2 | 338.5 | 1.00 | 1.10 | 17.9 |
| East: Kalandar St (E) | | | | | | | | | | | |
| 4 | L | 93 | 0.0 | 0.985 | 101.9 | LOS F | 41.7 | 293.1 | 1.00 | 1.16 | 11.9 |
| 5 | T | 218 | 0.6 | 0.985 | 93.0 | LOS F | 41.7 | 293.1 | 1.00 | 1.16 | 11.2 |
| 6 | R | 559 | 1.0 | 0.985 | 109.6 | LOS F | 41.7 | 293.1 | 1.00 | 1.10 | 11.2 |
| Approach | | 869 | 0.8 | 0.985 | 104.6 | LOS F | 41.7 | 293.1 | 1.00 | 1.12 | 11.2 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 505 | 0.3 | 0.529 | 9.4 | LOS A | 2.4 | 16.7 | 0.08 | 0.65 | 52.9 |
| 8 | T | 1525 | 1.0 | 0.982 | 75.4 | LOS F | 70.2 | 495.7 | 1.00 | 1.13 | 20.6 |
| 9 | R | 100 | 11.6 | 0.402 | 43.0 | LOS D | 4.0 | 30.7 | 0.95 | 0.78 | 29.3 |
| Approach | | 2130 | 1.3 | 0.982 | 58.2 | LOS E | 70.2 | 495.7 | 0.78 | 1.00 | 24.3 |
| West: Kalandar St (W) | | | | | | | | | | | |
| 10 | L | 73 | 2.0 | 0.918 | 84.8 | LOS F | 13.9 | 97.9 | 0.99 | 0.99 | 15.6 |
| 11 | T | 174 | 0.0 | 0.918 | 78.7 | LOS F | 20.3 | 142.6 | 0.99 | 0.99 | 14.4 |
| 12 | R | 190 | 0.8 | 0.918 | 94.8 | LOS F | 20.3 | 142.6 | 1.00 | 1.01 | 14.1 |
| Approach | | 437 | 0.7 | 0.918 | 86.7 | LOS F | 20.3 | 142.6 | 1.00 | 1.00 | 14.5 |
| All Vehicles | | 4615 | 1.6 | 0.985 | 78.4 | LOS F | 70.2 | 495.7 | 0.90 | 1.05 | 18.6 |

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

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 63 | 57.2 | LOS E | 0.2 | 0.2 | 0.87 | 0.87 |
| P3 | Across E approach | 63 | 32.7 | LOS D | 0.2 | 0.2 | 0.66 | 0.66 |
| P5 | Across N approach | 63 | 69.1 | LOS F | 0.3 | 0.3 | 0.96 | 0.96 |
| All Pedestrians | | 189 | 53.0 | LOS E | | | 0.83 | 0.83 |

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

# MOVEMENT SUMMARY

**Site: 9. Kalandar St-Kinghorne St (10 year + DEV Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Kalandar Street-Kinghorne Street-Albatross Road
Friday AM (0800-0900) - Equivalent 120th HH
10 Years - With Development
Roundabout

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Kinghorne Sttreet | | | | | | | | | | | |
| 1 | L | 34 | 7.7 | 0.850 | 31.0 | LOS C | 17.4 | 125.3 | 1.00 | 1.40 | 32.9 |
| 2 | T | 532 | 3.4 | 0.850 | 29.5 | LOS C | 17.4 | 125.3 | 1.00 | 1.40 | 33.1 |
| 3 | R | 65 | 0.0 | 0.850 | 34.3 | LOS C | 17.4 | 125.3 | 1.00 | 1.40 | 32.0 |
| Approach | | 631 | 3.3 | 0.850 | 30.1 | LOS C | 17.4 | 125.3 | 1.00 | 1.40 | 32.9 |
| East: Kalandar Street | | | | | | | | | | | |
| 4 | L | 359 | 7.5 | 0.490 | 8.2 | LOS A | 3.3 | 24.6 | 0.51 | 0.61 | 44.7 |
| 6 | R | 177 | 2.3 | 0.490 | 12.9 | LOS A | 3.3 | 24.6 | 0.51 | 0.78 | 41.7 |
| Approach | | 536 | 5.8 | 0.490 | 9.7 | LOS A | 3.3 | 24.6 | 0.51 | 0.67 | 43.7 |
| North: Kinghorne Street | | | | | | | | | | | |
| 7 | L | 145 | 3.7 | 0.376 | 9.1 | LOS A | 2.6 | 19.0 | 0.62 | 0.69 | 46.9 |
| 8 | T | 34 | 0.0 | 0.376 | 8.2 | LOS A | 2.6 | 19.0 | 0.62 | 0.66 | 46.8 |
| 9 | R | 194 | 3.4 | 0.376 | 12.2 | LOS A | 2.6 | 19.0 | 0.62 | 0.76 | 45.3 |
| Approach | | 373 | 3.2 | 0.376 | 10.6 | LOS A | 2.6 | 19.0 | 0.62 | 0.72 | 46.0 |
| South West: Albatross Road | | | | | | | | | | | |
| 30 | L | 287 | 4.5 | 0.896 | 38.4 | LOS C | 18.3 | 134.5 | 1.00 | 1.54 | 28.9 |
| 32 | R | 243 | 8.1 | 0.896 | 42.6 | LOS D | 18.3 | 134.5 | 1.00 | 1.53 | 28.4 |
| Approach | | 531 | 6.2 | 0.896 | 40.3 | LOS C | 18.3 | 134.5 | 1.00 | 1.54 | 28.7 |
| All Vehicles | | 2069 | 4.6 | 0.896 | 23.9 | LOS B | 18.3 | 134.5 | 0.80 | 1.12 | 35.2 |

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

# MOVEMENT SUMMARY

**Site: 9. Kalandar St-Kinghorne St (10 Year + DEV Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Kalandar Street-Kinghorne Street-Albatross Road
Friday PM (1600-1700) - Equivalent 120th HH
10 Years - With Development
Roundabout

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Kinghorne Sttreet | | | | | | | | | | | |
| 1 | L | 37 | 0.0 | 0.688 | 19.9 | LOS B | 8.4 | 58.6 | 0.98 | 1.15 | 39.2 |
| 2 | T | 359 | 0.0 | 0.688 | 18.7 | LOS B | 8.4 | 58.6 | 0.98 | 1.14 | 39.4 |
| 3 | R | 86 | 0.0 | 0.688 | 23.6 | LOS B | 8.4 | 58.6 | 0.98 | 1.15 | 37.7 |
| Approach | | 482 | 0.0 | 0.688 | 19.6 | LOS B | 8.4 | 58.6 | 0.98 | 1.15 | 39.0 |
| East: Kalandar Street | | | | | | | | | | | |
| 4 | L | 311 | 0.0 | 0.512 | 9.8 | LOS A | 3.7 | 26.1 | 0.67 | 0.76 | 43.5 |
| 6 | R | 131 | 0.0 | 0.512 | 14.6 | LOS B | 3.7 | 26.1 | 0.67 | 0.88 | 40.1 |
| Approach | | 441 | 0.0 | 0.512 | 11.2 | LOS A | 3.7 | 26.1 | 0.67 | 0.80 | 42.4 |
| North: Kinghorne Street | | | | | | | | | | | |
| 7 | L | 355 | 0.0 | 0.898 | 24.5 | LOS B | 19.8 | 138.9 | 1.00 | 1.31 | 35.6 |
| 8 | T | 88 | 0.0 | 0.898 | 23.7 | LOS B | 19.8 | 138.9 | 1.00 | 1.31 | 35.7 |
| 9 | R | 335 | 0.0 | 0.898 | 27.7 | LOS B | 19.8 | 138.9 | 1.00 | 1.31 | 34.7 |
| Approach | | 778 | 0.0 | 0.898 | 25.8 | LOS B | 19.8 | 138.9 | 1.00 | 1.31 | 35.2 |
| South West: Albatross Road | | | | | | | | | | | |
| 30 | L | 331 | 0.0 | 0.926 | 32.9 | LOS C | 23.1 | 161.4 | 1.00 | 1.53 | 31.1 |
| 32 | R | 382 | 0.0 | 0.926 | 37.0 | LOS C | 23.1 | 161.4 | 1.00 | 1.53 | 30.4 |
| Approach | | 713 | 0.0 | 0.926 | 35.1 | LOS C | 23.1 | 161.4 | 1.00 | 1.53 | 30.7 |
| All Vehicles | | 2414 | 0.0 | 0.926 | 24.6 | LOS B | 23.1 | 161.4 | 0.94 | 1.25 | 35.2 |

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

# MOVEMENT SUMMARY

**Site: 9. Kalandar St-Kinghorne St (10 Year + DEV Sat-120th HH)**

13S1231000 - West Culburra Subdivision
Kalandar Street-Kinghorne Street-Albatross Road
Saturday - Equivalent 120th HH
10 Years - With Development
Roundabout

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Kinghorne Sttreet | | | | | | | | | | | |
| 1 | L | 23 | 12.5 | 0.258 | 11.0 | LOS A | 1.6 | 11.7 | 0.64 | 0.77 | 47.1 |
| 2 | T | 178 | 1.6 | 0.258 | 9.2 | LOS A | 1.6 | 11.7 | 0.64 | 0.69 | 47.3 |
| 3 | R | 33 | 0.0 | 0.258 | 14.1 | LOS A | 1.6 | 11.7 | 0.64 | 0.82 | 44.4 |
| Approach | | 234 | 2.5 | 0.258 | 10.1 | LOS A | 1.6 | 11.7 | 0.64 | 0.72 | 46.8 |
| East: Kalandar Street | | | | | | | | | | | |
| 4 | L | 224 | 6.0 | 0.300 | 7.6 | LOS A | 1.7 | 12.1 | 0.40 | 0.57 | 45.5 |
| 6 | R | 107 | 1.4 | 0.300 | 12.4 | LOS A | 1.7 | 12.1 | 0.40 | 0.78 | 42.1 |
| Approach | | 332 | 4.5 | 0.300 | 9.2 | LOS A | 1.7 | 12.1 | 0.40 | 0.64 | 44.3 |
| North: Kinghorne Street | | | | | | | | | | | |
| 7 | L | 168 | 0.8 | 0.353 | 8.8 | LOS A | 2.3 | 16.6 | 0.57 | 0.67 | 47.2 |
| 8 | T | 23 | 0.0 | 0.353 | 8.0 | LOS A | 2.3 | 16.6 | 0.57 | 0.63 | 47.2 |
| 9 | R | 173 | 2.6 | 0.353 | 12.0 | LOS A | 2.3 | 16.6 | 0.57 | 0.75 | 45.5 |
| Approach | | 364 | 1.6 | 0.353 | 10.3 | LOS A | 2.3 | 16.6 | 0.57 | 0.71 | 46.4 |
| South West: Albatross Road | | | | | | | | | | | |
| 30 | L | 177 | 1.4 | 0.424 | 8.3 | LOS A | 3.0 | 21.4 | 0.62 | 0.65 | 47.0 |
| 32 | R | 260 | 1.7 | 0.424 | 12.5 | LOS A | 3.0 | 21.4 | 0.62 | 0.77 | 45.4 |
| Approach | | 437 | 1.6 | 0.424 | 10.8 | LOS A | 3.0 | 21.4 | 0.62 | 0.72 | 46.0 |
| All Vehicles | | 1366 | 2.5 | 0.424 | 10.1 | LOS A | 3.0 | 21.4 | 0.56 | 0.70 | 45.9 |

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

# MOVEMENT SUMMARY

**Site: 10. Princes Hwy-Forest (10 Year + DEV Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Forest Road
Friday AM (0800-0900) - Equivalent 120th HH
10 Years - With Development
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 2 | T | 1554 | 3.1 | 0.813 | 0.6 | X | X | X | X | 0.00 | 98.1 |
| 3 | R | 46 | 13.0 | 0.079 | 18.0 | LOS B | 0.3 | 2.3 | 0.59 | 0.87 | 55.7 |
| Approach | | 1600 | 3.4 | 0.813 | 1.1 | NA | 0.3 | 2.3 | 0.02 | 0.03 | 96.4 |
| South East: Forest Road (Median RT) | | | | | | | | | | | |
| 23 | R | 108 | 2.3 | 0.059 | 8.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| Approach | | 108 | 2.3 | 0.059 | 8.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| East: Forest Road | | | | | | | | | | | |
| 4 | L | 49 | 3.3 | 0.114 | 13.8 | LOS A | 0.3 | 2.2 | 0.57 | 0.85 | 50.7 |
| 6 | R | 108 | 2.3 | 0.253 | 16.2 | LOS B | 0.9 | 6.7 | 0.65 | 0.92 | 48.6 |
| Approach | | 158 | 2.6 | 0.253 | 15.4 | LOS B | 0.9 | 6.7 | 0.62 | 0.89 | 49.2 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 64 | 8.3 | 0.037 | 13.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.76 | 63.3 |
| 8 | T | 573 | 16.0 | 0.324 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 637 | 15.2 | 0.324 | 1.3 | NA | 0.0 | 0.0 | 0.00 | 0.08 | 95.7 |
| All Vehicles | | 2504 | 6.3 | 0.813 | 2.3 | NA | 0.9 | 6.7 | 0.05 | 0.12 | 89.0 |

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 10. Princes Hwy-Forest (10 Year + DEV Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Forest Road
Friday PM (1600-1700) - Equivalent 120th HH
10 Years - With Development
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 2 | T | 702 | 6.0 | 0.374 | 0.1 | X | X | X | X | 0.00 | 99.7 |
| 3 | R | 64 | 2.9 | 0.657 | 77.9 | LOS F | 2.4 | 16.9 | 0.98 | 1.06 | 21.8 |
| Approach | | 766 | 5.8 | 0.657 | 6.6 | NA | 2.4 | 16.9 | 0.08 | 0.09 | 81.0 |
| South East: Forest Road (Median RT) | | | | | | | | | | | |
| 23 | R | 75 | 2.2 | 0.041 | 8.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| Approach | | 75 | 2.2 | 0.041 | 8.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| East: Forest Road | | | | | | | | | | | |
| 4 | L | 69 | 0.0 | 0.920 | 137.1 | LOS F | 4.3 | 29.8 | 0.99 | 1.26 | 15.7 |
| 6 | R | 75 | 2.2 | 1.025 | 193.2 | LOS F | 7.0 | 49.9 | 1.00 | 1.50 | 12.0 |
| Approach | | 144 | 1.2 | 1.025 | 166.1 | LOS F | 7.0 | 49.9 | 1.00 | 1.38 | 13.5 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 161 | 2.0 | 0.088 | 12.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.75 | 63.3 |
| 8 | T | 1622 | 2.0 | 0.843 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 1783 | 2.0 | 0.843 | 1.1 | NA | 0.0 | 0.0 | 0.00 | 0.07 | 96.1 |
| All Vehicles | | 2768 | 3.0 | 1.025 | 11.4 | NA | 7.0 | 49.9 | 0.07 | 0.16 | 69.3 |

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 10. Princes Hwy-Forest (10 Year + DEV Sat-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Forest Road
Saturday - Equivalent 120th HH
10 Years - With Development
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 2 | T | 893 | 1.7 | 0.463 | 0.1 | X | X | X | X | 0.00 | 99.6 |
| 3 | R | 52 | 0.0 | 0.232 | 30.2 | LOS C | 0.8 | 5.5 | 0.88 | 0.98 | 41.8 |
| Approach | | 944 | 1.6 | 0.463 | 1.8 | NA | 0.8 | 5.5 | 0.05 | 0.05 | 94.2 |
| South East: Forest Road (Median RT) | | | | | | | | | | | |
| 23 | R | 98 | 0.0 | 0.053 | 8.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| Approach | | 98 | 0.0 | 0.053 | 8.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.61 | 53.3 |
| East: Forest Road | | | | | | | | | | | |
| 4 | L | 62 | 0.0 | 0.353 | 33.1 | LOS C | 1.2 | 8.4 | 0.90 | 1.01 | 37.5 |
| 6 | R | 98 | 3.0 | 0.654 | 48.1 | LOS D | 2.7 | 19.0 | 0.94 | 1.13 | 31.3 |
| Approach | | 160 | 1.8 | 0.654 | 42.3 | LOS C | 2.7 | 19.0 | 0.93 | 1.08 | 33.5 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 137 | 0.0 | 0.074 | 12.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.75 | 63.3 |
| 8 | T | 1268 | 1.7 | 0.657 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 1405 | 1.6 | 0.657 | 1.2 | NA | 0.0 | 0.0 | 0.00 | 0.07 | 95.8 |
| All Vehicles | | 2607 | 1.5 | 0.657 | 4.2 | NA | 2.7 | 19.0 | 0.07 | 0.15 | 84.1 |

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: 11. Princes Hwy-Moss (10 Year + DEV Fri AM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Moss Street
Friday AM (0800-0900) - Equivalent 120th HH
10 Years - With Development
Signals - Fixed Time  Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 5 | 0.0 | 0.980 | 102.3 | LOS F | 27.4 | 204.4 | 1.00 | 1.13 | 16.4 |
| 2 | T | 1019 | 7.6 | 1.060 | 125.5 | LOS F | 36.6 | 272.7 | 1.00 | 1.25 | 14.3 |
| 3 | R | 158 | 3.7 | 1.071 | 165.4 | LOS F | 17.1 | 123.2 | 1.00 | 1.19 | 10.6 |
| Approach | | 1182 | 7.1 | 1.071 | 130.7 | LOS F | 36.6 | 272.7 | 1.00 | 1.24 | 13.7 |
| East: Moss St (E) | | | | | | | | | | | |
| 4 | L | 37 | 3.4 | 0.405 | 50.1 | LOS D | 4.3 | 30.8 | 0.82 | 0.78 | 24.8 |
| 5 | T | 244 | 4.1 | 1.087 | 141.8 | LOS F | 55.3 | 401.6 | 0.97 | 1.30 | 11.0 |
| 6 | R | 276 | 4.6 | 1.087 | 172.4 | LOS F | 55.3 | 401.6 | 1.00 | 1.45 | 10.7 |
| Approach | | 557 | 4.3 | 1.087 | 150.9 | LOS F | 55.3 | 401.6 | 0.97 | 1.34 | 11.3 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 197 | 5.0 | 1.000[3] | 52.8 | LOS D | 29.0 | 213.4 | 0.96 | 0.93 | 26.1 |
| 8 | T | 1659 | 6.8 | 1.133 | 163.2 | LOS F | 85.7 | 635.1 | 0.99 | 1.51 | 11.6 |
| 9 | R | 336 | 3.7 | 1.044 | 113.6 | LOS F | 27.1 | 195.8 | 1.00 | 1.14 | 14.5 |
| Approach | | 2192 | 6.1 | 1.133 | 145.7 | LOS F | 85.7 | 635.1 | 0.99 | 1.40 | 12.5 |
| West: Moss St (W) | | | | | | | | | | | |
| 10 | L | 139 | 10.3 | 0.303 | 22.4 | LOS B | 3.4 | 26.1 | 0.68 | 0.76 | 24.5 |
| 11 | T | 135 | 3.6 | 0.555 | 54.4 | LOS D | 11.5 | 84.4 | 0.96 | 0.79 | 10.1 |
| 12 | R | 55 | 11.9 | 0.555 | 62.2 | LOS E | 11.5 | 84.4 | 0.96 | 0.82 | 12.6 |
| Approach | | 328 | 7.8 | 0.555 | 42.2 | LOS C | 11.5 | 84.4 | 0.84 | 0.78 | 14.7 |
| All Vehicles | | 4259 | 6.3 | 1.133 | 134.2 | LOS F | 85.7 | 635.1 | 0.98 | 1.30 | 12.7 |

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

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 53 | 55.1 | LOS E | 0.2 | 0.2 | 0.90 | 0.90 |
| P3 | Across E approach | 53 | 38.5 | LOS D | 0.2 | 0.2 | 0.76 | 0.76 |
| P5 | Across N approach | 53 | 61.6 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| P7 | Across W approach | 53 | 54.2 | LOS E | 0.2 | 0.2 | 0.90 | 0.90 |
| All Pedestrians | | 212 | 52.4 | LOS E | | | 0.88 | 0.88 |

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

# MOVEMENT SUMMARY

**Site: 11. Princes Hwy-Moss (10 Year + DEV Fri PM-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Moss Street
Friday PM (1600-1700) - Equivalent 120th HH
10 Years - With Development
Signals - Fixed Time  Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

## Movement Performance - Vehicles

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 14 | 0.0 | 1.208 | 260.3 | LOS F | 52.9 | 379.7 | 1.00 | 1.55 | 7.3 |
| 2 | T | 1232 | 3.1 | 1.307 | 320.3 | LOS F | 72.1 | 518.4 | 1.00 | 1.79 | 6.5 |
| 3 | R | 115 | 0.0 | 1.390 | 442.6 | LOS F | 21.7 | 151.7 | 1.00 | 1.49 | 4.4 |
| Approach | | 1360 | 2.8 | 1.390 | 330.0 | LOS F | 72.1 | 518.4 | 1.00 | 1.76 | 6.3 |
| East: Moss St (E) | | | | | | | | | | | |
| 4 | L | 37 | 4.3 | 0.382 | 56.3 | LOS D | 4.1 | 29.1 | 0.87 | 0.77 | 23.2 |
| 5 | T | 155 | 0.0 | 1.026 | 104.3 | LOS F | 35.1 | 248.3 | 0.97 | 1.13 | 13.7 |
| 6 | R | 238 | 1.9 | 1.026 | 129.6 | LOS F | 35.1 | 248.3 | 1.00 | 1.28 | 13.4 |
| Approach | | 429 | 1.4 | 1.026 | 114.2 | LOS F | 35.1 | 248.3 | 0.98 | 1.18 | 14.0 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 215 | 3.7 | 1.000[3] | 58.8 | LOS E | 29.6 | 213.6 | 1.00 | 0.95 | 24.2 |
| 8 | T | 1812 | 3.5 | 1.391 | 362.2 | LOS F | 144.8 | 1043.9 | 1.00 | 2.12 | 5.8 |
| 9 | R | 252 | 0.7 | 1.149 | 192.5 | LOS F | 27.8 | 195.6 | 1.00 | 1.25 | 9.3 |
| Approach | | 2278 | 3.0 | 1.391 | 314.9 | LOS F | 144.8 | 1043.9 | 1.00 | 1.91 | 6.5 |
| West: Moss St (W) | | | | | | | | | | | |
| 10 | L | 153 | 1.2 | 0.330 | 19.4 | LOS B | 3.3 | 23.4 | 0.61 | 0.75 | 26.3 |
| 11 | T | 260 | 0.0 | 1.400 | 433.2 | LOS F | 157.3 | 1108.4 | 1.00 | 2.13 | 1.6 |
| 12 | R | 148 | 1.1 | 1.400 | 440.7 | LOS F | 157.3 | 1108.4 | 1.00 | 2.13 | 2.1 |
| Approach | | 965 | 0.8 | 1.400 | 370.9 | LOS F | 157.3 | 1108.4 | 0.89 | 1.75 | 2.5 |
| All Vehicles | | 5033 | 2.4 | 1.400 | 312.1 | LOS F | 157.3 | 1108.4 | 0.99 | 1.64 | 6.3 |

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

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

## Movement Performance - Pedestrians

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 53 | 61.6 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| P3 | Across E approach | 53 | 41.6 | LOS E | 0.2 | 0.2 | 0.79 | 0.79 |
| P5 | Across N approach | 53 | 47.3 | LOS E | 0.2 | 0.2 | 0.84 | 0.84 |
| P7 | Across W approach | 53 | 55.1 | LOS E | 0.2 | 0.2 | 0.90 | 0.90 |
| All Pedestrians | | 212 | 51.4 | LOS E | | | 0.87 | 0.87 |

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

# MOVEMENT SUMMARY

**Site: 11. Princes Hwy-Moss (10 Year + DEV Sat-120th HH)**

13S1231000 - West Culburra Subdivision
Princes Highway-Moss Street
Saturday - Equivalent 120th HH
10 Years - With Development
Signals - Fixed Time  Cycle Time = 135 seconds (Optimum Cycle Time - Minimum Delay)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Princes Hwy (S) | | | | | | | | | | | |
| 1 | L | 14 | 0.0 | 0.886 | 71.8 | LOS F | 28.7 | 205.4 | 1.00 | 0.98 | 21.6 |
| 2 | T | 1300 | 2.7 | 0.958 | 73.3 | LOS F | 35.9 | 257.1 | 1.00 | 1.06 | 21.0 |
| 3 | R | 104 | 0.0 | 0.583 | 73.8 | LOS F | 6.8 | 47.7 | 1.00 | 0.79 | 20.0 |
| Approach | | 1418 | 2.4 | 0.958 | 73.4 | LOS F | 35.9 | 257.1 | 1.00 | 1.04 | 20.9 |
| East: Moss St (E) | | | | | | | | | | | |
| 4 | L | 35 | 0.0 | 0.243 | 52.6 | LOS D | 2.6 | 18.1 | 0.83 | 0.75 | 24.0 |
| 5 | T | 85 | 0.0 | 0.651 | 53.7 | LOS D | 13.9 | 98.5 | 0.96 | 0.79 | 20.7 |
| 6 | R | 155 | 1.8 | 0.651 | 63.0 | LOS E | 13.9 | 98.5 | 0.98 | 0.83 | 21.7 |
| Approach | | 275 | 1.0 | 0.651 | 58.8 | LOS E | 13.9 | 98.5 | 0.96 | 0.81 | 21.7 |
| North: Princes Hwy (N) | | | | | | | | | | | |
| 7 | L | 121 | 2.3 | 0.806 | 49.3 | LOS D | 23.3 | 165.6 | 0.82 | 0.99 | 27.4 |
| 8 | T | 1443 | 1.5 | 0.806 | 40.8 | LOS C | 31.6 | 224.1 | 0.89 | 0.82 | 29.8 |
| 9 | R | 284 | 1.0 | 0.946 | 64.9 | LOS E | 15.8 | 111.7 | 1.00 | 1.00 | 21.8 |
| Approach | | 1848 | 1.5 | 0.946 | 45.1 | LOS D | 31.6 | 224.1 | 0.90 | 0.86 | 28.2 |
| West: Moss St (W) | | | | | | | | | | | |
| 10 | L | 342 | 0.0 | 0.671 | 24.6 | LOS B | 9.2 | 64.3 | 0.79 | 0.81 | 23.1 |
| 11 | T | 163 | 0.0 | 0.785 | 60.2 | LOS E | 18.3 | 128.8 | 1.00 | 0.91 | 9.3 |
| 12 | R | 114 | 1.3 | 0.785 | 67.6 | LOS E | 18.3 | 128.8 | 1.00 | 0.91 | 11.7 |
| Approach | | 619 | 0.2 | 0.785 | 41.9 | LOS C | 18.3 | 128.8 | 0.89 | 0.85 | 15.3 |
| All Vehicles | | 4160 | 1.6 | 0.958 | 55.1 | LOS D | 35.9 | 257.1 | 0.94 | 0.92 | 23.4 |

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

**Movement Performance - Pedestrians**

| Mov ID | Description | Demand Flow ped/h | Average Delay sec | Level of Service | Average Back of Queue Pedestrian ped | Average Back of Queue Distance m | Prop. Queued | Effective Stop Rate per ped |
|---|---|---|---|---|---|---|---|---|
| P1 | Across S approach | 53 | 61.6 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| P3 | Across E approach | 53 | 34.8 | LOS D | 0.1 | 0.1 | 0.72 | 0.72 |
| P5 | Across N approach | 53 | 61.6 | LOS F | 0.2 | 0.2 | 0.96 | 0.96 |
| P7 | Across W approach | 53 | 46.5 | LOS E | 0.2 | 0.2 | 0.83 | 0.83 |
| All Pedestrians | | 212 | 51.1 | LOS E | | | 0.86 | 0.86 |

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

# MOVEMENT SUMMARY

**Site: Culburra-Collector East - Post-Dev AM**

12S1231000 West Culburra Subdivision
Culburra Road - Collector Road-East
Friday AM (0800-0900) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Culburra Road (E) | | | | | | | | | | | |
| 5 | T | 277 | 2.5 | 0.144 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| 6 | R | 108 | 1.0 | 0.101 | 14.6 | LOS B | 0.4 | 2.8 | 0.35 | 0.73 | 61.0 |
| Approach | | 385 | 2.1 | 0.144 | 4.1 | NA | 0.4 | 2.8 | 0.10 | 0.21 | 87.7 |
| North: Collector Road | | | | | | | | | | | |
| 7 | L | 314 | 1.0 | 0.364 | 9.4 | LOS A | 1.8 | 12.5 | 0.43 | 0.70 | 48.4 |
| 9 | R | 11 | 1.0 | 0.364 | 9.4 | LOS A | 1.8 | 12.5 | 0.43 | 0.80 | 48.4 |
| Approach | | 324 | 1.0 | 0.364 | 9.4 | LOS A | 1.8 | 12.5 | 0.43 | 0.70 | 48.4 |
| West: Culburra Road (W) | | | | | | | | | | | |
| 10 | L | 40 | 1.0 | 0.022 | 13.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.77 | 63.6 |
| 11 | T | 213 | 2.5 | 0.111 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 253 | 2.3 | 0.111 | 2.1 | NA | 0.0 | 0.0 | 0.00 | 0.12 | 93.6 |
| All Vehicles | | 962 | 1.8 | 0.364 | 5.4 | NA | 1.8 | 12.5 | 0.19 | 0.35 | 69.4 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: Culburra-Collector East - Post-Dev PM**

12S1231000 West Culburra Subdivision
Culburra Road - Collector Road-East
Friday PM (1600-1700) - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Culburra Road (E) | | | | | | | | | | | |
| 5 | T | 193 | 2.5 | 0.100 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| 6 | R | 314 | 1.0 | 0.316 | 15.7 | LOS B | 1.5 | 10.8 | 0.50 | 0.81 | 59.6 |
| Approach | | 506 | 1.6 | 0.316 | 9.7 | NA | 1.5 | 10.8 | 0.31 | 0.50 | 73.2 |
| North: Collector Road | | | | | | | | | | | |
| 7 | L | 114 | 1.0 | 0.333 | 15.1 | LOS B | 1.5 | 10.6 | 0.60 | 0.86 | 44.1 |
| 9 | R | 40 | 1.0 | 0.333 | 15.1 | LOS B | 1.5 | 10.6 | 0.60 | 0.90 | 44.1 |
| Approach | | 154 | 1.0 | 0.333 | 15.1 | LOS B | 1.5 | 10.6 | 0.60 | 0.87 | 44.1 |
| West: Culburra Road (W) | | | | | | | | | | | |
| 10 | L | 11 | 1.0 | 0.006 | 13.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.77 | 63.6 |
| 11 | T | 365 | 2.5 | 0.190 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 376 | 2.5 | 0.190 | 0.4 | NA | 0.0 | 0.0 | 0.00 | 0.02 | 98.8 |
| All Vehicles | | 1036 | 1.8 | 0.333 | 7.1 | NA | 1.5 | 10.8 | 0.24 | 0.38 | 73.1 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.

# MOVEMENT SUMMARY

**Site: Culburra-Collector East - Post-Dev SAT**

12S1231000 West Culburra Subdivision
Culburra Road - Collector Road-East
Saturday - Equivalent 120th HH
Future - Full Site Development
Giveway / Yield (Two-Way)

**Movement Performance - Vehicles**

| Mov ID | Turn | Demand Flow veh/h | HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | 95% Back of Queue Distance m | Prop. Queued | Effective Stop Rate per veh | Average Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Culburra Road (E) | | | | | | | | | | | |
| 5 | T | 251 | 2.5 | 0.131 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| 6 | R | 201 | 1.0 | 0.186 | 14.6 | LOS B | 0.8 | 5.4 | 0.36 | 0.74 | 61.0 |
| Approach | | 452 | 1.8 | 0.186 | 6.5 | NA | 0.8 | 5.4 | 0.16 | 0.33 | 81.0 |
| North: Collector Road | | | | | | | | | | | |
| 7 | L | 201 | 1.0 | 0.219 | 8.8 | LOS A | 0.9 | 6.3 | 0.38 | 0.68 | 48.9 |
| 9 | R | 1 | 1.0 | 0.219 | 8.8 | LOS A | 0.9 | 6.3 | 0.38 | 0.77 | 48.8 |
| Approach | | 202 | 1.0 | 0.219 | 8.8 | LOS A | 0.9 | 6.3 | 0.38 | 0.68 | 48.9 |
| West: Culburra Road (W) | | | | | | | | | | | |
| 10 | L | 1 | 1.0 | 0.001 | 13.4 | LOS A | 0.0 | 0.0 | 0.00 | 0.77 | 63.6 |
| 11 | T | 240 | 2.5 | 0.125 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 100.0 |
| Approach | | 241 | 2.5 | 0.125 | 0.1 | NA | 0.0 | 0.0 | 0.00 | 0.00 | 99.8 |
| All Vehicles | | 895 | 1.8 | 0.219 | 5.3 | NA | 0.9 | 6.3 | 0.17 | 0.32 | 73.6 |

Level of Service (LOS) Method: Delay (RTA NSW).
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 used.


**Melbourne**

A 87 High Street South
PO Box 684
KEW VIC 3101
P +613 9851 9600
F +613 9851 9610
E melbourne@gta.com.au

**Sydney**

**A** Level 6, 15 Help Street
CHATSWOOD NSW 2067
PO Box 5254
WEST CHATSWOOD NSW 1515
**P** +612 8448 1800
**F** +612 8448 1810
**E** sydney@gta.com.au

**Brisbane**

**A** Level 3, 527 Gregory Terrace
BOWEN HILLS QLD 4006
PO Box 555
FORTITUDE VALLEY QLD 4006
**P** +617 3113 5000
**F** +617 3113 5010
**E** brisbane@gta.com.au

**Canberra**

**A** Unit 4, Level 1, Sparta Building, 55 Woolley Street
PO Box 62
DICKSON ACT 2602
**P** +612 6263 9400
**F** +612 6263 9410
**E** canberra@gta.com.au

**Adelaide**

**A** Suite 4, Level 1, 136 The Parade
PO Box 3421
NORWOOD SA 5067
**P** +618 8334 3600
**F** +618 8334 3610
**E** adelaide@gta.com.au

**Gold Coast**

**A** Level 9, Corporate Centre 2
Box 37
1 Corporate Court
BUNDALL QLD 4217
**P** +617 5510 4800
**F** +617 5510 4814
**E** goldcoast@gta.com.au

**Townsville**

**A** Level 1, 25 Sturt Street
PO Box 1064
TOWNSVILLE QLD 4810
**P** +617 4722 2765
**F** +617 4722 2761
**E** townsville@gta.com.au


**www.gta.com.au**

GTAconsultants